油圧機器総合カタログ

Hydraulic Equipment

油研工業
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YUKEN

Hydraulic Equipment Catalogue

Please note before using this catalogue:

This catalogue was planned and edited in such manner it can be used in the planning of hydraulic system, for product recommendation, and as technical material for those who usually handle oil hydraulic equipment.
The specifications and characteristics listed in the catalogue are typical performance under certain conditions and are not guaranteed to work under all conditions. Please select products based on the assumption that there will be some fluctuations due to errors in each product.

Product description

The principal details described for each model include the following.

- Specifications
- Accessories
- List of seals
- Model Number Designation
- Outer dimensional drawing
- Interchangeability between current and new products
- Instructions
- Performance characteristics
- Others

About a unit

Unit in this catalogue is shown with SI unit only. Pressure in this catalogue is shown at “gauge pressure”.

About graphic symbols

The graphical symbols used to indicate the functions of hydraulic and pneumatic equipment and devices are specified in JIS B 0125-1. JIS B 0125-1 was revised in November 2007, and the graphical symbols of the former JIS are used in this catalogue. A table comparing the graphical symbols in this catalogue with those in JIS B0125-1:2007 is shown at the end of this catalogue for reference.

About the change of the design number

The design numbers are subject to change.
But the last digit of the design number is changed, the installation dimensions and performance characteristics will remain the same.
Please be sure to confirm the design number when ordering.

Safety Precautions

To prevent serious accidents, equipment damage, and other property damage, please observe the following precautions and "Instructions" in this catalogue, as well as all related regulations regarding safety.
Before using the product, be sure you read and understand all the instructions in the Operator's Manual entirely.
In this catalogue, safety precautions are classified into three ranks.

⚠ DANGER	Indicates an imminent danger that is very likely to cause death or severe injury unless the situation is avoided.
⚠ WARNING	Indicates a potential danger that may cause death or severe injury unless the situation is avoided.
⚠ CAUTION	Indicates a potential danger that may cause a minor or moderate injury or that may result in property damage.

1. Precautions for Use

⚠ **CAUTION** To avoid possible injury when handling the products, wear protective safety equipment in accordance with the instructions in the Operator's Manual.

⚠ **CAUTION** Failure to support the weight of the product or lifting the product with improper posture may result in injury to the hands or back. Be sure to follow the instructions in the Operator's Manual.

⚠ **CAUTION** Do not climb on, strike, drop or exert unnecessary force on the product. This may lead to injury or fire due to improper operation, damage, or oil leakage.

⚠ **CAUTION** Oil on the product or floor must be cleaned up thoroughly. Oil could cause you to drop the product or slip on the floor.

2. Precautions for Installation, Removal, and Maintenance

⚠ **WARNING** All installation, removal, seal replacement, piping or wiring should be performed by properly trained personnel.

⚠ **WARNING** Before starting the work for installation, removal, maintenance, piping and wiring, do the following jobs. Failure to do these jobs may cause the equipment to move suddenly or spout the oil from it during the work, which eventually may cause the serious accidents.

- Shut off the power supply to the equipment and make sure that all the electrical motors or engines have stopped.
- Fix the Cylinder rod not move/move down when installing/removing the Cylinder.
- Get the pressure in the pipes and cylinders in the hydraulic system back to zero pressure.

⚠ **WARNING** Before working on any electrical wiring, be sure to shut off the power supply. Failure to do this may cause electrical shock.

⚠ **CAUTION** Keep all installation holes and surfaces clean. Failure to do this may cause insufficient tightening of the bolts that may cause fire due to oil leakage.

⚠ **CAUTION** Before installing the product, be sure that all specified bolts are tightened with the specified torque. Tightening with the outside specifications may cause fire due to improper operation, damage, oil leakage, etc.

3. About Maximum Operating Pressure

⚠ **WARNING** The maximum operating pressure described in this catalogue includes the surge pressure. Using the product at the pressure higher than the maximum operating pressure may cause damage to the product, resulting in a serious accident.

4. Precautions for Operation

⚠ **DANGER** Never operate any device in an environment where there is danger of explosion or fire, unless the device is fully protected. This may lead to major and serious accidents including explosion or fire.

⚠ **WARNING** Always provide protective covers for rotating shafts of pumps, motors, etc. Do not approach near the pumps or motors in operation. There is a fear of injury by such an accident that the hands or clothes are caught by or coiled into the pumps and the motors.

⚠ **WARNING** In event of abnormal operation (unusual sounds, oil leakage, smoke, etc.), immediately stop operation and take appropriate corrective measures. Continued operation may result in damage, fire, injury, or other accidents.

⚠ **WARNING** Completely discharge air from the cylinder at low pressure. Failure to do so may result in unexpected movement of the cylinder, which in turn may cause injury.

⚠ **WARNING** Do not loosen the air vent valve more than the specified lift during the air bleeding operation. Doing so may result in a serious accident due to valve ejecting or oil spurting out.

⚠ **WARNING** [Cylinders with Cushion]
When adjusting the cushion, do not loosen the cushion adjustment valve more than the specified lift. Doing so may cause valve to protrude or oil to spray out, which could result in a serious accident.

⚠ **CAUTION** To adjust the cushion, gradually increase the cylinder speed from a low speed [50 mm/s or less]. Rapidly accelerating the cylinder may produce abnormal surge pressure, resulting in damage to the cylinder or the machinery and consequently leading to a serious accident.

⚠ **CAUTION** Before operating this device for the first time, check that hydraulic and electrical circuits are properly connected and that adjoining surfaces are tightly aligned.

⚠ **CAUTION** Do not use the product out of the specification as described in the catalogue, related data sheets, drawings, etc. Not doing so may cause improper operation, damage or injury.

⚠ **CAUTION** During operation, high temperatures in the hydraulic system or solenoid units may occur. Wear protective gear on hands and body when around these parts.

⚠ **CAUTION** Be sure to operate the product with proper oil, and within established ranges for temperature, viscosity and purity. Use outside of specified limits may cause improper operation or fire due to oil leakage.

5. Maintenance Precautions

⚠ **WARNING** Never convert the products. If any conversions are made, unexpected machine movement may cause injury.

⚠ **CAUTION** Do not disassemble or change the products without prior consent of the manufacturer. Failure to do this will cause the products not to perform the specified performance and characteristics, and moreover will become the causes of the accidents or failures.

⚠ **CAUTION** For transportation/storage of the product, pay attention to environmental conditions, such as ambient temperature and humidity, and take anti-dust/rust measures.

⚠ **CAUTION** The seals may be required to replace if the products is used after long-term storage.

⚠ **CAUTION** Read the manual thoroughly and take due care to replace the seals.

6. Related Regulations

⚠ **CAUTION** To ensure that this product is used in a safe manner, it is essential to observe the above precautions, as well as all related regulations regarding safety.

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50T: 50 Type Single Vane Pumps....B-5

A

PISTON PUMPS

Yuken offers low noise/high efficiency, swash plate type variable displacement piston pumps. These pumps have been developed by Yuken's leading hydraulic engineers and provide a diverse lineup to meet a wide range of application requirements.

ARL1 Series Piston Pumps
.....page A-3

- Compact and Lightweight
- Low Noise
- Covers Low Flow Rate Range
  Displacement from 6.2 to 16.3 cm³/rev

AR Series Variable Displacement Piston Pumps
.....page A-12

- Compact
- Low Noise
- High Reliability

A Series Variable Displacement Piston Pumps
.....page A-22

- A variety of control methods are supported
  Eleven types of unique control methods are available. These control types range from standard pressure compensator control to proportional solenoid pressure/flow control which integrate amplifiers and sensors.
- Available in a wide range of displacements
  Models are available in displacements ranging of 10 to 145 cm³/rev.

A3H Series High Pressure Variable Displacement Piston Pumps
...page A-111

Variable displacement piston pumps offer high pressure, high performance in a simple and compact package.

- High Pressure : 35MPa
- High Volumetric Efficiency
  These pumps maintain a high volumetric efficiency, even at a pressure of 35 MPa.
- Available in a wide range of displacements
  Seven models are available in displacements ranging of 16.3 to 180.7 cm³/rev

A3HG Series High Pressure Variable Displacement Piston Pumps
.....page A-148

- Conforming to International Standards
- High Reliability
- High Pressure : 35 MPa

A3HM Series High Pressure Variable Displacement Piston Pumps
.....page A-202

- Compact and Lightweight
- High Pressure : 35 MPa
- Available in a wide range of displacements

A7H Series High Pressure Variable Displacement Piston Pumps
.....page A-204

- High Pressure : Rated 35 MPa, Max. 40MPa
- Large Volume Displacement : 180/270 cm³/rev
- Compatible With Combined Pumps

Motor-Pumps & Electric Motors
.....page A-206

- Pal Pumps .....page A-207
- M Series Electric Motors .....page A-209

ASR Series AC Servo Motor Driven Pumps
.....page A-211

ASE Series AC Servo Motor Driven Pumps ...pageA-231
ASU Series AC Servo Motor Driven Pumps ...pageA-256

- Energy Saving
- Low Noise
- High Performance

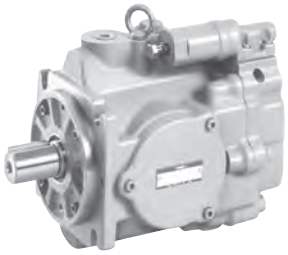
⚠ Caution

In the case of Water Glycol fluids, a slight oil leak occurs from the shaft seal part.
(Criterion: 500ml / 6 months of oil leakages.) Install a tray appropriate capacity on the pump-base, please.

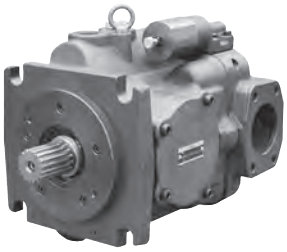
ARL1 Series Piston Pumps

AR Series
Variable Displacement Piston Pumps

A Series
Variable Displacement Piston Pumps



A3H Series High Pressure
Variable Displacement Piston Pumps



A3HG Series High Pressure
Variable Displacement Piston Pumps

A3HM Series High Pressure
Variable Displacement Piston Pumps

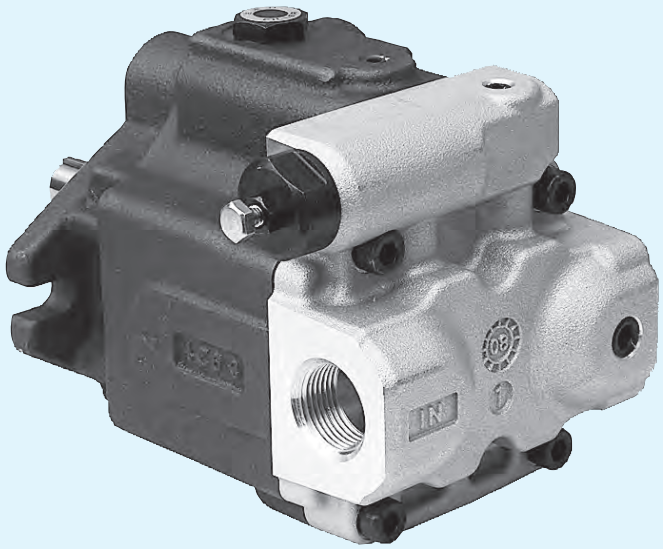
A7H Series High Pressure
Variable Displacement Piston Pumps

ASR Series
AC Servo Motor Driven Pumps

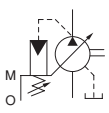
ASE Series
AC Servo Motor Driven Pumps

ASU Series
AC Servo Motor Driven Pumps

ARL1 Series Piston Pumps



"ARL1" Series Piston Pumps

Pump Type	Graphic Symbol	Geometric Displacement cm³/rev (1 2 5 10 20 50 100 150)	Maximum Operating Pressure MPa	Page
ARL1 Series Piston Pump		ARL1-6 ARL1-8 ARL1-12 ARL1-16	7	A-6

Hydraulic Fluids

Hydraulic Fluids

Use petroleum base oils such as anti-wear type hydraulic oils equivalent to ISO VG-32 or 46. The recommended viscosity range is from 20 to 400 mm^2/s and temperature range is from 0 to 60 °C, both of which have to be satisfied for the use of the above hydraulic oils.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the operating oil which can otherwise lead to breakdowns and shorten the life of the unit.
Please maintain the degree of contamination within NAS Grade 10.
The suction port must be equipped with at least a 100 µm (150 mesh) reservoir type filter and the return line must have a line type filter of under 10 µm.

Instructions

Mounting

When installing the pump the filling port should be positioned upwards.

Alignment of Shaft

Employ a flexible coupling whenever possible, and avoid any stress from bending or thrust.
Maximum permissible misalignment is less than 0.1 mm TIR and maximum permissible misangular is less than 0.2°.

Suction Pressure

Permissible suction pressure at inlet port of the pump is between -16.7 and +50 kPa.
For piping to the suction port, use the pipes of the same diameter as that of the specified pipe flange to be used.
Make sure that the height of the pump suction port is within one meter from the oil level in the reservoir.

Hints on Piping

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise.
Whenever there is fear of excessive load, please use rubber hoses.

Suction Piping

In case the pump is installed above the oil level, the suction piping and suction line filter should be located lower than the pump position to prevent air in the suction line.

Drain Piping

Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a normal pressure of less than 0.1 MPa and surge pressure of less than 0.5 MPa.
Length of piping should be less than 1 m, and the pipe end should be submerged in oil.
In case ARL1 pump, a screw-in torque of fitting is 55 to 75 Nm. Do not apply bending and thrust torque to the fitting.

[Recommended Drain Piping Size]

Model	Fitting Size	Inside Dia. of Pipe
ARL1	3/8	10 mm

Bleeding Air

It may be necessary to bleed air from pump case and outlet line to remove causes of vibration. An air bleed valve (Model Number ST1004-*-10*, Page A-259) is recommended for this purpose.

Starting

Before first starting, fill pump case with clean operating oil via the filling port.
In order to avoid air blockage when first starting, adjust the control valves so that the discharged oil from the pump is returned direct to the reservoir or the actuator moves in a free load.

[Volume of Pre-fill Oil Required]

Model	Volume cm^3
ARL1	285

Setting Discharge Pressure and Delivery

At the time of shipment, the unit has been preset to maximum delivery and minimum discharge pressure.
Adjust the preset delivery and pressure to meet your system requirements.

Adjustment of Discharge Pressure

Turning the adjustment screw clockwise, increases pressure.

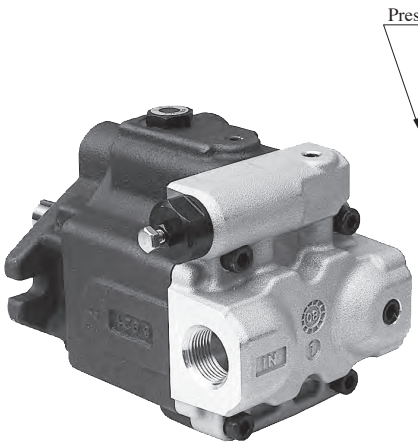
[Volume adjusted by each full turn of the pressure adjustment screw]

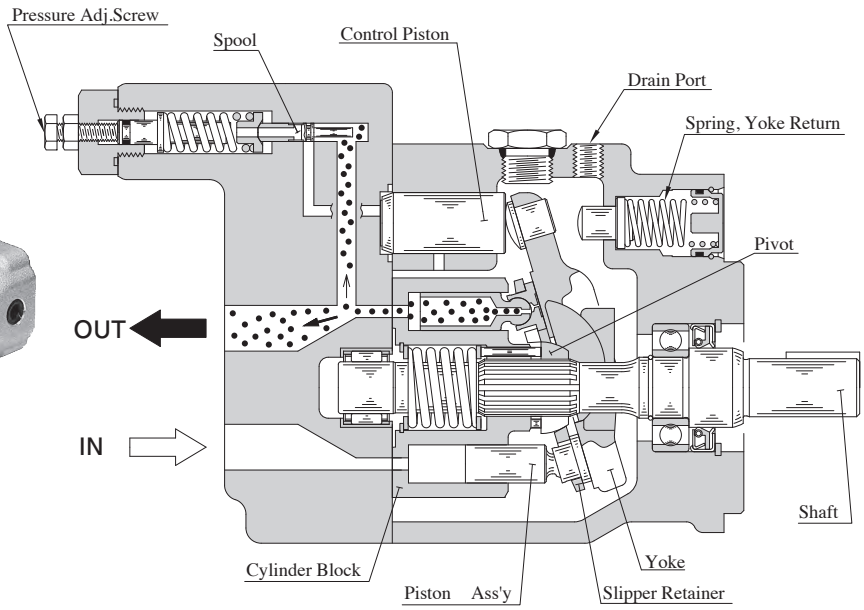
Model Numbers	Adjustment Volume MPa
ARL1	1.5

Displacement Adjustment Function

This pump does not have a displacement adjustment function.
Install a flow control valve, if necessary.

ARL1 Series Piston Pumps





Features

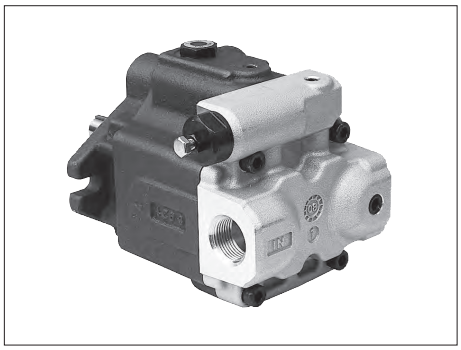
Low noise and high reliability based on the long established experience

The noise at full cut-off with a pressure of 7 MPa, pump rotational speed of 1500 r/min, and measured distance of 1 m is as low as 55 dB(A) (representative value of ARL1-16). This series also has a high reliability based on Yuken's long-time experience of manufacturing piston pumps.

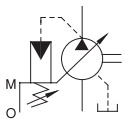
Lightweight and compact

Compared to the AR Series Variable Displacement Piston Pumps, this series is reduced by 40 % both in mass and volume, realizing a greatly lightweight and compact design.

ARL1 Series Piston Pumps, Pressure Compensator Type



Graphic Symbol



Specifications

Model Numbers	Geometric Displacement cm^3/rev	Minimum Adj. Pressure MPa	Max. Operating Pressure MPa	Shaft Speed Range r/min		Approx. Mass kg
				Max.	Min.	
ARL1-6-＊R01＊-10	6.2	1.2	7	1800	600	6.8 (Flange Mtg.) 9.0 (Foot Mtg.)
ARL1-8-＊R01＊-10	8.5					
ARL1-12-＊R01＊-10	12.3					
ARL1-16-＊R01＊-10	16.3					

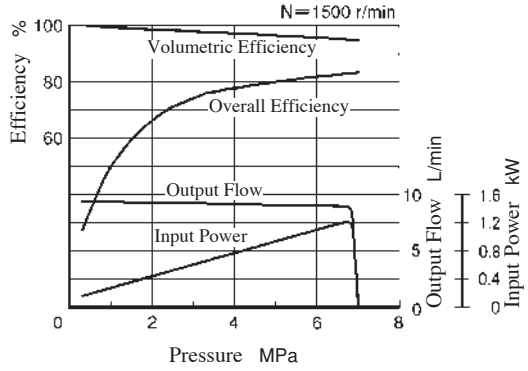
Model Number Designation

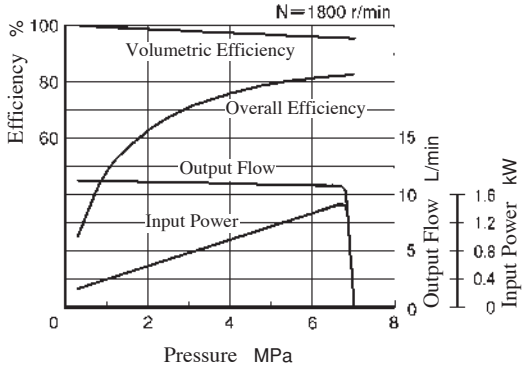
ARL1	-6	-F	R	01	S	-10
Series Number	Geometric Displacement	Mounting	Direction of Rotation	Control Type	Port Position	Design Number
ARL1	6：6.2 cm^3/rev 8：8.5 cm^3/rev 12：12.3 cm^3/rev 16：16.3 cm^3/rev	F：Flange Mtg. L：Foot Mtg.★	(Viewed from Shaft End) R：Clockwise	01：Pressure Compensator Type	S：Side Port (Standard) A：Suction Port Position: Down Wards	10

★ Foot mounting is available only for side ported type.

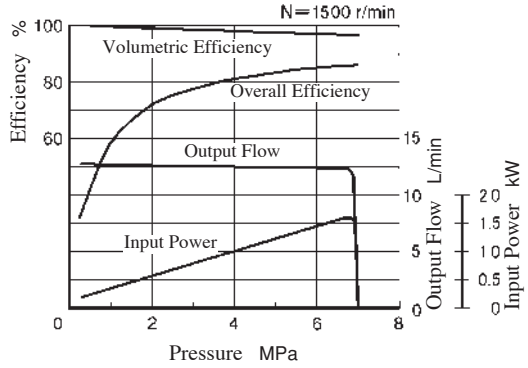
Typical Performance Characteristics of **ARL1** at Viscosity 32 mm²/s [ISO VG 32 Oils, 40°C]

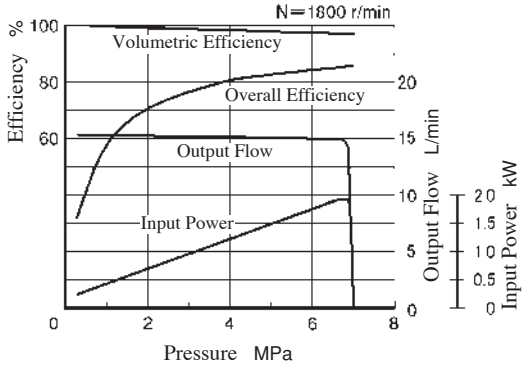
ARL1-6



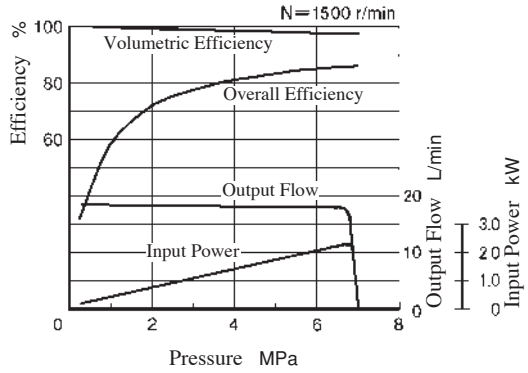


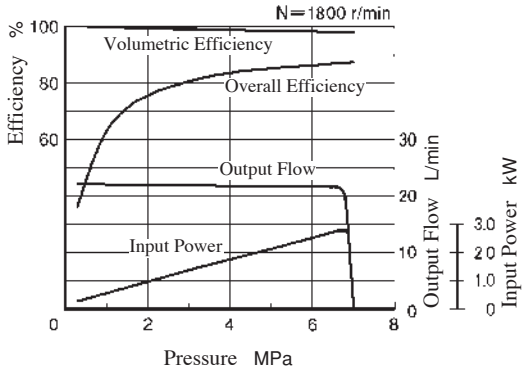
ARL1-8



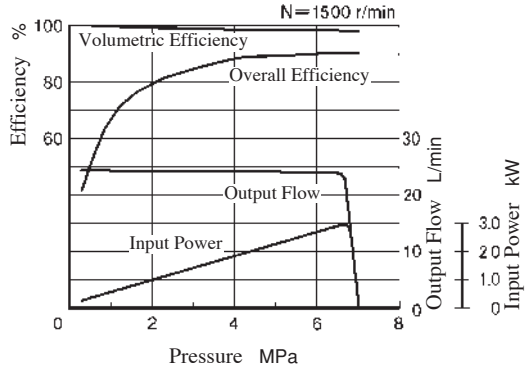


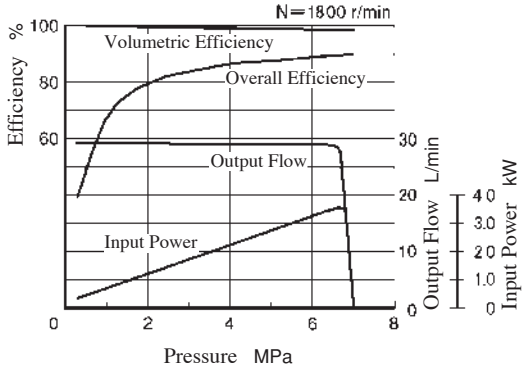
ARL1-12





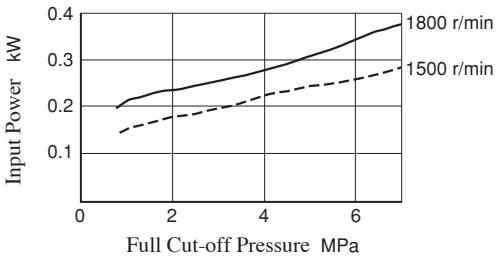
ARL1-16



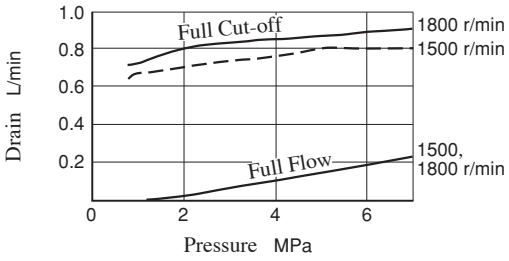


Typical Performance Characteristics of **ARL1** at Viscosity 32 mm²/s [ISO VG 32 Oils, 40°C]

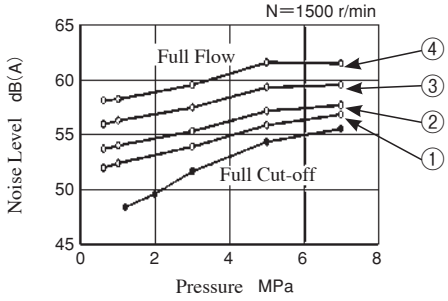
Full Cut-off Power

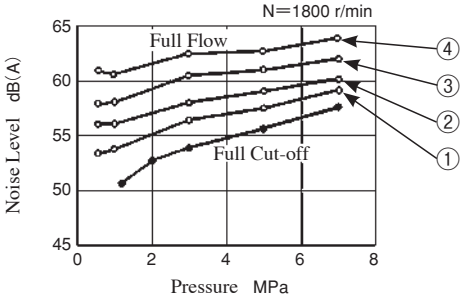


Drain



Noise Level [One meter horizontally away from pump head cover]



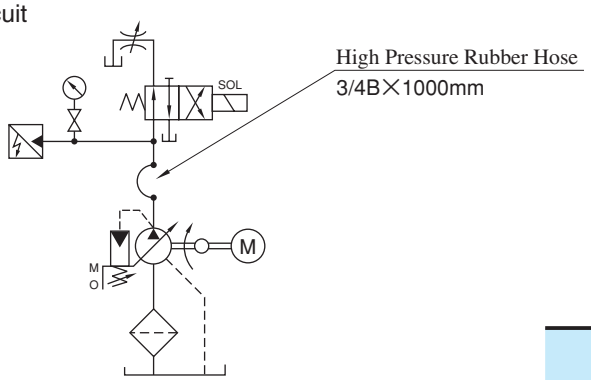


No.	Displacement
①	q = 6.2 cm³/rev
②	q = 8.5 cm³/rev
③	q = 12.3 cm³/rev
④	q = 16.3 cm³/rev

Response Characteristics Change in Accordance with Circuits and Operating Conditions

Test Circuit and Conditions

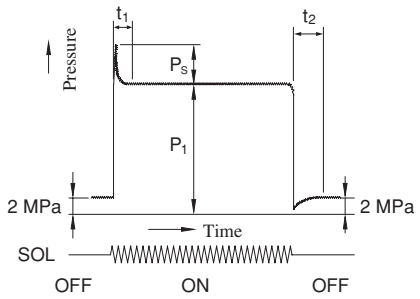
● Circuit



● Conditions

Shaft Speed：1500 r/min
Hydraulic Fluid：ISO VG32 Oil
Oil Temperature：40 °C (Viscosity 32 mm²/s)

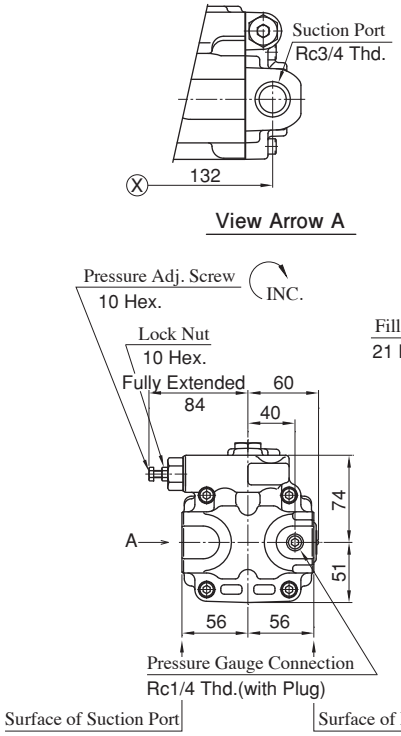
Result of Measurement



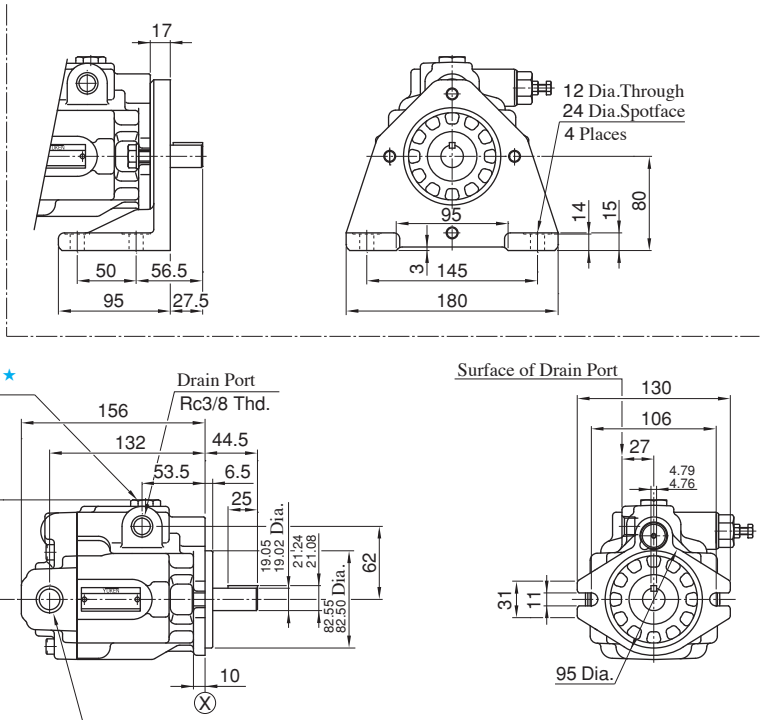
Model	Full Cut-off Pressure P_1 MPa	Response Time ms		Overshoot Pressure Ps MPa
		t_1	t_2	
ARL1	7	180	125	2.5

Side Port Type

ARL1-＊-FR01S



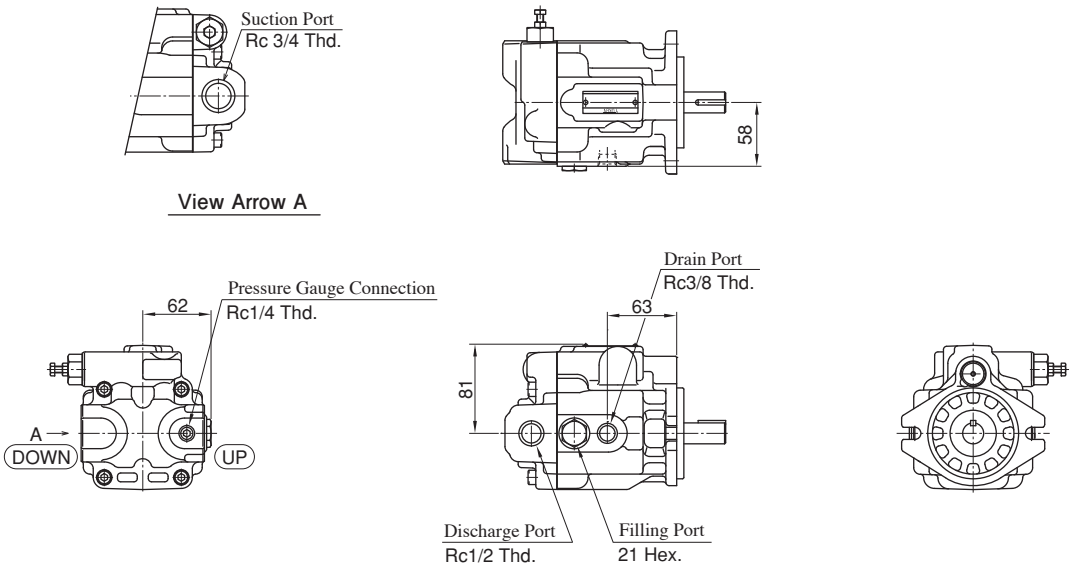
ARL1-＊-LR01S



★ Install the pump so that the “Filling Port” is at the top.

Suction Port Position : Down Wards

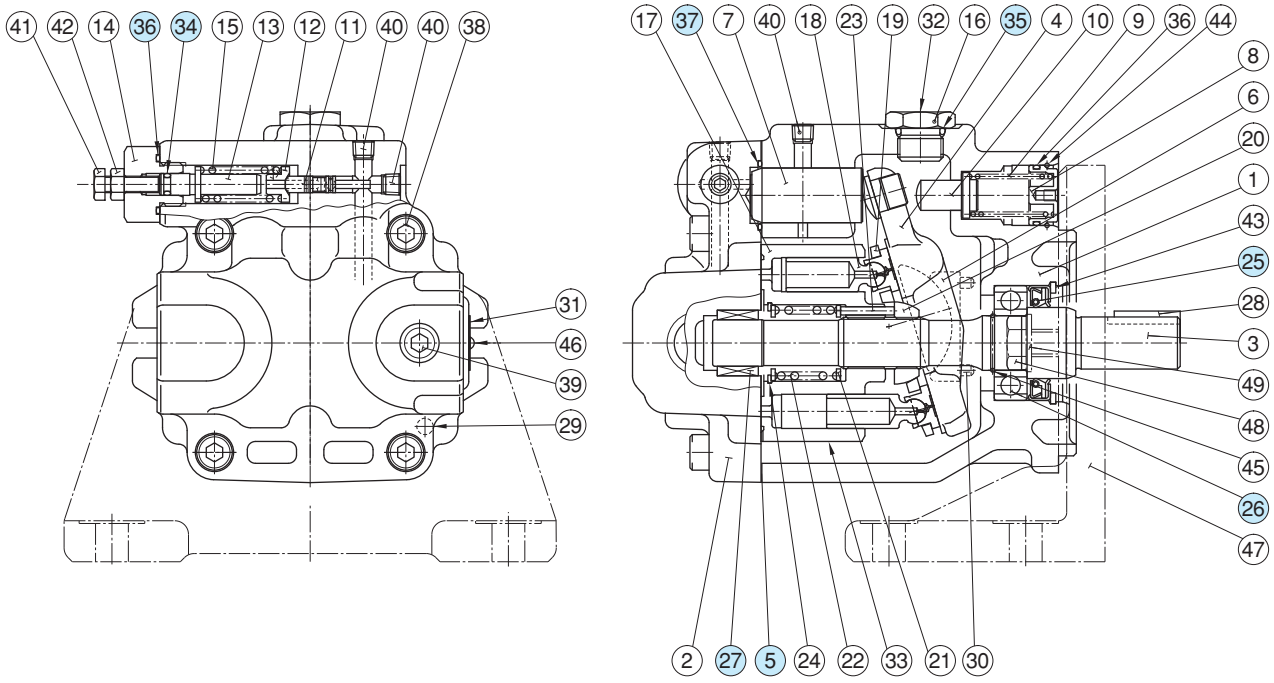
ARL1-＊-FR01A



● For other dimensions, refer to “Side Port Type”.

Spare Parts List

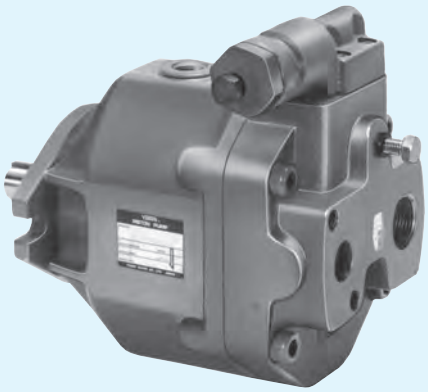
ARL1-6/8/12/16-＊R01

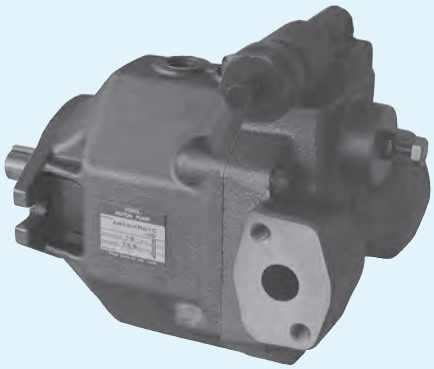


List of Seals and Bearings

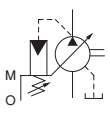
Item	Name of Parts	Part Numbers	Qty.
5	Gasket	1202-PK314357-5	1
25	Oil Seal	TK280035-7	1
26	Bearing	1202-PK413170-2	1
27	Bearing	1202-PK413171-0	1
34	O-Ring	OR NBR-70-1 P5-N	1
35	O-Ring	OR NBR-90 P14-N	1
36	O-Ring	AS 568-018 (NBR-70-1)	2
37	O-Ring	AS 568-020 (NBR-90)	1

AR Series
Variable Displacement Piston Pumps





"AR" Series Variable Displacement Piston Pumps

Pump Type	Graphic Symbol	Geometric Displacement cm^3/rev (1 2 5 10 20 50 100 150)	Maximum Operating Pressure MPa	Page
AR Series Variable Displacement Piston Pumps		AR16 / AR22	16	A-15

Hydraulic Fluids

Hydraulic Fluids

Use petroleum base oils such as anti-wear type hydraulic oils equivalent to ISO VG-32 or 46. The recommended viscosity range is from 20 to 400 mm^2/s and temperature range is from 0 to 60 °C, both of which have to be satisfied for the use of the above hydraulic oils.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the operating oil which can otherwise lead to breakdowns and shorten the life of the unit.
Please maintain the degree of contamination within NAS Grade 10.
The suction port must be equipped with at least a 100 µm (150 mesh) reservoir type filter and the return line must have a line type filter of under 10 µm.

Instructions

Mounting

When installing the pump the filling port should be positioned upwards.

Alignment of Shaft

Employ a flexible coupling whenever possible, and avoid any stress from bending or thrust.
Maximum permissible misalignment is less than 0.1 mm TIR and maximum permissible misangular is less than 0.2°.

Suction Pressure

Permissible suction pressure at inlet port of the pump is between -16.7 and +50 kPa .
For piping to the suction port, use the pipes of the same diameter as that of the specified pipe flange to be used.
Make sure that the height of the pump suction port is within one meter from the oil level in the reservoir.

Hints on Piping

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise.
Whenever there is fear of excessive load, please use rubber hoses.

Suction Piping

In case the pump is installed above the oil level, the suction piping and suction line filter should be located lower than the pump position to prevent air in the suction line.

Drain Piping

Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a normal pressure of less than 0.1 MPa and surge pressure of less than 0.5 MPa.
Length of piping should be less than 1 m, and the pipe end should be submerged in oil.
In case AR16 and AR22 pump, a screw-in torque of fitting is 40 to 50 Nm. Do not apply bending and thrust torque to the fitting.

[Recommended Drain Piping Size]

Model	Fitting Size	Inside Dia. of Pipe
AR16, AR22	3/8 (Inside Dia. 8.5 mm or more)	10 mm

Bleeding Air

It may be necessary to bleed air from pump case and outlet line to remove causes of vibration. An air bleed valve (Model Number ST1004-*-10*, Page A-259) is recommended for this purpose.

Starting

Before first starting, fill pump case with clean operating oil via the filling port.
In order to avoid air blockage when first starting, adjust the control valves so that the discharged oil from the pump is returned direct to the reservoir or the actuator moves in a free load.

[Volume of Pre-fill Oil Required]

Model	Volume cm^3
AR16 AR22	430

Setting Discharge Pressure and Delivery

At the time of shipment, the unit has been preset to maximum delivery and minimum discharge pressure.
Adjust the preset delivery and pressure to meet your system requirements.

Adjustment of Discharge Pressure

Turning the adjustment screw clockwise, increases pressure.

[Volume adjusted by each full turn of the pressure adjustment screw]

Model Numbers	Adjustment Volume MPa
AR16/AR22-FR01B	2.9
AR16/AR22-FR01C	5.4

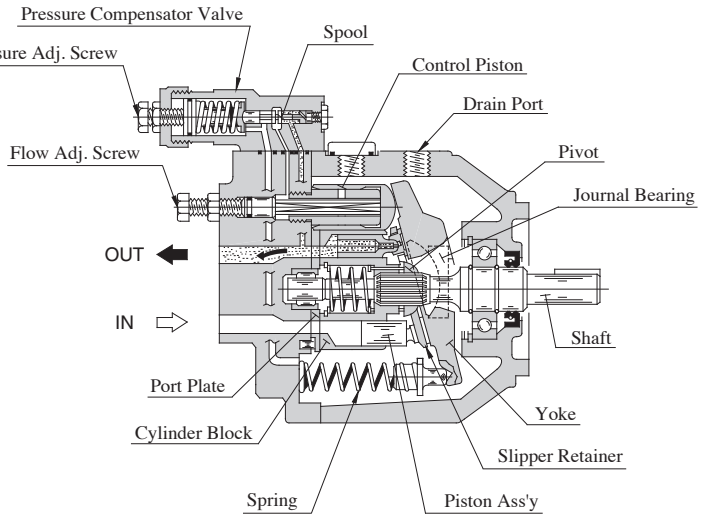
Adjustment of Delivery

Turning the delivery adjustment screw clockwise, decreases delivery.

[The minimum adjustable flow and adjustable volume of each full turn of the delivery adjustment screw]

Model Numbers	Adjustable volume with each full turn of the adjustment screw cm^3/rev	Minimum Adjustable Flow cm^3/rev
AR16	1.5	6
AR22	2.1	8.5

AR Series Variable Displacement Piston Pumps



Features

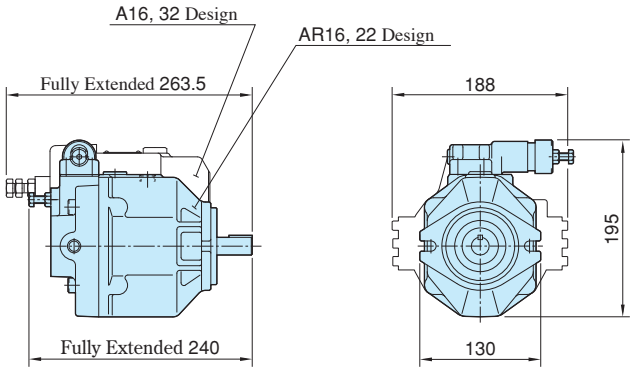
Smaller in Size and Lighter in Mass

As indicated in the dimensional comparison presented below, the AR16 is smaller than the A16 (32 design). Also, the mass of AR16 is substantially lighter than the A16.

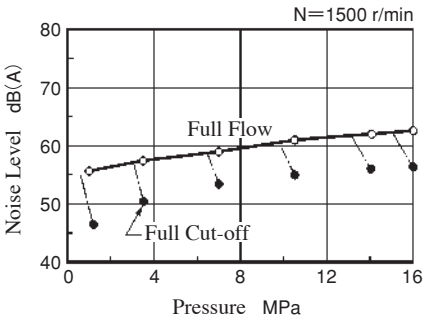
Low Noise

The noise level of AR16 has been reduced at full flow and full cut-off compared with that of the excellent A16 quiet pump.

[Comparison of “AR16” with “A16”]



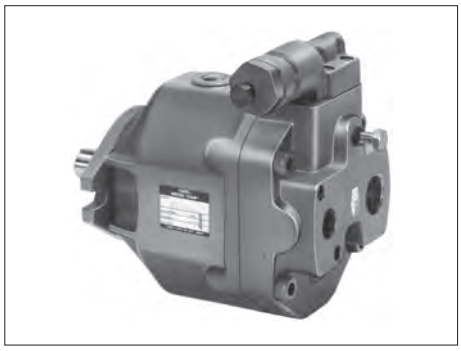
“AR16” Type Noise Level Characteristics (Example)



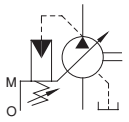
High Reliability

Since it uses the internal parts of "A" series piston pumps that it is belongs to abundant experience in sales performance with high reliability.

AR Series Variable Displacement Piston Pumps, Pressure Compensator Type



Graphic Symbol



Specifications

Model Numbers	Geometric Displacement cm^3/rev	Min. Adj. Flow cm^3/rev	Operating Pressure MPa		Shaft Speed Range r/min		Approx. Mass kg
			Rated	Intermittent★	Max.	Min.	
AR16-FR01＊＊-22	15.8	6.0	16		1800	600	11.8
AR22-FR01＊＊-22	22.2	8.5					12.5

★ When setting the pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.

Model Number Designation

AR16	-F	R	01	B	S	-22
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range	Port Position	Design Number
AR16 ($15.8 cm^3/rev$)	F : Flange Mtg.	[Viewed from Shaft End] R : Clockwise (Normal)	01 : Pressure Compensator Type	B : 1.2～7 C : 2.0～16	None : Axial Port S : Side Port	22
AR22 ($22.2 cm^3/rev$)						22

Pipe Flange Kits

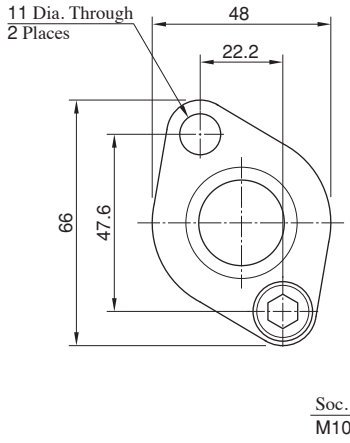
Pipe flange kits are available. When ordering, specify the kit number from table blow.

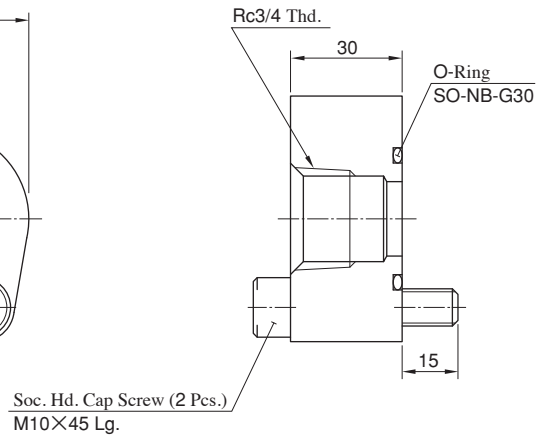
Pump Model Numbers	Name of Port	Pipe Flange Kit Numbers	
		Threaded Connection	Socket Welding
AR16-FR01 AR22-FR01	Suction	F5-06-A-1021	F5-06-B-1021
	Discharge	— ★	— ★

★ Discharge port is available only for the threaded connections.

Pipe Flange Kit for Suction Port : F5-06- A/B -1021

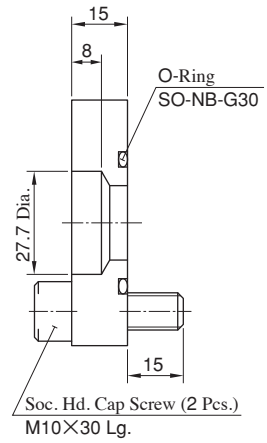
F5-06-A-1021





Approx. Mass···0.5 kg

F5-06-B-1021



Approx. Mass···0.3 kg

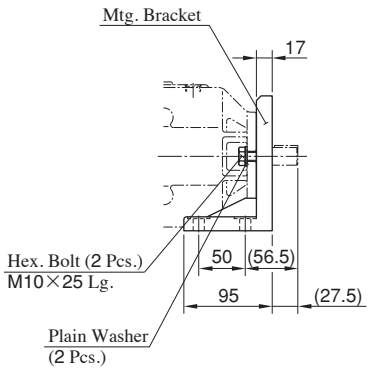
Mounting Bracket Kits

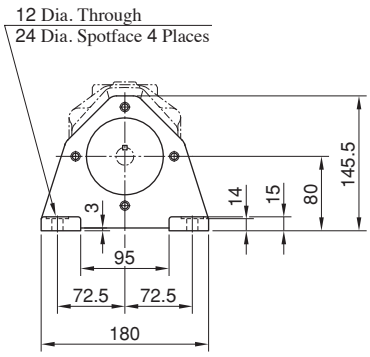
Mounting bracket available on separate order.

Pump Model Numbers	Mtg. Bracket Kit Numbers	Approx. Mass kg
AR16-FR01 AR22-FR01	LP-1A-10	2.2

Note : The mounting bracket kit consists of a mounting bracket, two hex. bolts and two plain washers.

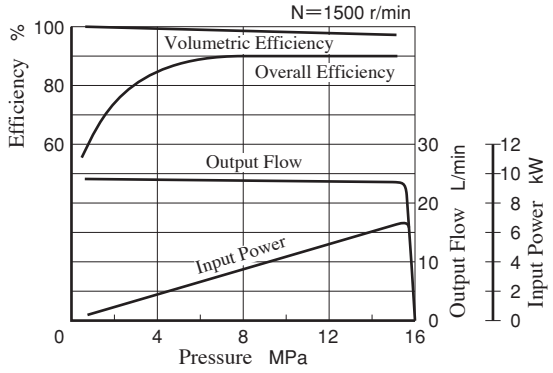
Mtg. Bracket Kit : LP-1A-10

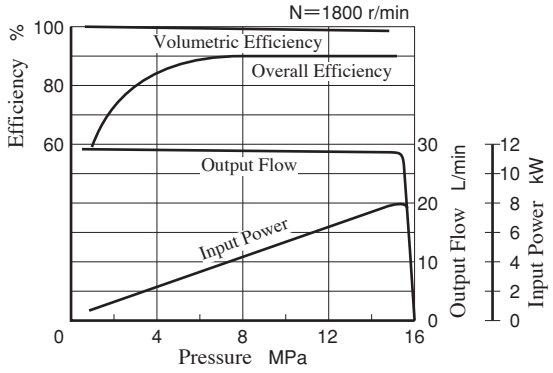




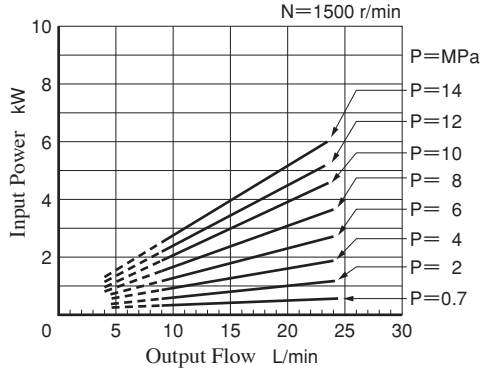
Typical Pump Characteristics of Type **AR16** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

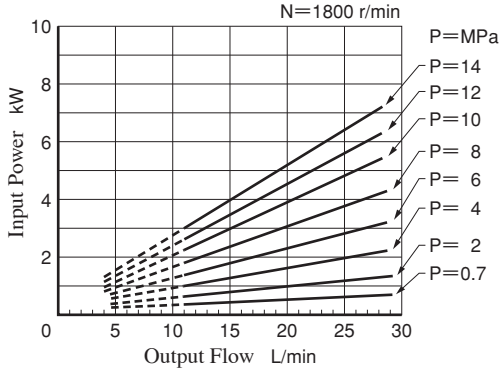
Performance Characteristic Curve





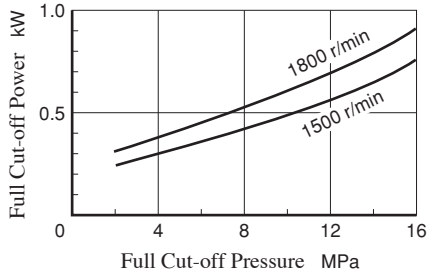
Input Power



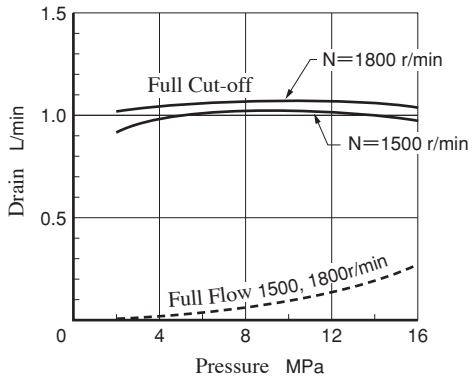


Note) The dotted line in the graph indicates less than minimum adjustable flow.

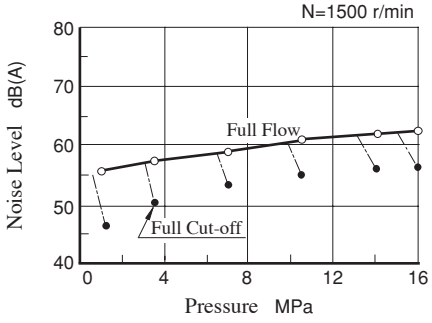
Full Cut-off Power

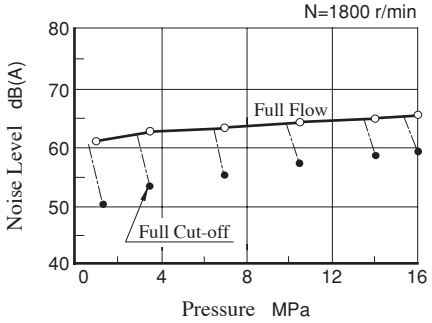


Drain



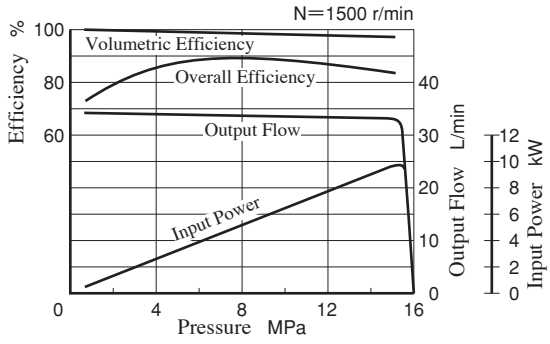
Noise Level [One meter horizontally away from pump head cover]

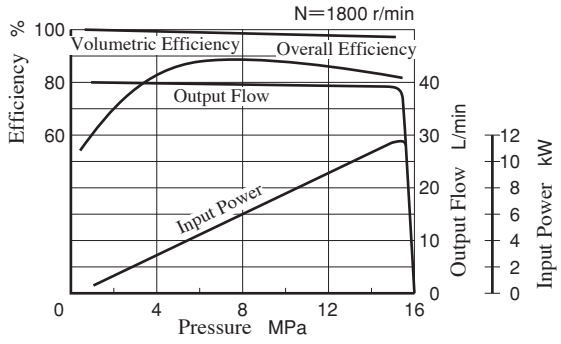




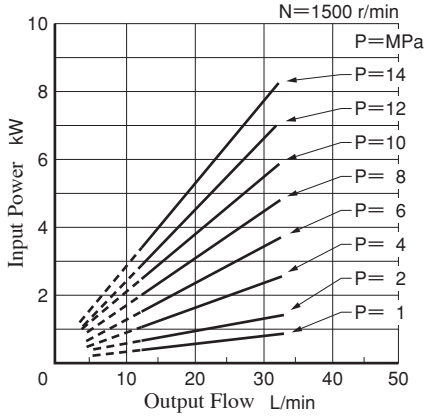
Typical Pump Characteristics of Type **AR22** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

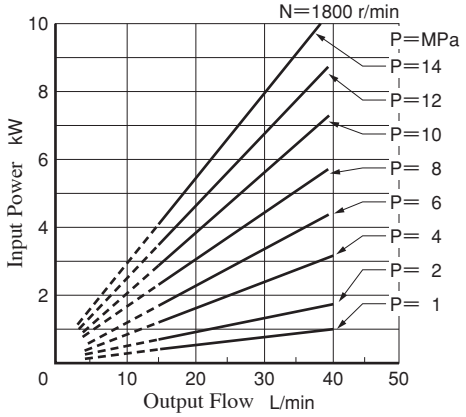
Performance Characteristic Curve





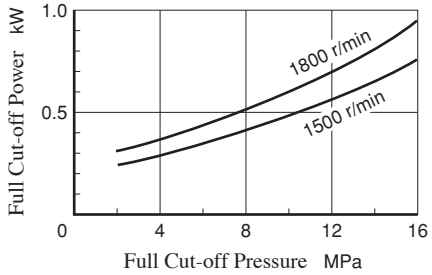
Input Power



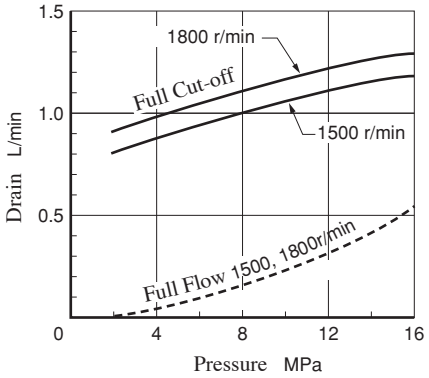


Note) The dotted line in the graph indicates less than minimum adjustable flow.

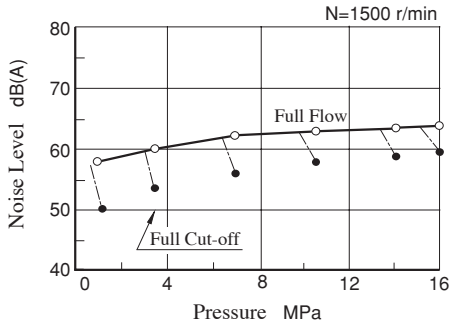
Full Cut-off Power

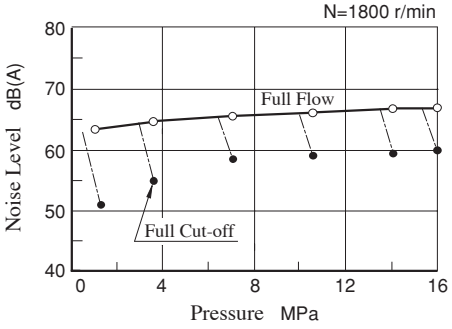


Drain



Noise Level [One meter horizontally away from pump head cover]

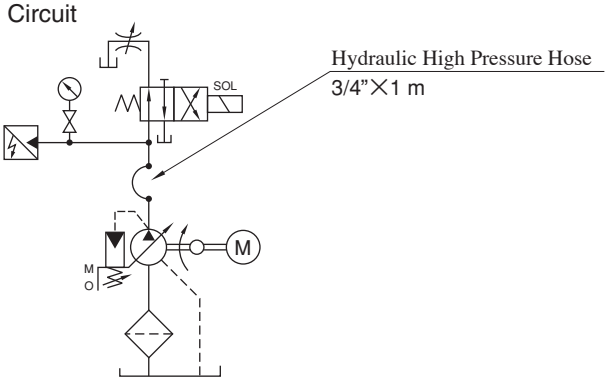




Response Characteristics Change in Accordance with Circuits and Operating Conditions.

Test Circuit Conditions

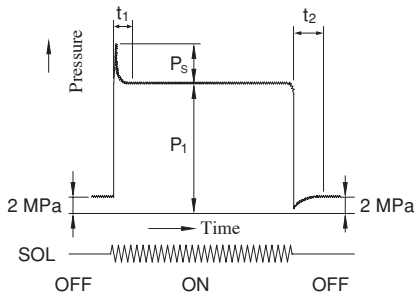
● Circuit



● Conditions

Shaft Speed : 1500 r/min
Hydraulic Fluid : ISO VG32 Oil
Oil Temperature : 40 °C
Viscosity : 32 mm²/s

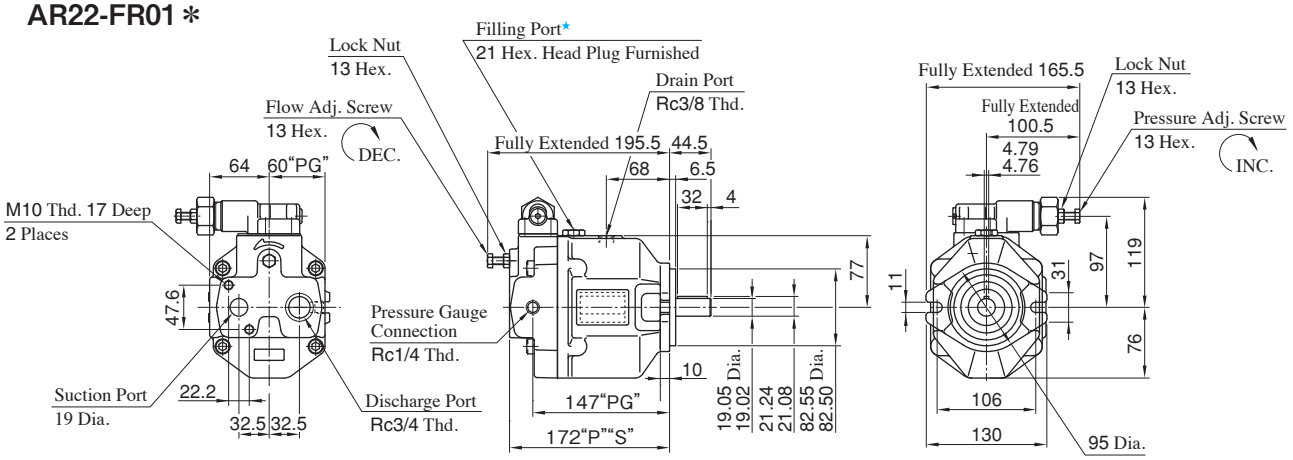
Result of Measurement



Model	Full Cut-off Pressure P_1 MPa	Response Time ms		Overshoot Pressure Ps MPa
		t_1	t_2	
AR16	16	120	90	3.6
AR22		90	100	5.2

Axial Port Type

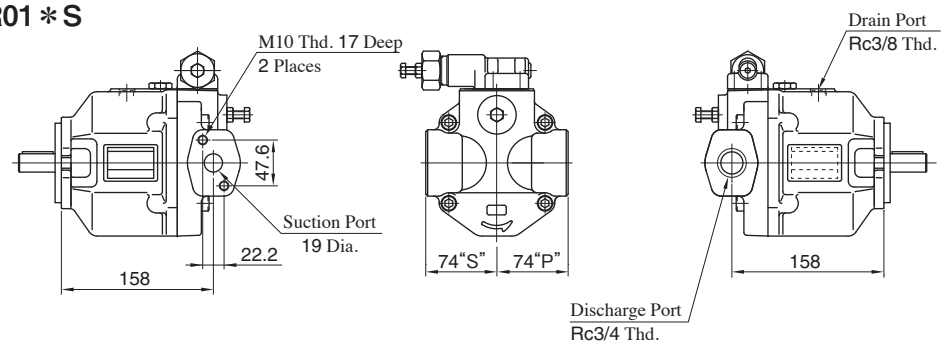
AR16-FR01＊
AR22-FR01＊



★ Install the pump so that the "Filling Port" is at the top.

Side Port Type

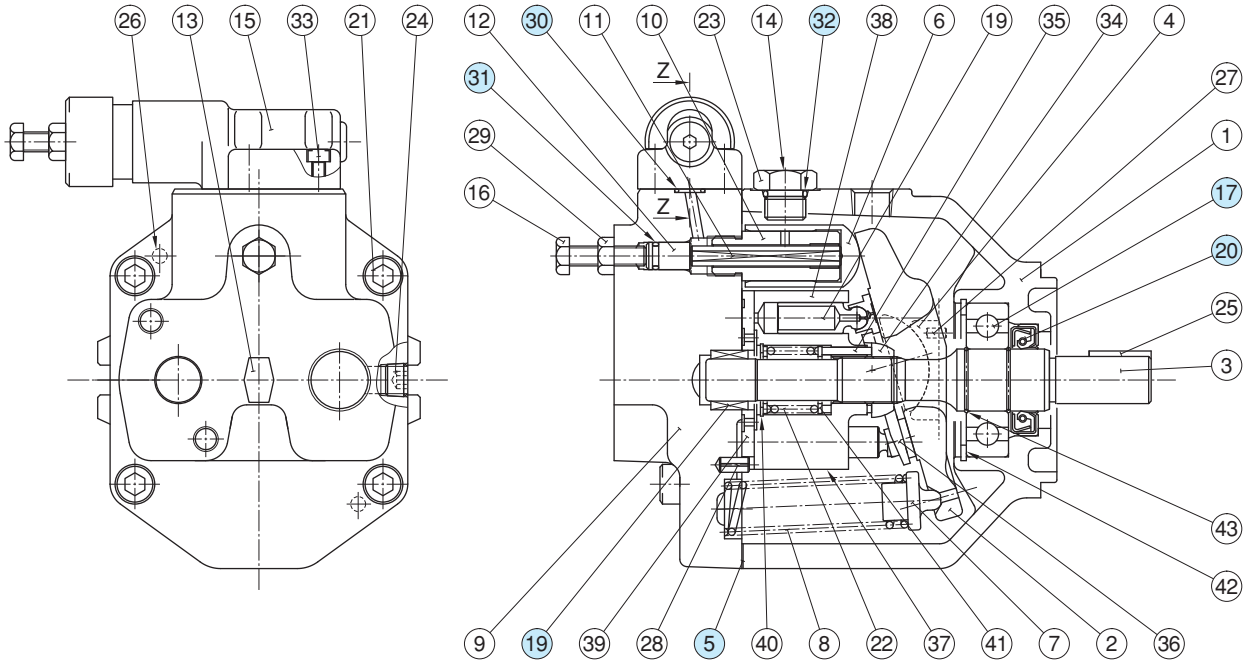
AR16-FR01＊S
AR22-FR01＊S

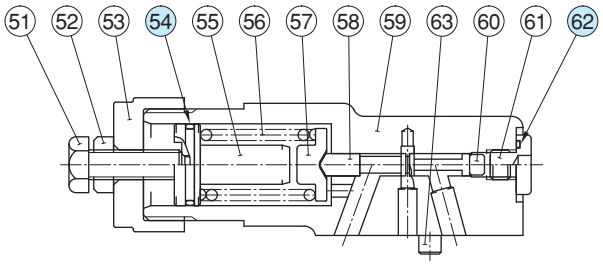


● For other dimensions, refer to "Axial port Type".

Spare Parts List

AR16-FR01
AR22-FR01



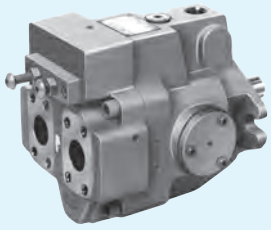


Section Z-Z

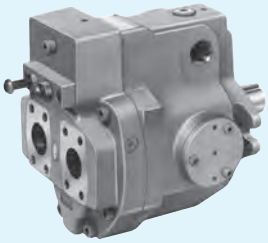
List of Seals and Bearings

Item	Name of Part	Part Numbers		Qty.
		AR16-FR01	AR22-FR01	
5	Gasket	1302-PK314545-5		1
17	Bearing	6305		1
19	Bearing	HMK 1715 V2	Z30-1303-PK410300-8	1
20	Oil Seal	TCN 254511		1
30	O-Ring	OR NBR-90 P9-N		3
31	O-Ring	OR NBR-70-1 P8-N		1
32	O-Ring	OR NBR-90 P14-N		1
54	O-Ring	AS 568-018 (NBR-70-1)		1
62	O-Ring	OR NBR-90 P10-N		1

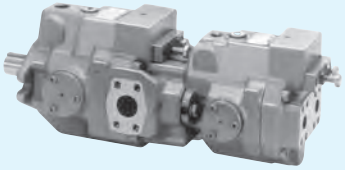
A Series
Variable Displacement Piston Pumps


A37

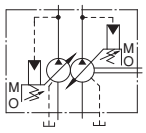
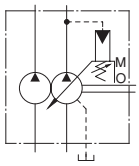
A16


A56

A10


A1637

"A" Series Variable Displacement Piston Pumps

Pump Type	Graphic Symbol	Geometric Displacement cm³/rev (1 2 5 10 20 50 100 200 300)	Maximum Operating Pressure MPa	Page
Single Pumps ★1		A10	21	A-25
		A16		
		A22	16	
		A37	21	
		A45	16	
		A56	21	
		A70	28	
		A90		
		A100	21	
		A145	28	
Double Pumps		Outboard Pump: A16 A37 A56 / Inboard Pump: A16 A37 A56 A70 A90 A145	28 ★2	A-107
Variable/Fixed Double Pumps		Outboard Pump: PV2R1 PV2R2 / Inboard Pump: A16 A37 A56 A70 A90 A145	28 ★2	A-109

★1 Various control types are available such as pressure compensator type. Refer to page A-26 and A-27.
★2 The maximum operating pressure for each double pump depends on its combination of pumps. Contact us for details.

Hydraulic Fluids

Hydraulic Fluids

Use petroleum based oils such as anti-wear type hydraulic oils equivalent to ISO VG-32 or 46. The recommended viscosity range is from 20 to 400 mm^2/s and temperature range is from 0 to 60°C, both of which have to be satisfied for the use of the above hydraulic oils.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the operating oil which can otherwise lead to breakdowns and shorten the life of the unit.
Please maintain the degree of contamination within NAS Grade 10.
The suction port must be equipped with at least a 100 µm (150 mesh) reservoir type filter and the return line must have a line type filter of under 10 µm.

Instructions

Mounting

When installing the pump the filling port should be positioned upwards.

Alignment of Shaft

Employ a flexible coupling whenever possible, and avoid any stress from bending or thrust.
Maximum permissible misalignment is less than 0.1 mm TIR and maximum permissible misangular is less than 0.2°.

Suction Pressure

Permissible suction pressure at inlet port of the pump is between -16.7 and +50 kPa.
For piping to the suction port, use the pipes of the same diameter as that of the specified pipe flange to be used.
Make sure that the height of the pump suction port is within one meter from the oil level in the reservoir.

Hints on Piping

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise.
Whenever there is fear of excessive load, please use rubber hoses.

Suction Piping

In case the pump is installed above the oil level, the suction piping and suction line filter should be located lower than the pump position to prevent air in the suction line.

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise.
Whenever there is fear of excessive load, please use rubber hoses.

Drain Piping

Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a normal pressure of less than 0.1 MPa and surge pressure of less than 0.5 MPa.
Length of piping should be less than 1 m, and the pipe end should be submerged in oil.

[Recommended Drain Piping Size]

Model	Fitting Size	Inside Dia. of Pipe
A10, A16, A22	3/8 [Inside Dia. 8.5 mm or more]	10 mm or more
A37, A45	1/2 [Inside Dia. 12 mm or more]	12 mm or more
A56, A70, A90, A100, A145	3/4 [Inside Dia. 16 mm or more]	19 mm or more

Bleeding Air

It may be necessary to bleed air from pump case and outlet line to remove causes of vibration. An air bleed valve (Model Number ST1004-∗-10∗, Page A-259) is recommended for this purpose.

Starting

Before first staring, fill pump case with clean operating oil via the filling port.
In order to avoid air blockage when first starting, adjust the control valves so that the discharged oil from the pump is returned direct to the reservoir or the actuator moves in a free load.

[Volume of Pre-fill Oil Required]

Model	Volume cm^3
A10	370
A16/A22	600
A37/A45/A56	1200
A70	2100
A90/A100	2500
A145	3300

Setting Discharge Pressure and Delivery

At the time of shipment, the unit has been preset to maximum delivery and minimum discharge pressure.
Adjust the preset delivery and pressure to meet your system requirements.

Adjustment of Discharge Pressure

Turning the adjustment screw clockwise, increases pressure.

[Volume adjusted by each full turn of the pressure adjustment screw]

Model Numbers	Adjustment Volume MPa
A10-FR01B	2.9
A10-FR01C/H	5.4
A16/A22/A37/A45/A56-＊-R-01-B	3.5
A16/A22/A37/A45/A56-＊-R-01-C	6.5
A16/A37/A56-＊-R-01-H	7.9
A70/A90/A100/A145-＊-R01B	2.3
A70/A90/A100/A145-＊-R01C	3.2
A70/A90/A100/A145-＊-R01H	4.0
A70/A90/A100/A145-＊-R01K	4.7

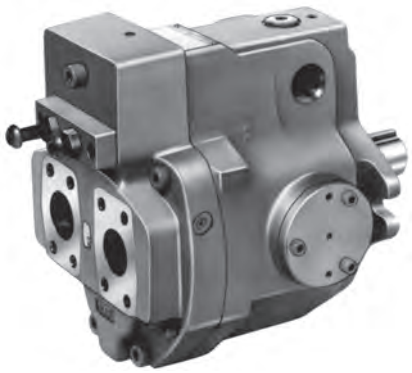
Adjustment of Delivery

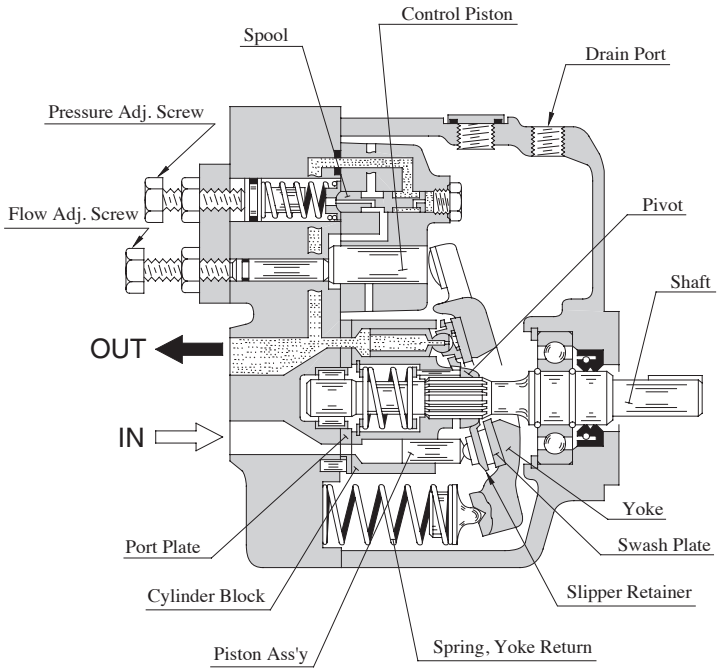
Turning the flow adjustment screw clockwise, decreases delivery.

[The minimum adjustable flow and adjustable volume of each full turn of the delivery adjustment screw]

Model	Adjustable volume with each full turn of the adjustment screw cm^3/rev	Minimum Adjustable Flow cm^3/rev
A10	1.1	2.0
A16	1.4	4.0
A22	2.0	6.0
A37/A45	2.9	10
A56	3.9	12
A70	4.4	36
A90	4.8	56
A100	5.2	62
A145	7.2	83

A Series Variable Displacement Piston Pumps



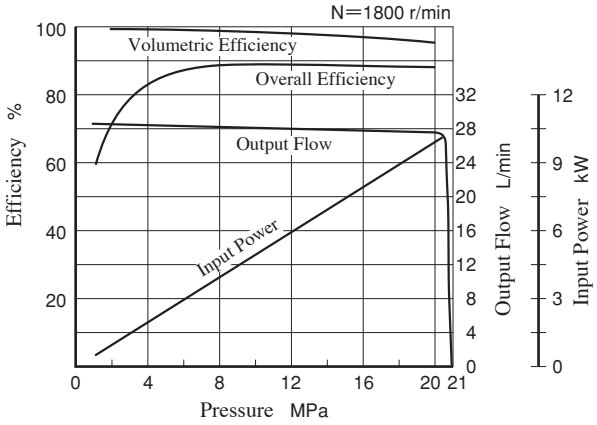


Features

High efficiency

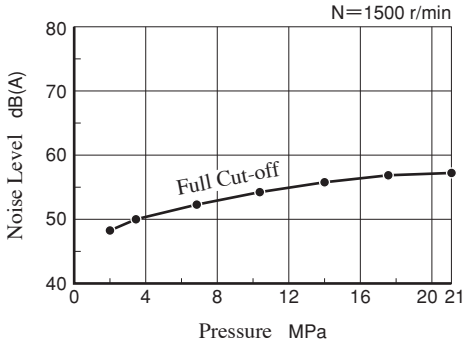
The efficiency properties in case of "A16" pump are high efficiencies to be shown below.

"A16" Type Performance Characteristics



Low noise level

In the "A16" pump, the noise level is as low as 57.3 dB(A) [at the full cut-off pressure 21 MPa with speed 1500 r/min one meter horizontally away from pump head cover.]



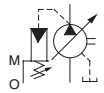
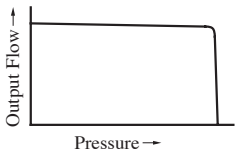
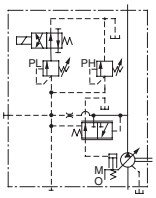
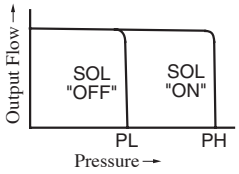
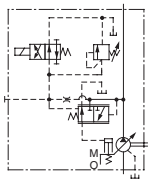
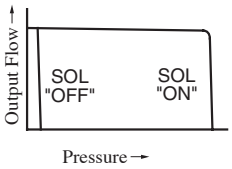
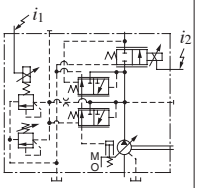
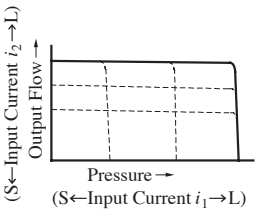
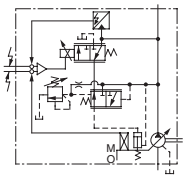
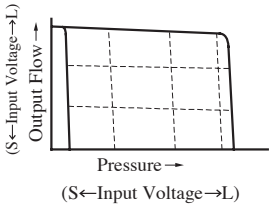
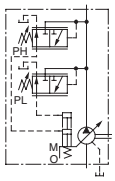
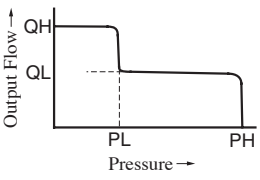
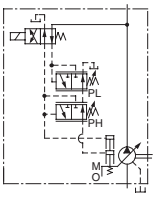
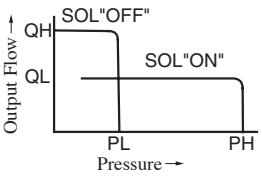
Accomplishment of energy-saving

Because the overall efficiency is high and the cut-off characteristics is sharp, thus the input power may be saved.

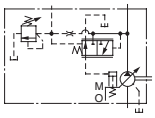
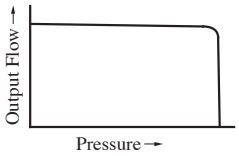
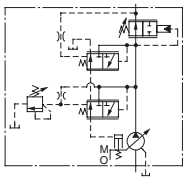
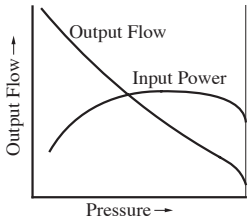
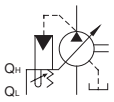
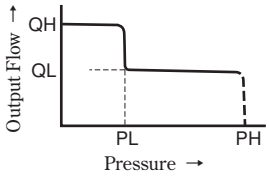
Low heat generation

Because of small power loss, it is possible to reduce the rise in oil temperature. Accordingly, capacity of a reservoir can be reduced.

Control Type

Control Type		Graphic Symbols	Performance Characteristics	Explanation	Page
"01"	Pressure Compensator Type			When the system pressure increases and comes close to the preset cut-off pressure, the pump flow decreases automatically while maintaining the set pressure as it is.	A-28
"02"	Solenoid Two Pressure Control Type			This type of control is ideal for an application where the output power of the actuator has to be controlled in two different load pressures while keeping the actuator speed nearly constant.	A-51
"03"	Pressure Compensator with Unloading Type			It is suitable for a situation where a long unloading time is required and heat generation and noise have to be kept at their lowest levels. • The pump can be used in combination with the multistage pressure control valve.	A-59
"04"	Proportional Electro-Hydraulic Load Sensing Type			This is an energy-saving type control which regulates the pump flow and load pressure to be at absolute minimum necessary level to operate the actuator. Pump flow rate and cut-off pressure are controlled proportional to the input current to the control device on the pump and the input current is regurated by the specific amplifier.	A-60
"04E"	Electro-Hydraulic Proportional Pressure & Flow Control Type			This type of control has the pressure sensor and tilt angle sensor in the pump. The pump is used with the external amplifier (amplifier is integrated into pump in case of "04EH"). Flow and pressure can be controlled in proportion to input voltage by only one control valve. The features has been greatly improved by electrical feedback of swash plate tilt angle correspond to flow rate and load pressure to control valve. • Linearity of input characteristics is excellent and easy to set. • Hysteresis is lower, repeatability and reproducibility are fine.	A-70
"04EH"	Electro-Hydraulic Proportional Pressure & Flow Control Type (OBE Type)				A-79
"05"	Two-Pressure Two-Flow Control Type by System Pres.			This type of control is suitable for an application like "Presses" where the changeover from rapid advance to feed is required just when the pressing (pressurizing) starts.	A-88
"06"	Two-Pressure Two-Flow Control Type by Solenoid Valve			This pump control is suitable for machining found on machine tool, where machining starts after the changeover from rapid advance to feed has been made.	A-89

Control Type

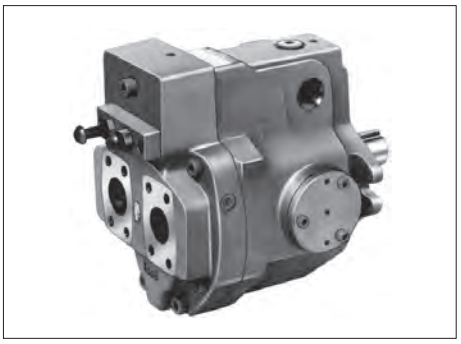
Control Type		Graphic Symbols	Performance Characteristics	Explanation	Page
"07"	Pilot Pressure Control Type Pressure Compensator			The pump is used in combination with the pilot relief valve or multistage pressure control valve. By controlling the pilot pressure, the full cut-off pressure can be remote-controlled according to your requirements.	A-90
"09"	Constant Power Control Type			• Pump input power can be controlled in accordance with the motor output. • When the discharge pressure rise, the output flow decreases corresponding to the preset input power. • The pump can act for function of two pumps, low-pressure large-flow and high-pressure small-flow. Therefore, the motor capacity can be reduced.	A-98
"00-Z500"	Simple Two-Pressure Two-Flow Control Type			• This type of control enables one pump to act as two pumps (low-pressure and large-flow/high-pressure and small-flow-rate). Therefore, the motor capacity can be reduced. • When the system pressure increases near the preset "PL" pressure due to the load increase, the pump flow automatically decreases to "QL." • This type of control is suitable for an application like the press, where switching from rapid advance to feed is required just when the press (pressurizing) starts. • The PH pressure can be remote-controlled with a separately located relief valve. With this type of control, it is easy to change the applied pressure setting when materials or shapes of the press are changed.	A-106

Availability of Control Type

Mark "◯" in the table below refers to standard model.

Model Numbers	Geometric Displacement cm^3/rev	Control Type										
		01	02	03	04	04E	04EH	05	06	07	09	00-Z500
A10	10.0	◯								◯		
A16	15.8	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
A22	22.2	◯	◯	◯	◯	◯	◯		◯	◯		
A37	36.9	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
A45	45.0	◯				◯						
A56	56.2	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
A70	70.0	◯	◯	◯	◯	◯	◯		◯	◯	◯	◯
A90	91.0	◯	◯	◯	◯	◯	◯		◯	◯		◯
A100	100	◯			◯	◯						
A145	145	◯	◯	◯	◯	◯	◯		◯	◯	◯	◯

Series Variable Displacement Piston Pumps, Pressure Compensator Type



Graphic Symbol

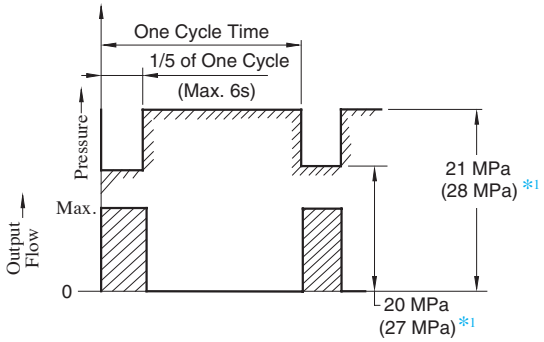
Specifications

Model Numbers	Geometric Displacement cm^3/rev	Minimum Adj. Flow cm^3/rev	Operating Pressure MPa		Shaft Speed Range r/min		Approx. Mass kg	
			Rated★2	Intermittent★1	Max.	Min.	Flange Mtg.	Foot Mtg.
A10-FR01∗-13	10.0	2	16	21	1800	600	8.5	—
A16-∗-R-01-∗-∗-K-32	15.8	4	16	21	1800	600	16.5	18.7
A22-∗-R-01-∗-∗-K-32	22.2	6	16	16	1800	600	16.5	18.7
A37-∗-R-01-∗-∗-K-32	36.9	10	16	21	1800	600	Axial:23.2 Side:28	Axial:26.3 Side:31.1
A45-∗-R-01-∗-∗-K-10	45.0	10	16	16	1800	600	28	32.3
A56-∗-R-01-∗-∗-K-32	56.2	12	16	21	1800	600	Axial:30.8 Side:35	Axial:33.3 Side:38.1
A70-∗R01∗S-70	70.0	36	25	28	1800	600	55.5	67.5
A90-∗R01∗S-70	91.0	56	25	28	1800	600	72	87.5
A100-∗R01∗S-20	100	62	21	21	1800	600	72.5	88
A145-∗R01∗S-60	145	83	25	28	1800	600	92.5	117.7

★1. Whenever setting pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.

★2. Care should be taken in cases of used at a higher pressure than the rated pressure, because operating terms may be restricted. For example, if used as per maximum illustrated operating conditions, intermittent time at maximum flow is restricted to under 1/5 of one cycle time and under six seconds simultaneously. Conditions may vary according to the actual working pressure and delivery (inclination angle of the swash plate). Consult factory or Yuken sales representative for further information.

★3. The table above shows specifications for using petroleum based oils.
Pumps (customized design) for special fluids are also available.
Their operating pressure and maximum shaft speed however differ from the values in the table above depending on the fluid type.
Range of operating temperature and viscosities may differ from those of petroleum based oils due to their characteristics.
Refer to the table below for details.



∗1. Applicable only for "A70/90/145"

Specifications and Design numbers for Special Fluids

Type of Fluids	Pump Series	Operating Pressure MPa		Allowable Maximum Shaft Speed r/min		Temperature Range °C	Viscosity Range mm^2/s	Design Numbers for Special Fluid
		Rated	Intermittent	Rated	Max.			
Water-Glycols	A16,A22,A37,A56	14	16 (14)★1	1200	(1800)★2	0-50	20-200	3230
	A70,A90,A145	21	21					7030 [A70, A90] 6030 [A145]
	A100	16	16					2006
Phosphate Ester Type	A16,A22,A37,A56	14	16 (14)★1	1200	(1800)★2	0-60		3206
	A70,A90,A145	21	21					7006 [A70, A90] 6006 [A145]
	A100	21	21					2030
Polyol Ester Type	A16,A22,A37,A56	16	16	1800	1800	0-60	20-200	32450
	A70,A90,A145	21	21					70450 [A70, A90] 60450 [A145]
	A100	21	21					20450

★1. The figures in brackets are for A22 type.

★2. As the specific gravities of water-glycol fluids and phosphate ester type fluids are higher than one, an overhead reservoir is required when pumps are operated at 1400 r/min or more.

Model Number Designation

A16	-F	-R	-01	-B	-S	-K	-32
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range MPa	Port Position	Shaft Extension	Design Number
A16 (15.8 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★2 (Normal)	01: Pressure Compensator Type	B: 1.2 - 7 C: 1.2 - 16 H: 1.2 - 21	None: Axial Port S: Side Port	K: Keyed Shaft	32
A22 (22.2 cm³/rev)				B: 1.2 - 7 C: 1.2 - 16			32
A37 (36.9 cm³/rev)				B: 1.2 - 7 ★3 C: 1.2 - 16 H: 1.2 - 21			32
A45 (45.0 cm³/rev)							10
A56 (56.2 cm³/rev)							32

A70	-F	R	01	B	S	-70
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range MPa	Port Position	Design Number
A10 (10.0 cm³/rev)	F: Flange★1 Mtg.	(Viewed from Shaft End) R: Clockwise★2 (Normal)	01: Pressure Compensator Type	B: 1.2 - 7 C: 2.0 - 16 H: 2.0 - 21	—	13
A70 (70.0 cm³/rev)	F: Flange Mtg. L: Foot Mtg.			B: 1.2 - 7 ★4 C: 1.5 - 16 H: 1.8 - 21 K: 2.0 - 28	S: Side Port	70
A90 (91.0 cm³/rev)						70
A100 (100 cm³/rev)						20
A145 (145 cm³/rev)						60

★ 1. When A10 pump is used as the foot Mtg., order the Mtg. bracket kit shown below separately. Refer to page A-17 for dimensions of the Mtg. bracket.

Note: The mounting bracket kit consists of a mounting bracket, two hex. bolts and two plain washer.

Mtg. Bracket Kit Numbers	Approx. Mass kg
LP-1A-10	2.2

★ 2. Available to supply pump with anti-clockwise rotation (except A100). Consult Yuken for details.

★ 3. Pres. adj. range of A45 type is B and C

★ 4. Pres. adj. range of A100 type is B, C, and H.

Pipe Flange Kits

Pipe flange kits are available. When ordering, specify the kit number from the table below.

Pump Model Numbers	Name of Port	Pipe Flange Kit Numbers		
		Threaded Connection	Socket Welding★	Butt Welding
A16-＊-R-01 A22-＊-R-01	Suction	F5-06-A-10	F5-06-B-10	F5-06-C-10
	Discharge	F5-06-A-10	F5-06-B-10	F5-06-C-10
A37-＊-R-01 A45-＊-R-01 A56-＊-R-01	Suction	F5-10-A-10	F5-10-B-10	F5-10-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10
A70-＊R01	Suction	F5-12-A-10	F5-12-B-10	F5-12-C-10
	Discharge	F5-08-A-10	F5-08-B-10	F5-08-C-10
A90-＊R01 A100-＊R01 A145-＊R01	Suction	F5-16-A-10	F5-16-B-10	F5-16-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10

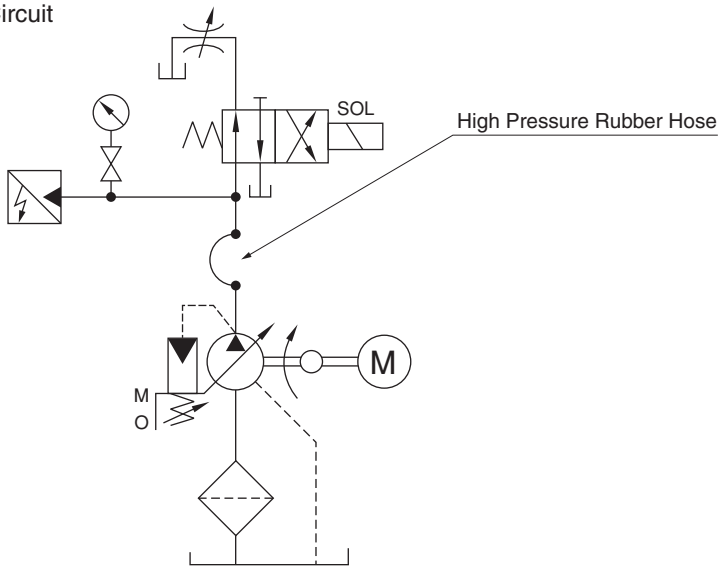
★ In case of using socket welding flanges, there is a case where the operating pressure should be set lower than the normal because of strength of the flanges. Therefore, please pay cautious attention to the operating pressure when the socket welding flanges are used.

● Details of the pipe flange kits are shown on pages A-258 and A-259.

Response Characteristics Change in Accordance with Circuits and Operating Conditions.

The Circuit and Conditions

Circuit



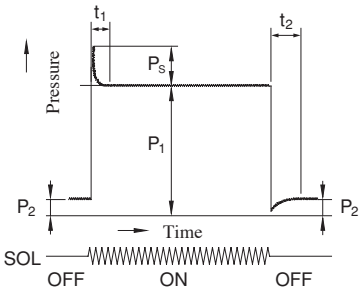
Model	Rubber Hose Size
A10	1/2"× 800 mm
A16 A22	3/4"× 700 mm
A37 A56	3/4"× 2000 mm
A70	3/4"× 3500 mm
A90 A100 A145	3/4"× 3000 mm + 1-1/4 × 2000 mm

Conditions

Shaft Speed : 1500 r/min
Hydraulic Fluid : ISO VG 32 Oil
Oil Temperature: See right table

Model	Oil Temperature
A10 - A56	50°C (20 mm²/s)
A70 - A145	40°C (32 mm²/s)

Result of Measurement

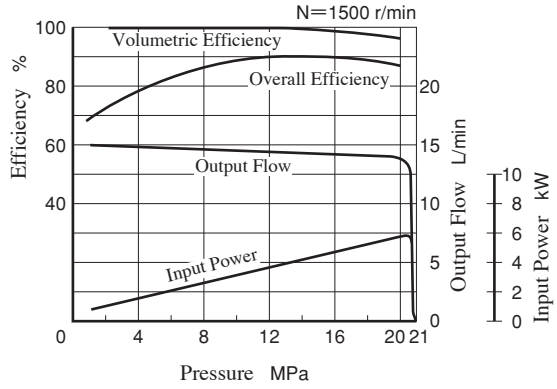


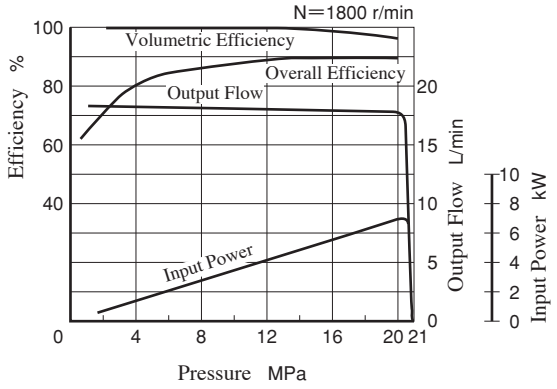
Model	Full Cut-off Pressure P_1 MPa	Pressure at Full Flow P_2 MPa	Response Time ms		Overshoot Pressure P_S MPa
			t_1	t_2	
A10	21	2	100	75	2.6
A16	16	2	38★	59★	3.6
A22	16	2	30★	72★	5.9
A37	16	2	40★	78★	7.8
A56	16	2	38★	88★	7.6
A70	25	2	80	100	7.8
A90	25	3	90	110	7.9
A100	21	3	90	110	8.1
A145	25	3	100	150	8.8

★ 1. Response time except A16, A22, A37 and A56 is measured Yoke travel.
★ 2. As for A45, please contact us.

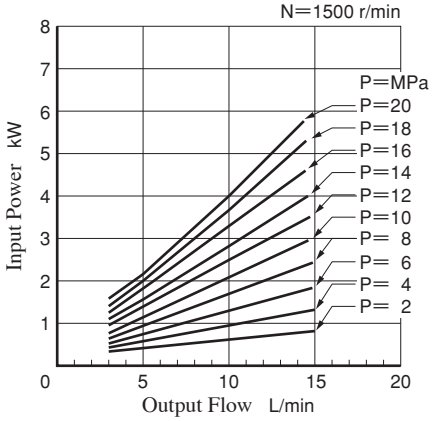
Typical Performance Characteristics of Type **A10** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

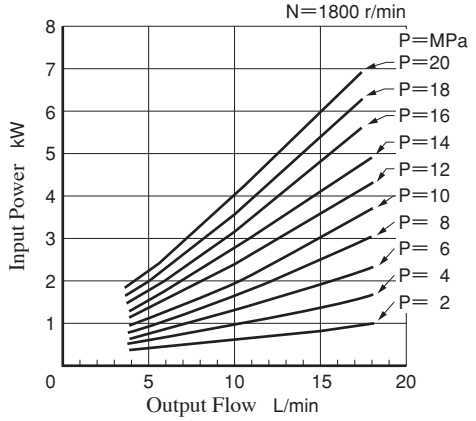
Performance Characteristic Curve



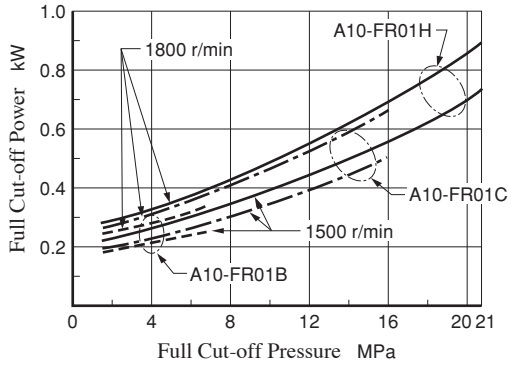


Input Power

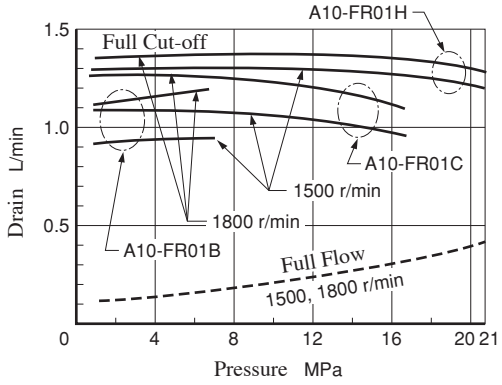




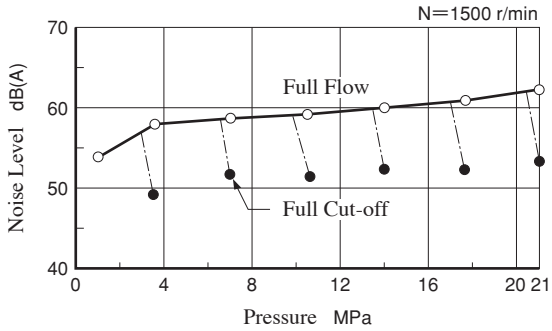
Full Cut-off Power

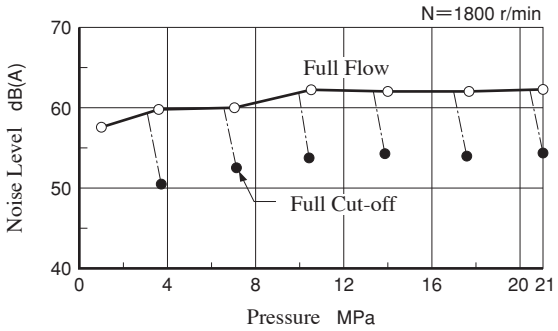


Drain



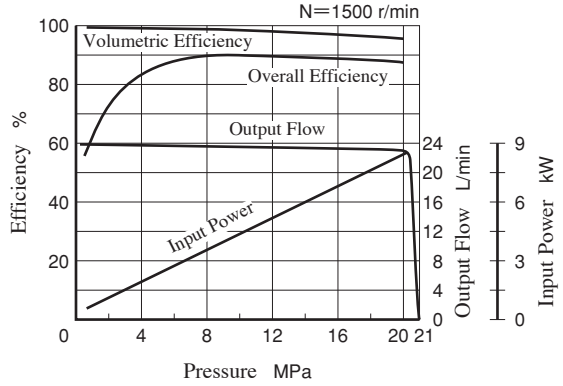
Noise Level [One meter horizontally away from pump head cover]

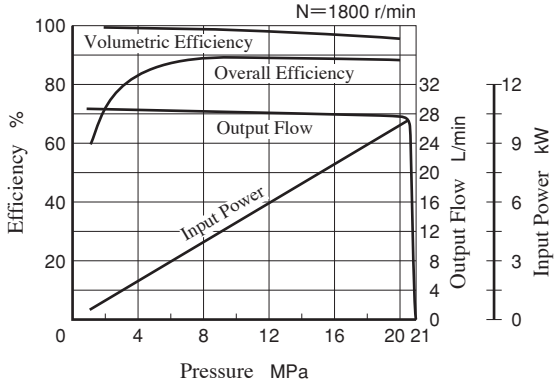




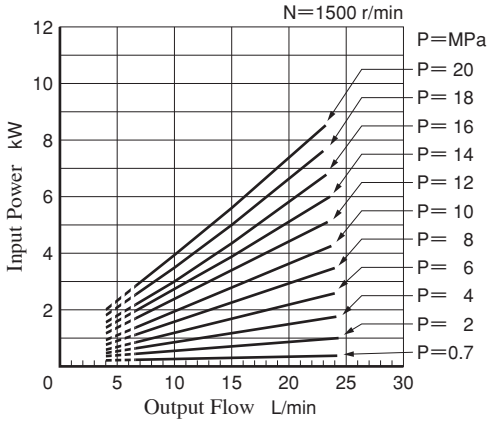
Typical Performance Characteristics of Type **A16** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

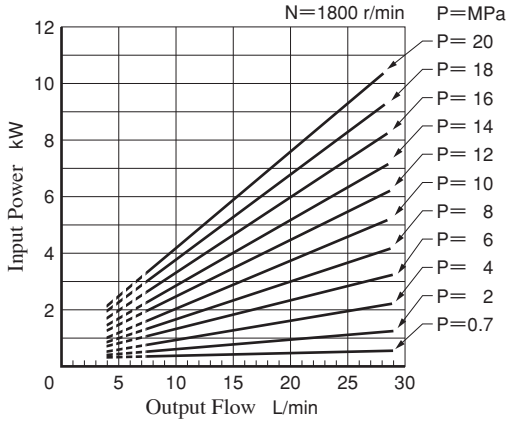
Performance Characteristic Curve



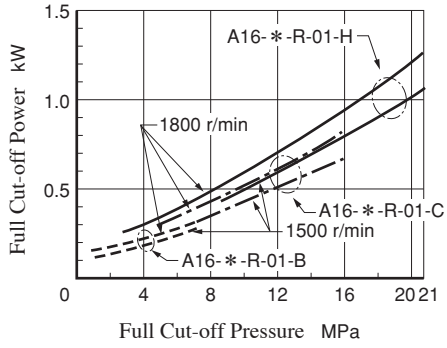


Input Power

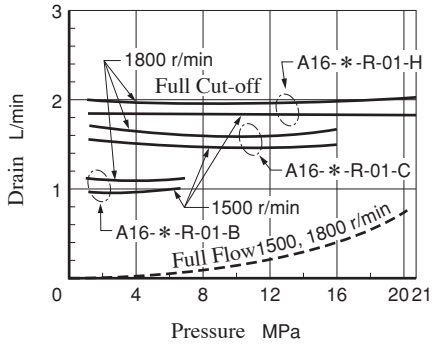




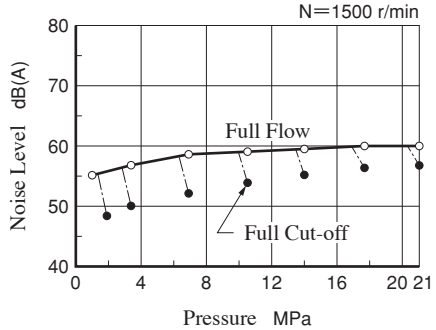
Full Cut-off Power

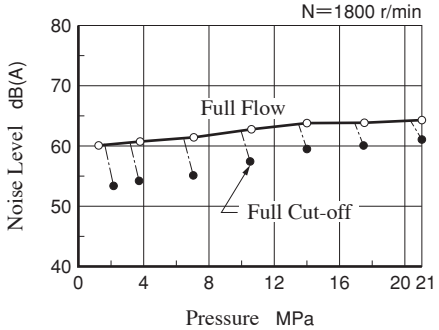


Drain



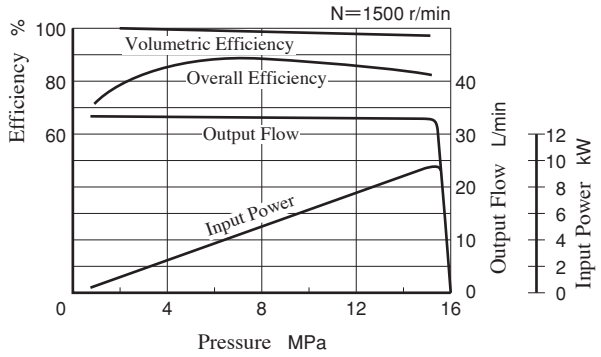
Noise Level [One meter horizontally away from pump head cover]

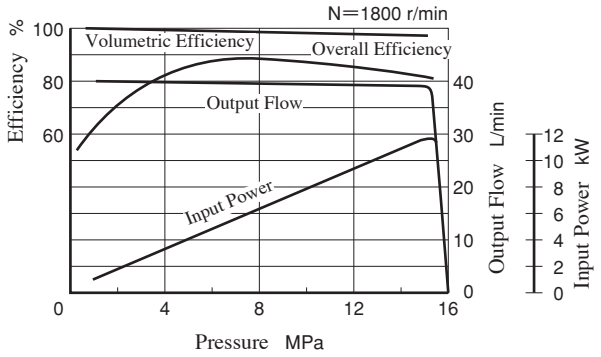




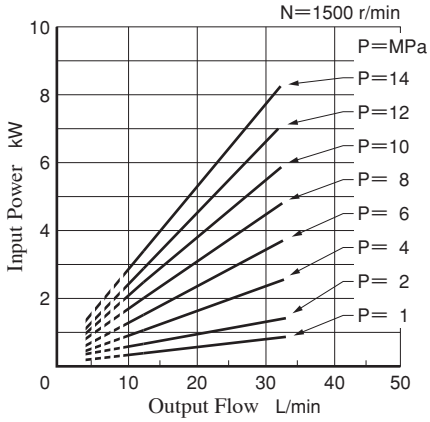
Typical Performance Characteristics of Type **A22** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

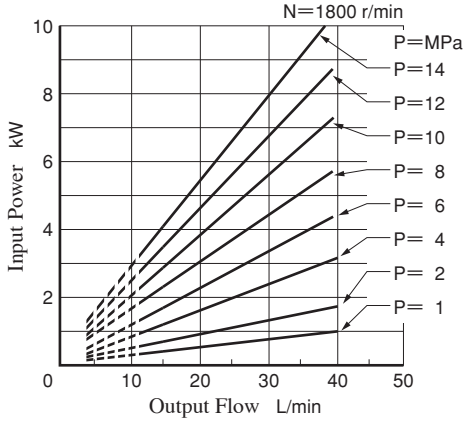
Performance Characteristic Curve



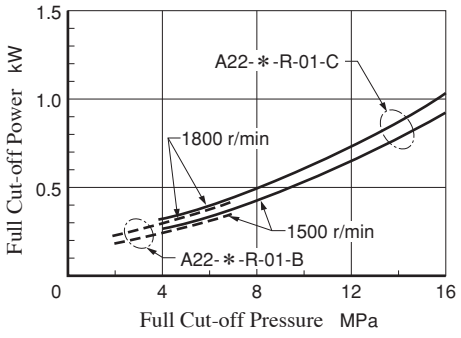


Input Power

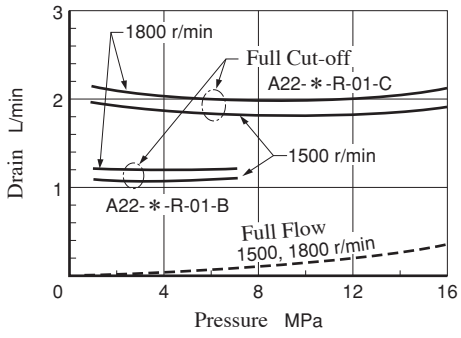




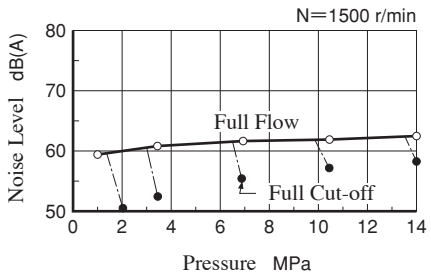
Full Cut-off Power

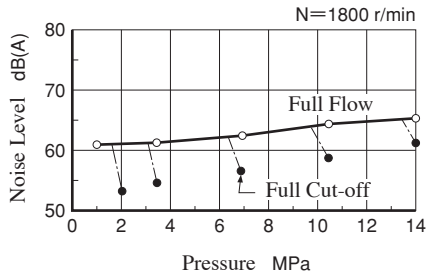


Drain



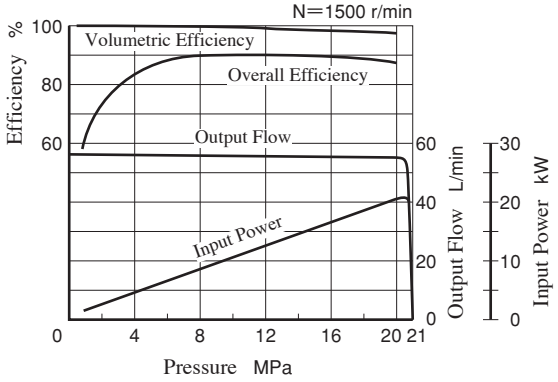
Noise Level [One meter horizontally away from pump head cover]

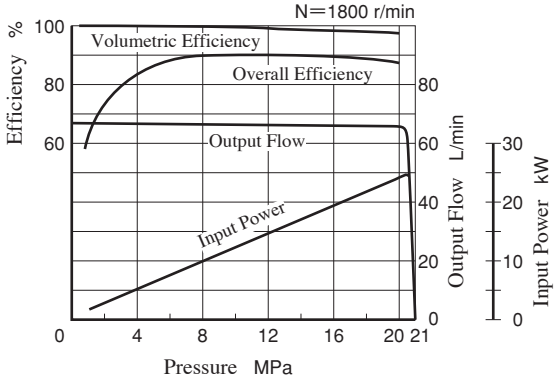




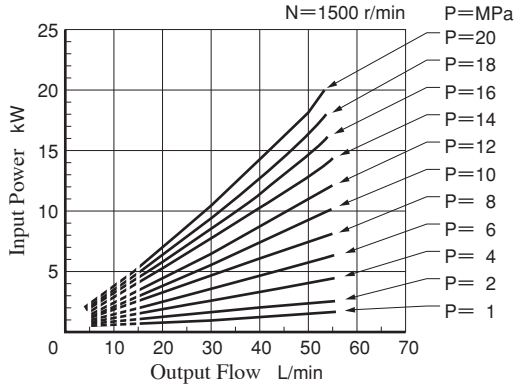
Typical Performance Characteristics of Type **A37** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

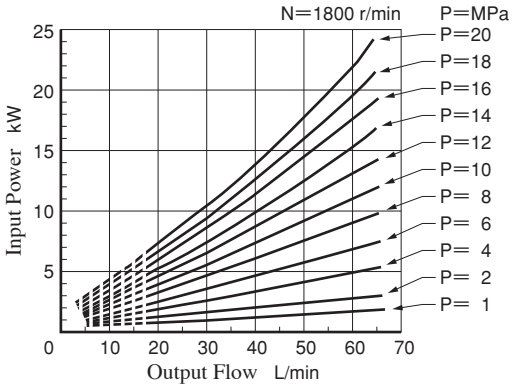
Performance Characteristic Curve



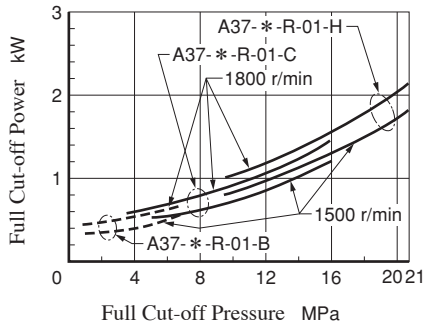


Input Power

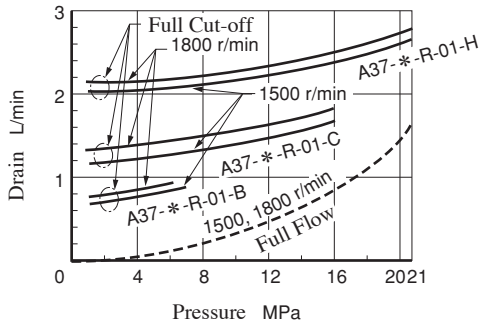




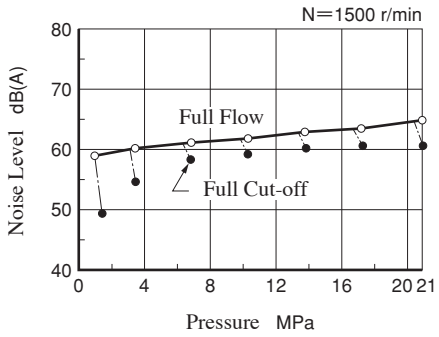
Full Cut-off Power

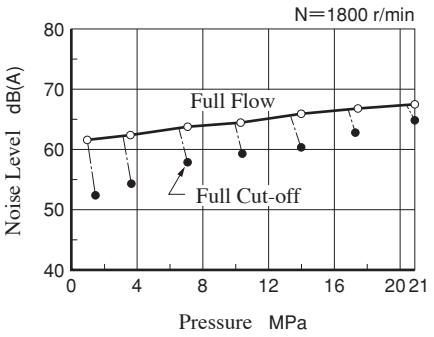


Drain



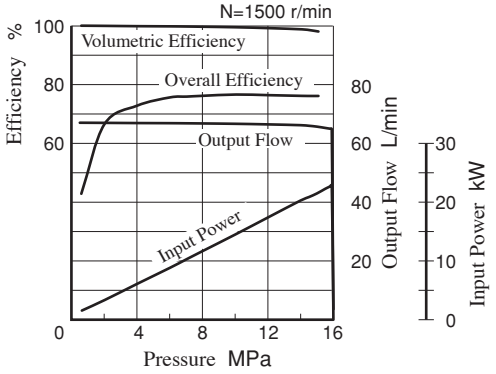
Noise Level [One meter horizontally away from pump head cover]

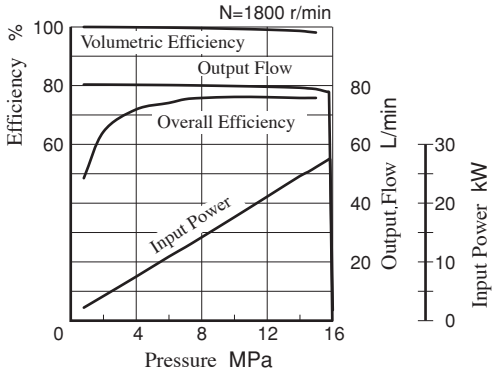




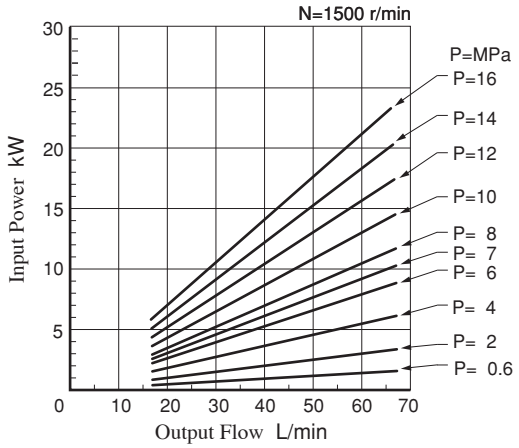
Typical Performance Characteristics of Type **A45** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

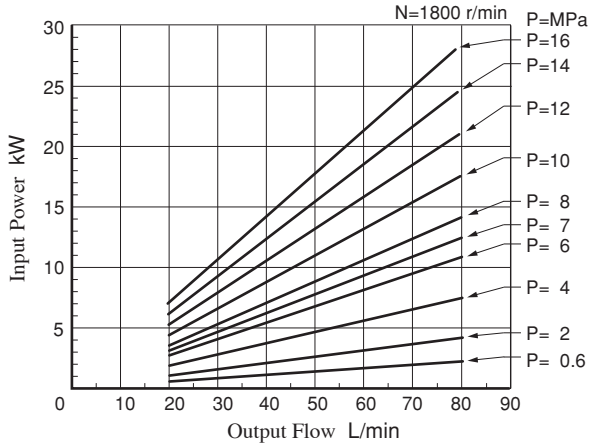
Performance Characteristic Curve



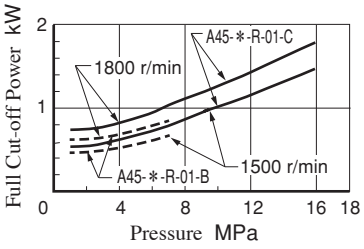


Input Power

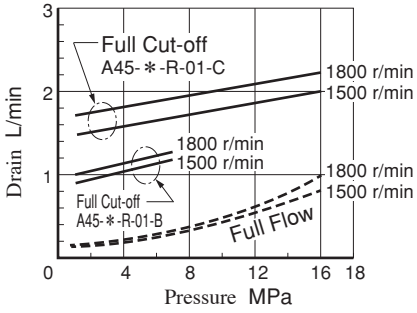




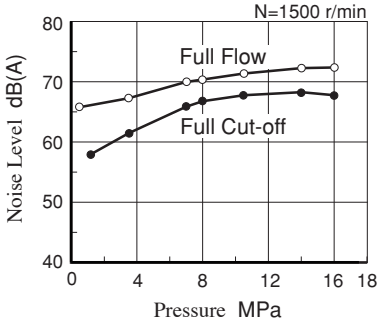
Full Cut-off Power

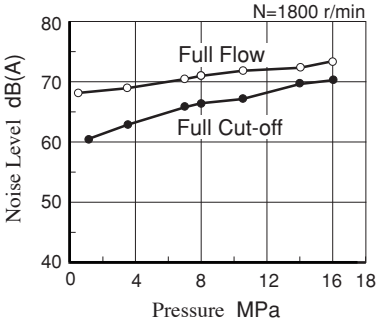


Drain



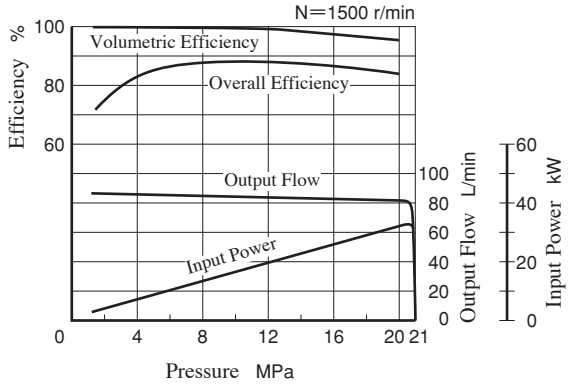
Noise Level [One meter horizontally away from pump head cover]

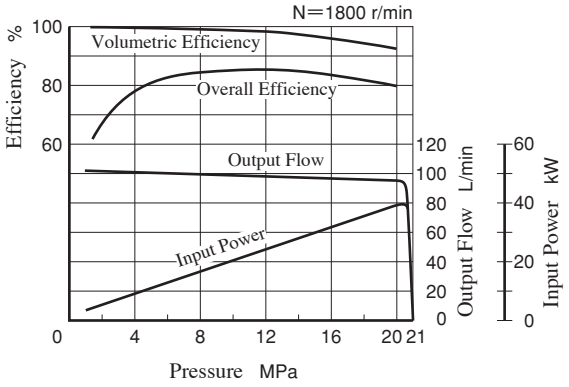




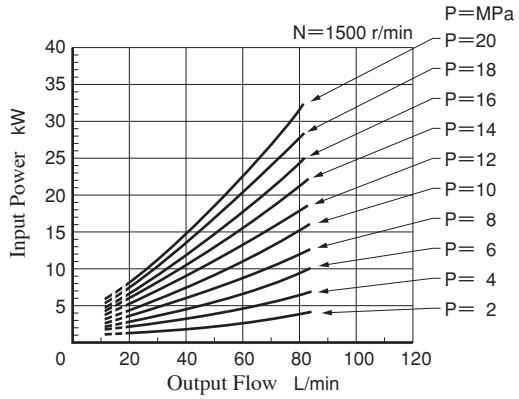
Typical Performance Characteristics of Type **A56** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

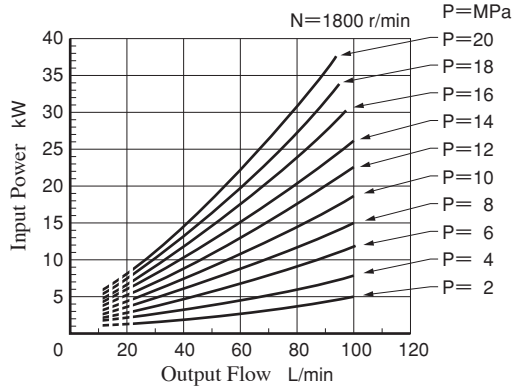
Performance Characteristic Curve



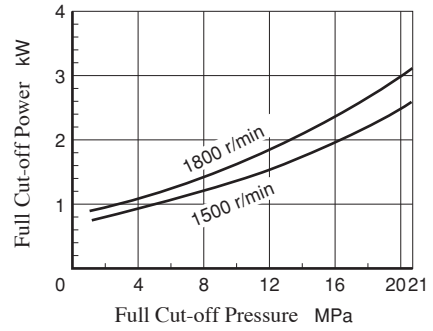


Input Power

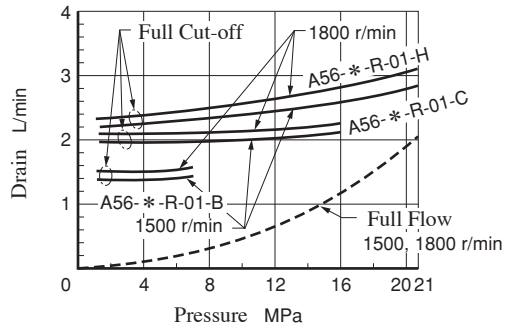




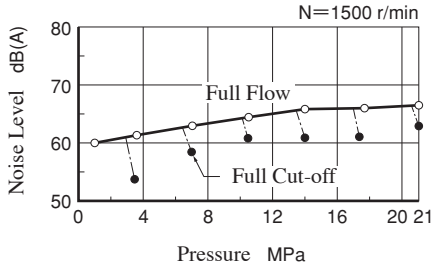
Full Cut-off Power

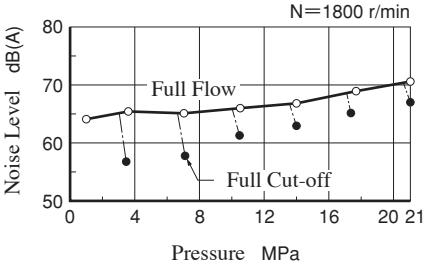


Drain



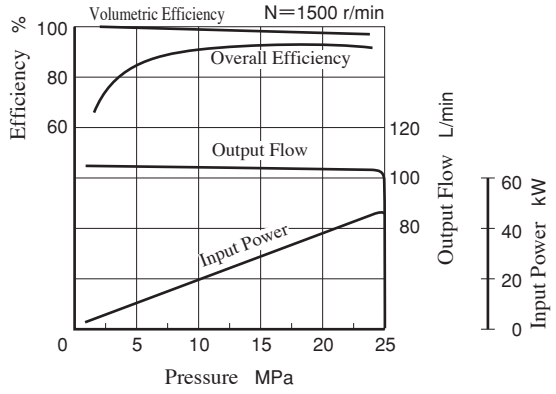
Noise Level [One meter horizontally away from pump head cover]

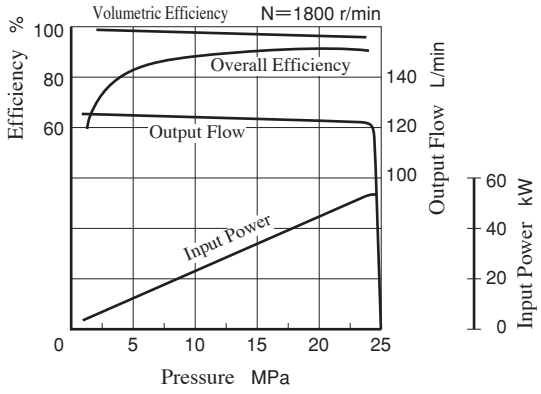




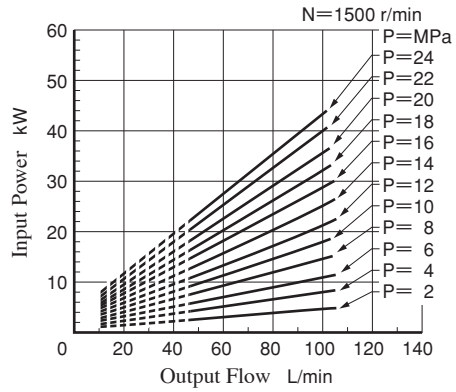
Typical Performance Characteristics of Type **A70** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

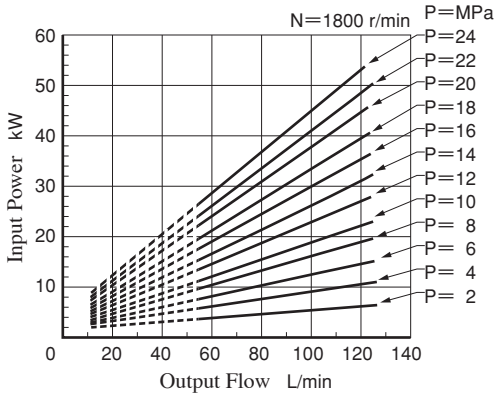
Performance Characteristic Curve



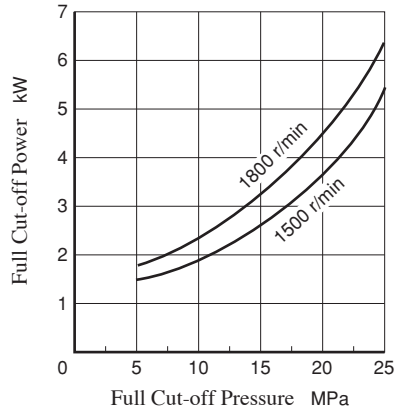


Input Power

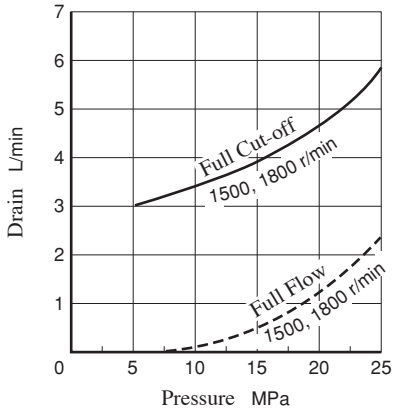




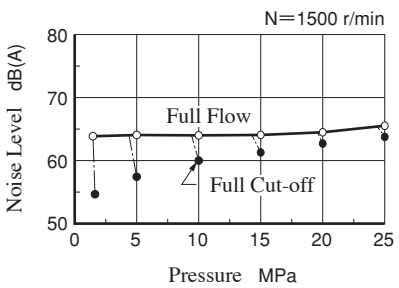
Full Cut-off Power

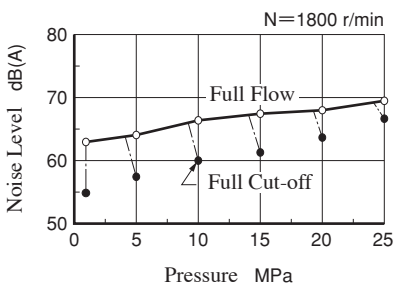


Drain



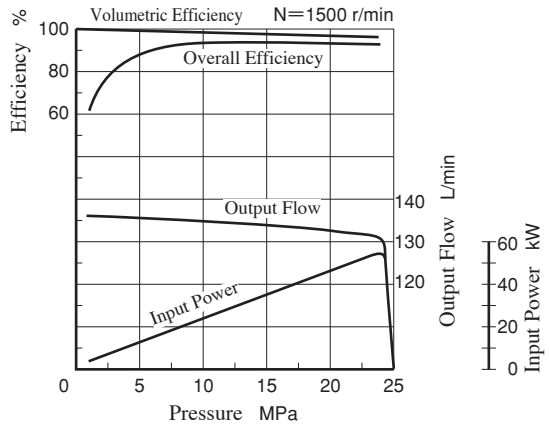
Noise Level [One meter horizontally away from pump head cover]

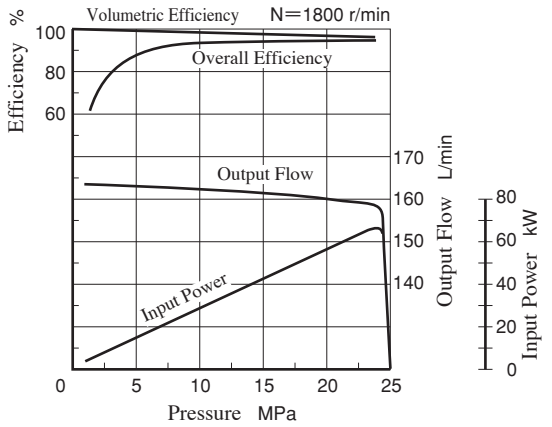




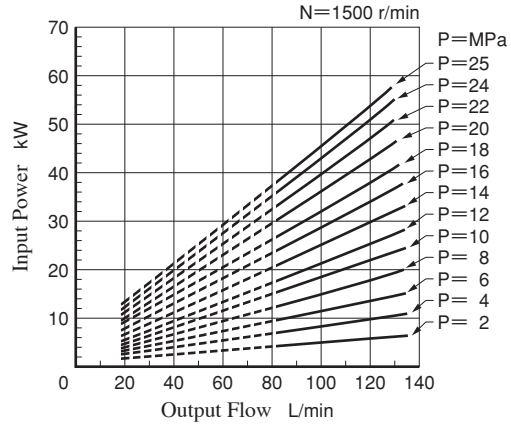
Typical Performance Characteristics of Type **A90** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

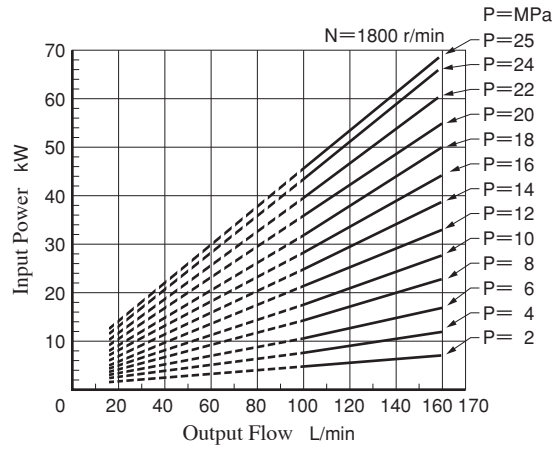
Performance Characteristic Curve



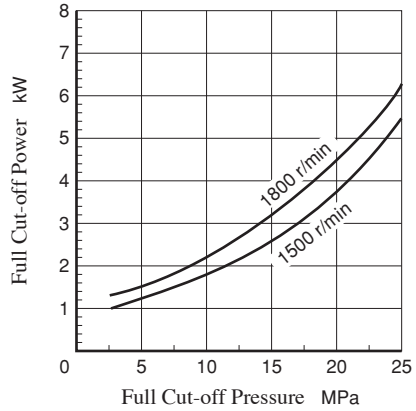


Input Power

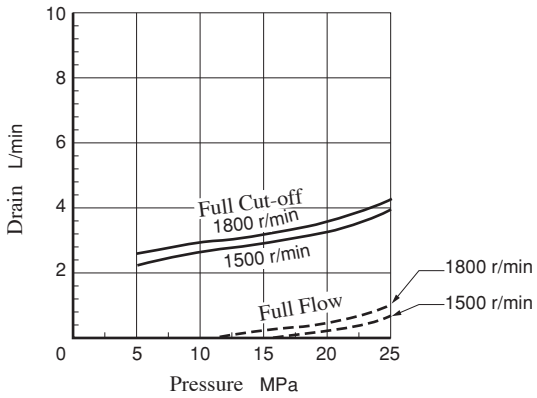




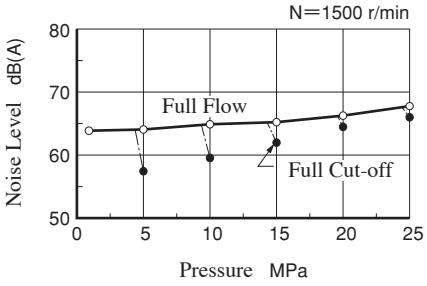
Full Cut-off Power

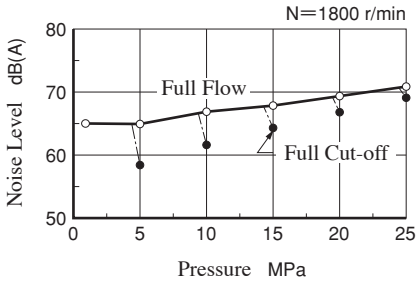


Drain



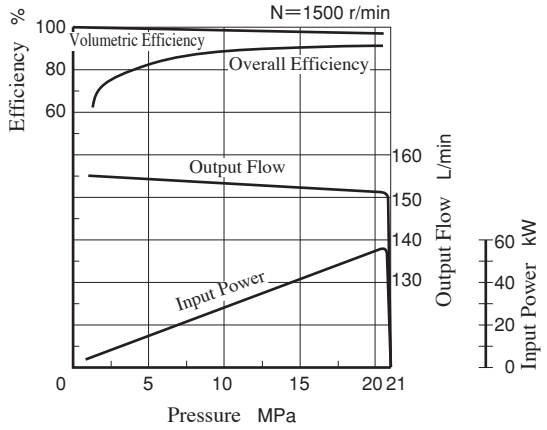
Noise Level [One meter horizontally away from pump head cover]

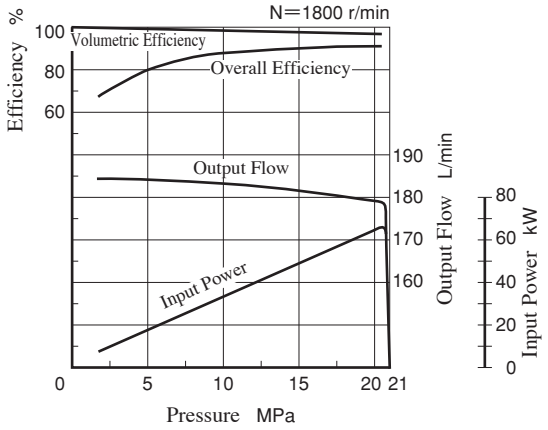




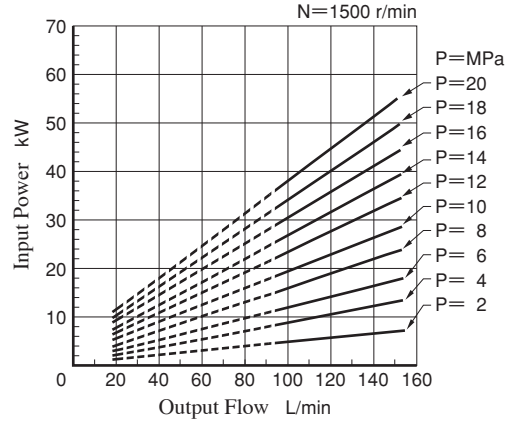
Typical Performance Characteristics of Type **A100** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

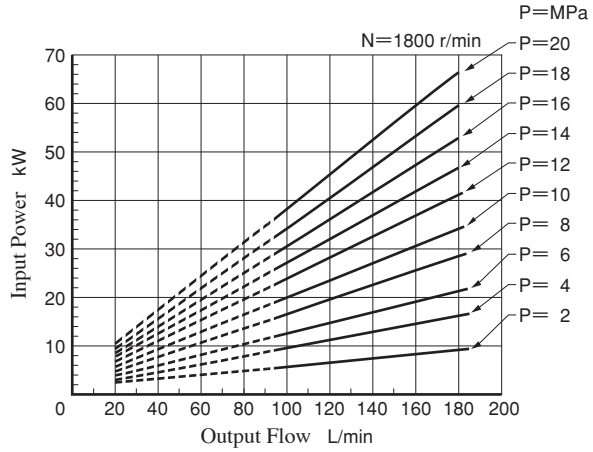
Performance Characteristic Curve



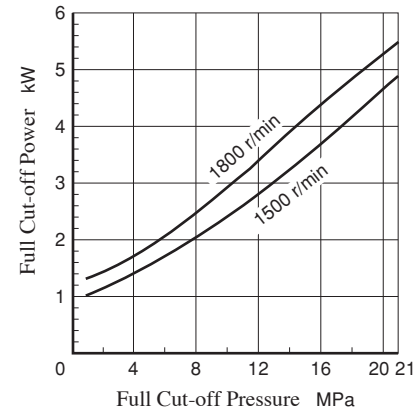


Input Power

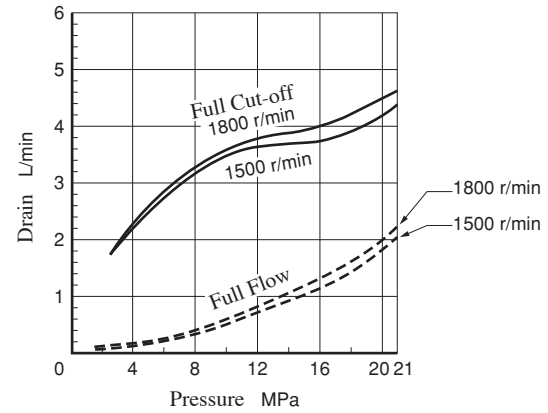




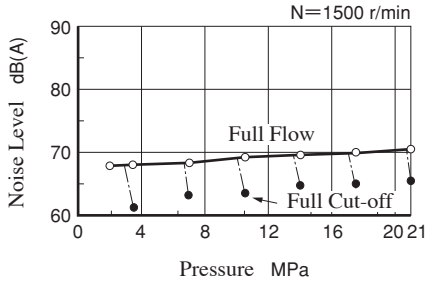
Full Cut-off Power

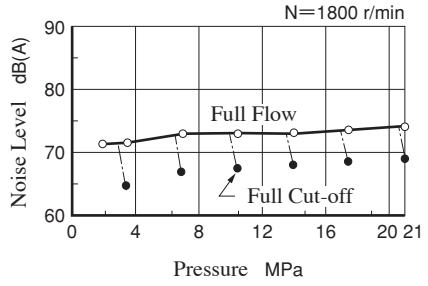


Drain



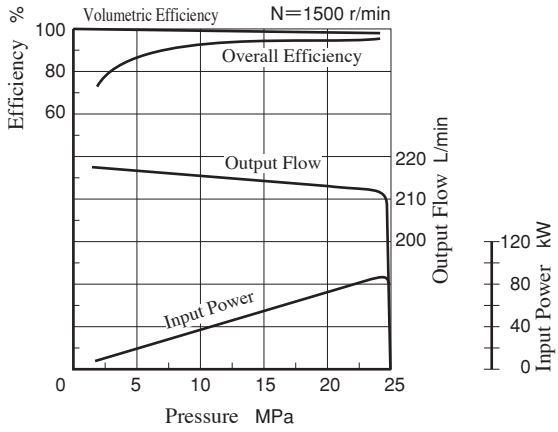
Noise Level [One meter horizontally away from pump head cover]

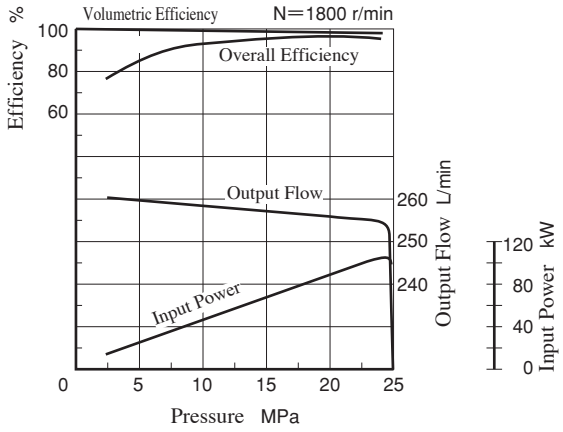




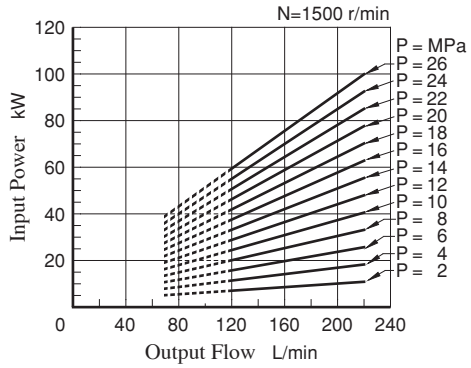
Typical Performance Characteristics of Type **A145** at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

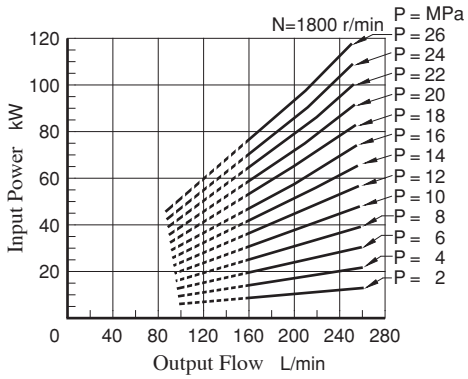
Performance Characteristic Curve



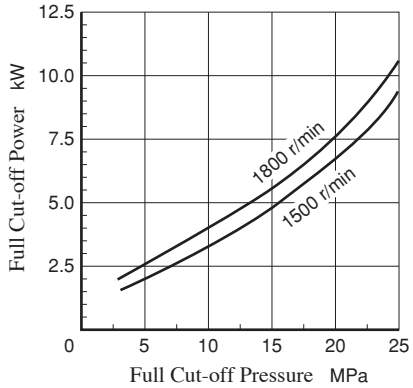


Input Power

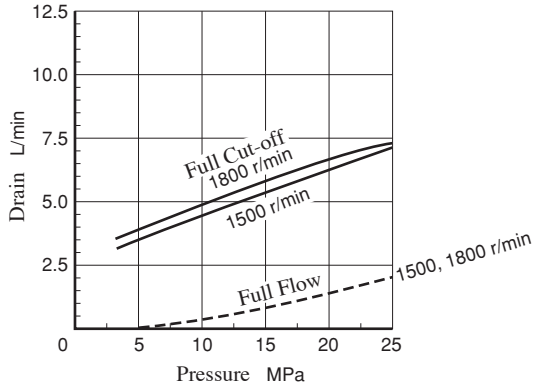




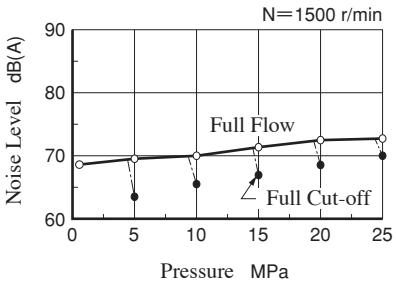
Full Cut-off Power

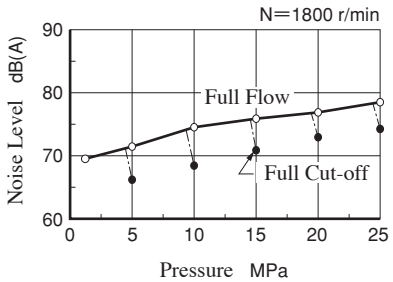


Drain

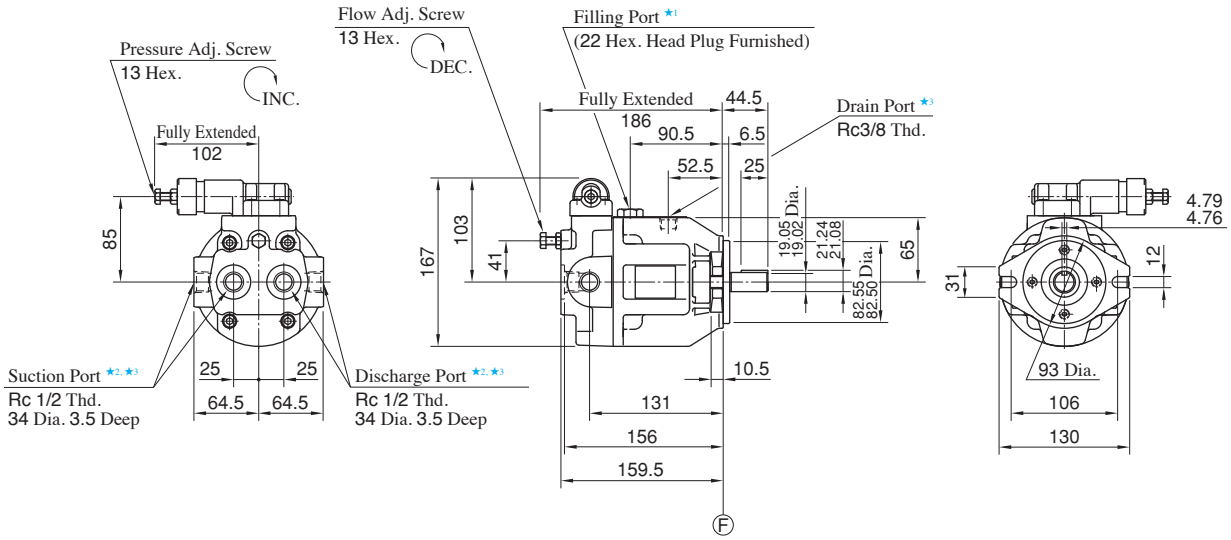


Noise Level [One meter horizontally away from pump head cover]





Flange Mtg. : A10-FR01 *

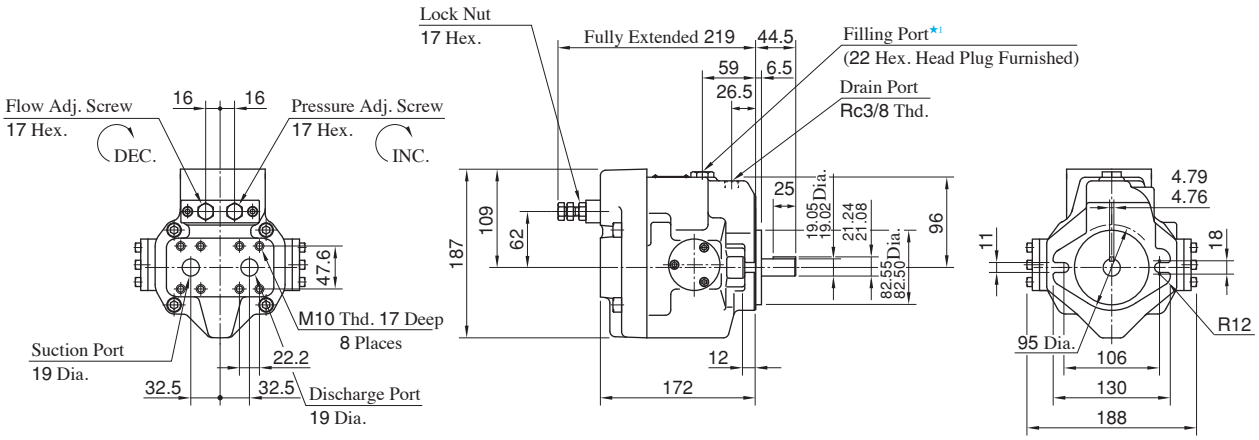


★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two suction and discharge ports at your option. Keep the remaining ports plugged.
★3. As the tightening torques of suction, discharge and drain port fittings, conform to the below.

Name of Port	Tightening Torque Nm
Suction Discharge	65 - 75
Drain	40 - 50

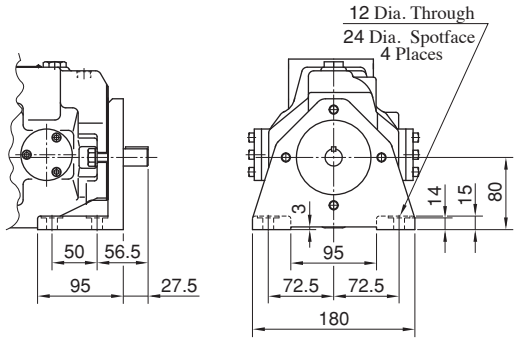
Axial Port Type

Flange Mtg. : A16-F-R-01-∗-K
A22-F-R-01-∗-K



★ 1. Install the pump so that the “Filling Port” is at the top.

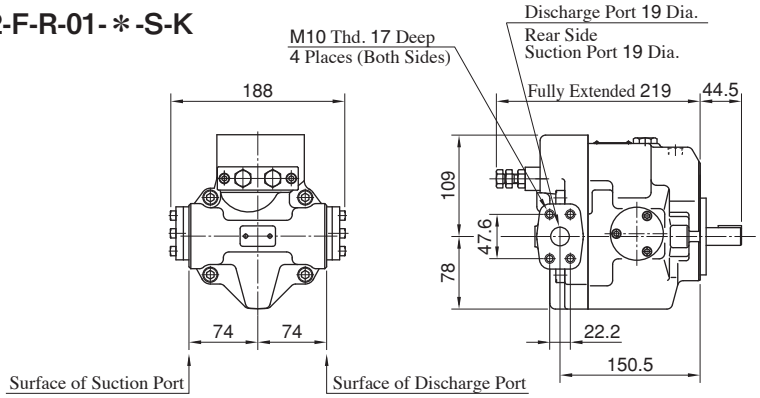
Foot Mtg. : A16-L-R-01-∗-K
A22-L-R-01-∗-K



● For other dimensions, refer to “Flange Mtg.”.

Side Port Type

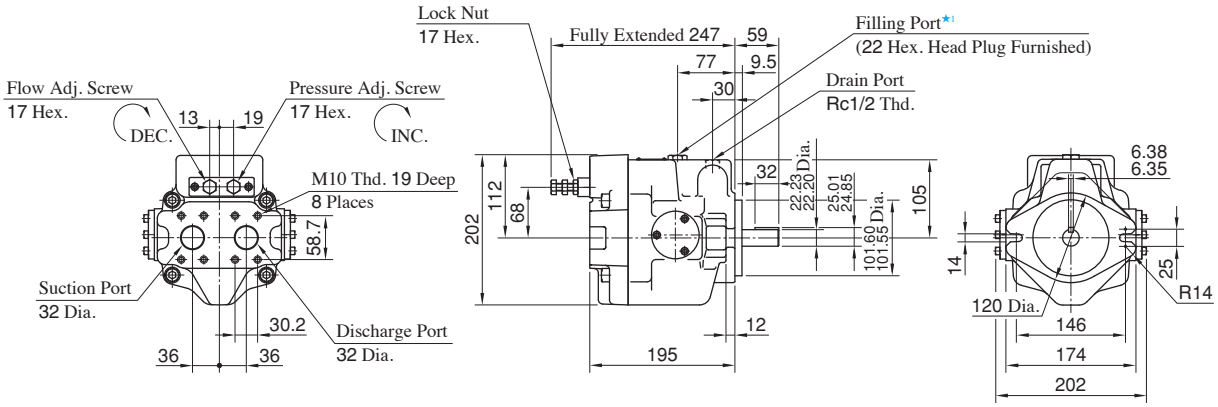
Flange Mtg. : A16-F-R-01-∗-S-K
A22-F-R-01-∗-S-K



● For other dimensions, refer to “Axial Port Type”.
● Foot Mtg. Type：Mounting bracket is common to that of “Axial Port Type”.

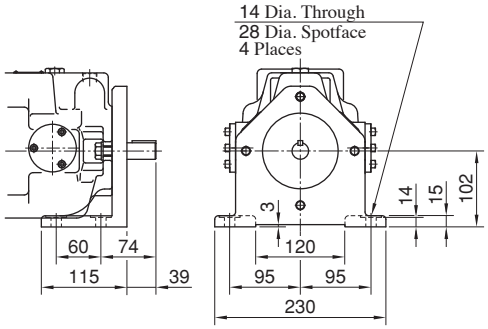
Axial Port Type

Flange Mtg. : A37-F-R-01-＊-K
A45-F-R-01-＊-K



★1. Install the pump so that the "Filling Port" is at the top.

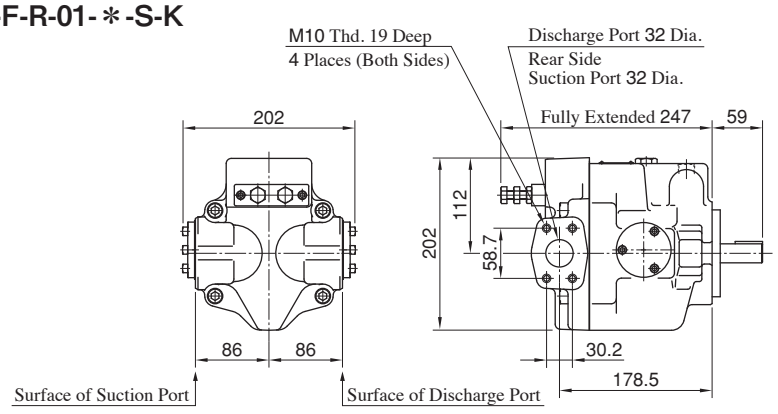
Foot Mtg. : A37-L-R-01-＊-K
A45-L-R-01-＊-K



● For other dimensions, refer to "Flange Mtg.".

Side Port Type

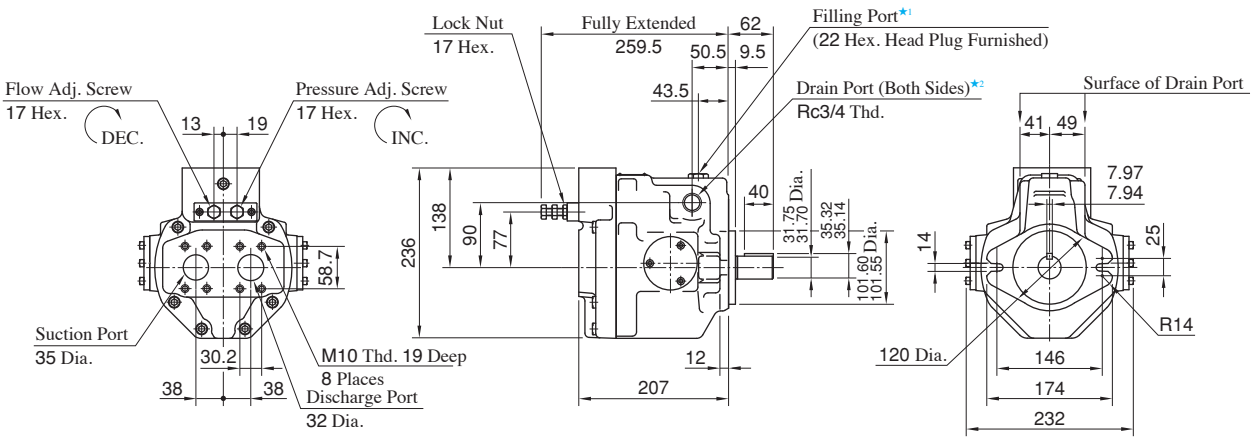
Flange Mtg. : A37-F-R-01-＊-S-K
A45-F-R-01-＊-S-K



● For other dimensions, refer to "Axial Port Type".
● Foot Mtg. Type：Mounting bracket is common to that of "Axial Port Type".

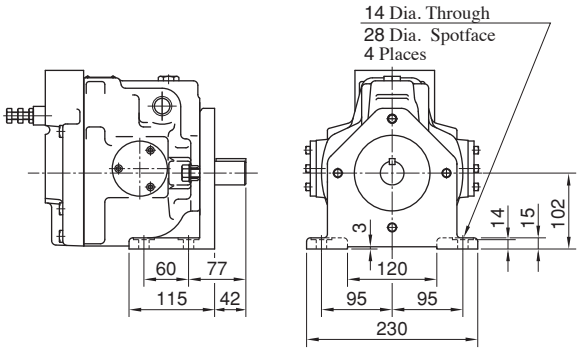
Axial Port Type

Flange Mtg. : A56-F-R-01-∗-K



★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of the two drain ports at your option. Keep the remaining port plugged.

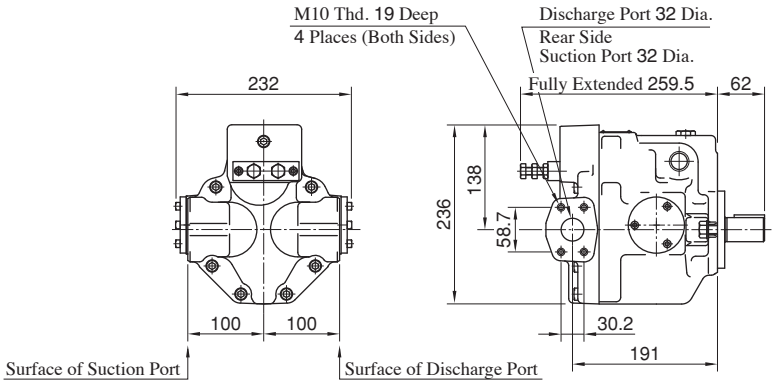
Foot Mtg. : A56-L-R-01-∗-K



● For other dimensions, refer to "Flange Mtg.".

Side Port Type

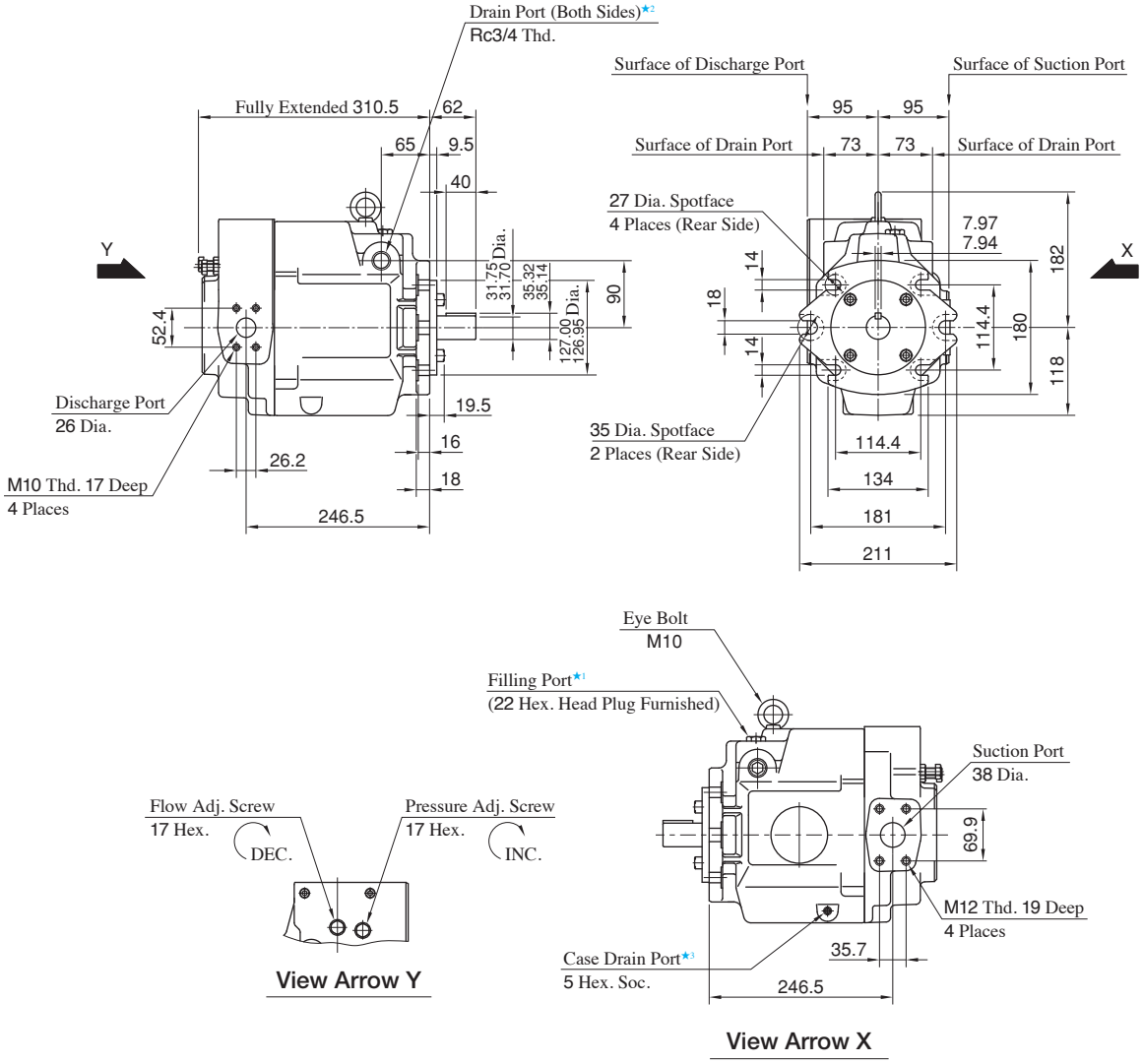
Flange Mtg. : A56-F-R-01-∗-S-K



● For other dimensions, refer to "Axial Port Type".

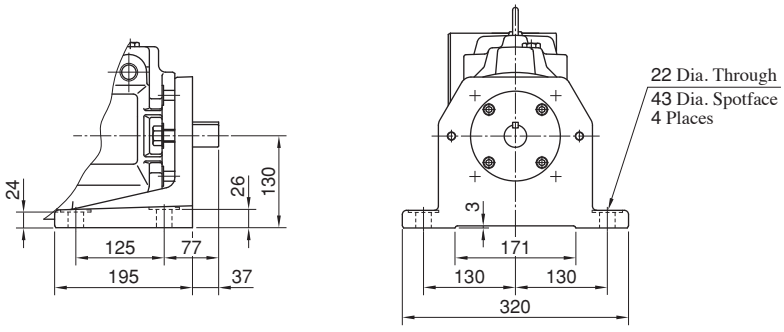
Side Port Type

Flange Mtg. : A70-FR01 ∗ S



★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of the two drain ports at your option. Keep the remaining port plugged.
★3. Case drain port is available for use when draining hydraulic fluid from pump casing.

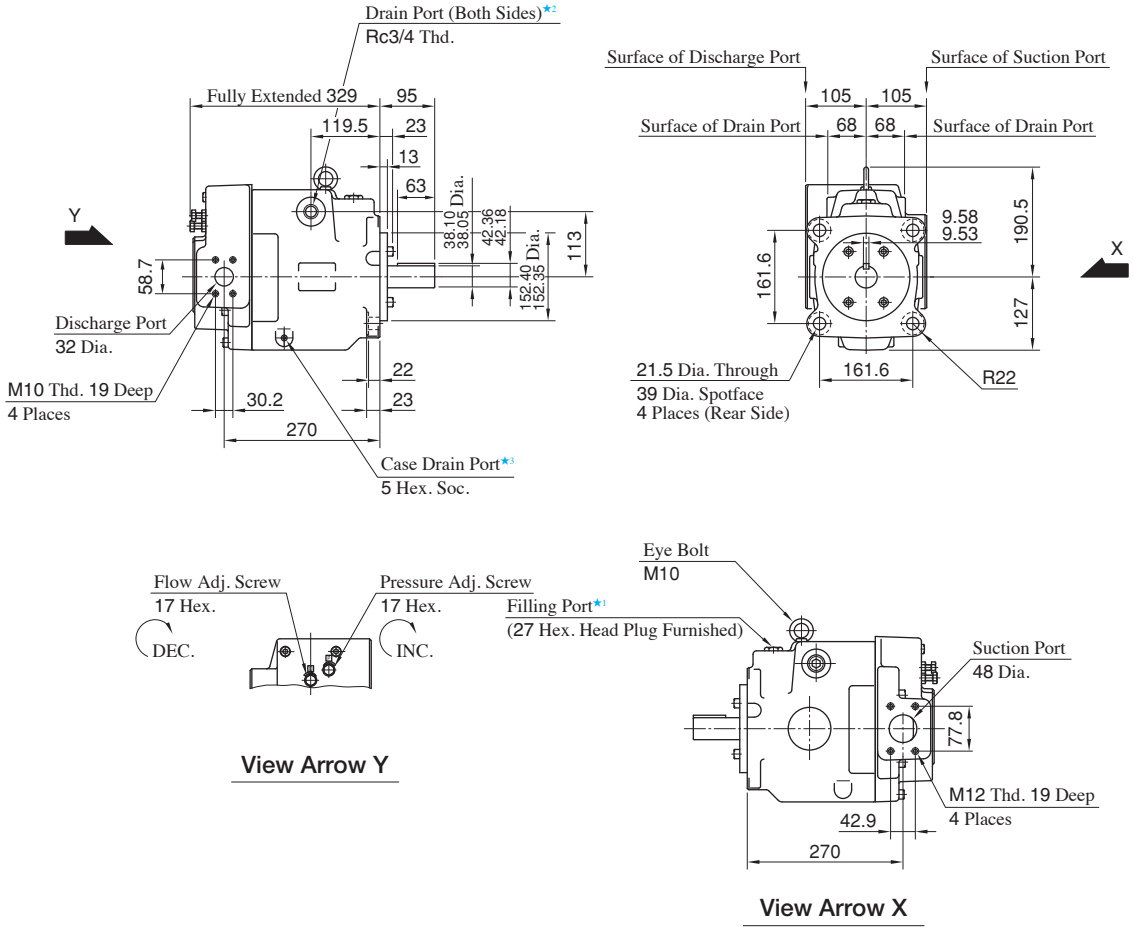
Foot Mtg. : A70-LR01 ∗ S



● For other dimensions, refer to "Flange Mtg.".

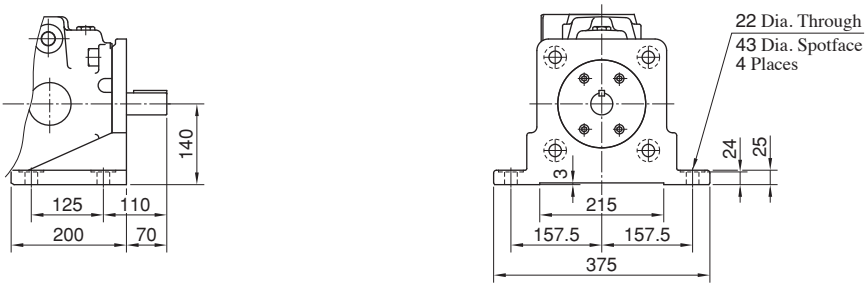
Side Port Type

Flange Mtg. : A90-FR01＊S
A100-FR01＊S



★1. Install the pump so that the “Filling Port” is at the top.
★2. Use either port of the two drain ports at your option. Keep the remaining port plugged.
★3. Case drain port is available for use when draining hydraulic fluid from pump casing.

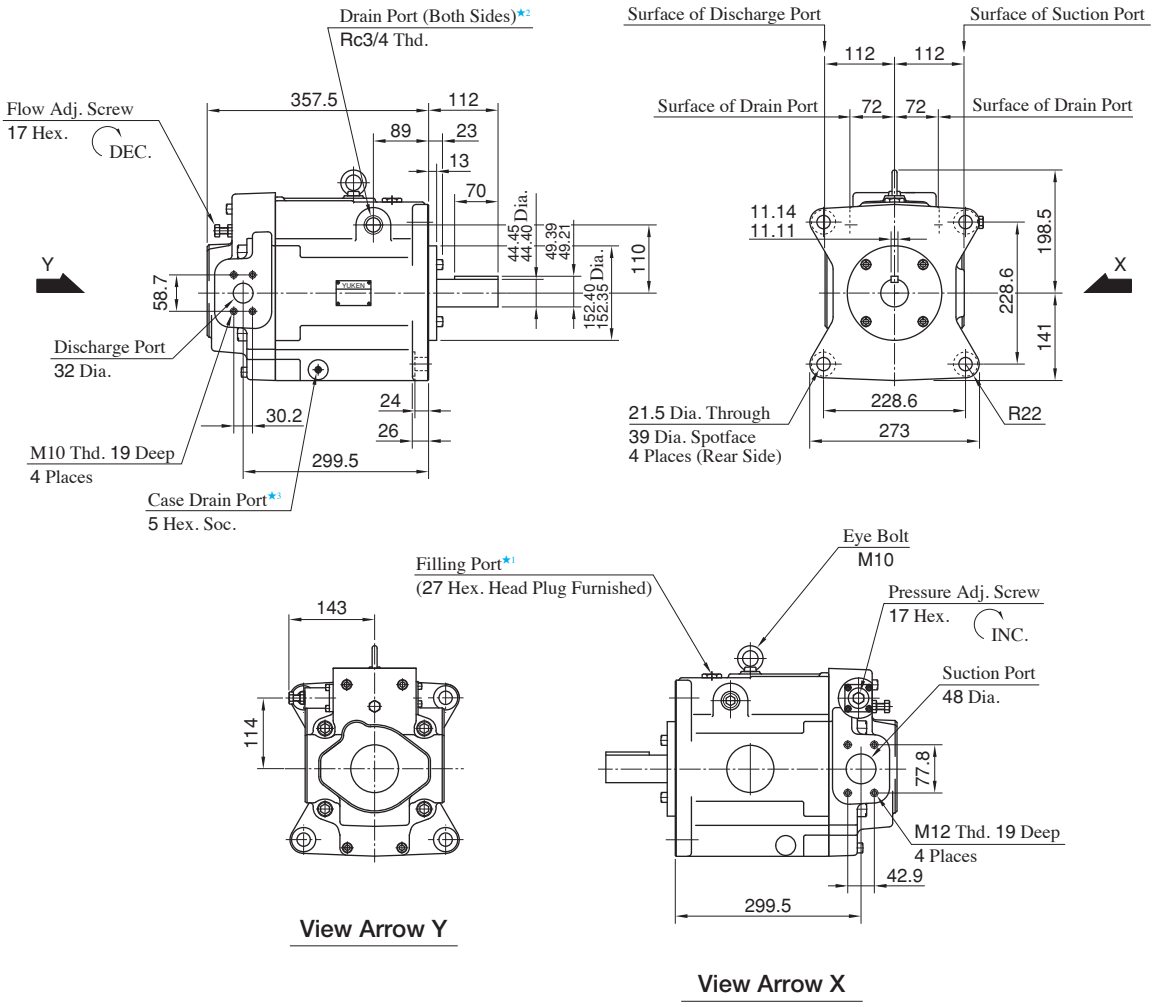
Foot Mtg. : A90-LR01＊S
A100-LR01＊S



● For other dimensions, refer to “Flange Mtg.”.

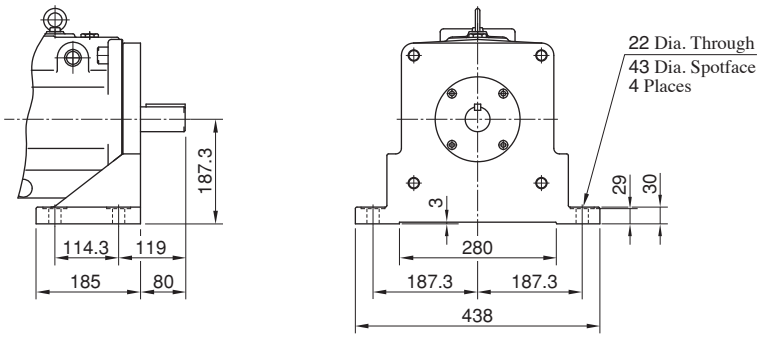
Side Port Type

Flange Mtg. : A145-FR01 ∗ S



★1. Install the pump so that the “Filling Port” is at the top.
★2. Use either port of the two drain ports at your option. Keep the remaining port plugged.
★3. Case drain port is available for use when draining hydraulic fluid from pump casing.

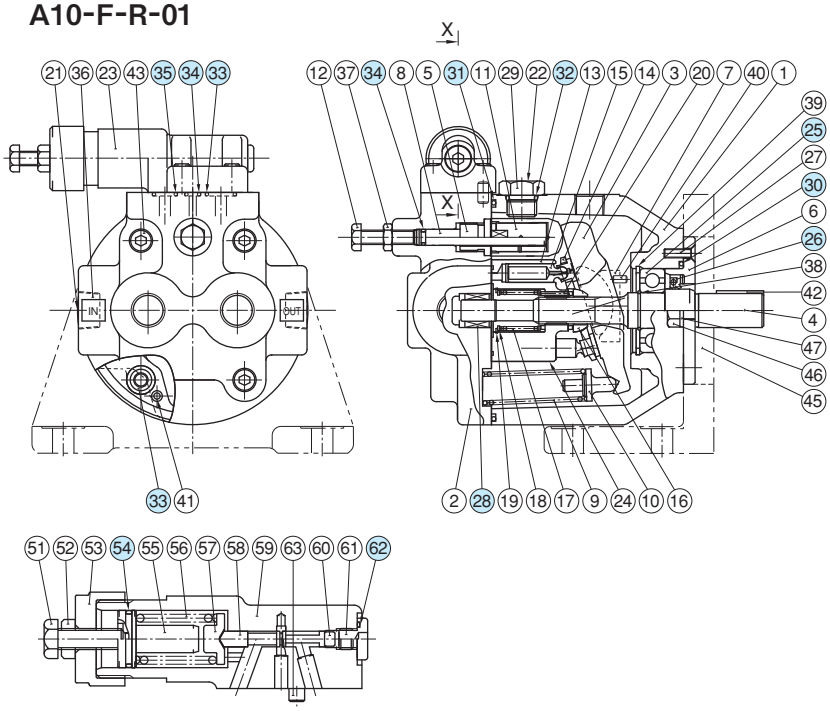
Foot Mtg. : A145-LR01 ∗ S



● For other dimensions, refer to “Flange Mtg.”.

Spare Parts List

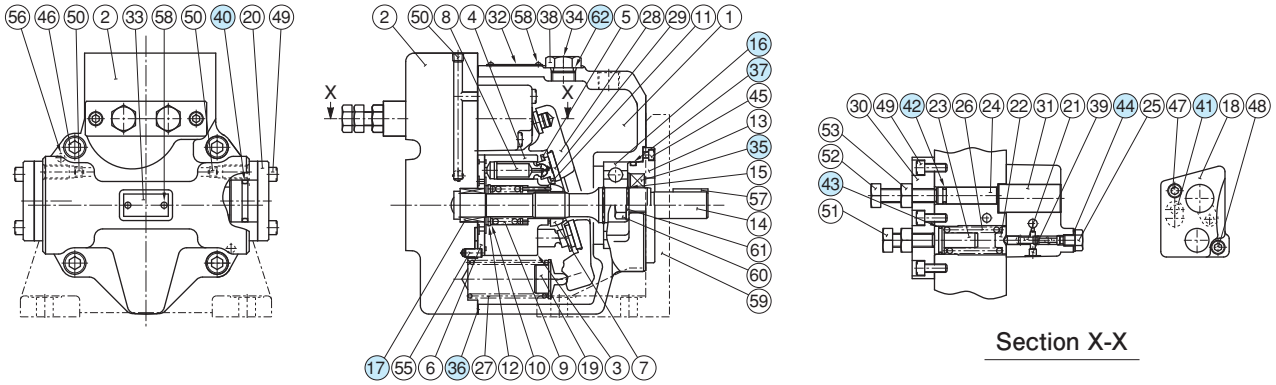
A10-F-R-01



Section X-X

Item	Name of Parts	Part Numbers	Qty.
25	Bearing	6204	1
26	Oil Seal	TCN24408Y	1
28	Bearing	HMK1215	1
30	O-Ring	OR-NBR-70-1 G50-N	1
31	O-Ring	OR-NBR-90 G120-N	1
32	O-Ring	OR-NBR-90 P14-N	1
33	O-Ring	OR-NBR-90 P12-N	5
34	O-Ring	OR-NBR-90 P6-N	2
35	O-Ring	OR-NBR-90 P9-N	1
54	O-Ring	AS568-018 (NBR-70-1)	1
62	O-Ring	OR-NBR-90 P10-N	1

A16/A22/A37/A45/A56-＊-R-01

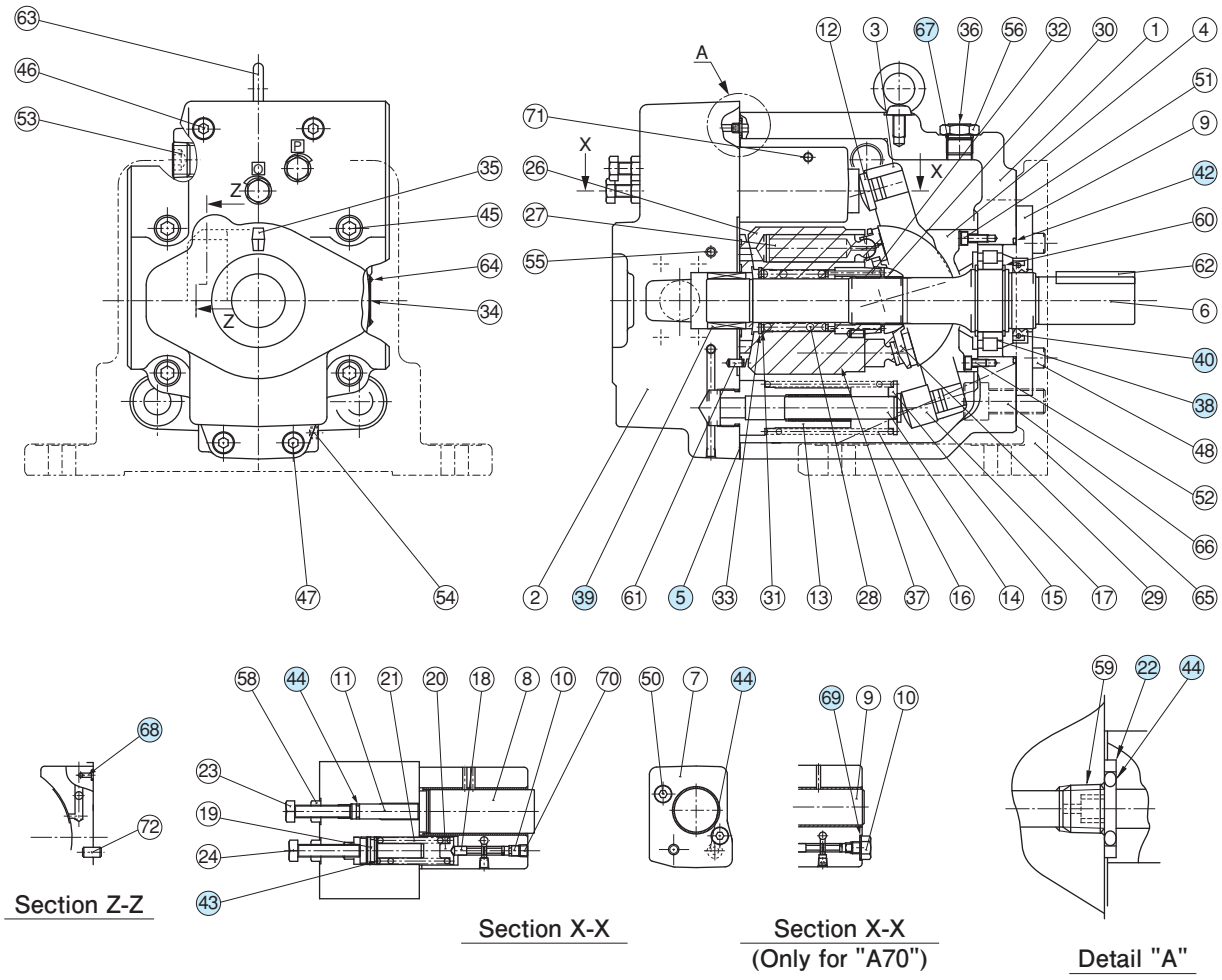


Section X-X

Item	Name of Parts	Part Numbers				Qty.
		A16-＊-R-01	A22-＊-R-01	A37-＊-R-01 A45-＊-R-01	A56-＊-R-01	
16	Bearing	6305		6307	NUP 207E	1
17	Bearing	HMK 1715	Z30-1303-PK410300-8	HMK 2025V2	HMK 2530V2	1
35	Oil Seal	TCN 254511		TCN 355511	TCN 355511	1
36	Gasket	130-PK211969-1		1316-PK211970-9	1307-PK21197-7	1
37	O-Ring	OR-NBR-70-1 G55-N		OR-NBR-70-1 G75-N		1
40	O-Ring	OR-NBR-70-1 G25-N		OR-NBR-70-1 G30-N	OR-NBR-70-1 P36-N	2
41	O-Ring	OR-NBR-90 P12-N		OR-NBR-90 P10A-N		1
42	O-Ring	OR-NBR-90 P9-N				1
43	O-Ring	AS568-017 (NBR-70-1)				1
44	Seal Washer	W8				1
62	O-Ring	OR-NBR-90 P14-N				1

Spare Parts List

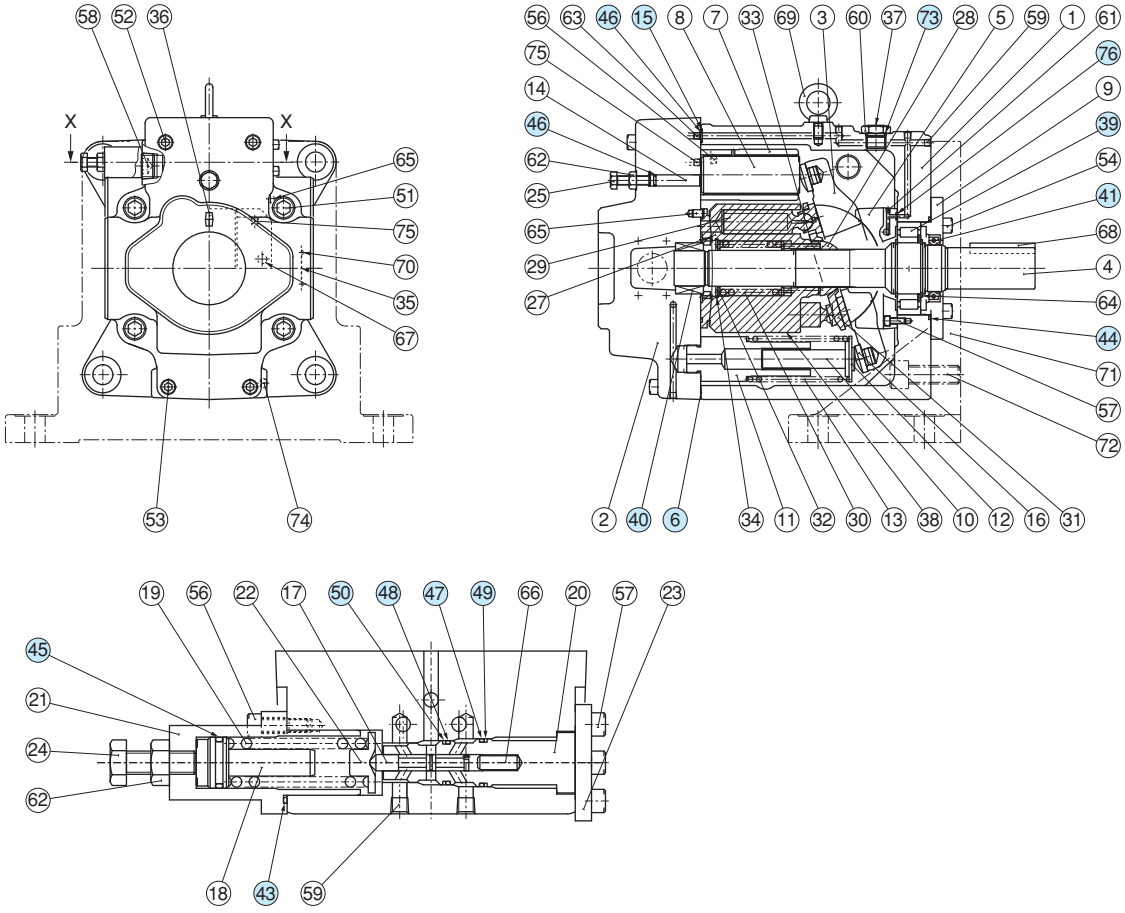
A70/A90/A100-＊R01＊S



Item	Name of Parts	Part Numbers		Qty.
		A70-＊R01＊S	A90-＊R01＊S A100-＊R01＊S	
5	Gasket	1314E-PK211972-5	1310E-PK211973-3	1
22	Back Up Ring	1310E-PK412440-0	1310E-PK412440-0	1
38	Bearing	NUP 208EX50	NUP 210E	1
39	Needle Bearing	HMK 3030V2	HMK 3530BV2	1
40	Oil Seal	TCN 355511 (FKM)	TCN 456812 (FKM)	1
42	O-Ring	OR-FKM-90 G85-N	OR-FKM-90 G95-N	1
43	O-Ring	OR-NBR-70-1 P18-N	OR-NBR-70-1 P18-N	1
44	O-Ring	OR-NBR-90 P9-N	OR-NBR-90 P9-N	3
67	O-Ring	OR-NBR-90 P14-N	OR-NBR-90 P18-N	1
68	O-Ring	OR-NBR-90 P5-N	OR-NBR-90 P5-N	1
69	Seal Washer	W10	——	1

Spare Parts List

A145-＊R01＊S

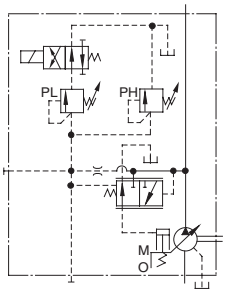


Section X-X

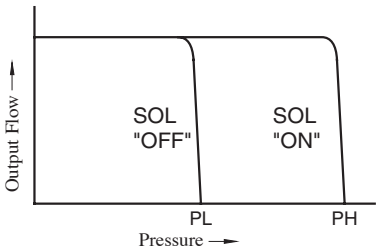
Item	Name of Parts	Part Numbers	Qty.
6	Gasket	1312-PK211974-1	1
15	Back Up Ring	1310E-PK412440-0	1
39	Bearing	NUP 2211ET2	1
40	Needle Bearing	8Q-NK38×55×30	1
41	Oil Seal	TCN 507212 (FKM)	1
43	O-Ring	S-31.5 (NBR-70)	1
44	O-Ring	OR FKM-90 G105-N	1
45	O-Ring	OR NBR-70-1 P18-N	1
46	O-Ring	OR NBR-90 P9-N	2
47	O-Ring	AS568-017 (NBR-70-1)	1
48	O-Ring	AS568-016 (NBR-70-1)	1
49	Back Up Ring	For AS568-017 (NBR-70-1)	1
50	Back Up Ring	For AS568-016 (NBR-70-1)	1
73	O-Ring	OR NBR-90 P18-N	1
76	O-Ring	OR NBR-90 P5-N	1

Series Variable Displacement Piston Pumps, Solenoid Two Pressure Control Type

Graphic Symbol



Performance Characteristics



Specifications

Model Numbers	Geometric Displacement cm^3/rev	Minimum Adj. Flow cm^3/rev	Operating Pressure MPa		Minimum Adj. Pres. MPa	Shaft Speed Range r/min		Approx. Mass kg	
			Rated★2	Intermittent★1		Max.	Min.	Flange Mtg.	Foot Mtg.
A16-＊-R-02-＊-K＊-32	15.8	4	16	21	1.2	1800	600	24.5	26.7
A22-＊-R-02-＊-K＊-32	22.2	6	16	16	1.2	1800	600	24.5	26.7
A37-＊-R-02-＊-K＊-32	36.9	10	16	21	1.2	1800	600	36	40.3
A56-＊-R-02-＊-K＊-32	56.2	12	16	21	1.2	1800	600	43	47.3
A70-＊R02S＊-70	70.0	36	25	25	2	1800	600	63.5	75.5
A90-＊R02S＊-70	91.0	56	25	25	2	1800	600	80.5	101
A145-＊R02S＊-60	145	83	25	25	2	1800	600	97.5	122.5

★1. Whenever setting pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.
★2. When operating the pump exceeding the rated pressure, operating conditions are restricted. Refer to page A-28 for the details.

Solenoid Ratings

Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
			Source Rating	Serviceable Range	Inrush (A)★2	Holding (A)	Power (W)
AC	A100	50	100	80 - 110	2.42	0.51	—
		60	100	90 - 120	2.14	0.37	
			110		2.35	0.44	
	A120	50	120	96 - 132	2.02	0.42	
		60		108 - 144	1.78	0.31	
	A200	50	200	160 - 220	1.21	0.25	
		60	200	180 - 240	1.07	0.19	
			220		1.18	0.22	
	A240	50	240	192 - 264	1.01	0.21	
		60		216 - 288	0.89	0.15	
DC (K Series)	D12	—	12	10.8 - 13.2	—	2.45	29
	D24		24	21.6 - 26.4		1.23	
	D48		48	43.2 - 52.8		0.61	
AC→DC Rectified(R)★1	R100	50/60	100	90 - 110	—	0.33	29
	R200		200	180 - 220		0.16	

★1. R type models with built-in current rectifier is recommended for shockless operation with AC power.
★2. Inrush current in the above table show rms values at maximum stroke.

Model Number Designation

A16	-F	-R	-02	-S	-K	-A100	-32
Series Number	Mounting	Direction of Rotation	Control Type	Port Position	Shaft Extension	Coil Type of Solenoid Valve	Design Number
A16 (15.8 cm^3/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	02: Solenoid Two Pressure Control Type	None: Axial Port S: Side Port	K: Keyed Shaft	AC A100, A120 A200, A240 DC D12, D24 D48 R (AC→DC Rectified) R100, R200	32
A22 (22.2 cm^3/rev)							32
A37 (36.9 cm^3/rev)							32
A56 (56.2 cm^3/rev)							32

A70	-F	R	02	S	A100	-70
Series Number	Mounting	Direction of Rotation	Control Type	Port Position	Coil Type of Solenoid Valve	Design Number
A70 (70.0 cm^3/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	02: Solenoid Two Pressure Control Type	S: Side Port	AC A100, A120 A200, A240 DC D12, D24 D48 R (AC→DC Rectified) R100, R200	70
A90 (91.0 cm^3/rev)						70
A145 (145 cm^3/rev)						60

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.

Performance Characteristics

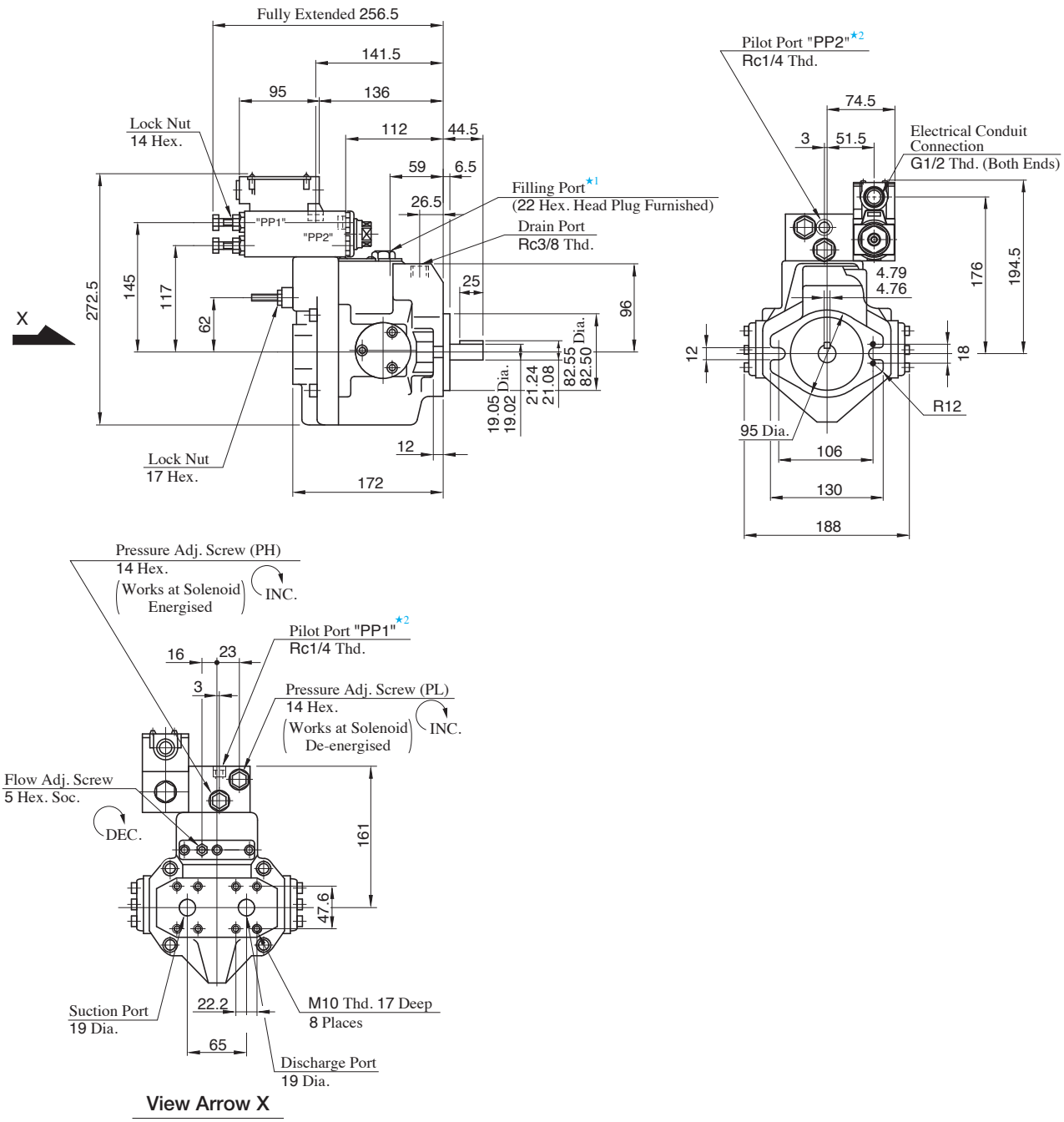
For performance characteristics, refer to models of pressure compensator type on page A-32 to A-34, A-36 to A-38 and A-40.

Pipe Flange Kits

For pipe flange, refer to form of pressure compensator type on page A-29.

Axial Port Type

Flange Mtg. : A16-F-R-02-K
A22-F-R-02-K



View Arrow X

★1. Install the pump so that the "Filling Port" is at the top.
★2. The pilot port provided is for connecting a control valve, if multistage pressure control is required.

Side Port Type

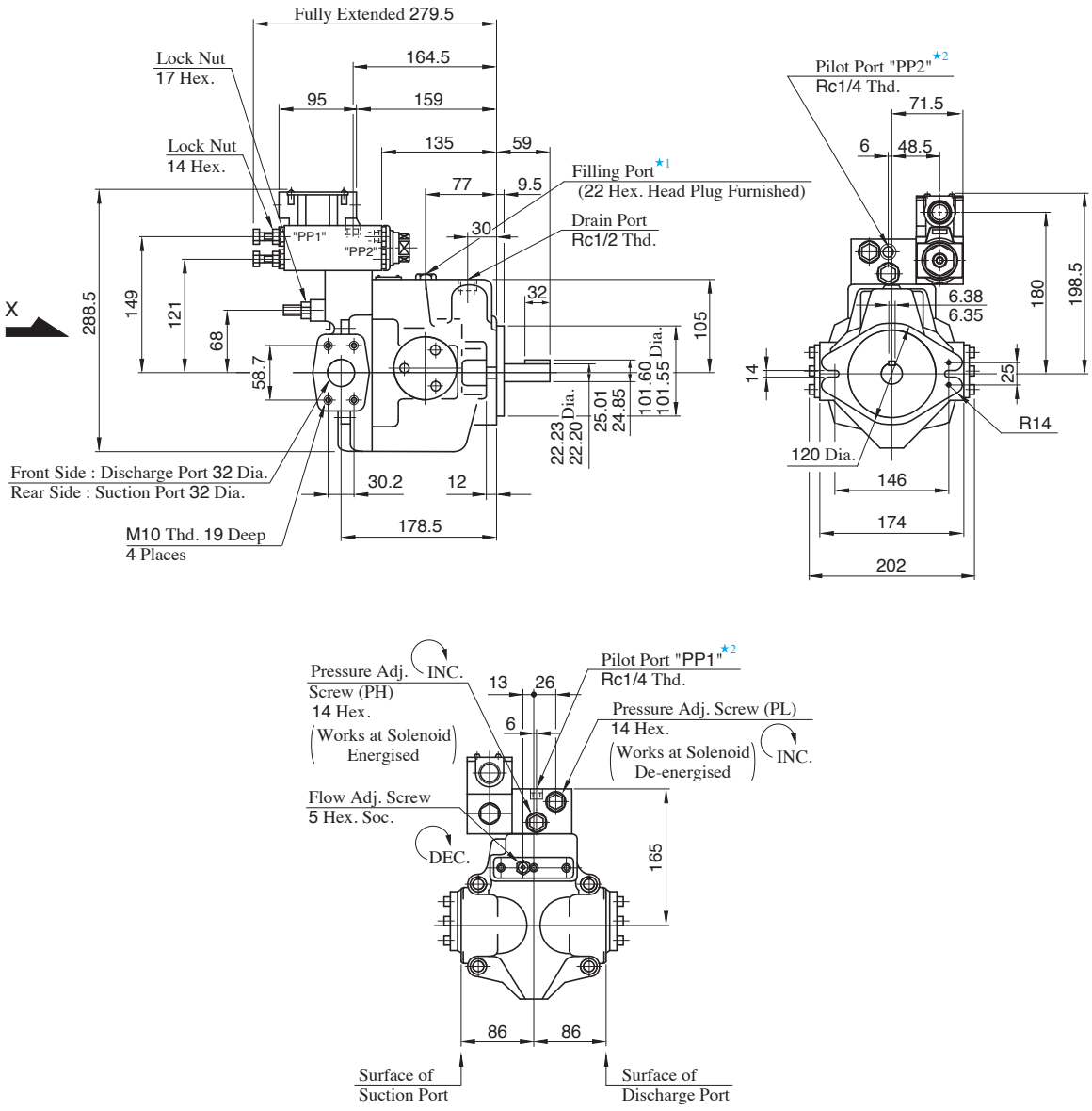
Port mounting dimensions are the same as those of pressure compensator model.
Refer to page A-42 for port mounting dimensions.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-42 for the dimensions of mounting bracket.

Side Port Type

Flange Mtg. : A37-F-R-02-S-K



View Arrow X

★1. Install the pump so that the "Filling Port" is at the top.
★2. The pilot port provided is for connecting a control valve, if multistage pressure control is required.

Axial Port Type

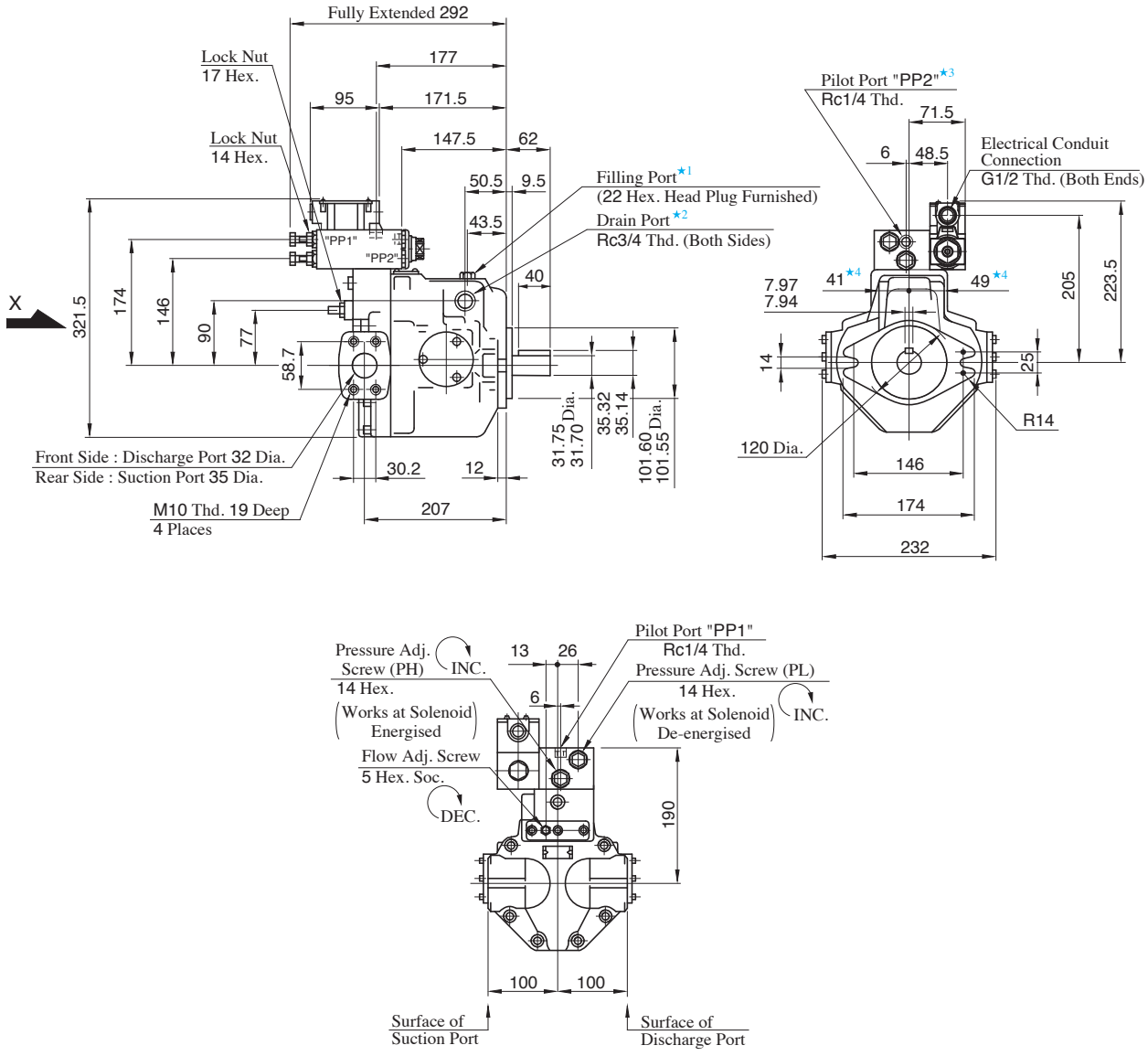
Port mounting dimensions are the same as those of pressure compensator model.
Refer to page A-43 for port mounting dimensions.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-43 for the dimensions of mounting bracket.

Side Port Type

Flange Mtg. : A56-F-R-02-S-K



View Arrow X

★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
★4. Dimensions show surface of drain port.

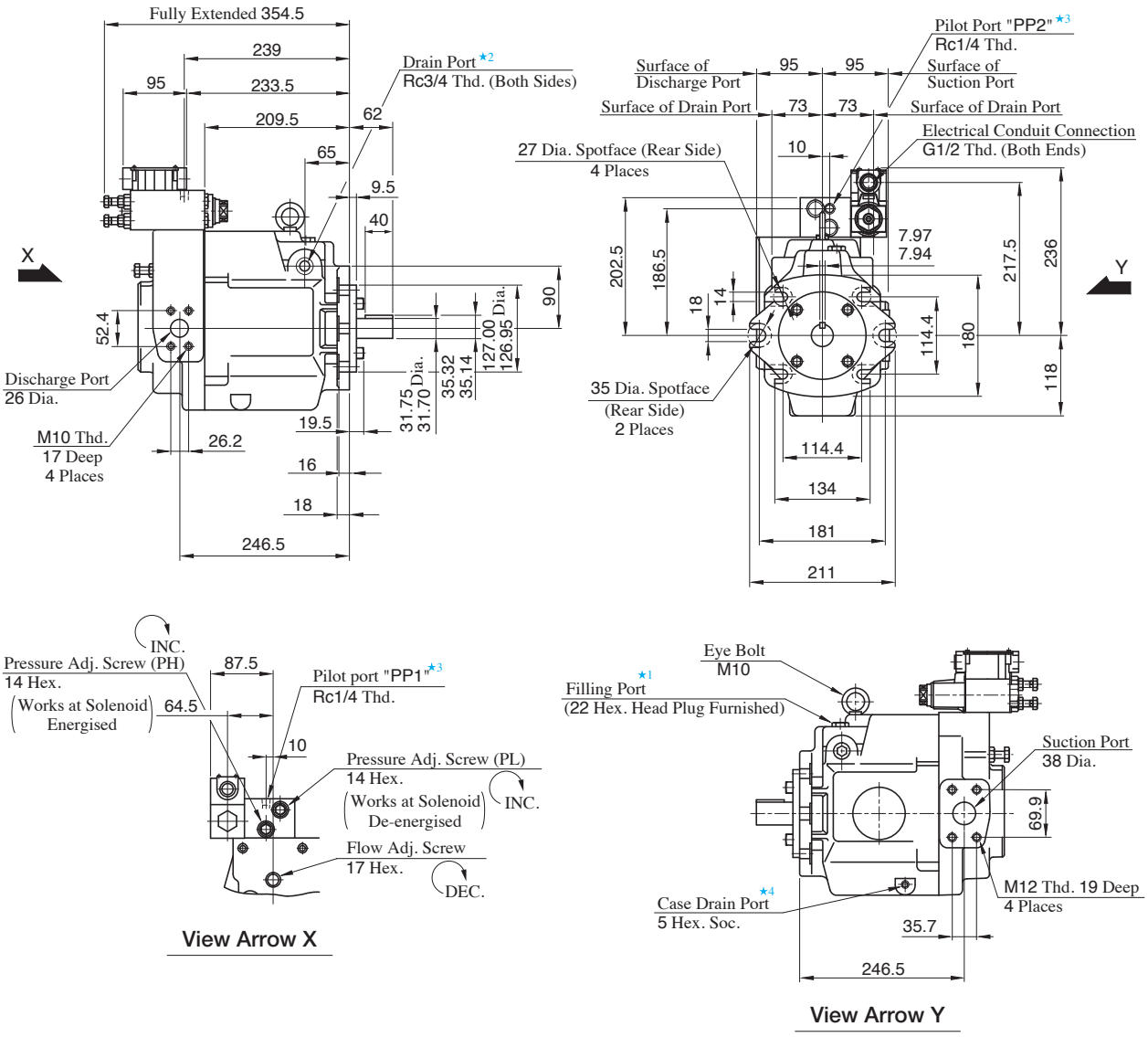
Axial Port Type

Port mounting dimensions are the same as those of pressure compensator model.
Refer to page A-44 for port mounting dimensions.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-44 for the dimensions of mounting bracket.

Flange Mtg. : A70-FR02＊

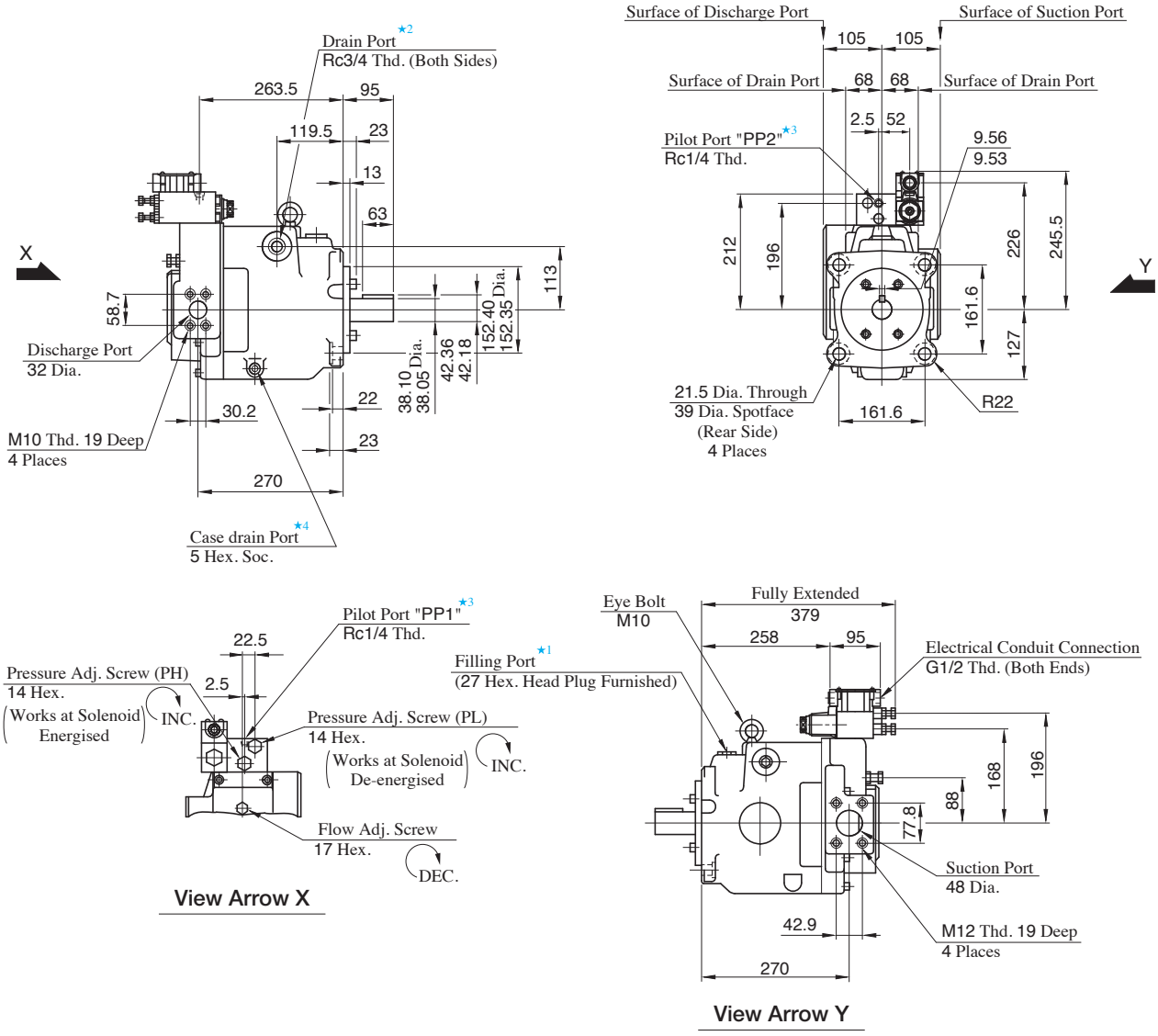


★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
★4. Case drain port is available for use when draining hydraulic fluid from pump casing.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-45 for the dimensions of mounting bracket.

Flange Mtg. : A90-FR02 ✻

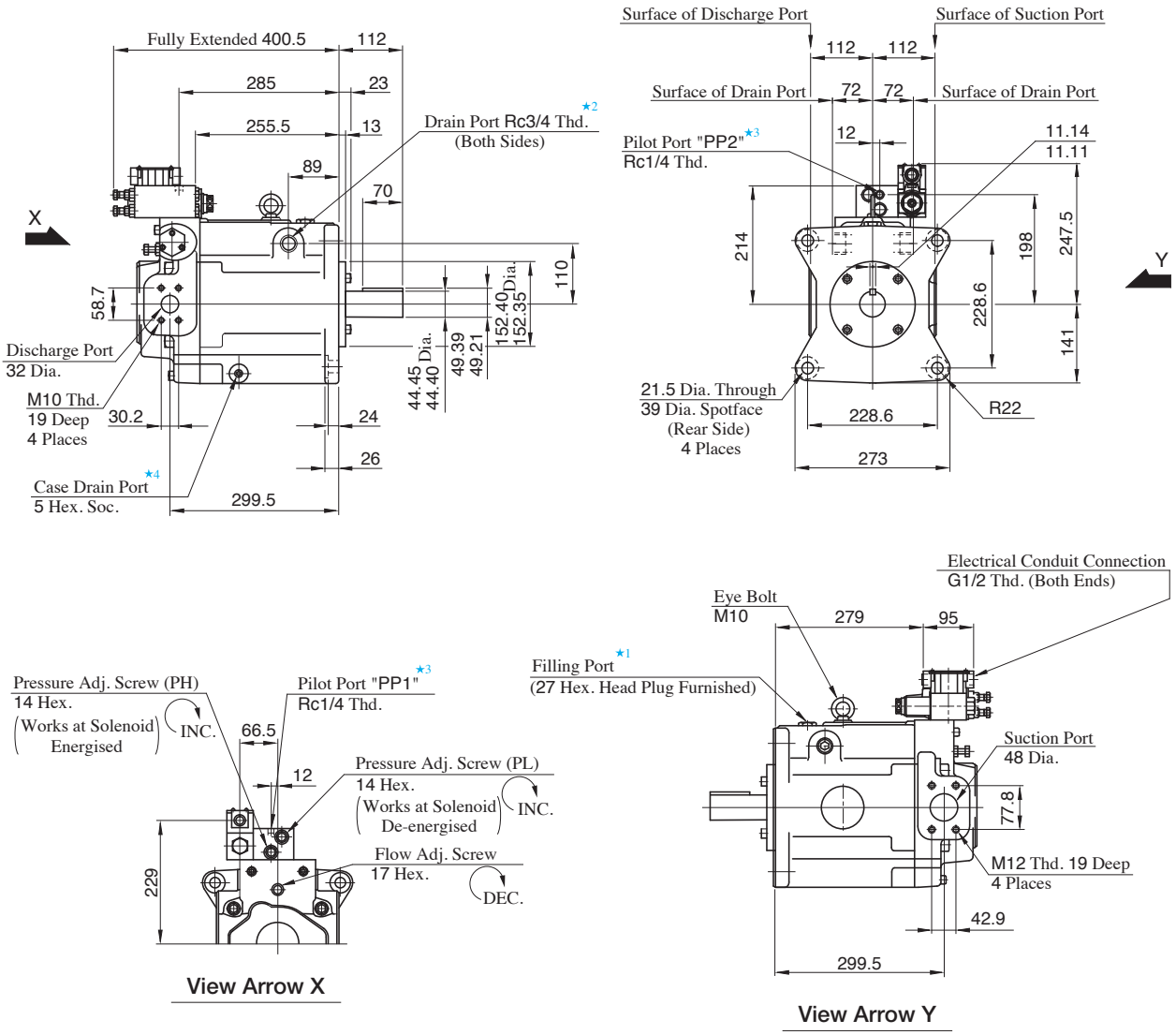


★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
★4. Case drain port is available for use when draining hydraulic fluid from pump casing.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-46 for the dimensions of mounting bracket.

Flange Mtg. : A145-FR02＊



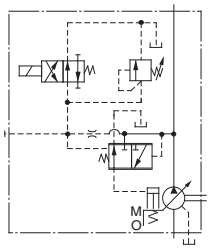
★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
★4. Case drain port is available for use when draining hydraulic fluid from pump casing.

● Foot Mounting Type

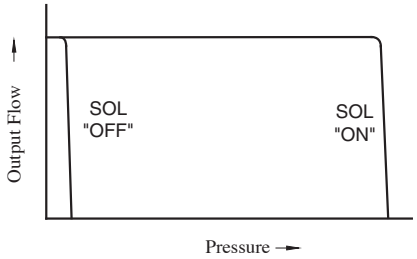
Mounting bracket is common to that of pressure compensator model.
Refer to page A-47 for the dimensions of mounting bracket.

A Series Variable Displacement Piston Pumps, Pressure Compensator with Unloading Type

Graphic Symbol



Performance Characteristics



Specifications

Model Numbers	Geometric Displacement cm³/rev	Minimum Adj. Flow cm³/rev	Operating Pressure MPa		Unloading Pressure MPa	Shaft Speed Range r/min	
			Rated	Intermittent		Max.	Min.
A16-＊-R-03-＊-K-＊-32	15.8	4	16	21	1.2	1800	600
A22-＊-R-03-＊-K-＊-32	22.2	6	16	16	1.2	1800	600
A37-＊-R-03-＊-K-＊-32	36.9	10	16	21	1.2	1800	600
A56-＊-R-03-＊-K-＊-32	56.2	12	16	21	1.2	1800	600
A70-＊R03S＊-70	70.0	36	25	25	1.2	1800	600
A90-＊R03S＊-70	91.0	56	25	25	1.2	1800	600
A145-＊R03S＊-60	145	83	25	25	1.2	1800	600

Model Number Designation

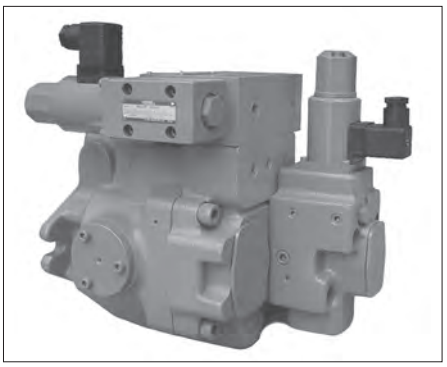
A16	-F	-R	-03	-S	-K	-A100	-32
Series Number	Mounting	Direction of Rotation	Control Type	Port Position	Shaft Extension	Coil Type of Solenoid Valve	Design Number
A16 (15.8 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	03: Pressure Compensator with Unloading Type	None: Axial Port S: Side Port	K: Keyed Shaft	AC A100, A120 A200, A240 DC D12, D24 D48 R (AC→DC Rectified) R100, R200	32
A22 (22.2 cm³/rev)							32
A37 (36.9 cm³/rev)							32
A56 (56.2 cm³/rev)							32

A70	-F	R	03	S	A100	-70
Series Number	Mounting	Direction of Rotation	Control Type	Port Position	Coil Type of Solenoid Valve	Design Number
A70 (70.0 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	03: Pressure Compensator with Unloading Type	S: Side Port	AC A100, A120 A200, A240 DC D12, D24 D48 R (AC→DC Rectified) R100, R200	70
A90 (91.0 cm³/rev)						70
A145 (145 cm³/rev)						60

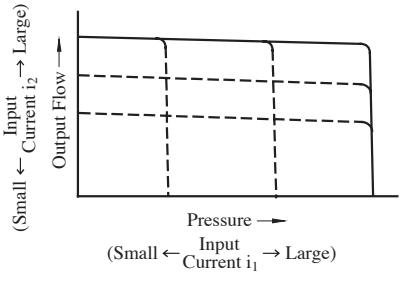
★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.

Consult Yuken when detailed material such as dimensions figures is required.

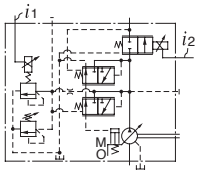
A Series Variable Displacement Piston Pumps, Proportional Electro-Hydraulic Load Sensing Type



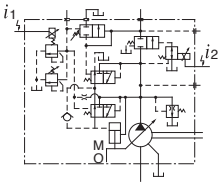
Performance Characteristics



Graphic Symbols



A16/A22/A37/A56



A70/A90/A100/A145

Model Number Designation

A56	-F	-R	-04	-C	-K	-32
Series Number	Mounting	Direction of Rotation	Control Type	Pressure Adj. Range MPa	Shaft Extension	Design Number
A16 (15.8 cm^3/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1	04: Proportional Electro-Hydraulic Load Sensing Type	B: 1.5 - 6.9 (220 - 1000) C: 1.5 - 15.7 (220 - 2280) H: 1.5 - 20.6 (220 - 2990)	K: Keyed Shaft	32
A22 (22.2 cm^3/rev)				B: 1.5 - 6.9 (220 - 1000) C: 1.5 - 15.7 (220 - 2280)		32
A37 (36.9 cm^3/rev)				B: 2 - 6.9 (290 - 1000) C: 2 - 15.7 (290 - 2280) H: 2 - 20.6 (290 - 2990)		32
A56 (56.2 cm^3/rev)						32

A70	-F	R	04	C	S	-70
Series Number	Mounting	Direction of Rotation	Control Type	Pressure Adj. Range MPa	Port Position	Design Number
A70 (70.0 cm^3/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1	04: Proportional Electro-Hydraulic Load Sensing Type	C: 1.5 - 16 (220 - 2320) H: 1.5 - 21 (220 - 3050)	S: Side Port	70
A90 (91.0 cm^3/rev)						70
A100 (100 cm^3/rev)						20
A145 (145 cm^3/rev)						60

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.

Pipe Flange Kits

Pipe flange kits are available. When ordering, specify the kit number from the table below.

Pump Model Numbers	Name of Port	Pipe Flange Kit Numbers		
		Threaded Connection	Socket Welding★1	Butt Welding
A16-＊-R-04 A22-＊-R-04	Suction	F5-06-A-10	F5-06-B-10	F5-06-C-10
	Discharge	—★2	—★2	—★2
A37-＊-R-04 A56-＊-R-04	Suction	F5-10-A-10	F5-10-B-10	F5-10-C-10
	Discharge	F5-06-A-10	F5-06-B-10	F5-06-C-10
A 70-＊R04	Suction	F5-12-A-10	F5-12-B-10	F5-12-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10
A 90-＊R04 A100-＊R04 A145-＊R04	Suction	F5-16-A-10	F5-16-B-10	F5-16-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10

★1. In case of using socket welding flanges, there is a case where the operating pressure should be set lower than the normal because of strength of the flanges. Therefore, please pay cautious attention to the operating pressure when the socket welding flanges are used.
★2. Discharge port for pump model "A16" and "A22" is available only the threaded connections.

● Details of the pipe flange kits are shown on pages A-258 and A-259.

Instructions

Bleeding Air

In order to get steadily controlled pressure and flow, bleed air by loosening the air vent screw and fill solenoid armature with operating oil.

Manual Adjustment Screws

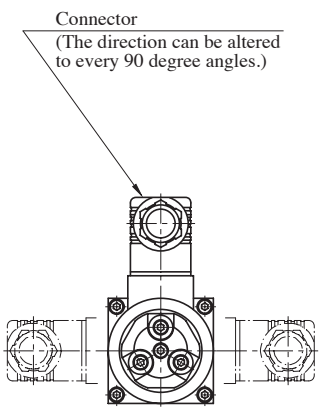
Manual adjustment screws may be used for initial running adjustment or in case of electrical failures in order to adjust pressure and flow temporarily. In case of normal use, put the manual adjustment screws back in their preset positions.

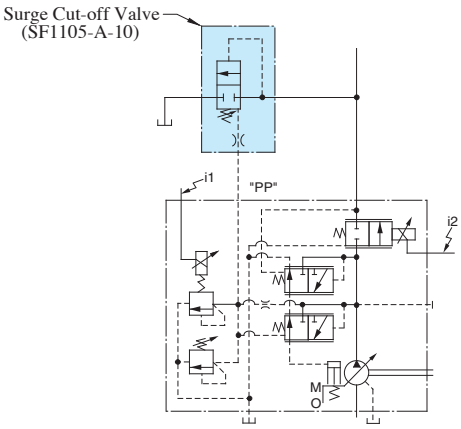
Position of Cable Departure

Position of cable departure can be changed. For details, refer to drawing below.

Connection of Surge Cut-off Valve to "A" Series Pump (For A16 to A56 Type)

If using surge cut-off valve (SF1105-A-10), connect between pilot port "PP" of this pump and port "PP" of surge cut-off valve as pilot piping (refer to symbol below).
Inside diameter of pipe should be more than 8 mm.
Consult Yuken for details of surge cut-off valve.





Specifications

Descriptions \ Model Numbers			A16	A22	A37	A56	A70	A90	A100	A145
Geometric Displacement		cm^3/rev	15.8	22.2	36.9	56.2	70.0	91.0	100	145
Operating Pressure MPa		Rated★2	16	16	16	16	21	21	21	21
		Intermittent★1	21	16	21	21	21	21	21	21
Shaft Speed Range r/min		Max.	1800	1800	1800	1800	1800	1800	1800	1800
		Min.	600	600	600	600	600	600	600	600
Flow Control	Flow Adj. Range	L/min	1 - 28.4	1 - 40	1 - 66	1 - 101	1 - 126	1 - 163	1 - 180	2 - 261
	Min. Pres. Required for Flow Adj.	MPa	1.5	1.5	1.5	2.0	1.0	1.0	1.0	1.0
	Differential Pres. (Discharge Pres. -Load Pres.)	MPa	0.37				0.22			
	Step Response★5 (0 → Max. Flow)	ms	70	80	120	125	100	120	120	210
	Hysteresis		3 % or less★1							
	Rated Current	mA	900	700	740	790	820	920	945	920
	Coil Resistance (20°C)	Ω	10							
Pres. Control	Pres. Adj. Range	MPa	Refer to Model Number Designation							
	Step Response ms	t_1★5	80	80	50	55	150	150	150	160
		t_2★5	140	90	80	80	80	120	120	180
	Hysteresis		2 % or less★1							
	Rated Current	mA	(Pres. Adj. Range) B: 770, C:880, H:790				C: 860 H: 765	C: 873 H: 765	C: 873 H: 765	C: 875 H: 755
	Coil Resistance (20°C)	Ω	10							
Applicable Amplifier Model★3			AME-D2-1010-11							
Approx. Mass kg		Flange Mtg.	32	32	38	45	70	88.5	88	109.5
		Foot Mtg.	34.2	34.2	43.2	49.3	82	109	104	134.5

★1. Whenever setting pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.

★2. When operating the pump exceeding the rated pressure, operating conditions are restricted. Refer to page A-28 for details.

★3. Specifications of power amplifiers, consult Yuken for details.

★4. The figure mentioned in the above table are those obtained using Yuken's amplifier.

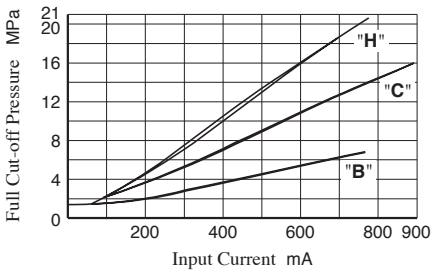
★5. Step response depends on circuit and operating conditions. Data shown in the table above is an example based on the condition right.

Model	Pres. Step Response		Loading Volume
	t_1	t_2	
A16, A22	1.5 → 16 MPa	16 → 1.5 MPa	High Pressure Hose 3/8" × 2 m
A37, A56	2.0 → 16 MPa	16 → 2.0 MPa	High Pressure Hose 3/4" × 2 m
A70, A90 A100, A145	3.0 → 16 MPa	16 → 3.0 MPa	High Pressure Hose 1-1/4" × 2 m

Typical Performance Characteristics at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

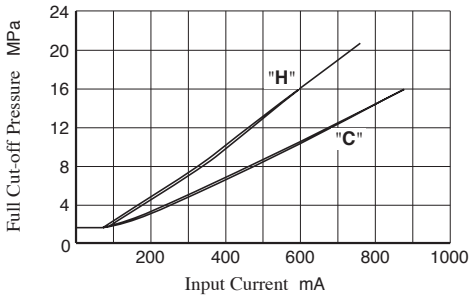
Full Cut-off Pres. vs. Input Signal

A16/A22/A37/A56



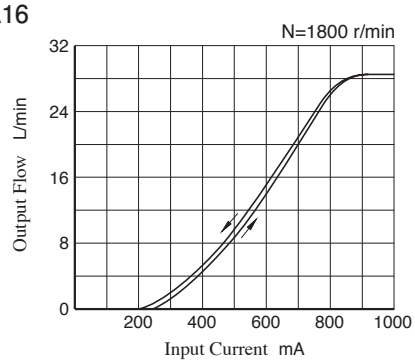
Note: Pressure adjustment range "H" is not available for A22.

A70/A90/A100/A145

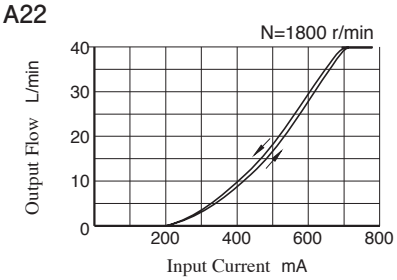


Output Flow vs. Input Current

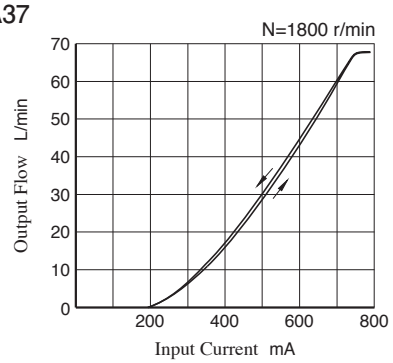
A16



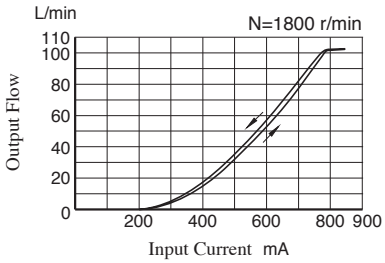
A22



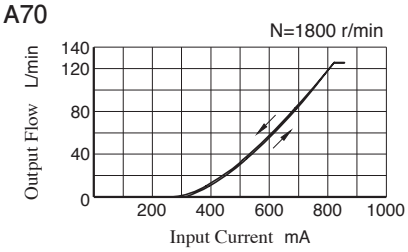
A37



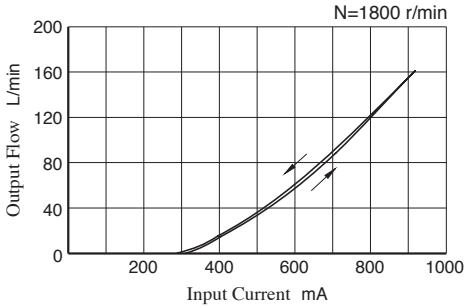
A56



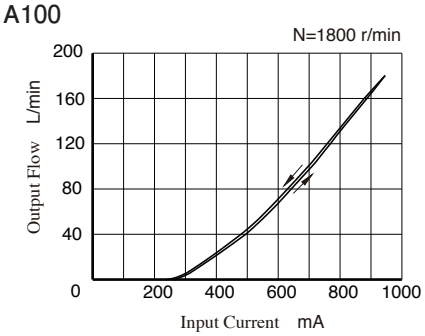
A70



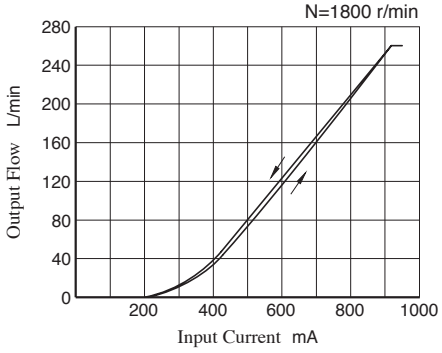
A90



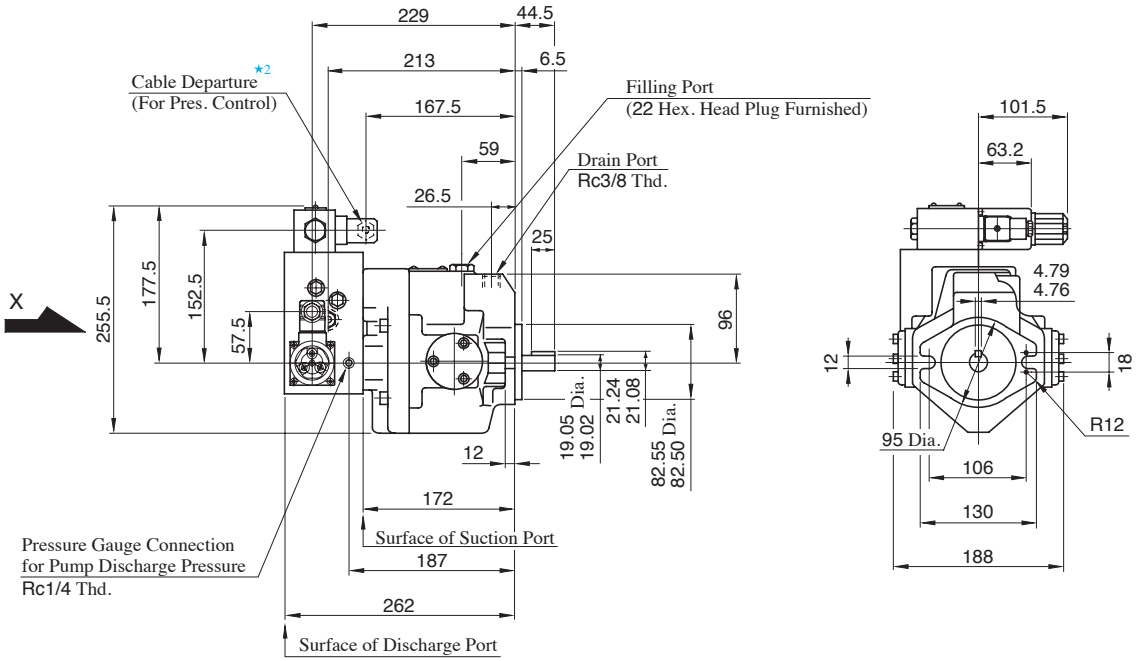
A100

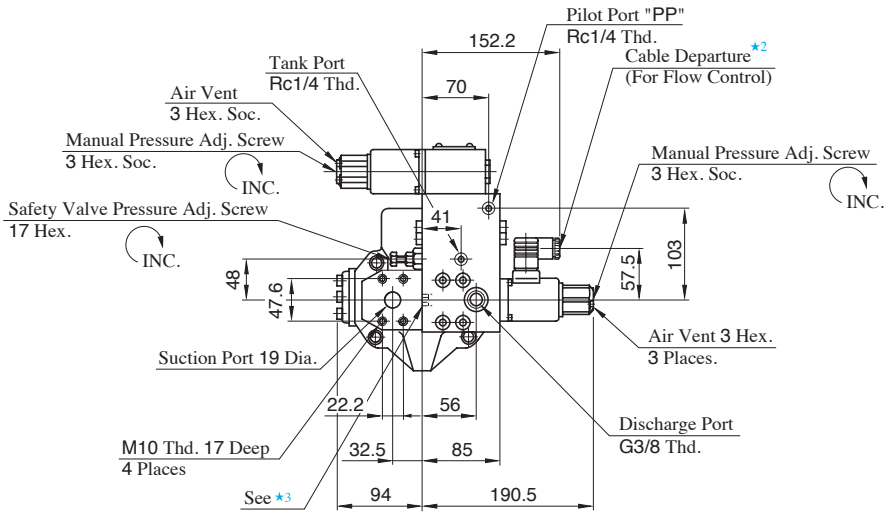


A145



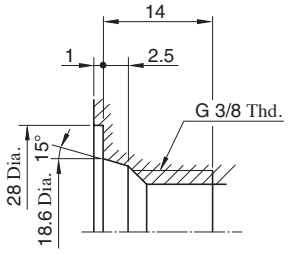
Flange Mtg. : A16-F-R-04∗-K
A22-F-R-04∗-K





View Arrow X

★1. **Detail of Discharge Port**



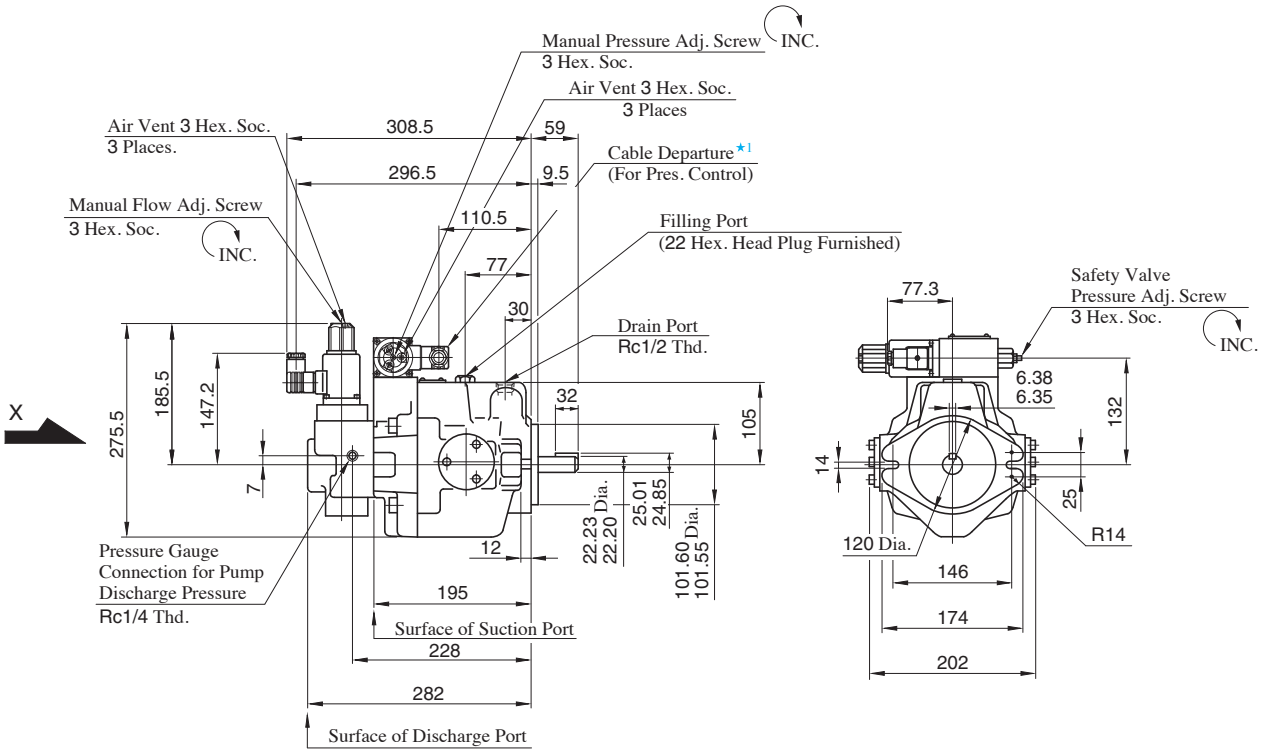
★2. Cable Applicable:
Outside Dia.....8-10 mm
Conductor Area.....Not Exceeding 1.5 mm^2

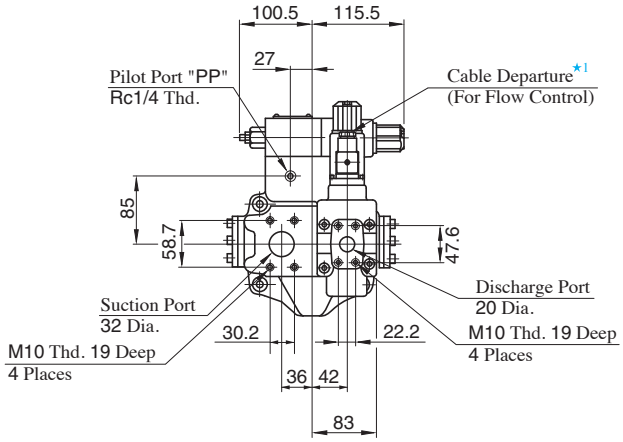
★3. Do not touch the screw because it is adjusted at the time of shipment.

● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-42 for the dimensions of mounting bracket.

Flange Mtg. : A37-F-R-04∗-K

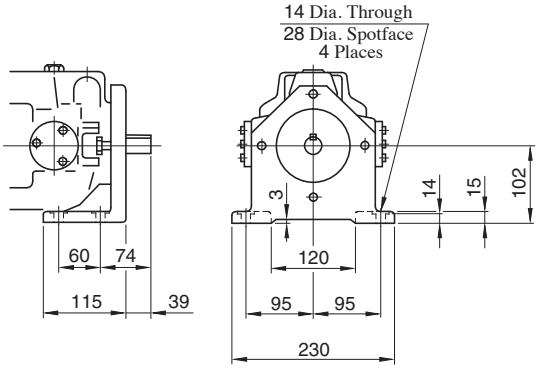




View Arrow X

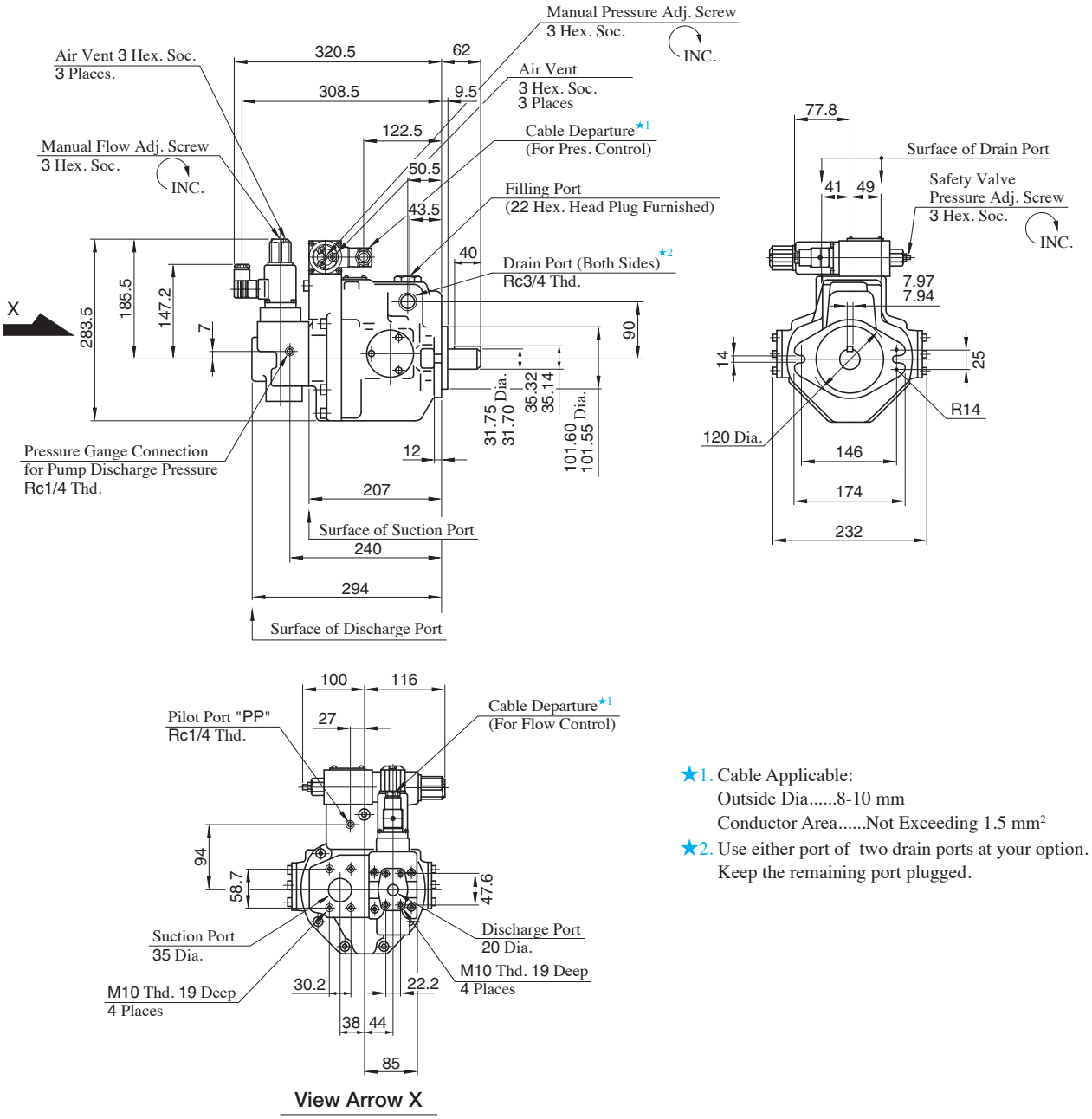
★1. Cable Applicable:
Outside Dia.....8-10 mm
Conductor Area.....Not Exceeding 1.5 mm²

Foot Mtg. : A37-L-R-04∗-K



● For other dimensions, refer to “Flange Mtg.”.

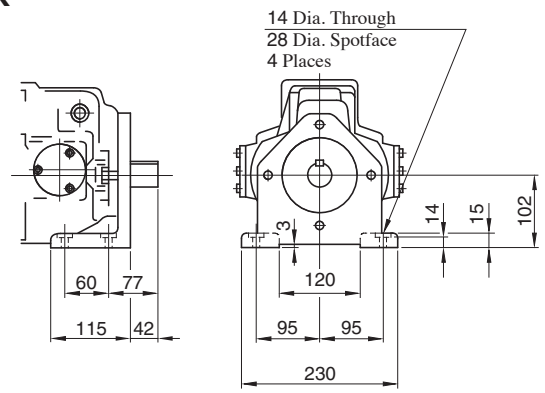
Flange Mtg. : A56-F-R-04∗-K



★1. Cable Applicable:
Outside Dia.....8-10 mm
Conductor Area.....Not Exceeding 1.5 mm²

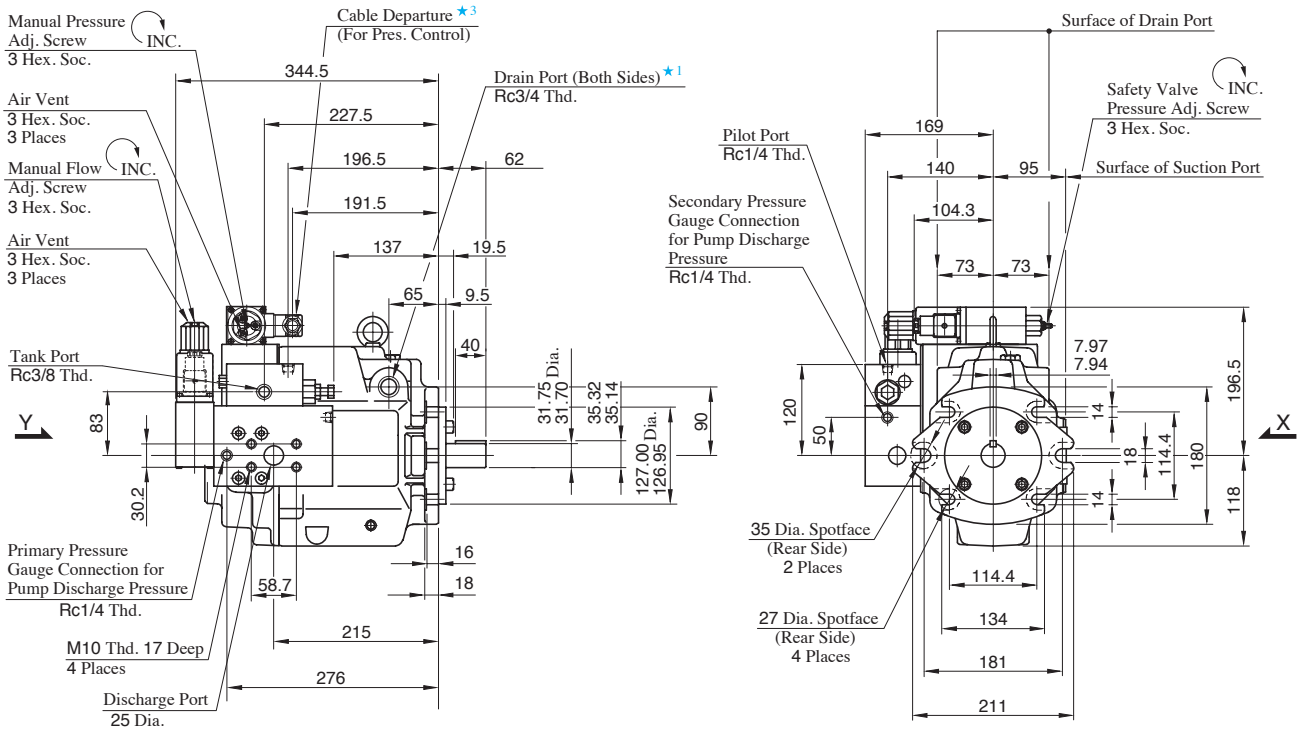
★2. Use either port of two drain ports at your option.
Keep the remaining port plugged.

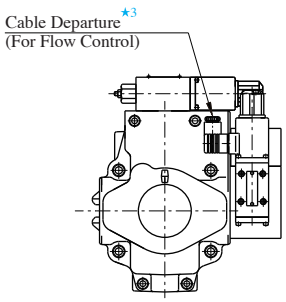
Foot Mtg. : A56-L-R-04∗-K



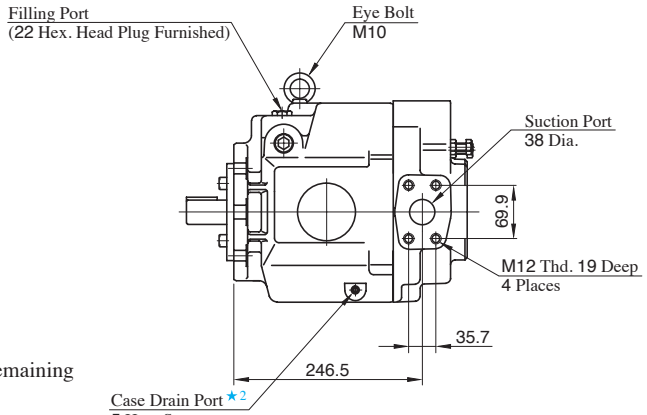
● For other dimensions, refer to “Flange Mtg.”.

Flange Mtg. : A70-FR04∗S





View Arrow Y



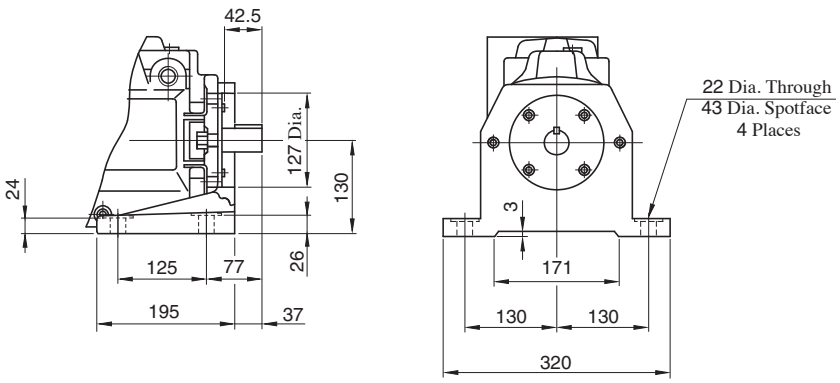
View Arrow X

★1. Use either port of two drain ports at your option. Keep the remaining port plugged.

★2. Case drain port is available for use when draining hydraulic fluid from pump casing.

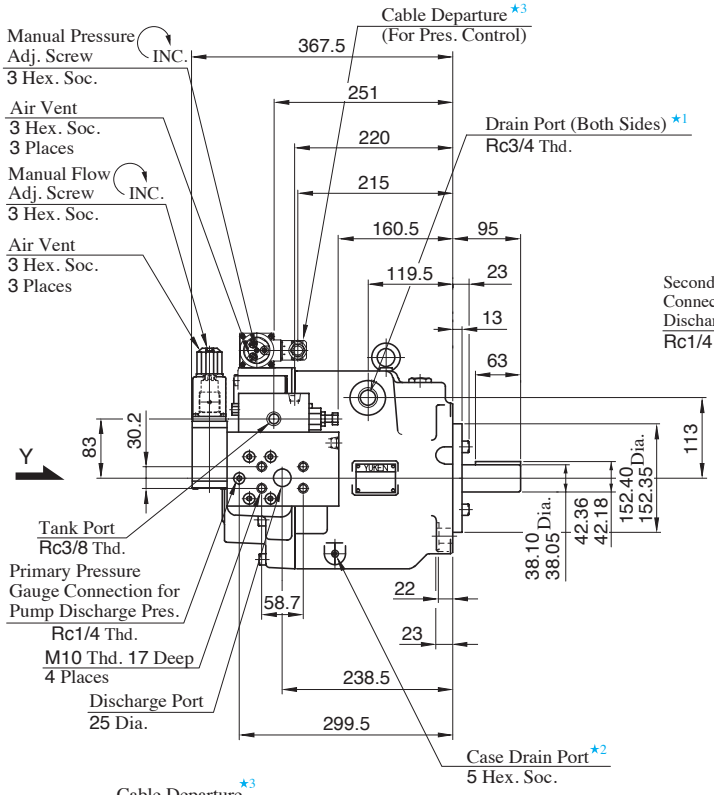
★3. Cable Applicable:
Outside Dia.....8-10 mm
Conductor Area.....Not Exceeding 1.5 mm²

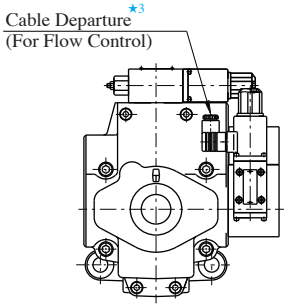
Foot Mtg. : A70-LR04∗S



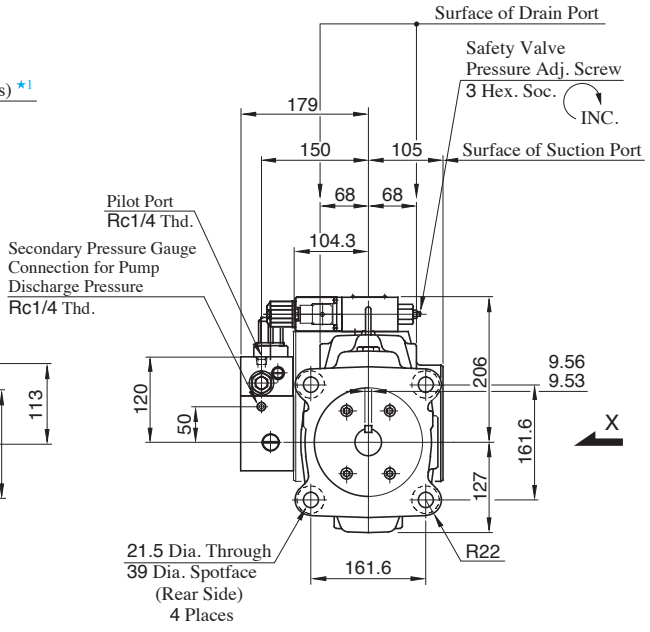
● For other dimensions, refer to “Flange Mtg.”.

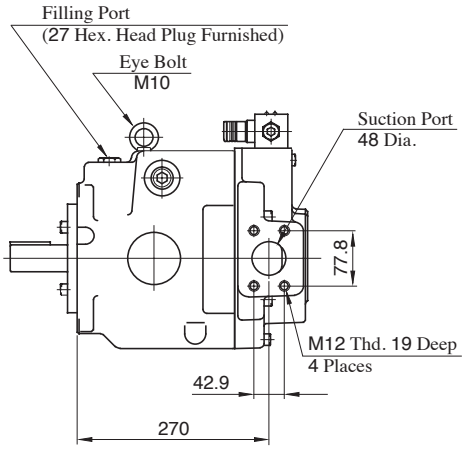
Flange Mtg. : A90-FR04＊S
A100-FR04＊S





View Arrow Y





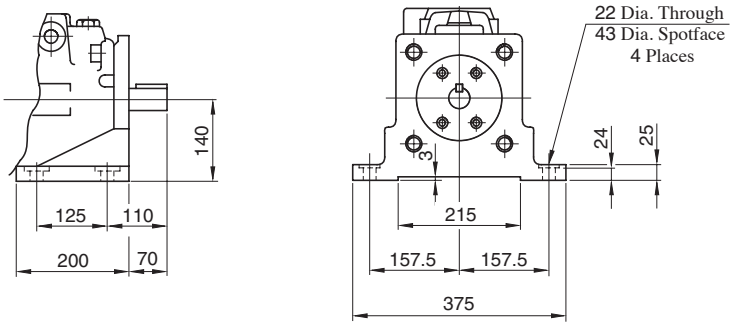
View Arrow X

★1. Use either port of two drain ports at your option. Keep the remaining port plugged.

★2. Case drain port is available for use when draining hydraulic fluid from pump casing.

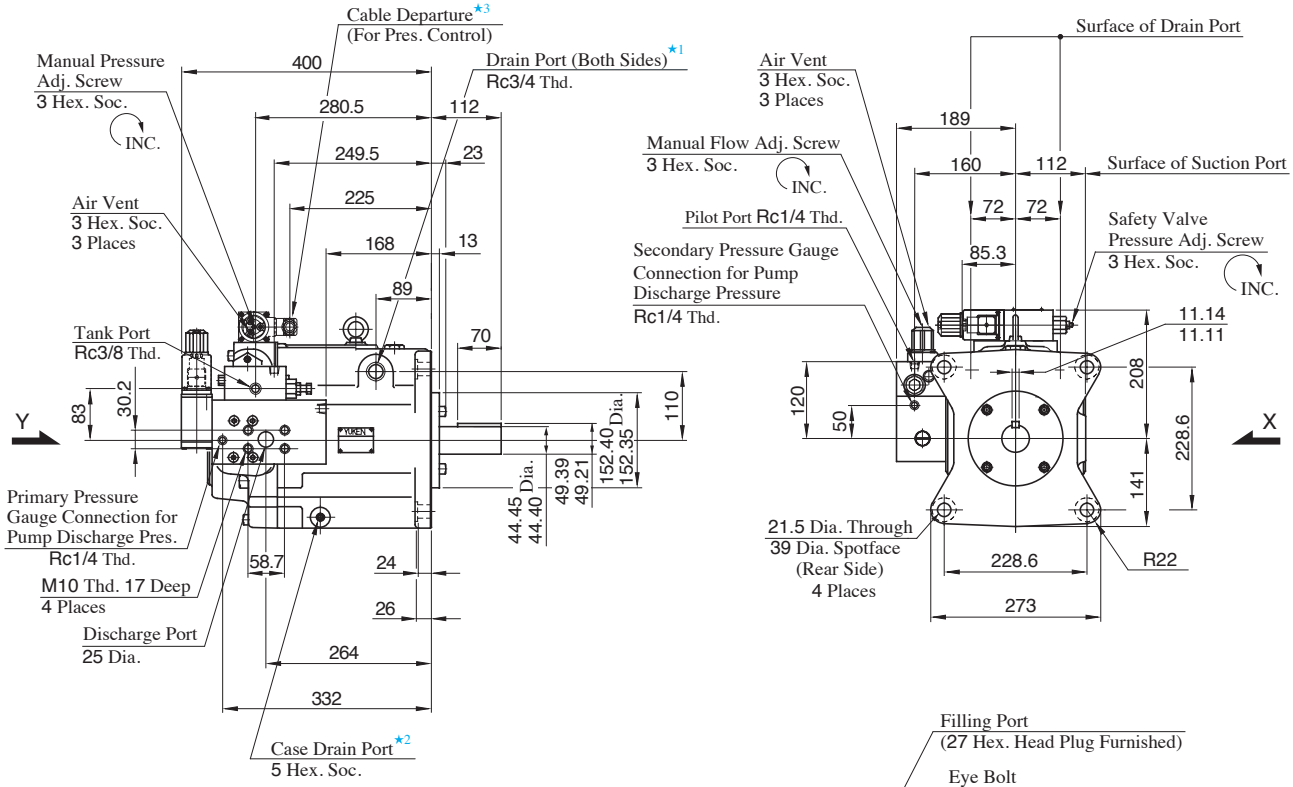
★3. Cable Applicable:
Outside Dia.....8-10 mm
Conductor Area.....Not Exceeding 1.5 mm^2

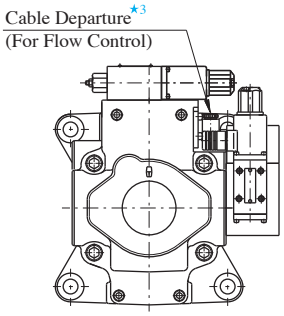
Foot Mtg. : A90-LR04＊S



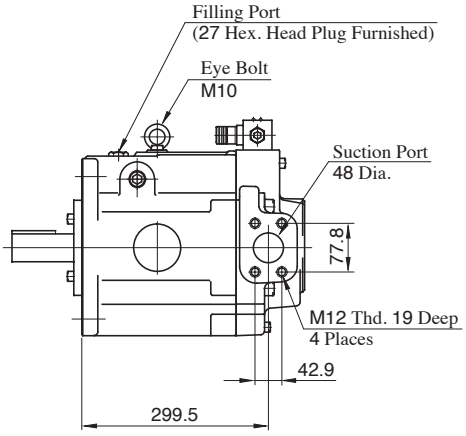
● For other dimensions, refer to “Flange Mtg.”.

Flange Mtg. : A145-FR04＊S





View Arrow Y



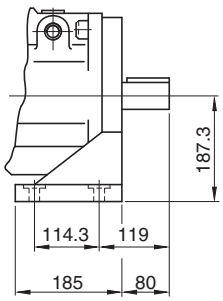
View Arrow X

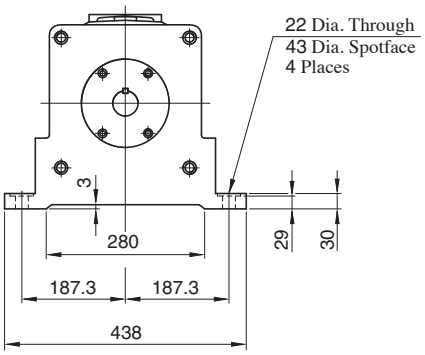
★1. Use either port of two drain ports at your option. Keep the remaining port plugged.

★2. Case drain port is available for use when draining hydraulic fluid from pump casing.

★3. Cable Applicable:
Outside Dia.....8-10 mm
Conductor Area.....Not Exceeding 1.5 mm^2

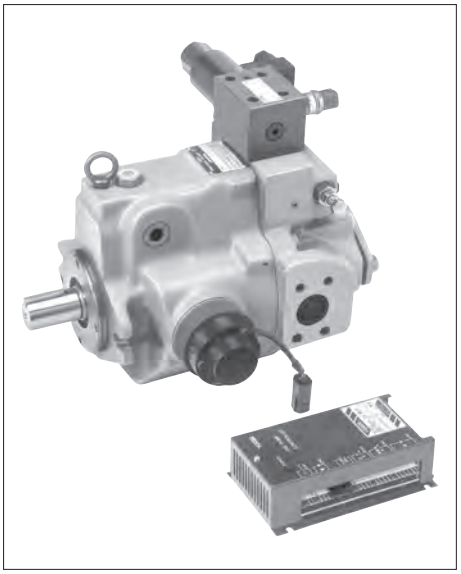
Foot Mtg. : A145-LR04＊S

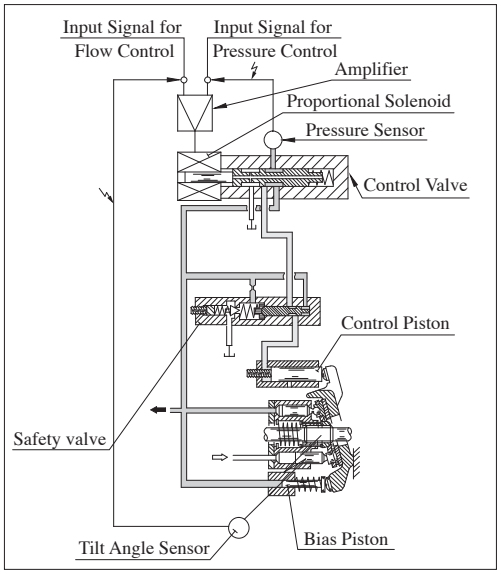




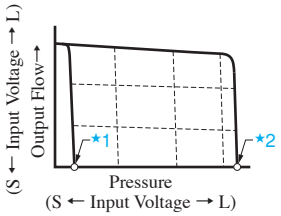
● For other dimensions, refer to “Flange Mtg.”.

A Series Variable Displacement Piston Pumps, Electro-Hydraulic Proportional Pressure & Flow Control Type



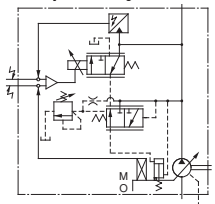


Performance Characteristics

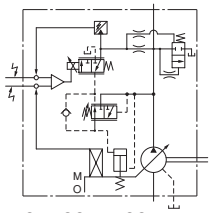


★1. Unloading pressure when input signal is 0 V.
★2. Safety valve setting pressure

Graphic Symbols



A16/A22/A37/A45/A56



A70/A90/A100/A145

Model Number Designation

A45	-F	R	04E	16M		S	-60	-12
A70	-F	R	04E	16M	A		-60	-70
Series Number	Mounting	Direction of Rotation	Control Type	Control Pressure at Input Signal is 5 V	Type of Outboard Pump	Port Position	Compensation Number★3	Design Number
A45 (45.0 cm³/rev)	L: Foot Mtg. F: Flange Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	04E: Proportional Pressure & Flow Control Type	Use the same measure of the control pressure as shown on the right, 6.9 MPa specify within the range of maximum operating pressure	——	None : Axial Port S : Side Port	60	12
A16 (15.8 cm³/rev)							06	44
A22 (22.2 cm³/rev)							11	44
A37 (36.9 cm³/rev)					None★2	——	01	44
A56 (56.2 cm³/rev)							02	44
A70 (70.0 cm³/rev)							60	70
A90 (91.0 cm³/rev)					A ★2		60	70
A100 (100 cm³/rev)					B ★2		60	20
A145 (145 cm³/rev)							60	62

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
★2. These pumps, except A16/A22/A45 types, can be connected to outboard pumps.
- A37/A56 type (outboard pump connection symbol: **None**): spigot diameter: 82.55 mm (A16, A22, and PV2R1).
- A70/A90/A100/A145 type (outboard pump connection symbol: **"A"**): spigot diameter:82.55 mm (A16, A22, and PV2R1).
- A70/A90/A100/A145 type (outboard pump connection symbol: **"B"**): spigot diameter:101.6 mm (A37 and PV2R2).

★3. Amplifier compensation number may differ according to the main machine conditions. Consult Yuken for details.

Specifications

Descriptions \ Model Numbers			A16	A22	A37	A45	A56	A70	A90	A100	A145
Geometric Displacement		cm³/rev	15.8	22.2	36.9	45.0	56.2	70.0	91.0	100	145
Operating Pressure		MPa Rated★2	16	16	16	16	16	25	25	21	25
		MPa Intermittent★1	21	16	21	17.2	21	28	28	21	28
Shaft Speed Range		r/min	600 - 1800								
Flow Control	Max. Flow★3	L/min 50 Hz Pin	28.4	40.0	66.4	81.0	101	126	163	180	261
		L/min 60 Hz Pin	23.7	33.3	55.4	67.0	84.3	105	136	150	217
	Min. Pres. Required for Flow Adj.	MPa	2								
	Hysteresis		1 % or less								
	Repeatability		1 % or less								
	Input Signal		Max. Flow / 5 V DC								
Pressure Control	Min. Adjustment Pressure	MPa	0.7								
	Hysteresis		1 % or less								
	Repeatability		1 % or less								
	Input Signal		Specified Control Pressure / 5 V DC								
Coil Resistance		Ω (@20°C)	10								
Input Impedance			Flow Control : 10 kΩ Pressure Control : 10 kΩ								
Supply Electric Power			24 V DC (21 - 28 V Included Ripple)								
Power Input (Max.)		W	30								
Output Signal		Flow	5 V DC / Max. Flow (50 Hz Pin)								
		Pressure	5 V DC / Specified Control Pressure								
Alarm Signal Output (Open Collector)			Voltage : Max. 30 V DC Current : Max. 40 mA								
Ambient Temperature		°C	0 - 50 (With Circulated Air)								
Approx. Mass		kg Flange Mtg.	20.5	20.5	32	32	39	64	76.5	77.5	96.4
		kg Foot Mtg.	22.7	22.7	36.3	36.3	43.3	76	97	93	121.4

★1. Whenever setting pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.
★2. When operating the pump exceeding the rated pressure, operating conditions are restricted.
Refer to page A-28 for details.
★3. Maximum flow differs to shaft speed.
The value listed above indicates shaft speed of 1800 r/min.
For other shaft speed calculate by the ratio of shaft speed.

Pipe Flange Kits

Pipe flange kits are available. When ordering, specify the kit number from the table below.

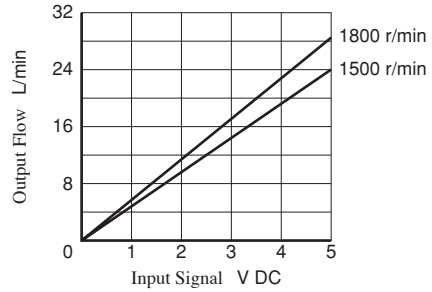
Pump Model Numbers	Name of Port	Pipe Flange Kit Numbers		
		Threaded Connection	Socket Welding★	Butt Welding
A 16-＊R04E A 22-＊R04E	Suction	F5-06-A-10	F5-06-B-10	F5-06-C-10
	Discharge	F5-06-A-10	F5-06-B-10	F5-06-C-10
A 37-＊R04E A 45-＊R04E A 56-＊R04E	Suction	F5-10-A-10	F5-10-B-10	F5-10-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10
A 70-＊R04E	Suction	F5-12-A-10	F5-12-B-10	F5-12-C-10
	Discharge	F5-08-A-10	F5-08-B-10	F5-08-C-10
A 90-＊R04E A100-＊R04E A145-＊R04E	Suction	F5-16-A-10	F5-16-B-10	F5-16-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10

★ In case of using socket welding flanges, there is a case where the operating pressure should be set lower than the normal because of strength of the flanges. Therefore, please pay cautious attention to the operating pressure when the socket welding flanges are used.

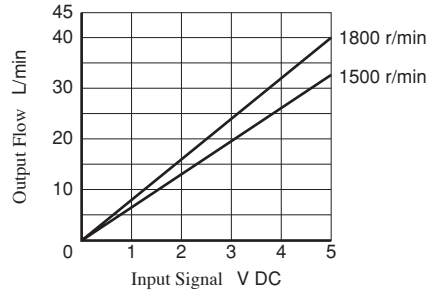
● Details of the pipe flange kits are shown on pages A-258 and A-259.

Output Flow vs. Input Signal

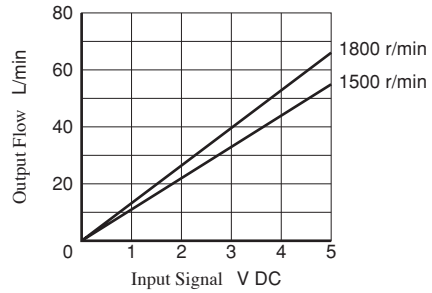
A16



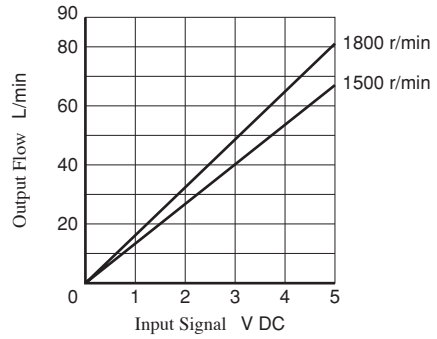
A22



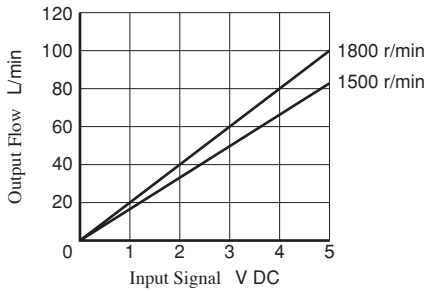
A37



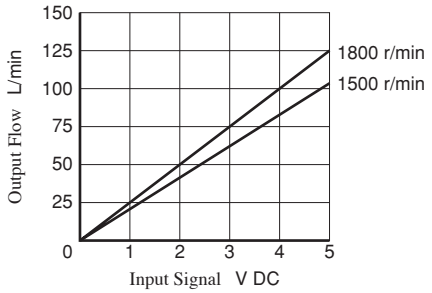
A45



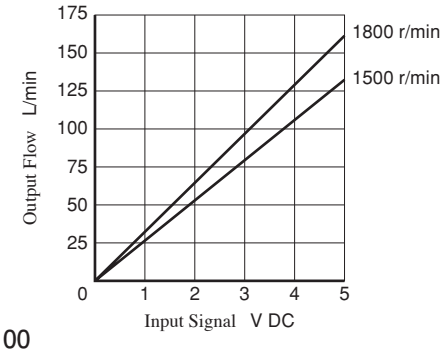
A56



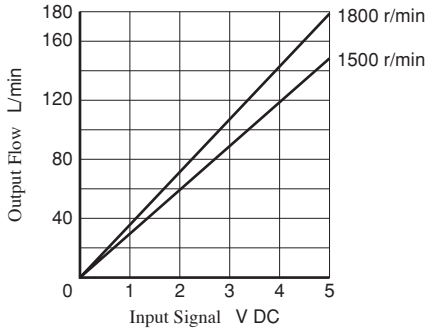
A70



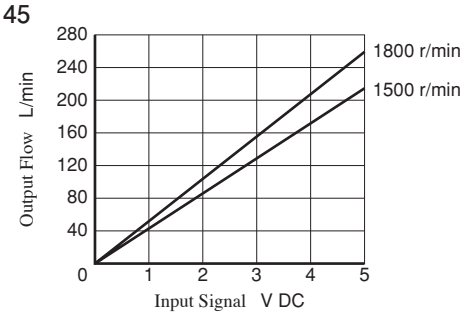
A90



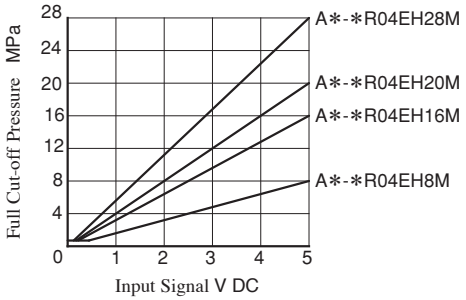
A100



A145

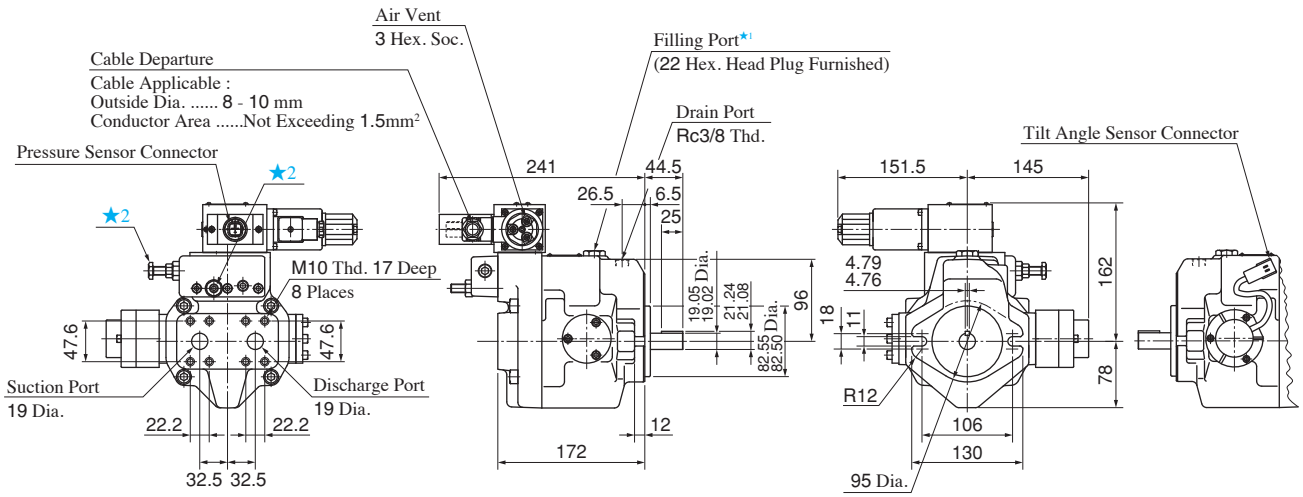


Full Cut-off Pres. vs. Input Signal



Refer to page A-32 to A-40 for performance characteristics of pressure compensator type excluding characteristics appeared on this catalogue.

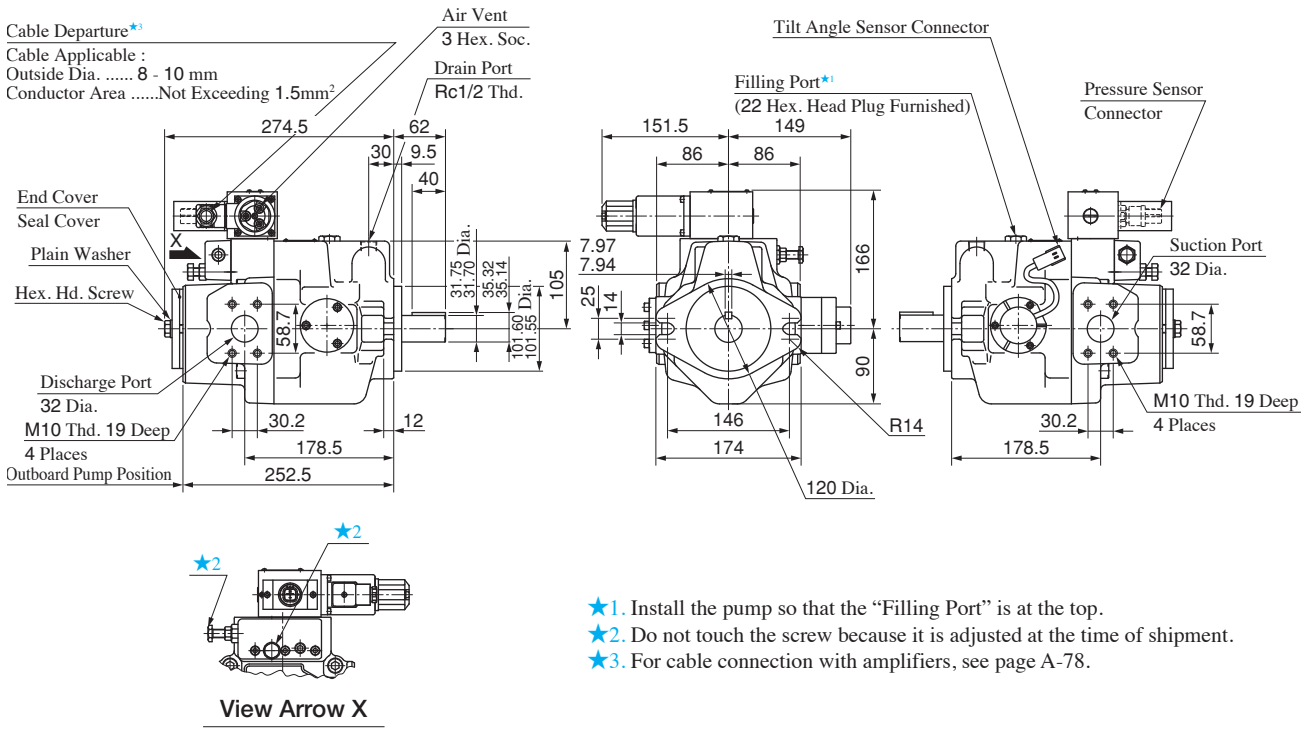
Flange Mtg. : A16-FR04E＊
A22-FR04E＊



★1. Install the pump so that the “Filling Port” is at the top.
★2. Do not touch the screw because it is adjusted at the time of shipment.
★3. For cable connection with amplifiers, see page A-78.

● Foot Mounting Type
Mounting bracket is common to that of pressure compensator model.
Refer to page A-42 for the dimensions of mounting bracket.

Flange Mtg. : A37-FR04E＊

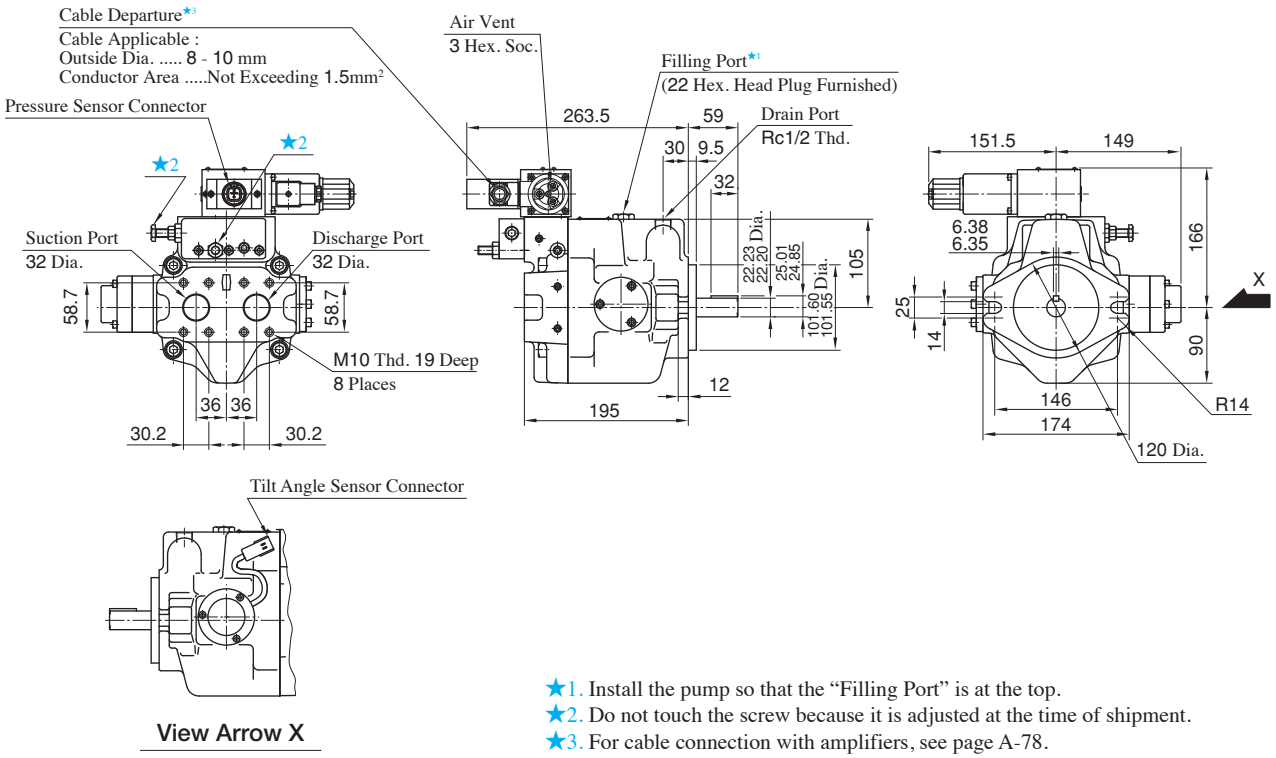


★1. Install the pump so that the “Filling Port” is at the top.
★2. Do not touch the screw because it is adjusted at the time of shipment.
★3. For cable connection with amplifiers, see page A-78.

● Foot Mounting Type
Mounting bracket is common to that of pressure compensator model.
Refer to page A-43 for the dimensions of mounting bracket.

Axial Port Type

Flange Mtg. : A45-FR04E＊

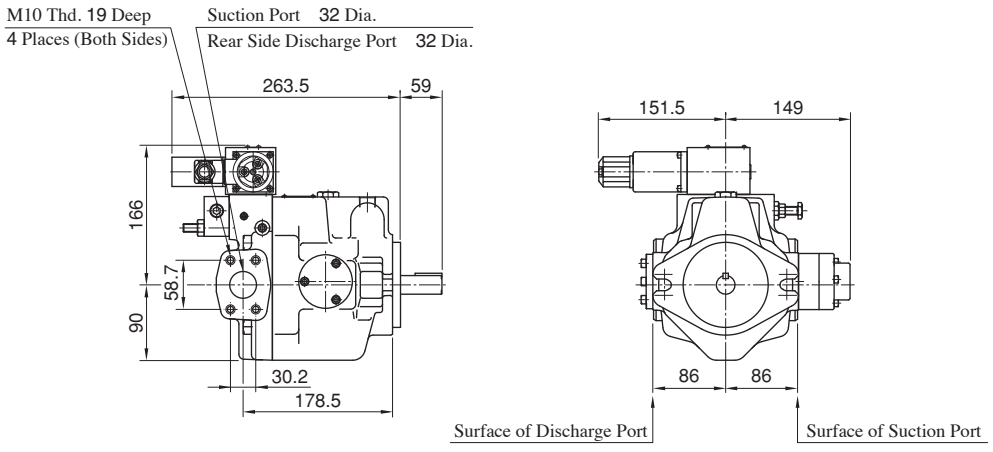


View Arrow X

★1. Install the pump so that the “Filling Port” is at the top.
★2. Do not touch the screw because it is adjusted at the time of shipment.
★3. For cable connection with amplifiers, see page A-78.

Side Port Type

Flange Mtg. : A45-FR04E＊S

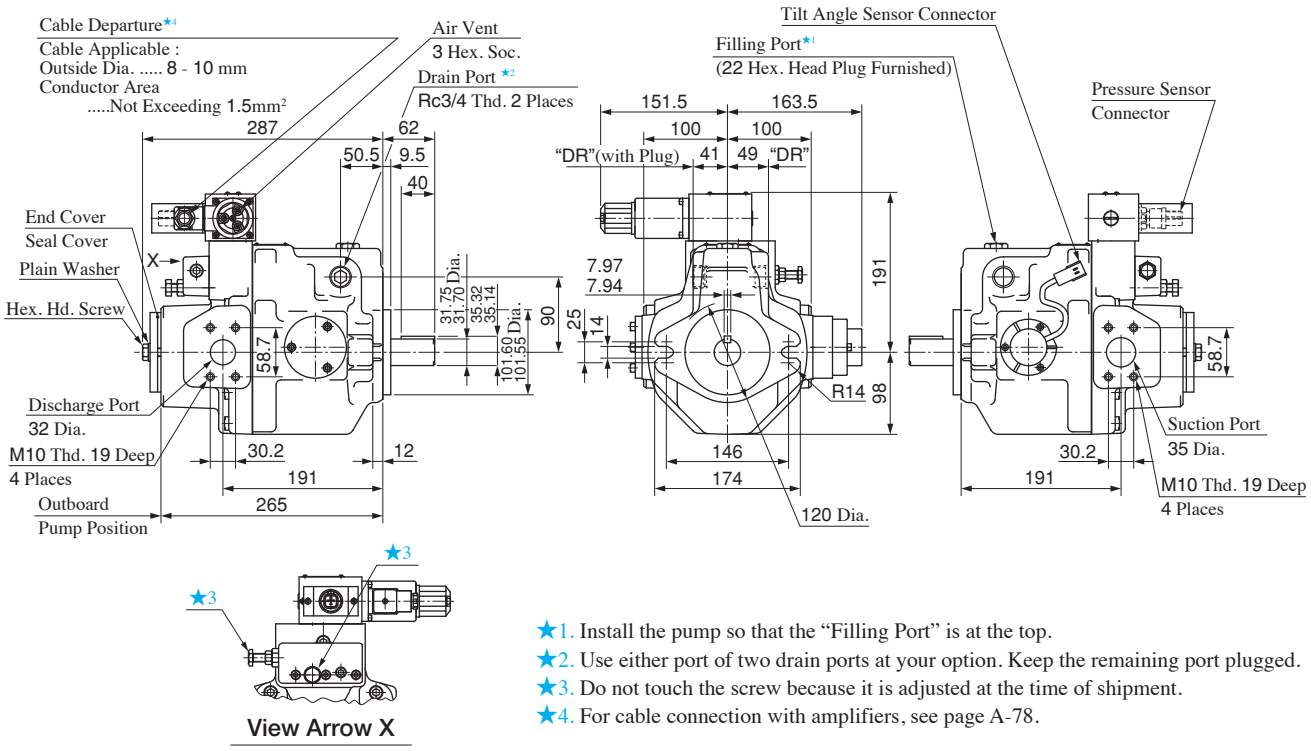


● For other dimensions, refer to “Axial Port Type”.

● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-43 for the dimensions of mounting bracket.

Flange Mtg. : A56-FR04E＊

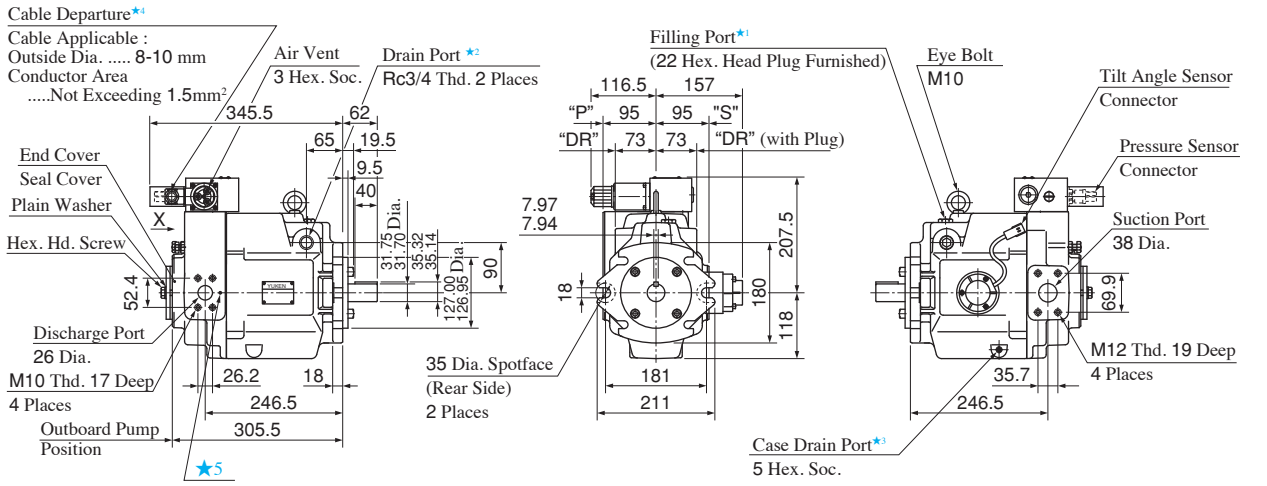


★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. For cable connection with amplifiers, see page A-78.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-44 for the dimensions of mounting bracket.

Flange Mtg. : A70-FR04E＊

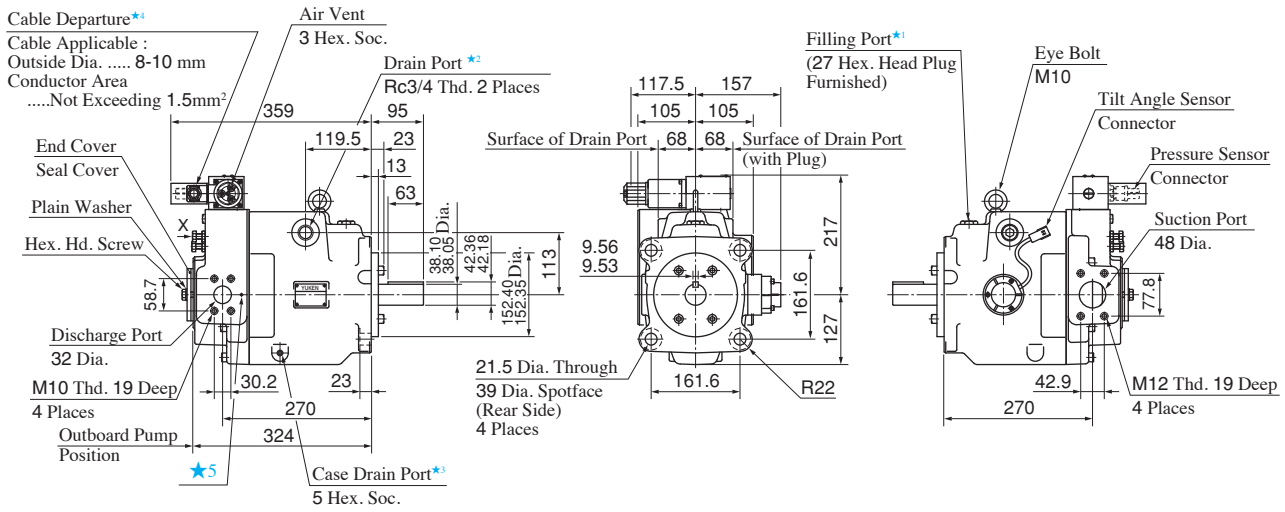


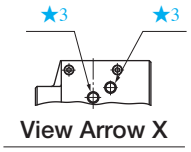
★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option.
Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. For cable connection with amplifiers, see page A-78.
★5. If you do not use the special sequence valve, plug the port (FP-SC-1/32).

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-45 for the dimensions of mounting bracket.

Flange Mtg. : A90-FR04E＊＊
A100-FR04E＊＊



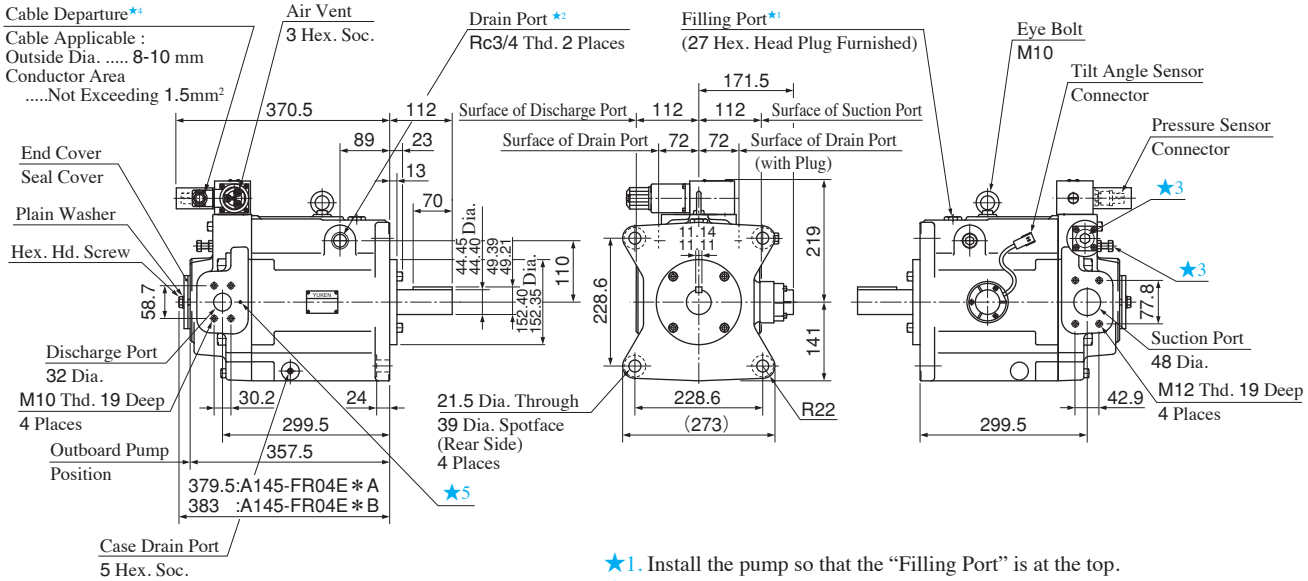


★1. Install the pump so that the “Filling Port” is at the top.
★2. Use either port of two drain ports at your option.
Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. For cable connection with amplifiers, see page A-78.
★5. If you do not use the special sequence valve, plug the port (FP-SC-1/32).

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-46 for the dimensions of mounting bracket.

Flange Mtg. : A145-FR04E＊＊



★1. Install the pump so that the “Filling Port” is at the top.
★2. Use either port of two drain ports at your option.
Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. For cable connection with amplifiers, see page A-78.
★5. If you do not use the special sequence valve, plug the port (FP-SC-1/32).

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-47 for the dimensions of mounting bracket.

Amplifiers for Electro-Hydraulic Proportional Pressure & Flow Control Type Pumps

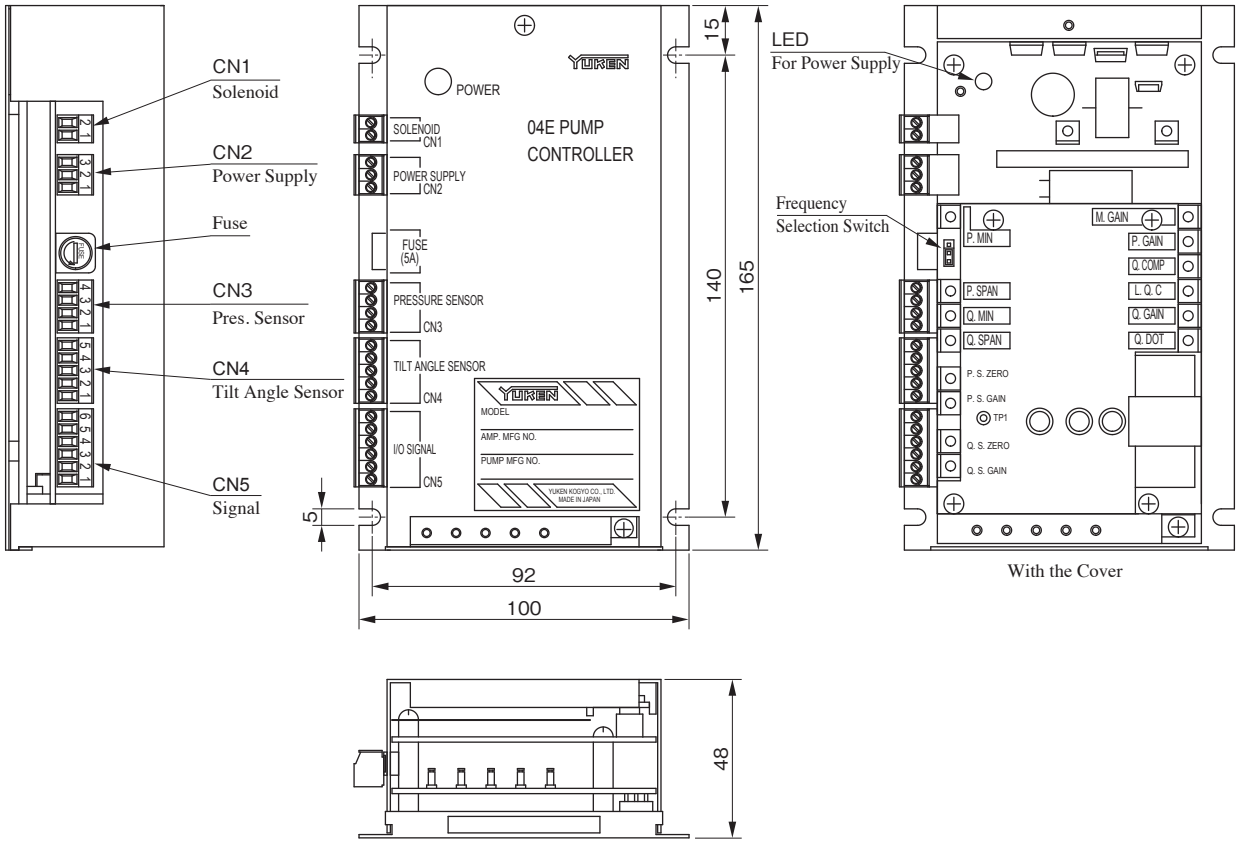
SK1106-★-＊-＊-11＊＊

Specifications

Descriptions \ Model No.	SK1106-★-＊-＊-11＊＊
Applicable Coil Resistance	10 Ω (20°C)
Input Impedance	10 kΩ (PIN, QIN)
Power Supply	24 V DC (21 - 28 V Included Ripple)
Power Input (Max.)	30 W
Input Signal	Max. Flow / 5 V (QIN) Specified Pres. / 5 V (PIN)
Output Signal for Sensor Monitor	5 V / Max. Flow (SMQ) 5 V / Specified Pres. (SMP)
Ambient Temperature	0 - 50 °C
Approx. Mass	450 g

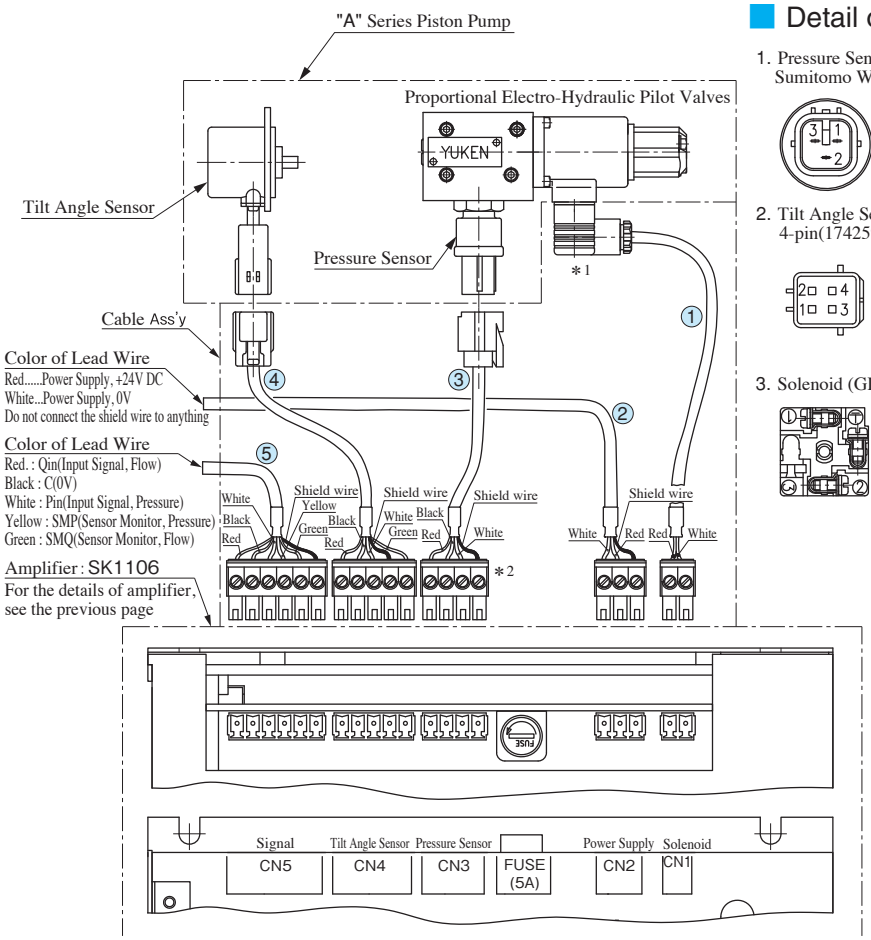
Detail of Connector

Connector		Name of Signal	
CN1 Solenoid	1	Output to pilot valve solenoid	
	2		
CN2 Power Supply	1	0 [V]	(0 V)
	2	+24 [V]	(24 V)
	3	0 [V]	
CN3 Pres. Sensor	1	+5 [V]	Power Supply for Sensor
	2	0 [V]	
	3	Input Signal - Sensor	
	4	0 [V]	
CN4 Tilt Angle Sensor	1	+8 [V]	Power Supply for Sensor
	2	0 [V]	
	3	Input Signal - Sensor	
	4	0 [V]	
	5	—	
CN5 Input/ Output Signal	1	Input Signal - Flow	(Qin)
	2	Input Signal - Common	(COM)
	3	Input Signal - Pres.	(Pin)
	4	Output Signal - Sensor Monitor P	(SMP)
	5	Output Signal - Sensor Monitor Q	(SMQ)
	6	0 [V]	



Cable Connection Between Pump and Amplifier

The cable connections between the proportional pilot valve and the sensor of the pump and the attached amplifier (SK1106) are shown below.



Detail of Connector (Pump Side)

1. Pressure Sensor (HW090 connector 3-Pin (T-type)
Sumitomo Wiring Systems, Ltd.)

Terminals No.
1. Power Supply (Color of mating connector Ass'y lead : Red)
2. Output(Color of mating connector Ass'y lead : White)
3. 0V(Color of mating connector Ass'y lead : Black)

2. Tilt Angle Sensor (J series connector<Mark II>
4-pin(174259-2) TE connectivity

Terminals No.
1. Power Supply (Color of mating connector Ass'y lead : Red)
2. 0V (Color of mating connector Ass'y lead : Black)
3. Output (Color of mating connector Ass'y lead : White)
4. Shield wire

3. Solenoid (GDM-211-B-11:YUKEN)

Terminals No.
1. SOL Input
(Color of mating connector Ass'y Lead : Red)
2. SOL Input
(Color of mating connector Ass'y lead : White)
3. Not Used

Connector For Cable Ass'y

Amplifier Side

MC1.5/＊-ST-3.81
(Phoenix Contact)

Sensor Side

1. Pressure Sensor
Type:HW090
Housing : F (6189-0131)
Retainer : F (6918-0326)
Terminal : F (1500-0106)
Wire seal : S (7165-0118)
(Sumitomo Wiring Systems, Ltd.)

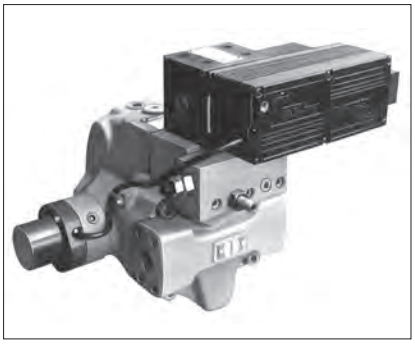
2. Tilt Angle Sensor
Type : J Series
Connector<Mark II>
4-pin : (174257-2)
(TE connectivity)

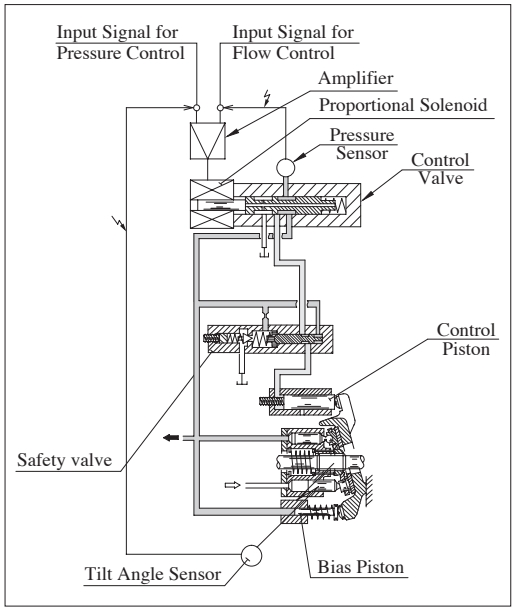
★1. Cable assemblies are available. When ordering, specify the cable Ass'y model numbers from the table below.

Name of Cable Ass'y	Cable Ass'y Model Numbers					
	Approx. Length of Cable (mm)					
	2000	5000	10000	15000	20000	25000
①For Solenoid	SK1112-S-2-11	SK1112-S-5-11	SK1112-S-10-11	SK1112-S-15-11	SK1112-S-20-11	SK1112-S-25-11
②For Power Supply	SK1112-V-2-11	SK1112-V-5-11	SK1112-V-10-11	SK1112-V-15-11	SK1112-V-20-11	SK1112-V-25-11
③For Pressure Sensor	SK1112-P-2-11	SK1112-P-5-11	SK1112-P-10-11	SK1112-P-15-11	SK1112-P-20-11	SK1112-P-25-11
④For Tilt Angle Sensor	SK1112-Q-2-11	SK1112-Q-5-11	SK1112-Q-10-11	SK1112-Q-15-11	SK1112-Q-20-11	SK1112-Q-25-11
⑤For Signal	SK1112-C-2-11	SK1112-C-5-11	SK1112-C-10-11	SK1112-C-15-11	SK1112-C-20-11	SK1112-C-25-11

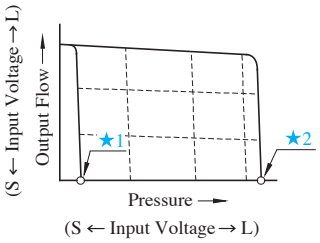
★2. ＊1 connector for the solenoid (GDM-211-B-11) and ＊2 connectors for amplifier (MC1.5/＊-ST-3.81) are already attached to the pump and the amplifier, respectively. If using the cable Ass'y, remove every attached connector before wiring.

A Series Variable Displacement Piston Pumps, "OBE" Type Electro-Hydraulic Proportional Pressure & Flow Control Type





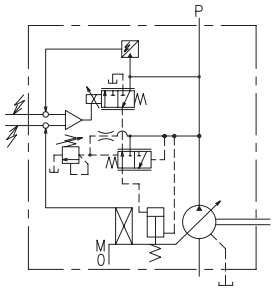
Performance Characteristics



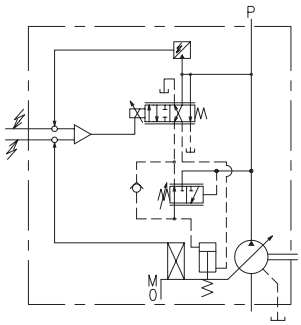
★1. Unloading pressure when input signal is 0 V.

★2. Safety valve setting pressure

Graphic Symbols



A16/A22/A37/A56



A70/A90/A145

Model Number Designation

A70	-F	R	04EH	16M	R	S	-60	44
Series Number	Mounting	Direction of Rotation	Control Type	Pressure Control Level	Amplifier Direction	Port Position	Compensation Number★2	Design Number
A16 (15.8 cm³/rev)	F: Flange Mtg.	(Viewed from Shaft End)	04EH: "OBE" Type Proportional Pressure & Flow Control Type	Specify Control Pressure between 6.9 MPa and Maximum Operating Pressure (Example) 16M:16 MPa	—	None: Axial Port	06	44
A22 (22.2 cm³/rev)							11	44
A37 (36.9 cm³/rev)						S: Side Port	01	44
A56 (56.2 cm³/rev)							02	44
A70 (70.0 cm³/rev)	L: Foot Mtg.	R: Clockwise★1 (Normal)			(Viewed from Shaft End) R: Right L: Left	S: Side Port	60	70
A90 (91.0 cm³/rev)							60	70
A145 (145 cm³/rev)							60	62

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
★2. Amplifier Compensation Number may differ according to the main machine conditions. Consult Yuken for details.

Specifications

Descriptions \ Model Numbers			A16	A22	A37	A56	A70	A90	A145
Geometric Displacement		cm^3/rev	15.8	22.2	36.9	56.2	70.0	91.0	145.0
Operating Pressure		MPa Rated★2	16	16	16	16	25	25	25
		MPa Intermittent★1	21	16	21	21	28	28	28
Shaft Speed Range		r/min	600 - 1800						
Flow Control	Max. Flow★2	L/min	28.4	40.0	66.4	101.2	126.0	163.0	261.0
	Min. Pres. Required for Flow Adj.	MPa	2.0						
	Hysteresis		1 % or less						
	Repeatability		1 % or less						
	Input Signal		Max. Flow / 5 V DC						
Pressure Control	Min. Adjustment Pressure	MPa	0.7						
	Hysteresis		1 % or less						
	Repeatability		1 % or less						
	Input Signal		Specified Control Pressure / 5 V DC						
Coil Resistance		Ω [@ 20°C]	10						
Input Impedance			Flow Control : 10 kΩ Pres. Control : 10 kΩ						
Supply Electric Power			24 V DC (21 - 28 V Included Ripple)						
Power Input (Max.)		W	30						
Output Signal		Flow	5 V DC / Max. Flow						
		Pressure	5 V DC / Specified Control Pressure						
Alarm Signal Output (Open Collector)			Voltage : Max. 30 V DC Current : Max. 40 mA						
Ambient Temperature		°C	0 - 50 (With Circulated Air)						
Mass		kg Flange Mtg.	20.7	20.7	32.2	39.2	64	76.5	98
		kg Foot Mtg.	22.9	22.9	36.5	43.5	76	97	123

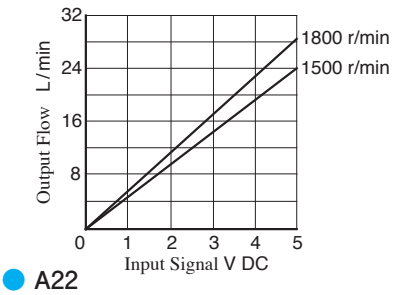
★1. Whenever setting pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.
★2. When operating the pump exceeding the rated pressure, operating conditions are restricted.
Refer to page A-28 for details.
★3. Maximum flow differs to shaft speed.
The value listed above indicates shaft speed of 1800 r/min.
For other shaft speed calculate by the ratio of shaft speed.

Pipe Flange Kits

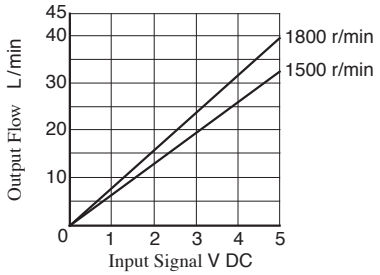
For pipe flange, refer to form of pressure compensator type on page A-29.

Output Flow vs. Input Signal

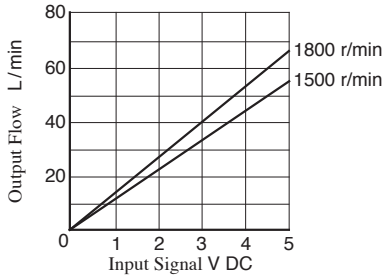
A16



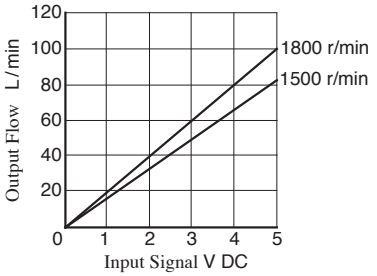
A22



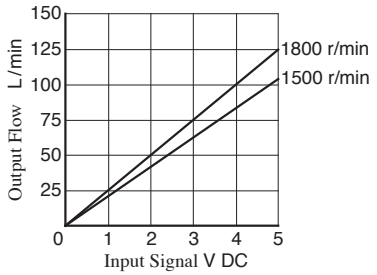
A37



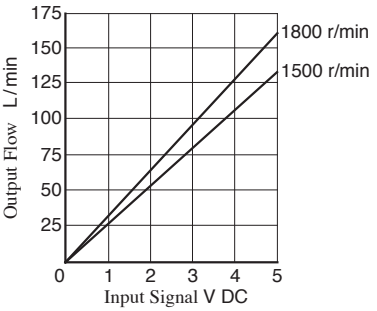
A56



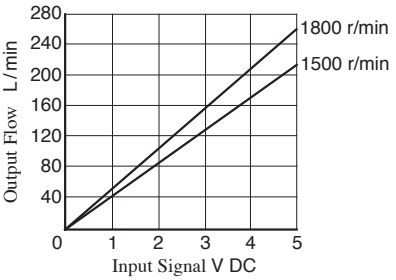
A70



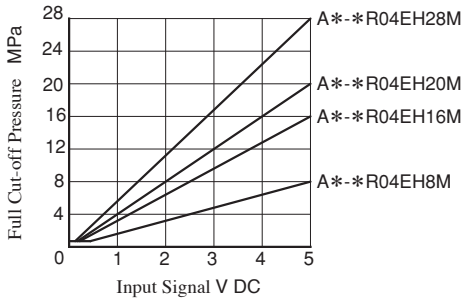
A90



A145



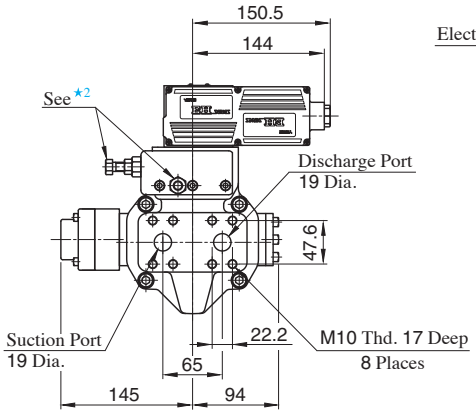
Full Cut-off Pres. vs. Input Signal

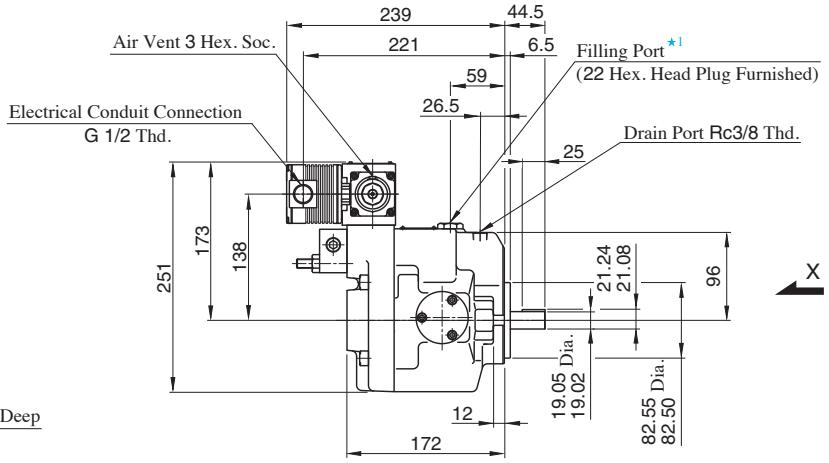


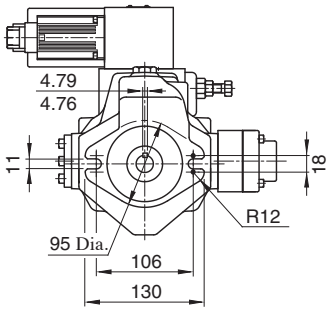
Refer to pages A-32 to A-34, A-36 to A-38 and A-40 for performance characteristics of pressure compensator type excluding characteristics appeared on this catalogue.

Axial Port Type

Flange Mtg. : A16-FR04EH＊ A22-FR04EH＊







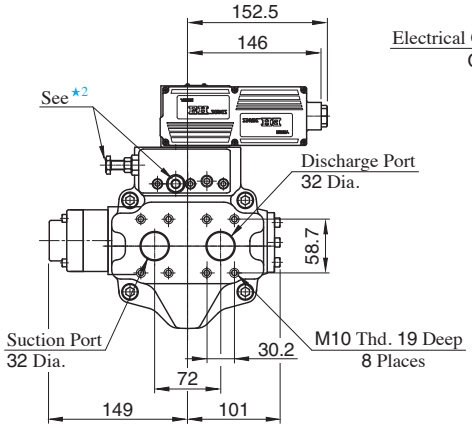
View Arrow X

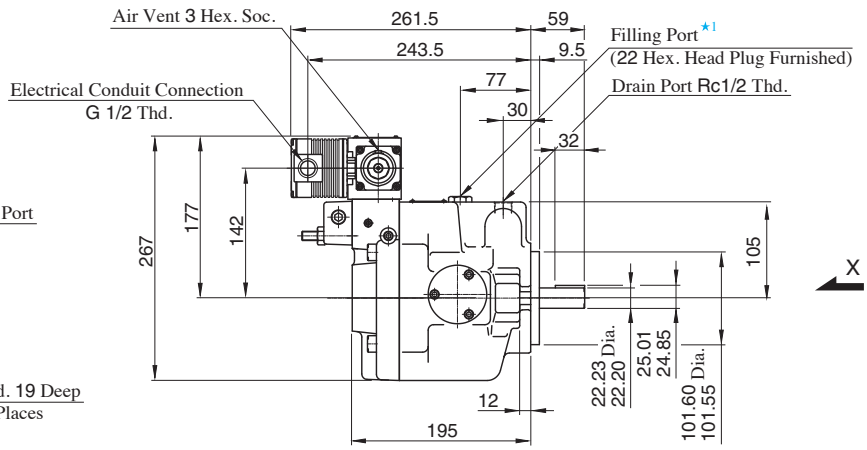
★1. Install the pump so that the "Filling Port" is at the top.
★2. Do not touch the screw because it is adjusted at the time of shipment.
★3. For detail of amplifier, refer to page A-87.

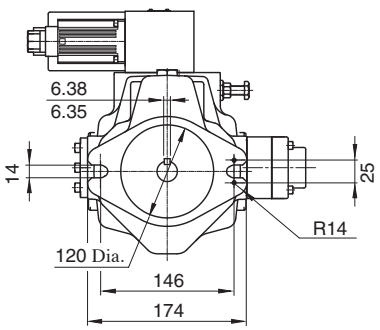
- **Side Port Type**
  Port mounting dimensions are the same as those of pressure compensator model. Refer to page A-42 for port mounting dimensions.
- **Foot Mounting Type**
  Mounting bracket is common to that of pressure compensator model. Refer to page A-42 for the dimensions of mounting bracket.

Axial Port Type

Flange Mtg. : A37-FR04EH＊







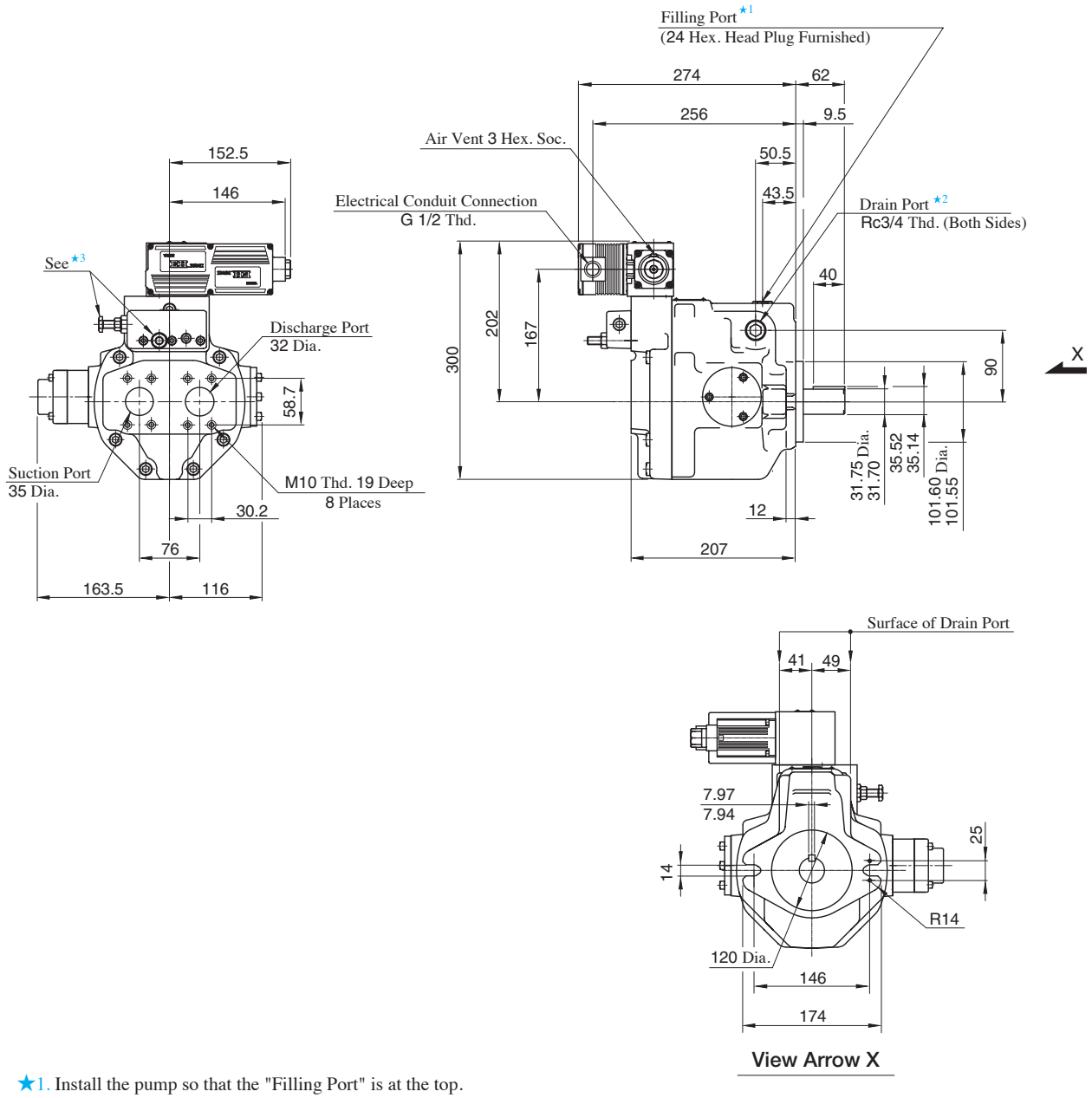
View Arrow X

★1. Install the pump so that the "Filling Port" is at the top.
★2. Do not touch the screw because it is adjusted at the time of shipment.
★3. For detail of amplifier, refer to page A-87.

- **Side Port Type**
  Port mounting dimensions are the same as those of pressure compensator model. Refer to page A-43 for port mounting dimensions.
- **Foot Mounting Type**
  Mounting bracket is common to that of pressure compensator model. Refer to page A-43 for the dimensions of mounting bracket.

Axial Port Type

Flange Mtg. : A56-FR04EH ∗



View Arrow X

★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. For detail of amplifier, refer to page A-87.

● Side Port Type

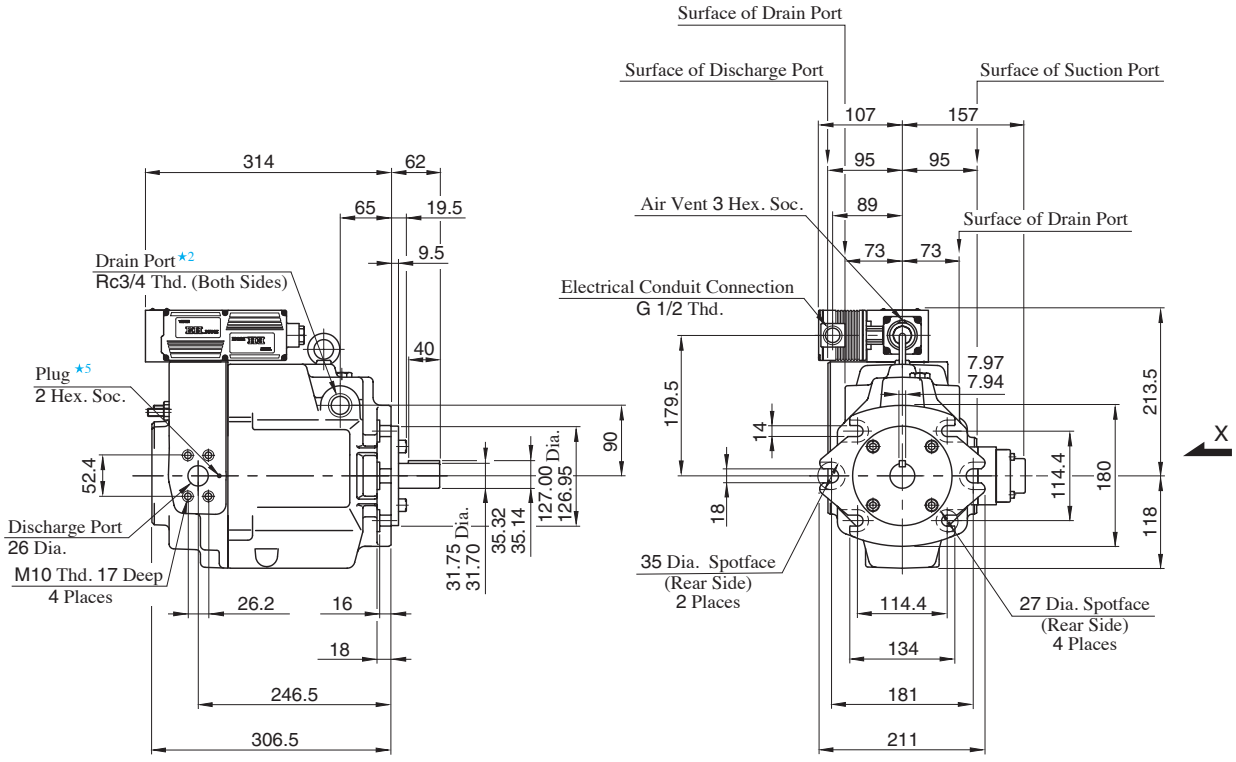
Port mounting dimensions are the same as those of pressure compensator model. Refer to page A-44 for port mounting dimensions.

● Foot Mounting Type

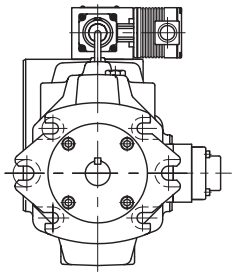
Mounting bracket is common to that of pressure compensator model. Refer to page A-44 for the dimensions of mounting bracket.

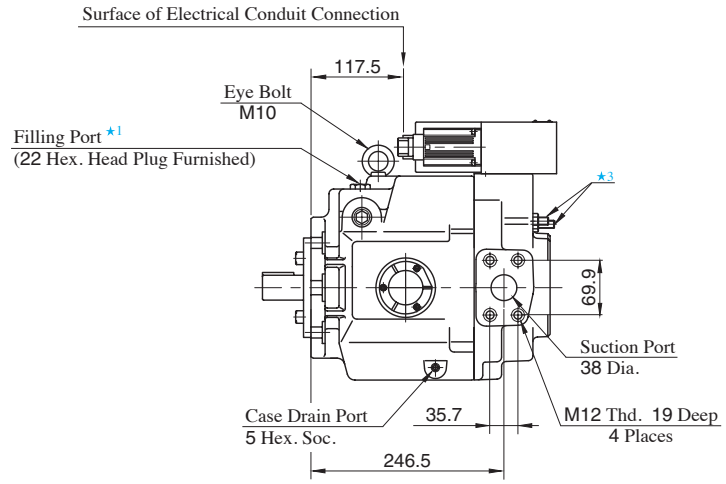
Flange Mtg.

◦ Amplifier Direction "L" : A70-FR04EH＊LS



◦ Amplifier Direction "R": A70-FR04EH＊RS





View Arrow X

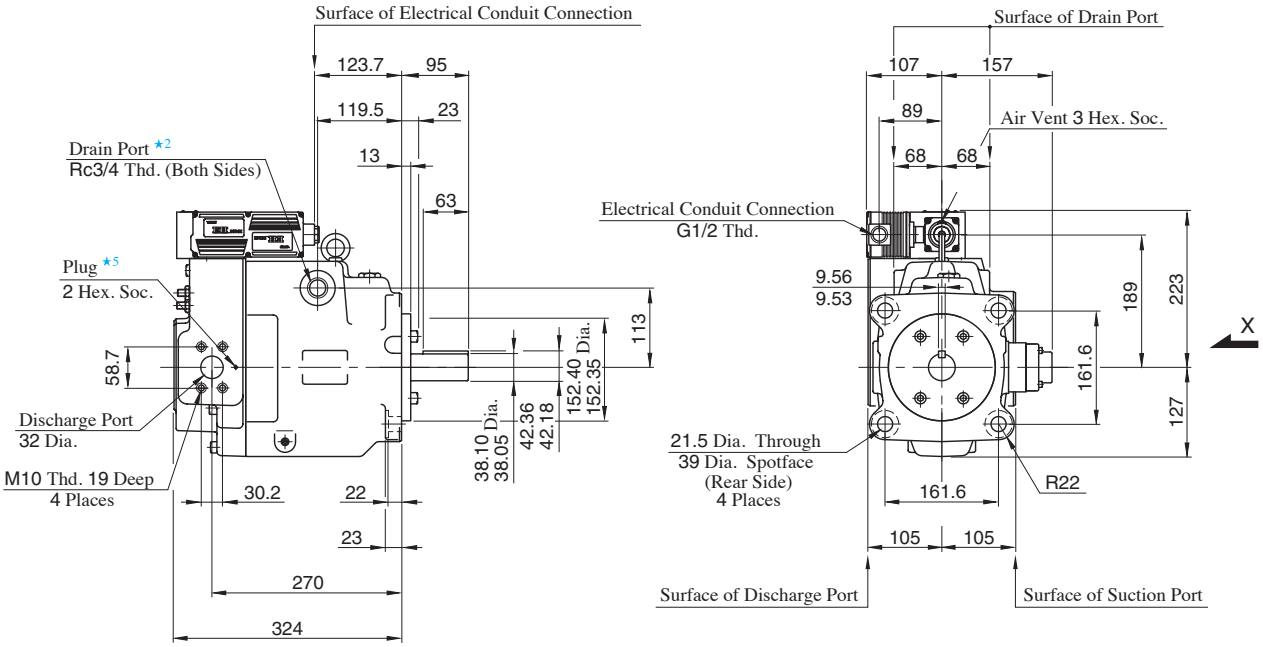
★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. For detail of amplifier, refer to page A-87.
★5. If you use the special sequence valve, remove the plug.

● Foot Mounting Type

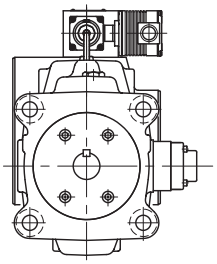
Mounting bracket is common to that of pressure compensator model.
Refer to page A-45 for the dimensions of mounting bracket.

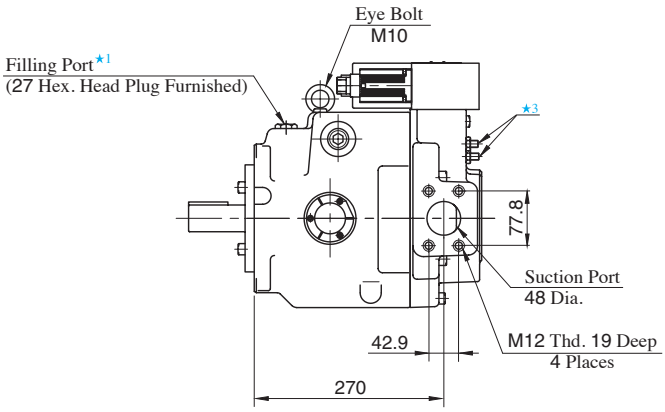
Flange Mtg.

◦ Amplifier Direction "L" : A90-FR04EH＊LS



◦ Amplifier Direction "R": A90-FR04EH＊RS





View Arrow X

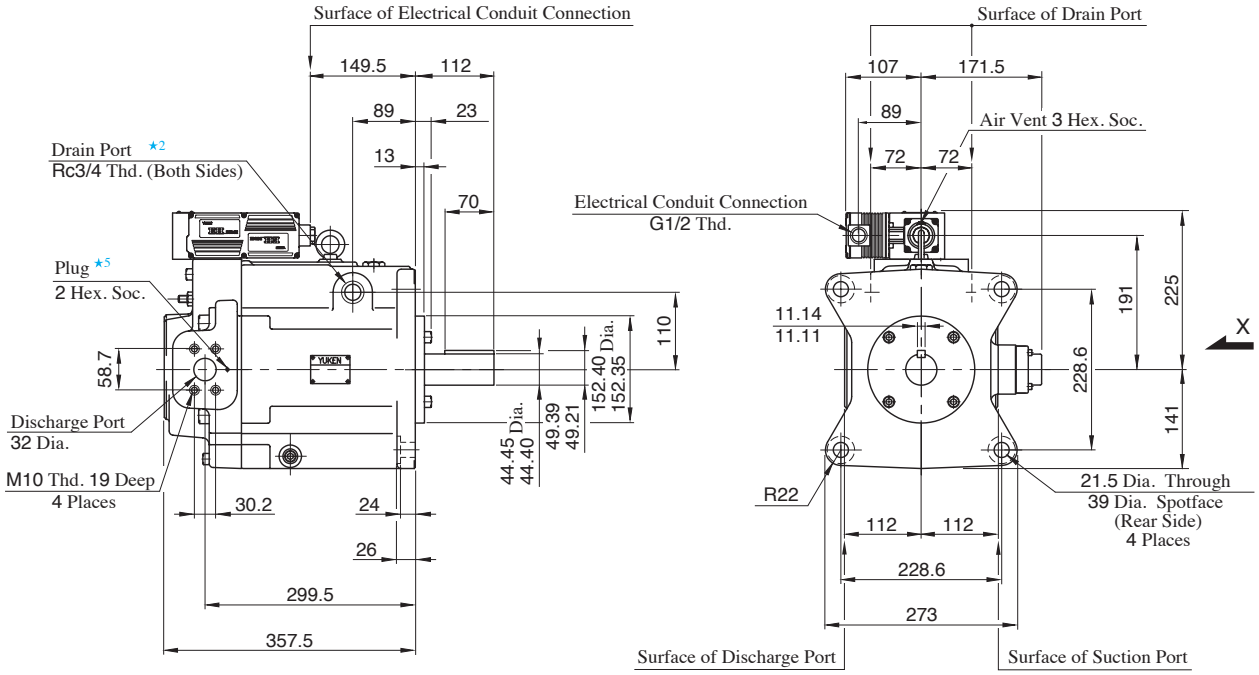
★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. For detail of amplifier, refer to page A-87.
★5. If you use the special sequence valve, remove the plug.

● Foot Mounting Type

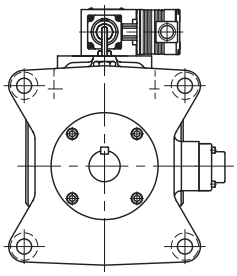
Mounting bracket is common to that of pressure compensator model.
Refer to page A-46 for the dimensions of mounting bracket.

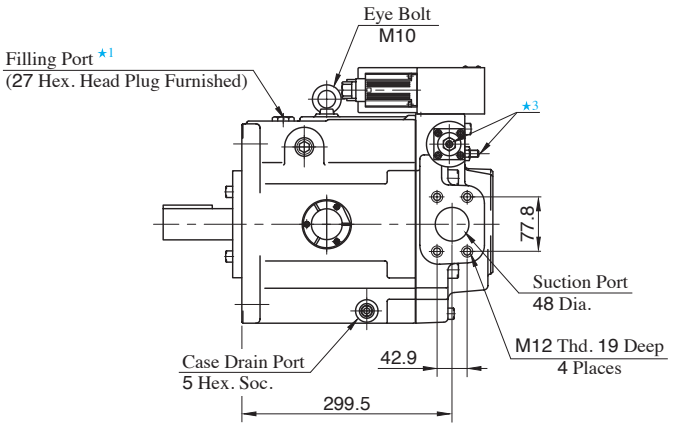
Flange Mtg.

◦ Amplifier Direction "L" : A145-FR04EH＊LS



◦ Amplifier Direction "R": A145-FR04EH＊RS





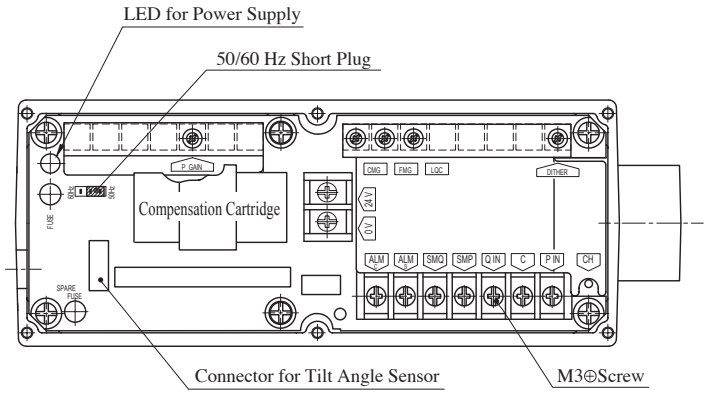
★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. For detail of amplifier, refer to page A-87.
★5. If you use the special sequence valve, remove the plug.

● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-47 for the dimensions of mounting bracket.

Detail of Amplifier

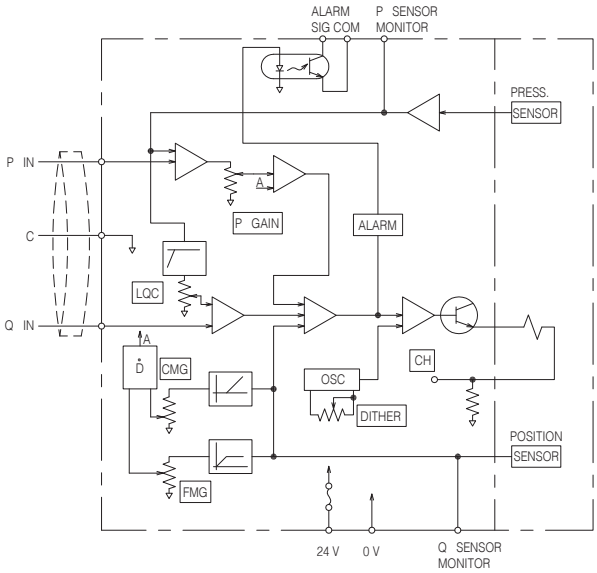
Connecting Terminal



Terminal	Name
P IN	Input Signal, Pressure (+)
C	Input Signal (COM)
Q IN	Input Signal, Flow (+)
SMP	Sensor Monitor Output, Pressure
SMQ	Sensor Monitor Output, Tilt Angle
0 V	Power Supply
24 V	
ALM S	Alarm Output
ALM C	Alarm Output (COM)
CH	Output Current Check (to COM)

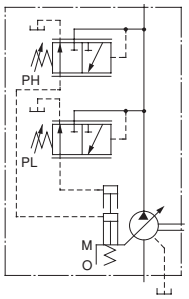
Note 1. For "SENSOR MONITOR" terminal, external instruments should have input impedance of more than 10 kΩ.
2. For "CH" terminal, external instruments should have input impedance of more than 10 kΩ.
3. Volume adjustment of "DITHER", "GAIN", "CMG", "FMG" and "LQC" is made at the time of shipment. Adjustment at the customer is not required.
4. Use shielded cable for "Input" connection. The ground of the shielded cable must be connected to input signal side.

Circuit Schematic

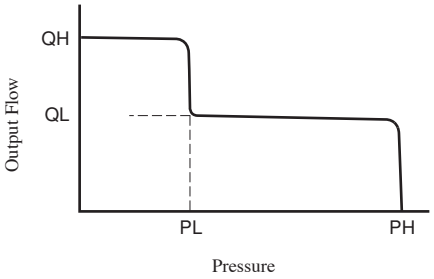


A Series Variable Displacement Piston Pumps, Two-Pressure Two-Flow Control Type By System Pressure

Graphic Symbol



Performance Characteristics



Specifications

Model Numbers	Geometric Displacement cm³/rev	Delivery Volume Adj. Range cm³/rev		Operating Pressure MPa		Shaft Speed Range r/min	
		Large Displacement (QH)	Small Displacement (QL)	Rated	Intermittent	Max.	Min.
A16-＊-R-05-＊＊-S-K-32	15.8	2.6-15.8	2.6-11.1	16	21	1800	600
A37-＊-R-05-＊＊-S-K-32	36.9	4.1-36.9	4.1-20.1	16	21		
A56-＊-R-05-＊＊-S-K-32	56.2	3.4-56.2	3.4-25.1	16	21		

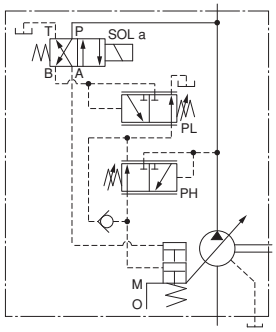
Model Number Designation

A16	-F	-R	-05	-B	C	-S	-K	-32
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range for High Pressure MPa	Pres. Adj. Range for Low Pressure MPa	Port Position	Shaft Extension	Design Number
A16 (15.8 cm³/rev)	F: Flange Mtg.	(Viewed from Shaft End)	05: Two Pressure Two Flow Control Type by System Pressure	B: 2.5 - 7 C: 2.5 - 16 H: 2.5 - 21	B: 2.5 - 7 C: 2.5 - 16 H: 2.5 - 21	None: Axial Port	K: Keyed Shaft	32
A37 (36.9 cm³/rev)	L: Foot Mtg.	R: Clockwise (Normal)				S: Side Port		32
A56 (56.2 cm³/rev)								32

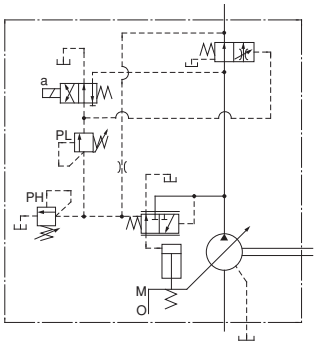
Consult Yuken when detailed material such as dimensions figures is required.

Series Variable Displacement Piston Pumps, Two-Pressure Two-Flow Control Type By Solenoid Valve

Graphic Symbols

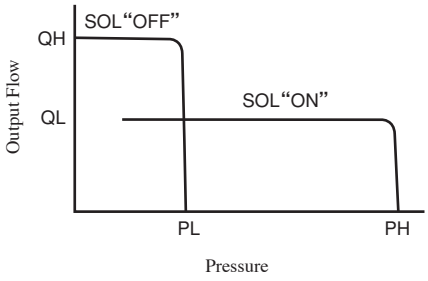


A16/A22/A37/A56



A70/A90/A145

Performance Characteristics



Specifications

Model Numbers	Geometric Displacement cm³/rev	Delivery Volume Adj. Range cm³/rev		Operating Pressure MPa		Shaft Speed Range r/min	
		Large Displacement (QH)	Small Displacement (QL)	Rated	Intermittent	Max.	Min.
A16-＊-R-06-＊＊-S-K-＊-33	15.8	2.6 - 15.8	2.6 - 11.1	16	21	1800	600
A22-＊-R-06-＊＊-S-K-＊-33	22.2	3.7 - 22.2	3.7 - 15.5	16	16		
A37-＊-R-06-＊＊-S-K-＊-33	36.9	4.1 - 36.9	4.1 - 20.1	16	21		
A56-＊-R-06-＊＊-S-K-＊-33	56.2	3.4 - 56.2	3.4 - 25.1	16	21		
A70-＊R06S＊-70	70.0	36 - 70.0	3 - 70.0	25	25		
A90-＊R06S＊-70	91.0	56 - 91.0	3 - 70.0	25	25		
A145-＊R06S＊-60	145	83 - 145	3 - 145	25	25		

Model Number Designation

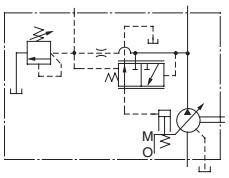
A16	-F	-R	-06	-B	C	-S	-K	A200	-33
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range for High Pressure MPa	Pres. Adj. Range for Low Pressure MPa	Port Position	Shaft Extension	Coil Type of Solenoid Valve	Design Number
A16 (15.8 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise (Normal)	06: Two-Pressure Two-Flow Control Type by Solenoid Valve	B: 2.5 - 7 C: 2.5 - 16 H: 2.5 - 21	B: 2.5 - 7 C: 2.5 - 16 H: 2.5 - 21	S: Side Port	K: Keyed Shaft	AC A100, A120 A200, A240 DC D12, D24 D48 R(AC→DC Rectified) R100, R200	33
A22 (22.2 cm³/rev)									33
A37 (36.9 cm³/rev)									33
A56 (56.2 cm³/rev)									33

A70	-F	R	06	S	A200	-70
Series Number	Mounting	Direction of Rotation	Control Type	Port Position	Coil Type of Solenoid Valve	Design Number
A70 (70.0 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise (Normal)	06: Two-Pressure Two-Flow Control Type by Solenoid Valve	S: Side Port	AC A100, A120 A200, A240 DC D12, D24 D48 R(AC→DC Rectified) R100, R200	70
A90 (91.0 cm³/rev)						70
A145 (145 cm³/rev)						60

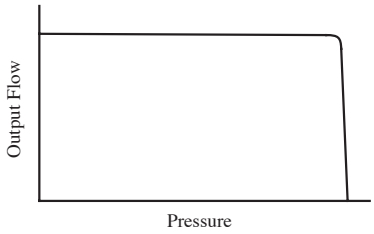
Consult Yuken when detailed material such as dimensions figures is required.

A Series Variable Displacement Piston Pumps, Pilot Pressure Control Type Pressure Compensator

Graphic Symbol



Performance Characteristics



Specifications

Model Numbers	Geometric Displacement cm³/rev	Minimum Adj. Flow cm³/rev	Operating Pressure MPa		Minimum Adj. Pres. MPa	Shaft Speed Range r/min		Approx. Mass kg	
			Rated★2	Intermittent★1		Max.	Min.	Flange Mtg.	Foot Mtg.
A10-FR07-13	10.0	2	16	21	2.0	1800	600	9.5	—
A16-＊-R-07-＊-K-32	15.8	4	16	21	1.2	1800	600	21	23.2
A22-＊-R-07-＊-K-32	22.2	6	16	16	1.2	1800	600	21	23.2
A37-＊-R-07-＊-K-32	36.9	10	16	21	1.2	1800	600	29	33.3
A56-＊-R-07-＊-K-32	56.2	12	16	21	1.2	1800	600	36	40.3
A70-＊R07S-70	70.0	36	25	25	2	1800	600	60.3	72.3
A90-＊R07S-70	91.0	56	25	25	2	1800	600	77.5	98
A145-＊R07S-60	145	83	25	25	2	1800	600	94	119

★1. Whenever setting pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.
★2. When operating the pump exceeding the rated pressure, operating conditions are restricted.
Refer to page A-28 for details.

Model Number Designation

A16	-F	-R	-07	-S	-K	-32
Series Number	Mounting	Direction of Rotation	Control Type	Port Position	Shaft Extension	Design Number
A16 (15.8 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	07: Pilot Pressure Control Type Pressure Compensator	None: Axial Port S: Side Port	K: Keyed Shaft	32
A22 (22.2 cm³/rev)						32
A37 (36.9 cm³/rev)						32
A56 (56.2 cm³/rev)						32

A70	-F	R	07	S	-70
Series Number	Mounting	Direction of Rotation	Control Type	Port Position	Design Number
A10 (10.0 cm³/rev)	F: Flange Mtg.★2	(Viewed from Shaft End) R: Clockwise★1 (Normal)	07: Pilot Pressure Control Type Pressure Compensator	—	13
A70 (70.0 cm³/rev)	F: Flange Mtg. L: Foot Mtg.			S: Side Port	70
A90 (91.0 cm³/rev)					70
A145 (145 cm³/rev)					60

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
★2. When A10 pump is used as the foot Mtg., order the Mtg. bracket kit shown below separately.
Refer to page A-17 for dimensions of the Mtg. bracket.

Mtg. Bracket Kit Numbers	Approx. Mass kg
LP-1A-10	2.2

Note: The mounting bracket kit consists of a mounting bracket, 2 hex. bolts and 2 plain washers.

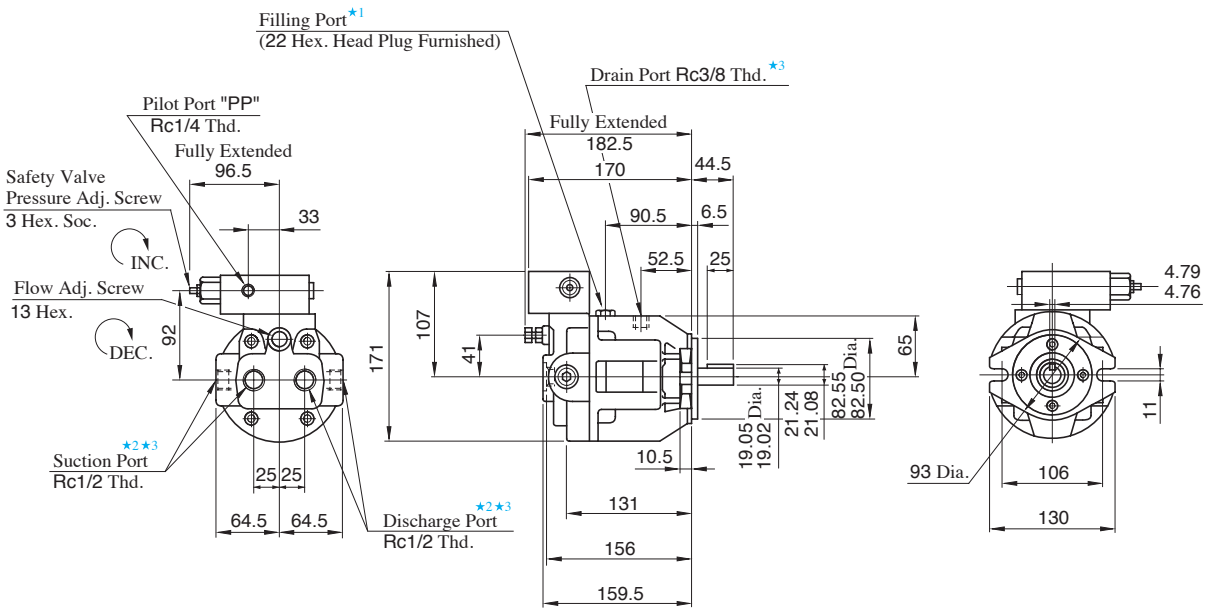
Performance Characteristics

For performance characteristics, refer to models of pressure compensator type on page A-31 to A-34. A-36 to A-38 and A-40.

Pipe Flange Kit

For pipe flange, refer to form of pressure compensator type on page A-29.

Flange Mtg. : A10-FR07

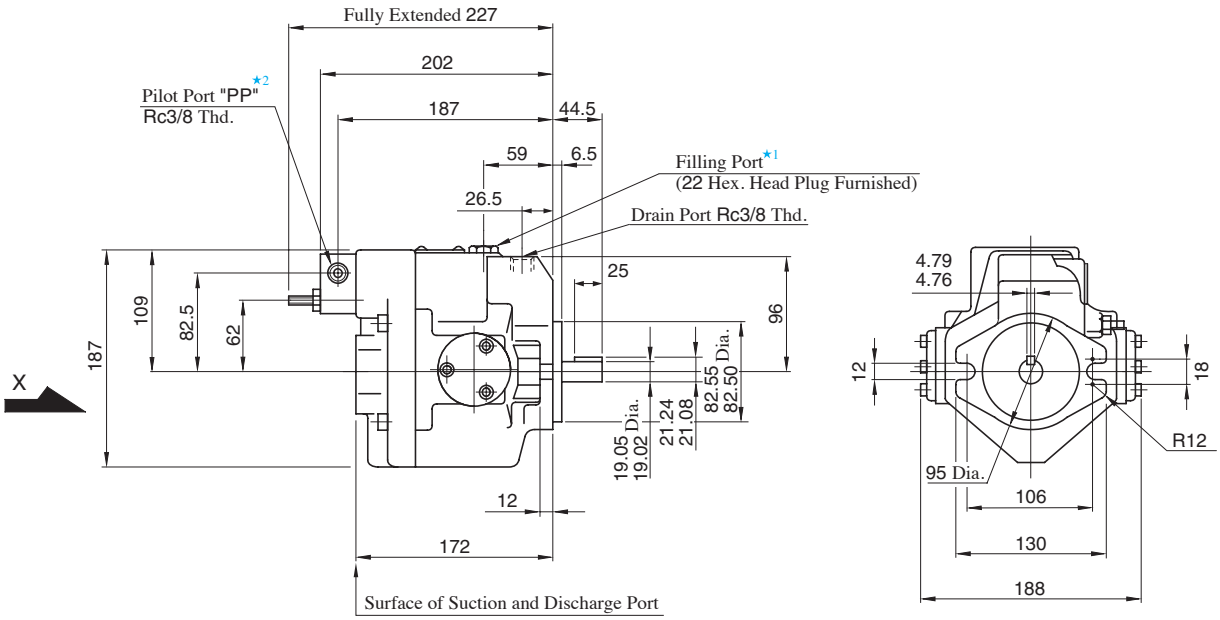


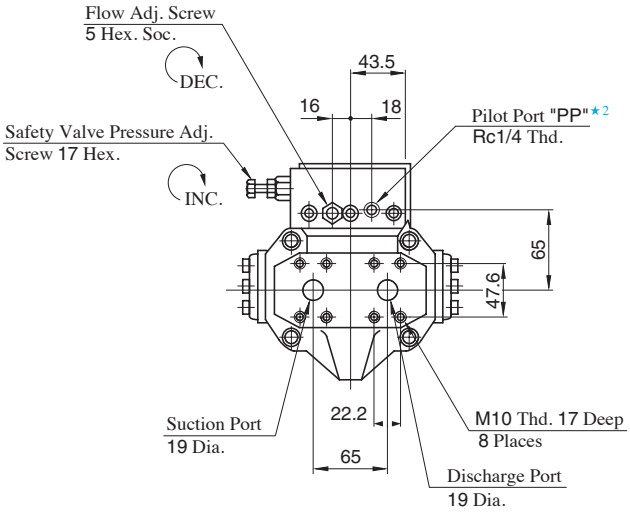
★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two suction and discharge ports at your option. Keep the remaining ports plugged.
★3. As the tightening torques of suction, discharge and drain port fittings, conform to the below.

Model Numbers	Tightening Torque Nm	
	Suction Port & Discharge Port	Drain Port
A10-FR07-12	65 - 75	40 - 50

Axial Port Type

Flange Mtg. : A16-F-R-07-K
A22-F-R-07-K





View Arrow X

★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two pilot ports at your option.
Keep the remaining port plugged.

Axial Port Type

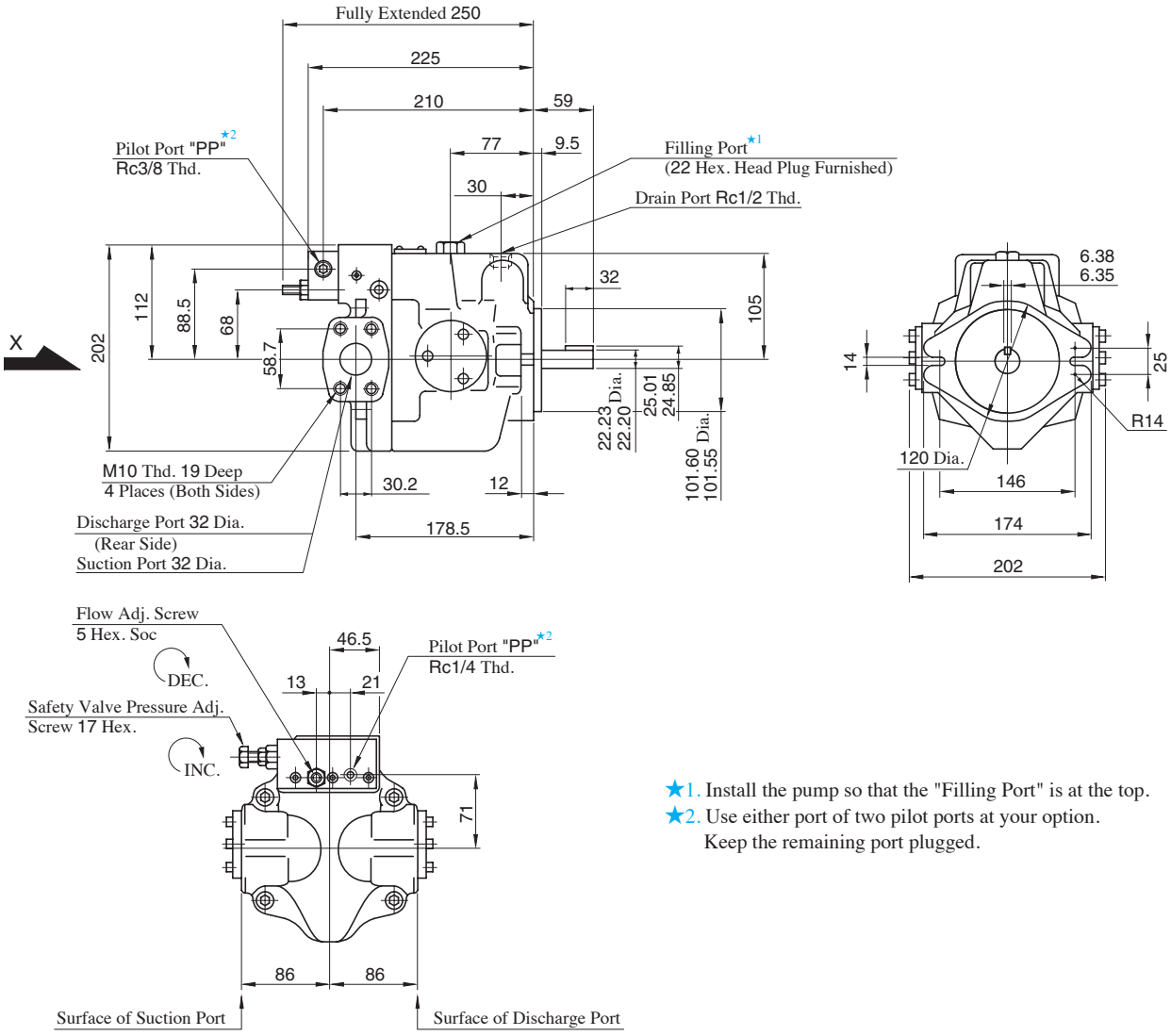
Port mounting dimensions are the same as those of pressure compensator model. Refer to page A-42 for port mounting dimensions.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model. Refer to page A-42 for the dimensions of mounting bracket.

Side Port Type

Flange Mtg. : A37-F-R-07-S-K



View Arrow X

★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two pilot ports at your option.
Keep the remaining port plugged.

Axial Port Type

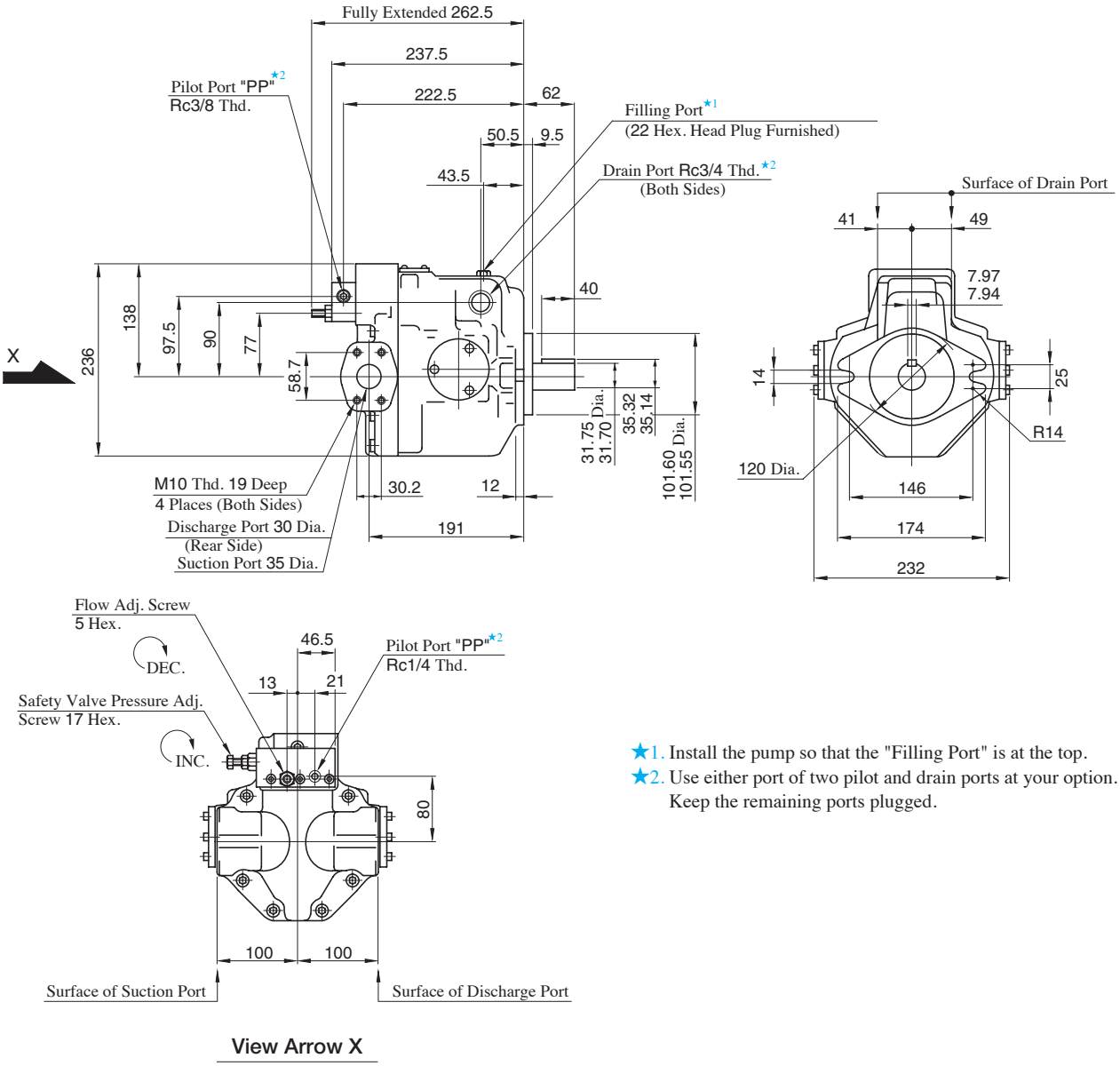
Port mounting dimensions are the same as those of pressure compensator model. Refer to page A-43 for port mounting dimensions.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-43 for the dimensions of mounting bracket.

Side Port Type

Flange Mtg. : A56-F-R-07-S-K



View Arrow X

★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two pilot and drain ports at your option.
Keep the remaining ports plugged.

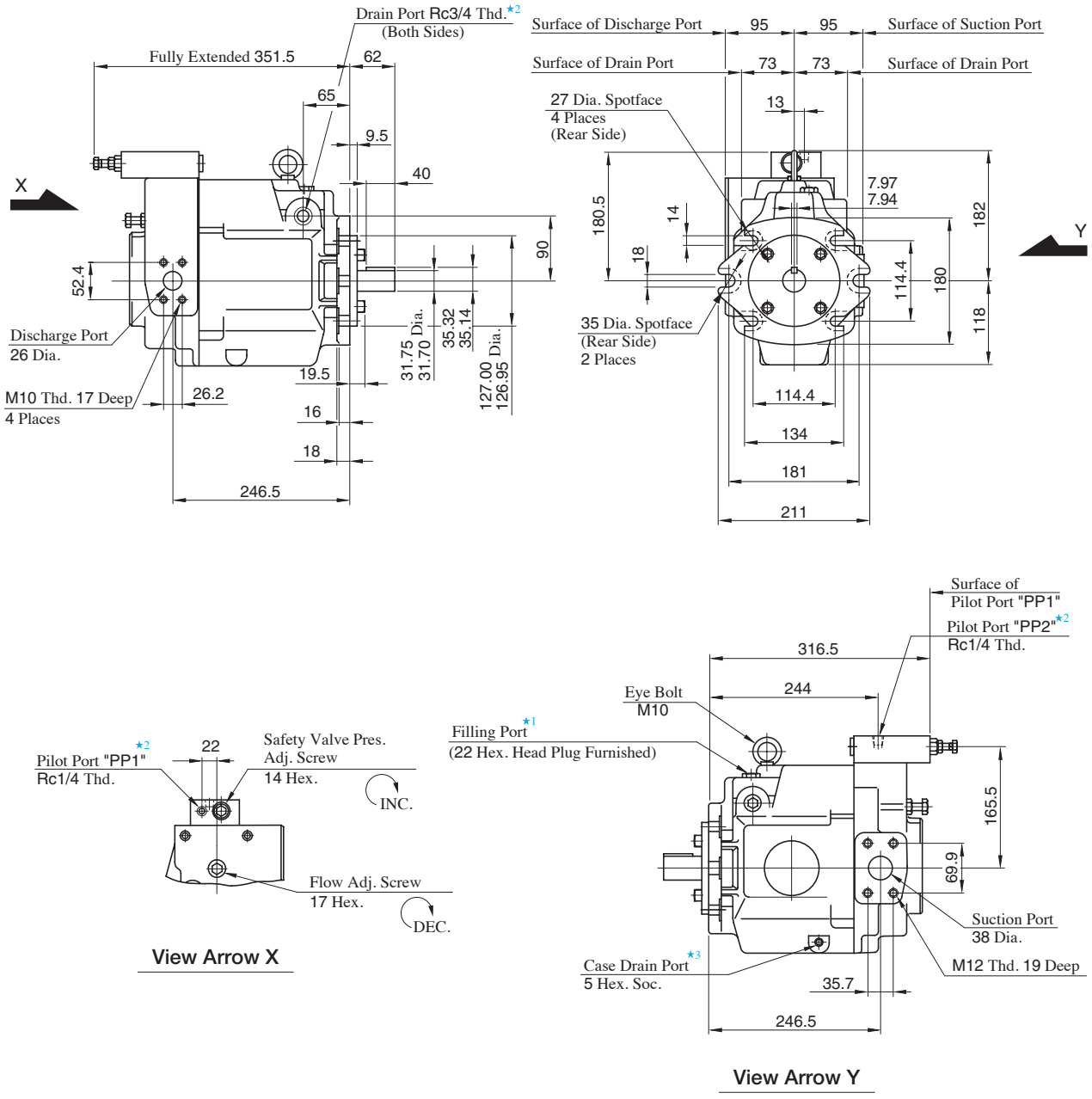
Axial Port Type

Port mounting dimensions are the same as those of pressure compensator model. Refer to page A-44 for port mounting dimensions.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model. Refer to page A-44 for the dimensions of mounting bracket.

Flange Mtg. : A70-FR07S

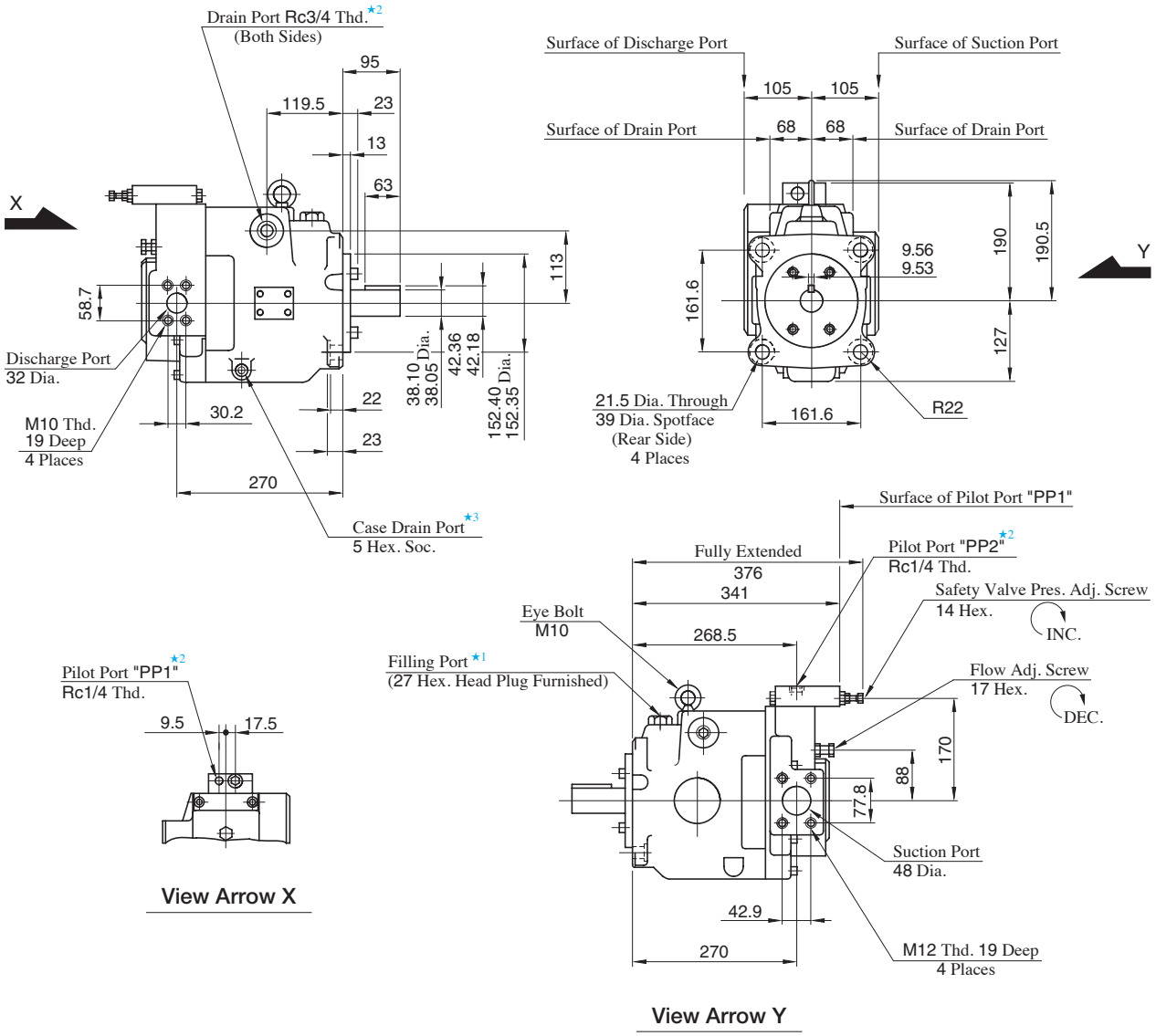


★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two pilot and drain ports at your option. Keep the remaining ports plugged.
★3. Case drain port is available for use when draining hydraulic fluid from pump casing.

● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-45 for the dimensions of mounting bracket.

Flange Mtg. : A90-FR07S

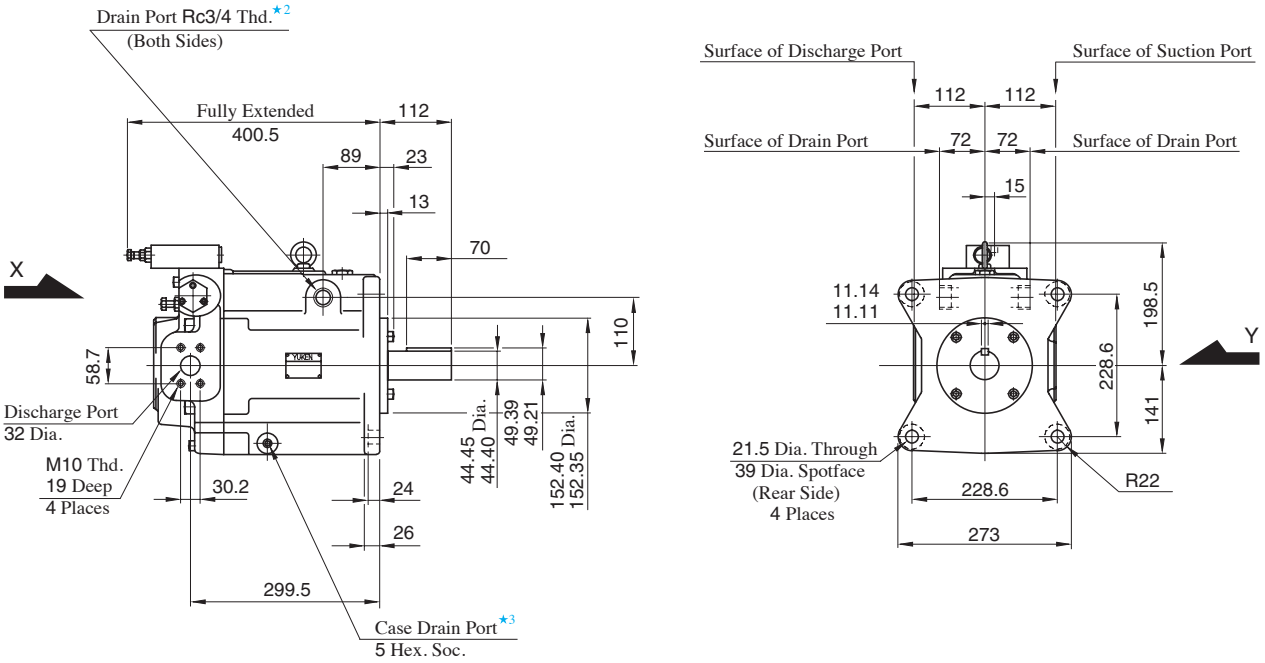


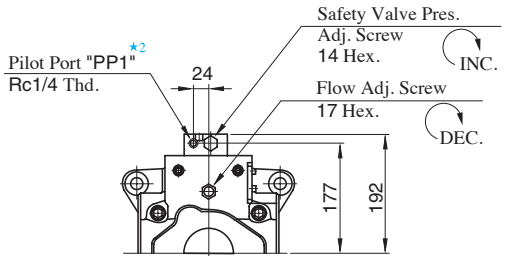
★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two pilot and drain ports at your option. Keep the remaining ports plugged.
★3. Case drain port is available for use when draining hydraulic fluid from pump casing.

● Foot Mounting Type

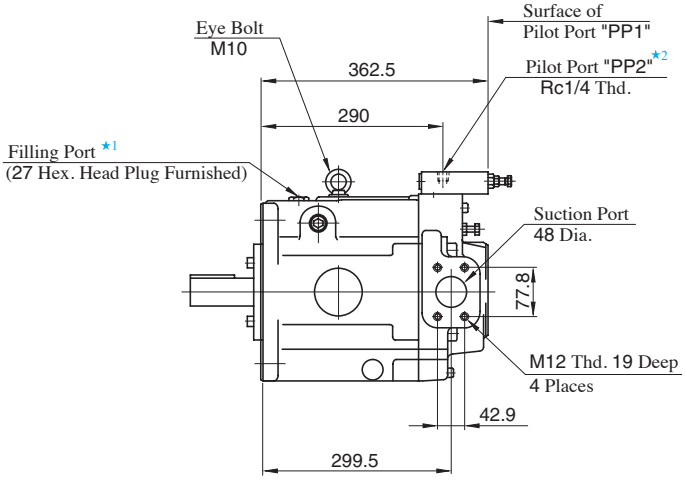
Mounting bracket is common to that of pressure compensator model.
Refer to page A-46 for the dimensions of mounting bracket.

Flange Mtg. : A145-FR07S





View Arrow X



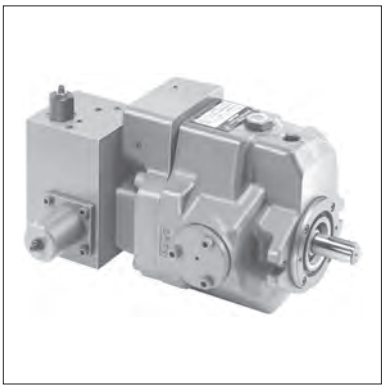
View Arrow Y

★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two pilot and drain ports at your option. Keep the remaining ports plugged.
★3. Case drain port is available for use when draining hydraulic fluid from pump casing.

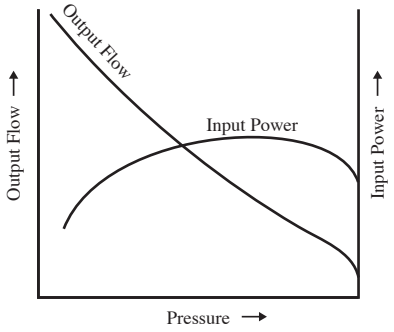
● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-47 for the dimensions of mounting bracket.

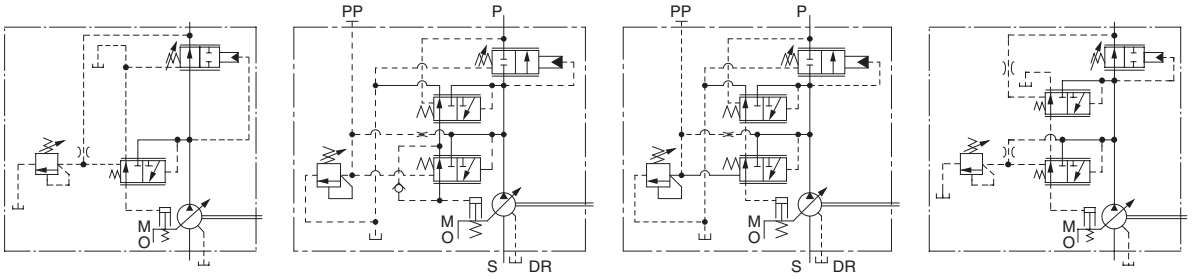
A Series Variable Displacement Piston Pumps, Constant Power Control Type



Performance Characteristics



Graphic Symbols



A16 A37 A56 A70/A145

Specifications

Model Numbers	Geometric Displacement cm^3/rev	Minimum★2 Adj. Flow cm^3/rev	Operating Pres. MPa	Shaft Speed Range r/min		Approx. Mass kg	
			Max.	Max.	Min.	Flange Mtg.	Foot Mtg.
A16-＊-R-09-＊-＊-K-32	15.8	——	21★1	1800	600	29.0	31.2
A37-＊-R-09-＊-＊-K-32	36.9	——	21★1	1800	600	37.0	41.3
A56-＊-R-09-＊-＊-K-32	56.2	——	21★1	1800	44.0	44.0	48.3
A70-＊R09＊S-70	70.0	36	25	1800	600	72.8	84.8
A145-＊R09＊S-60	145	83	25	1800	600	110	135

★1. Maximum operating pressure of A16/A37/A56 varies according to input power setting. See “Model Number Designation” for details.
★2. Minimum adjustment flow of A70/A145 is absolutely minimum flow that can be adjusted with flow adjustment screw.

Model Number Designation

A16/A37/A56

A16	-F	-R	-09	-A	-16M	-K	-32
Series Number	Mounting	Direction of Rotation	Control Type	Input Power Setting	Specify Control Pres.	Shaft Extension	Design Number
A16 (15.8 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	09: Constant Power Control Type	A : 3.7 kW, B : 5.5 kW, E : 2.2 kW, F : 1.5 kW	7M : 7 Pa 10.5M : 10.5 Pa 14M : 14 Pa 16M : 16 Pa 17.5M : 17.5 Pa 21M : 21 Pa	K: Keyed Shaft	32
A37 (36.9 cm³/rev)				A : 3.7 kW, B : 5.5 kW, C : 7.5 kW, D : 11 kW			32
A56 (56.2 cm³/rev)				A : 3.7 kW, B : 5.5 kW, C : 7.5 kW, D : 11 kW, E : 15 kW, F : 18.5 kW, G : 22 kW			32

A70/A145

A70	-F	R	09	-A	S	-70
Series Number	Mounting	Direction of Rotation	Control Type	Input Power Setting	Direction of Port	Design Number
A70 (70 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	09: Constant Power Control Type	A : 15 kW, B : 18.5 kW, C : 22 kW, D : 30 kW	S: Side Port	70
A145 (145 cm³/rev)				A : 15 kW, B : 18.5 kW, C : 22 kW, D : 30 kW, E : 37 kW, F : 45 kW, G : 55 kW, H : 75 kW		60

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
★2. Specify control pressure of A16/A37/A56 with lower than maximum operating pressure depending on input power setting.

Performance Characteristics / Model	Maximum Operating Pressure MPa								
	1.5 kW	2.2 kW	3.7 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW	22 kW
A16	10.5	16	21	21	——	——	——	——	——
A37	——	——	16	21	21	21	——	——	——
A56	——	——	10.5	14	17.5	21	21	21	21

Pipe Flange Kits

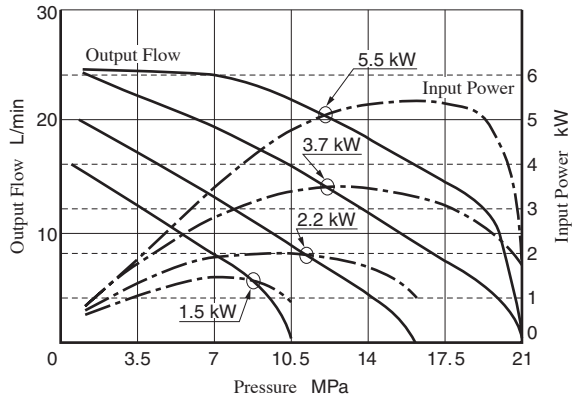
Pipe flange kits are available. When ordering, specify the kit number from the table below.

Pump Model Numbers	Name of Port	Pipe Flange Kit Numbers		
		Threaded Connection	Socket Welding★1	Butt Welding
A16-✻-R-09	Suction	F5-06-A-10	F5-06-B-10	F5-06-C-10
	Discharge	——★2	——★2	——★2
A37-✻-R-09	Suction	F5-10-A-10	F5-10-B-10	F5-10-C-10
A56-✻-R-09	Discharge	F5-06-A-10	F5-06-B-10	F5-06-C-10
A70-✻-R-09	Suction	F5-12-A-10	F5-12-B-10	F5-12-C-10
	Discharge	F5-08-A-10	F5-08-B-10	F5-08-C-10
A145-✻-R-09	Suction	F5-16-A-10	F5-16-B-10	F5-16-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10

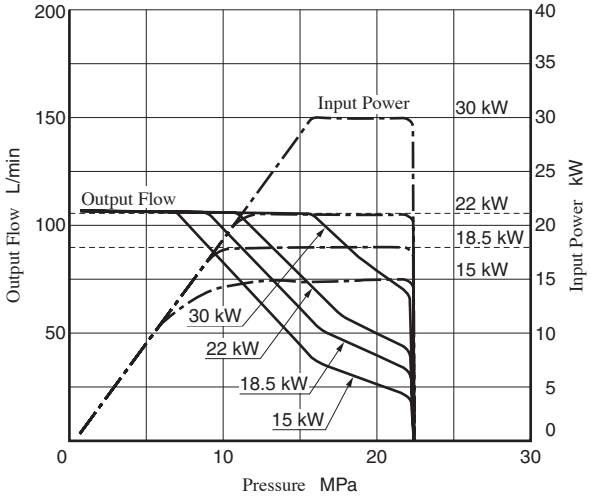
★1. In case of using socket welding flanges, there is a case where the operating pressure should be set lower than the normal because of strength of flanges. Therefore, please pay cautious attention to the operating pressure when the socket welding flanges are used.
★2. Discharge port for pump model "A16" is available only the threaded connections.
● Detail of the pipe flange kits are shown on pages A-258 and A-259.

Typical Performance Characteristics at 1500 r/min

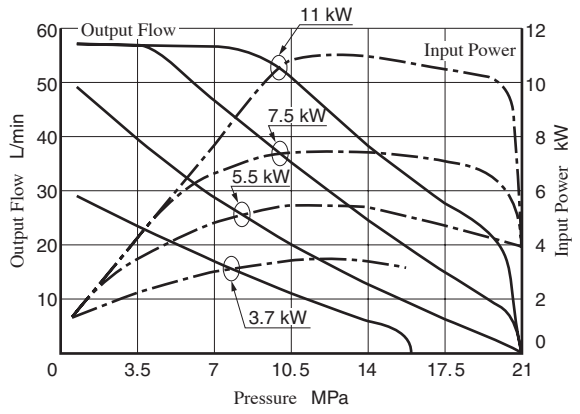
A16



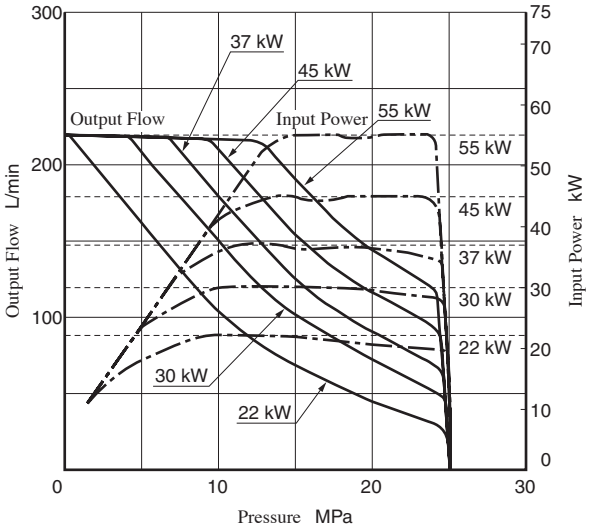
A70



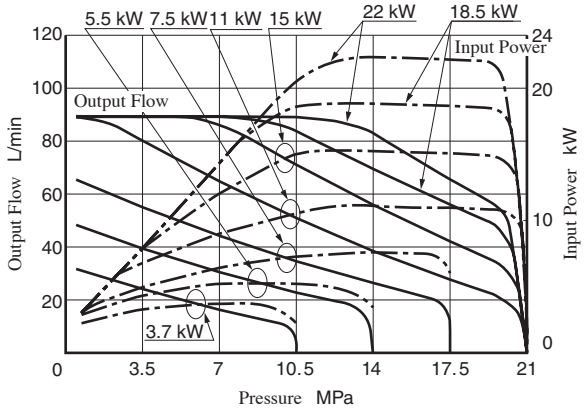
A37



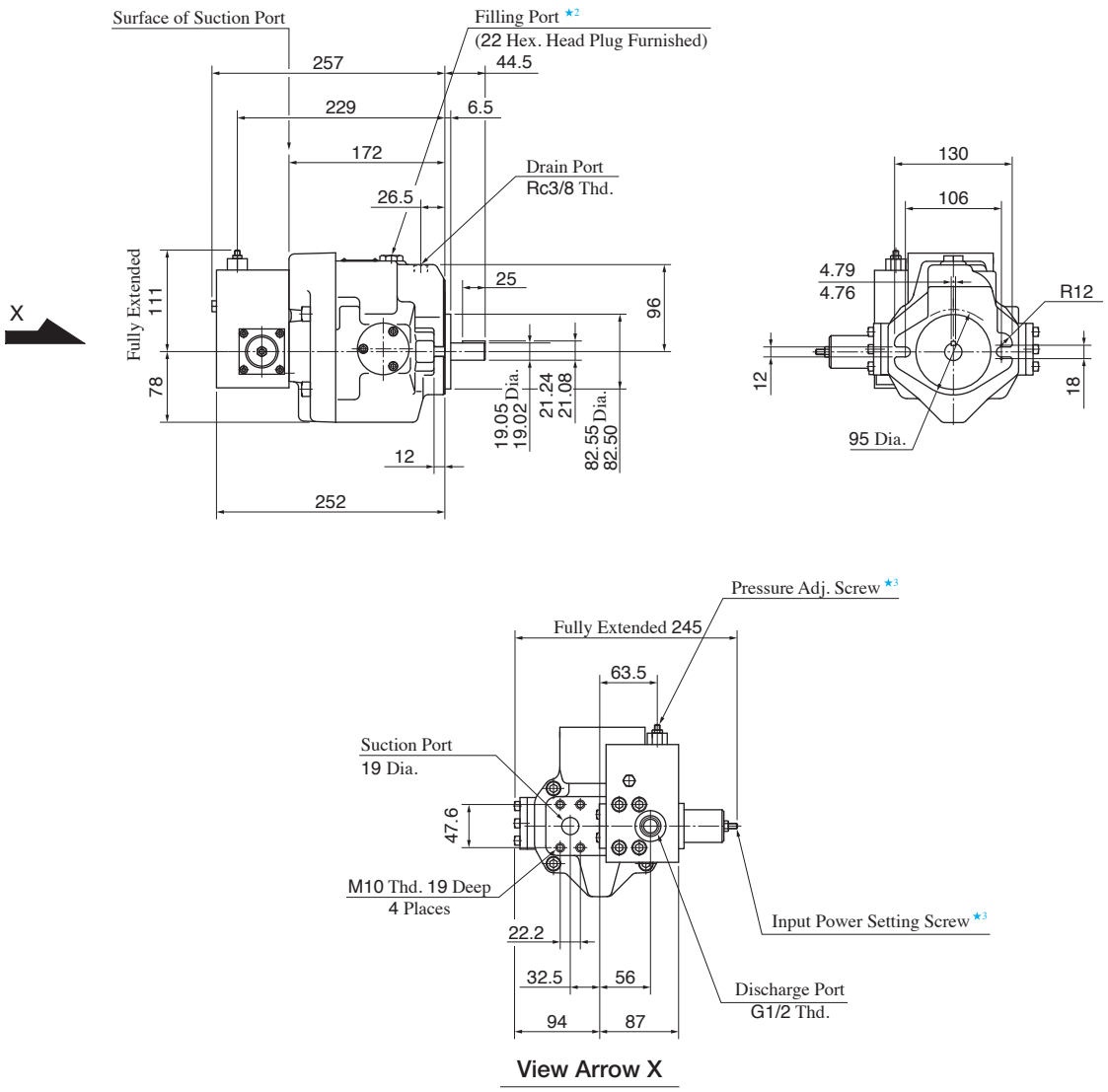
A145



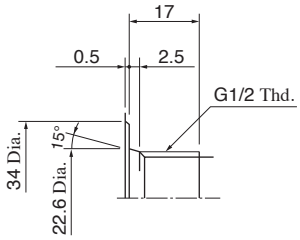
A56



Flange Mtg. : A16-F-R-09-＊-K



View Arrow X

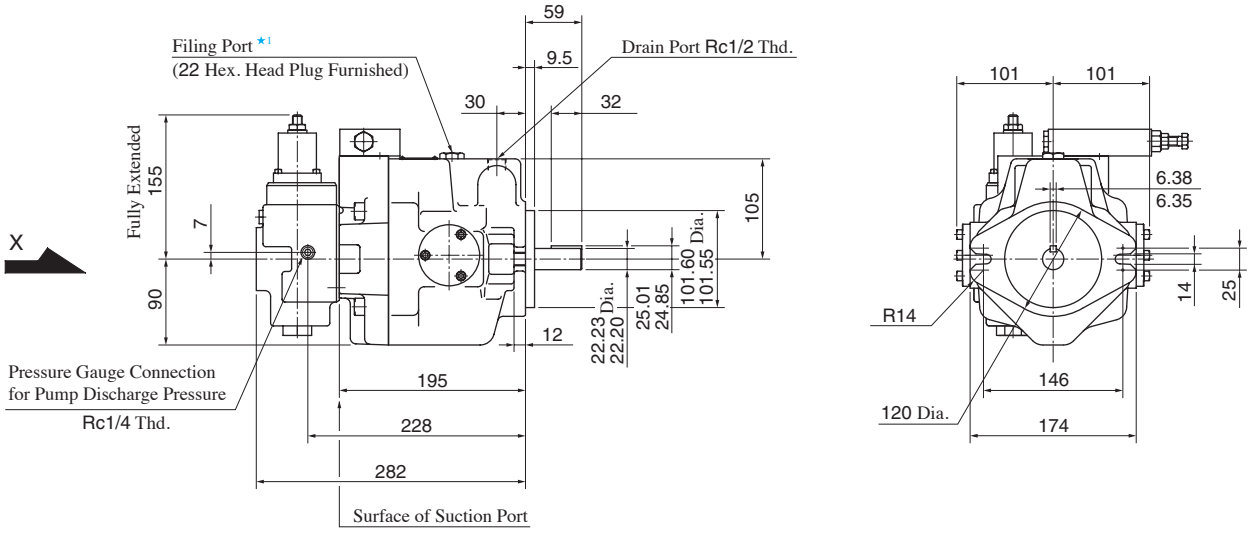


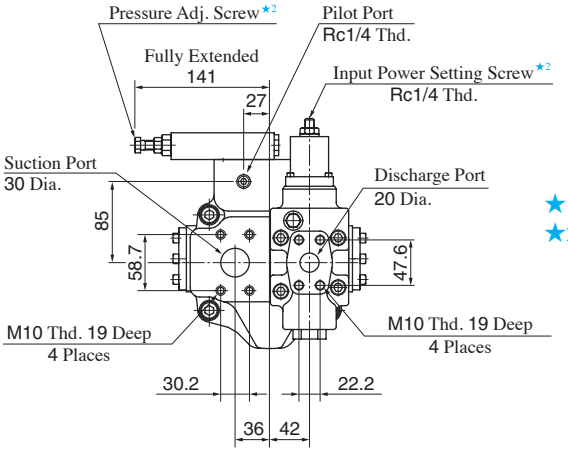
★1. Detail of Discharge Port
★2. Install the pump so that the "Filling Port" is at the top.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-42 for the dimensions of mounting bracket.

Flange Mtg. : A37-F-R-09-＊-K

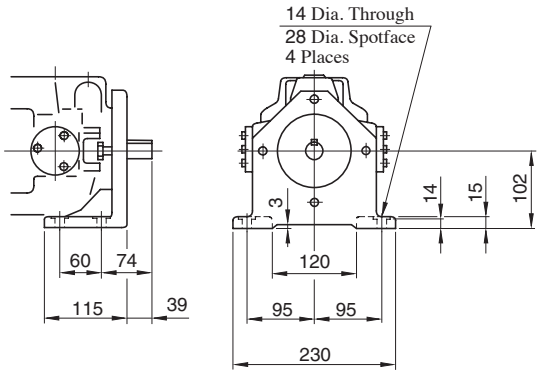




View Arrow X

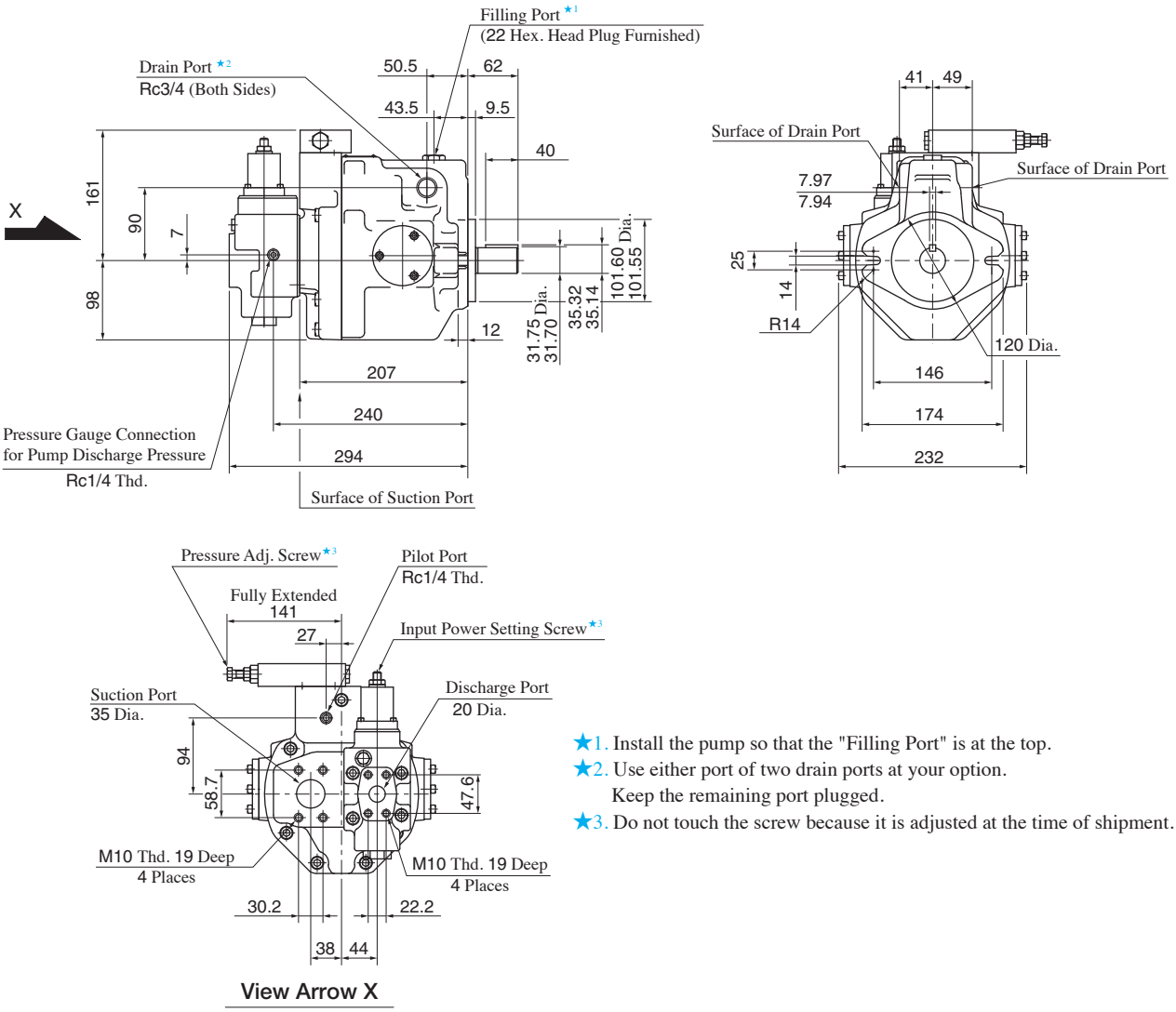
★1. Install the pump so that the "Filling Port" is at the top.
★2. Do not touch the screw because it is adjusted at the time of shipment.

Foot Mtg. : A37-L-R-09-＊-K



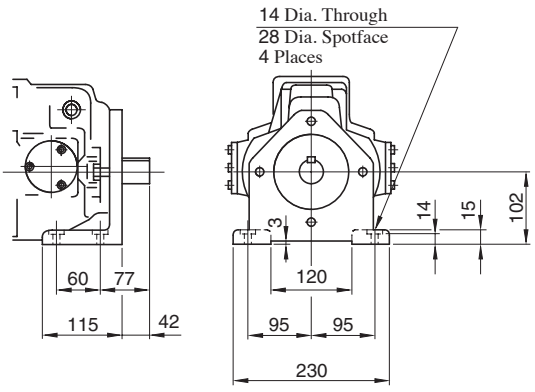
● For other dimensions, refer to “Flange Mtg.”.

Flange Mtg. : A56-F-R-09-＊-K



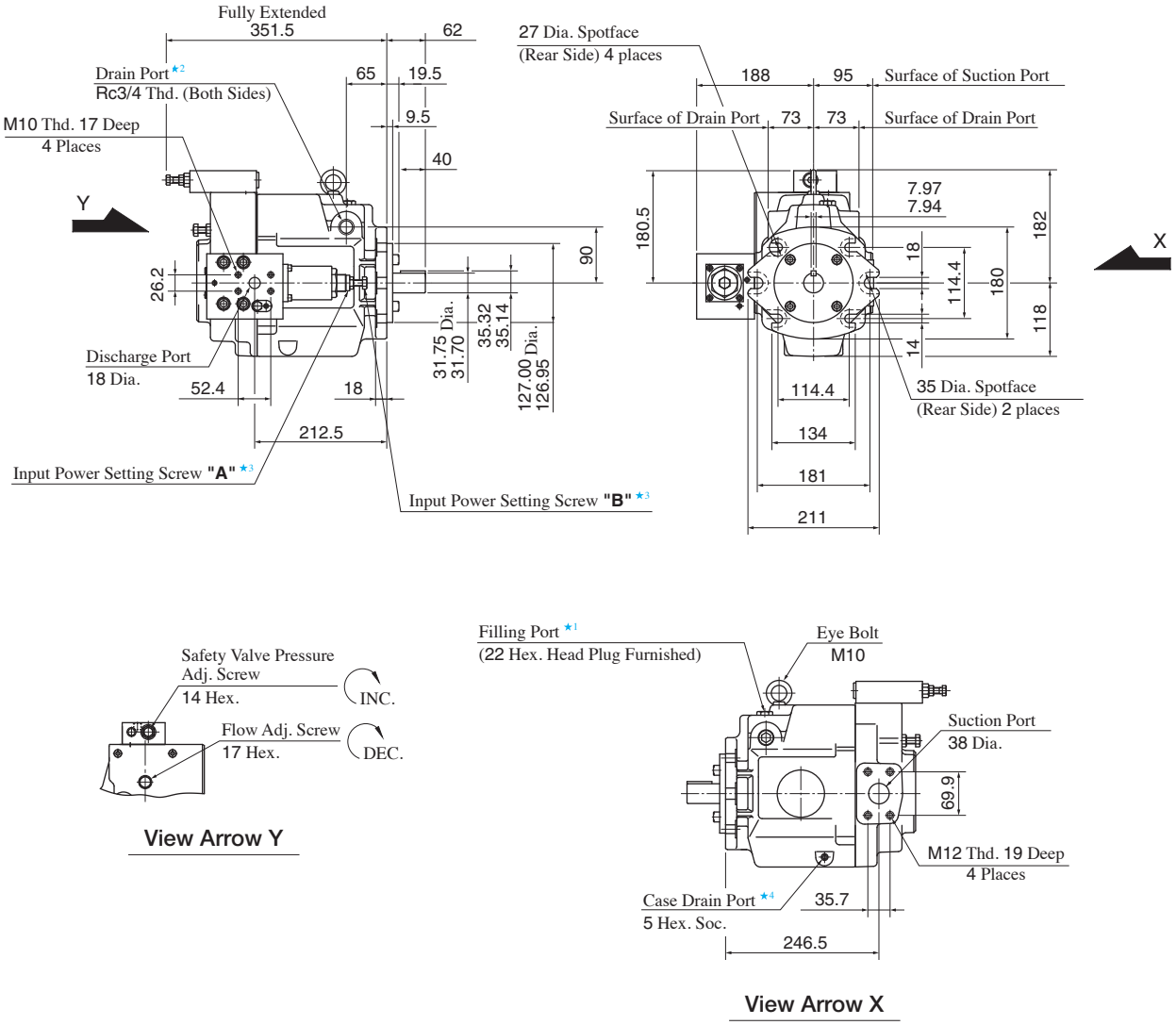
★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option.
Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Foot Mtg. : A56-L-R-09-＊-K-32



● For other dimensions, refer to “Flange Mtg.”.

Flange Mtg. : A70-FR09＊S

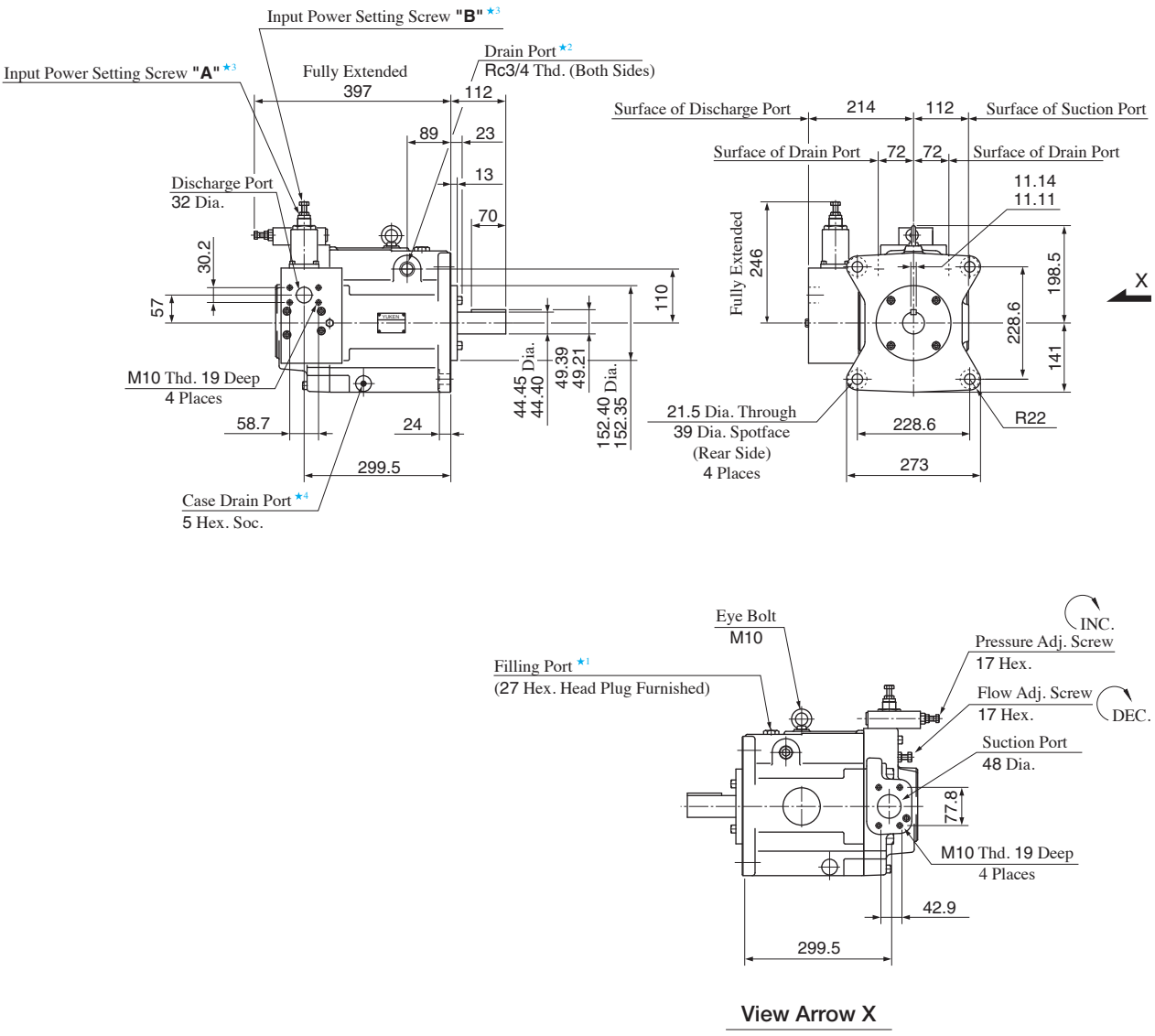


★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. Case drain port is available for use when draining hydraulic fluid from pump casing.

● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-45 for the dimensions of mounting bracket.

Flange Mtg. : A145-FR09＊S



View Arrow X

★1. Install the pump so that the "Filling Port" is at the top.
★2. Use either port of two drain ports at your option. Keep the remaining port plugged.
★3. Do not touch the screw because it is adjusted at the time of shipment.
★4. Case drain port is available for use when draining hydraulic fluid from pump casing.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-47 for the dimensions of mounting bracket.

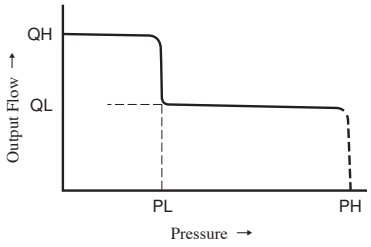
A Series Variable Displacement Piston Pumps - Single Pump, Simple Two-Pressure Two-Flow Control Type

Specifications

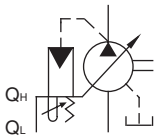
Model Numbers	Geometric Displacement cm^3/rev	Output Flow Adj. Range cm^3/rev		Operating Pressure MPa		Shaft Speed Range r/min
		Large Displacement (QH)	Small Displacement (QL)	Rated	Intermittent	
A16-∗-R-00-H-K-32500	15.8	4-15.8	3-10	16	21	600-1800
A37-∗-R-00-H-K-32500	36.9	7-36.9	3-18	16	21	
A56-∗-R-00-H-K-32500	56.2	9-56.2	3-25.0	16	21	
A70-∗R00HS-70500	70.0	36-70.0	★-24	21	21	
A90-∗R00HS-70500	91	56-91.0	★-45	21	21	
A145-∗R00HS-60500	145	83-145	★-70	21	21	

Note) ★: Minimum adjustment flow of relief valve, which is for setting with PH pressure. (Relief valve is external set.)

Performance Characteristics



Graphic Symbol



Instruction

As the pump does not have full cut-off function, setting relief valve of PH pressure (maximum pressure on circuit) for pump discharge line is absolutely required.

Model Number Designation

A16-A56

A16	—F	—R	—00	—H	—K	—32500
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range MPa	Shaft Extension	Design Number
A16 ($15.8\ cm^3/rev$)	F : Flange Mtg. L : Foot Mtg.	(Viewed from Shaft End) R : Clockwise★ (Normal)	00 : Special Control Type	H : 1.2-21	K : Keyed Shaft	32500
A37 ($36.9\ cm^3/rev$)						32500
A56 ($56.2\ cm^3/rev$)						32500

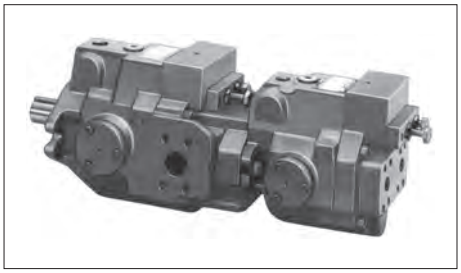
A70-A145

A70	—F	R	00	H	S	—70500
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range MPa	Port Position	Design Number
A70 ($70.0\ cm^3/rev$)	F : Flange Mtg. L : Foot Mtg.	(Viewed from Shaft End) R : Clockwise★ (Normal)	00 : Special Control Type	H : 2-21	S : Side Port	70500
A90 ($91.0\ cm^3/rev$)						70500
A145 ($145\ cm^3/rev$)						60500

★ Available to supply pump with anti-clockwise rotation. Consult Yuken for details.

Consult Yuken when detailed material such as dimensions figures is required.

A Series Variable Displacement Piston Pumps – Double Pumps, Pressure Compensator Type



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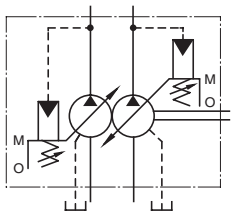


Specifications

Model Numbers		Geometric Displacement cm^3/rev	Min. Adj. Flow cm^3/rev	Operating Pressure MPa		Shaft Speed Range r/min		Approx. Mass kg	
				Rated	Intermittent	Max.	Min.	Flange Mtg.	Foot Mtg.
A1616-＊R01＊01＊＊K-32	Outboard Pump	15.8	4	16	21	1800	600	35.5	37.7
	Inboard Pump	15.8	4	16	21				
A1622-＊R01＊01＊＊K-32	Outboard Pump	15.8	4	16	21	1800	600	35.5	37.7
	Inboard Pump	22.2	6	16	16				
A2222-＊R01＊01＊＊K-32	Outboard Pump	22.2	6	16	16	1800	600	35.5	37.7
	Inboard Pump	22.2	6	16	16				
A1637-＊R01＊01＊＊K-32	Outboard Pump	15.8	4	16	21	1800	600	50	54.3
	Inboard Pump	36.9	10	16	21				
A2237-＊R01＊01＊＊K-32	Outboard Pump	22.2	6	16	16	1800	600	50	54.3
	Inboard Pump	36.9	10	16	21				
A1656-＊R01＊01＊＊K-32	Outboard Pump	15.8	4	16	21	1800	600	54.5	58.8
	Inboard Pump	56.2	12	16	21				
A2256-＊R01＊01＊＊K-32	Outboard Pump	22.2	6	16	16	1800	600	54.5	58.8
	Inboard Pump	56.2	12	16	21				
A1670-＊R01＊01＊＊-70	Outboard Pump	15.8	4	16	21	1800	600	77.5	89.5
	Inboard Pump	70.0	36	25	28				
A2270-＊R01＊01＊＊-70	Outboard Pump	22.2	6	16	16	1800	600	77.5	89.5
	Inboard Pump	70.0	36	25	28				
A3770-＊R01＊01＊＊-70	Outboard Pump	36.9	10	16	21	1800	600	86.5	98.5
	Inboard Pump	70.0	36	25	28				
A1690-＊R01＊01＊＊-70	Outboard Pump	15.8	4	16	21	1800	600	88	108.5
	Inboard Pump	91.0	56	25	28				
A2290-＊R01＊01＊＊-70	Outboard Pump	22.2	6	16	16	1800	600	88	108.5
	Inboard Pump	91.0	56	25	28				
A3790-＊R01＊01＊＊-70	Outboard Pump	36.9	10	16	21	1800	600	100.5	121
	Inboard Pump	91.0	56	25	28				
A5690-＊R01＊01＊＊-70	Outboard Pump	56.2	12	16	21	1800	600	107.5	128
	Inboard Pump	91.0	56	25	28				
A16145-＊R01＊01＊＊-60	Outboard Pump	15.8	4	16	21	1800	600	109	134
	Inboard Pump	145	83	25	28				
A22145-＊R01＊01＊＊-60	Outboard Pump	22.2	6	16	16	1800	600	109	134
	Inboard Pump	145	83	25	28				
A37145-＊R01＊01＊＊-60	Outboard Pump	36.9	10	16	21	1800	600	121.5	146.5
	Inboard Pump	145	83	25	28				
A56145-＊R01＊01＊＊-60	Outboard Pump	56.2	12	16	21	1800	600	128.5	153.5
	Inboard Pump	145	83	25	28				

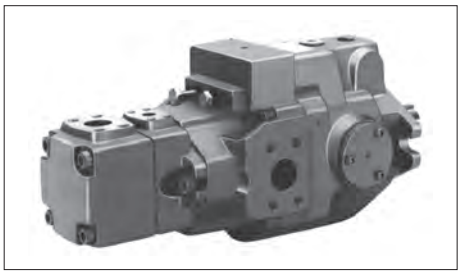
Consult Yuken when detailed material such as dimensions figures is required.

Model Number Designation

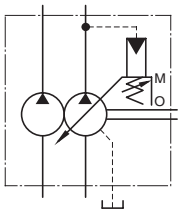
A1637	-F	-R	Outboard Pump		Inboard Pump (Driven End)		S	K	-32
			01	C	01	C			
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range MPa	Control Type	Pres. Adj. Range MPa	Port Position of Outboard Pump	Shaft Extension	Design Number
A1616 (15.8/15.8 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	01: Pressure Compensator Type	B : 1.2- 7 C : 1.2-16 D : 1.2-21	01: Pressure Compensator Type	B : 1.2- 7 C : 1.2-16 D : 1.2-21	S: Side Port None: Axial Port	K: Keyed Shaft	32
A1622 (15.8/22.2 cm³/rev)						B : 1.2- 7 C : 1.2-16			32
A2222 (22.2/22.2 cm³/rev)				B : 1.2- 7 C : 1.2-16					32
A1637 (15.8/36.9 cm³/rev)				B : 1.2- 7 C : 1.2-16 H : 1.2-21		B : 1.2- 7 C : 1.2-16 D : 1.2-21			32
A2237 (22.2/36.9 cm³/rev)				B : 1.2- 7 C : 1.2-16					32
A1656 (15.8/56.2 cm³/rev)				B : 1.2- 7 C : 1.2-16 H : 1.2-21					32
A2256 (22.2/56.2 cm³/rev)				B : 1.2- 7 C : 1.2-16					32
A1670 (15.8/70.0 cm³/rev)				B : 1.2- 7 C : 1.2-16 H : 1.2-21		B : 1.2- 7 C : 1.5-16 H : 1.8-21 K : 2.0-28		None: Keyed Shaft	70
A2270 (22.2/70.0 cm³/rev)				B : 1.2- 7 C : 1.2-16					70
A3770 (36.2/70.0 cm³/rev)				B : 1.2- 7 C : 1.2-16 H : 1.2-21					70
A1690 (15.8/91.0 cm³/rev)									70
A2290 (22.2/91.0 cm³/rev)				B : 1.2- 7 C : 1.2-16					70
A3790 (36.9/91.0 cm³/rev)				B : 1.2- 7 C : 1.2-16 H : 1.2-21					70
A5690 (56.2/91.0 cm³/rev)									70
A16145 (15.8/145 cm³/rev)									60
A22145 (22.2/145 cm³/rev)				B : 1.2- 7 C : 1.2-16					60
A37145 (36.9/145 cm³/rev)				B : 1.2- 7 C : 1.2-16 H : 1.2-21					60
A56145 (56.2/145 cm³/rev)									60

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.

Series Piston Pumps – Variable / Fixed Double Pumps



Graphic Symbol



Model Number Designation

A1637	-F	-R	Inboard Pump (Driven End)		Outboard Pump			K	-32
			01	C	-23	A	A		
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range MPa	Nominal Displacement cm^3/rev	Discharge Port Position	Suction Port Position	Shaft Extension	Design Number
A16R1	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	01: Pressure Compensator Type	B : 1.2- 7 C : 1.2-16 D : 1.2-21	6, 8 10, 12 14, 17 19, 23 25, 31	(Viewed from Shaft End) A: Up	(Viewed from Shaft End) A: Up	K: Keyed Shaft	32
A22R1				B : 1.2- 7 C : 1.2-16					32
A37R1				B : 1.2- 7 C : 1.2-16 D : 1.2-21					32
A56R1									32
A70R1				B : 1.2- 7 C : 1.5-16 H : 1.8-21 K : 2.0-28				None: Keyed Shaft	70
A90R1									70
A145R1									60
A70R2				B : 1.2- 7 C : 1.5-16 H : 1.8-21 K : 2.0-28	41,47 56,59 65				70
A90R2									70
A145R2									60

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.

Consult Yuken when detailed material such as dimensions figures is required.

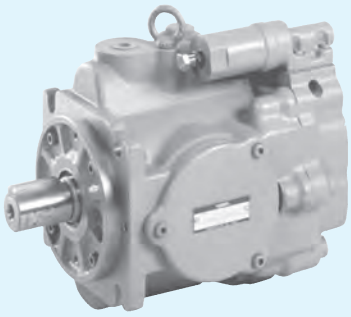
Specifications

Model Numbers		Geometric Displacement cm^3/rev	Operating Pressure MPa		Shaft Speed Range r/min		Approx. Mass kg	
			Rated	Intermittent	Max.	Min.	Flange Mtg.	Foot Mtg.
A16R1-＊R01＊-AAK-32	Outboard Pump	Refer to the following table			1800	750	28.8	31.0
	Inboard Pump	15.8	16	21				
A22R1-＊R01＊-AAK-32	Outboard Pump	Refer to the following table			1800	750	28.8	31.0
	Inboard Pump	22.2	16	16				
A37R1-＊R01＊-AAK-32	Outboard Pump	Refer to the following table			1800	750	39	43.3
	Inboard Pump	36.9	16	21				
A56R1-＊R01＊-AAK-32	Outboard Pump	Refer to the following table			1800	750	47	51.3
	Inboard Pump	56.2	16	21				
A70R1-＊R01＊-AA-70	Outboard Pump	Refer to the following table			1800	750	66	78
	Inboard Pump	70.0	25	28				
A90R1-＊R01＊-AA-70	Outboard Pump	Refer to the following table			1800	750	82	105
	Inboard Pump	91.0	25	28				
A145R1-＊R01＊-AA-60	Outboard Pump	Refer to the following table			1800	750	102	129
	Inboard Pump	145	25	28				
A70R2-＊R01＊-＊AA-70	Outboard Pump	Refer to the following table			1800	600	72.5	84.5
	Inboard Pump	70.0	25	28				
A90R2-＊R01＊-＊AA-70	Outboard Pump	Refer to the following table			1800	600	91.5	112
	Inboard Pump	91.0	25	28				
A145R2-＊R01＊-＊AA-60	Outboard Pump	Refer to the following table			1800	600	112	137
	Inboard Pump	145	25	28				

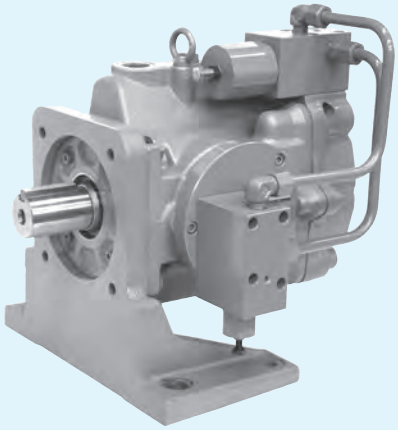
Geometric Displacement and Max. Pressure of Outboard Pump

Model Numbers	Geometric Displacement cm^3/rev	Max Pres. MPa	
		Anti-Wear Type	R & O Type
A＊R1-＊R01＊-6	5.8	21	16
A＊R1-＊R01＊-8	8.0		
A＊R1-＊R01＊-10	9.4	21	
A＊R1-＊R01＊-12	12.2		
A＊R1-＊R01＊-14	13.7		
A＊R1-＊R01＊-17	16.6		
A＊R1-＊R01＊-19	18.6		
A＊R1-＊R01＊-23	22.7	17.5	
A＊R1-＊R01＊-25	25.3	15	15
A＊R1-＊R01＊-31	31.0	12	12
A＊R2-＊R01＊-26	26.6	21	14
A＊R2-＊R01＊-33	33.3		
A＊R2-＊R01＊-41	41.3		
A＊R2-＊R01＊-47	47.2	20	
A＊R2-＊R01＊-53	52.5	18	
A＊R2-＊R01＊-59	58.2	16	
A＊R2-＊R01＊-65	64.7	14	

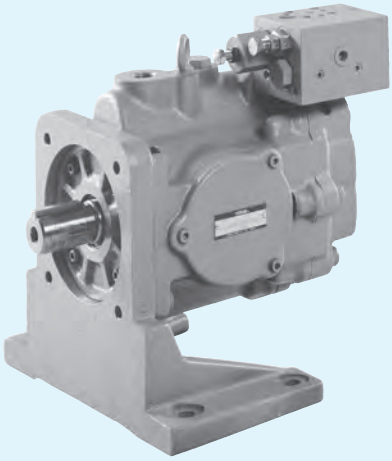
A3H Series High Pressure Variable Displacement Piston Pumps



Pressure Compensator Type



Constant Power (Torque) Control Type



Load Sensing Type

"A3H" Series High Pressure Variable Displacement Piston Pumps

Pump Type	Graphic Symbol	Graphic Displacement cm³/rev (1 2 5 10 20 50 100 200 300)	Maximum Operating Pressure MPa	Page
A3H Series High Pressure Variable Displacement Piston Pumps — Single Pump★		A3H16 A3H37 A3H56 A3H71 A3H100 A3H145 A3H180	35	A-114

★ Four control types are available such as pressure compensator type. Refer to page A-115.

Hydraulic Fluids

Hydraulic Fluids

Use petroleum base oils such as anti-wear type hydraulic oils or R & O (Rust and Oxidation inhibitor) type hydraulic oils equivalent to ISO VG-32 or 46.
The recommended viscosity range is from 20 to 400 mm^2/s and temperature range is from 0 to 60 °C, both of which have to be satisfied for the use of the above hydraulic oils.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the operating oil which can otherwise lead to breakdowns and shorten the life of the unit. Please maintain the degree of contamination within NAS Grade 10.
The suction port must be equipped with at least a 100 µm (150 mesh) reservoir type filter and the return line must have a line filter of under 10 µm.

Instructions

Mounting

When installing the pump the filling port should be positioned upwards.

Alignment of Shaft

Employ a flexible coupling whenever possible, and avoid any stress from bending or thrust.
Maximum permissible misalignment is less than 0.1 mm TIR and maximum permissible misangular is less than 0.2°.

Suction Pressure

Permissible suction pressure at suction port of the pump is between -16.7 and +50 kPa. In case of the speed is over 1800 r/min, adjust the pressure 0 to +50 kPa.
For piping to the suction port, use the pipes of the same diameter as that of the specified pipe flange to be used.
Make sure that the height of the pump suction port is whithin one meter from the oil level in the reservoir.

Hints on Piping

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise.
Whenever there is fear of excessive load, please use rubber hoses.

Suction Piping

In case the pump is installed above the oil level, the suction piping and suction line filter should be located lower than the pump position to prevent air in the suction line.

Drain Piping

Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a normal pressure of less than 0.1 MPa and surge pressure of less than 0.5 MPa.
Length of piping should be less than 1 m, and the pipe end should be submerged in oil.

[Recommended Drain Piping Size]

Model	Fitting Size	Inside Dia. of Pipe
A3H16 A3H37	1/2	12 mm or more
A3H56 I A3H180	3/4	19 mm or more

Safety Valve

When delivery line is blocked suddenly, surge pressure is occurred so a safety valve should be set in the circuit to eliminate any damage on equipment and piping.

Bleeding Air

It may be necessary to bleed air from pump case and outlet line to remove causes of vibration.

Starting

Before first staring, fill pump case with clean operating oil via the fill port.
In order to avoid air blockage when first starting, adjust the control valves so that the discharged oil from the pump is returned direct to the tank or the actuator moves in a free load.

[Volume of Pre-fill Oil Required]

Model	Volume cm^3
A3H16	400
A3H37	700
A3H56	900
A3H71	1300
A3H100	1700
A3H145	2400
A3H180	3200

Setting Discharge Pressure and Delivery

At the time of shipment, the unit has been preset to maximum delivery and minimum discharge pressure.
Adjust the preset delivery and pressure to meet your system requirements.

Adjustment of Discharge Pressure

Turning the adjustment screw clockwise, increases pressure.

[Volume adjusted by each full turn of the pressure adjustment screw]

Model Numbers	Adjustment Volume MPa
A3H16/A3H37/A3H56-01	5.5
A3H71/A3H100/A3H145-01	6.3
A3H180-01	5.7

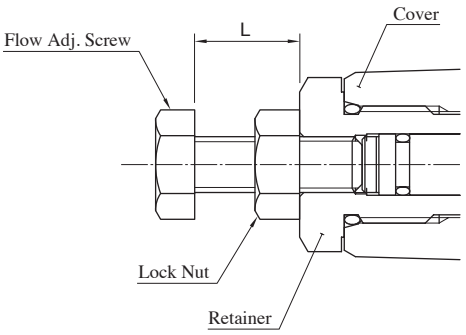
Adjustment of Delivery

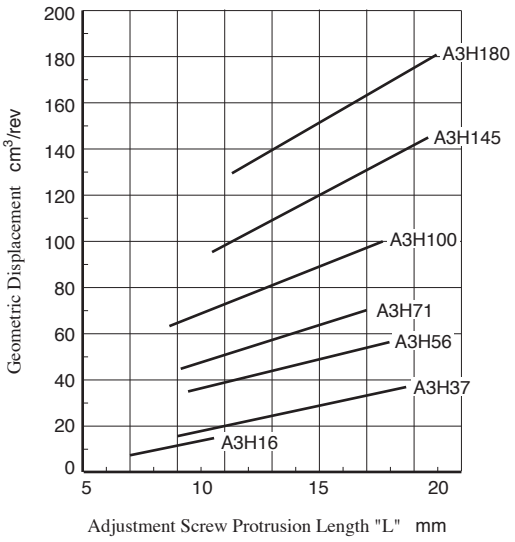
Turning the flow adjustment screw clockwise, decreases delivery.

[The minimum adjustable flow and adjustable volume of each full turn of the delivery adjustment screw]

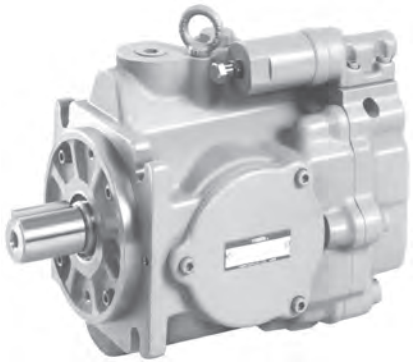
Model Numbers	Adjustable volumre with each full turn of the adjustment screw cm^3/rev	Minimum Adjustable Flow cm^3/rev
A3H16	1.4	8
A3H37	3.3	16
A3H56	4.2	35
A3H71	4.9	45
A3H100	6.2	63
A3H145	9.4	95
A3H180	10.3	130

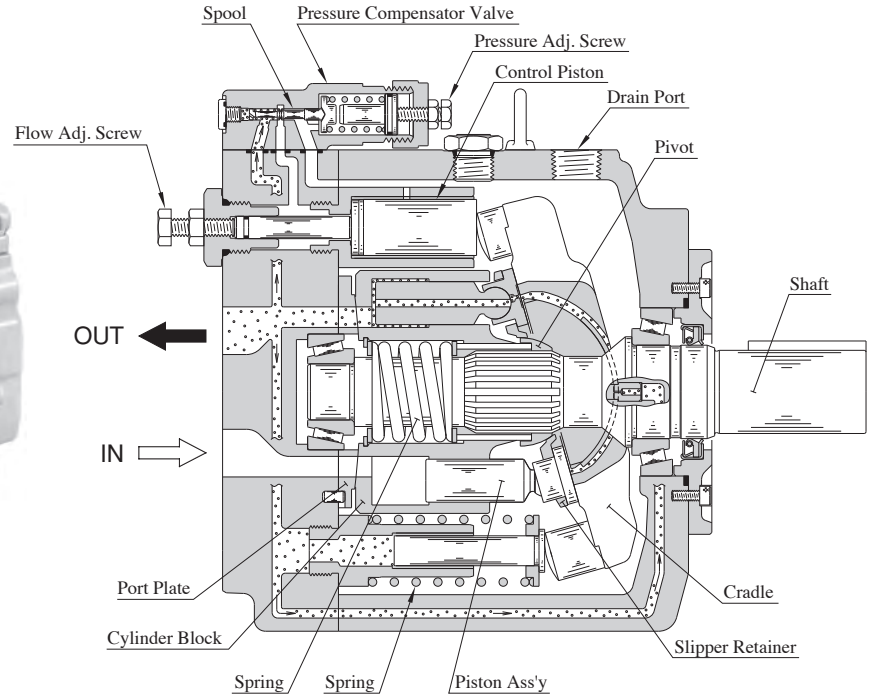
Flow Adjustment Screw Protrusion Length "L" vs. Geometric Displacement (Reference)



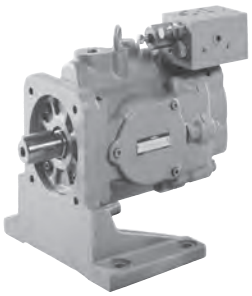


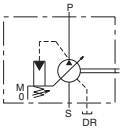
A3H Series High Pressure Variable Displacement Piston Pumps

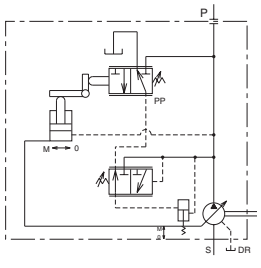


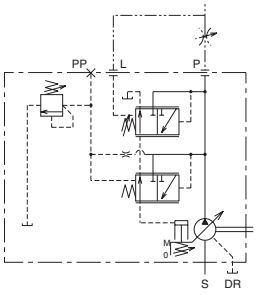


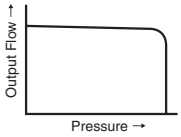
Control Type



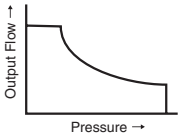




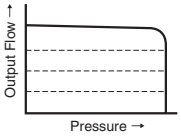




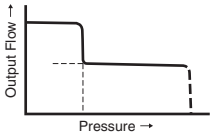
"01"
Pressure Compensator Type



"09"
Constant Power Control Type



"14"
Load Sensing Type



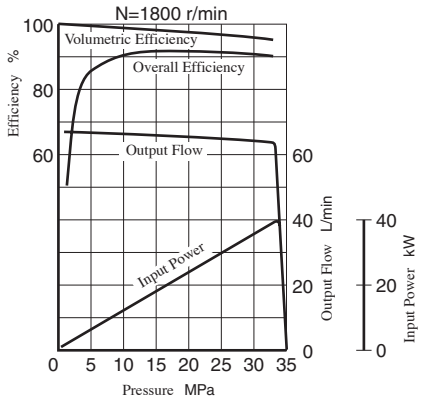
"55"
Simple Two-Pressure
Two-Flow Control Type

Features

High performance at maximum pressure 35 MPa

Volumetric efficiency is over 95% and overall efficiency is more than 90% at 1800 r/min.

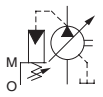
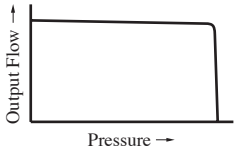
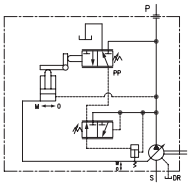
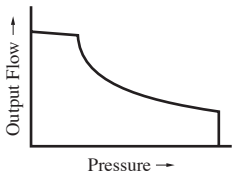
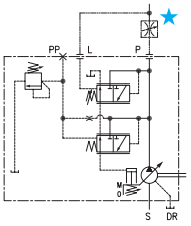
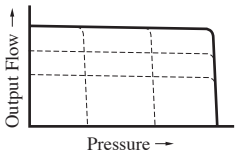
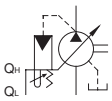
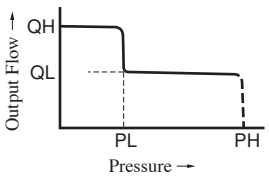
"A3H37" Type Performance Characteristics



Compact size

A3H series are compact in size because output / mass ratio is large.

Control Type

Control Type	Graphic Symbols	Performance Characteristics	Explanation	Page
"01" Pressure Compensator Type			When the system pressure increases and comes close to the preset cut-off pressure, the pump flow decreases automatically while maintaining the set pressure as it is.	A-116
"09" Constant Power (Torque) Control Type			• This type of control can control the pump input power according to the motor output. • When the system pressure increases, the pump swash plate tilt angle (output flow) decreases, in correspondence to predetermined shaft input values. • This type of control can enable one pump to act as two pumps (low-pressure and large-flow/high-pressure and small-flow). Therefore, the motor capacity can be reduced.	A-135
"14" Load Sensing Type			• This is an energy-saving type control which maintains the pump flow and load pressure at the absolute minimum necessary level to operate the actuator. • This type of control automatically regulates the output flow so that the inlet-outlet differential pressure of the flow control valve at the output side is constant. To do so, the load pressure must be introduced to the load sensing port "L" of the pump through the external piping. • This type of control provides the remote control of the full cut-off pressure by connecting a remote control relief valve to the pilot port "PP".	A-141
"55" Simple Two-Pressure Two-Flow Control Type			• This type of control enables one pump to act as two pumps (low-pressure and large-flow/high-pressure and small-flow-rate). Therefore, the motor capacity can be reduced. • When the system pressure increases near the preset "PL" pressure due to the load increase, the pump flow automatically decreases to "QL." • This type of control is suitable for an application like the press, where switching from rapid advance to feed is required just when the press (pressurizing) starts. • The PH pressure can be remote-controlled with a separately located relief valve. With this type of control, it is easy to change the applied pressure setting when materials or shapes of the press are changed.	A-147

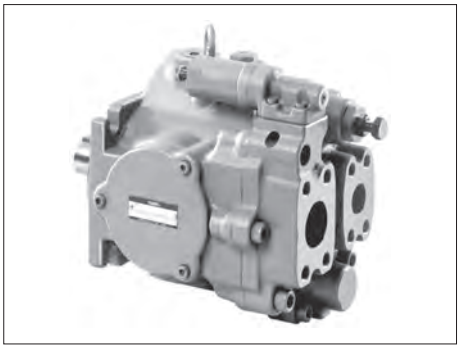
★A flow control valve is not included with the pump. Install the valve separately.

Availability of Control Type

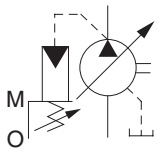
Mark "○" in the table below refers to standard model.

Model Numbers	Geometric Displacement cm^3/rev	"01" Pressure Compensator Type	"09" Constant Power (Torque) Control Type	"14" Load Sensing Type	"55" Simple Two-Pressure Two-Flow Control Type
A3H 16	16.3	○		○	○
A3H 37	37.1	○	○	○	○
A3H 56	56.3	○	○	○	○
A3H 71	70.7	○	○	○	○
A3H100	100.5	○	○	○	○
A3H145	145.2	○	○	○	○
A3H180	180.7	○	○	○	○

A3H Series High Pressure Variable Displacement Piston Pumps, Pressure Compensator Type



Graphic Symbol



Specifications

Model Numbers	Geometric Displacement cm^3/rev	Minimum Adj. Flow cm^3/rev	Operating Pressure MPa		Shaft Speed Range r/min		Approx. Mass kg	
			Rated★1	Intermittent	Max.★2	Min.	Flange Mtg.	Foot Mtg.
A3H 16-＊R01KK-10	16.3	8.0	28	35	3600	600	14.5	23.4
A3H 37-＊R01KK-10	37.1	16.0			2700	600	19.5	27.0
A3H 56-＊R01KK-10	56.3	35.0			2500	600	25.7	33.2
A3H 71-＊R01KK-10	70.7	45.0			2300	600	35.0	42.5
A3H100-＊R01KK-10	100.5	63.0			2100	600	44.9	72.9
A3H145-＊R01KK-10	145.2	95.0			1800	600	60.0	88.0
A3H180-＊R01KK-10	180.7	130.0			1800	600	70.4	98.4

★1. Consult Yuken when pump is used over rated pressure because there is a restriction on operating condition.
★2. The maximum shaft speeds shown in the above table are at suction pressure 0 kPa.
★3. The table above shows specifications for using petroleum based oils.
Pumps (customized design) for special fluids are also available. Their operating pressure and maximum shaft speed however differ from the values in the table above depending on the fluid type.
Range of operating temperature and viscosities may differ from those of petroleum based oils due to their characteristics.

Specifications and Design Numbers for Special Fluids

Type of Fluids	Operating Pressure MPa		Allowable Maximum Shaft Speed r/min		Temperature Range °C	Viscosity Range mm^2/s	Design Numbers for Special Fluid
	Rated	Intermittent	Rated	Max.			
Water-Glycols	21	21	1200	(1800)★1	0 - 50	20 - 200	1030
Phosphate Ester Type	21	21	1200	(1800)★1	0 - 60		1006
Polyol Ester Type	21	25	1200	1800	0 - 60	20 - 200	10450

★1. As the specific gravities of water-glycol fluids and phosphate ester type fluids are higher than one, an overhead reservoir is required when pumps are operated at 1500 r/min or more.

Model Number Designation

A3H16	-F	R	01	K	K	-10
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range MPa	Shaft Extension	Design Number
A3H16 (16.3 cm^3/rev)						10
A3H37 (37.1 cm^3/rev)						10
A3H56 (56.3 cm^3/rev)						10
A3H71 (70.7 cm^3/rev)	**F:** Flange Mtg.	(Viewed from Shaft End)	**01:** Pressure Compensator Type	**K:** 5 - 35	**K:** Keyed Shaft	10
A3H100 (100.5 cm^3/rev)	**L:** Foot Mtg.	**R:** Clockwise (Normal)				10
A3H145 (145.2 cm^3/rev)						10
A3H180 (180.7 cm^3/rev)						10

Pipe Flange Kits

Pipe flange kits are available. When ordering, specify the kit number from the table below.

Pump Model Numbers	Name of Port	Threaded Connection	Socket Welding	Butt Welding
A3H16-＊R01	Suction	F5-08-A-10	F5-08-B-10	F5-08-C-10
	Discharge	F6-06-A-M-10★1	F6-06-B-M-10	——
A3H37-＊R01	Suction	F5-10-A-10	F5-10-B-10	F5-10-C-10
	Discharge	F6-08-A-M-10★1	F6-08-B-M-10	——
A3H56-＊R01	Suction	F5-12-A-10	F5-12-B-10	F5-12-C-10
	Discharge	F6-08-A-M-10★1	F6-08-B-M-10	——
A3H71-＊R01	Suction	F5-16-A-10	F5-16-B-10	F5-016-C-10
	Discharge	F6-10-A-M-10★1	F6-10-B-M-10	——
A3H100-＊R01 A3H145-＊R01	Suction	F5-20-A-10	F5-20-B-10	F5-20-C-10
	Discharge	F6-10-A-M-10★1	F6-10-B-M-10	——
A3H180-＊R01	Suction	F5-24-A-10	F5-24-B-10	——
	Discharge	F6-12-A-M-10★1	F6-12-B-M-10	——

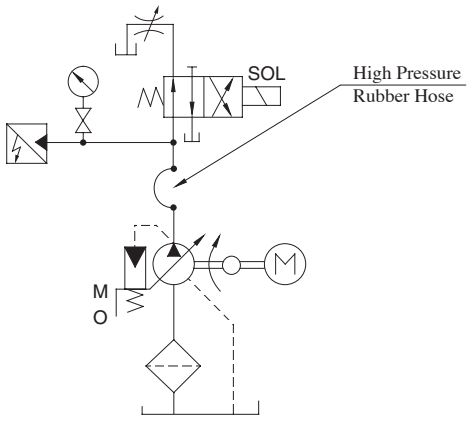
★1. These flanges are with tapered threaded port, maximum pressure is restricted at 31 MPa.

● Details of the pipe flange kits are shown on pages A-258 and A-259.

Response Characteristics Change in Accordance with Circuits and Operating Conditions.

The Circuit and Conditions

Circuit



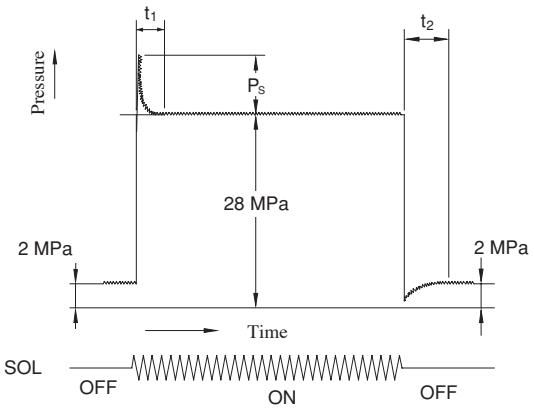
Size of High Pressure Rubber Hose

Model	High Pressure Rubber Hose
A3H16	3/4B × 1500 mm
A3H37/56/71	3/4B × 2000 mm
A3H100/145	1-1/4B × 2000 mm
A3H180	1-1/4B × 2500 mm

Conditions

Drive Speed : 1500 r/min
Hydraulic Fluid : ISO VG32 Oil
Oil Temperature: 40°C [Viscosity 32 mm^2/s]

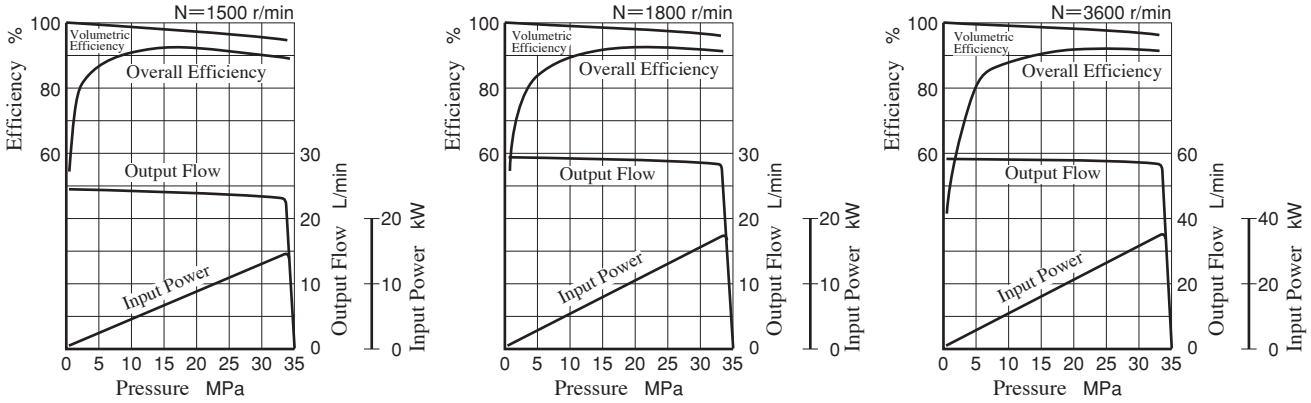
Result of Measurement



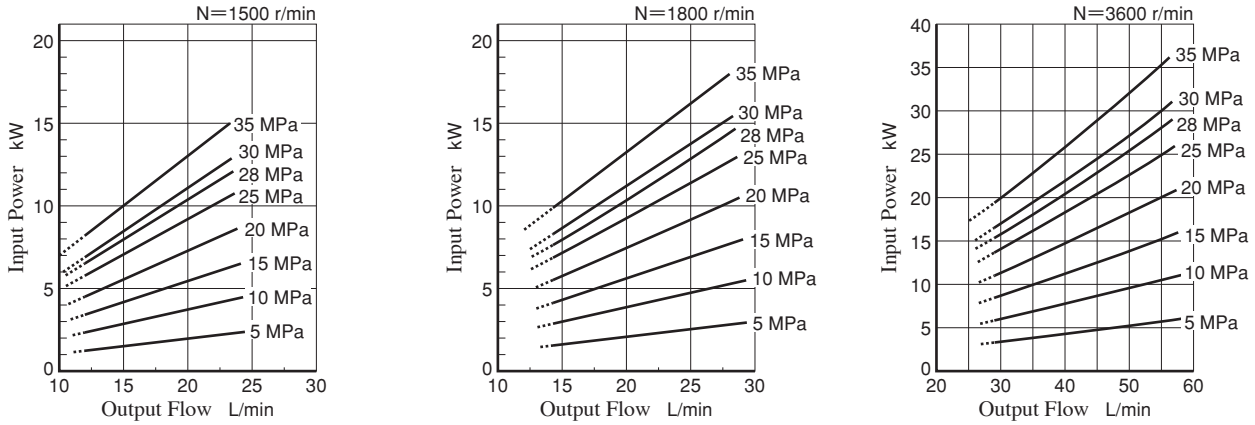
Model	Response Time ms		P_S Overshoot Pres. MPa
	t_1	t_2	
A3H 16	30	140	2.5
A3H 37	40	80	3.5
A3H 56	50	90	7.5
A3H 71	50	140	10.0
A3H100	70	170	11.0
A3H145	70	180	12.5
A3H180	70	220	12.0

Typical Performance Characteristics of Type **A3H16** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

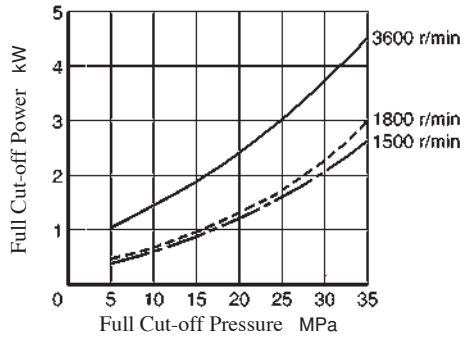


Input Power

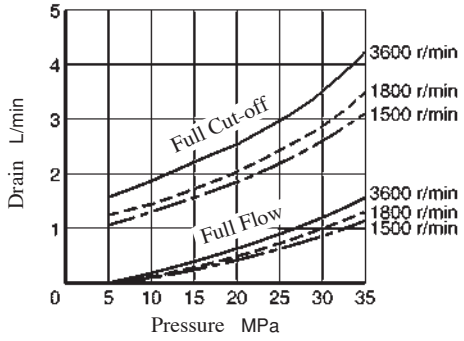


Note) The dotted line in the graph indicates less than minimum adjustable flow.

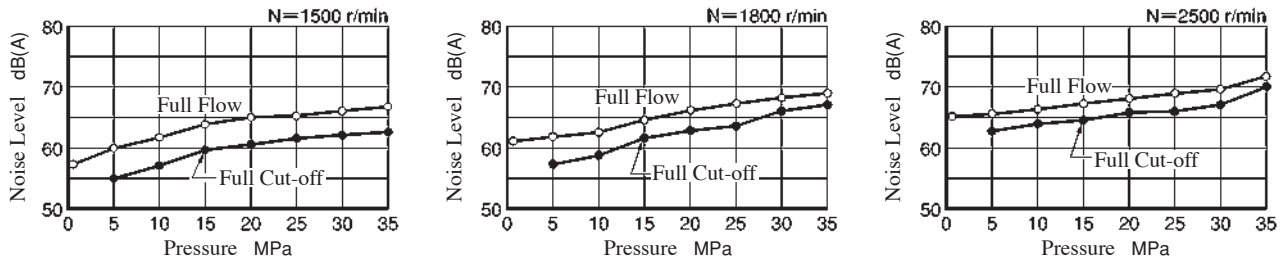
Full Cut-off Power



Drain

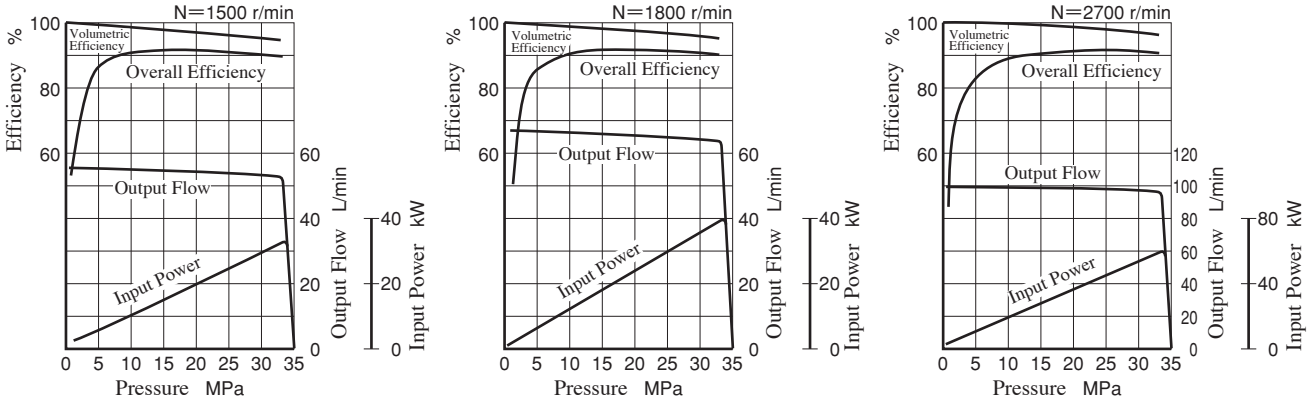


Noise Level [One meter horizontally away from pump head cover]

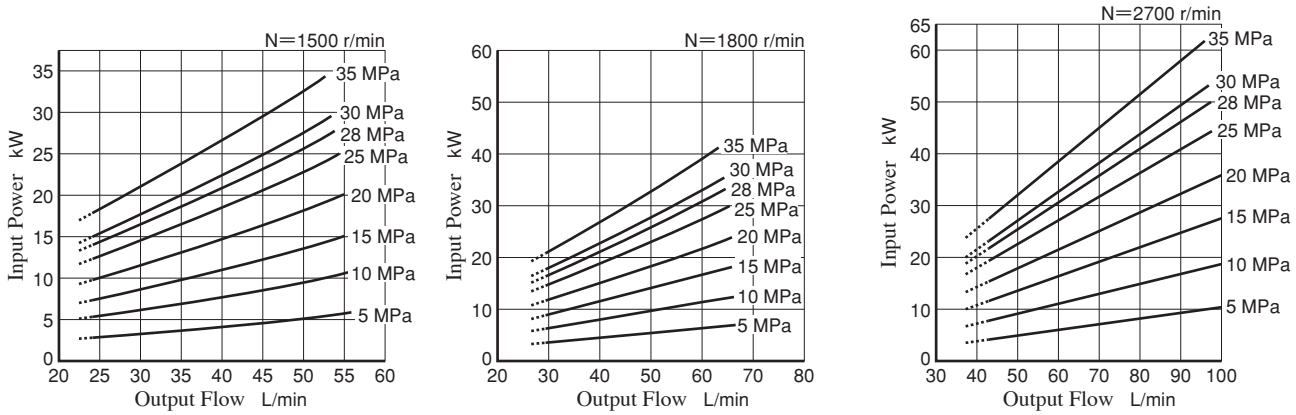


Typical Performance Characteristics of Type **A3H37** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

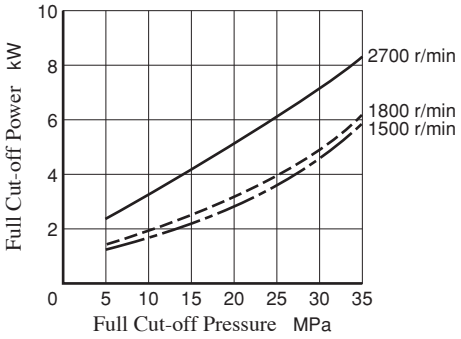


Input Power

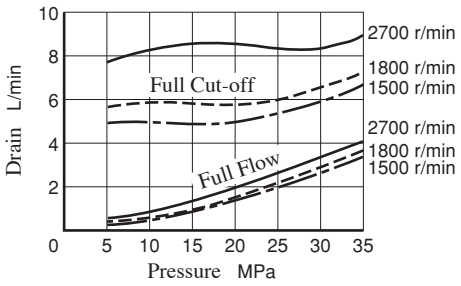


Note) The dotted line in the graph indicates less than minimum adjustable flow.

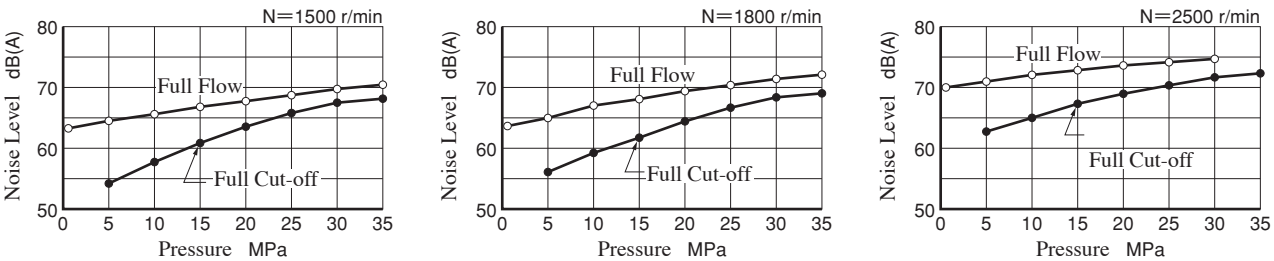
Full Cut-off Power



Drain

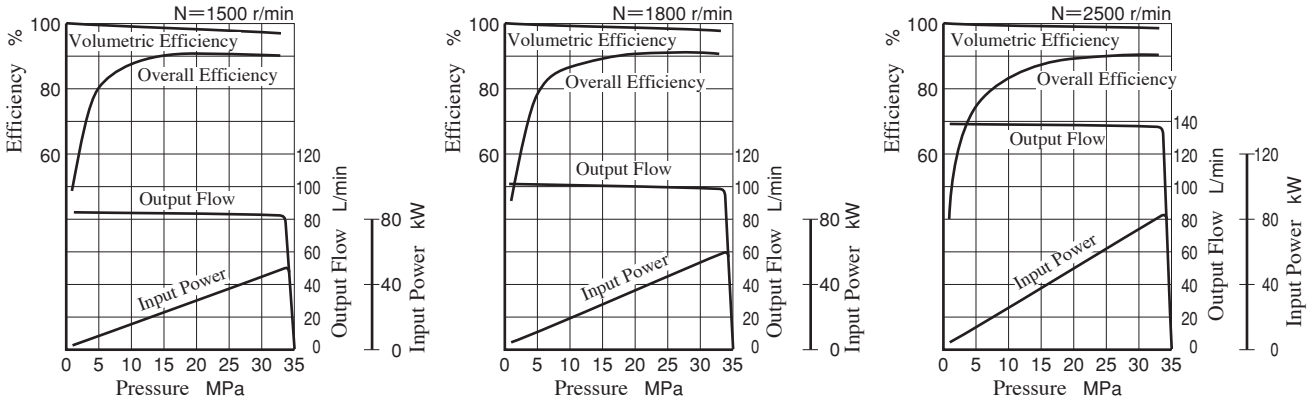


Noise Level [One meter horizontally away from pump head cover]

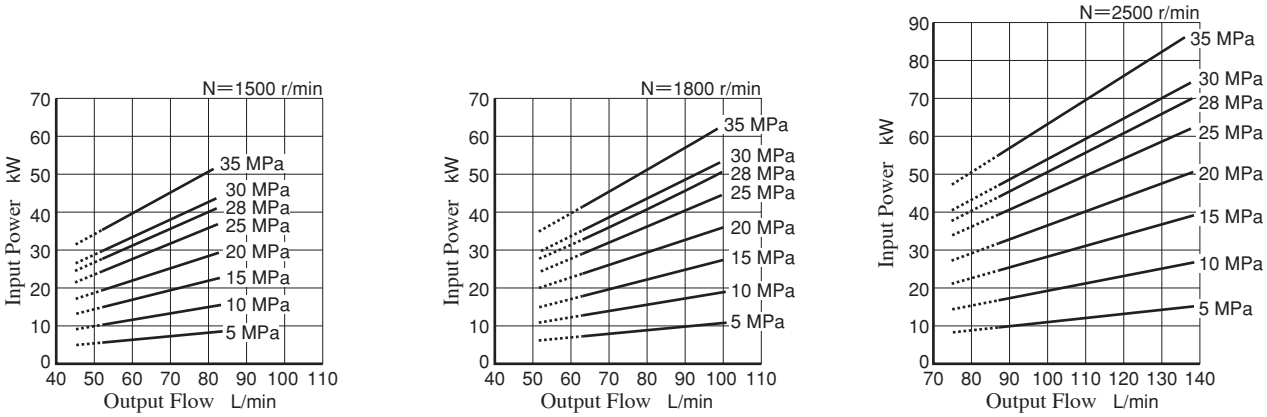


Typical Performance Characteristics of Type **A3H56** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

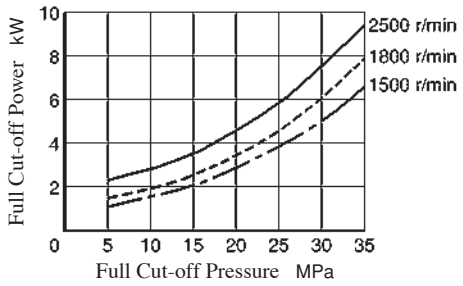


Input Power

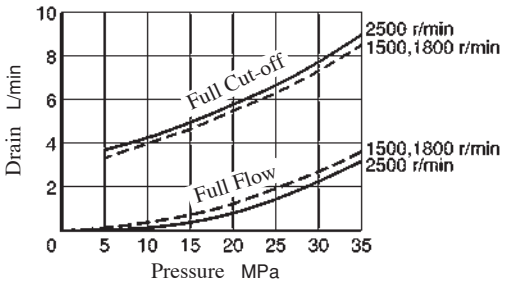


Note) The dotted line in the graph indicates less than minimum adjustable flow.

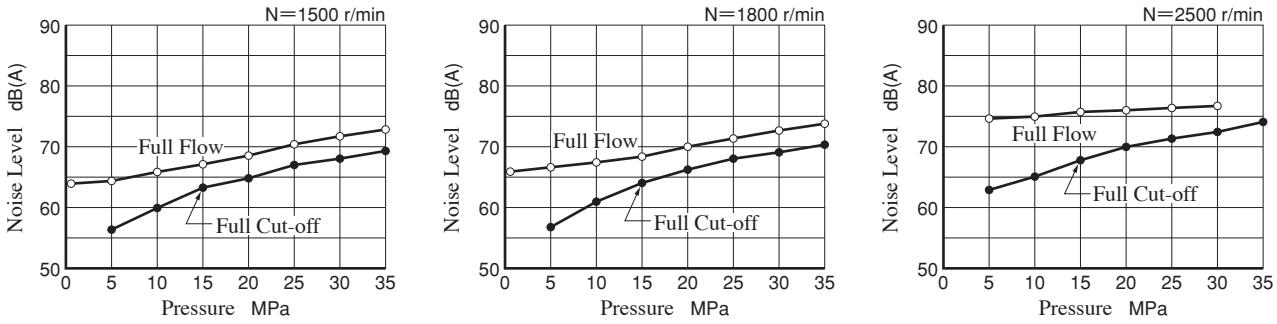
Full Cut-off Power



Drain

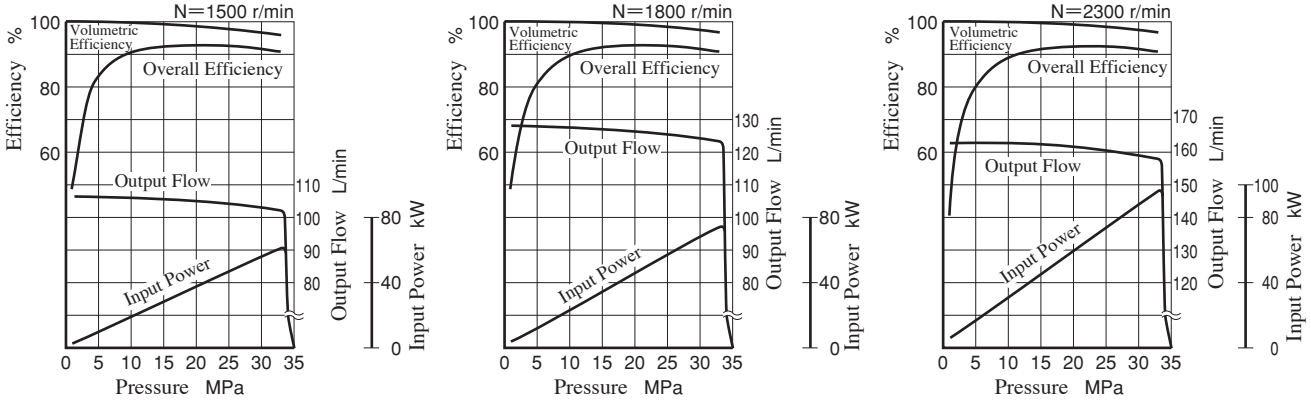


Noise Level [One meter horizontally away from pump head cover]

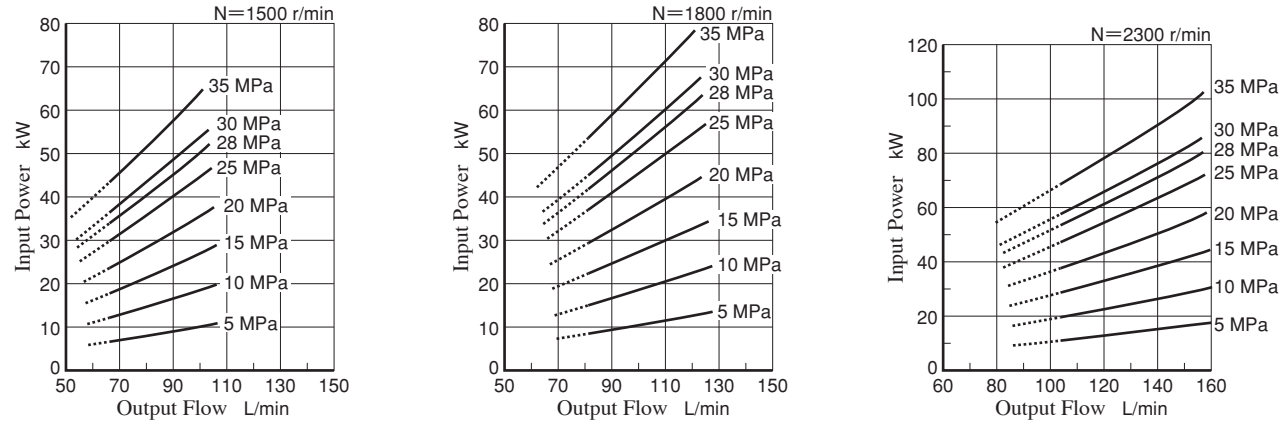


Typical Performance Characteristics of Type **A3H71** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

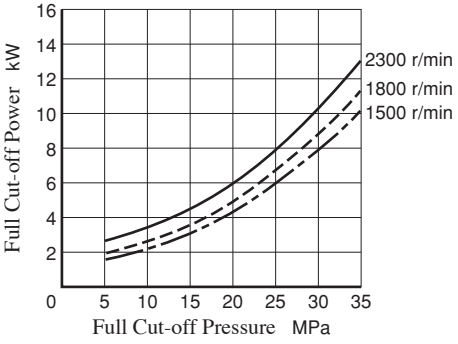


Input Power

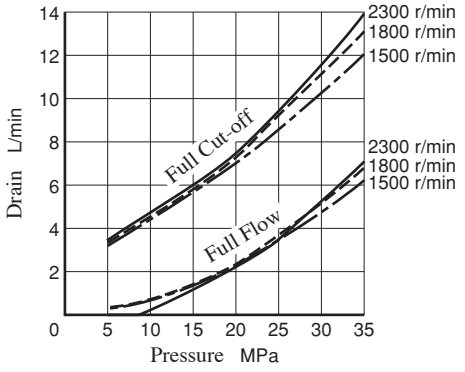


Note) The dotted line in the graph indicates less than minimum adjustable flow.

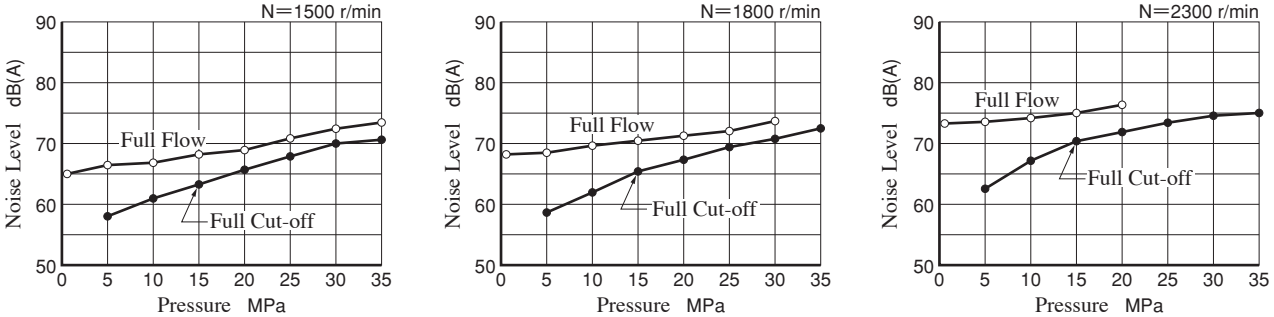
Full Cut-off Power



Drain

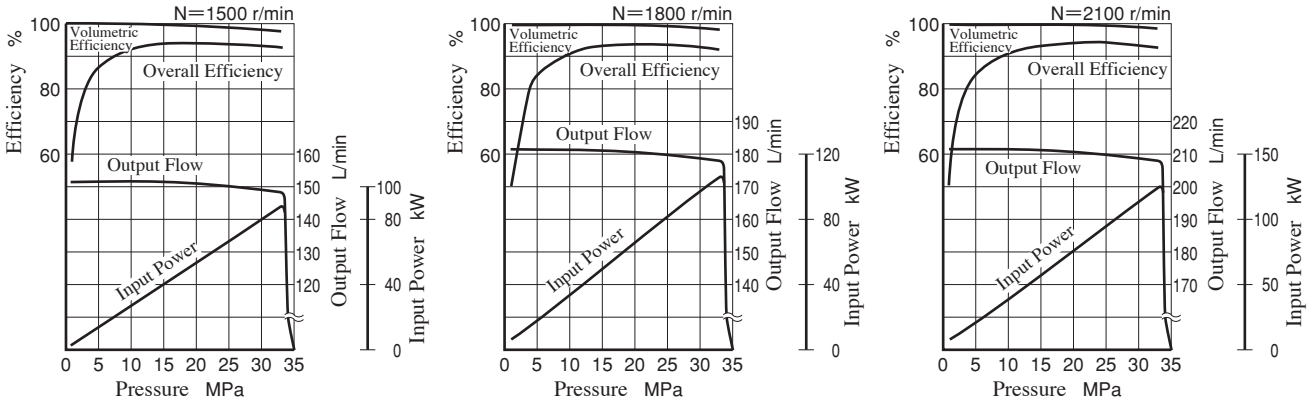


Noise Level [One meter horizontally away from pump head cover]

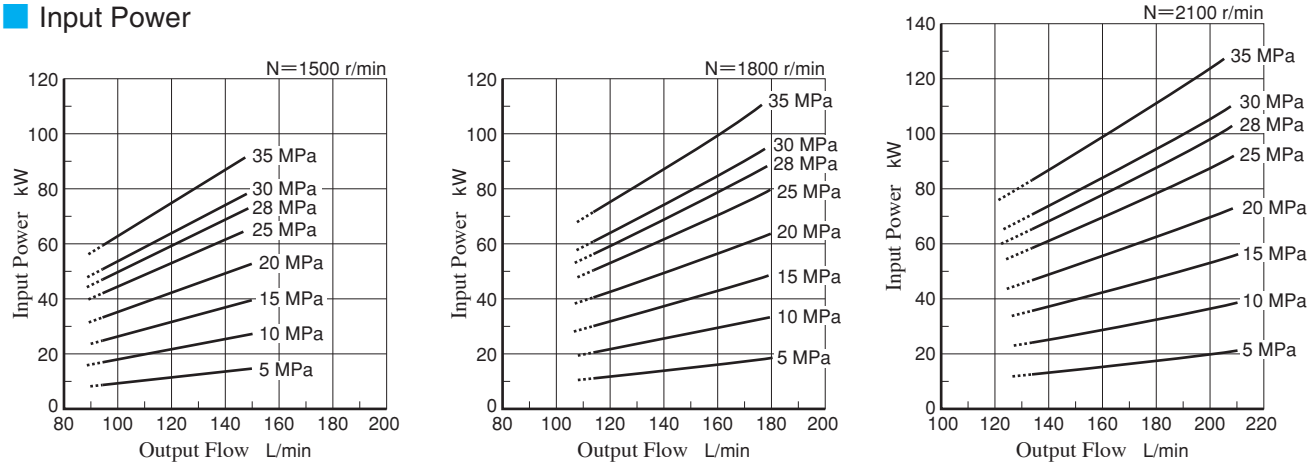


Typical Performance Characteristics of Type **A3H100** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

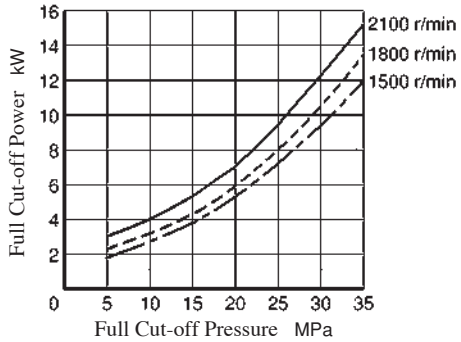


Input Power

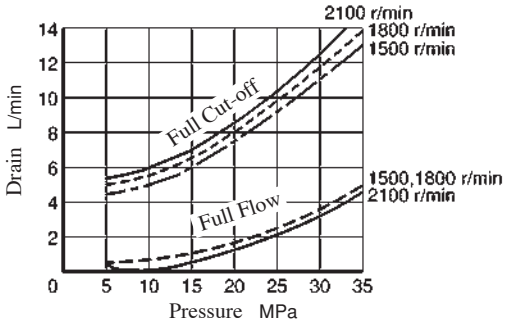


Note) The dotted line in the graph indicates less than minimum adjustable flow.

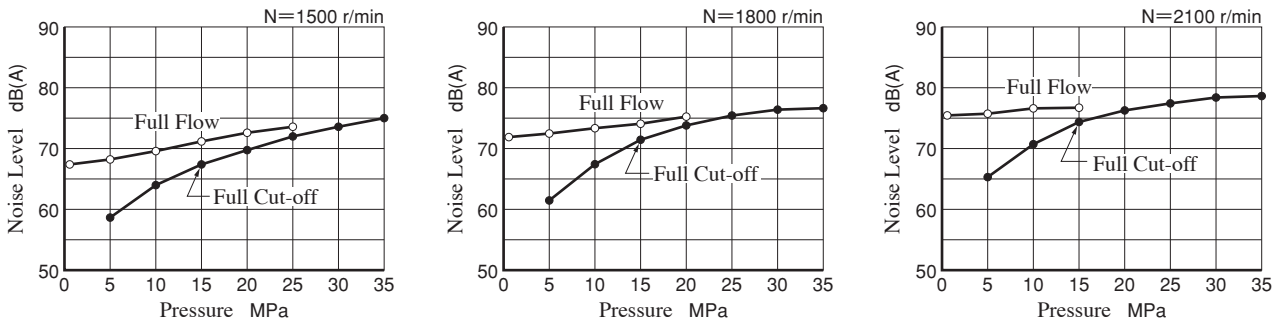
Full Cut-off Power



Drain

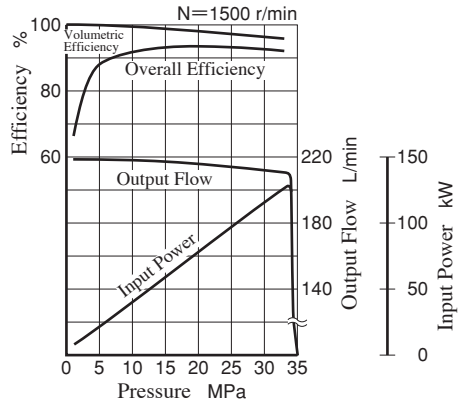


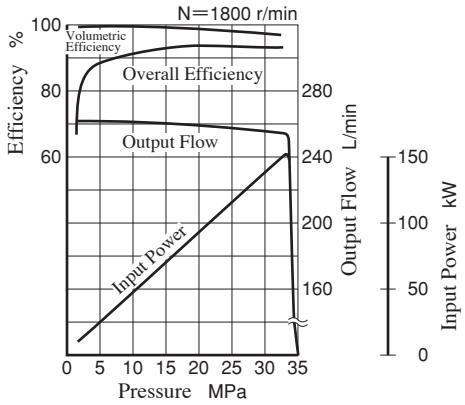
Noise Level [One meter horizontally away from pump head cover]



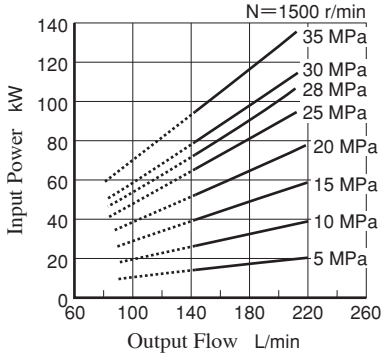
Typical Performance Characteristics of Type **A3H145** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

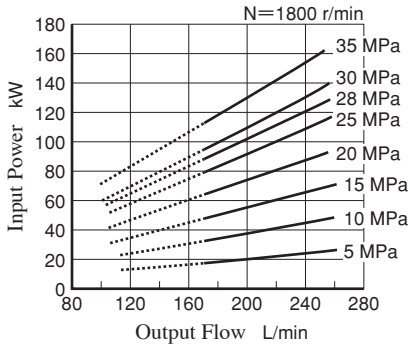
Performance Characteristic Curve





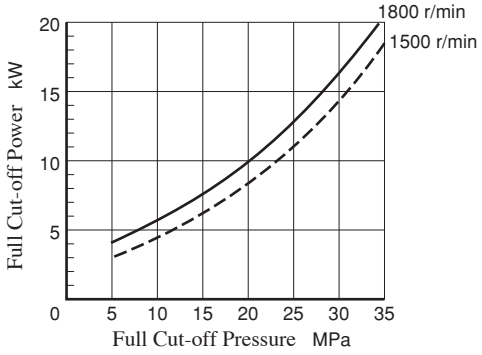
Input Power



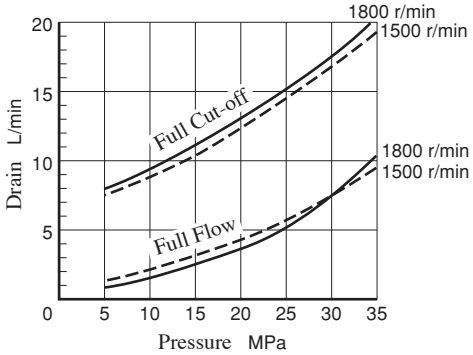


Note) The dotted line in the graph indicates less than minimum adjustable flow.

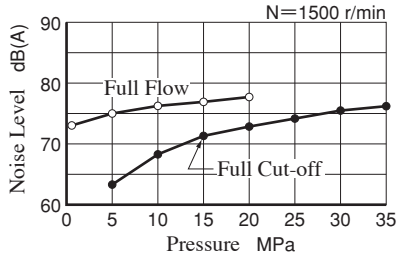
Full Cut-off Power

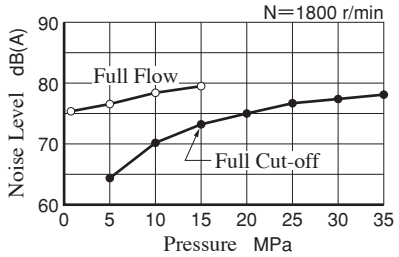


Drain



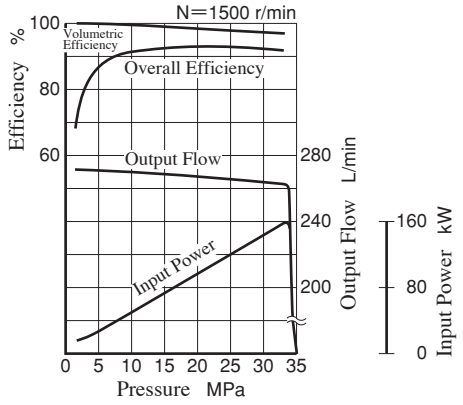
Noise Level [One meter horizontally away from pump head cover]

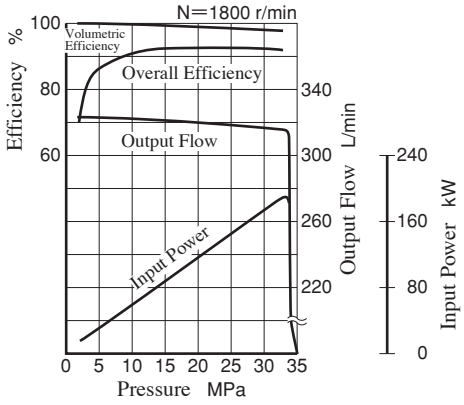




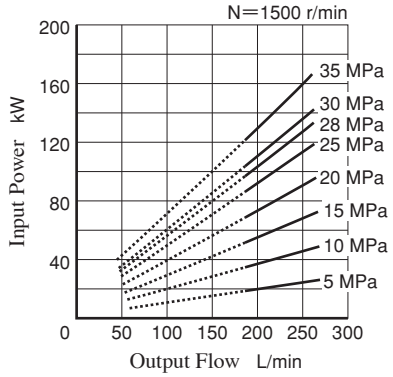
Typical Performance Characteristics of Type **A3H180** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

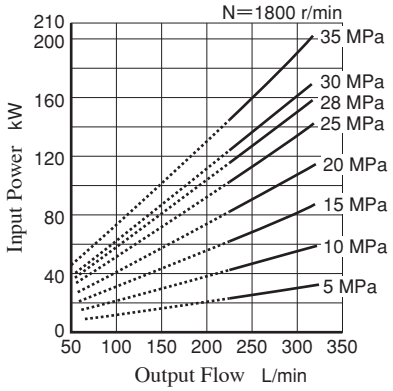
Performance Characteristic Curve





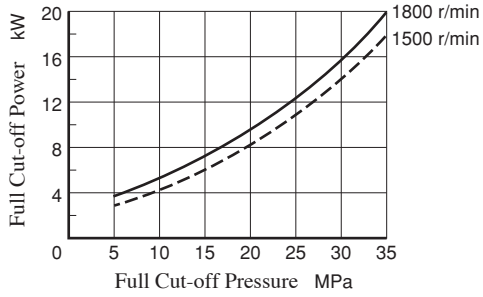
Input Power



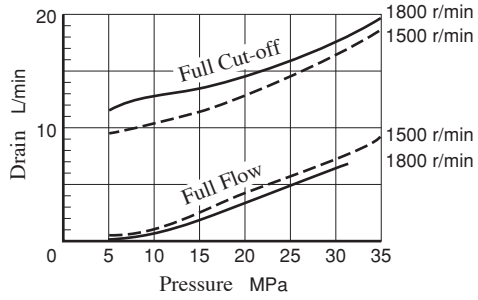


Note) The dotted line in the graph indicates less than minimum adjustable flow.

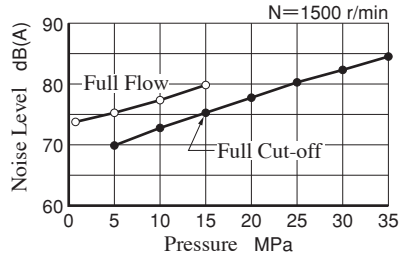
Full Cut-off Power

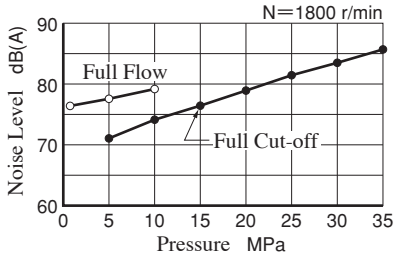


Drain

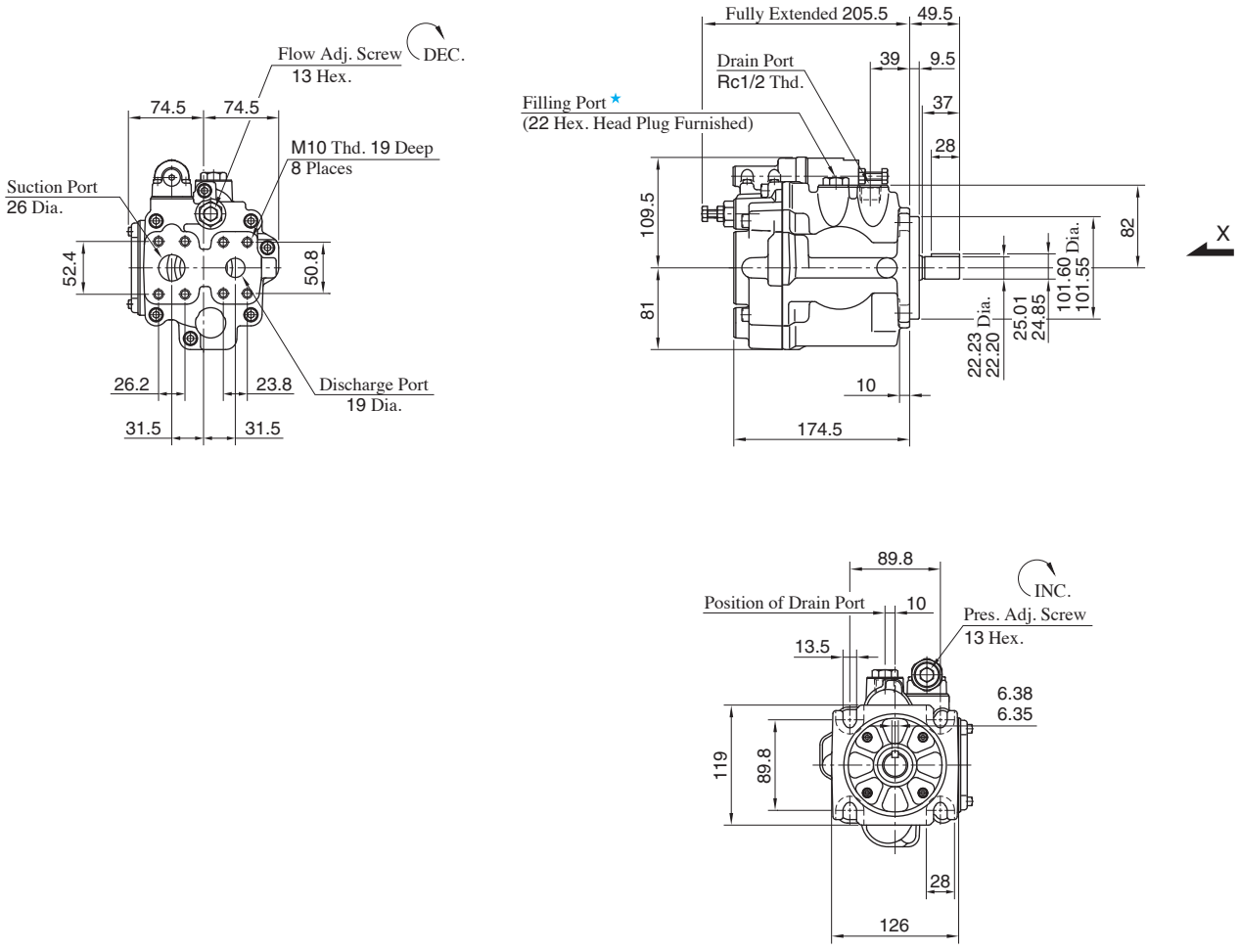


Noise Level [One meter horizontally away from pump head cover]





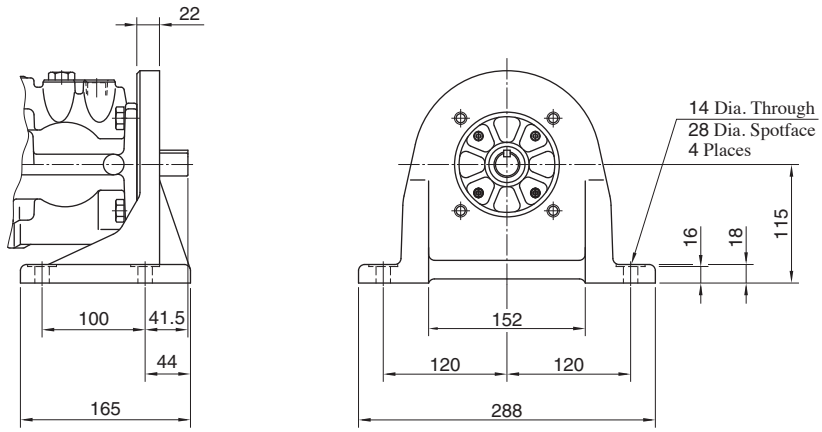
Flange Mtg. : A3H16-FR01KK



★ Install the pump so that the "Filling Port" is at the top.

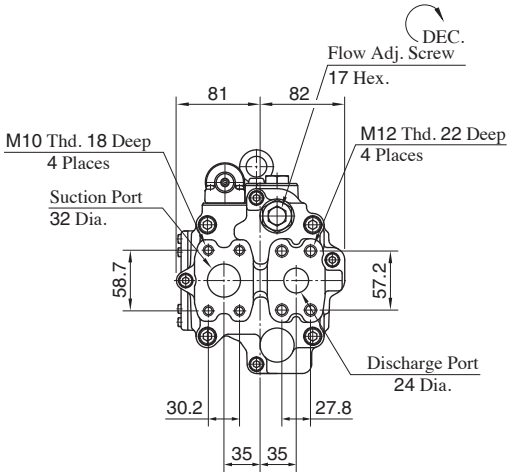
View Arrow X

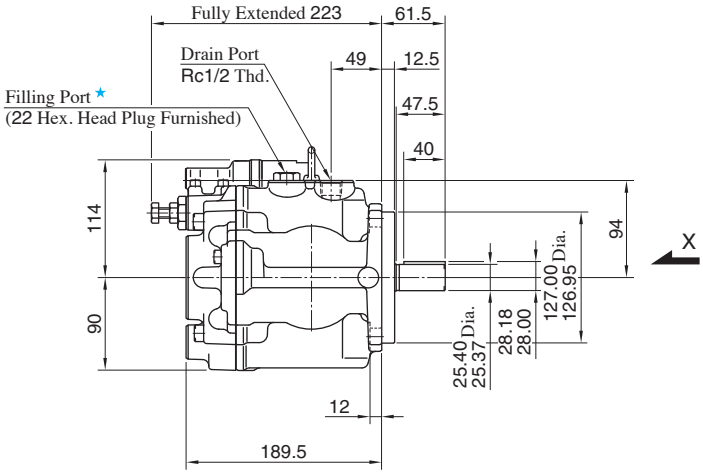
Foot Mtg. : A3H16-LR01KK

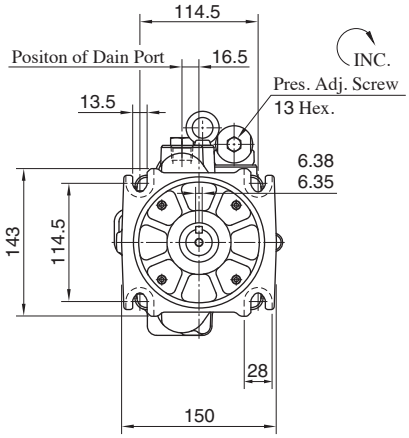


● For other dimensions, refer to "Flange Mtg.".

Flange Mtg. : A3H37-FR01KK



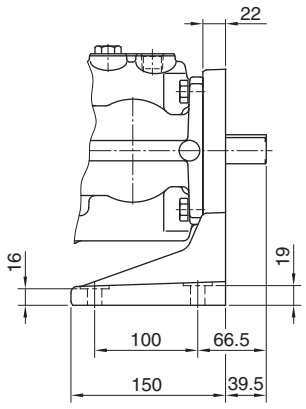


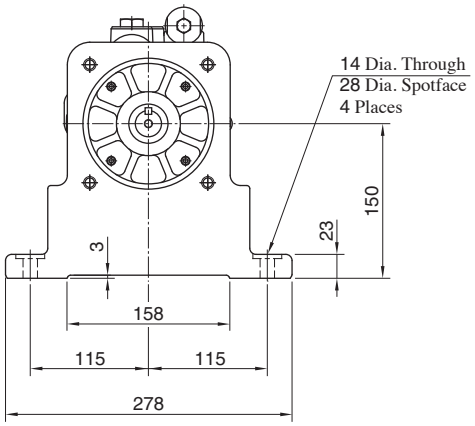


★ Install the pump so that the “Filling Port” is at the top.

View Arrow X

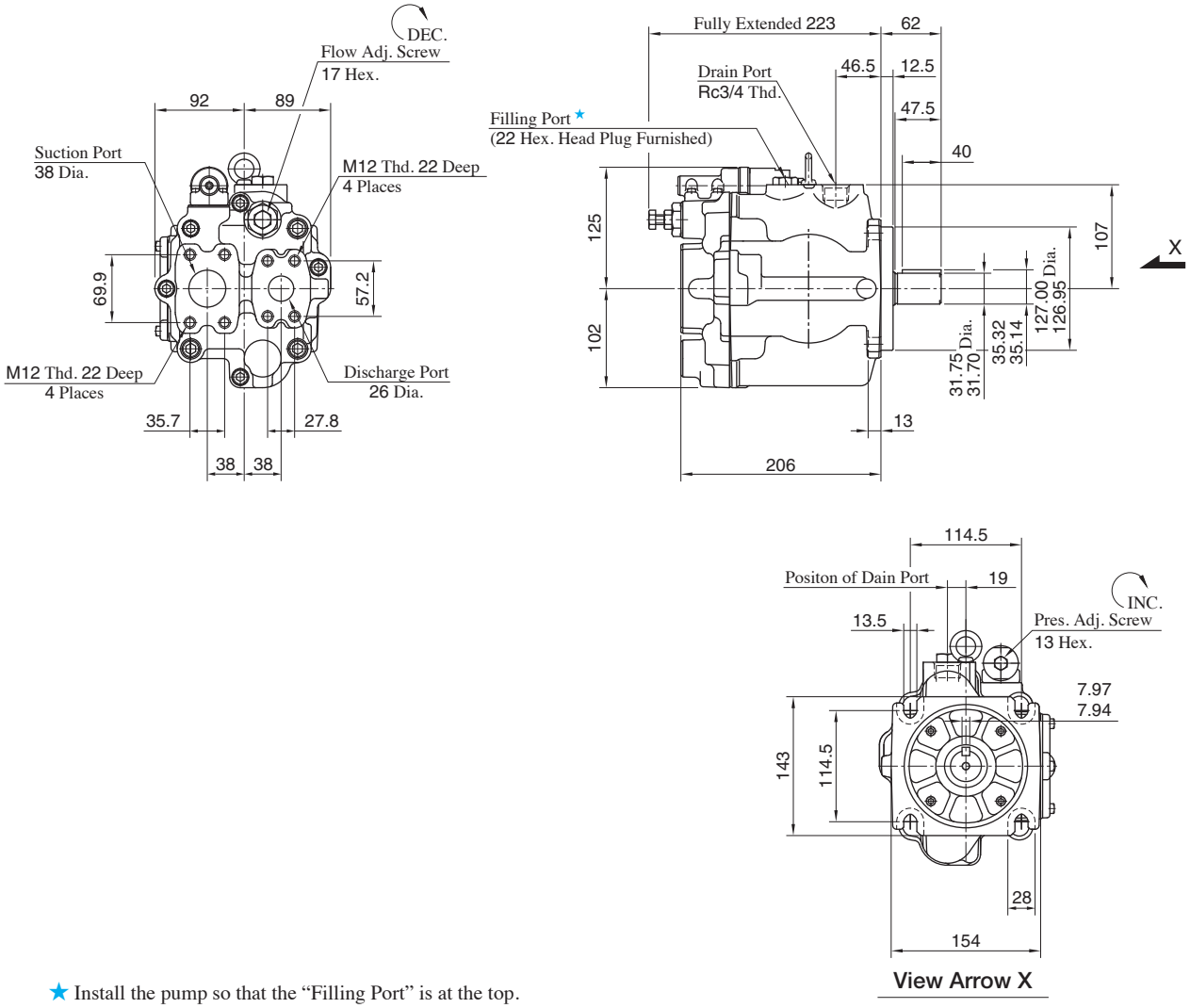
Foot Mtg. : A3H37-LR01KK





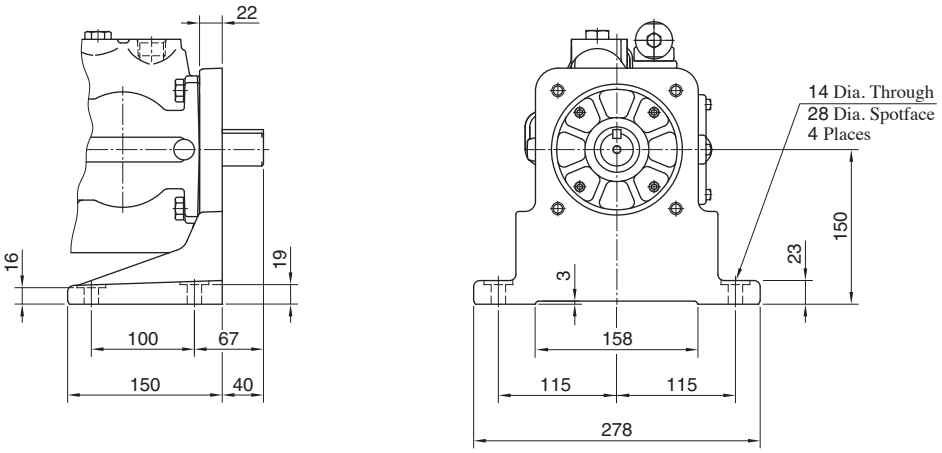
● For other dimensions, refer to “Flange Mtg.”.

Flange Mtg. : A3H56-FR01KK



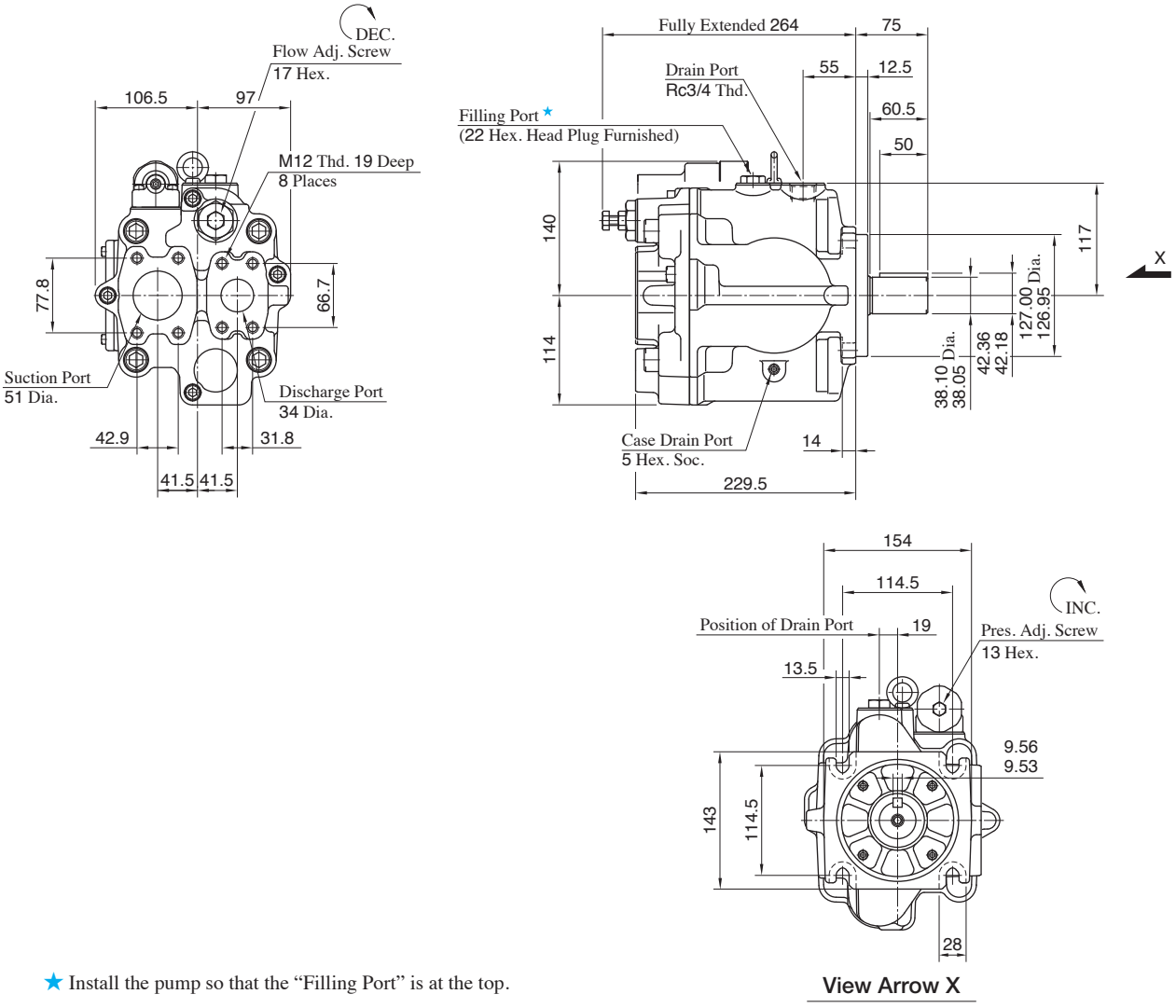
★ Install the pump so that the “Filling Port” is at the top.

Foot Mtg. : A3H56-LR01KK



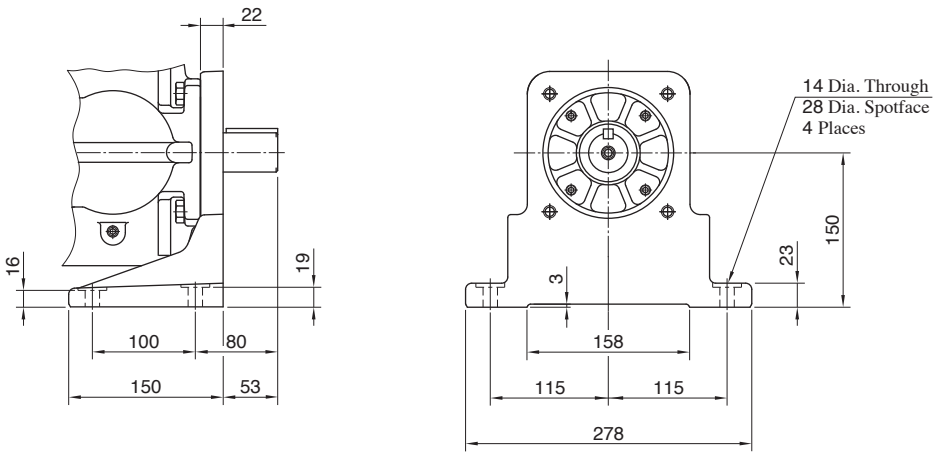
● For other dimensions, refer to “Flange Mtg.”.

Flange Mtg. : A3H71-FR01KK



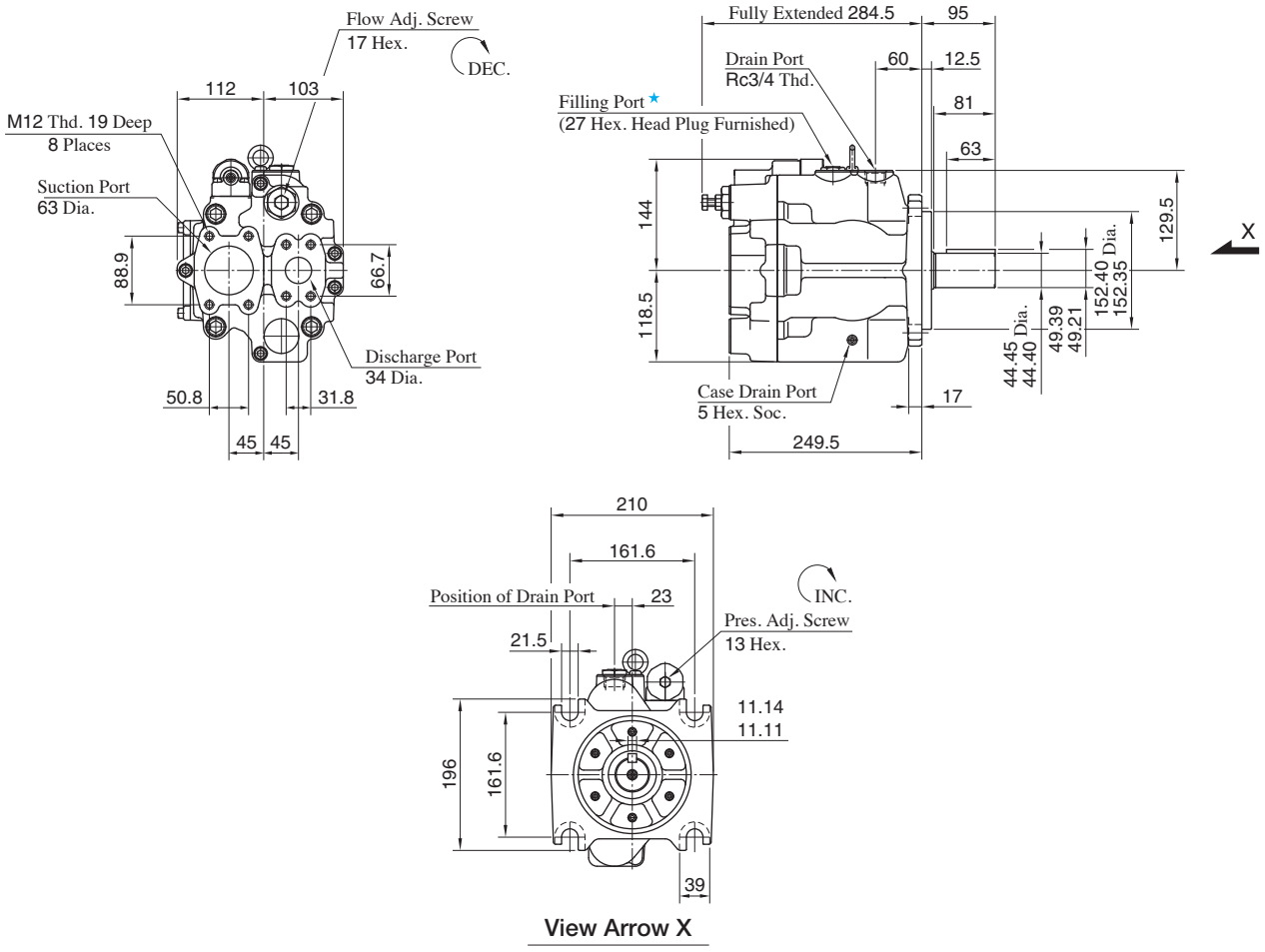
★ Install the pump so that the "Filling Port" is at the top.

Foot Mtg. : A3H71-LR01KK



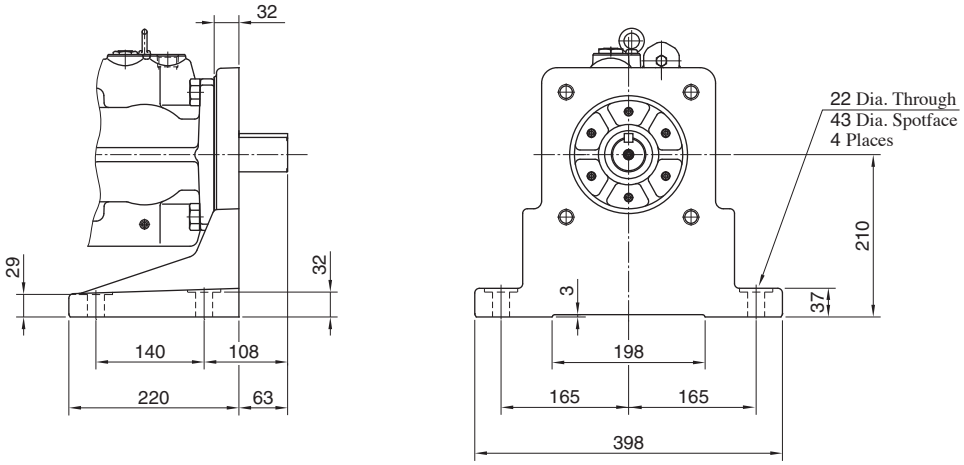
● For other dimensions, refer to "Flange Mtg.".

Flange Mtg. : A3H100-FR01KK



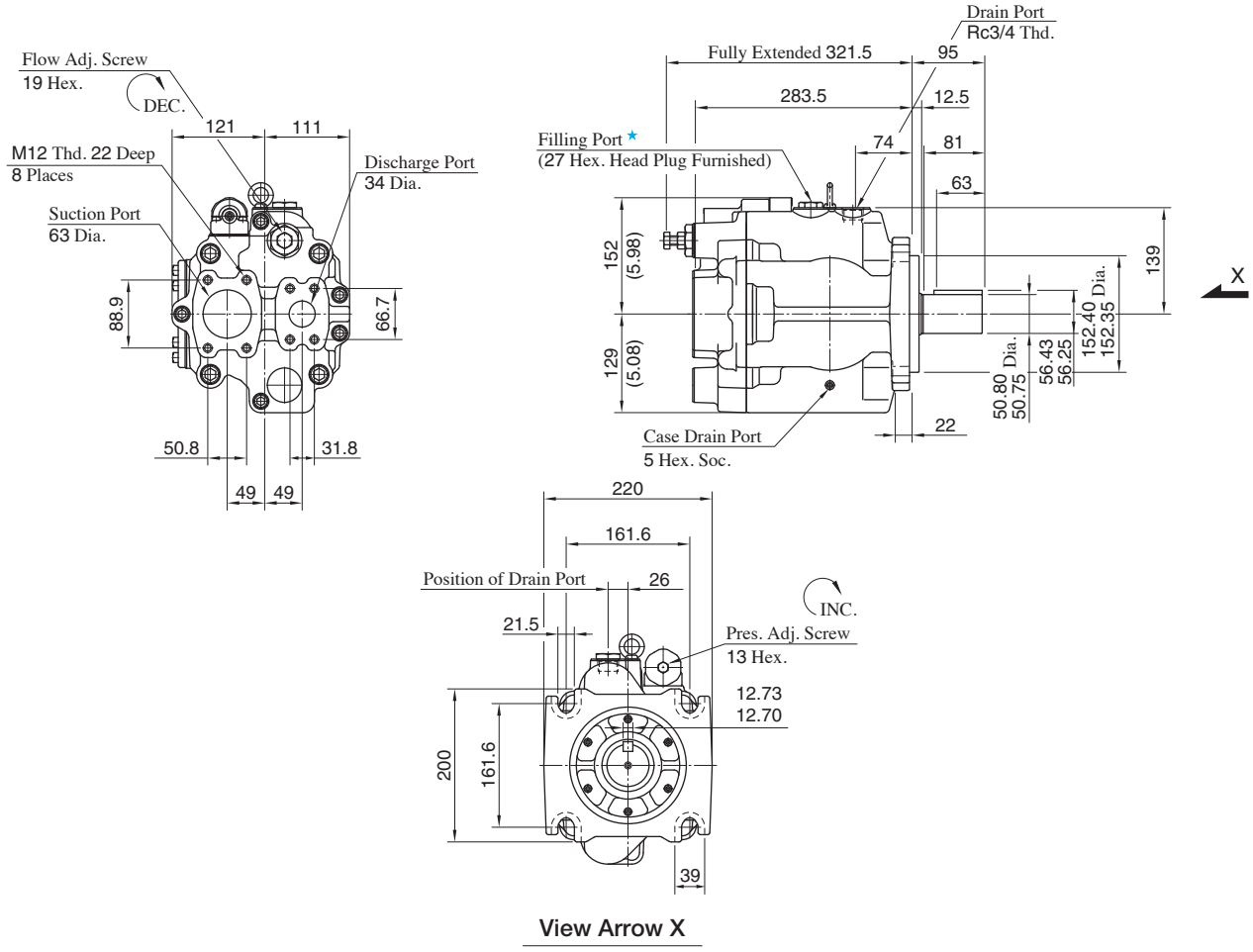
★ Install the pump so that the “Filling Port” is at the top.

Foot Mtg. : A3H100-LR01KK



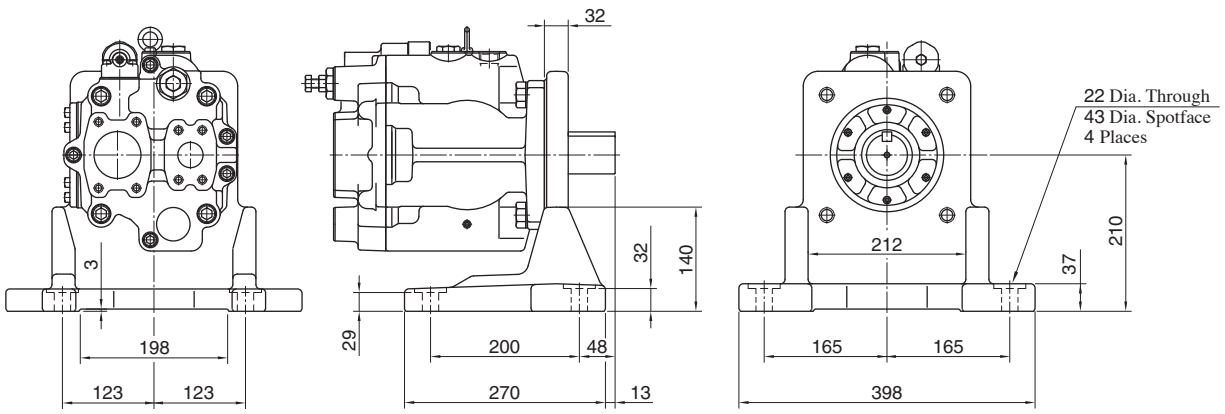
● For other dimensions, refer to “Flange Mtg.”.

Flange Mtg. : A3H145-FR01KK



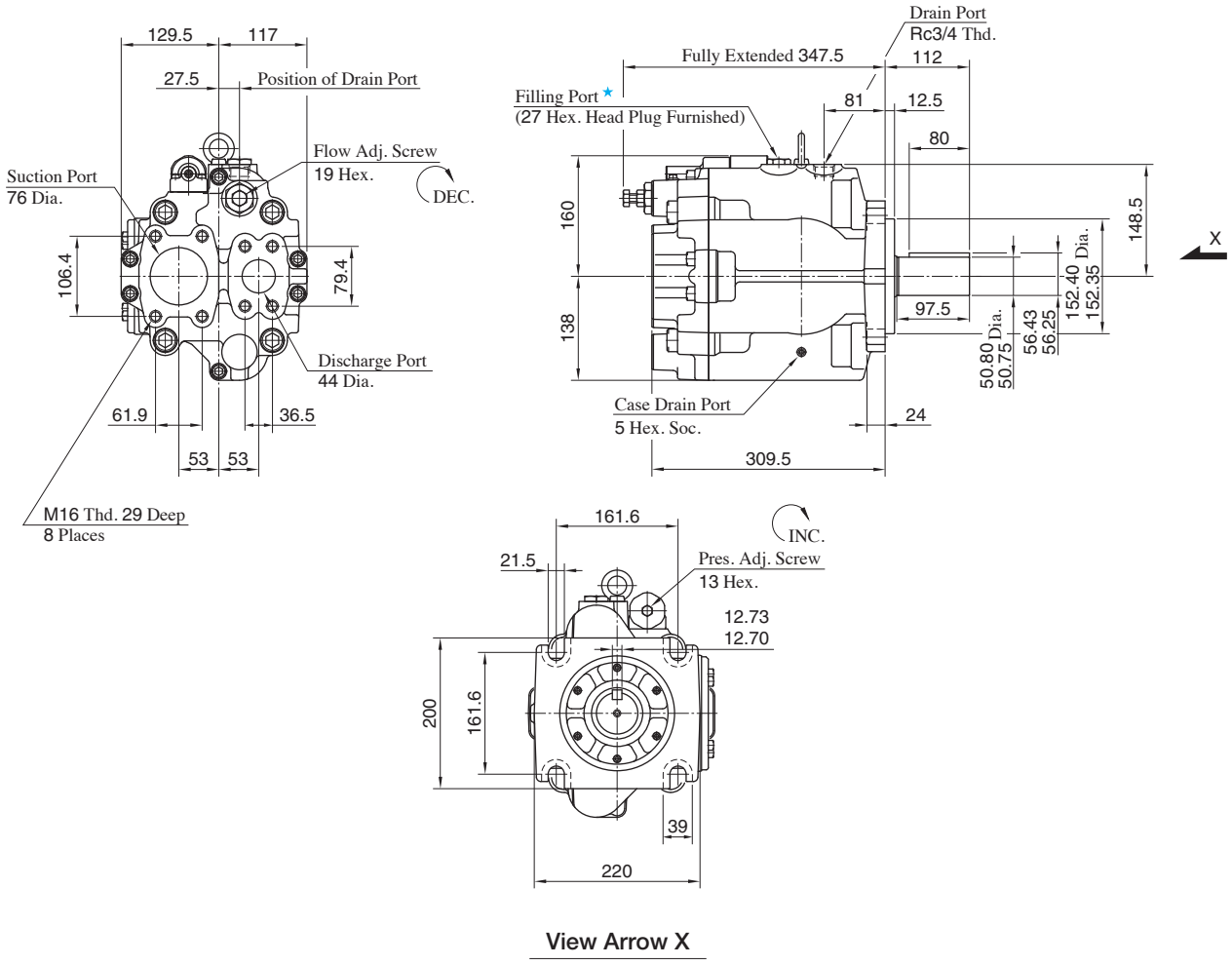
★ Install the pump so that the “Filling Port” is at the top.

Foot Mtg. : A3H145-LR01KK



● For other dimensions, refer to “Flange Mtg.”.

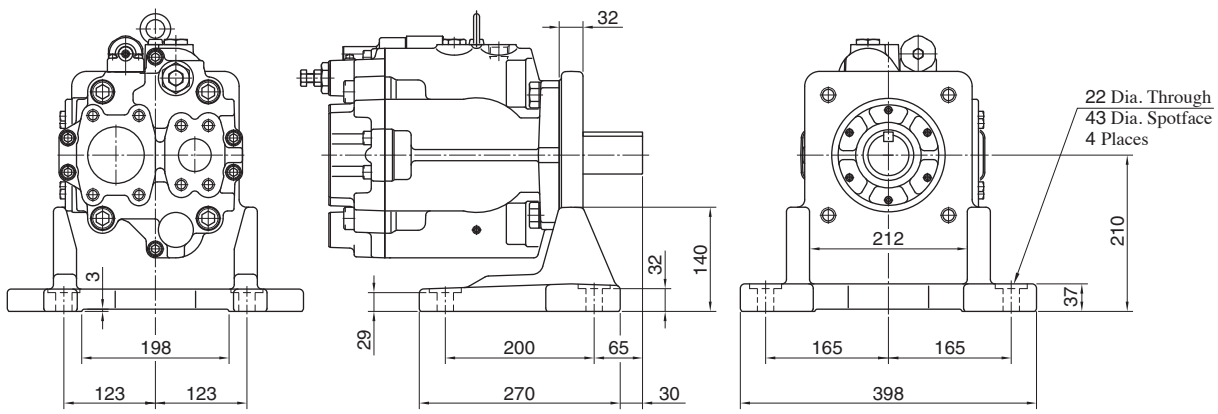
Flange Mtg. : A3H180-FR01KK



View Arrow X

★ Install the pump so that the “Filling Port” is at the top.

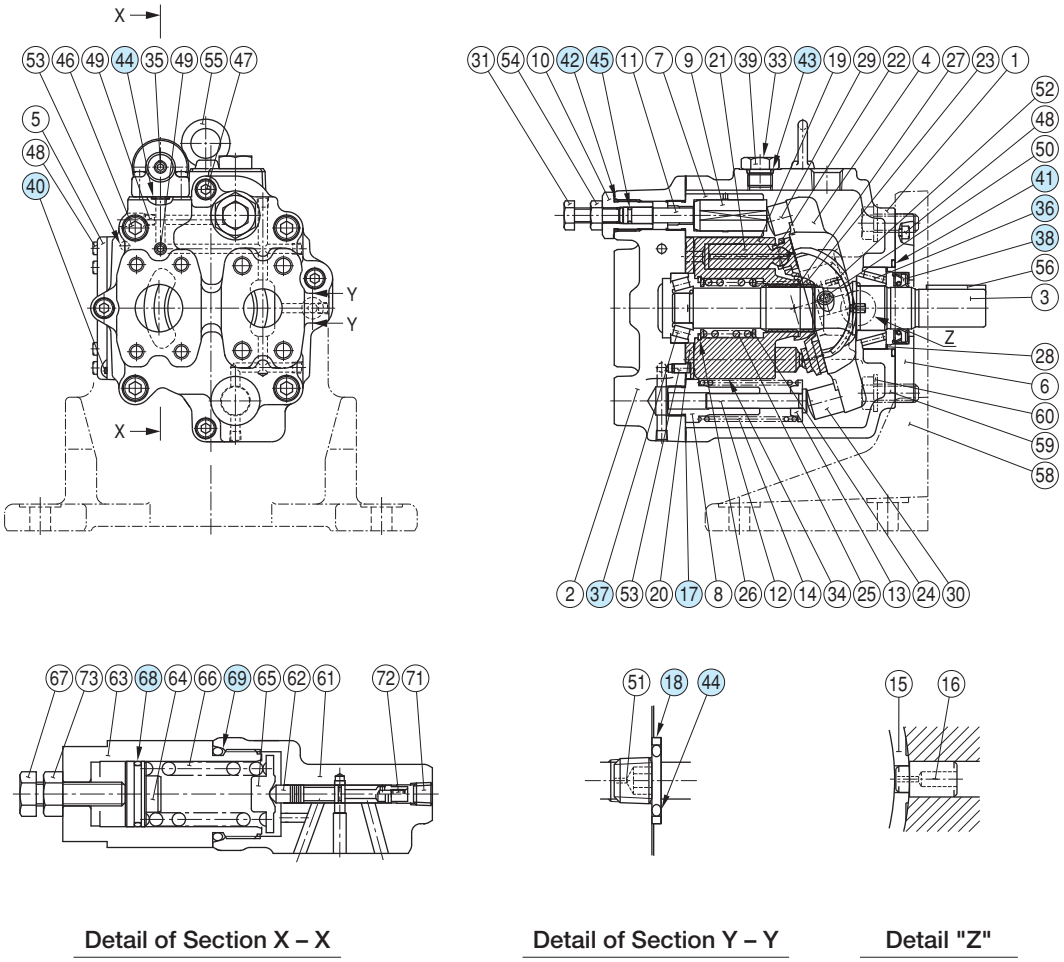
Foot Mtg. : A3H180-LR01KK



● For other dimensions, refer to “Flange Mtg.”.

Spare Parts List

A3H16/A3H37/A3H56-＊R01KK



Detail of Section X – X

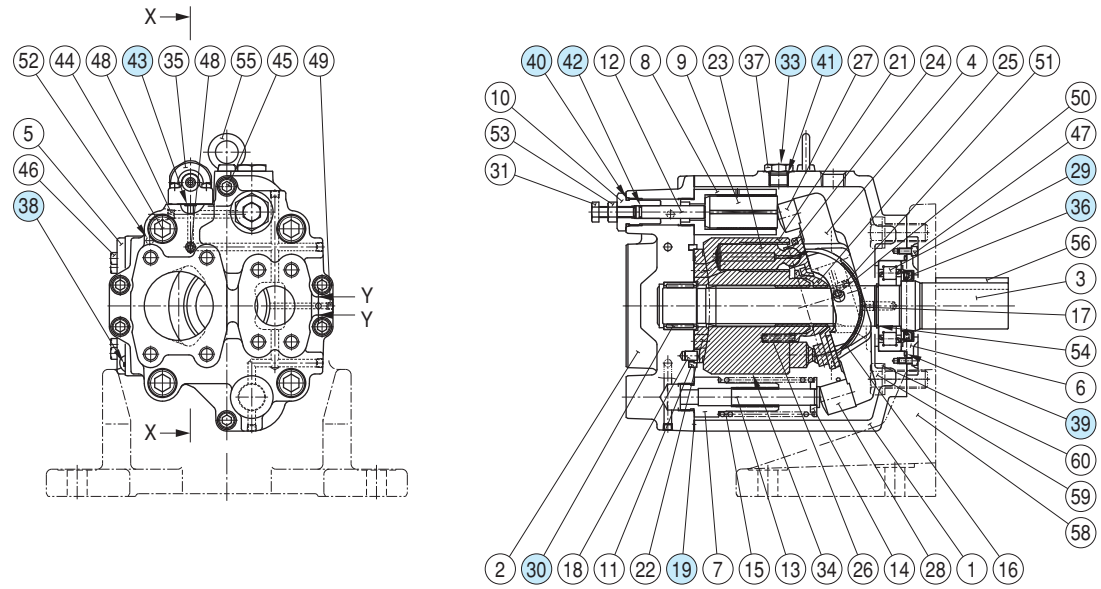
Detail of Section Y – Y

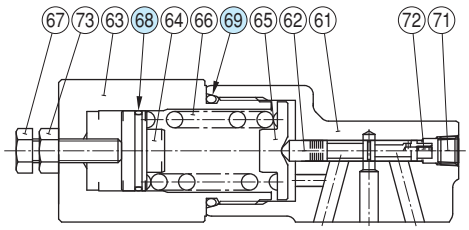
Detail "Z"

Item	Name of Parts	Part Numbers			Qty.
		A3H16	A3H37	A3H56	
17	Gasket	2270-PK313655-3	2271-PK-313518-3	2272-PK313433-5	1
18	Back Up Ring	1310E-PK412440-0			1
36	Cylindrical Roller Bearing	NUP205E	——	——	1
	Tapered Roller Bearing	——	4T-30204	4T-33008	
37	Needle Roller Bearing	HMK2025V2	——	——	1
	Tapered Roller Bearing	——	4T-33006	4T-32205R	
38	Oil Seal	TCN254511 (FKM)	TCN284811 (FKM)	TCN355511 (FKM)	1
40	O-Ring	S65 (NBR-70)	S85 (NBR-70)	S95 (NBR-70)	1
41	O-Ring	OR NBR-70 G60-N	OR NBR-70 G60-N	S71 (NBR-70)	1
42	O-Ring	OR NBR-90 P14-N	OR NBR-90 P18-N	OR NBR-90 P21-N	1
43	O-Ring	OR NBR-90 P14-N			1
44	O-Ring	OR NBR-90 P9-N			4
45	O-Ring	OR NBR-90 P6-N	OR NBR-90 P8-N	OR NBR-90 P9-N	1
68	O-Ring	AS568-A018 (NBR-70)			1
69	O-Ring	OR NBR-90 P26-N			1

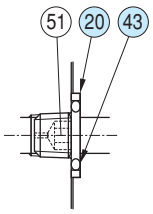
Spare Parts List

A3H71/A3H100/A3H145/A3H180-＊R01KK





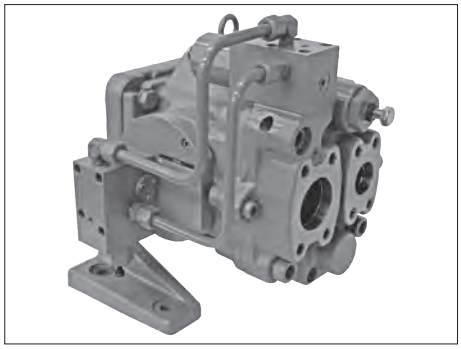
Detail of Section X – X



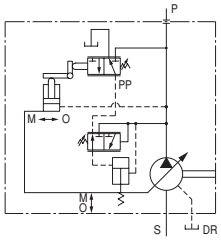
Detail of Section Y – Y

Item	Name of Parts	Part Numbers				Qty.
		A3H71	A3H100	A3H145	A3H180	
19	Gasket	2273-PK212356-0	2274-PK212368-5	2275-PK212382-6	2276-PK212301-6	1
20	Back Up Ring	1310E-PK412440-0				1
29	Tapered Roller Bearing	33009JR	4T-33206	HR33011	——	1
	Cylindrical Roller Bearing	——	——	——	2276-PK412859-1	
30	Tapered Roller Bearing	32205JR	4T-30210	4T-33206	——	1
	Needle Roller Bearing	——	——	——	2276-PK412860-9	
36	Oil Seal	TCN426512 (FKM)	TCN507212 (FKM)	TCN557812 (FKM)	TCN557812 (FKM)	1
38	O-Ring	S100 (NBR-70)	S110 (NBR-70)	S125 (NBR-70)	S130 (NBR-70)	1
39	O-Ring	OR NBR-70 G80-N	OR NBR-70 G95-N	OR NBR-70 G95-N	OR NBR-70 G105-N	1
40	O-Ring	OR NBR-90 P24-N		OR NBR-90 P26-N		1
41	O-Ring	OR NBR-90 P14-N	OR NBR-90 P18-N	OR NBR-90 P18-N		1
42	O-Ring	OR NBR-90 P9-N		OR NBR-90 P10A-N		1
43	O-Ring	OR NBR-90 P9-N				4
68	O-Ring	AS568-A021 (NBR-70)				1
69	O-Ring	OR NBR-90 P32-N				1

A3H Series High Pressure Variable Displacement Piston Pumps, Constant Power (Torque) Control Type



Graphic Symbol



Specifications

Model Numbers	Geometric Displacement cm^3/rev	Minimum Adj. Flow cm^3/rev	Max. Operating Pressure MPa	Shaft Speed Range r/min		Approx. Mass kg	
				Max.★	Min.	Flange Mtg.	Foot Mtg.
A3H 37-＊R09-＊＊＊K-10	37.1	16.0	35	2700	600	23.0	30.5
A3H 56-＊R09-＊＊＊K-10	56.3	35.0		2500	600	29.0	36.5
A3H 71-＊R09-＊＊＊K-10	70.7	45.0		2300	600	38.0	45.5
A3H100-＊R09-＊＊＊K-10	100.5	63.0		2100	600	48.3	76.3
A3H145-＊R09-＊＊＊K-10	145.2	95.0		1800	600	63.0	91.0
A3H180-＊R09-＊＊＊K-10	180.7	130.0		1800	600	74.2	102.2

★ The maximum shaft speeds shown in the above table are at suction pressure 0 kPa.

Model Number Designation

A3H37	-F	R	09	-11	A	4	K	-10
Series Number	Mounting	Direction of Rotation	Control Type	Input Power Setting	Frequency of Power Source	Pole Number of Electric Motor	Shaft Extension★2	Design Number
A3H37 (37.1 cm^3/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	09: Constant Power (Torque) Control Type	5.5: 5.5 kW | 110: 110 kW Refer to the table on following page for combination.	A: 50 Hz B: 60 Hz	4: 4 Poles 6: 6 Poles	K: Keyed Shaft	10
A3H56 (56.3 cm^3/rev)								10
A3H71 (70.7 cm^3/rev)								10
A3H100 (100.5 cm^3/rev)								10
A3H145 (145.2 cm^3/rev)								10
A3H180 (180.7 cm^3/rev)								10

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
★2. We can also supply spline-type shaft extension. Consult Yuken for details.

Combination of Pump Series and Input Power Setting (○= Available Combinations)

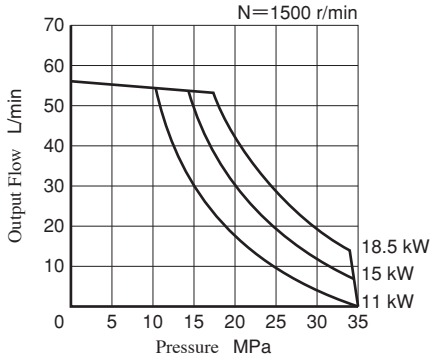
Model Numbers		Input Power Setting kW																				
		Pole Number of Electric Motor : **4P**											Pole Number of Electric Motor : **6P**									
		11	15	18.5	22	30	37	45	55	75	90	110	5.5	7.5	11	15	18.5	22	30	37	45	55	75
A3H 37	50 Hz	○	○	○									○	○	○								
	60 Hz	○	○	○	○									○	○	○							
A3H 56	50 Hz		○	○	○	○								○	○	○	○							
	60 Hz			○	○	○	○								○	○	○	○						
A3H 71	50 Hz			○	○	○	○								○	○	○	○						
	60 Hz				○	○	○	○								○	○	○	○					
A3H100	50 Hz				○	○	○	○	○							○	○	○	○					
	60 Hz					○	○	○	○								○	○	○	○	○			
A3H145	50 Hz					○	○	○	○	○							○	○	○	○	○	○		
	60 Hz						○	○	○	○	○							○	○	○	○	○		
A3H180	50 Hz						○	○	○	○	○							○	○	○	○	○		
	60 Hz							○	○	○	○	○							○	○	○	○	○	

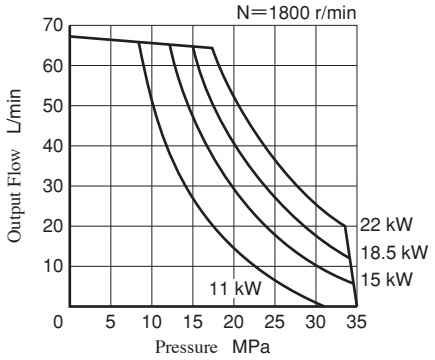
Pipe Flange Kits

For pipe flange, refer to form of pressure compensator type on page A-117.

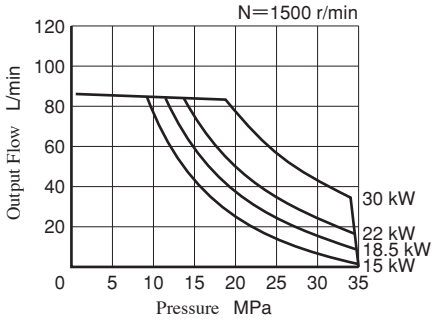
Typical Performance Characteristics of Control Type **09** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

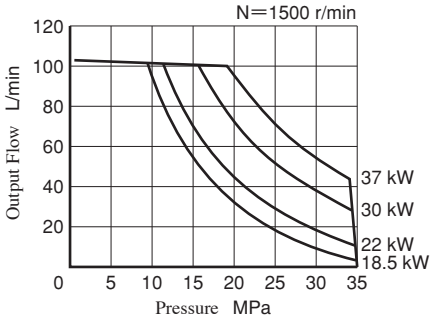
A3H37





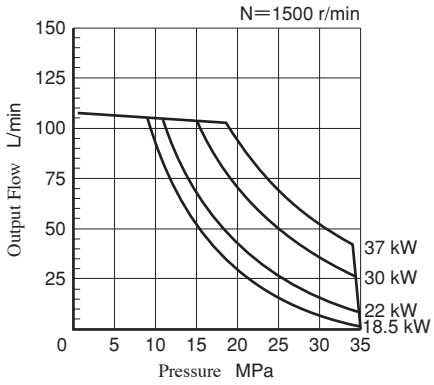
A3H56

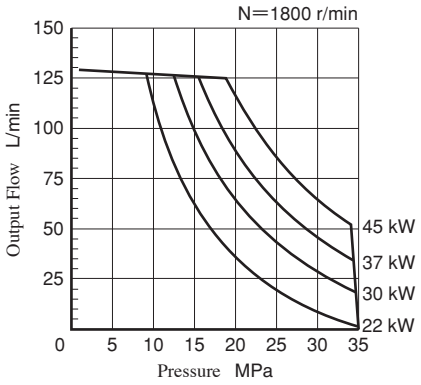




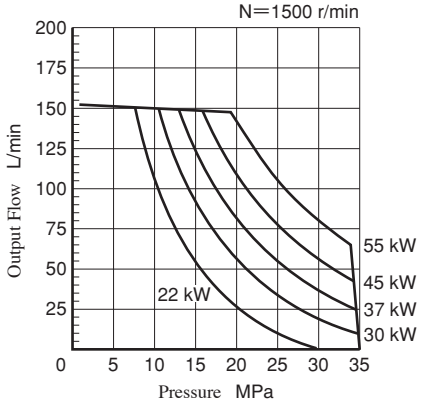
Typical Performance Characteristics of Control Type **09** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

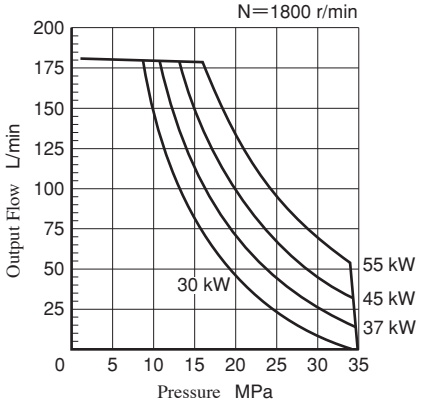
A3H71



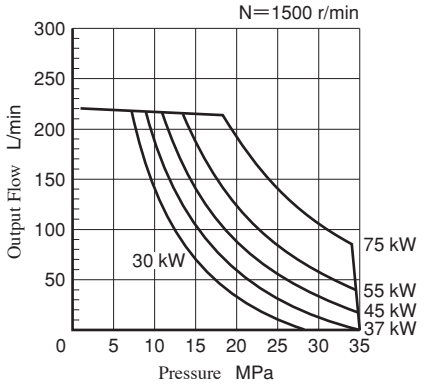


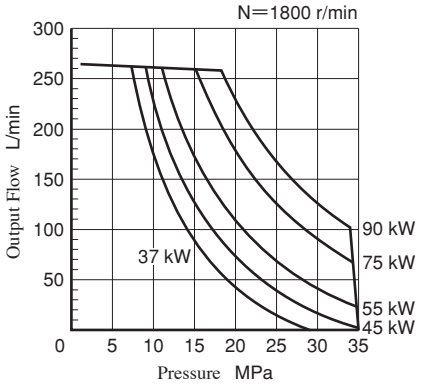
A3H100



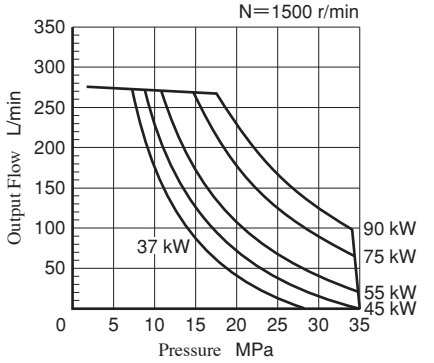


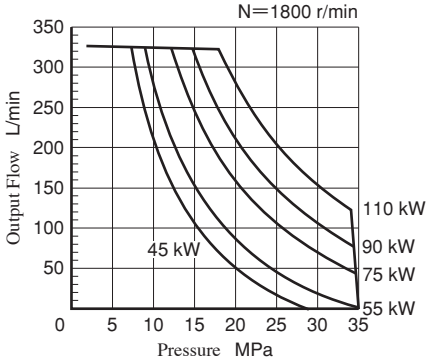
A3H145



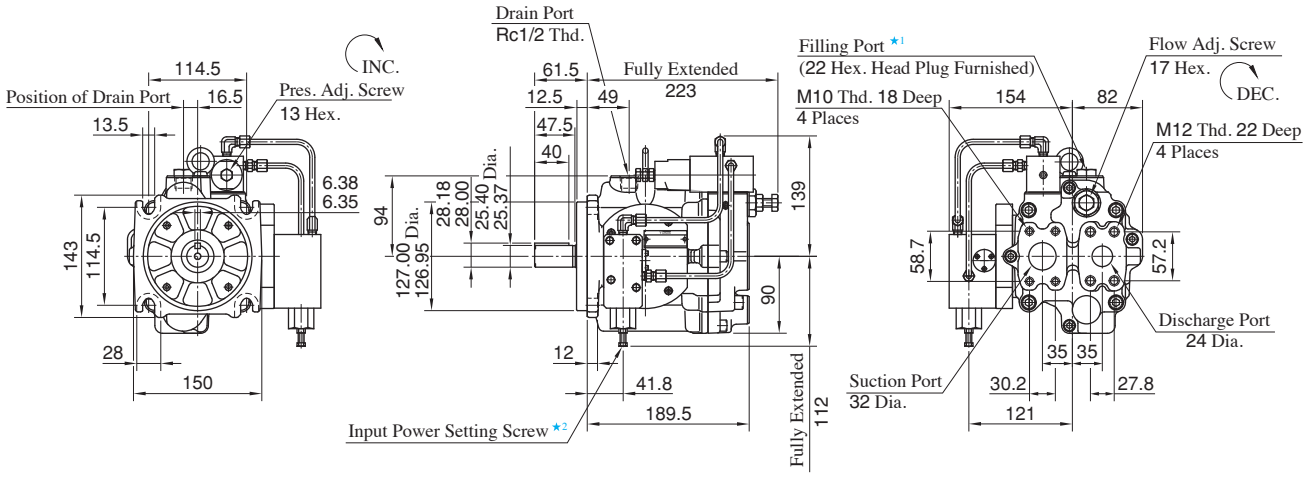


A3H180





Flange Mtg. : A3H37-FR09-＊＊＊K

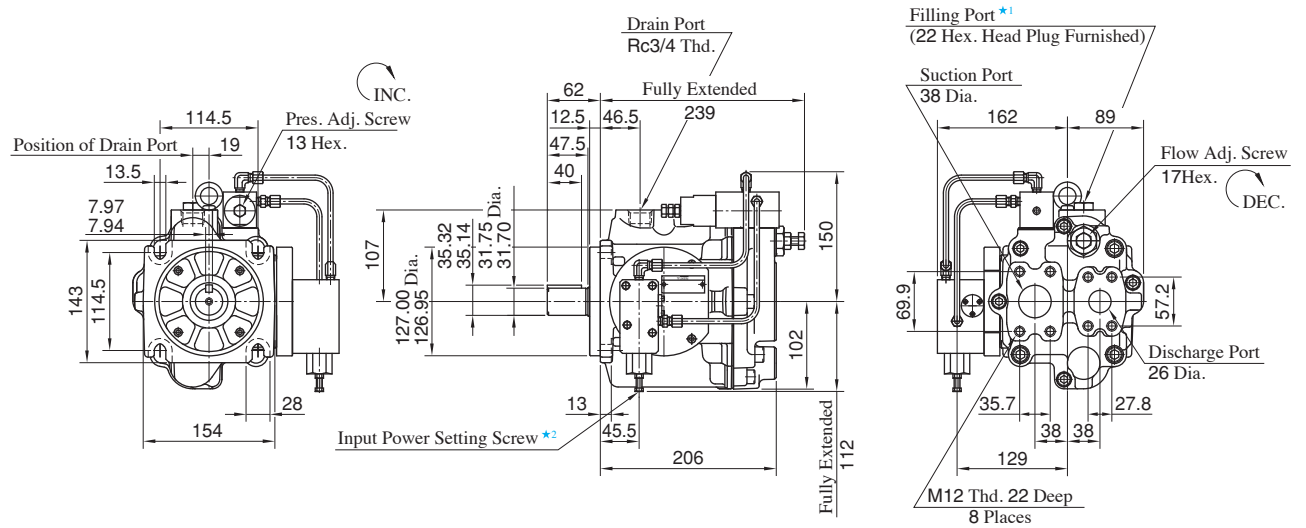


★1. Install the pump so that the "Filling Port" is at the top.
★2. Do not touch the screw because it is adjusted at the time of shipment.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-127 for the dimensions of mounting bracket.

Flange Mtg. : A3H56-FR09-＊＊＊K

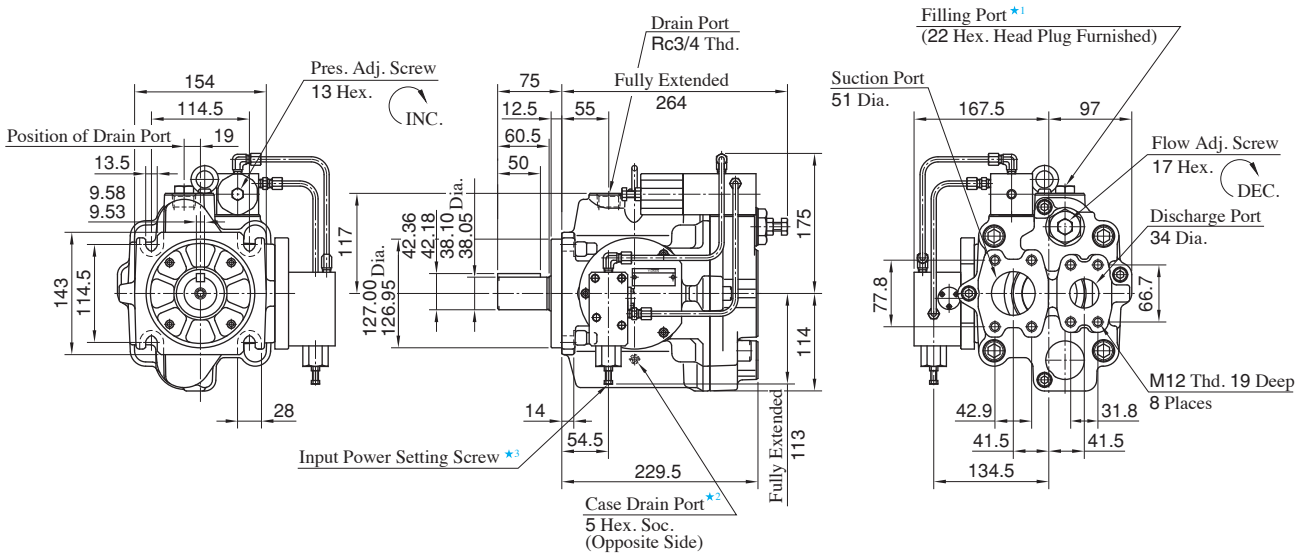


★1. Install the pump so that the "Filling Port" is at the top.
★2. Do not touch the screw because it is adjusted at the time of shipment.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-128 for the dimensions of mounting bracket.

Flange Mtg. : A3H71-FR09-＊＊＊K

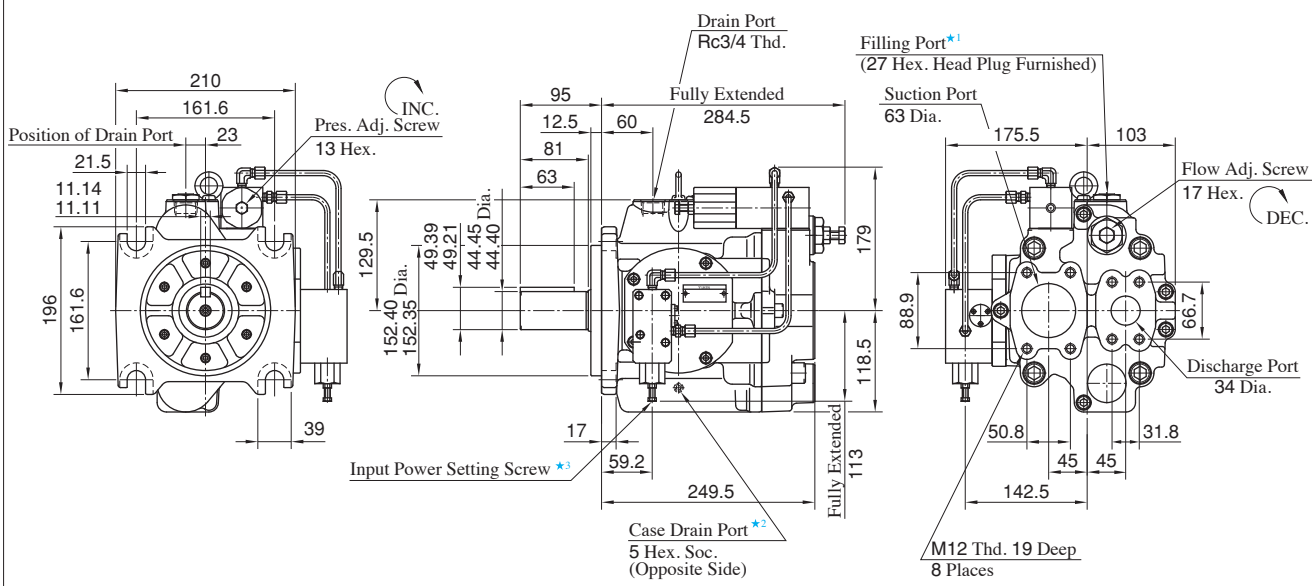


★1. Install the pump so that the "Filling Port" is at the top.
★2. Please use case drain port in case of discharge the hydraulic oil in the pump casing.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-129 for the dimensions of mounting bracket.

Flange Mtg. : A3H100-FR09-＊＊＊K

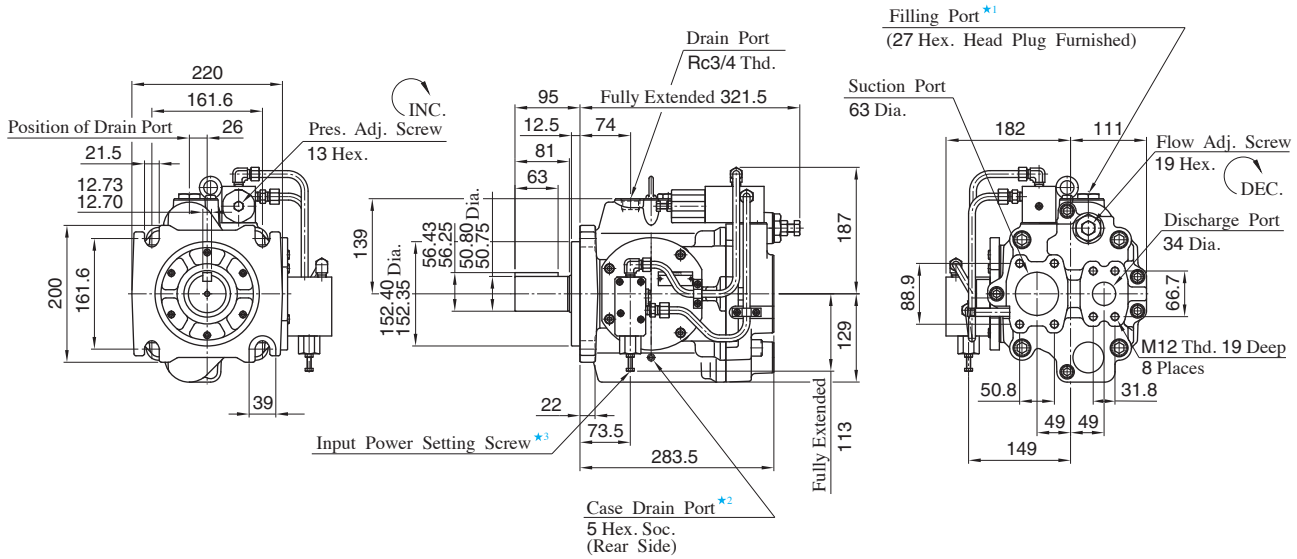


★1. Install the pump so that the "Filling Port" is at the top.
★2. Please use case drain port in case of discharge the hydraulic oil in the pump casing.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-130 for the dimensions of mounting bracket.

Flange Mtg. : A3H145-FR09-∗∗∗K

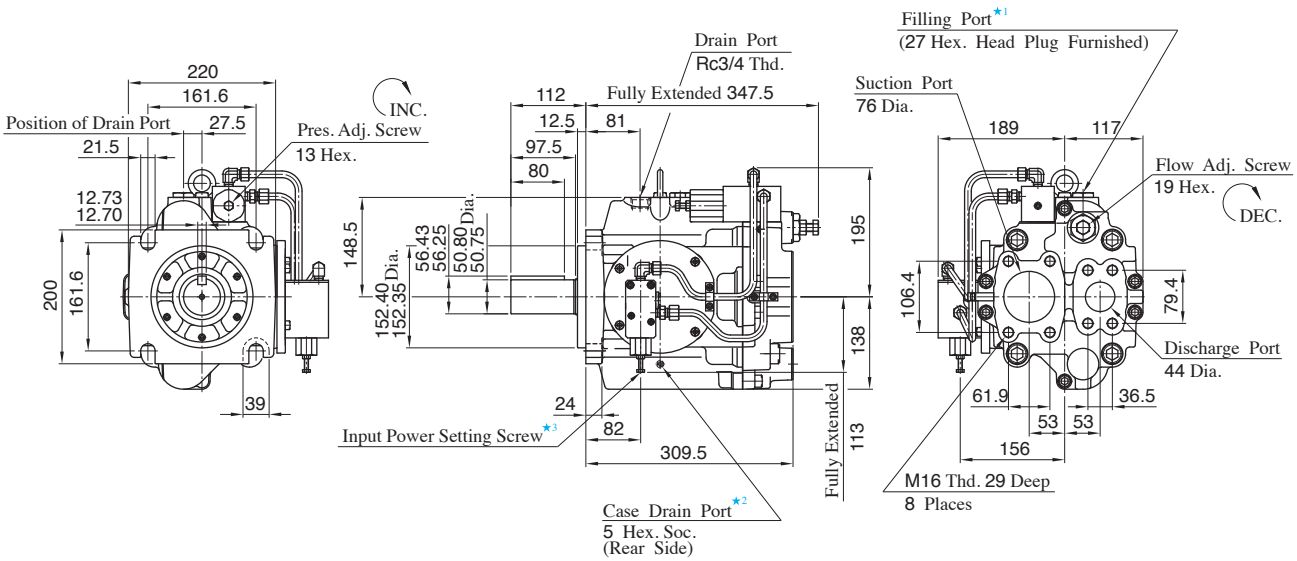


★1. Install the pump so that the "Filling Port" is at the top.
★2. Please use case drain port in case of discharge the hydraulic oil in the pump casing.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-131 for the dimensions of mounting bracket.

Flange Mtg. : A3H180-FR09-∗∗∗K

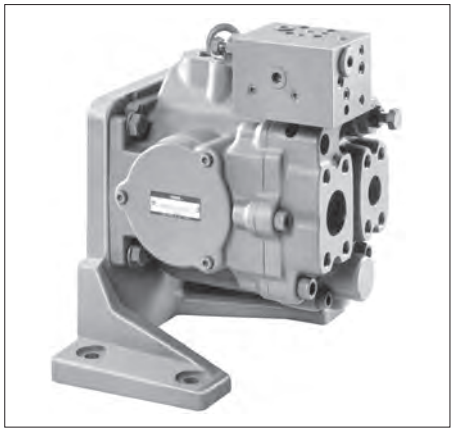


★1. Install the pump so that the "Filling Port" is at the top.
★2. Please use case drain port in case of discharge the hydraulic oil in the pump casing.
★3. Do not touch the screw because it is adjusted at the time of shipment.

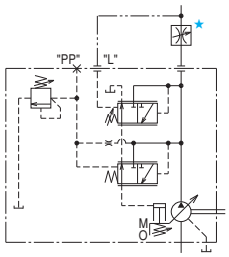
Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-132 for the dimensions of mounting bracket.

A3H Series High Pressure Variable Displacement Piston Pumps, Load Sensing Type



Graphic Symbol



★ A flow control valve is not included with the pump. Install the valve separately.

Specifications

Model Numbers	Geometric Displacement cm^3/rev	Operating Pressure★1 MPa		Load Sensing Pres. Difference ΔP MPa	Shaft Speed Range r/min		Approx. Mass kg	
		Rated	Intermittent		Max.★3	Min.	Flange Mtg.	Foot Mtg.
A3H 16-＊R14K-10	16.3	28	35	1.5 (At the time of shipment)★2	3600	600	17.5	26.4
A3H 37-＊R14K-10	37.1				2700	600	22.5	30.0
A3H 56-＊R14K-10	56.3				2500	600	28.7	36.2
A3H 71-＊R14K-10	70.7				2300	600	38.0	45.5
A3H100-＊R14K-10	100.5				2100	600	47.9	75.9
A3H145-＊R14K-10	145.2				1800	600	63.0	91.0
A3H180-＊R14K-10	180.7				1800	600	73.4	101.4

★1. The operating pressure means pump discharge pressure.
★2. Load pressure difference ΔP is adjustable in range of 1.0 - 3.0 MPa.
★3. The maximum shaft speeds shown in the above table are at suction pressure 0 kPa.

Model Number Designation

A3H37	-F	R	14	K	-10
Series Number	Mounting	Direction of Rotation	Control Type	Shaft Extension★2	Design Number
A3H16 (16.3 cm^3/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise★1 (Normal)	14: Load Sensing Type	K: Keyed Shaft	10
A3H37 (37.1 cm^3/rev)					10
A3H56 (56.3 cm^3/rev)					10
A3H71 (70.7 cm^3/rev)					10
A3H100 (100.5 cm^3/rev)					10
A3H145 (145.2 cm^3/rev)					10
A3H180 (180.7 cm^3/rev)					10

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
★2. We can also supply spline-type shaft extension. Consult Yuken for details.

Pipe Flange Kits

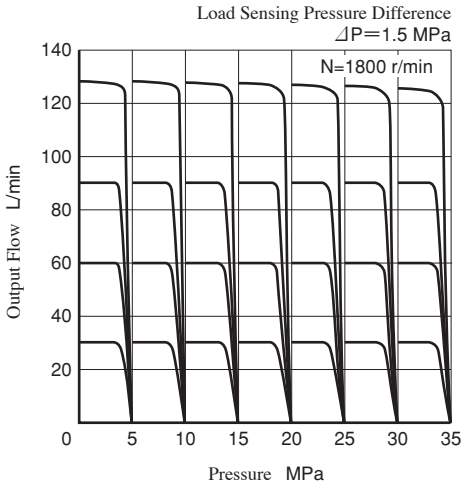
Pipe flange kits are available. When ordering, specify the kit number from the table below.

Pump Model Numbers	Name of Port	Pipe Flange Kits Number		
		Threaded Connection★	Socket Welding	Butt Welding
A3H 16-＊R14K	Suction	F5-08-A-10	F5-08-B-10	F5-08-C-10
	Discharge	F6-06-A-M-10	F6-06-B-M-10	——
A3H 37-＊R14K	Suction	F5-10-A-10	F5-10-B-10	F5-10-C-10
	Discharge	F6-08-A-M-10	F6-08-B-M-10	——
A3H 56-＊R14K	Suction	F5-12-A-10	F5-12-B-10	F5-12-C-10
	Discharge	F6-08-A-M-10	F6-08-B-M-10	——
A3H 71-＊R14K	Suction	F5-16-A-10	F5-16-B-10	F5-16-C-10
	Discharge	F6-10-A-M-10	F6-10-B-M-10	——
A3H100-＊R14K A3H145-＊R14K	Suction	F5-20-A-10	F5-20-B-10	F5-20-C-10
	Discharge	F6-10-A-M-10	F6-10-B-M-10	——
A3H180-＊R14K	Suction	F5-24-A-10	F5-24-B-10	——
	Discharge	F6-12-A-M-10	F6-12-B-M-10	——

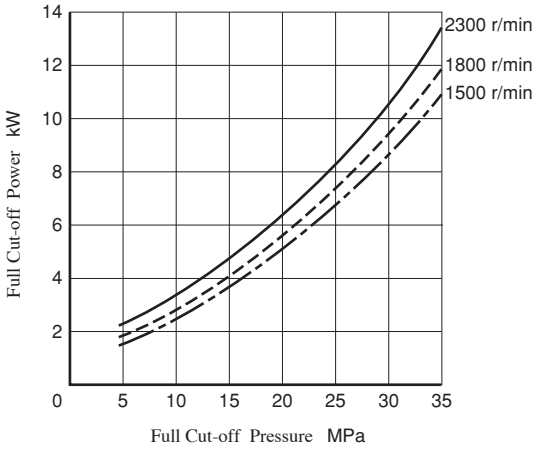
★ These flanges are with tapered threaded port, maximum pressure is restricted at 31 MPa.

Typical Performance Characteristics of Control Type **A3H71** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

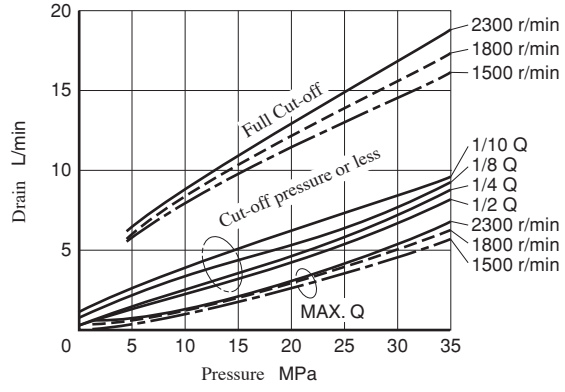
Pressure vs. Output Flow



Full Cut-off Input Power

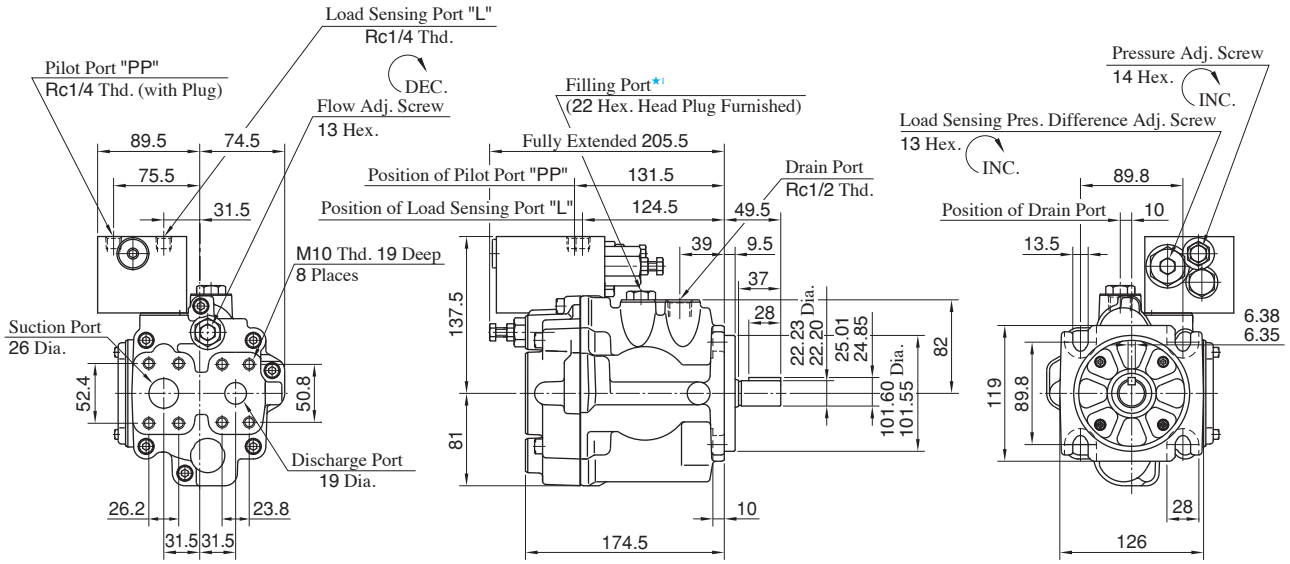


Drain



★ Consult Yuken for performance characteristics of other series than A3H71.

Flange Mtg. : A3H16-FR14K

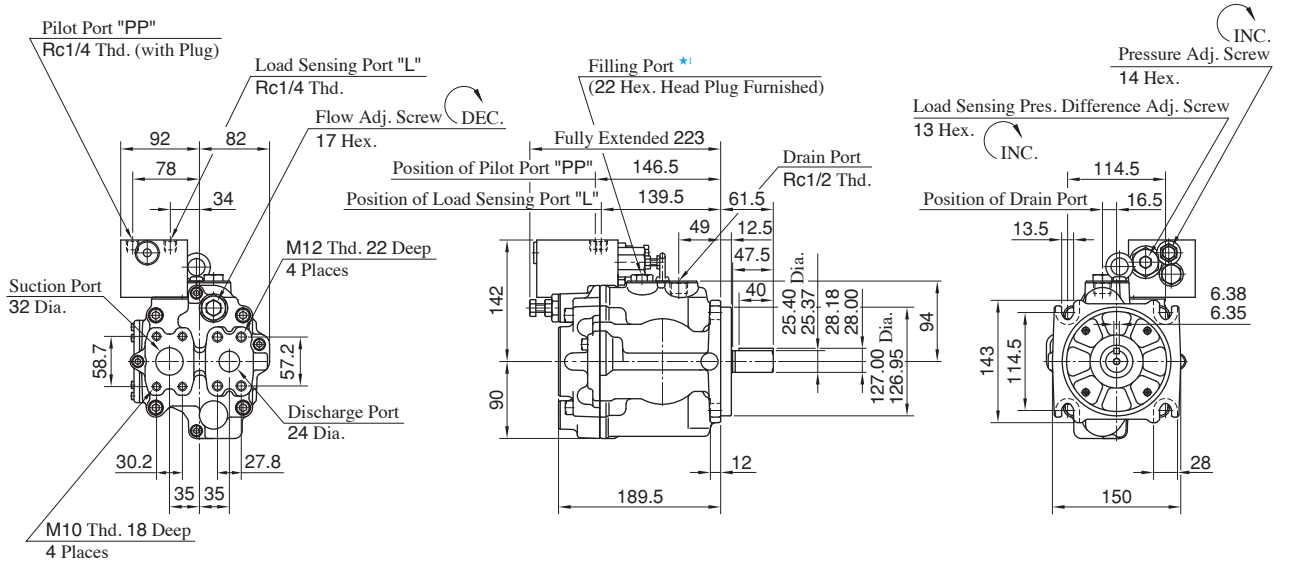


★1. Install the pump so that the "Filling Port" is at the top.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-126 for the dimensions of mounting bracket.

Flange Mtg. : A3H37-FR14K

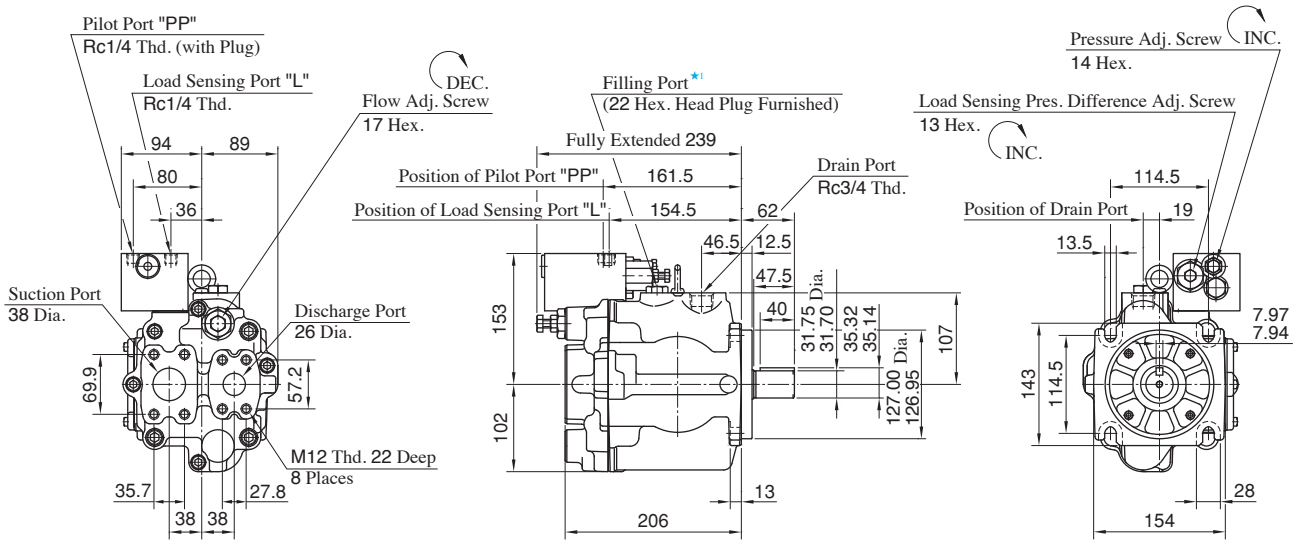


★1. Install the pump so that the "Filling Port" is at the top.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-127 for the dimensions of mounting bracket.

Flange Mtg. : A3H56-FR14K

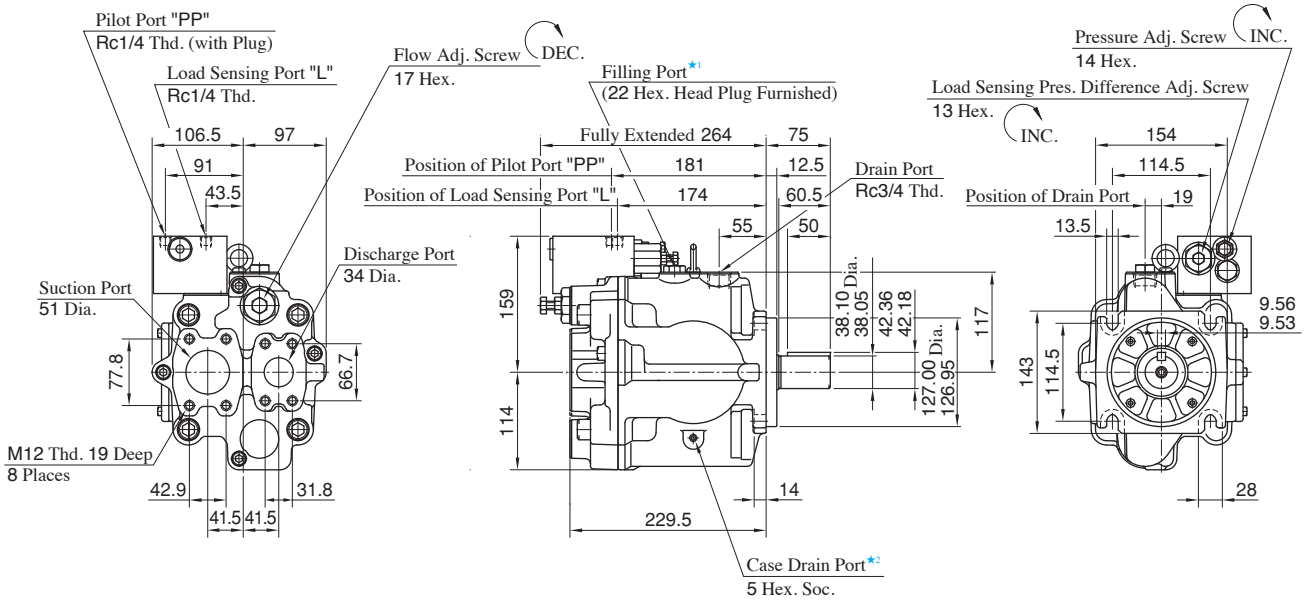


★1. Install the pump so that the "Filling Port" is at the top.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-128 for the dimensions of mounting bracket.

Flange Mtg. : A3H71-FR14K

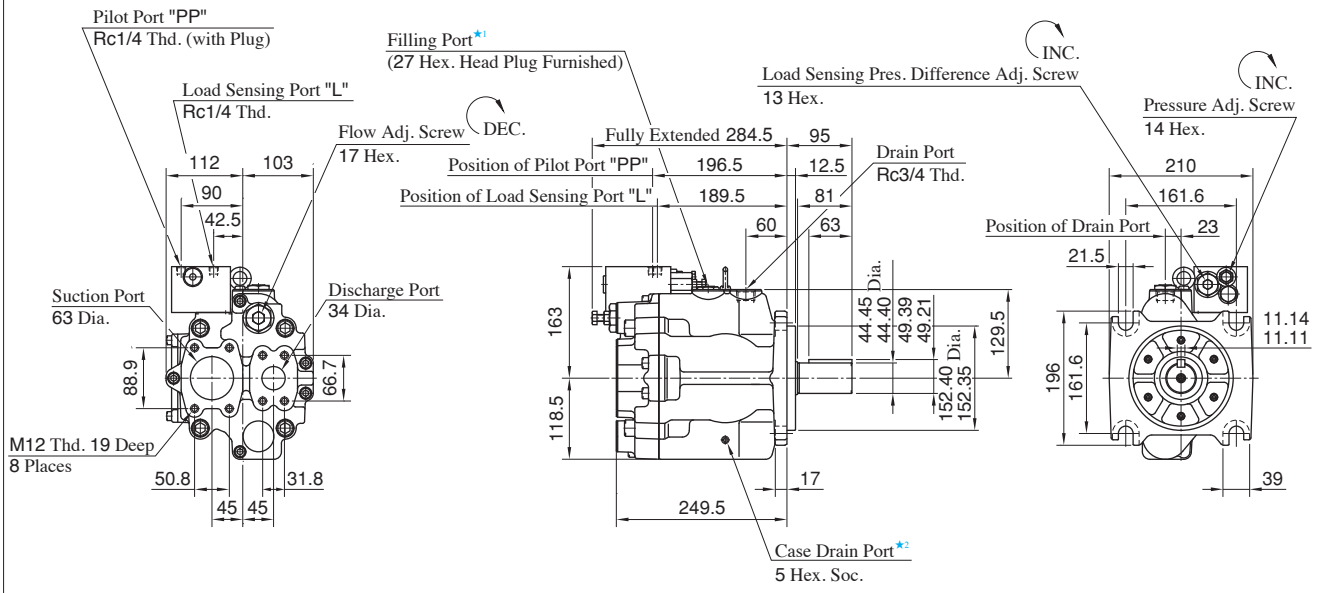


★1. Install the pump so that the “Filling Port” is at the top.
★2. Please use case drain port in case of discharge the hydraulic oil in the pump casing.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-129 for the dimensions of mounting bracket.

Flange Mtg. : A3H100-FR14K

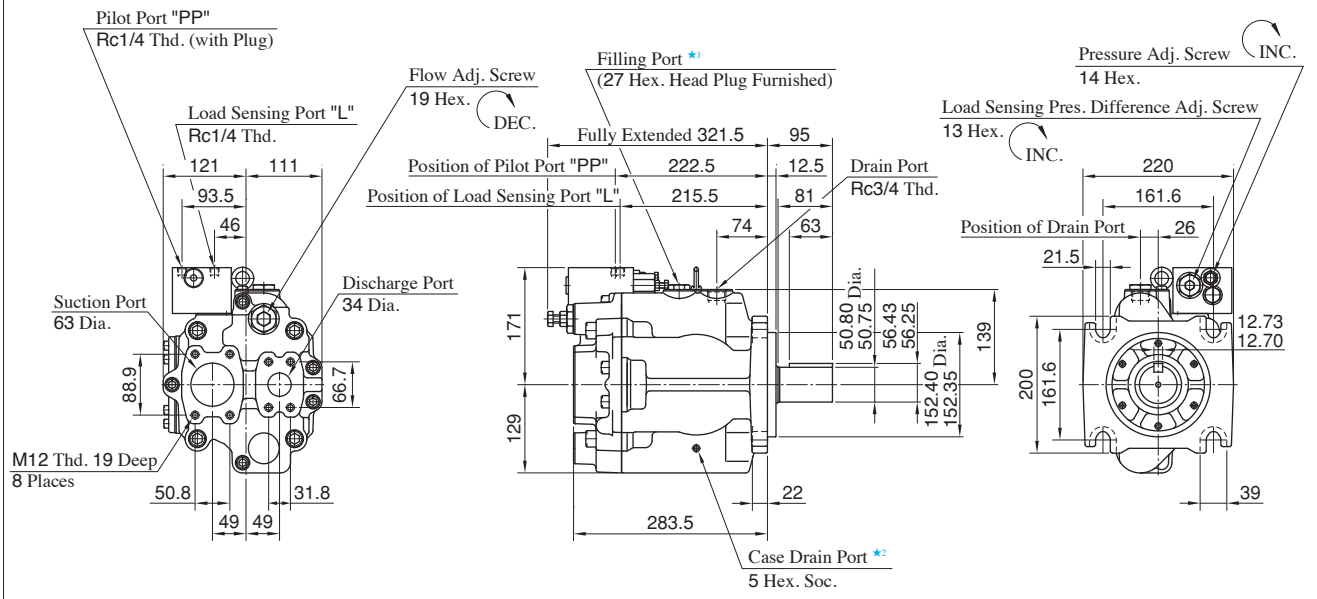


★1. Install the pump so that the "Filling Port" is at the top.
★2. Please use case drain port in case of discharge the hydraulic oil in the pump casing.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-130 for the dimensions of mounting bracket.

Flange Mtg. : A3H145-FR14K

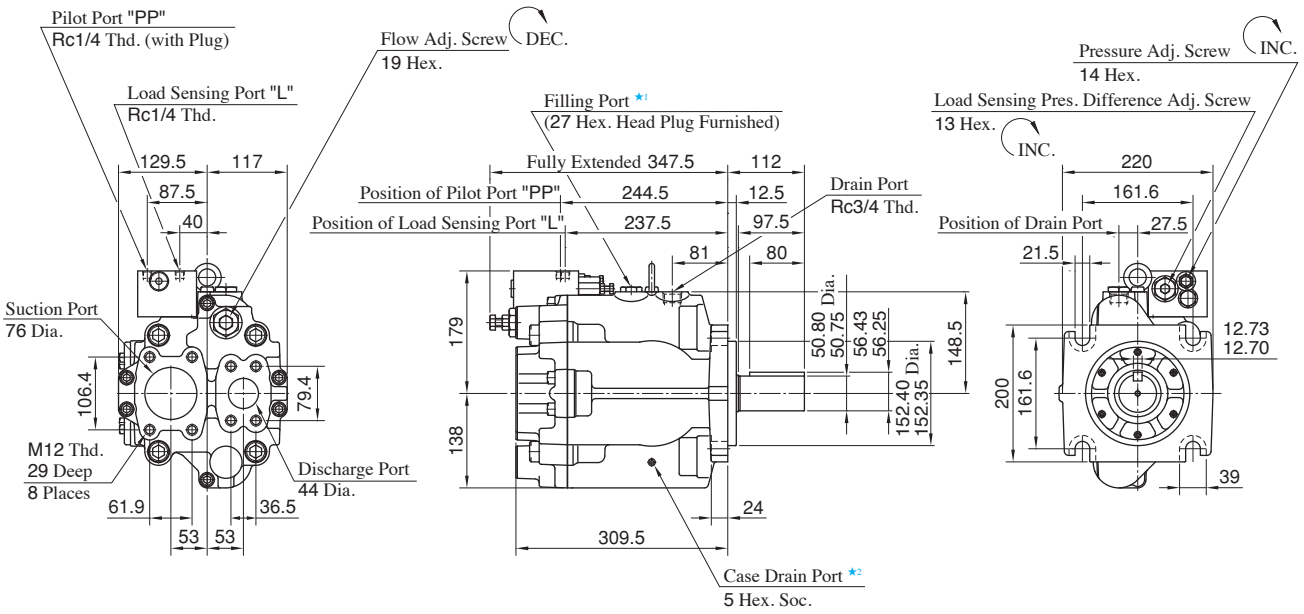


★1. Install the pump so that the "Filling Port" is at the top.
★2. Please use case drain port in case of discharge the hydraulic oil in the pump casing.

Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.
Refer to page A-131 for the dimensions of mounting bracket.

Flange Mtg. : A3H180-FR14K



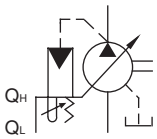
★1. Install the pump so that the “Filling Port” is at the top.
★2. Please use case drain port in case of discharge the hydraulic oil in the pump casing.

Foot Mounting Type

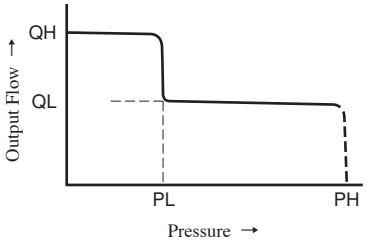
Mounting bracket is common to that of pressure compensator model.
Refer to page A-132 for the dimensions of mounting bracket.

A3H Series High Pressure Variable Displacement Piston Pumps, Simple Two-Pressure Two-Flow Control Type

Graphic Symbol



Performance Characteristics



Specifications

Model Numbers	Geometric Displacement cm³/rev	Delivery Volume Adj. Range cm³/rev		Operating Pressure MPa		Shaft Speed Range r/min
		Large Displacement (QH)	Small Displacement (QL)	Rated	Intermittent	
A3H16-✻R55-KK-10	16.3	8 - 16.3	★ - 8	25	25	600 - 3600
A3H37-✻R55-KK-10	37.1	16 - 37.1	★ - 19			600 - 2700
A3H56-✻R55-KK-10	56.3	35 - 56.3	★ - 30			600 - 2500
A3H71-✻R55-KK-10	70.7	45 - 70.7	★ - 35			600 - 2300
A3H100-✻R55-KK-10	100.5	63 - 100.5	★ - 48			600 - 2100
A3H145-✻R55-KK-10	145.2	95 - 145.2	★ - 60			600 - 1800
A3H180-✻R55-KK-10	180.7	130 - 180.7	★ - 90			600 - 1800

Note) ★ Pressure, PH, is the minimum required flow of the external relief valve.

Instruction

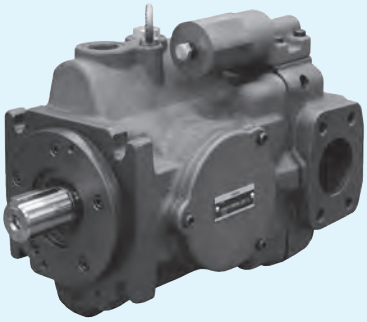
Please install the external relief valve since there is no full cut-off performance on this pump.

Model Number Designation

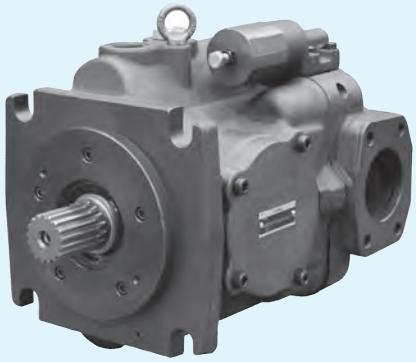
A3H37	-F	R	55	K	K	-10
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range	Shaft Extension	Design Number
A3H16 (16.3 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise (Normal)	55: Simple Two-Pressure Two-Flow Control Type	K: 5 - 25	K: Keyed Shaft	10
A3H37 (37.1 cm³/rev)						10
A3H56 (56.3 cm³/rev)						10
A3H71 (70.7 cm³/rev)						10
A3H100 (100.5 cm³/rev)						10
A3H145 (145.2 cm³/rev)						10
A3H180 (180.7 cm³/rev)						10

Consult Yuken when detailed material such as dimensions figures is required.

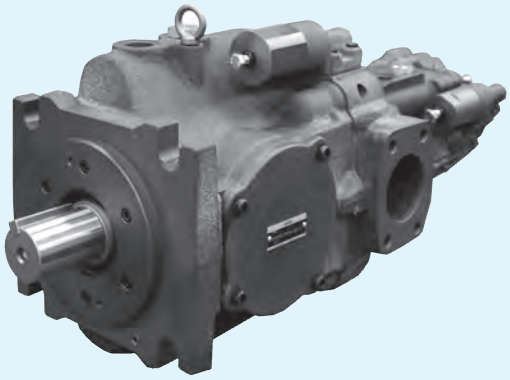
A3HG Series High Pressure Variable Displacement Piston Pumps



A3HG71



A3HG100



A3HG Through Drive

"A3HG" Series High Pressure Variable Displacement Piston Pumps

Pump Type	Graphic Symbol	Geometric Displacement cm^3/rev (1 2 5 10 20 50 100 200 300)	Maximum Operating Pressure MPa	Page
A3HG Series High Pressure Variable Displacement Piston Pumps — Single Pump		A3HG16 A3HG37 A3HG56 A3HG71 A3HG100 A3HG145 A3HG180	35	A-151

★ Four control types are available such as pressure compensator type. Refer to page A-152.

Hydraulic Fluids

Hydraulic Fluids

Use clean petroleum base oils equivalent to ISO VG-32 or 46. The recommended viscosity range is from 20 to 400 mm^2/s and temperature range is from 0 to 60 C°, both of which have to be satisfied for the use of the above hydraulic oils.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the operating oil which can otherwise lead to breakdowns and shorten the life of the unit. Please maintain the degree of contamination within NAS Grade 9.

The suction port must be equipped with at least a 100 µm (150 mesh) reservoir type filter and the return line must have a line filter of under 10 µm.

Instructions

Mounting

When installing the pump the filling port should be positioned upwards.

Alignment of Shaft

Employ a flexible coupling whenever possible, and avoid any stress from bending or thrust.

Maximum permissible misalignment is less than 0.1 mm TIR and maximum permissible misangular is less than 0.2.

Suction Pressure

Permissible suction pressure at suction port of the pump is between -16.7 and +50 kPa.In case of the speed is over 1800 r/min, adjust the pressure 0 to +50 kPa.

For piping to the suction port, use the pipes of the same diameter as that of the specified pipe flange to be used. Make sure that the height of the pump suction port is whithin one meter from the oil level in the reservoir.

Hints on Piping

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise.

Whenever there is fear of excessive load, please use rubber hoses.

Suction Piping

In case the pump is installed above the oil level, the suction piping and suction line filter should be located lower than the pump position to prevent air in the suction line.

Pilot Piping

Install pilot piping according to the chart.

[Recommended Pilot Piping Size]

Port /Flange Code	Fitting Size	Inside Dia. of Pipe
E1	M14×1.5	6 mm or more
U1	1/2-20UNF	
U2	G 1/4	
J1	R 1/4	

Drain Piping

Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a normal pressure of less than 0.1 MPa and surge pressure of less than 0.5 MPa.

Length of piping should be less than 1 m, and the pipe end should be submerged in oil.

[Recommended Drain Piping Size]

Model	Port /Flange Code	Fitting		Inside Dia. of Pipe
		Size	Inside Dia.	
A3HG16 A3HG37	E1	M22×1.5	12 mm or more	12 mm or more
	U1	7/8-14UNF		
	U2	G 1/2		
	J1	R 1/2		
A3HG56 | A3HG180	E1	M27×2	16 mm or more	19 mm or more
	U1	1 1/16-12UNF		
	U2	G 3/4		
	J1	R 3/4		

Safety Valve

When delivery line is blocked suddenly, surge pressure is occurred so a safety valve should be set in the circuit to eliminate any damage on equipment and piping.

Bleeding Air

It may be necessary to bleed air from pump case and outlet line to remove causes of vibration.

Starting

Before first starting, fill pump case with clean operating oil via the fill port.

In order to avoid air blockage when first starting, adjust the control valves so that the discharged oil from the pump is returned direct to the tank or the actuator moves in a free load.

[Volume of Pre-fill Oil Required]

Model	Volume cm^3	Model	Volume cm^3
A3HG16	400	A3HG100	1600
A3HG37	850	A3HG145	2350
A3HG56	1050	A3HG180	3300
A3HG71	1480	—	—

Setting Discharge Pressure and Delivery

At the time of shipment, the unit has been preset to maximum delivery and minimum discharge pressure.
Adjust the preset delivery and pressure to meet your system requirements.

Adjustment of Discharge Pressure

Turning the adjustment screw clockwise, increases pressure. For the volume adjusted by each full turn of the adjustment screw, see the table below.
After adjustment, make sure to tighten the lock nut.

[Volume adjusted by each full turn of the pressure adjustment screw]

Model Numbers	Adjustment Volume MPa
A3HG16/A3HG37/A3HG56-01	5.5
A3HG71/A3HG100/A3HG145-01	6.3
A3HG180-01	5.7

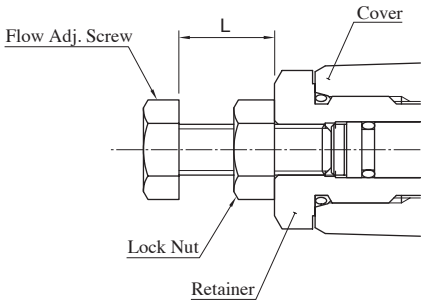
Adjustment of Delivery

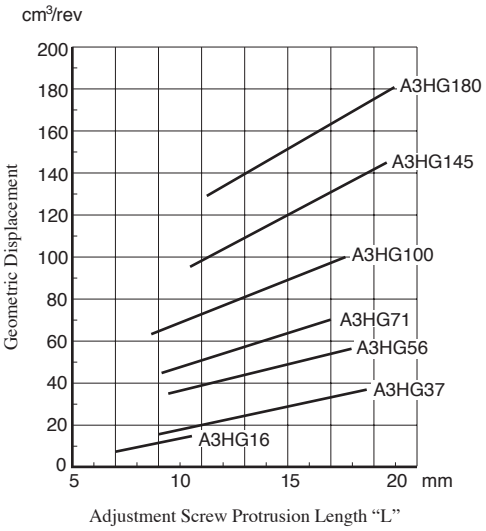
Turning the flow adjustment screw clockwise, decreases delivery. For the volume adjusted by each full turn of the adjustment screw, see the table below.
After adjustment, make sure to tighten the lock nut.

[The minimum adjustment flow and adjustable volume of each full turn of the delivery adjustment screw]

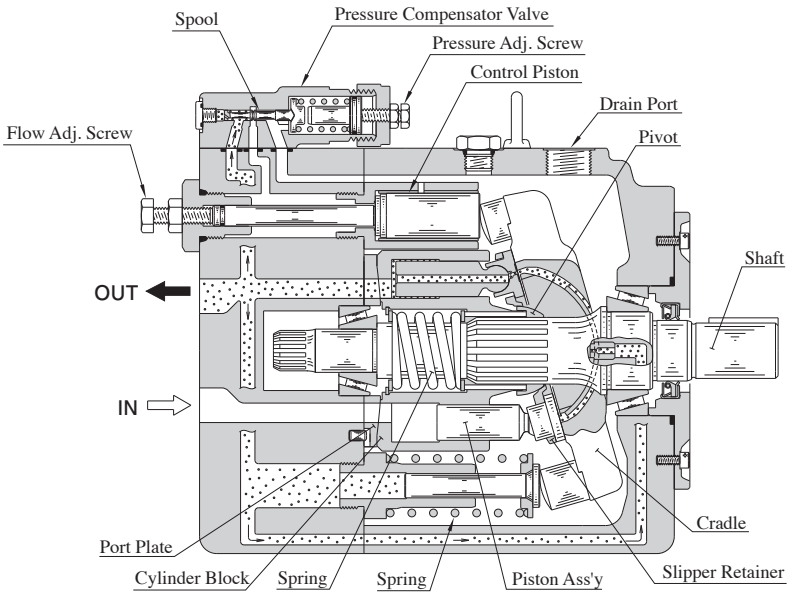
Model Numbers	Adjustable volume with each full turn of the adjustment screw cm^3/rev	Minimum Adjustment Flow cm^3/rev
A3HG16	1.4	8
A3HG37	3.3	16
A3HG56	4.2	35
A3HG71	4.9	45
A3HG100	6.2	63
A3HG145	9.4	95
A3HG180	10.3	130

Flow Adjustment Screw Protrusion Length “L” vs. Geometric Displacement (Reference)





A3HG Series High Pressure Variable Displacement Piston Pumps

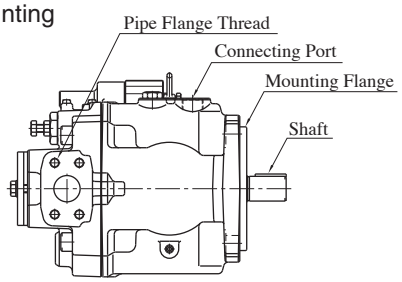


Features

Conforming to International Standards

We have widened the range and now have available pumps not only with JIS mounting but also ISO 3019-2 and ISO 3019-1 variants as standard depending on market needs.
Both keyed shaft and spline shaft are available as standard design.

Mounting



Frange/Port Code	Pipe Flange Thread	Connecting Port	Mounting Flange and Shaft
E1	Metric	Metric	Conforms to ISO 3019-2
U1	Unified	Unified	Conforms to ISO 3019-1
U2	Metric	BSPP	Conforms to ISO 3019-1
J1	Metric	Rc	Conforms to ISO 3019-1

Shaft Extension

Keyed

Spline

High Pressure and Wide Flow Range

Maintaining the high performance of our A3H pumps, the improved A3HG series now offers a nominal pressure of 31.5 MPa.
With a wide flow range, varying from 16.3 cm^3/rev to 180.7 cm^3/rev.
Supporting a wide range of applications as mid-high load capacity pumps.

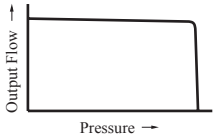
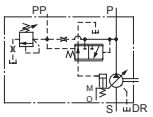
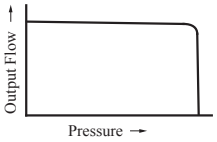
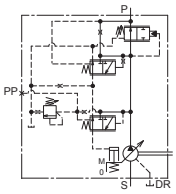
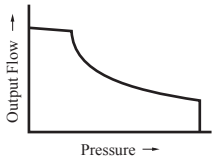
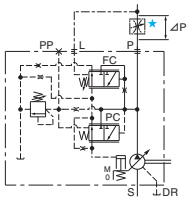
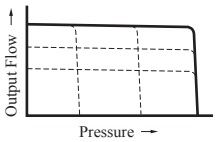
Through-drive System Adopted as A Standard Feature

The through-drive system adopted as a standard feature allows connecting a pump having the same capacity as the driving pump on the driven side, increasing the maximum flow range. Any pump conforming to international standards can be used on the driven side; replacement in machines can be readily done.

Wide Variety of Control Modes

Four control modes are available to support various functions:
pressure compensator type, pilot pressure control type pressure compensator, constant power control type with external pilot and load sensing type.

Control Type

Control Type	Graphic Symbols	Performance Characteristics	Explanation	Page
"01" Pressure Compensator Type			• When the system pressure increases and comes close to the preset cut-off pressure, the pump flow decreases automatically while maintaining the set pressure as it is. • The output flow and full cut-off pressure can be manually adjusted.	A-153
"07" Pilot Pressure Control Type Pressure Compensator			The pump is used in combination with the pilot relief valve or multistage pressure control valve. By controlling the pilot pressure, the full cut-off pressure can be remote-controlled according to your requirements.	A-172
"09V" Constant Power Control Type With External Pilot			• This type of control can control the pump input power according to the motor output. • When the system pressure increases, the output flow decreases, in correspondence to predetermined shaft input values. • This type of control can enable one pump to act as two pumps (low-pressure and large-flow/high-pressure and small-flow). Therefore, the motor capacity can be reduced. • This type of control provides the remote control of the full cut-off pressure by connecting a remote control relief valve to the pilot port "PP".	A-179
"14" Load Sensing Type			• This is an energy-saving type control which maintains the pump flow and load pressure at the absolute minimum necessary level to operate the actuator. • This type of control automatically regulates the output flow so that the inlet-outlet differential pressure of the flow control valve at the output side is constant. To do so, the load pressure must be introduced to the load sensing port "L" of the pump through the external piping. • This type of control provides the remote control of the full cut-off pressure by connecting a remote control relief valve to the pilot port "PP".	A-186

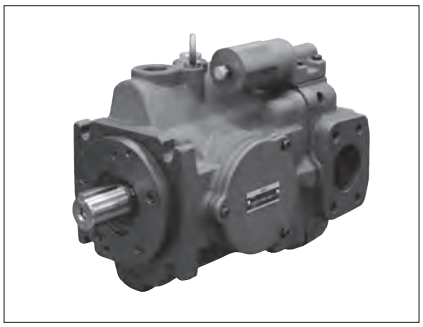
★ A flow control valve is not included with the pump. Install the valve separately.

Availability of Control Type

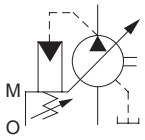
Mark "○" in the table below refers to standard model.

Model Numbers	Geometric Displacement cm^3/rev	Control Type			
		"01"	"07"	"09V"	"14"
A3HG16	16.3	○	○		○
A3HG37	37.1	○	○	○	○
A3HG56	56.3	○	○	○	○
A3HG71	70.7	○	○	○	○
A3HG100	100.5	○	○	○	○
A3HG145	145.2	○	○	○	○
A3HG180	180.7	○	○	○	○

A3HG Series High Pressure Variable Displacement Piston Pumps
Pressure Compensator Type



Graphic Symbol



Specifications

Model Numbers	Geometric Displacement cm³/rev	Minimum Adjustment Flow cm³/rev	Operating Pressure MPa		Shaft Speed Range r/min		Approx. Mass kg	
			Rated★1	Intermittent	Max.★2	Min.	Flange Mtg.	Foot Mtg.
A3HG16-＊R01K＊-＊C-10	16.3	8	31.5	35	3600	600	17	21
A3HG37-＊R01K＊-＊C-10	37.1	16			2700	600	26.5	35
A3HG37-＊R01K＊-＊D-10								34
A3HG56-＊R01K＊-＊C-10	56.3	35			2500	600	34.5	43
A3HG56-＊R01K＊-＊D-10							32.5	40
A3HG71-＊R01K＊-E1D/E2D-10	70.7	45			2300	600	45	71
A3HG71-＊R01K＊-U1D/U2D/J1D-10							41.5	49
A3HG100-＊R01KK-E1D/E2D-10	100.5	63			2100	600	56.5	81.5
A3HG100-＊R01KSP＊-E1D/E2D-10							56	81
A3HG100-＊R01K＊-U1D/U2D/J1D-10							56	83
A3HG145-＊R01KK-E1D/E2D-10	145.2	95			1800	600	68.5	94.5
A3HG145-＊R01KSP＊-E1D/E2D-10							68	94
A3HG145-＊R01K＊-U1D/U2D/J1D-10							68	95.5
A3HG180-＊R01KK-E1D/E2D-10	180.7	130			1800	600	88	114
A3HG180-＊R01KSP＊-E1D/E2D-10							87.5	113.5
A3HG180-＊R01KK-U1D/U2D/J1D-10							87.5	115

★1. Consult Yuken when pump is used over rated pressure because there is a restriction on operating condition.
★2. The maximum shaft speeds shown in the above table are at suction pressure 0 kPa.

Model Number Designation

A3HG16	-F	R	01	K	K	-E1	D	-10
Series Number	Mounting	Direction of Rotation	Control Type	Pres. Adj. Range MPa	Shaft Extension	Main Pump Mtg. Flange Connecting Port / Pipe Flange Thread Second Pump Mtg.	Number of Pump Mtg. Bolts	Design Number
A3HG16 (16.3 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise (Normal)	01: Pressure Compensator Type	K: 5 - 35	K: Keyed Shaft SP: Splined Shaft (High Torque) SP1: Splined Shaft (Conforms to ISO 3019-1)		C: 2	10
A3HG37 (37.1 cm³/rev)							C: 2 D: 4	10
A3HG56 (56.3 cm³/rev)								10
A3HG71 (70.7 cm³/rev)							D: 4	10
A3HG100 (100.5 cm³/rev)								10
A3HG145 (145.2 cm³/rev)								10
A3HG180 (180.7 cm³/rev)								10

Code	Main Pump Mtg. Flange	Connecting Port	Pipe Flange Thread	Second Pump Mtg.
E1	ISO 3019-2	Metric	Metric	ISO 3019-2
E2	ISO 3019-2	Metric	Metric	ISO 3019-1
U1	ISO 3019-1	Unified	Unified	ISO 3019-1
U2	ISO 3019-1	BSPP	Metric	ISO 3019-1
J1	ISO 3019-1	Rc	Metric	ISO 3019-1

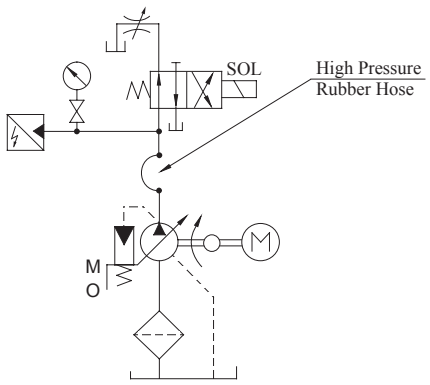
Pipe Flange Kits

Pipe flange mouting surface conforms to SAE J 518, 4 bolt split flange.
Pipe flange kits are not available. Contact us for the details.

Response Characteristics Change in Accordance with Circuits and Operating Conditions.

Test Circuit and Conditions

Circuit



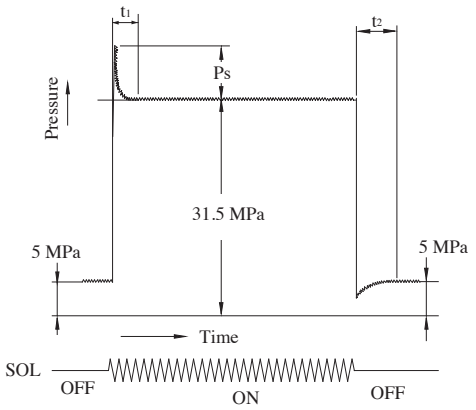
Size of High Pressure Rubber Hose

Model	High Pressure Rubber Hose
A3HG16	3/4B × 1500 mm
A3HG37/56/71	3/4B × 2000 mm
A3HG100/145	1-1/4B × 2000 mm
A3HG180	1-1/4B × 2500 mm

Conditions

Drive Speed : 1500 r/min
Hydraulic Fluid : ISO VG32 Oil
Oil Temperature: 40°C [Viscosity 32 mm^2/s]

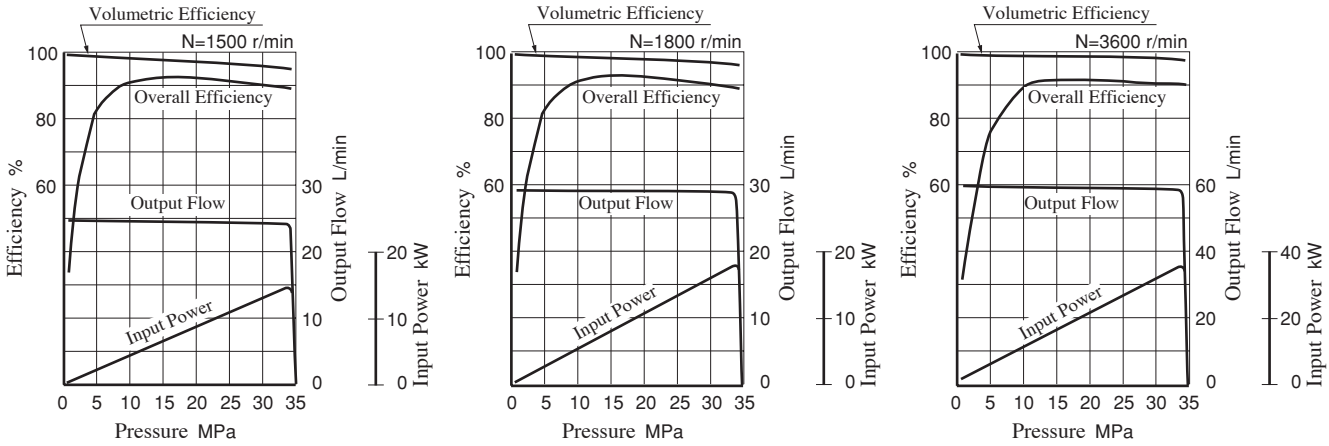
Result of Measurement



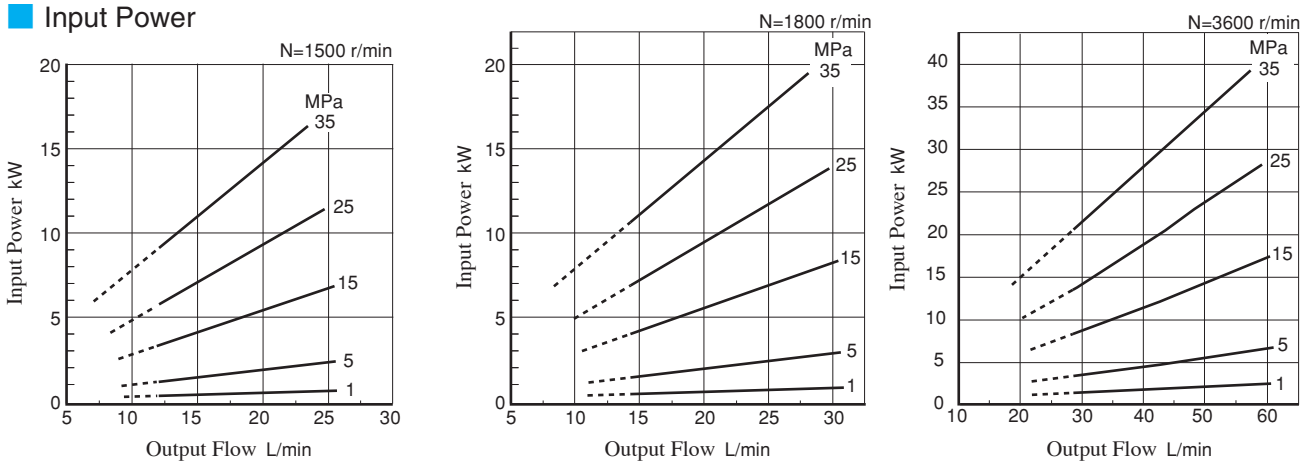
Model	Response Time ms		Overshoot Pressure Ps MPa
	t_1	t_2	
A3HG16	130	140	2.5
A3HG37	95	70	4.0
A3HG56	105	90	7.5
A3HG71	80	125	9.5
A3HG100	85	140	11.0
A3HG145	85	150	12.0
A3HG180	95	230	16.0

Typical Performance Characteristics of Type **A3HG16** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

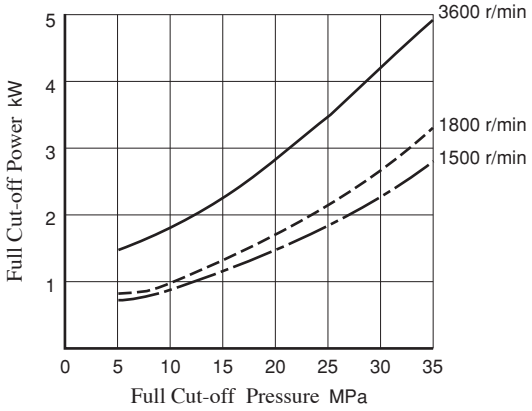


Input Power

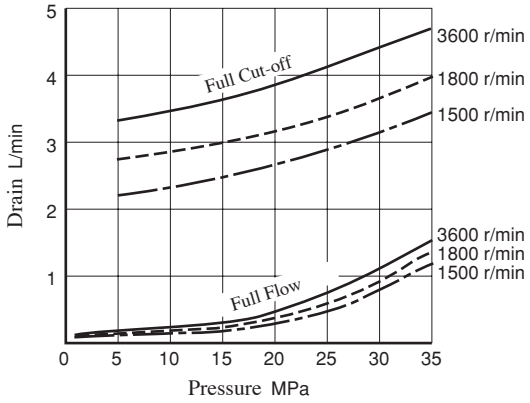


★ The dotted line in the graph indicates less than minimum adjustable flow.

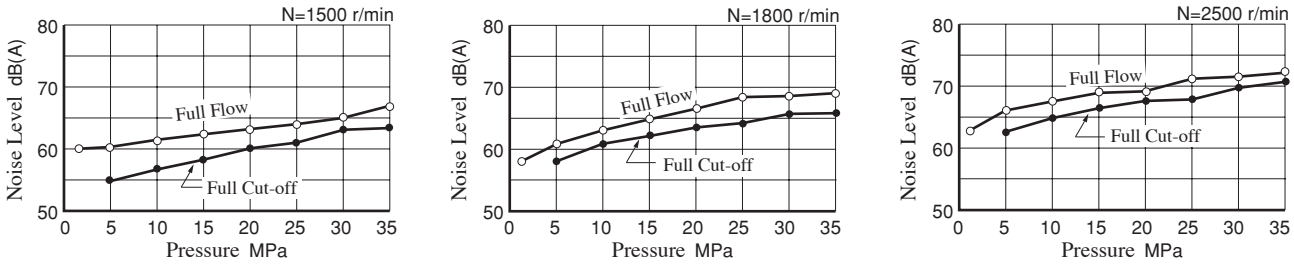
Full Cut-off Power



Drain

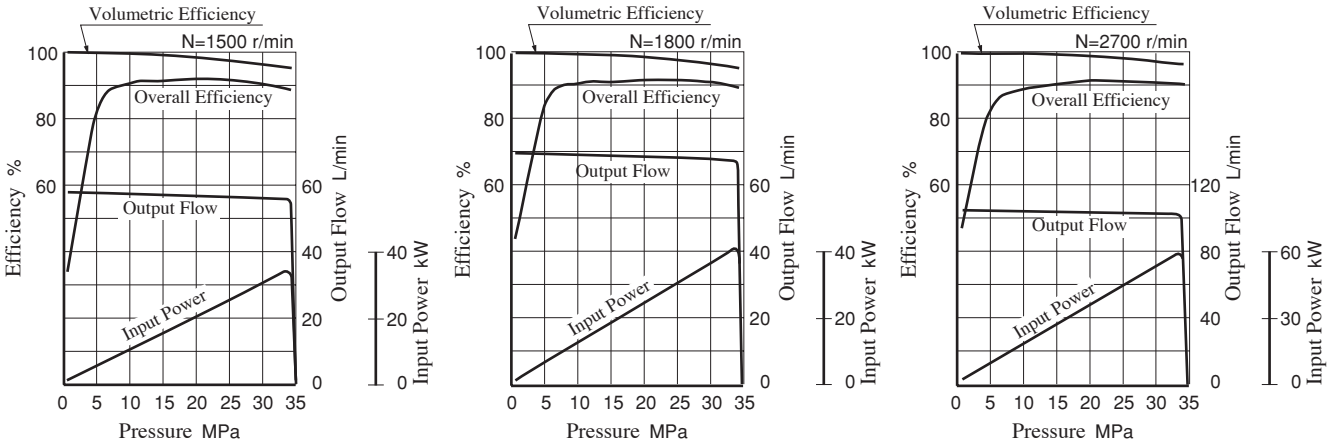


Noise Level [One meter horizontally away from pump head cover]

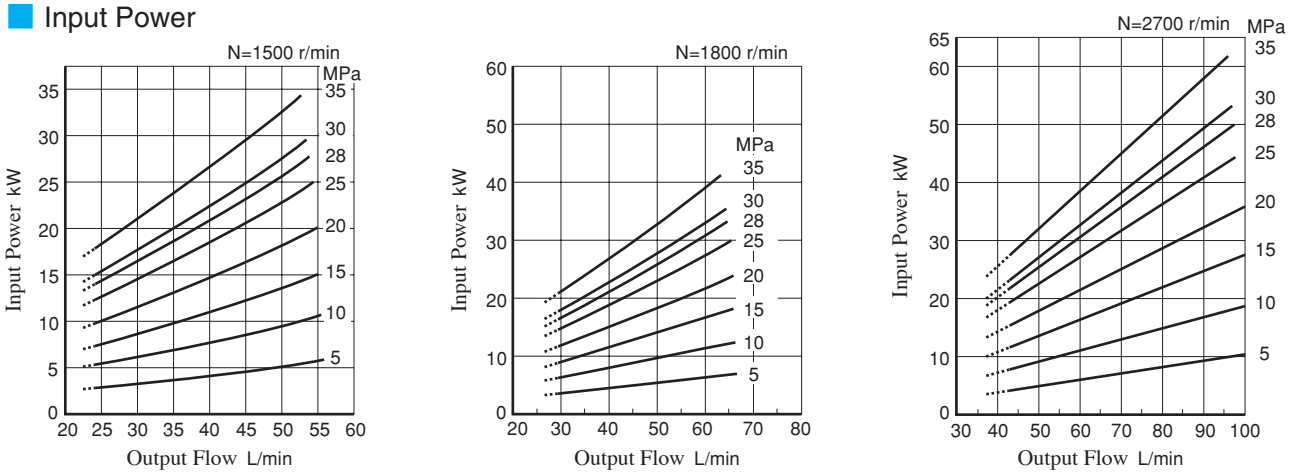


Typical Performance Characteristics of Type **A3HG37** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

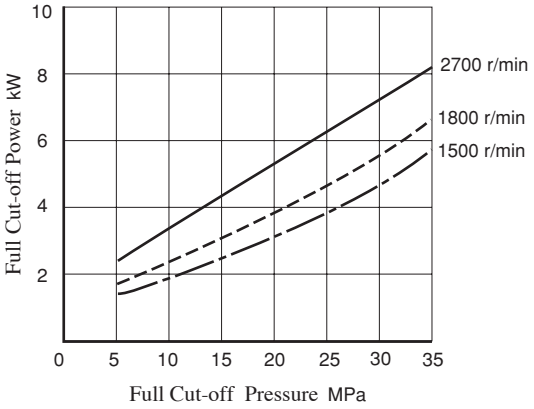


Input Power

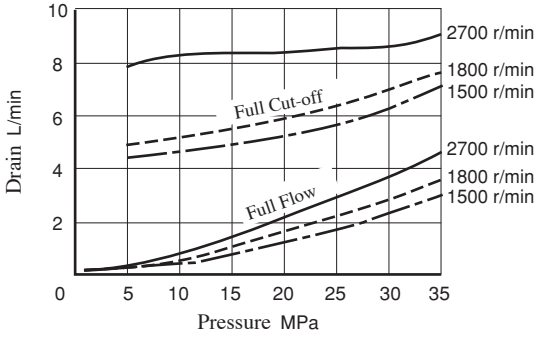


★ The dotted line in the graph indicates less than minimum adjustable flow.

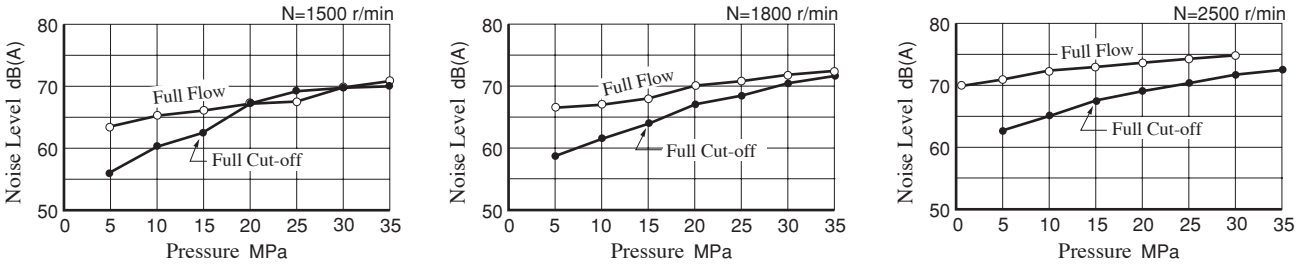
Full Cut-off Power



Drain

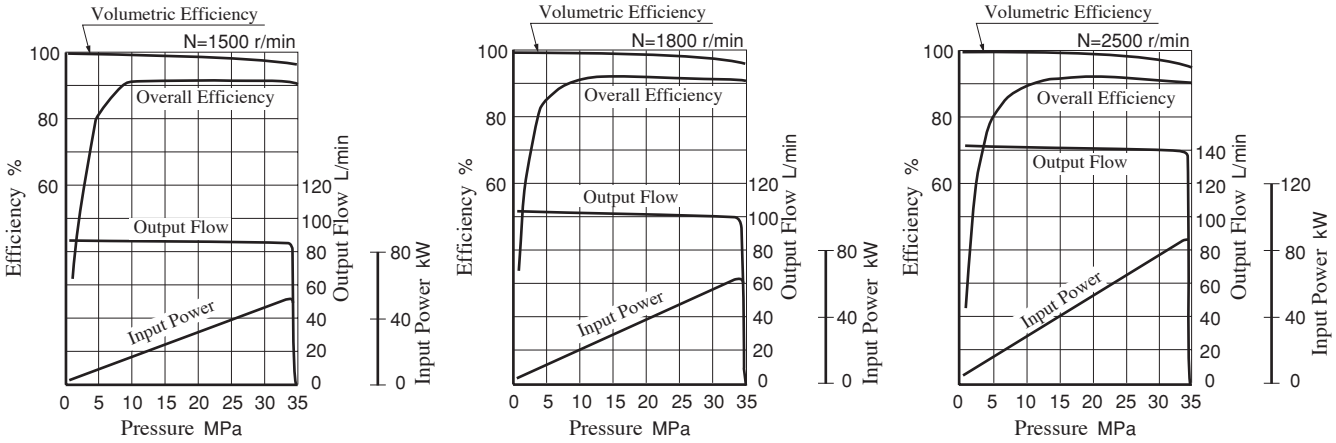


Noise Level [One meter horizontally away from pump head cover]

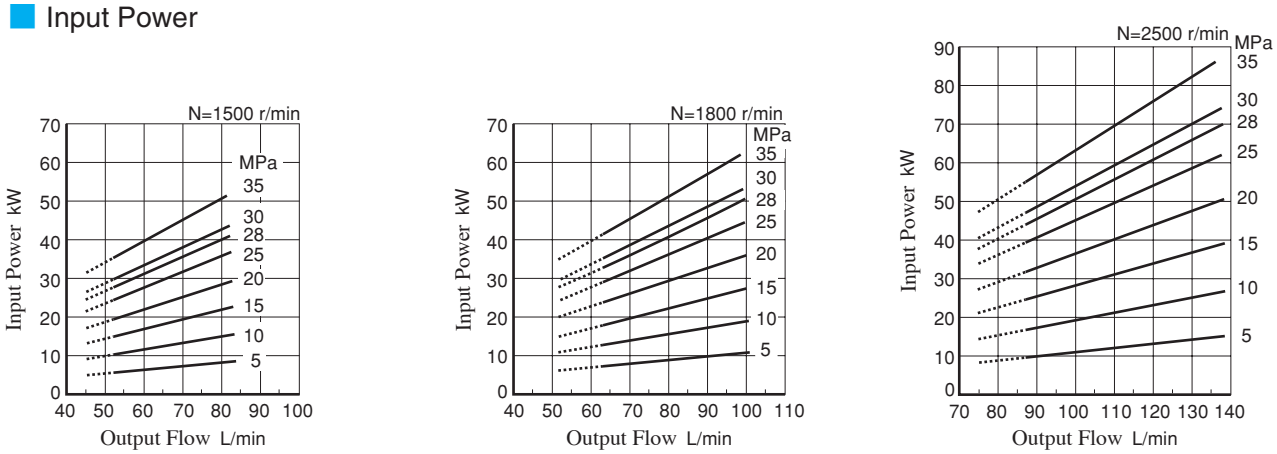


Typical Performance Characteristics of Type **A3HG56** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

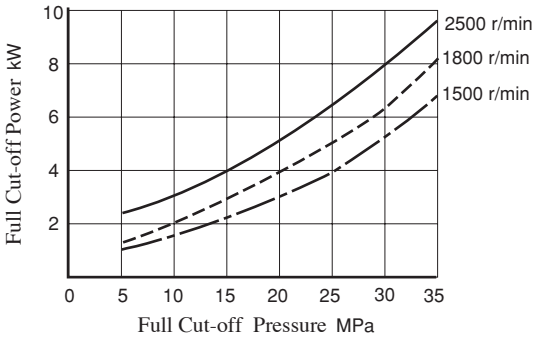


Input Power

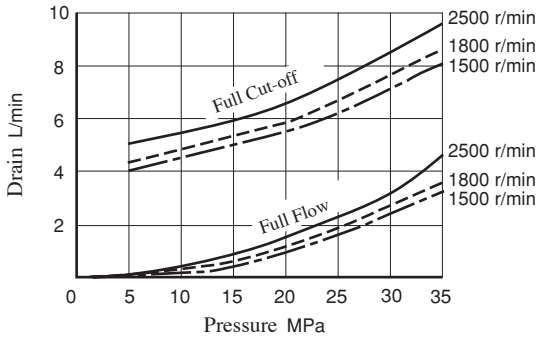


★ The dotted line in the graph indicates less than minimum adjustable flow.

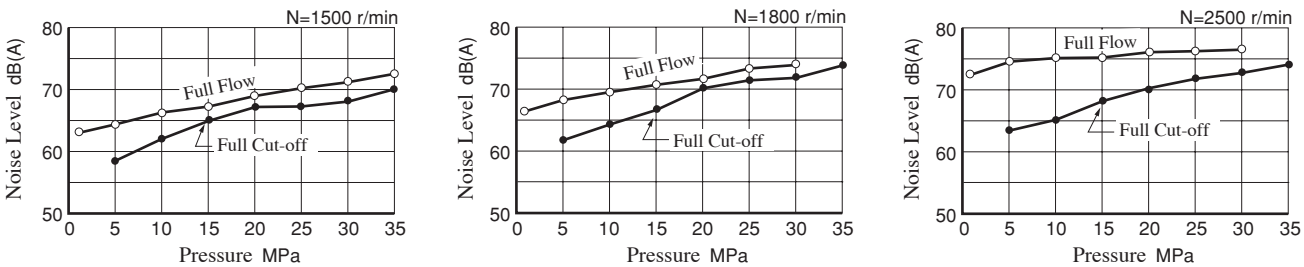
Full Cut-off Power



Drain

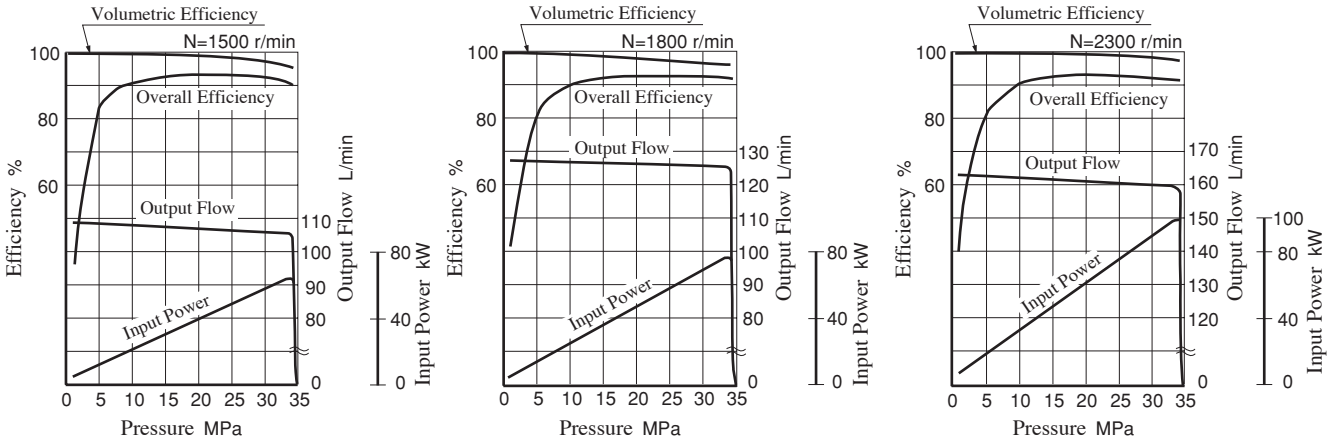


Noise Level [One meter horizontally away from pump head cover]

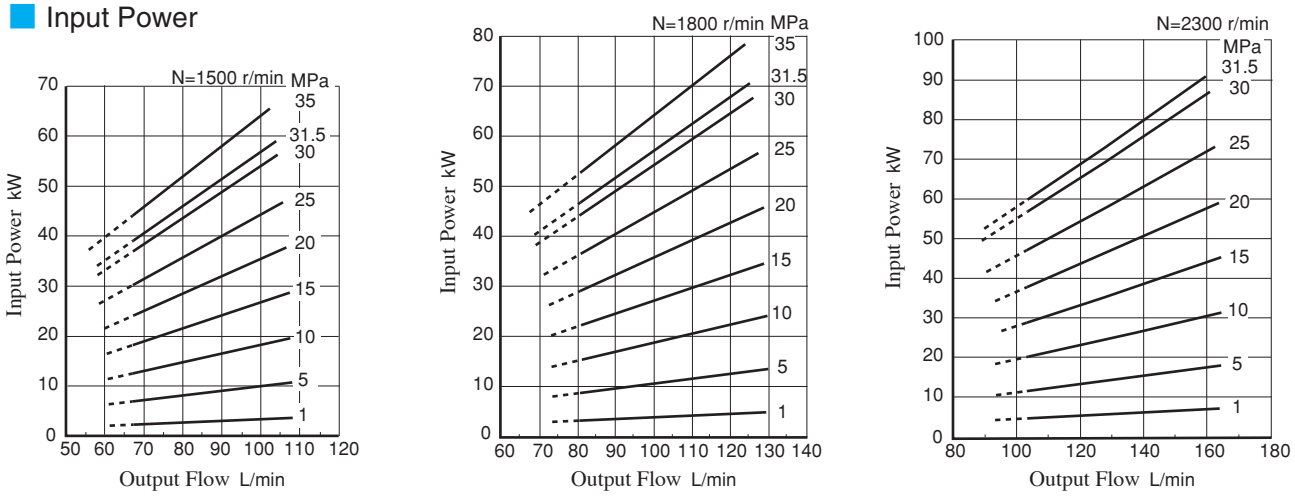


Typical Performance Characteristics of Type **A3HG71** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

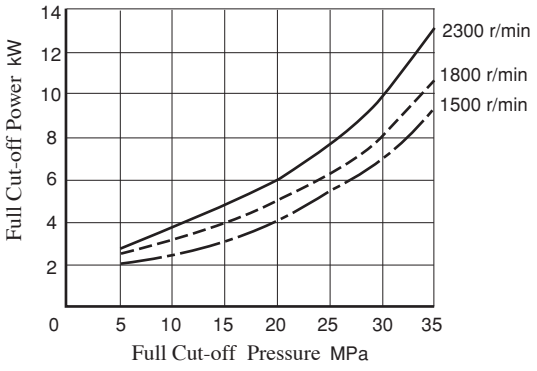


Input Power

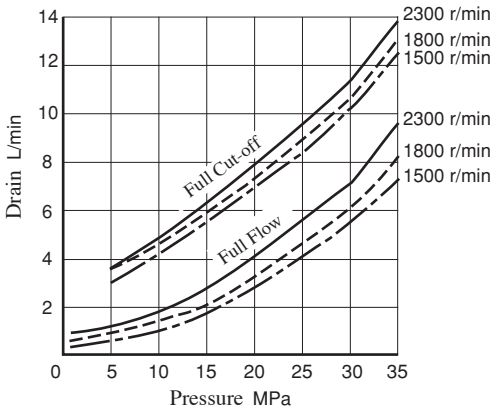


★ The dotted line in the graph indicates less than minimum adjustable flow.

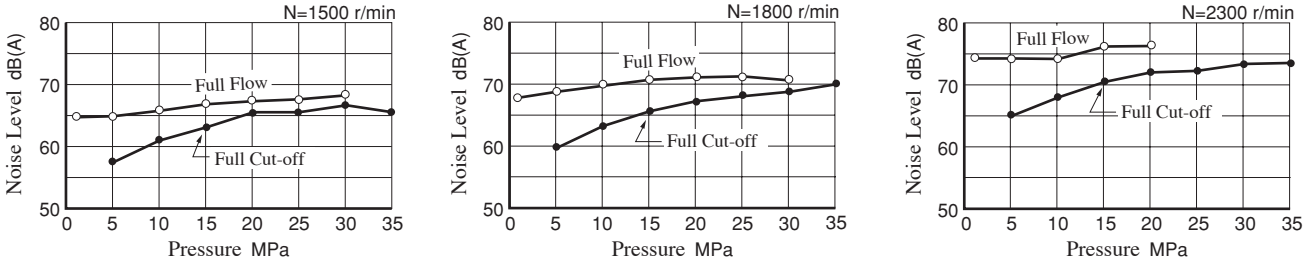
Full Cut-off Power



Drain

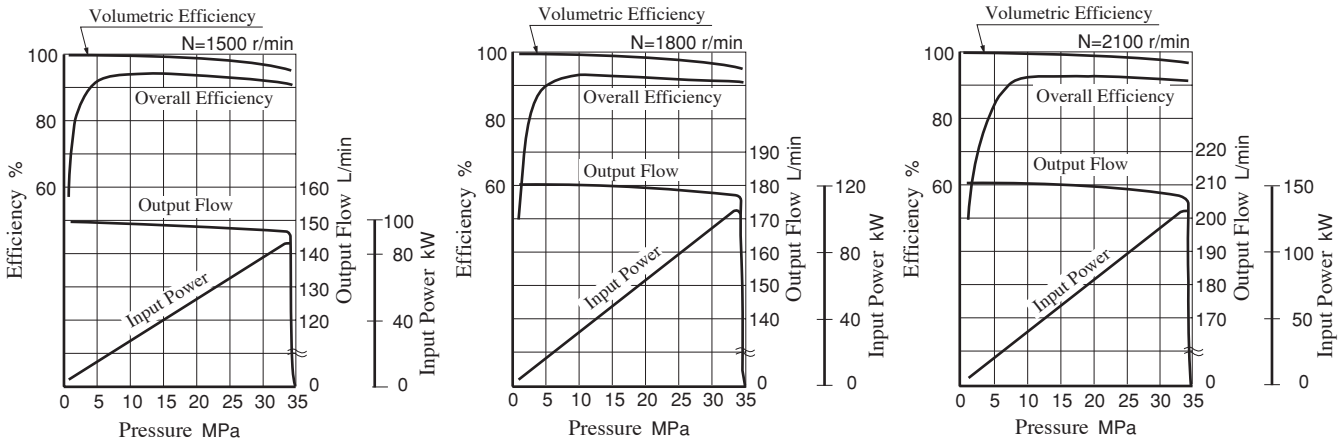


Noise Level [One meter horizontally away from pump head cover]

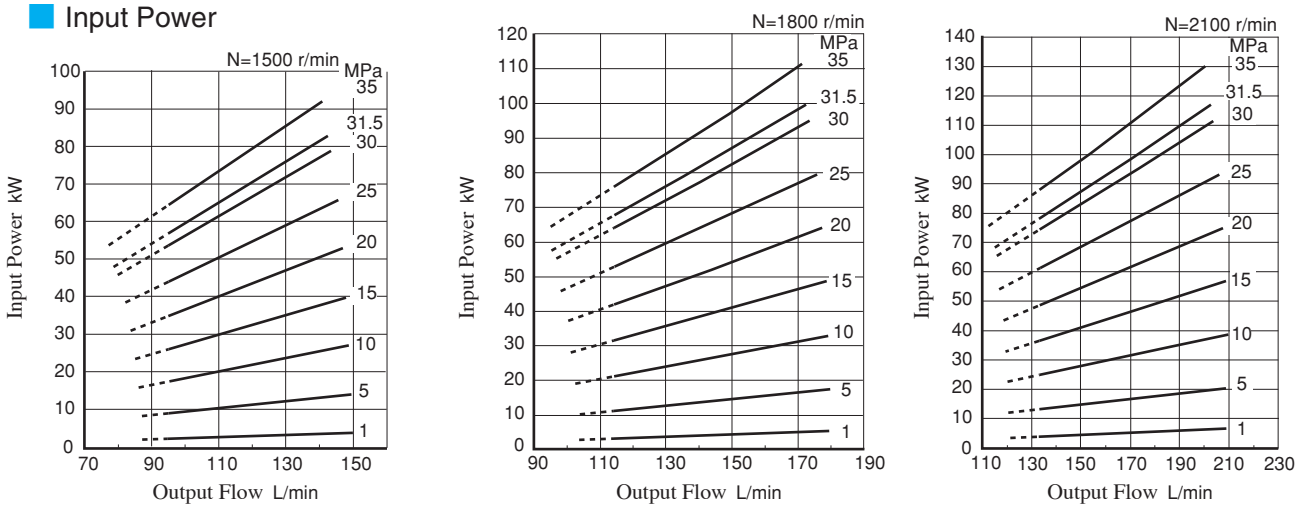


Typical Performance Characteristics of Type **A3HG100** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

Performance Characteristic Curve

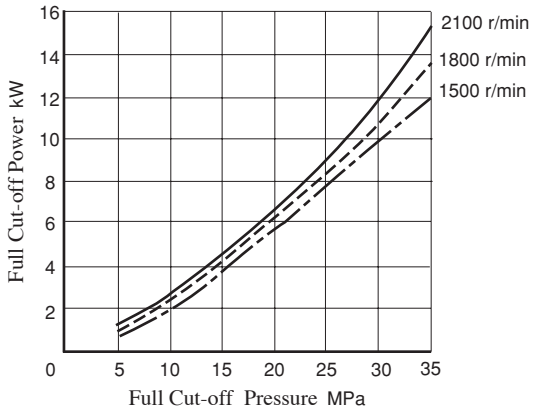


Input Power

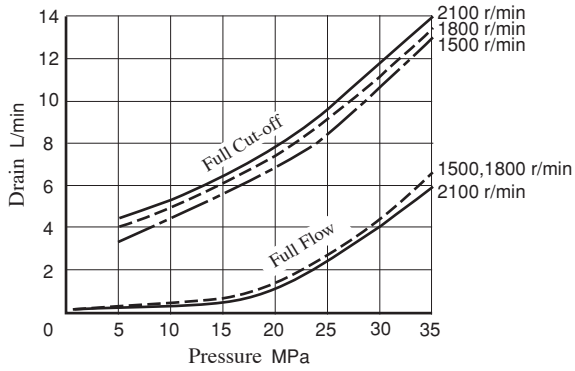


★ The dotted line in the graph indicates less than minimum adjustable flow.

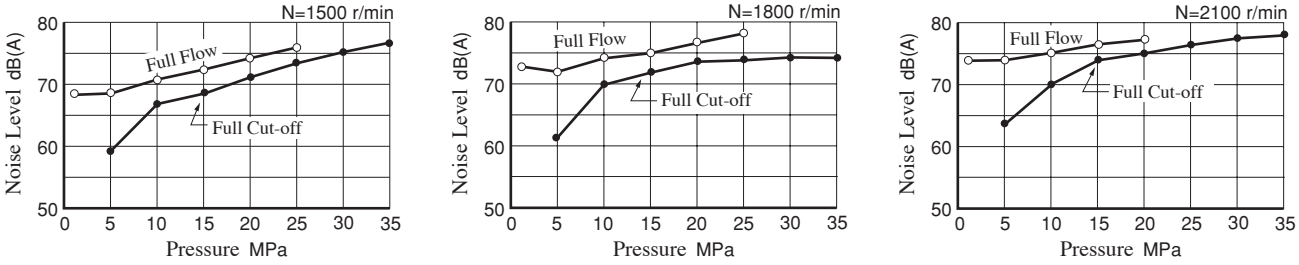
Full Cut-off Power



Drain

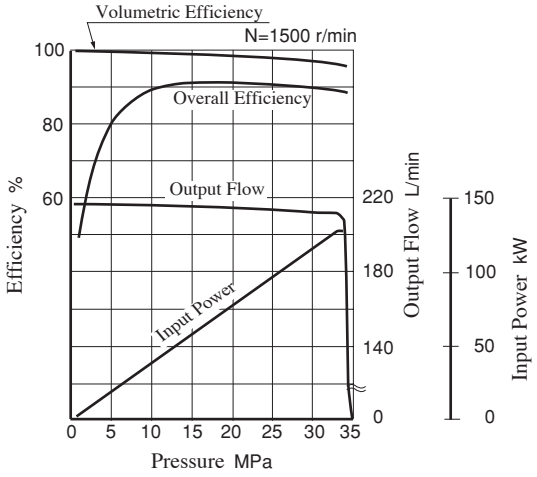


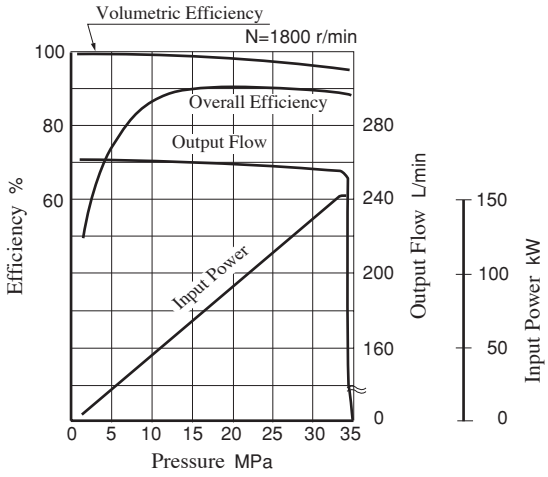
Noise Level [One meter horizontally away from pump head cover]



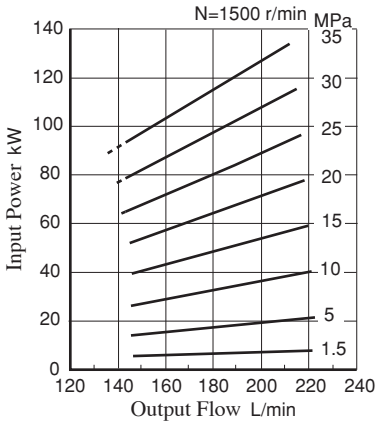
Typical Performance Characteristics of Type **A3HG145** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

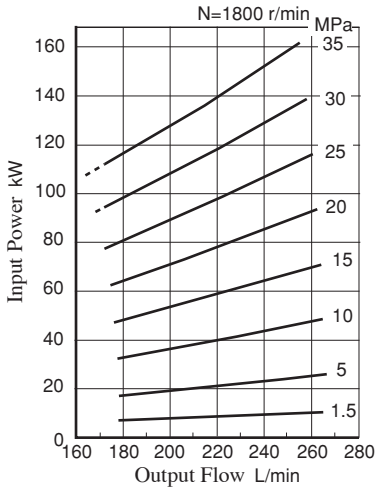
Performance Characteristic Curve





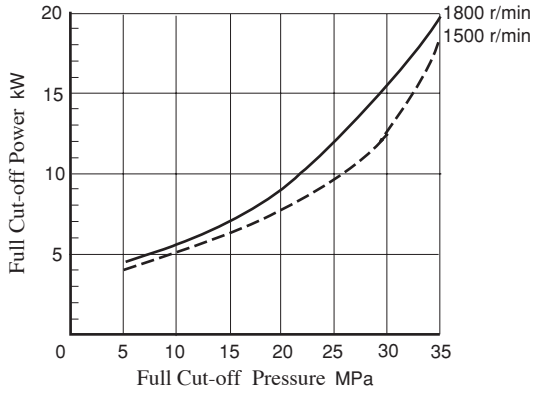
Input Power



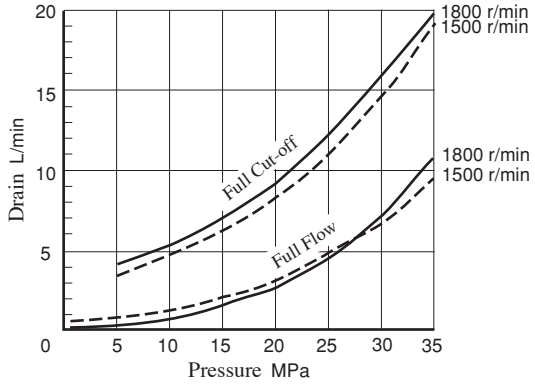


★ The dotted line in the graph indicates less than minimum adjustable flow.

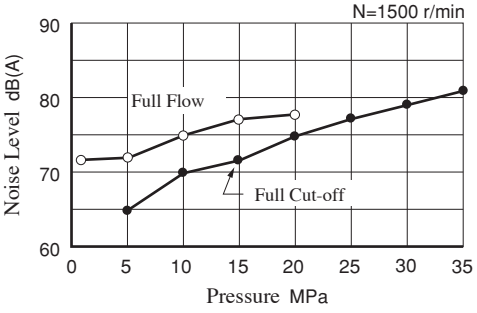
Full Cut-off Power

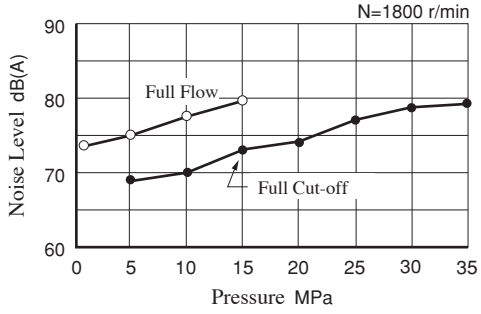


Drain



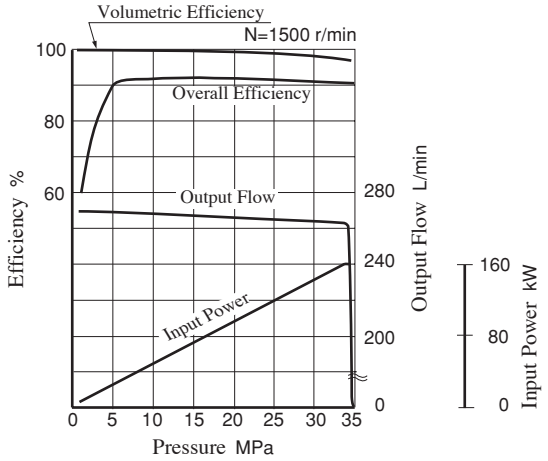
Noise Level [One meter horizontally away from pump head cover]

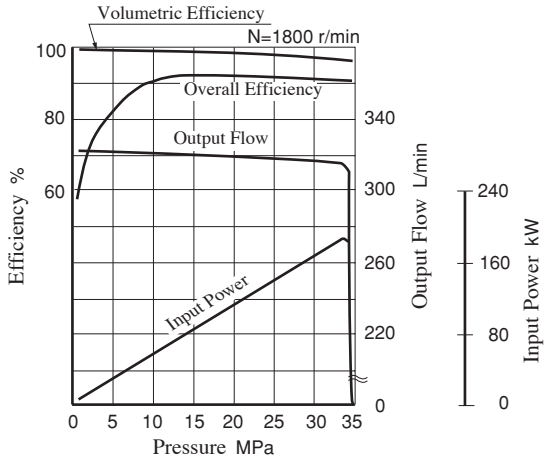




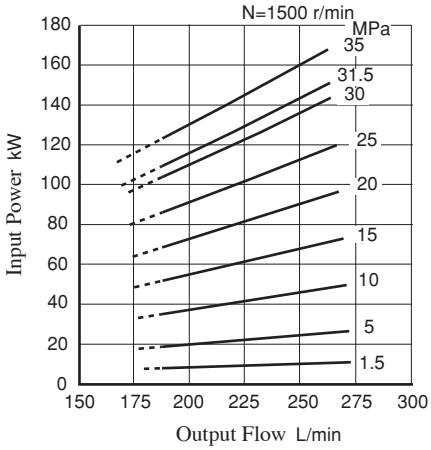
Typical Performance Characteristics of Type **A3HG180** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

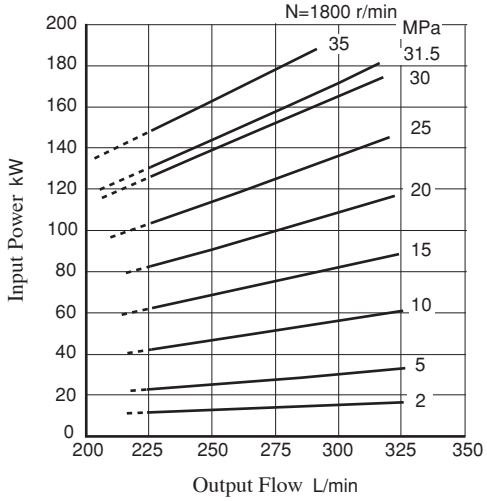
Performance Characteristic Curve





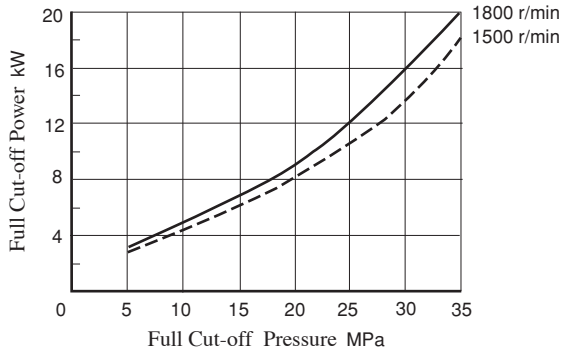
Input Power



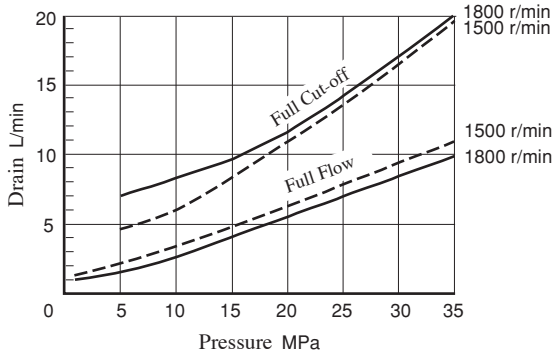


★ The dotted line in the graph indicates less than minimum adjustable flow.

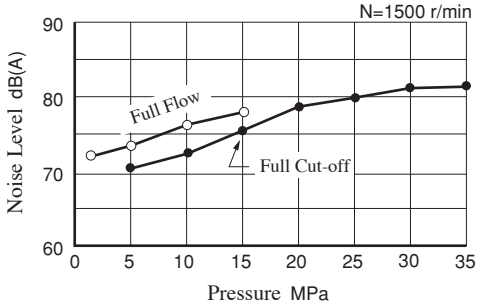
Full Cut-off Power

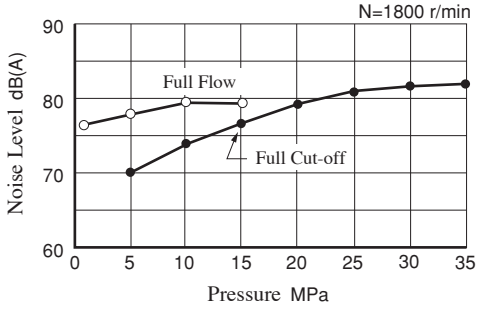


Drain

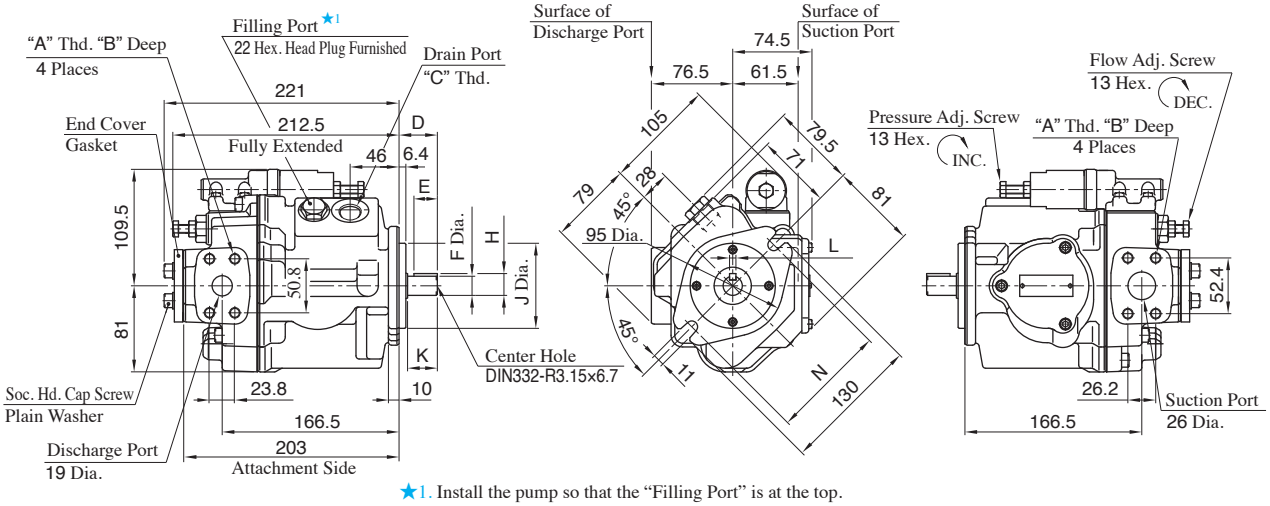


Noise Level [One meter horizontally away from pump head cover]





Flange Mtg.:A3HG16-FR01KK-E1C/U1C/U2C/J1C



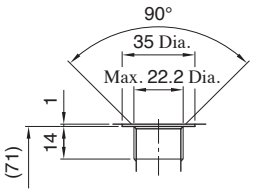
★1. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG16-FR01KK-E1C	M10	19	M22×1.5	36	22	$18^{+0.008}_{-0.003}$	$20.5^{+0.008}_{-0.133}$	$80^{0}_{-0.046}$	28	$6^{0}_{-0.03}$	109	Conforms to ISO 3019-2	Metric	Metric
A3HG16-FR01KK-U1C	3/8-16 UNC	17	G 1/2	41	28	$19.05^{0}_{-0.03}$	$21.24^{0}_{-0.16}$	$82.55^{0}_{-0.05}$	33	$4.76^{+0.03}_{0}$	106	Conforms to ISO 3019-1	Unified	Unified
A3HG16-FR01KK-U2C	M10	19	G 1/2	41	28	$19.05^{0}_{-0.03}$	$21.24^{0}_{-0.16}$	$82.55^{0}_{-0.05}$	33	$4.76^{+0.03}_{0}$	106	Conforms to ISO 3019-1	BSPP	Metric
A3HG16-FR01KK-J1C	M10	19	G 1/2	41	28	$19.05^{0}_{-0.03}$	$21.24^{0}_{-0.16}$	$82.55^{0}_{-0.05}$	33	$4.76^{+0.03}_{0}$	106	Conforms to ISO 3019-1	Rc	Metric

Drain Port

For port/flange code "U1/J1", adapter and bonded seal are attached. After installing the bonded seal at the drain port tighten the adapter.

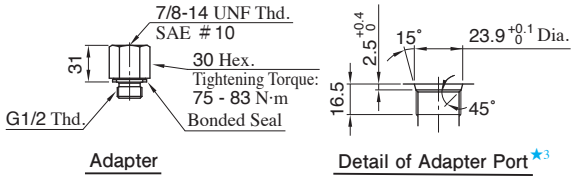
Detail:A3HG16-FR01KK-E1C



Detail of Drain Port ★2

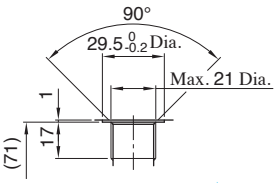
★2. Drain port conforms to ISO 9974-1, metric threads.

Accessories:A3HG16-FR01KK-U1C



★3. Adapter port conforms to SAE J 514, O-ring seals.

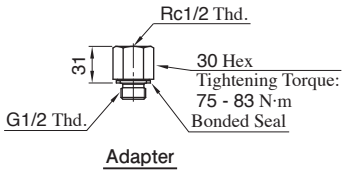
Detail:A3HG16-FR01KK-U2C



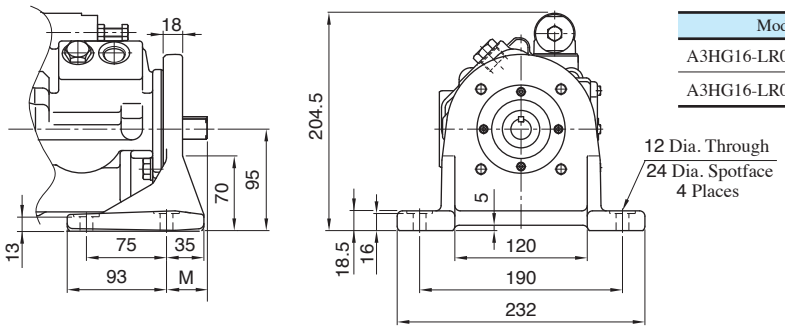
Detail of Drain Port ★4

★4. Drain port conforms to ISO 1179-1, BSPP threads.

Accessories:A3HG16-FR01KK-J1C



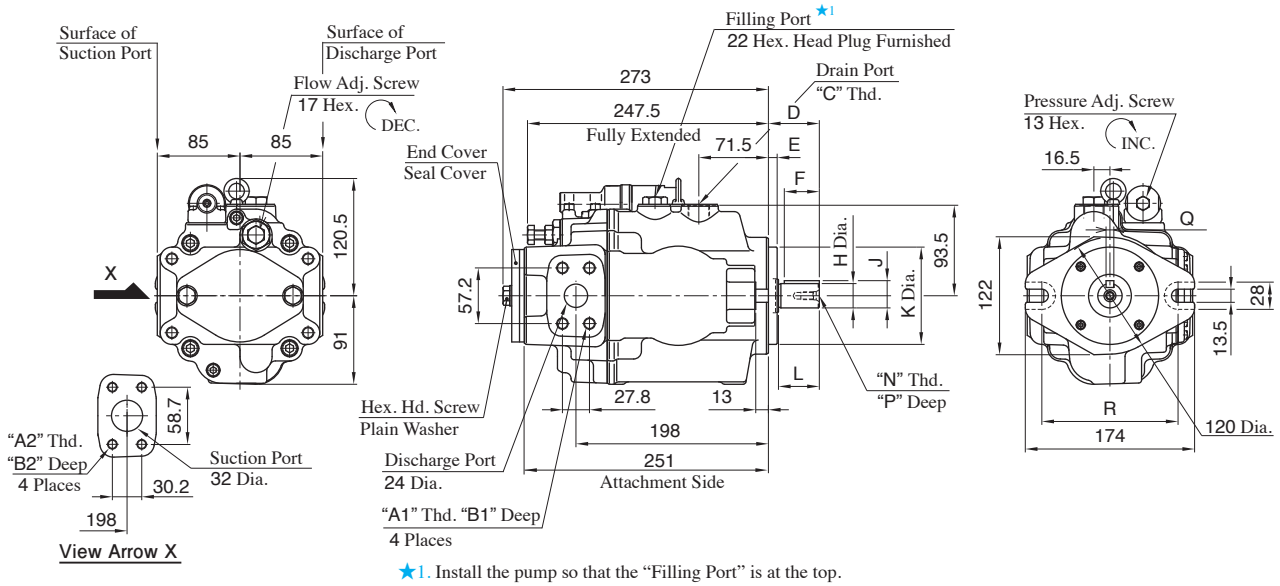
Foot Mtg.:A3HG16-LR01KK-E1C/U1C/U2C/J1C



Model Numbers	M
A3HG16-LR01KK-E1C	33
A3HG16-LR01KK-U1C/U2C/J1C	38

● For other dimensions, refer to "Flange Mtg.".

Flange Mtg. Two Bolts:A3HG37-FR01KK-E1C/E2C/U1C/U2C/J1C



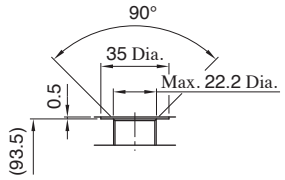
★1. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	R	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG37-FR01KK-E1C/E2C	M12	M10	22	18	M22×1.5	52	9	36	25 $^{+0.009}_{-0.004}$	28 $^{+0.009}_{-0.294}$	100 $^{0}_{-0.054}$	42	M8	19	8 $^{0}_{-0.036}$	140	Conforms to ISO 3019-2	Metric	Metric
A3HG37-FR01KK-U1C	7/16-14 UNC		20		G 1/2	46	9.7	32	25.4 $^{0}_{-0.05}$	28.18 $^{0}_{-0.18}$	101.6 $^{0}_{-0.05}$	38	1/4-20 UNC	16	6.35 $^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Unified	Unified
A3HG37-FR01KK-U2C	M12	M10	22	18	G 1/2	46	9.7	32	25.4 $^{0}_{-0.05}$	28.18 $^{0}_{-0.18}$	101.6 $^{0}_{-0.05}$	38		16	6.35 $^{+0.03}_{0}$	146	Conforms to ISO 3019-1	BSPP	Metric
A3HG37-FR01KK-J1C	M12	M10	22	18	G 1/2	46	9.7	32	25.4 $^{0}_{-0.05}$	28.18 $^{0}_{-0.18}$	101.6 $^{0}_{-0.05}$	38		16	6.35 $^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Rc	Metric

Drain Port

For port/flange code "U1/J1", adapter and bonded seal are attached. After installing the bonded seal at the drain port tighten the adapter.

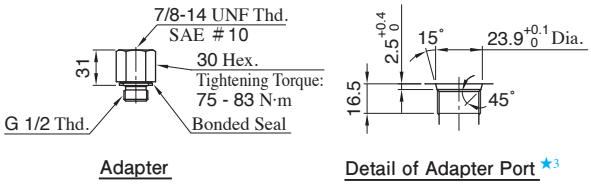
Detail:A3HG37-FR01KK-E1C/E2C



Detail of Drain Port ★2

★2. Drain port conforms to ISO 9974-1, metric threads.

Accessories:A3HG37-FR01KK-U1C

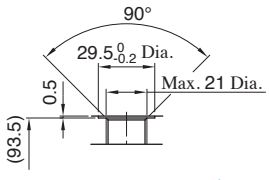


Adapter

Detail of Adapter Port ★3

★3. Adapter port conforms to SAE J 514, O-ring seals.

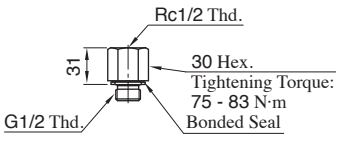
Detail:A3HG37-FR01KK-U2C



Detail of Drain Port ★4

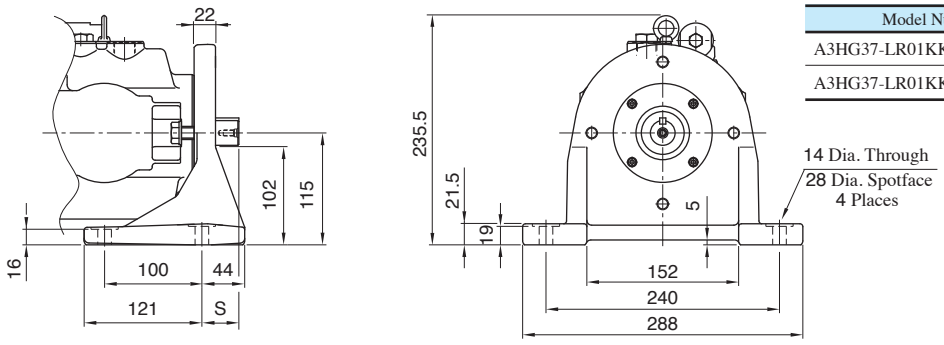
★4. Drain port conforms to ISO 1179-1, BSPP threads.

Accessories:A3HG37-FR01KK-J1C



Adapter

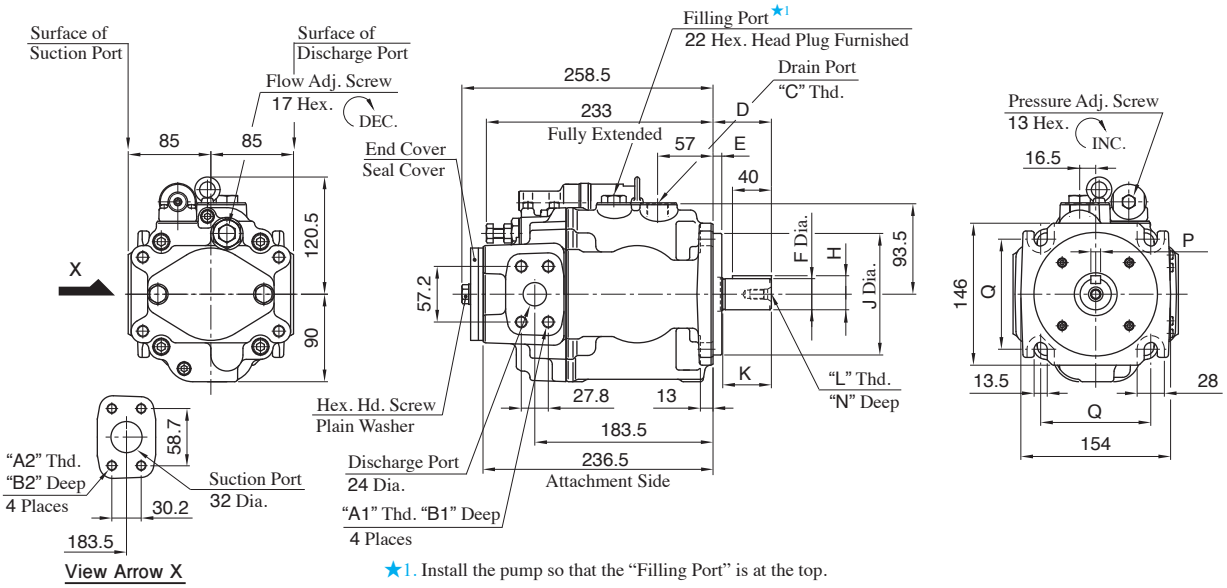
Foot Mtg. Two Bolts:A3HG37-LR01KK-E1C/E2C/U1C/U2C/J1C



Model Numbers	S
A3HG37-LR01KK-E1C/E2C	44
A3HG37-LR01KK-U1C/U2C/J1C	38

● For other dimensions, refer to "Flange Mtg. Two Bolts".

Flange Mtg. Four Bolts:A3HG37-FR01KK-E1D/E2D/U1D/U2D/J1D



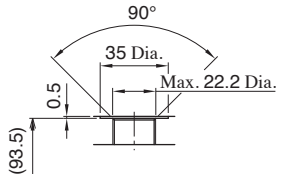
★1. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG37-FR01KK-E1D/E2D	M12	M10	22	18	M22×1.5	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$125^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	113.2	Conforms to ISO 3019-2	Metric	Metric
A3HG37-FR01KK-U1D	7/16-14 UNC		20		G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Unified	Unified
A3HG37-FR01KK-U2D	M12	M10	22	18	G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	BSPP	Metric
A3HG37-FR01KK-J1D	M12	M10	22	18	G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Rc	Metric

Drain Port

For port/flange code "U1/J1", adapter and bonded seal are attached. After installing the bonded seal at the drain port tighten the adapter.

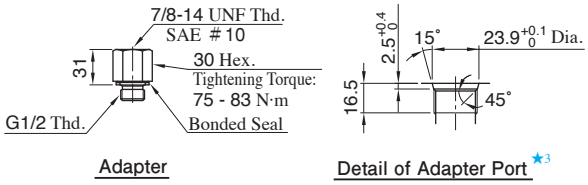
Detail:A3HG37-FR01KK-E1D/E2D



Detail of Drain Port ★2

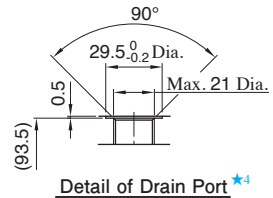
★2. Drain port conforms to ISO 9974-1, metric threads.

Accessories:A3HG37-FR01KK-U1D



★3. Adapter port conforms to SAE J 514, O-ring seals.

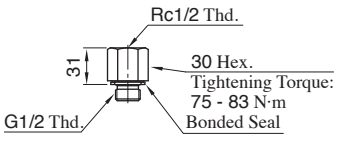
Detail:A3HG37-FR01KK-U2D



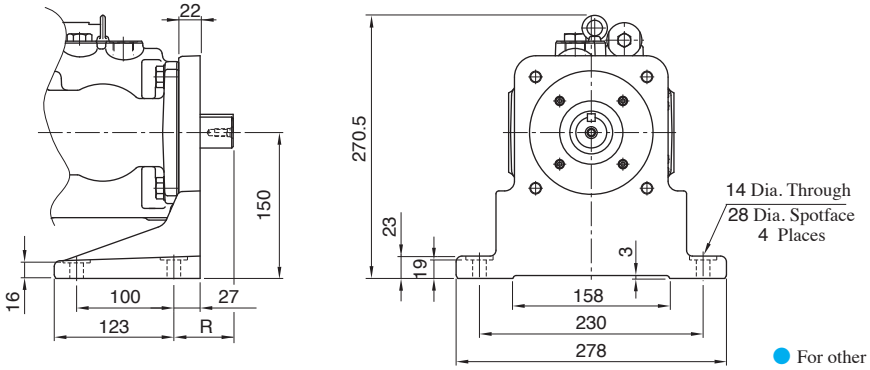
Detail of Drain Port ★4

★4. Drain port conforms to ISO 1179-1, BSPP threads.

Accessories:A3HG37-FR01KK-J1D



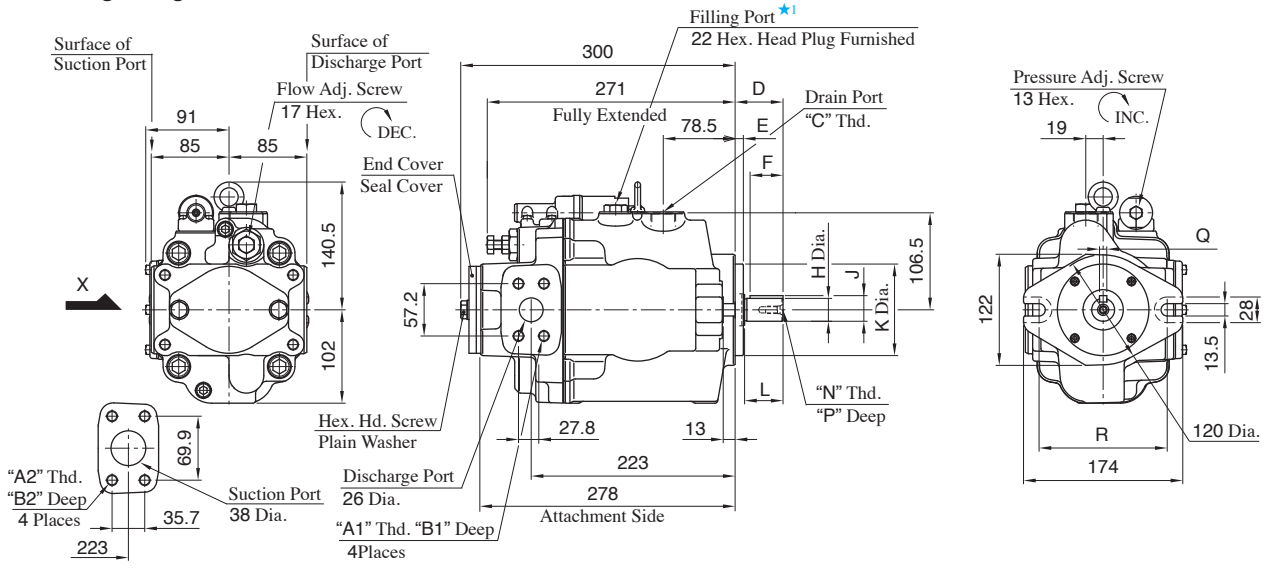
Foot Mtg. Four Bolts:A3HG37-LR01KK-E1D/E2D/U1D/U2D/J1D



Model Numbers	R
A3HG37-LR01KK-E1D/E2D	65
A3HG37-LR01KK-U1D/U2D/J1D	61

● For other dimensions, refer to "Flange Mtg. Four Bolts".

Flange Mtg. Two Bolts:A3HG56-FR01KK-E1C/E2C/U1C/U2C/J1C



View Arrow X

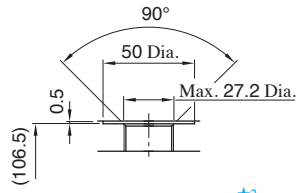
★1. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	R	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG56-FR01KK-E1C/E2C	M12	M12	22	22	M27X2	52	9	36	25 $^{+0.009}_{-0.004}$	28 $^{+0.009}_{-0.294}$	100 $^{0}_{-0.054}$	42	M8	19	8 $^{0}_{-0.036}$	140	Conforms to ISO 3019-2	Metric	Metric
A3HG56-FR01KK-U1C	7/16-14 UNC	1/2-13UNC	20	21	G 3/4	46	9.7	32	25.4 $^{0}_{-0.05}$	28.18 $^{0}_{-0.18}$	101.6 $^{0}_{-0.05}$	38	1/4-20 UNC	16	6.35 $^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Unified	Unified
A3HG56-FR01KK-U2C	M12	M12	22	22	G 3/4	46	9.7	32	25.4 $^{0}_{-0.05}$	28.18 $^{0}_{-0.18}$	101.6 $^{0}_{-0.05}$	38		16	6.35 $^{+0.03}_{0}$	146	Conforms to ISO 3019-1	BSPP	Metric
A3HG56-FR01KK-J1C	M12	M12	22	22	G 3/4	46	9.7	32	25.4 $^{0}_{-0.05}$	28.18 $^{0}_{-0.18}$	101.6 $^{0}_{-0.05}$	38		16	6.35 $^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Rc	Metric

Drain Port

For port/flange code "U1/J1", adapter and bonded seal are attached. After installing the bonded seal at the drain port tighten the adapter.

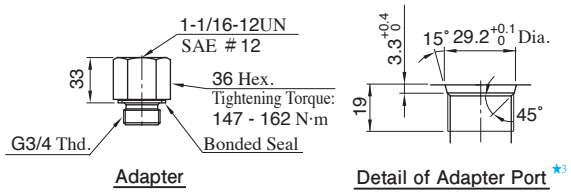
Detail:A3HG56-FR01KK-E1C/E2C



Detail of Drain Port ★2

★2. Drain port conforms to ISO 9974-1, metric threads.

Accessories:A3HG56-FR01KK-U1C

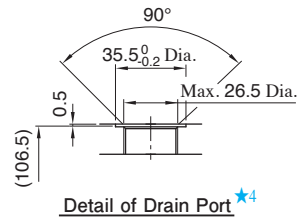


Adapter

Detail of Adapter Port ★3

★3. Adapter port conforms to SAE J 514, O-ring seals.

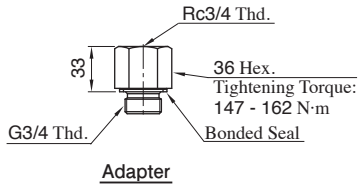
Detail:A3HG56-FR01KK-U2C



Detail of Drain Port ★4

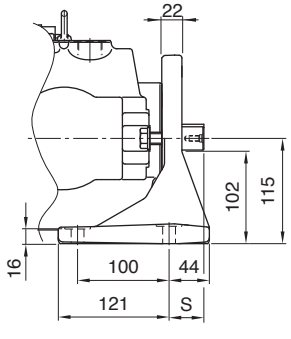
★4. Drain port conforms to ISO 1179-1, BSPP threads.

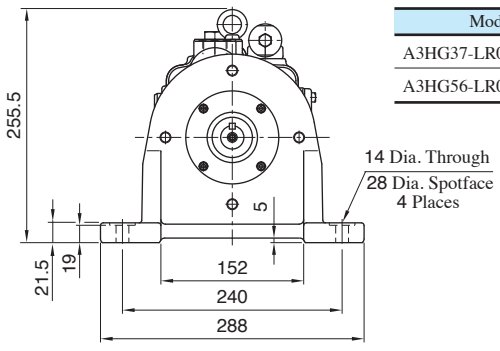
Accessories:A3HG56-FR01KK-J1C



Adapter

Foot Mtg. Two Bolts:A3HG56-LR01KK-E1C/E2C/U1C/U2C/J1C

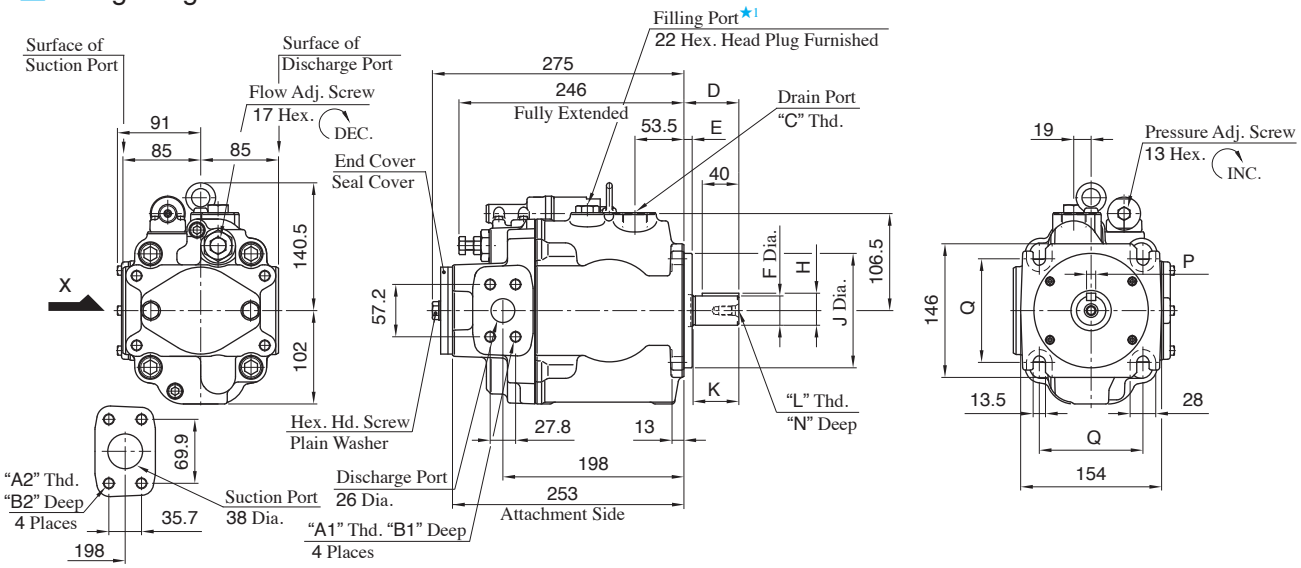




Model Numbers	S
A3HG37-LR01KK-E1C/E2C	44
A3HG56-LR01KK-U1C/U2C/J1C	38

● For other dimensions, refer to "Flange Mtg. Two Bolts".

Flange Mtg. Four Bolts:A3HG56-FR01KK-E1D/E2D/U1D/U2D/J1D



View Arrow X

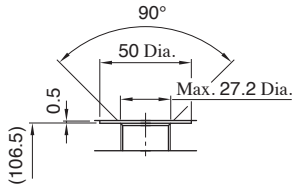
★1. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG56-FR01KK-E1D/E2D	M12	M12	22	22	M27X2	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$125^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	113.2	Conforms to ISO 3019-2	Metric	Metric
A3HG56-FR01KK-U1D	7/16-14 UNC	1/2-13UNC	20	21	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Unified	Unified
A3HG56-FR01KK-U2D	M12	M12	22	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	BSPP	Metric
A3HG56-FR01KK-J1D	M12	M12	22	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Rc	Metric

Drain Port

For port/flange code "U1/J1", adapter and bonded seal are attached. After installing the bonded seal at the drain port tighten the adapter.

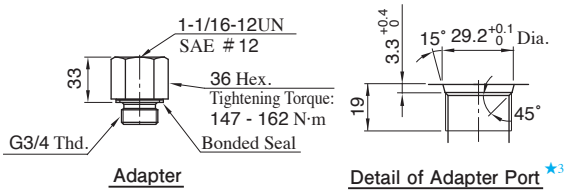
Detail:A3HG56-FR01KK-E1D/E2D



Detail of Drain Port ★2

★2. Drain port conforms to ISO 9974-1, metric threads.

Accessories:A3HG56-FR01KK-U1D

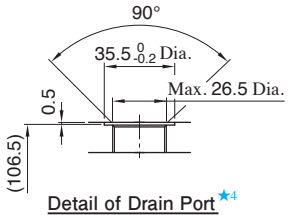


Adapter

Detail of Adapter Port ★3

★3. Adapter port conforms to SAE J 514, O-ring seals.

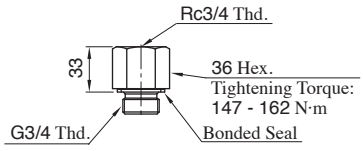
Detail:A3HG56-FR01KK-U2D



Detail of Drain Port ★4

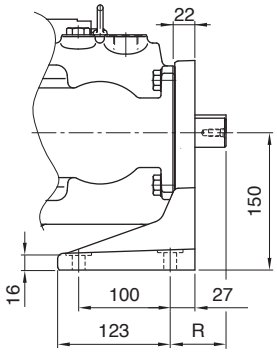
★4. Drain port conforms to ISO 1179-1, BSPP threads.

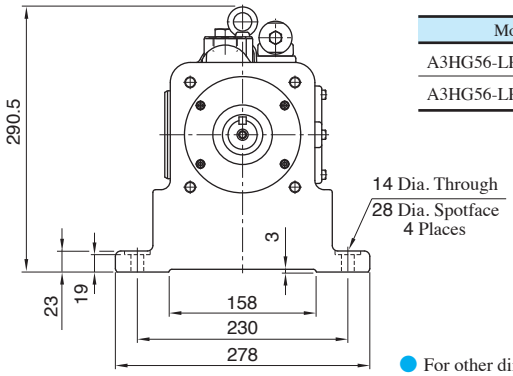
Accessories:A3HG56-FR01KK-J1D



Adapter

Foot Mtg. Four Bolts:A3HG56-LR01KK-E1D/E2D/U1D/U2D/J1D

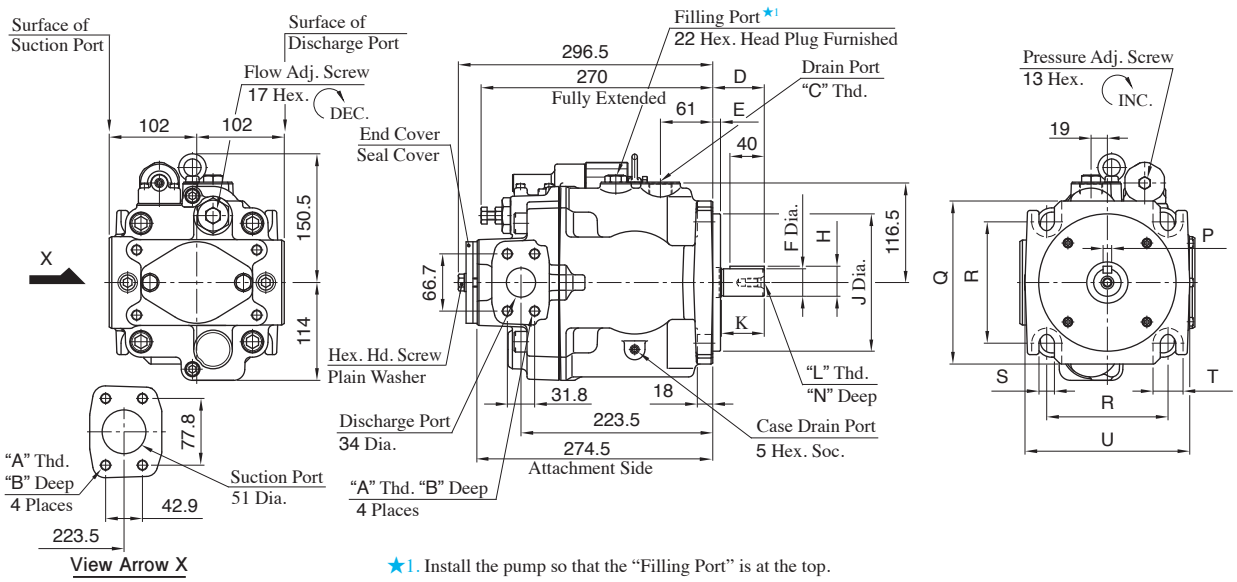




Model Numbers	R
A3HG56-LR01KK-E1D/E2D	65
A3HG56-LR01KK-U1D/U2D/J1D	61

● For other dimensions, refer to "Flange Mtg. Four Bolts".

Flange Mtg.:A3HG71-FR01KK-E1D/E2D/U1D/U2D/J1D



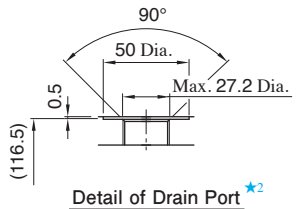
★1. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	U	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG71-FR01KK-E1D/E2D	M12	22	M27X2	60	9	32 $^{+0.018}_{+0.002}$	35 $^{+0.018}_{-0.288}$	160 $^{0}_{-0.063}$	50	M10	22	10 $^{0}_{-0.036}$	190	141.4	18	35	192	Conforms to ISO 3019-2	Metric	Metric
A3HG71-FR01KK-U1D	1/2-13 UNC	21	G 3/4	56	12.7	31.75 $^{0}_{-0.05}$	35.32 $^{0}_{-0.18}$	127 $^{0}_{-0.05}$	48		19	7.94 $^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	Unified	Unified
A3HG71-FR01KK-U2D	M12	22	G 3/4	56	12.7	31.75 $^{0}_{-0.05}$	35.32 $^{0}_{-0.18}$	127 $^{0}_{-0.05}$	48	5/16-18 UNC	19	7.94 $^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	BSPP	Metric
A3HG71-FR01KK-J1D	M12	22	G 3/4	56	12.7	31.75 $^{0}_{-0.05}$	35.32 $^{0}_{-0.18}$	127 $^{0}_{-0.05}$	48		19	7.94 $^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	Rc	Metric

Drain Port

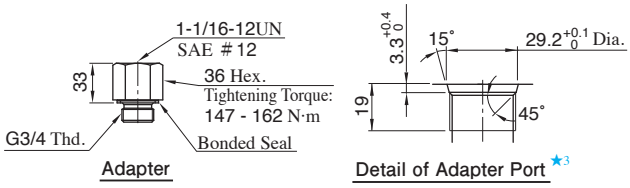
For port/flange code "U1/J1", adapter and bonded seal are attached. After installing the bonded seal at the drain port tighten the adapter.

Detail:A3HG71-FR01KK-E1D/E2D



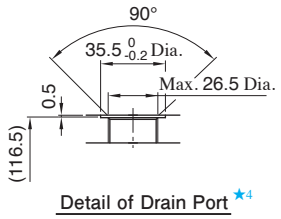
★2. Drain port conforms to ISO 9974-1, metric threads.

Accessories:A3HG71-FR01KK-U1D



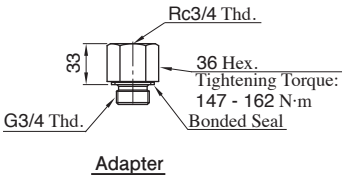
★3. Adapter port conforms to SAE J 514, O-ring seals.

Detail:A3HG71-FR01KK-U2D

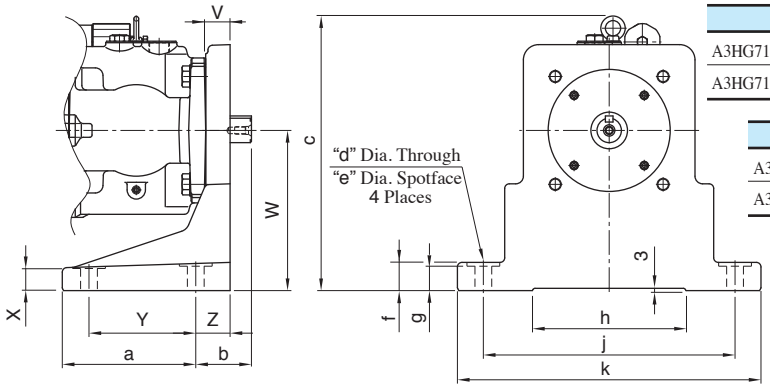


★4. Drain port conforms to ISO 1179-1, BSPP threads.

Accessories:A3HG71-FR01KK-J1D



Foot Mtg.:A3HG71-LR01KK-E1D/E2D/U1D/U2D/J1D

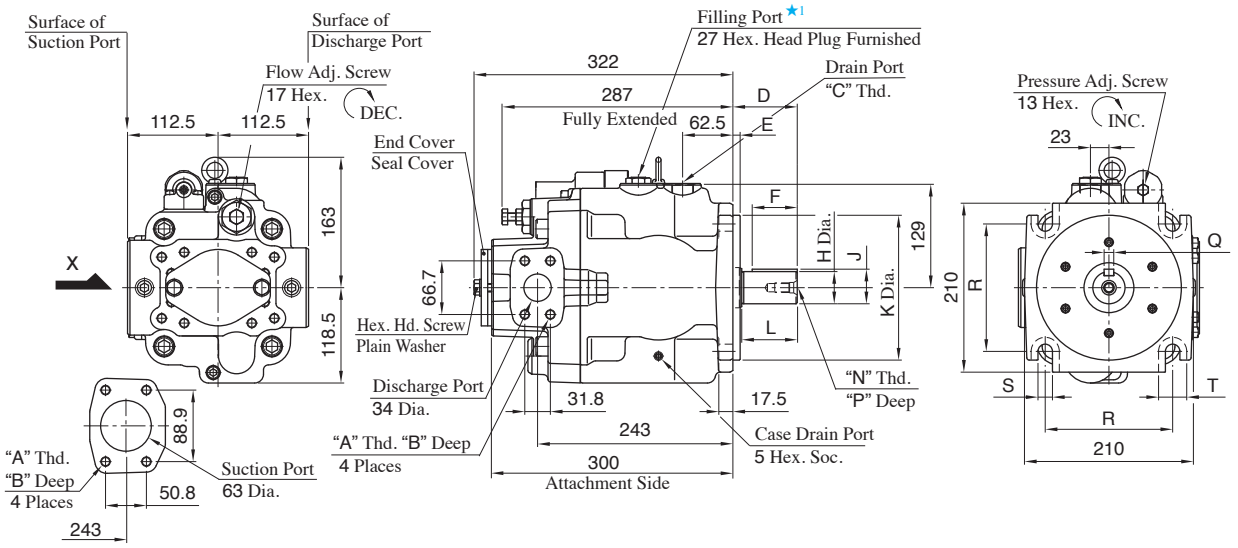


Model Numbers	V	W	X	Y	Z	a	b	c
A3HG71-LR01KK-E1D/E2D	32	210	29	140	45	175	73	360.5
A3HG71-LR01KK-U1D/U2D/J1D	22	150	16	100	27	123	61	300.5

Model Numbers	d	e	f	g	h	j	k
A3HG71-LR01KK-E1D/E2D	22	43	37	32	198	330	398
A3HG71-LR01KK-U1D/U2D/J1D	14	28	23	19	158	230	278

● For other dimensions, refer to "Flange Mtg.".

Flange Mtg.:A3HG100-FR01KK-E1D/E2D/U1D/U2D/J1D



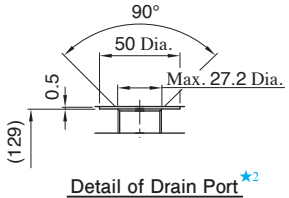
★1. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG100-FR01KK-E1D/E2D	M12	22	M27X2	80	9	56	$40^{+0.018}_{+0.002}$	$43^{+0.018}_{-0.288}$	$180^{0}_{-0.063}$	70	M12	28	$12^{0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG100-FR01KK-U1D	1/2-13 UNC	21	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54	7/16-14 UNC	28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG100-FR01KK-U2D	M12	22	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54		28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG100-FR01KK-J1D	M12	22	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54		28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Drain Port

For port/flange code "U1/J1", adapter and bonded seal are attached. After installing the bonded seal at the drain port tighten the adapter.

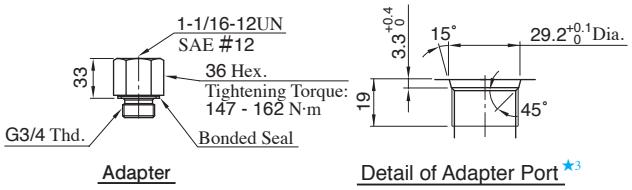
Detail:A3HG100-FR01KK-E1D/E2D



Detail of Drain Port ★2

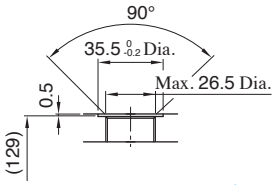
★2. Drain port conforms to ISO 9974-1, metric threads.

Accessories:A3HG100-FR01KK-U1D



★3. Adapter port conforms to SAE J 514, O-ring seals.

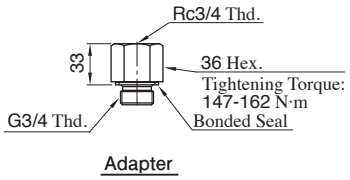
Detail:A3HG100-FR01KK-U2D



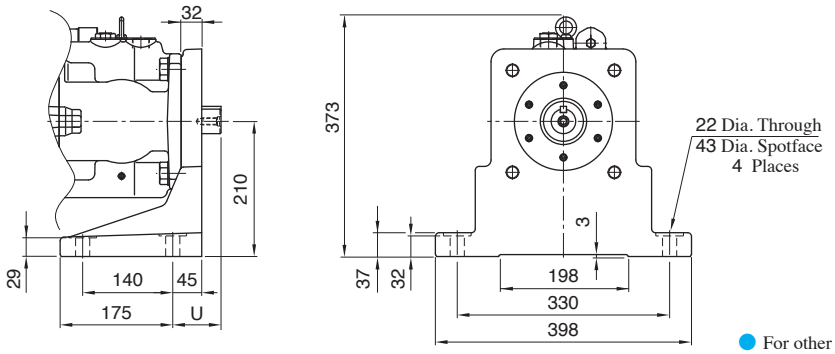
Detail of Drain Port ★4

★4. Drain port conforms to ISO 1179-1, BSPP threads.

Accessories:A3HG100-FR01KK-J1D



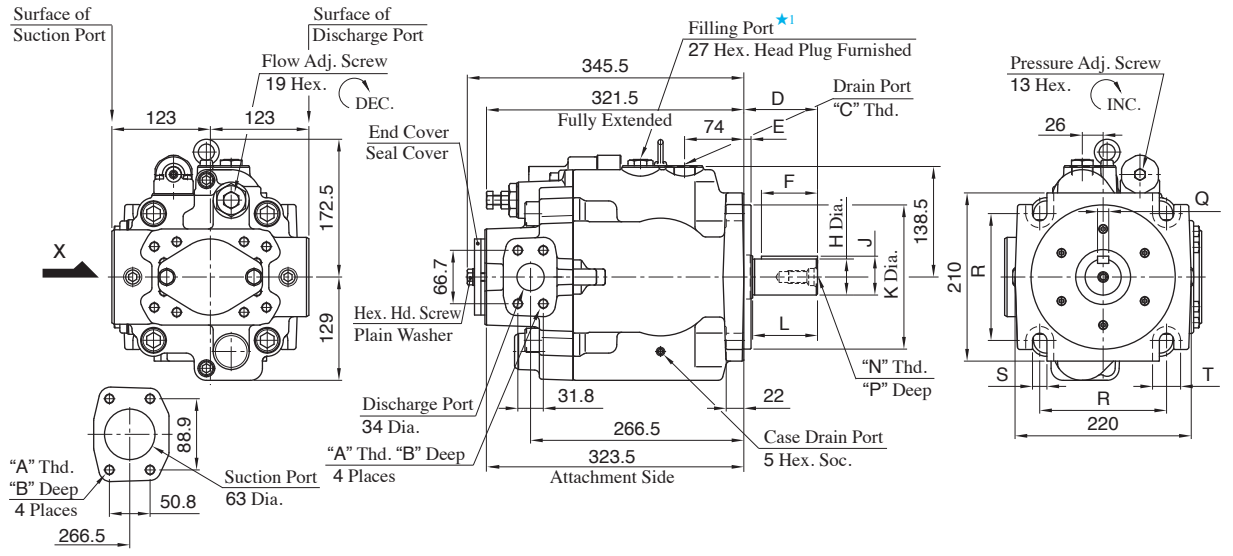
Foot Mtg.:A3HG100-LR01KK-E1D/E2D/U1D/U2D/J1D



Model Numbers	U
A3HG100-LR01KK-E1D/E2D	93
A3HG100-LR01KK-U1D/U2D/J1D	75

● For other dimensions, refer to "Flange Mtg.".

Flange Mtg.:A3HG145-FR01KK-E1D/E2D/U1D/U2D/J1D



View Arrow X

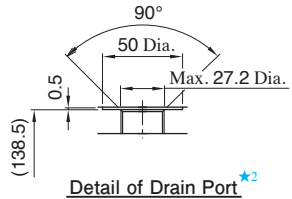
★1. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG145-FR01KK-E1D/E2D	M12	22	M27X2	92	9	70	$45^{+0.018}_{+0.002}$	$48.5^{+0.018}_{-0.288}$	$180^{\ 0}_{-0.063}$	82	M16	36	$14^{\ 0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG145-FR01KK-U1D	1/2-13 UNC	21	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67		32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG145-FR01KK-U2D	M12	22	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67	1/2-13 UNC	32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG145-FR01KK-J1D	M12	22	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67		32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Drain Port

For port/flange code "U1/J1", adapter and bonded seal are attached. After installing the bonded seal at the drain port tighten the adapter.

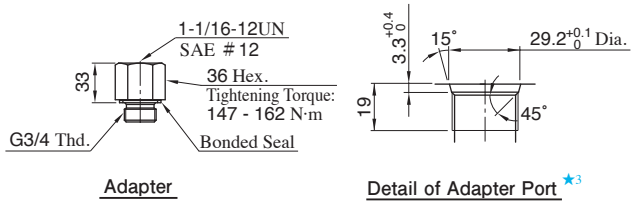
Detail:A3HG145-FR01KK-E1D/E2D



Detail of Drain Port ★2

★2. Drain port conforms to ISO 9974-1, metric threads.

Accessories:A3HG145-FR01KK-U1D

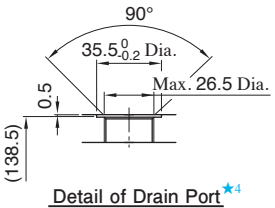


Adapter

Detail of Adapter Port ★3

★3. Adapter port conforms to SAE J 514, O-ring seals.

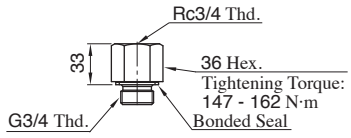
Detail:A3HG145-FR01KK-U2D



Detail of Drain Port ★4

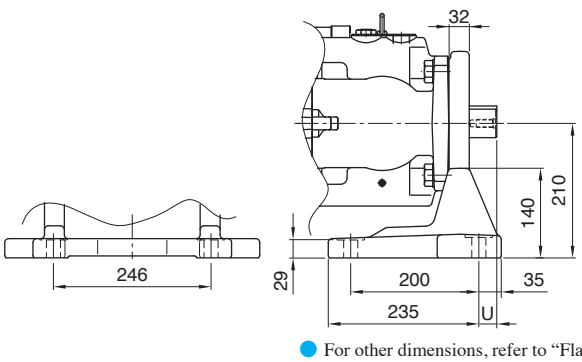
★4. Drain port conforms to ISO 1179-1, BSPP threads.

Accessories:A3HG145-FR01KK-J1D



Adapter

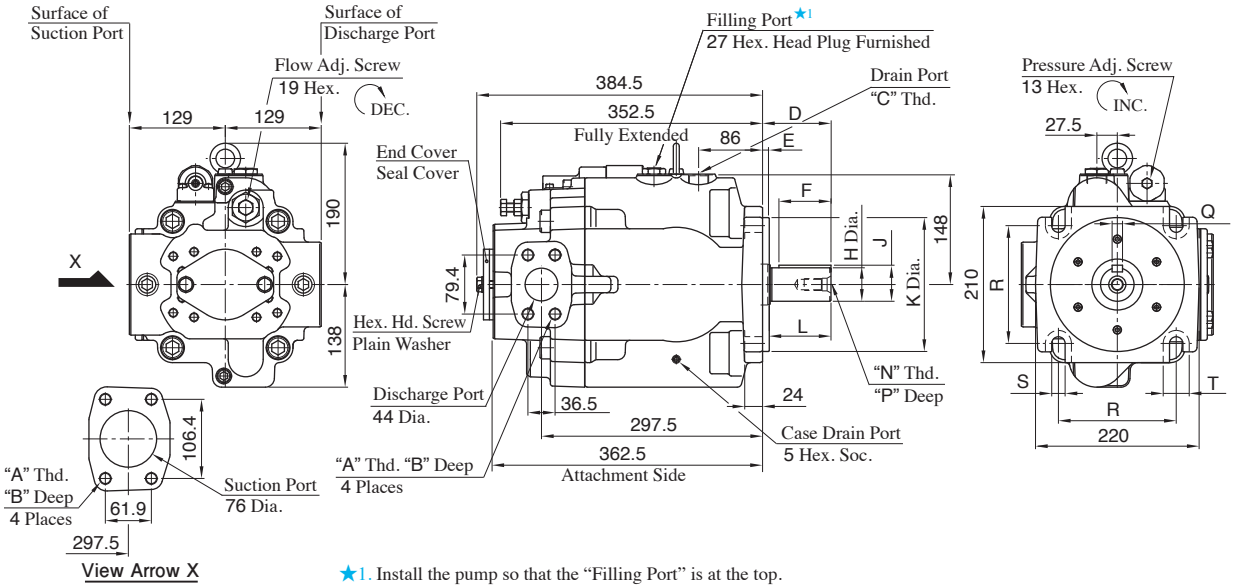
Foot Mtg.:A3HG145-LR01KK-E1D/E2D/U1D/U2D/J1D



Model Numbers	U
A3HG145-LR01KK-E1D/E2D	45
A3HG145-LR01KK-U1D/U2D/J1D	28

● For other dimensions, refer to "Flange Mtg.".

Flange Mtg.:A3HG180-FR01KK-E1D/E2D/U1D/U2D/J1D



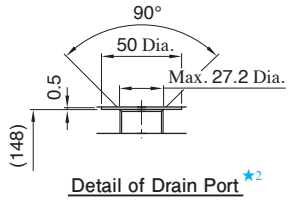
★1. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG180-FR01KK-E1D/E2D	M16	29	M27×2	92	9	70	$45^{+0.018}_{+0.002}$	$48.5^{+0.018}_{-0.288}$	$180^{\ 0}_{-0.063}$	82	M16	36	$14^{\ 0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG180-FR01KK-U1D	5/8-11 UNC	29	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67	1/2-13 UNC	32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG180-FR01KK-U2D	M16	29	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67		32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG180-FR01KK-J1D	M16	29	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67		32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Drain Port

For port/flange code "U1/J1", adapter and bonded seal are attached. After installing the bonded seal at the drain port tighten the adapter.

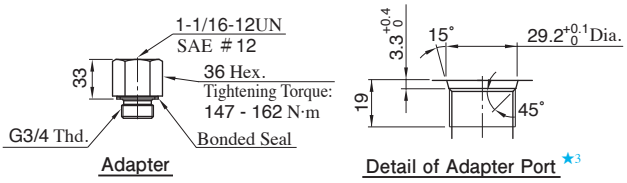
Detail:A3HG180-FR01KK-E1D/E2D



Detail of Drain Port ★2

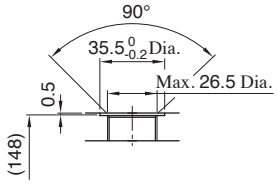
★2. Drain port conforms to ISO 9974-1, metric threads.

Accessories:A3HG180-FR01KK-U1D



★3. Adapter port conforms to SAE J 514, O-ring seals.

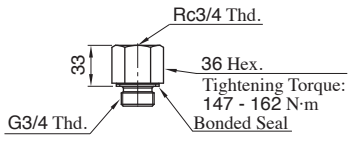
Detail:A3HG180-FR01KK-U2D



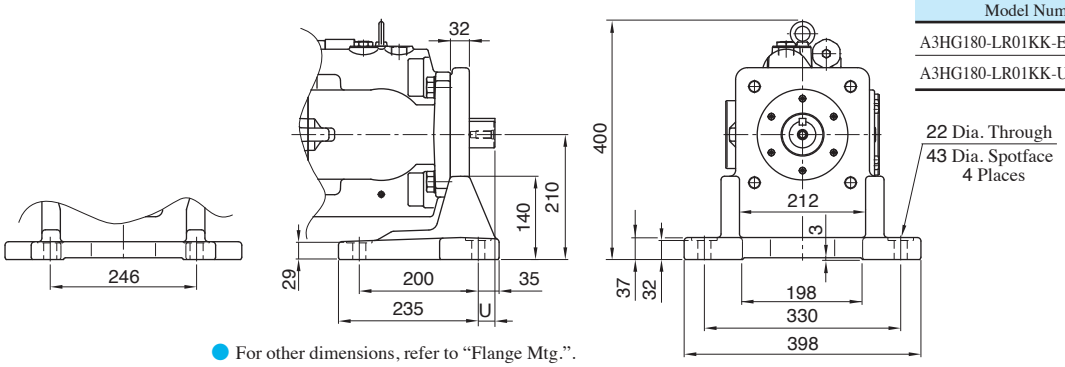
Detail of Drain Port ★4

★4. Drain port conforms to ISO 1179-1, BSPP threads.

Accessories:A3HG180-FR01KK-J1D



Foot Mtg.:A3HG180-LR01KK-E1D/E2D/U1D/U2D/J1D

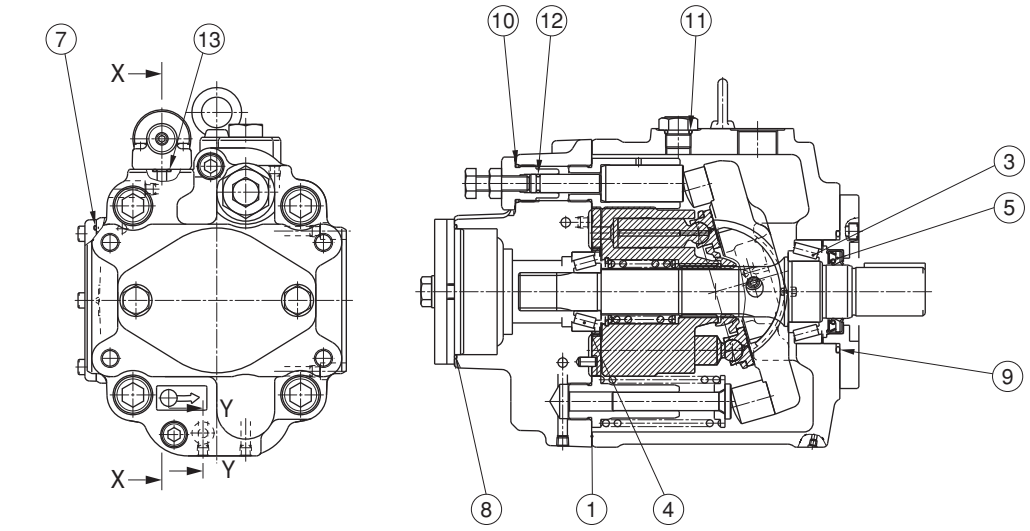


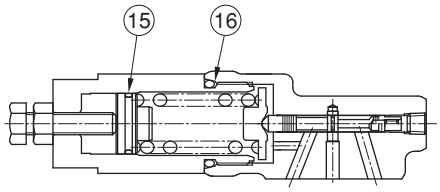
Model Numbers	U
A3HG180-LR01KK-E1D/E2D	45
A3HG180-LR01KK-U1D/U2D/J1D	28

● For other dimensions, refer to "Flange Mtg.".

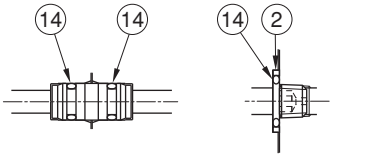
Spare Parts List

A3HG＊-＊R01KK





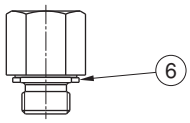
Detail of Section X – X



A3HG16

A3HG37/56/71
A3HG100/145/180

Detail of Section Y – Y



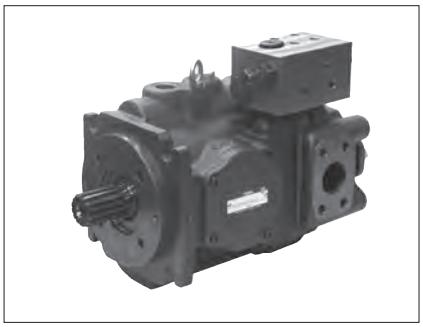
Accessories

List of Seals and Bearings

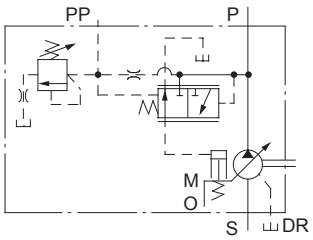
Item	Name of Parts	Part Numbers							Qty.
		A3HG16	A3HG37	A3HG56	A3HG71	A3HG100	A3HG145	A3HG180	
1	Gasket	Z150-2270-PK314095-1	Z800-2271-PK314517-4	Z800-2272-PK314506-7	2283-PK212657-1	2284-PK212655-5	2285-PK212635-7	2286-PK212656-3	1
2	Back Up Ring	—	1310E-PK412440-0						1
3	Tapered Roller Bearing	—	HR33007J	4T-33008	33009JR	4T-30210	HR33011	—	1
	Cylindrical Roller Bearing	NUP205E	—	—	—	—	—	2276-PK412859-1	
4	Tapered Roller Bearing	—	4T-33005	4T-33205R	4T-33205	4T-33206	4T-33206	—	1
	Needle Roller Bearing	HMK2030V3	—	—	—	—	—	2276-PK412860-9	
5	Oil Seal	TCN254511 (FKM)	TCN355511 (FKM)	TCN355511 (FKM)	TCN355511 (FKM)	TCN507212 (FKM)	TCN557812 (FKM)	TCN557812 (FKM)	1
6	Bonded Seal★	KP-C-04 (FKM)	KP-C-04 (FKM)	KP-C-05 (FKM)	KP-C-05 (FKM)	KP-C-05 (FKM)	KP-C-05 (FKM)	KP-C-05 (FKM)	1
7	O-Ring	S65 (FKM-70)	S85 (FKM-70)	S95 (FKM-70)	S100 (FKM-70)	S110 (FKM-70)	S125 (FKM-70)	S130 (FKM-70)	1
8	O-Ring, Gasket	2280-PK413358-3	S80 (FKM-70)	S80 (FKM-70)	S80 (FKM-70)	S80 (FKM-70)	S80 (FKM-70)	S80 (FKM-70)	1
9	O-Ring	AS568-139 (FKM-90)	OR FKM-70 G70-N	OR FKM-70 G75-N	OR FKM-70 G80-N	OR FKM-70 G95-N	OR FKM-70 G95-N	OR FKM-70 G105-N	1
10	O-Ring	OR FKM-90 P14-N	OR FKM-90 P18-N	OR FKM-90 P21-N	OR FKM-90 P24-N	OR FKM-90 P24-N	OR FKM-90 P26-N	OR FKM-90 P26-N	1
11	O-Ring	OR FKM-90 P14-N	OR FKM-90 P14-N	OR FKM-90 P14-N	OR FKM-90 P14-N	OR FKM-90 P18-N	OR FKM-90 P18-N	OR FKM-90 P18-N	1
12	O-Ring	OR FKM-90 P6-N	OR FKM-90 P8-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P10A-N	OR FKM-90 P10A-N	1
13	O-Ring	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	3
14	O-Ring	OR FKM-90 P7-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	OR FKM-90 P9-N	P7-N:2 P9-N:1
15	O-Ring	AS568-018 (FKM-70)	AS568-018 (FKM-70)	AS568-018 (FKM-70)	AS568-021 (FKM-70)	AS568-021 (FKM-70)	AS568-021 (FKM-70)	AS568-021 (FKM-70)	1
16	O-Ring	OR FKM-90 P26-N	OR FKM-90 P26-N	OR FKM-90 P26-N	OR FKM-90 P32-N	OR FKM-90 P32-N	OR FKM-90 P32-N	OR FKM-90 P32-N	1

★ Attached only to the port/flange U1 or J1.

A3HG Series High Pressure Variable Displacement Piston Pumps
Pilot Pressure Control Type Pressure Compensator



Graphic Symbol



Specifications

Model Numbers	Geometric Displacement cm^3/rev	Minimum Adjustment Flow cm^3/rev	Operating Pressure MPa		Minimum Adjustment Pressure MPa	Shaft Speed Range r/min		Approx. Mass kg	
			Rated★1	Intermittent		Max.★2	Min.	Flange Mtg.	Foot Mtg.
A3HG16-＊R07＊-＊C-10	16.3	8	31.5	35	5	3600	600	18.9	22.9
A3HG37-＊R07＊-＊C-10	37.1	16				2700	600	28.5	37
A3HG37-＊R07＊-＊D-10									36
A3HG56-＊R07＊-＊C-10	56.3	35				2500	600	36.5	45
A3HG56-＊R07＊-＊D-10								34.5	42
A3HG71-＊R07＊-E1D/E2D-10	70.7	45			6	2300	600	47	73
A3HG71-＊R07＊-U1D/U2D/J1D-10								43.5	51
A3HG100-＊R07K-E1D/E2D-10	100.5	63				2100	600	58.5	83.5
A3HG100-＊R07SP＊-E1D/E2D-10								58	83
A3HG100-＊R07＊-U1D/U2D/J1D-10								58	85
A3HG145-＊R07K-E1D/E2D-10	145.2	95				1800	600	70.5	96.5
A3HG145-＊R07SP＊-E1D/E2D-10								70	96
A3HG145-＊R07＊-U1D/U2D/J1D-10								70	97.5
A3HG180-＊R07K-E1D/E2D-10	180.7	130				1800	600	90	116
A3HG180-＊R07SP＊-E1D/E2D-10								89.5	115.5
A3HG180-＊R07＊-U1D/U2D/J1D-10								89.5	117

★1. Consult Yuken when pump is used over rated pressure because there is a restriction on operating condition.
★2. The maximum shaft speeds shown in the above table are at suction pressure 0 kPa.

Model Number Designation

A3HG16	-F	R	07	K	-E1	D	-10
Series Number	Mounting	Direction of Rotation	Control Type	Shaft Extension	Main Pump Mtg. Flange Connecting Port / Pipe Flange Thread Second Pump Mtg.	Number of Pump Mtg. Bolts	Design Number
A3HG16 (16.3 cm^3/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise (Normal)	07: Pilot Pressure Control Type Pressure Compensator	K: Keyed Shaft SP: Splined Shaft (High Torque) SP1: Splined Shaft (Conforms to ISO 3019-1)		C: 2	10
A3HG37 (37.1 cm^3/rev)						C: 2 D: 4	10
A3HG56 (56.3 cm^3/rev)							10
A3HG71 (70.7 cm^3/rev)						D: 4	10
A3HG100 (100.5 cm^3/rev)							10
A3HG145 (145.2 cm^3/rev)							10
A3HG180 (180.7 cm^3/rev)							10

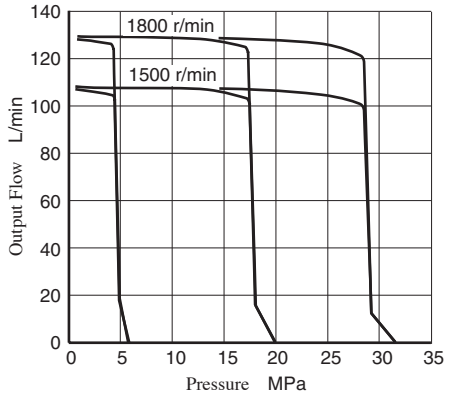
Code	Main Pump Mtg. Flange	Connecting Port	Pipe Flange Thread	Second Pump Mtg.
E1	ISO 3019-2	Metric	Metric	ISO 3019-2
E2	ISO 3019-2	Metric	Metric	ISO 3019-1
U1	ISO 3019-1	Unified	Unified	ISO 3019-1
U2	ISO 3019-1	BSPP	Metric	ISO 3019-1
J1	ISO 3019-1	Rc	Metric	ISO 3019-1

Pipe Flange Kits

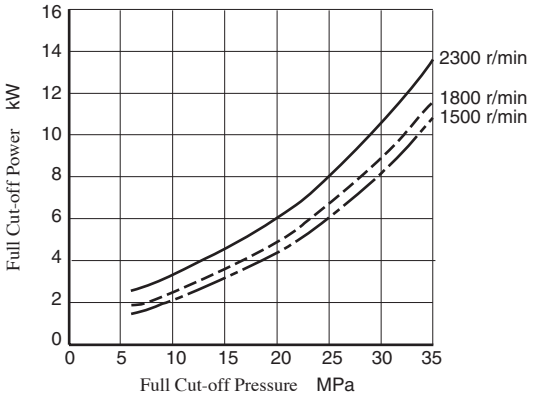
Pipe flange mouting surface conforms to SAE J 518, 4 bolt split flange.
Pipe flange kits are not available. Contact us for details.

Typical Performance Characteristics of Type “A3HG71” at Viscosity 32 mm²/s[ISO VG32 Oils, 40°C]

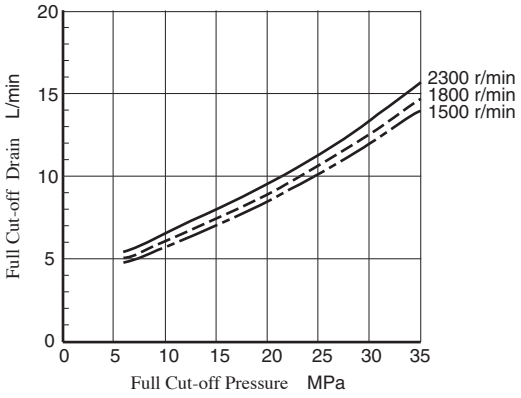
Pressure vs. Output Flow



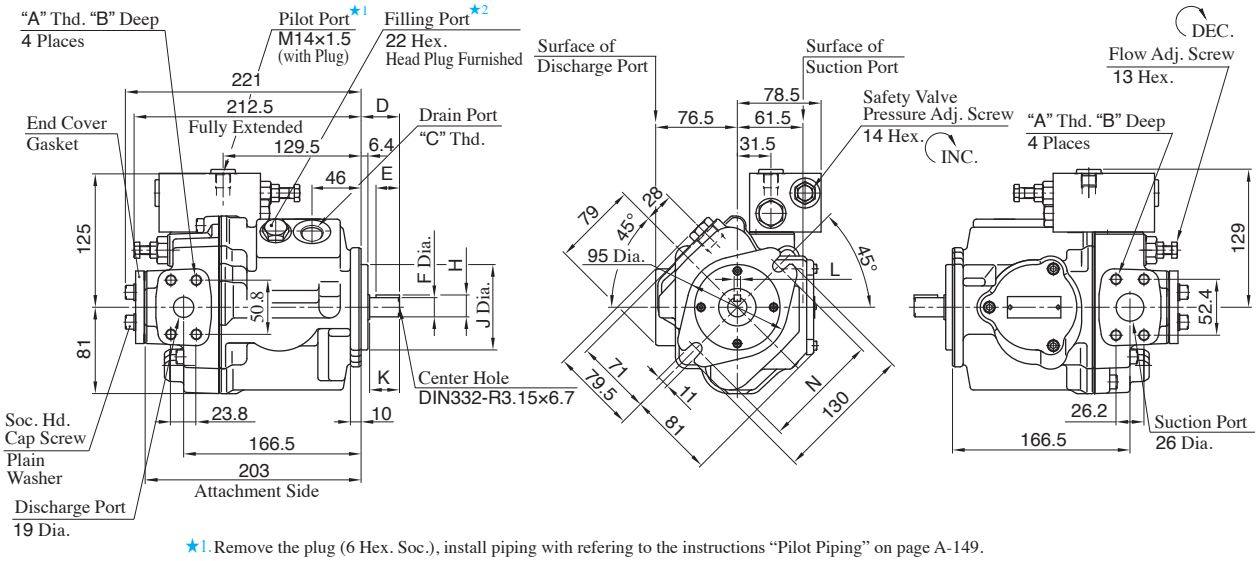
Full Cut-off Power



Full Cut-off Drain



Flange Mtg.:A3HG16-FR07K-E1C/U1C/U2C/J1C



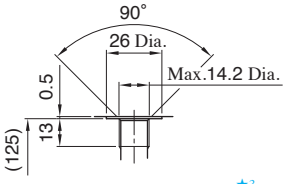
★1. Remove the plug (6 Hex. Soc.), install piping with refering to the instructions "Pilot Piping" on page A-149.
★2. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG16-FR07K-E1C	M10	19	M22×1.5	36	22	18 $^{+0.008}_{-0.003}$	20.5 $^{+0.008}_{-0.133}$	80 $^{0}_{-0.046}$	28	6 $^{0}_{-0.03}$	109	Conforms to ISO 3019-2	Metric	Metric
A3HG16-FR07K-U1C	3/8-16 UNC	17	G 1/2	41	28	19.05 $^{0}_{-0.03}$	21.24 $^{0}_{-0.16}$	82.55 $^{0}_{-0.05}$	33	4.76 $^{+0.03}_{0}$	106	Conforms to ISO 3019-1	Unified	Unified
A3HG16-FR07K-U2C	M10	19	G 1/2	41	28	19.05 $^{0}_{-0.03}$	21.24 $^{0}_{-0.16}$	82.55 $^{0}_{-0.05}$	33	4.76 $^{+0.03}_{0}$	106	Conforms to ISO 3019-1	BSPP	Metric
A3HG16-FR07K-J1C	M10	19	G 1/2	41	28	19.05 $^{0}_{-0.03}$	21.24 $^{0}_{-0.16}$	82.55 $^{0}_{-0.05}$	33	4.76 $^{+0.03}_{0}$	106	Conforms to ISO 3019-1	Rc	Metric

Pilot Port

For port/flange code "U1/U2/J1", adapter and O-ring are attached. After installing the O-ring at the drain port tighten the adapter.

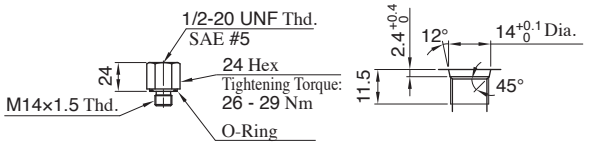
Detail:A3HG16-FR07K-E1C



Detail of Pilot Port ★3

★3. Pilot port conforms to ISO 9974-1, metric threads.

Accessories:A3HG16-FR07K-U1C

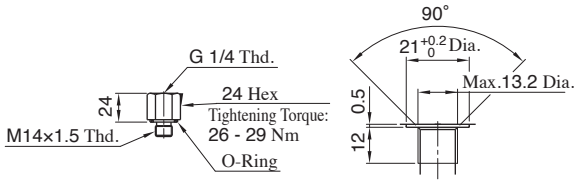


Adapter

Detail of Adapter Port ★4

★4. Adapter port conforms to SAE J 514, O-ring seals

Accessories:A3HG16-FR07K-U2C

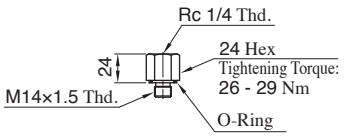


Adapter

Detail of Adapter Port ★5

★5. Adapter port conforms to ISO 1179-1, BSPP threads.

Accessories:A3HG16-FR07K-J1C



Adapter

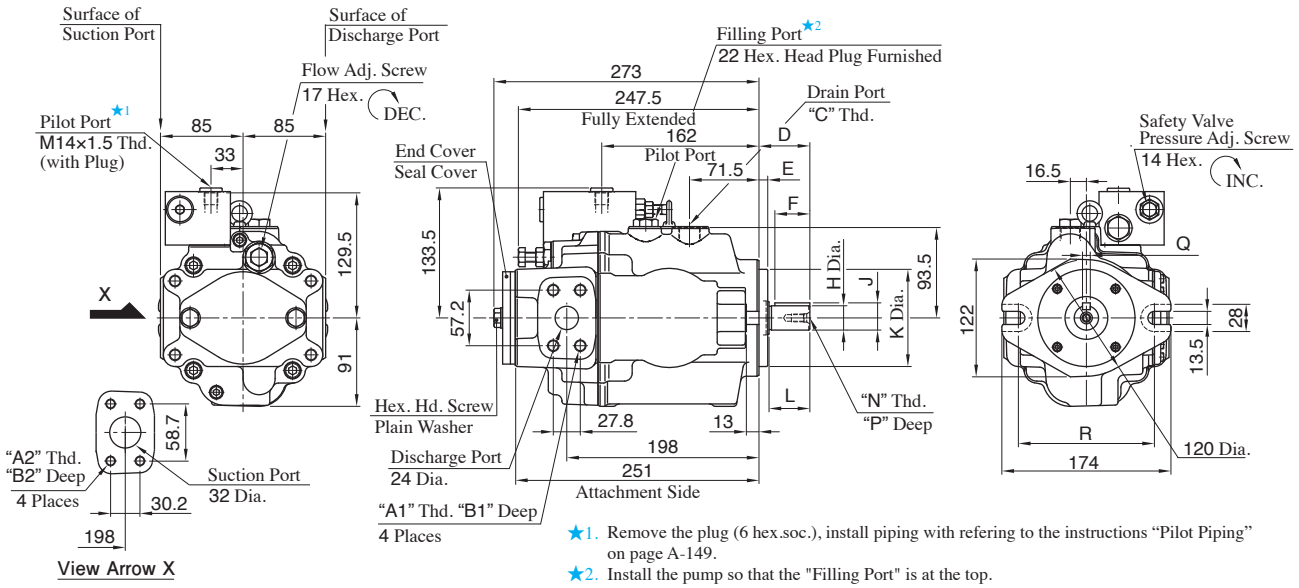
Drain Port

Drain port is common to that of pressure compensator model.
Refer to page A-162 for the dimensions of drain port.

Foot Mtg.:A3HG16-LR07K-E1C/U1C/U2C/J1C

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to page A-162 for the dimensions of mounting bracket.

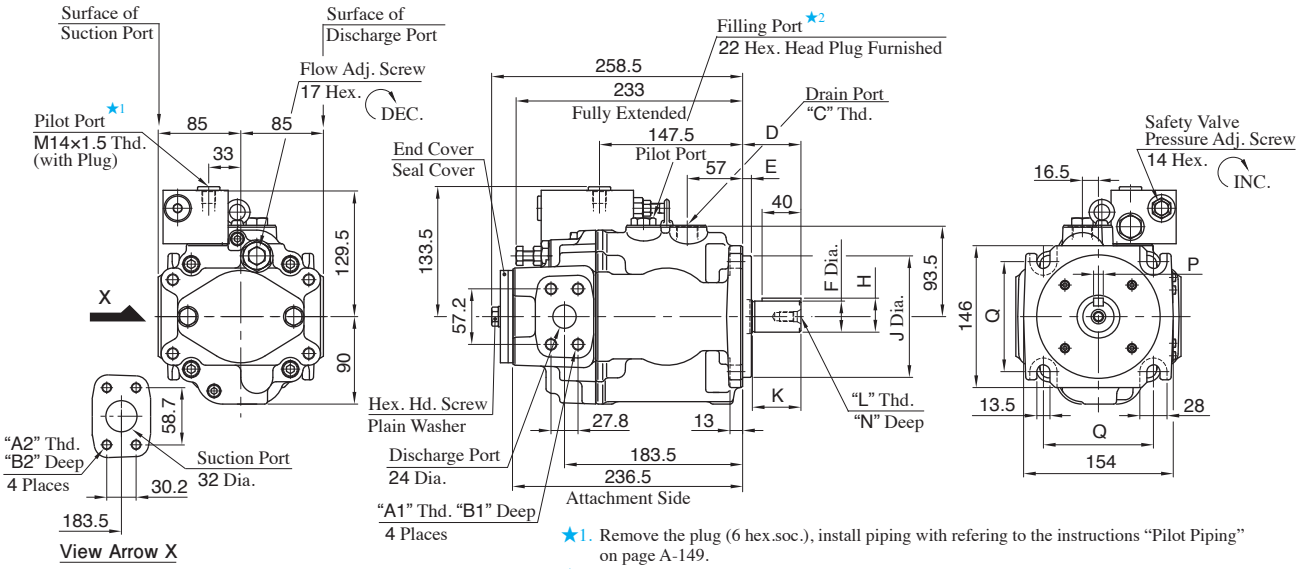
Flange Mtg. Two Bolts:A3HG37-FR07K-E1C/E2C/U1C/U2C/J1C



★1. Remove the plug (6 hex.soc.), install piping with refering to the instructions "Pilot Piping" on page A-149.
★2. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	R	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG37-FR07K-E1C/E2C	M12	M10	22	18	M22X1.5	52	9	36	$25^{+0.009}_{-0.004}$	$28^{+0.009}_{-0.294}$	$100^{0}_{-0.054}$	42	M8	19	$8^{0}_{-0.036}$	140	Conforms to ISO 3019-2	Metric	Metric
A3HG37-FR07K-U1C	7/16-14 UNC		20		G 1/2	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38	1/4-20 UNC	16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Unified	Unified
A3HG37-FR07K-U2C	M12	M10	22	18	G 1/2	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	BSPP	Metric
A3HG37-FR07K-J1C	M12	M10	22	18	G 1/2	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg. Four Bolts:A3HG37-FR07K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the instructions "Pilot Piping" on page A-149.
★2. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG37-FR07K-E1D/E2D	M12	M10	22	18	M22X1.5	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$125^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	113.2	Conforms to ISO 3019-2	Metric	Metric
A3HG37-FR07K-U1D	7/16-14 UNC		20		G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Unified	Unified
A3HG37-FR07K-U2D	M12	M10	22	18	G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	BSPP	Metric
A3HG37-FR07K-J1D	M12	M10	22	18	G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Rc	Metric

Pilot Port

Pilot port is common to that of "A3HG16-FR07K-E1C/U1C/U2C/J1C" (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

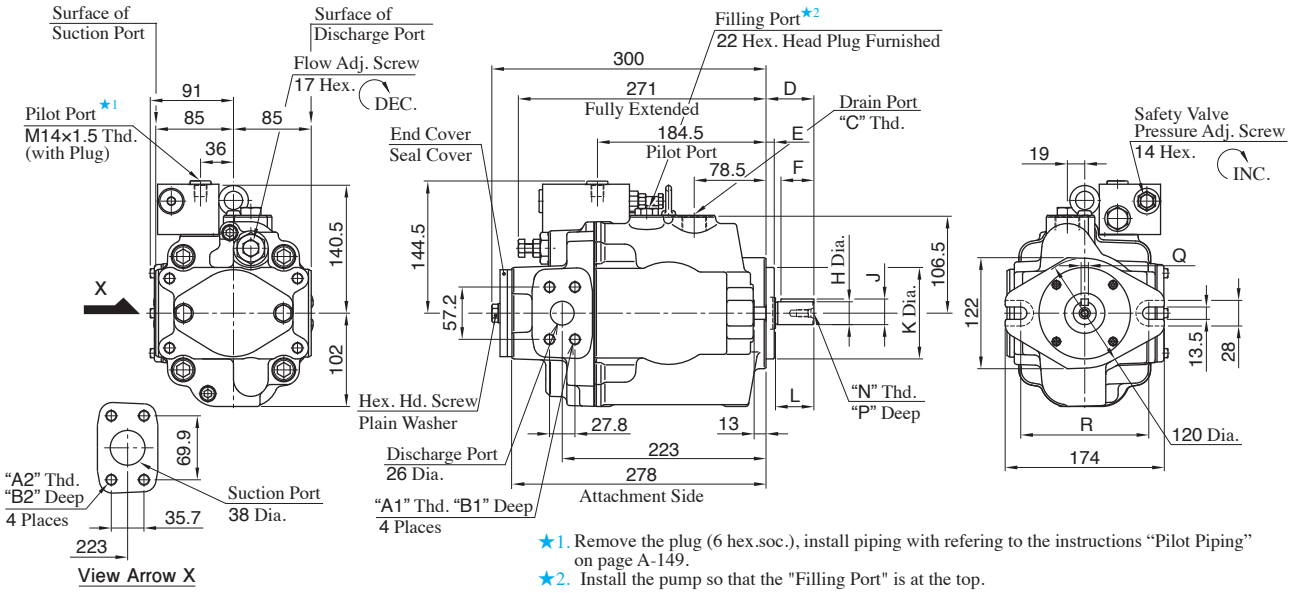
Drain Port

Drain port is common to that of pressure compensator model.Refer to page A-163 or A-164 for the dimensions of drain port.

Foot Mtg.:A3HG37-LR07K-E1C/E2C/U1C/U2C/J1C, A3HG37-LR07K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to pages A-163 and A-164 for the dimensions of mounting bracket.

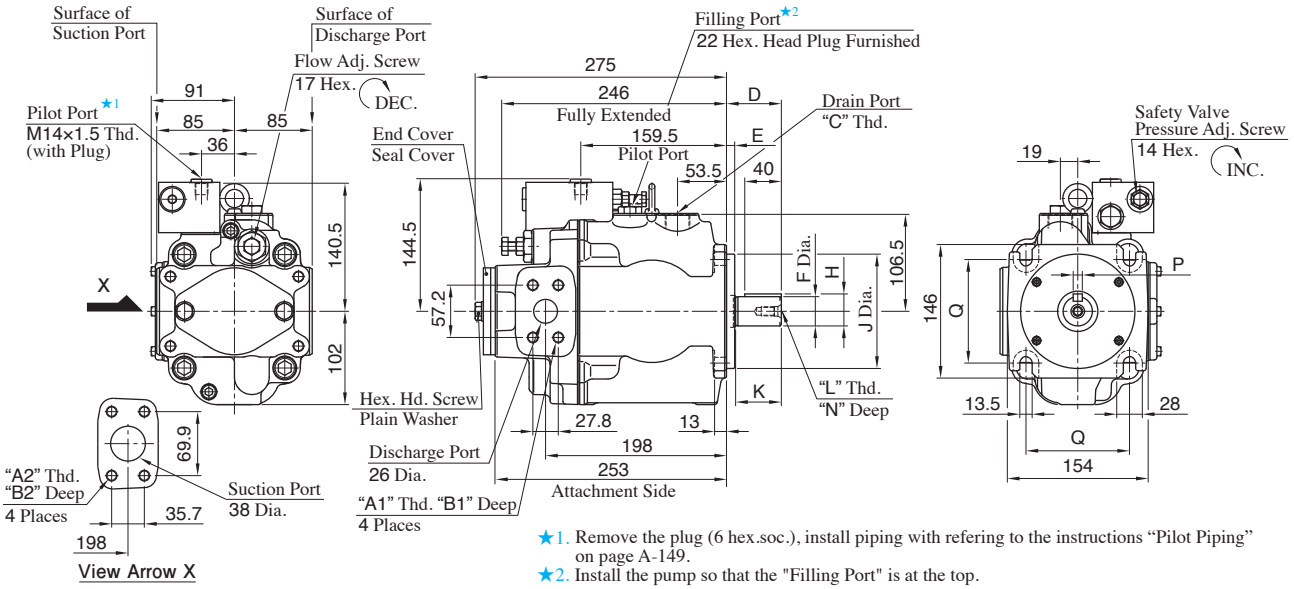
Flange Mtg. Two Bolts:A3HG56-FR07K-E1C/E2C/U1C/U2C/J1C



★1. Remove the plug (6 hex.soc.), install piping with refering to the instructions "Pilot Piping" on page A-149.
★2. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	R	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG56-FR07K-E1C/E2C	M12	M12	22	22	M27×2	52	9	36	25 $^{+0.009}_{-0.004}$	28 $^{+0.009}_{-0.294}$	100 $^{0}_{-0.054}$	42	M8	19	8 $^{0}_{-0.036}$	140	Conforms to ISO 3019-2	Metric	Metric
A3HG56-FR07K-U1C	7/16-14 UNC	1/2-13UNC	20	21	G 3/4	46	9.7	32	25.4 $^{0}_{-0.05}$	28.18 $^{0}_{-0.18}$	101.6 $^{0}_{-0.05}$	38	1/4-20 UNC	16	6.35 $^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Unified	Unified
A3HG56-FR07K-U2C	M12	M12	22	22	G 3/4	46	9.7	32	25.4 $^{0}_{-0.05}$	28.18 $^{0}_{-0.18}$	101.6 $^{0}_{-0.05}$	38		16	6.35 $^{+0.03}_{0}$	146	Conforms to ISO 3019-1	BSPP	Metric
A3HG56-FR07K-J1C	M12	M12	22	22	G 3/4	46	9.7	32	25.4 $^{0}_{-0.05}$	28.18 $^{0}_{-0.18}$	101.6 $^{0}_{-0.05}$	38		16	6.35 $^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg. Four Bolts:A3HG56-FR07K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the instructions "Pilot Piping" on page A-149.
★2. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG56-FR07K-E1D/E2D	M12	M12	22	22	M27×2	60	9	32 $^{+0.018}_{+0.002}$	35 $^{+0.018}_{-0.288}$	125 $^{0}_{-0.063}$	50	M10	22	10 $^{0}_{-0.036}$	113.2	Conforms to ISO 3019-2	Metric	Metric
A3HG56-FR07K-U1D	7/16-14 UNC	1/2-13UNC	20	21	G 3/4	56	12.7	31.75 $^{0}_{-0.05}$	35.32 $^{0}_{-0.18}$	127 $^{0}_{-0.05}$	48	5/16-18 UNC	19	7.94 $^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Unified	Unified
A3HG56-FR07K-U2D	M12	M12	22	22	G 3/4	56	12.7	31.75 $^{0}_{-0.05}$	35.32 $^{0}_{-0.18}$	127 $^{0}_{-0.05}$	48		19	7.94 $^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	BSPP	Metric
A3HG56-FR07K-J1D	M12	M12	22	22	G 3/4	56	12.7	31.75 $^{0}_{-0.05}$	35.32 $^{0}_{-0.18}$	127 $^{0}_{-0.05}$	48		19	7.94 $^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Rc	Metric

Pilot Port

Pilot port is common to that of "A3HG16-FR07K-E1C/U1C/U2C/J1C" (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

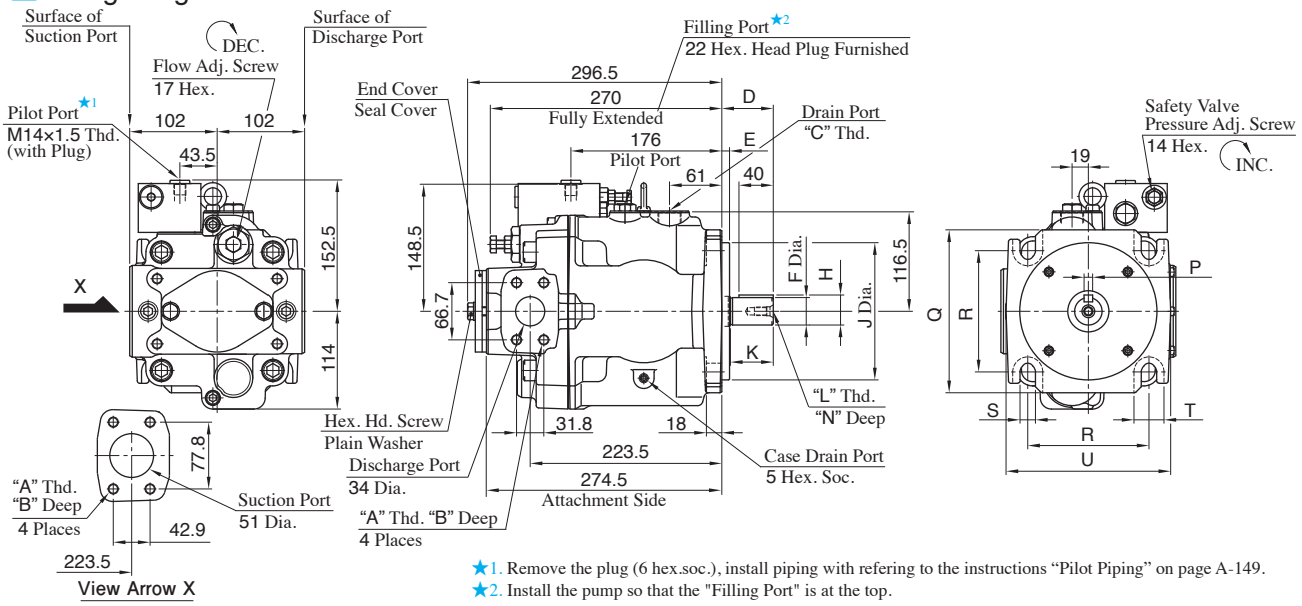
Drain Port

Drain port is common to that of pressure compensator model.Refer to page A-165 or A-166 for the dimensions of drain port.

Foot Mtg.:A3HG56-LR07K-E1C/E2C/U1C/U2C/J1C, A3HG56-LR07K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to pages A-165 and A-166 for the dimensions of mounting bracket.

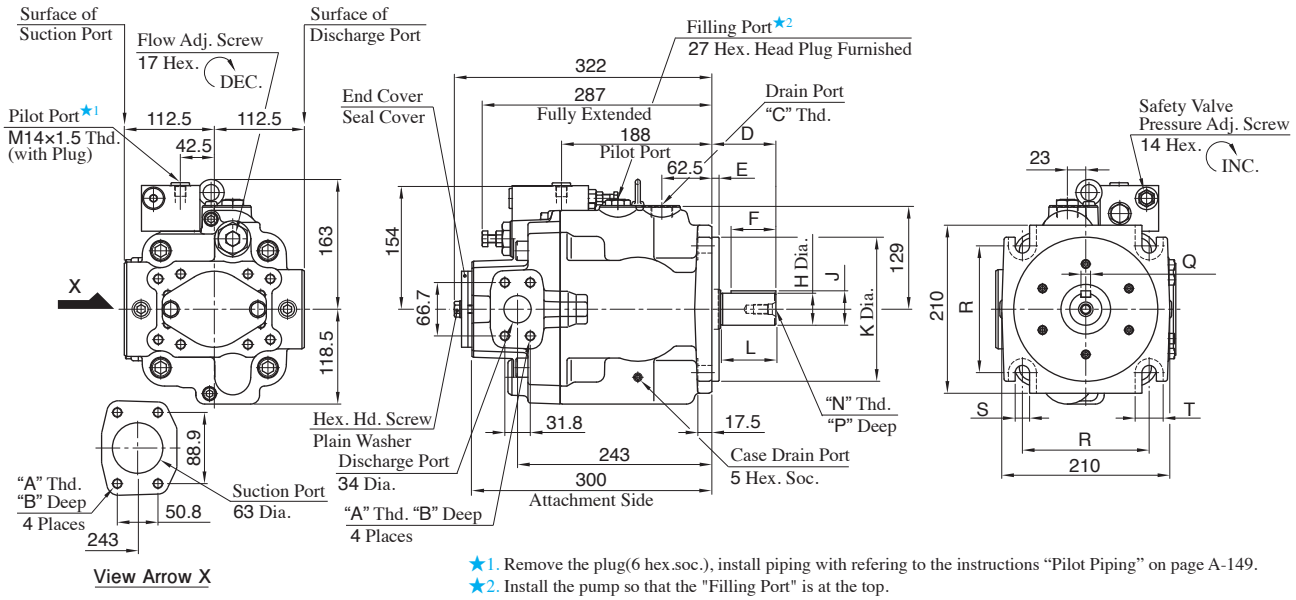
Flange Mtg.:A3HG71-FR07K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the instructions "Pilot Piping" on page A-149.
★2. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	U	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG71-FR07K-E1D/E2D	M12	22	M27X2	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$160^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	190	141.4	18	35	192	Conforms to ISO 3019-2	Metric	Metric
A3HG71-FR07K-U1D	1/2-13 UNC	21	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	Unified	Unified
A3HG71-FR07K-U2D	M12	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	BSPP	Metric
A3HG71-FR07K-J1D	M12	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg.:A3HG100-FR07K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug(6 hex.soc.), install piping with refering to the instructions "Pilot Piping" on page A-149.
★2. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG100-FR07K-E1D/E2D	M12	22	M27X2	80	9	56	$40^{+0.018}_{+0.002}$	$43^{+0.018}_{-0.288}$	$180^{0}_{-0.063}$	70	M12	28	$12^{0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG100-FR07K-U1D	1/2-13 UNC	21	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54		28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG100-FR07K-U2D	M12	22	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54	7/16-14 UNC	28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG100-FR07K-J1D	M12	22	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54		28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Pilot Port

Pilot port is common to that of "A3HG16-FR07K-E1C/U1C/U2C/J1C" (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

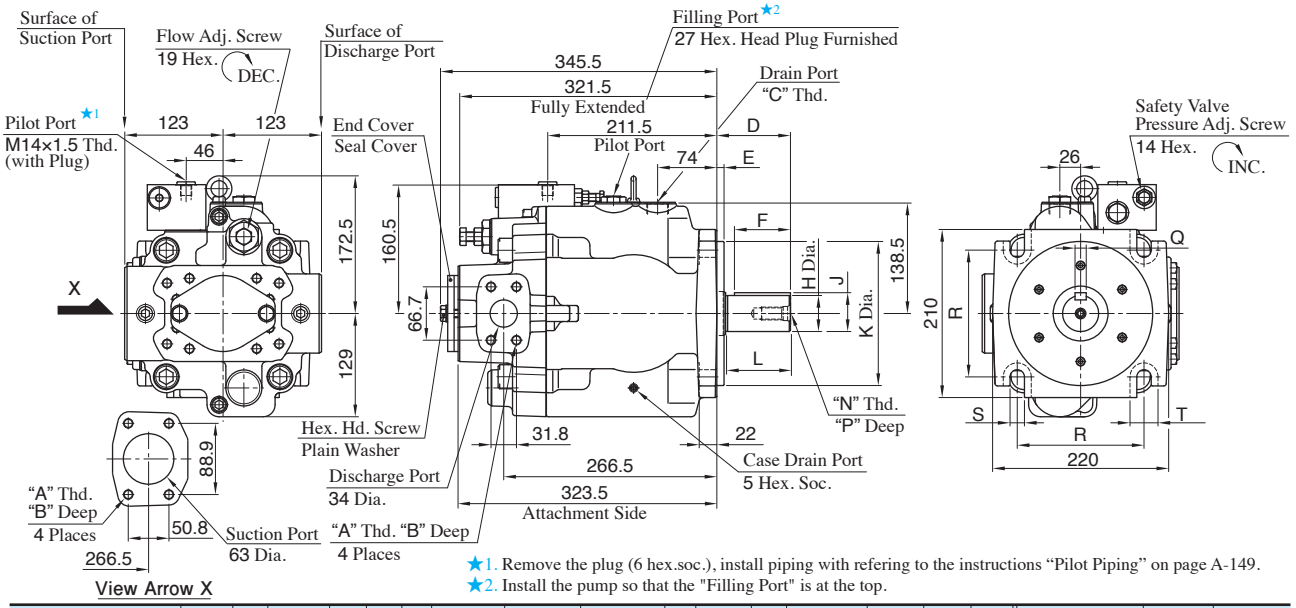
Drain Port

Drain port is common to that of pressure compensator model.Refer to page A-167 or A-168 for the dimensions of drain port.

Foot Mtg.:A3HG71-LR07K-E1D/E2D/U1D/U2D/J1D, A3HG100-LR07K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model.
Refer to pages A-167 and A-168 for the dimensions of mounting bracket.

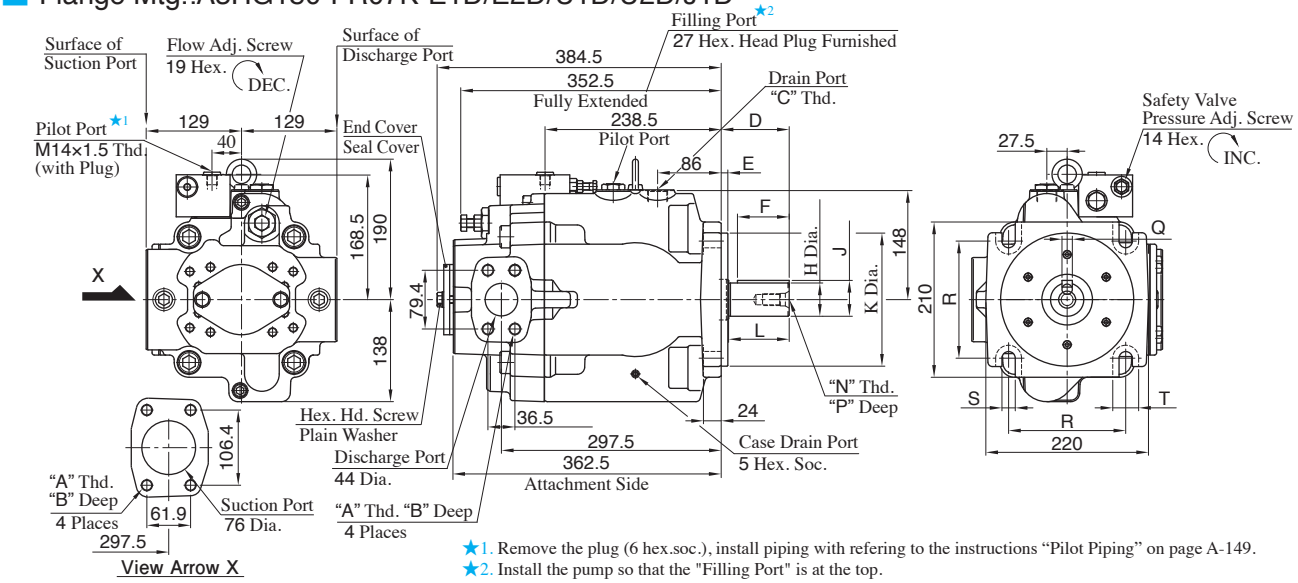
Flange Mtg.:A3HG145-FR07K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the instructions "Pilot Piping" on page A-149.
★2. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG145-FR07K-E1D/E2D	M12	22	M27X2	92	9	70	$45^{+0.018}_{+0.002}$	$48.5^{+0.018}_{-0.288}$	$180^{\ 0}_{-0.063}$	82	M16	36	$14^{\ 0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG145-FR07K-U1D	1/2-13 UNC	21	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67	1/2-13 UNC	32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG145-FR07K-U2D	M12	22	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67		32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG145-FR07K-J1D	M12	22	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67		32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg.:A3HG180-FR07K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the instructions "Pilot Piping" on page A-149.
★2. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG180-FR07K-E1D/E2D	M16	29	M27X2	92	9	70	$45^{+0.018}_{+0.002}$	$48.5^{+0.018}_{-0.288}$	$180^{\ 0}_{-0.063}$	82	M16	36	$14^{\ 0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG180-FR07K-U1D	5/8-11 UNC	29	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67	1/2-13 UNC	32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG180-FR07K-U2D	M16	29	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67		32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG180-FR07K-J1D	M16	29	G 3/4	75	12.7	56	$44.45^{\ 0}_{-0.05}$	$49.39^{\ 0}_{-0.18}$	$152.4^{\ 0}_{-0.05}$	67		32	$11.11^{+0.03}_{\ 0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Pilot Port

Pilot port is common to that of "A3HG16-FR07K-E1C/U1C/U2C/J1C" (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

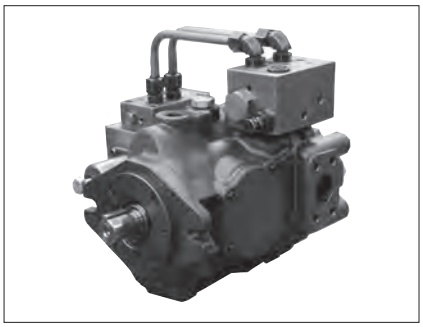
Drain Port

Drain port is common to that of pressure compensator model.Refer to page A-169 or A-170 for the dimensions of drain port.

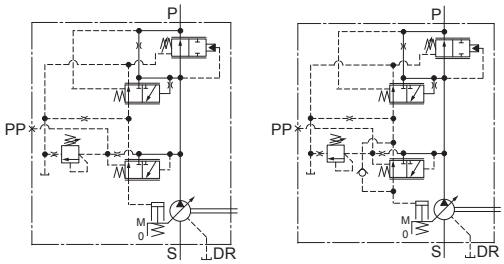
Foot Mtg.:A3HG145-LR07K-E1D/E2D/U1D/U2D/J1D, A3HG180-LR07K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model.
Refer to pages A-169 and A-170 for the dimensions of mounting bracket.

A3HG Series High Pressure Variable Displacement Piston Pumps Constant Power Control Type With External Pilot



Graphic Symbols



A3HG37/A3HG56

A3HG71/A3HG100
A3HG145/A3HG180

Specifications

Model Numbers	Geometric Displacement cm³/rev	Minimum Adjustment Flow cm³/rev	Operating Pressure MPa		Minimum Adjustment Pressure MPa	Shaft Speed Range r/min		Approx. Mass kg	
			Rated★1	Intermittent		Max.★2	Min.	Flange Mtg.	Foot Mtg.
A3HG37-＊R09V＊-＊-＊C-10	37.1	16	31.5	35	5	2700	600	37	45.5
A3HG37-＊R09V＊-＊-＊D-10									44.5
A3HG56-＊R09V＊-＊-＊C-10	56.3	35				2500	600	45	53.5
A3HG56-＊R09V＊-＊-＊D-10								43	50.5
A3HG71-＊R09V＊-＊-E1D/E2D-10	70.7	45				2300	600	56	82
A3HG71-＊R09V＊-＊-U1D/U2D/J1D-10								52.5	60
A3HG100-＊R09V＊-K-E1D/E2D-10	100.5	63				2100	600	67.5	92.5
A3HG100-＊R09V＊-SP＊-E1D/E2D-10								67	92
A3HG100-＊R09V＊-＊-U1D/U2D/J1D-10								67	94
A3HG145-＊R09V＊-K-E1D/E2D-10	145.2	95				1800	600	83.5	109.5
A3HG145-＊R09V＊-SP＊-E1D/E2D-10								83	109
A3HG145-＊R09V＊-＊-U1D/U2D/J1D-10								83	110.5
A3HG180-＊R09V＊-K-E1D/E2D-10	180.7	130				1800	600	101	127
A3HG180-＊R09V＊-SP＊-E1D/E2D-10								100.5	126.5
A3HG180-＊R09V＊-＊-U1D/U2D/J1D-10								100.5	128

★1. Consult Yuken when pump is used over rated pressure because there is a restriction on operating condition.
★2. The maximum shaft speeds shown in the above table are at suction pressure 0 kPa.

Model Number Designation

A3HG37	-F	R	09V	B	-K	-E1	D	-10
Series Number	Mounting	Direction of Rotation	Control Type	Input Power Setting	Shaft Extension	Main Pump Mtg. Flange Connecting Port / Pipe Flange Thread Second Pump Mtg.	Number of Pump Mtg. Bolts	Design Number
A3HG37 (37.1 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise (Normal)	09V: Constant Power Control Type With External Pilot	B:7.5 kW N:110 kW Refer to the table on following page for combination.	K: Keyed Shaft SP: Splined Shaft (High Torque) SP1: Splined Shaft (Conforms to ISO 3019-1)		C: 2 D: 4	10
A3HG56 (56.3 cm³/rev)								10
A3HG71 (70.7 cm³/rev)							D: 4	10
A3HG100 (100.5 cm³/rev)								10
A3HG145 (145.2 cm³/rev)								10
A3HG180 (180.7 cm³/rev)								10

Code	Main Pump Mtg. Flange	Connecting Port	Pipe Flange Thread	Second Pump Mtg.
E1	ISO 3019-2	Metric	Metric	ISO 3019-2
E2	ISO 3019-2	Metric	Metric	ISO 3019-1
U1	ISO 3019-1	Unified	Unified	ISO 3019-1
U2	ISO 3019-1	BSPP	Metric	ISO 3019-1
J1	ISO 3019-1	Rc	Metric	ISO 3019-1

Combination of Pump Series and Input Power Setting

Mark "○" in the table below refers to available combinations.

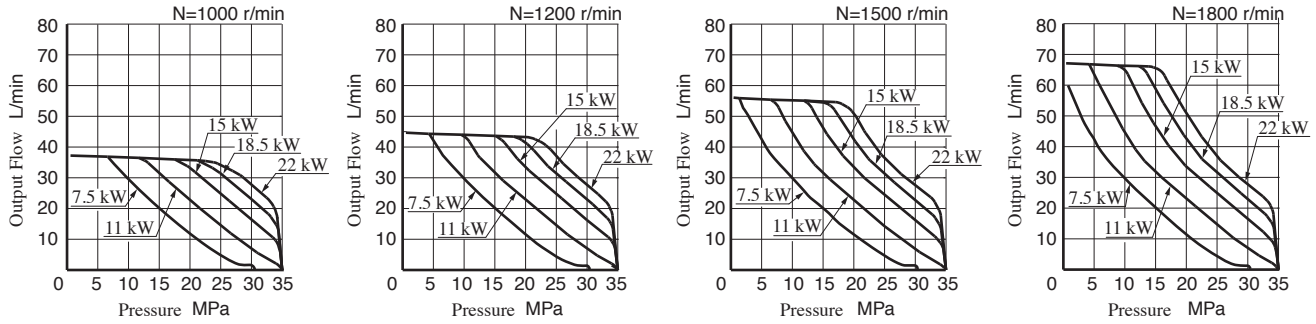
Model Numbers	Input Power Setting kW											
	B: 7.5	C: 11	D: 15	E: 18.5	F: 22	G: 30	H: 37	J: 45	K: 55	L: 75	M: 90	N: 110
A3HG37	○	○	○	○	○							
A3HG56		○	○	○	○	○	○					
A3HG71			○	○	○	○	○	○				
A3HG100				○	○	○	○	○	○			
A3HG145					○	○	○	○	○	○	○	
A3HG180						○	○	○	○	○	○	○

Pipe Flange Kits

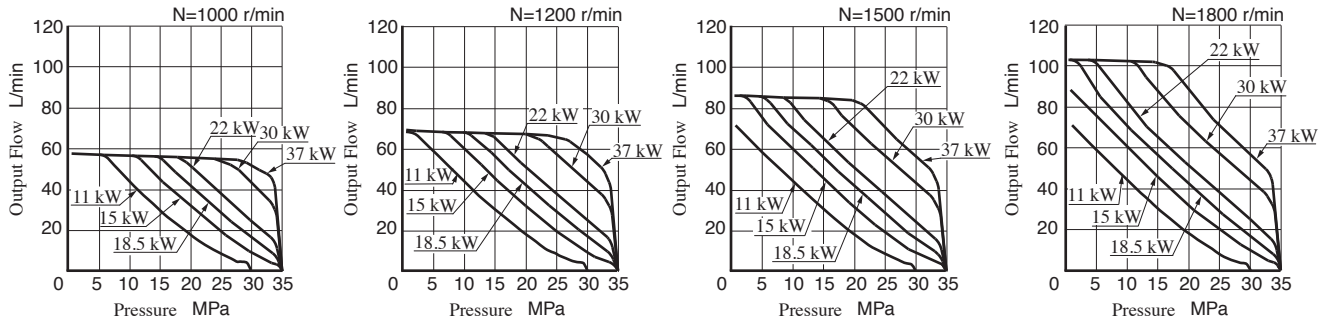
Pipe flange mouting surface conforms to SAE J 518, 4 bolt split flange.
Pipe flange kits are not available. Contact us for details.

Typical Performance Characteristics of Type "**A3HG37/56/71**" at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

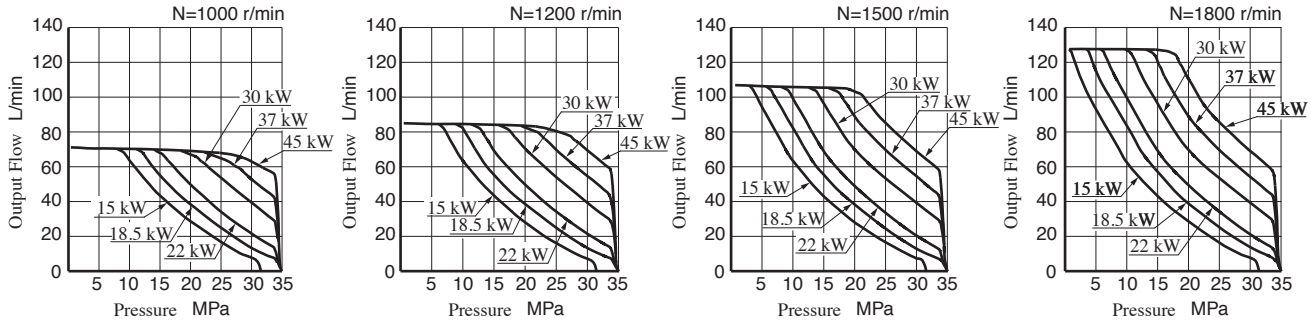
A3HG37



A3HG56



A3HG71

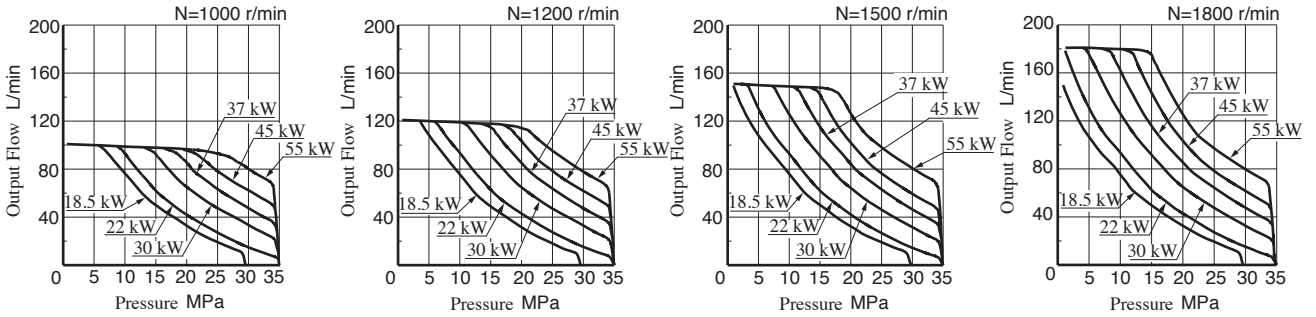


★1. Pumps are adjusted to the required power before shipment, but in case of oil temperature rise (increase of drain) the input power may exceed the adjusted power. In that case phase re-adjust screw refering to instruction manual.

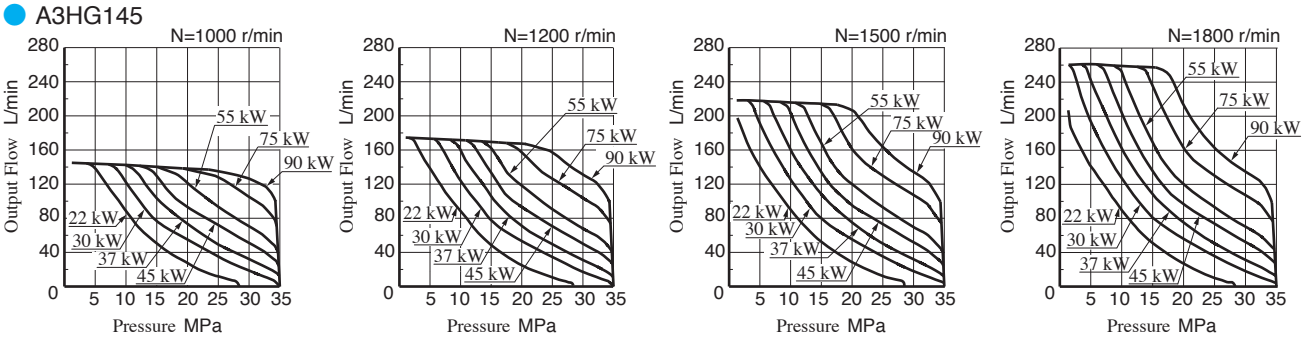
★2. In case of over 1800 r/min of shaft speed, the input power may exceed the adjusted power. In that case phase re-adjust screw refering to instruction manual.

Typical Performance Characteristics of Type "**A3HG100/145/180**" at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

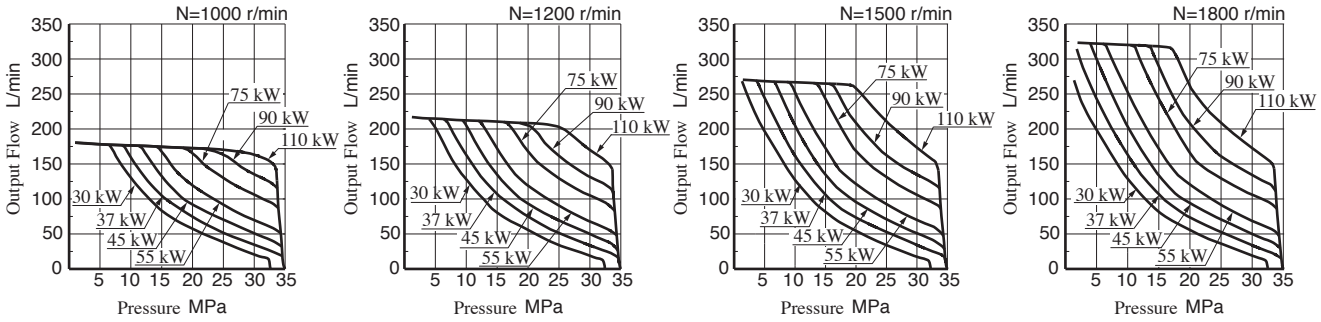
A3HG100



A3HG145



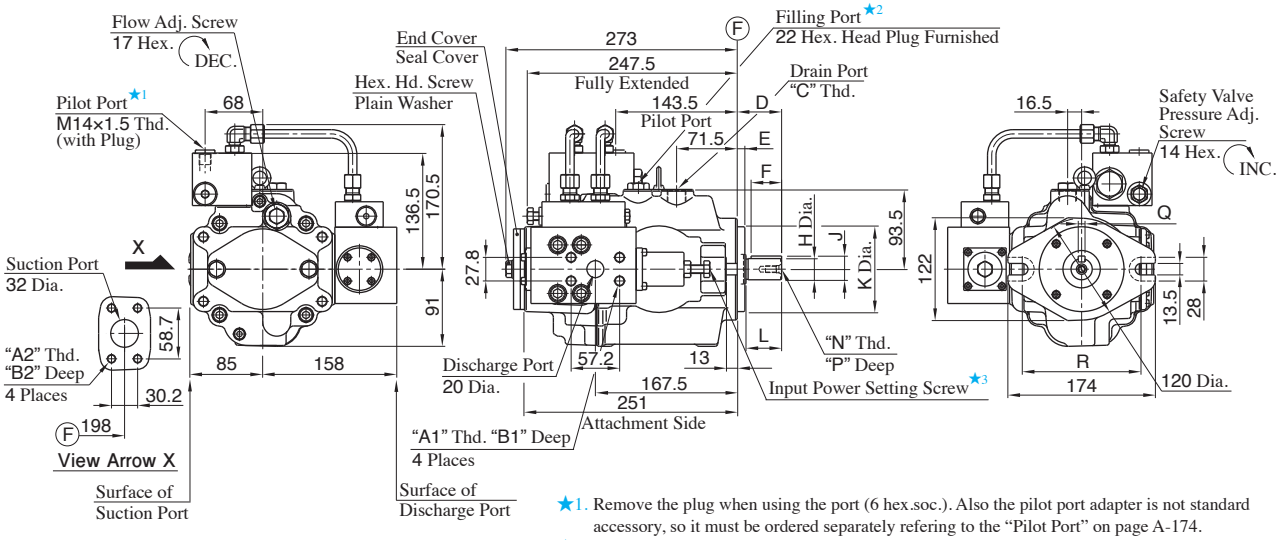
A3HG180



★1. Pumps are adjusted to the required power before shipment, but in case of oil temperature rise (increase of drain) the input power may exceed the adjusted power. In that case phase re-adjust screw refering to instruction manual.

★2. In case of over 1800 r/min of shaft speed, the input power may exceed the adjusted power. In that case phase re-adjust screw refering to instruction manual(except the model of "A3HG145/A3HG180").

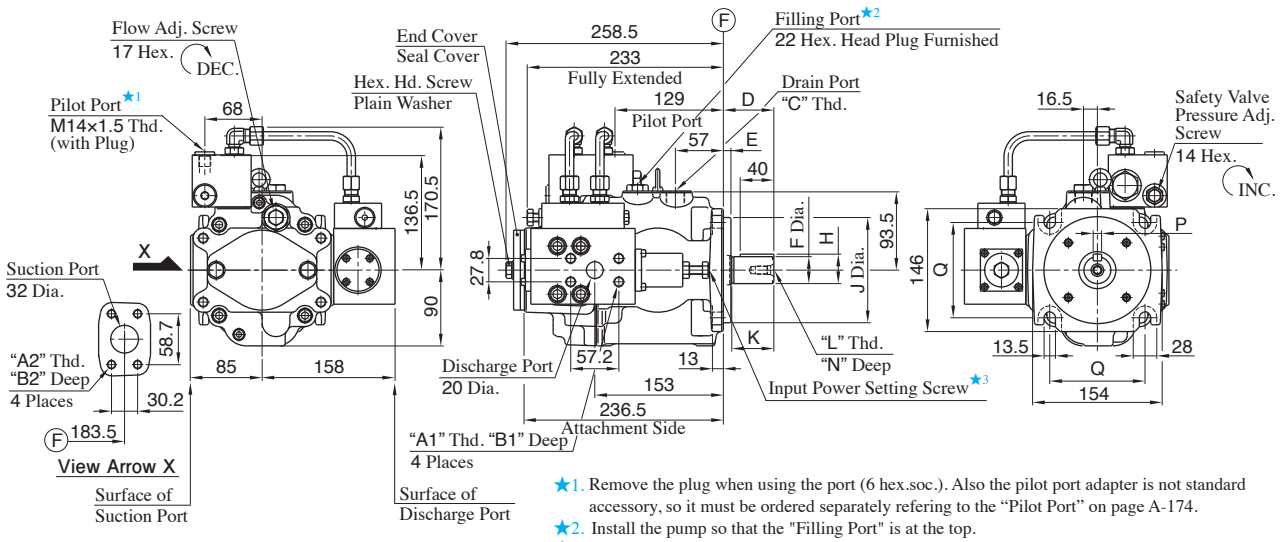
Flange Mtg. Two Bolts:A3HG37-FR09V*-K-E1C/E2C/U1C/U2C/J1C



★1. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★2. Install the pump so that the "Filling Port" is at the top.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	R	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG37-FR09V*-K-E1C/E2C	M12	M10	22	18	M22×1.5	52	9	36	$25^{+0.009}_{-0.004}$	$28^{+0.009}_{-0.294}$	$100^{0}_{-0.054}$	42	M8	19	$8^{0}_{-0.036}$	140	Conforms to ISO 3019-2	Metric	Metric
A3HG37-FR09V*-K-U1C	7/16-14 UNC		20		G 1/2	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38	1/4-20 UNC	16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Unified	Unified
A3HG37-FR09V*-K-U2C	M12	M10	22	18	G 1/2	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	BSPP	Metric
A3HG37-FR09V*-K-J1C	M12	M10	22	18	G 1/2	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg. Four Bolts:A3HG37-FR09V*-K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★2. Install the pump so that the "Filling Port" is at the top.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG37-FR09V*-K-E1D/E2D	M12	M10	22	18	M22×1.5	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$125^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	113.2	Conforms to ISO 3019-2	Metric	Metric
A3HG37-FR09V*-K-U1D	7/16-14 UNC		20		G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Unified	Unified
A3HG37-FR09V*-K-U2D	M12	M10	22	18	G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	BSPP	Metric
A3HG37-FR09V*-K-J1D	M12	M10	22	18	G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Rc	Metric

Pilot Port

Pilot port is common to that of "A3HG16-FR07K-E1C/U1C/U2C/J1C" (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

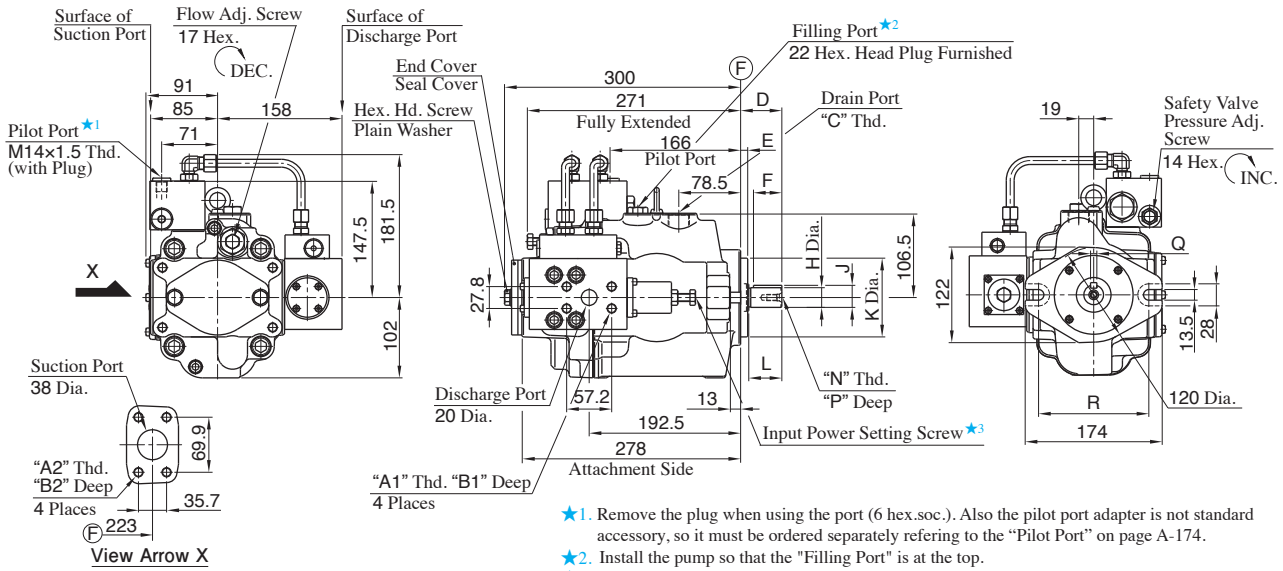
Drain Port

Drain port is common to that of pressure compensator model. Refer to page A-163 or A-164 for the dimensions of drain port.

Foot Mtg.:A3HG37-LR09V*-K-E1C/E2C/U1C/U2C/J1C, A3HG37-LR09V*-K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to pages A-163 and A-164 for the dimensions of mounting bracket.

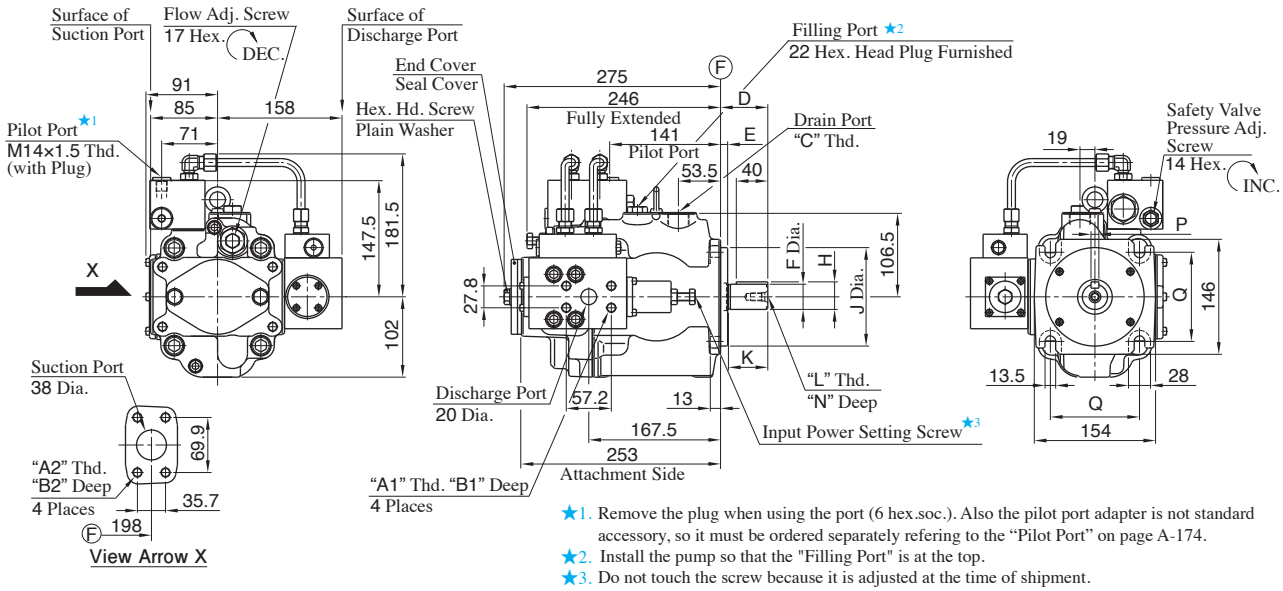
Flange Mtg. Two Bolts:A3HG56-FR09V*-K-E1C/E2C/U1C/U2C/J1C



★1. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★2. Install the pump so that the "Filling Port" is at the top.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	R	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG56-FR09V*-K-E1C/E2C	M12	M12	22	22	M27X2	52	9	36	$25^{+0.009}_{-0.004}$	$28^{+0.009}_{-0.294}$	$100^{0}_{-0.054}$	42	M8	19	$8^{0}_{-0.036}$	140	Conforms to ISO 3019-2	Metric	Metric
A3HG56-FR09V*-K-U1C	7/16-14 UNC	1/2-13UNC	20	21	G 3/4	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38	1/4-20 UNC	16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Unified	Unified
A3HG56-FR09V*-K-U2C	M12	M12	22	22	G 3/4	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	BSPP	Metric
A3HG56-FR09V*-K-J1C	M12	M12	22	22	G 3/4	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg. Four Bolts:A3HG56-FR09V*-K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★2. Install the pump so that the "Filling Port" is at the top.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG56-FR09V*-K-E1D/E2D	M12	M12	22	22	M27X2	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$125^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	113.2	Conforms to ISO 3019-2	Metric	Metric
A3HG56-FR09V*-K-U1D	7/16-14 UNC	1/2-13UNC	20	21	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Unified	Unified
A3HG56-FR09V*-K-U2D	M12	M12	22	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	BSPP	Metric
A3HG56-FR09V*-K-J1D	M12	M12	22	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Rc	Metric

Pilot Port

Pilot port is common to that of "A3HG16-FR07K-E1C/U1C/U2C/J1C" (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

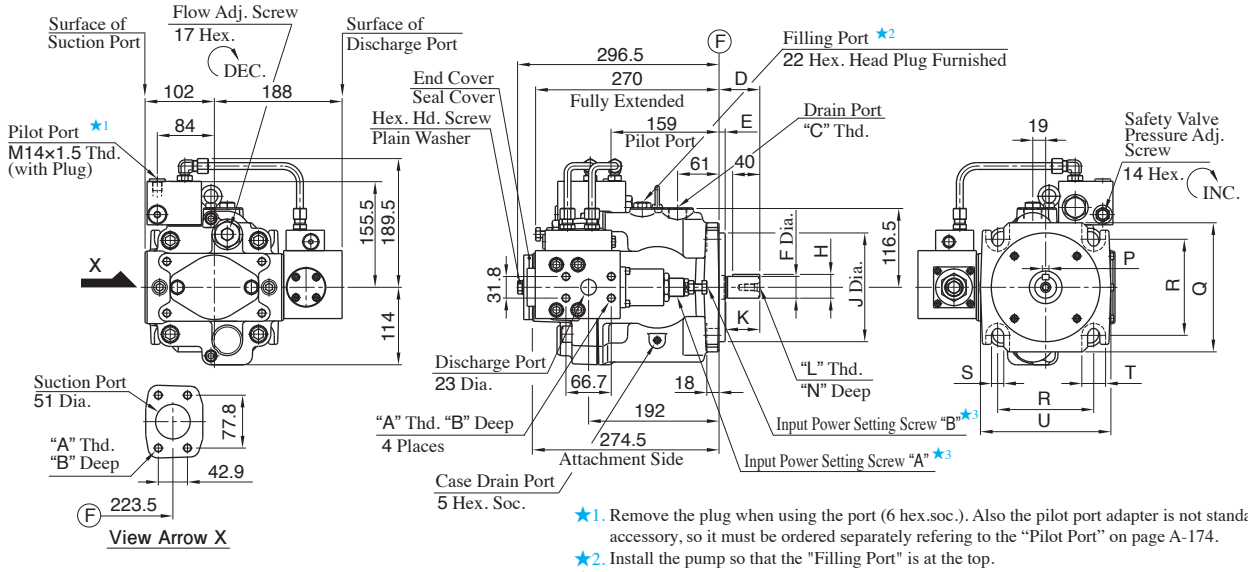
Drain Port

Drain port is common to that of pressure compensator model.Refer to page A-165 or A-166 for the dimensions of drain port.

Foot Mtg.:A3HG56-LR09V*-K-E1C/E2C/U1C/U2C/J1C, A3HG56-LR09V*-K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to pages A-165 and A-166 for the dimensions of mounting bracket.

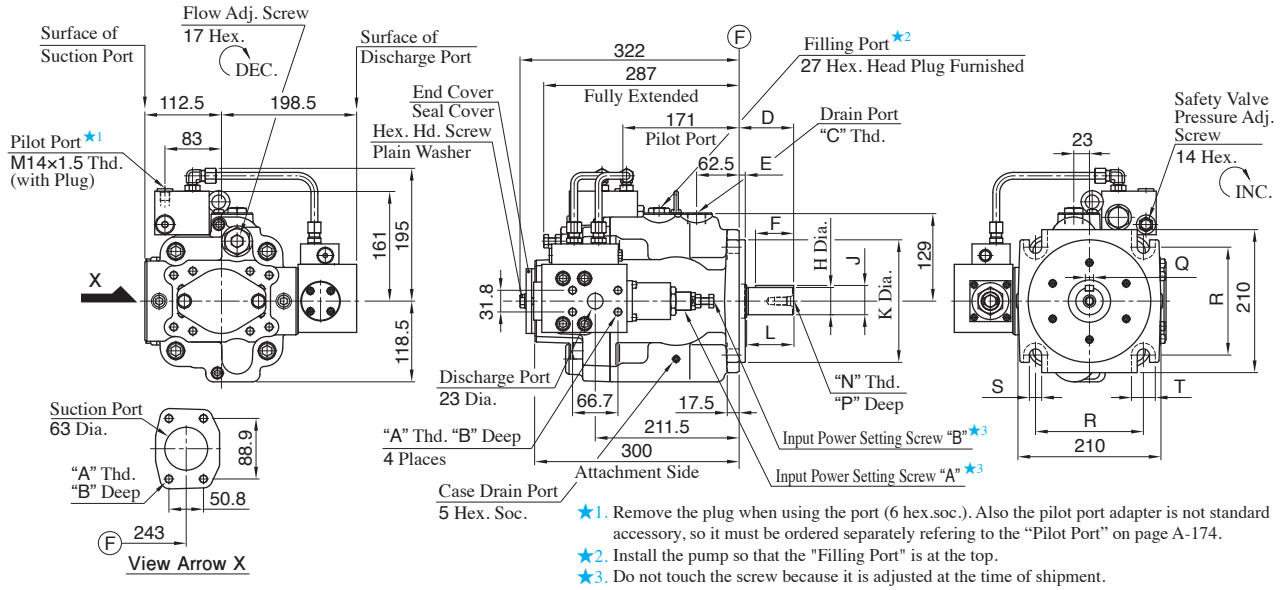
Flange Mtg.:A3HG71-FR09V*-K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★2. Install the pump so that the "Filling Port" is at the top.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	U	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG71-FR09V*-K-E1D/E2D	M12	22	M27X2	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$160^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	190	141.4	18	35	192	Conforms to ISO 3019-2	Metric	Metric
A3HG71-FR09V*-K-U1D	1/2-13 UNC	21	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	Unified	Unified
A3HG71-FR09V*-K-U2D	M12	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	BSPP	Metric
A3HG71-FR09V*-K-J1D	M12	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg.:A3HG100-FR09V*-K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★2. Install the pump so that the "Filling Port" is at the top.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG100-FR09V*-K-E1D/E2D	M12	22	M27X2	80	9	56	$40^{+0.018}_{+0.002}$	$43^{+0.018}_{-0.288}$	$180^{0}_{-0.063}$	70	M12	28	$12^{0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG100-FR09V*-K-U1D	1/2-13 UNC	21	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54	7/16-14 UNC	28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG100-FR09V*-K-U2D	M12	22	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54		28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG100-FR09V*-K-J1D	M12	22	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54		28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Pilot Port

Pilot port is common to that of "A3HG16-FR07K-E1C/U1C/U2C/J1C" (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

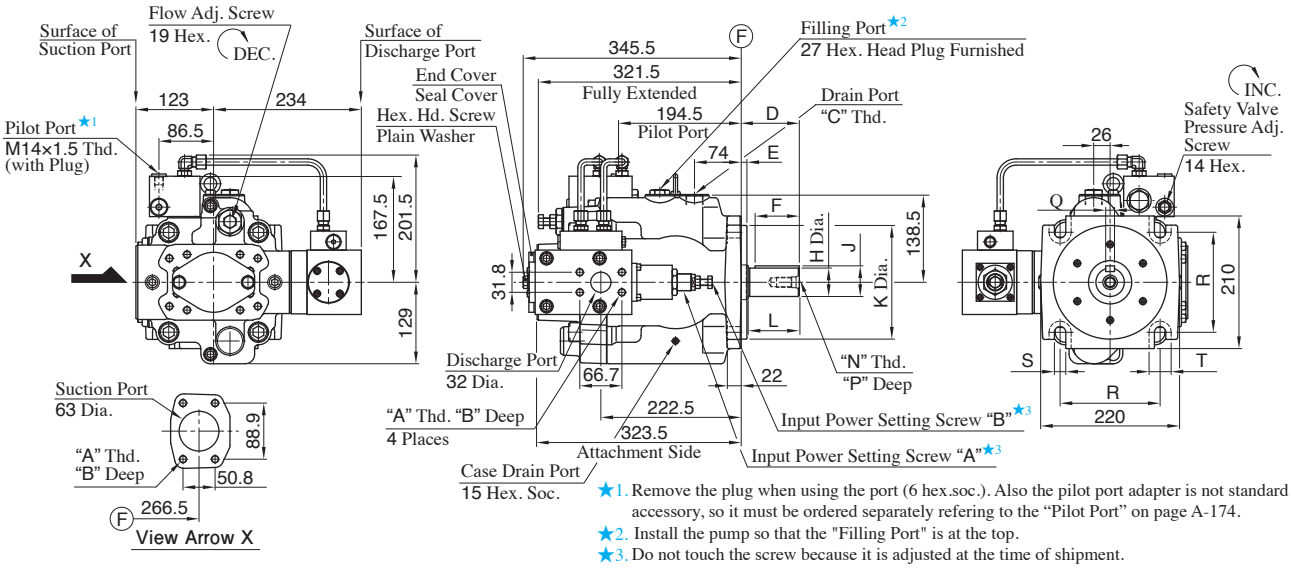
Drain Port

Drain port is common to that of pressure compensator model. Refer to page A-167 or A-168 for the dimensions of drain port.

Foot Mtg.:A3HG71-LR09V*-K-E1D/E2D/U1D/U2D/J1D, A3HG100-LR09V*-K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to pages A-167 and A-168 for the dimensions of mounting bracket.

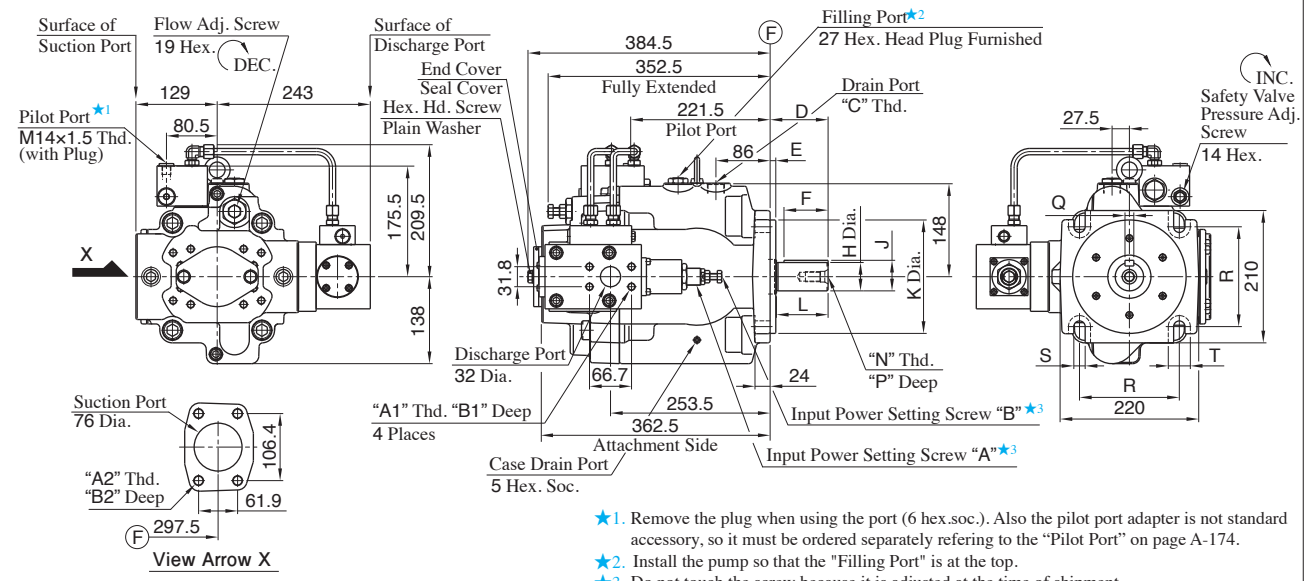
Flange Mtg.:A3HG145-FR09V*-K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★2. Install the pump so that the "Filling Port" is at the top.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG145-FR09V*-K-E1D/E2D	M12	22	M27×2	92	9	70	$45^{+0.018}_{+0.002}$	$48.5^{+0.018}_{-0.288}$	$180^{0}_{-0.063}$	82	M16	36	$14^{0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG145-FR09V*-K-U1D	1/2-13 UNC	21	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67	1/2-13 UNC	32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG145-FR09V*-K-U2D	M12	22	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67		32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG145-FR09V*-K-J1D	M12	22	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67		32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg.:A3HG180-FR09V*-K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★2. Install the pump so that the "Filling Port" is at the top.
★3. Do not touch the screw because it is adjusted at the time of shipment.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG180-FR09V*-K-E1D/E2D	M12	M16	22	29	M27×2	92	9	70	$45^{+0.018}_{+0.002}$	$48.5^{+0.018}_{-0.288}$	$180^{0}_{-0.063}$	82	M16	36	$14^{0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG180-FR09V*-K-U1D	1/2-13 UNC	5/8-11 UNC	21	29	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67		32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG180-FR09V*-K-U2D	M12	M16	22	29	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67	1/2-13 UNC	32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG180-FR09V*-K-J1D	M12	M16	22	29	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67		32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Pilot Port

Pilot port is common to that of "A3HG16-FR07K-E1C/U1C/U2C/J1C" (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

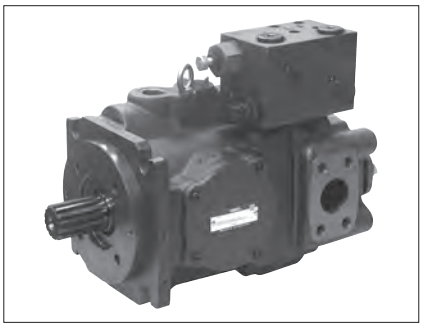
Drain Port

Drain port is common to that of pressure compensator model. Refer to page A-169 or A-170 for the dimensions of drain port.

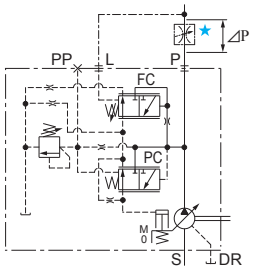
Foot Mtg.:A3HG145-LR09V*-K-E1D/E2D/U1D/U2D/J1D, A3HG180-LR09V*-K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to pages A-169 and A-170 for the dimensions of mounting bracket.

A3HG Series High Pressure Variable Displacement Piston Pumps Load Sensing Type



Graphic Symbol



★ A flow control valve is not included with the pump. Install the valve separately.

Specifications

Model Numbers	Geometric Displacement cm³/rev	Operating Pressure★1 MPa		Load Sensing Pres. Difference ΔP MPa	Shaft Speed Range r/min		Approx. Mass kg	
		Rated	Intermittent		Max.★3	Min.	Flange Mtg.	Foot Mtg.
A3HG16-＊R14＊-＊C-11	16.3	31.5	35	1.5★2 (At the time of shipment)	3600	600	19.5	23.5
A3HG37-＊R14＊-＊C-11	37.1				2700	600	29	37.5
A3HG37-＊R14＊-＊D-11								36.5
A3HG56-＊R14＊-＊C-11	56.3				2500	600	37	45.5
A3HG56-＊R14＊-＊D-11							35	42.5
A3HG71-＊R14＊-E1D/E2D-11	70.7				2300	600	47.5	73.5
A3HG71-＊R14＊-U1D/U2D/J1D-11							44	51.5
A3HG100-＊R14K-E1D/E2D-11	100.5				2100	600	59	84
A3HG100-＊R14SP＊-E1D/E2D-11							58.5	83.5
A3HG100-＊R14＊-U1D/U2D/J1D-11							58.5	85.5
A3HG145-＊R14K-E1D/E2D-11	145.2				1800	600	71	97
A3HG145-＊R14SP＊-E1D/E2D-11							70.5	96.5
A3HG145-＊R14＊-U1D/U2D/J1D-11							70.5	98
A3HG180-＊R14K-E1D/E2D-11	180.7				1800	600	90.5	116.5
A3HG180-＊R14SP＊-E1D/E2D-11							90	116
A3HG180-＊R14＊-U1D/U2D/J1D-11							90	117.5

★1. The operating pressure means pump discharge pressure.
★2. Load pressure difference is adjustable in range of 1.0 -3.0 MPa
★3. The maximum shaft speeds shown in the above table are at suction pressure 0 kPa.

Model Number Designation

A3HG16	-F	R	14	K	-E1	D	-11
Series Number	Mounting	Direction of Rotation	Control Type	Shaft Extension	Main Pump Mtg. Flange Connecting Port / Pipe Flange Thread Second Pump Mtg.	Number of Pump Mtg. Bolts	Design Number
A3HG16 (16.3 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise (Normal)	14: Load Sensing Type	K: Keyed Shaft SP: Splined Shaft (High Torque) SP1: Splined Shaft (Conforms to ISO 3019-1)		C: 2	11
A3HG37 (37.1 cm³/rev)						C: 2 D: 4	11
A3HG56 (56.3 cm³/rev)							11
A3HG71 (70.7 cm³/rev)						D: 4	11
A3HG100 (100.5 cm³/rev)							11
A3HG145 (145.2 cm³/rev)							11
A3HG180 (180.7 cm³/rev)							11

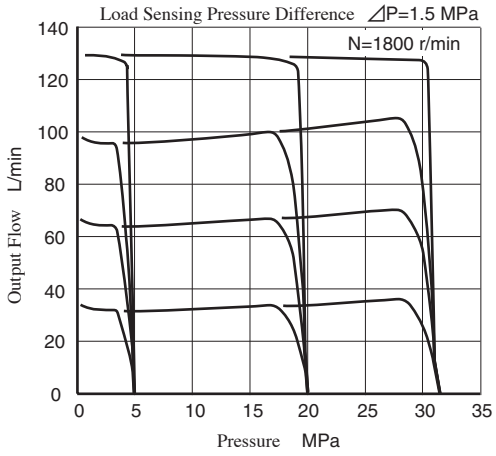
Code	Main Pump Mtg. Flange	Connecting Port	Pipe Flange Thread	Second Pump Mtg.
E1	ISO 3019-2	Metric	Metric	ISO 3019-2
E2	ISO 3019-2	Metric	Metric	ISO 3019-1
U1	ISO 3019-1	Unified	Unified	ISO 3019-1
U2	ISO 3019-1	BSPP	Metric	ISO 3019-1
J1	ISO 3019-1	Rc	Metric	ISO 3019-1

Pipe Flange Kits

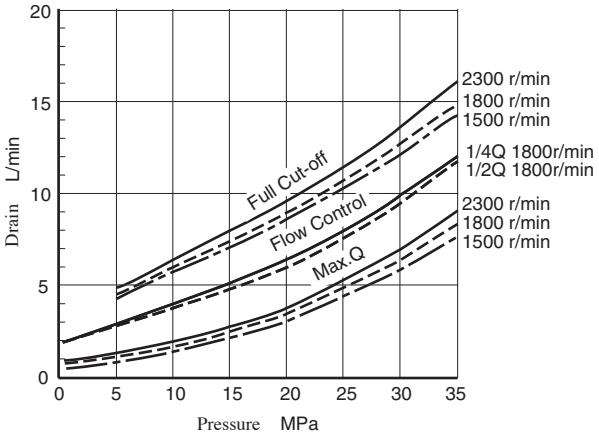
Pipe flange mouting surface conforms to SAE J 518, 4 bolt split flange.
Pipe flange kits are not available. Contact us for the details.

Typical Performance Characteristics of Type **"A3HG71"** at Viscosity 32 mm²/s [ISO VG32 Oils, 40°C]

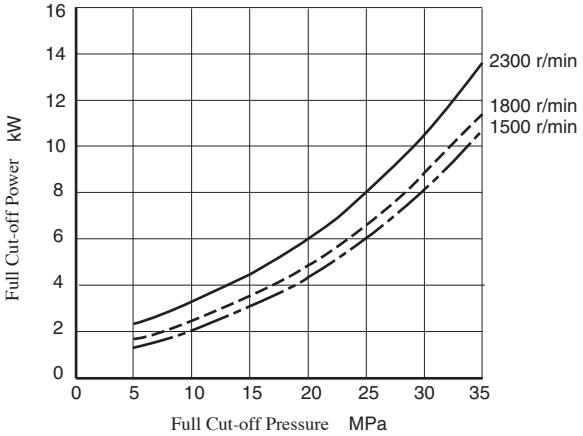
Pressure vs. Output Flow



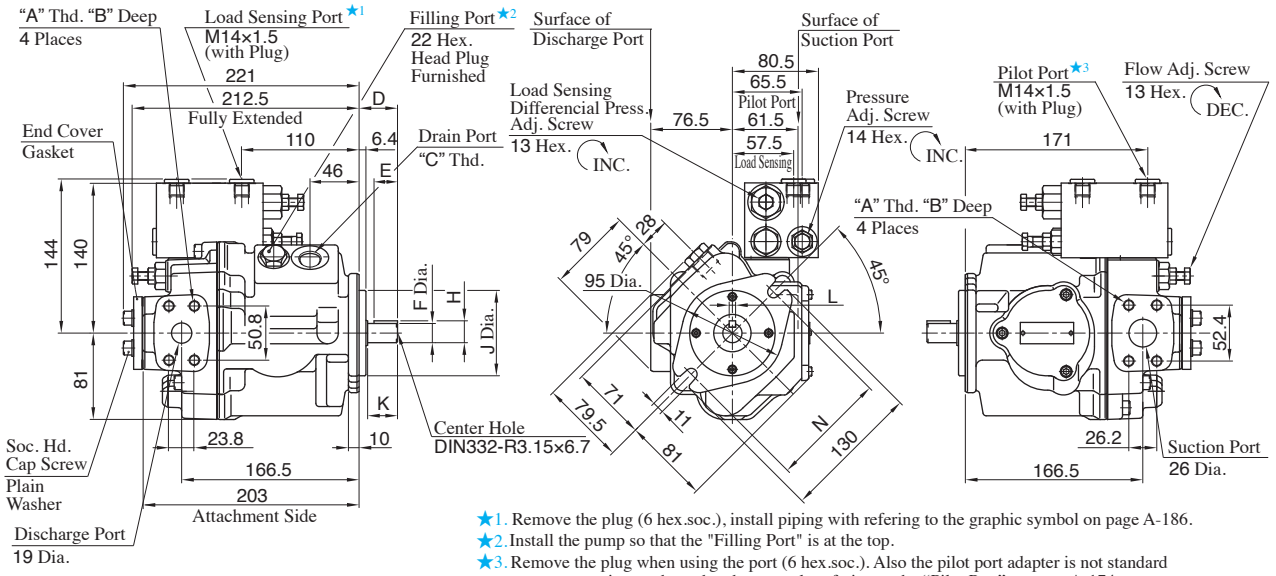
Drain



Full Cut-off Power



Flange Mtg.:A3HG16-FR14K-E1C/U1C/U2C/J1C



★1. Remove the plug (6 hex.soc.), install piping with refering to the graphic symbol on page A-186.
★2. Install the pump so that the "Filling Port" is at the top.
★3. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG16-FR14K-E1C	M10	19	M22×1.5	36	22	$18^{+0.008}_{-0.003}$	$20.5^{+0.008}_{-0.133}$	$80^{0}_{-0.046}$	28	$6^{0}_{-0.03}$	109	Conforms to ISO 3019-2	Metric	Metric
A3HG16-FR14K-U1C	3/8-16 UNC	17	G 1/2	41	28	$19.05^{0}_{-0.03}$	$21.24^{0}_{-0.16}$	$82.55^{0}_{-0.05}$	33	$4.76^{+0.03}_{0}$	106	Conforms to ISO 3019-1	Unified	Unified
A3HG16-FR14K-U2C	M10	19	G 1/2	41	28	$19.05^{0}_{-0.03}$	$21.24^{0}_{-0.16}$	$82.55^{0}_{-0.05}$	33	$4.76^{+0.03}_{0}$	106	Conforms to ISO 3019-1	BSPP	Metric
A3HG16-FR14K-J1C	M10	19	G 1/2	41	28	$19.05^{0}_{-0.03}$	$21.24^{0}_{-0.16}$	$82.55^{0}_{-0.05}$	33	$4.76^{+0.03}_{0}$	106	Conforms to ISO 3019-1	Rc	Metric

Load Sensing Port/Pilot Port

Load sensing port is common to that of pilot port (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

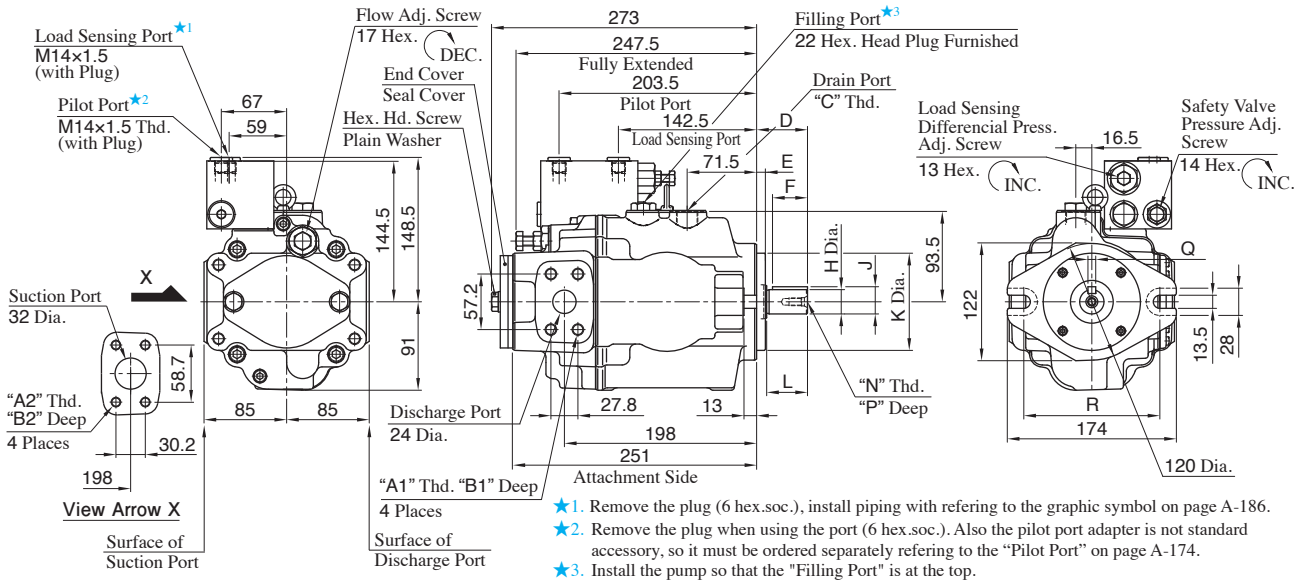
Drain Port

Drain port is common to that of pressure compensator model. Refer to page A-162 for the dimensions of drain port.

Foot Mtg.:A3HG16-LR14K-E1C/U1C/U2C/J1C

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to page A-162 for the dimensions of mounting bracket.

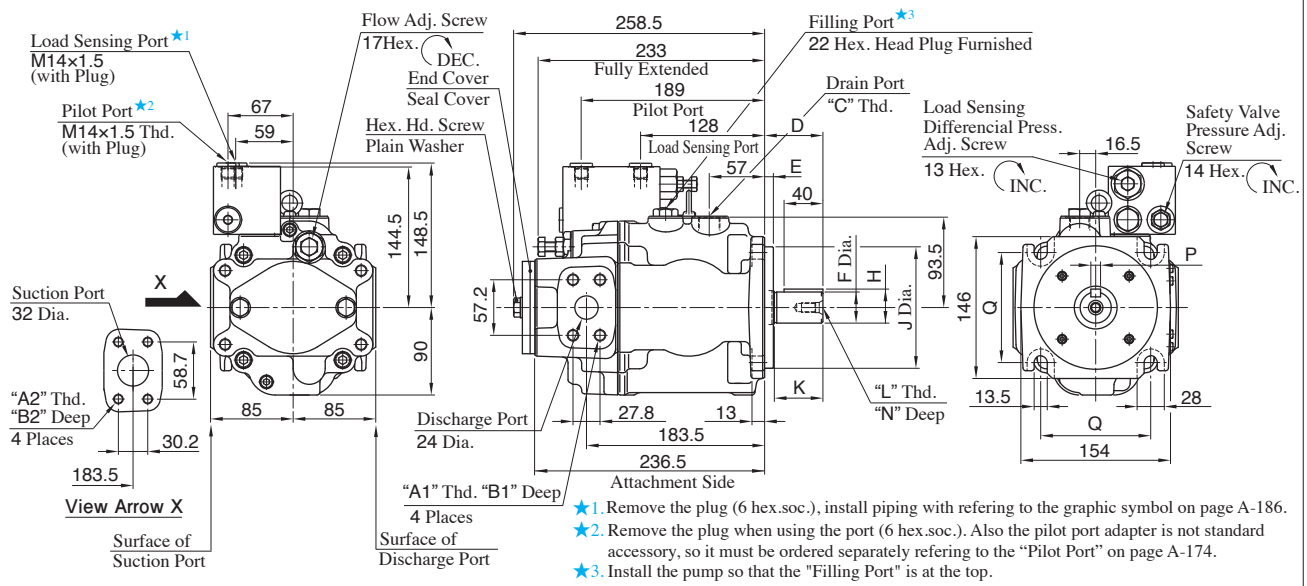
Flange Mtg. Two Bolts:A3HG37-FR14K-E1C/E2C/U1C/U2C/J1C



★1. Remove the plug (6 hex.soc.), install piping with refering to the graphic symbol on page A-186.
★2. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★3. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	R	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG37-FR14K-E1C/E2C	M12	M10	22	18	M22×1.5	52	9	36	$25^{+0.009}_{-0.004}$	$28^{+0.009}_{-0.294}$	$100^{0}_{-0.054}$	42	M8	19	$8^{0}_{-0.036}$	140	Conforms to ISO 3019-2	Metric	Metric
A3HG37-FR14K-U1C	7/16-14 UNC		20		G 1/2	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38	1/4-20 UNC	16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Unified	Unified
A3HG37-FR14K-U2C	M12	M10	22	18	G 1/2	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	BSPP	Metric
A3HG37-FR14K-J1C	M12	M10	22	18	G 1/2	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg. Four Bolts:A3HG37-FR14K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the graphic symbol on page A-186.
★2. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★3. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG37-FR14K-E1D/E2D	M12	M10	22	18	M22×1.5	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$125^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	113.2	Conforms to ISO 3019-2	Metric	Metric
A3HG37-FR14K-U1D	7/16-14 UNC		20		G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Unified	Unified
A3HG37-FR14K-U2D	M12	M10	22	18	G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	BSPP	Metric
A3HG37-FR14K-J1D	M12	M10	22	18	G 1/2	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Rc	Metric

Load Sensing Port/Pilot Port

Load sensing port is common to that of pilot port (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

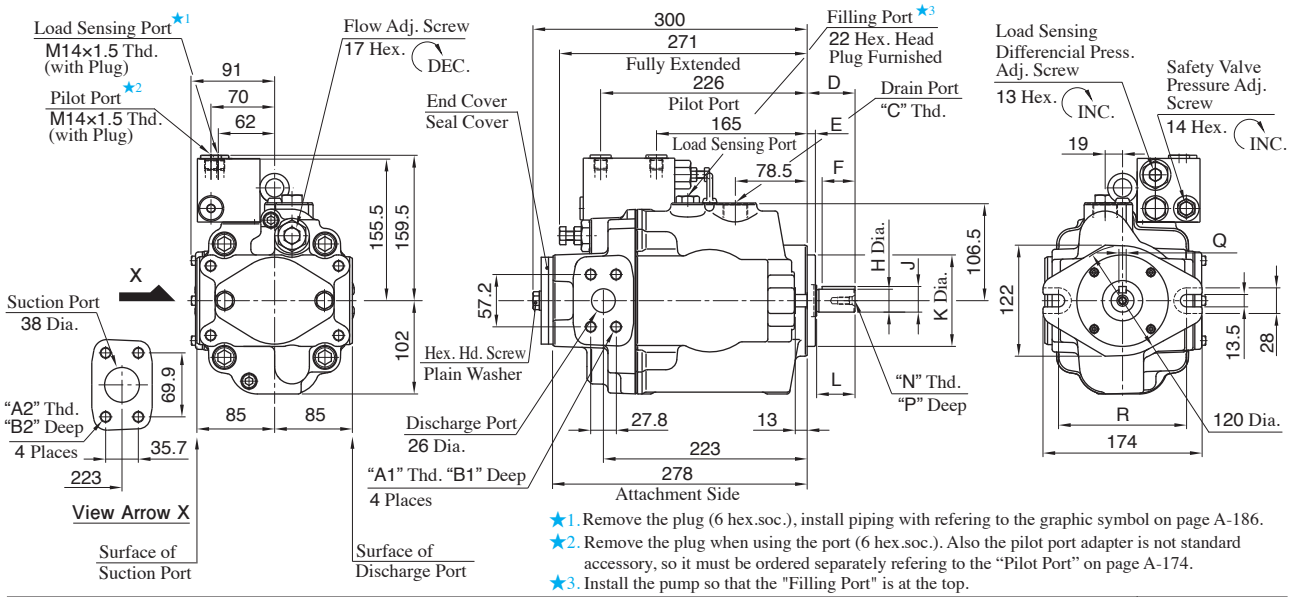
Drain Port

Drain port is common to that of pressure compensator model. Refer to page A-163 or A-164 for the dimensions of drain port.

Foot Mtg.:A3HG37-LR14K-E1C/E2C/U1C/U2C/J1C, A3HG37-LR14K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to pages A-163 and A-164 for the dimensions of mounting bracket.

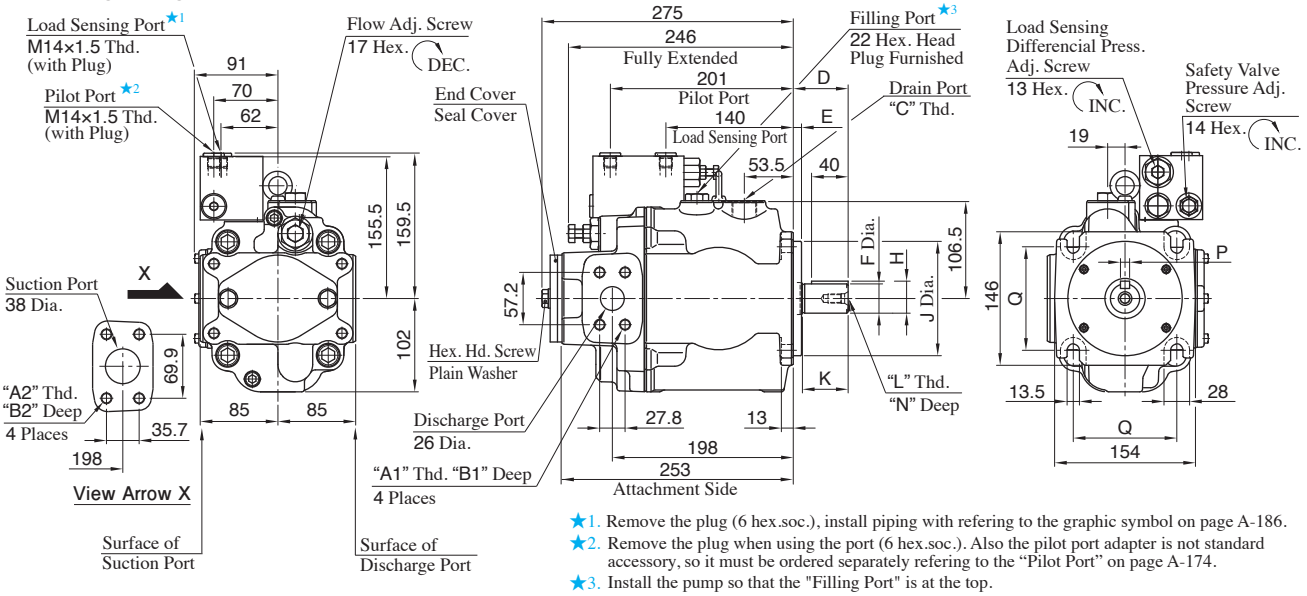
Flange Mtg. Two Bolts:A3HG56-FR14K-E1C/E2C/U1C/U2C/J1C



★1. Remove the plug (6 hex.soc.), install piping with refering to the graphic symbol on page A-186.
★2. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★3. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	R	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG56-FR14K-E1C/E2C	M12	M12	22	22	M27×2	52	9	36	$25^{+0.009}_{-0.004}$	$28^{+0.009}_{-0.294}$	$100^{0}_{-0.054}$	42	M8	19	$8^{0}_{-0.036}$	140	Conforms to ISO 3019-2	Metric	Metric
A3HG56-FR14K-U1C	7/16-14 UNC	1/2-13UNC	20	21	G 3/4	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38	1/4-20 UNC	16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Unified	Unified
A3HG56-FR14K-U2C	M12	M12	22	22	G 3/4	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	BSPP	Metric
A3HG56-FR14K-J1C	M12	M12	22	22	G 3/4	46	9.7	32	$25.4^{0}_{-0.05}$	$28.18^{0}_{-0.18}$	$101.6^{0}_{-0.05}$	38		16	$6.35^{+0.03}_{0}$	146	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg. Four Bolts:A3HG56-FR14K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the graphic symbol on page A-186.
★2. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★3. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A1	A2	B1	B2	C	D	E	F	H	J	K	L	N	P	Q	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG56-FR14K-E1D/E2D	M12	M12	22	22	M27×2	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$125^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	113.2	Conforms to ISO 3019-2	Metric	Metric
A3HG56-FR14K-U1D	7/16-14 UNC	1/2-13UNC	20	21	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Unified	Unified
A3HG56-FR14K-U2D	M12	M12	22	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	BSPP	Metric
A3HG56-FR14K-J1D	M12	M12	22	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	114.5	Conforms to ISO 3019-1	Rc	Metric

Load Sensing Port/Pilot Port

Load sensing port is common to that of pilot port (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

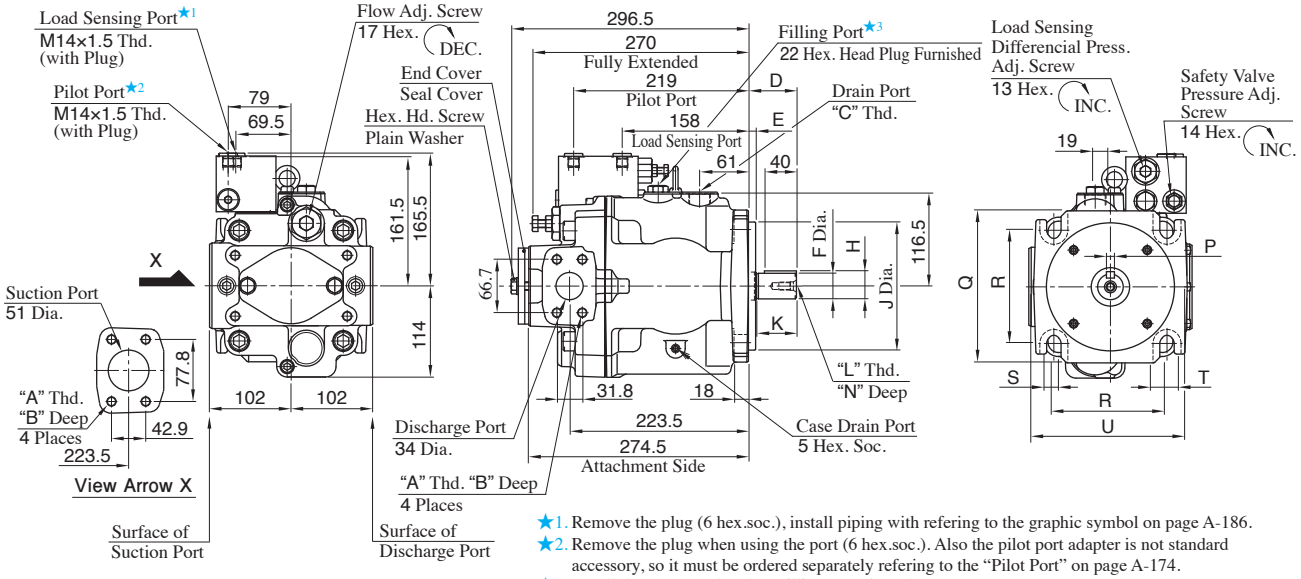
Drain Port

Drain port is common to that of pressure compensator model. Refer to page A-165 or A-166 for the dimensions of drain port.

Foot Mtg.:A3HG56-LR14K-E1C/E2C/U1C/U2C/J1C, A3HG56-LR14K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to pages A-165 and A-166 for the dimensions of mounting bracket.

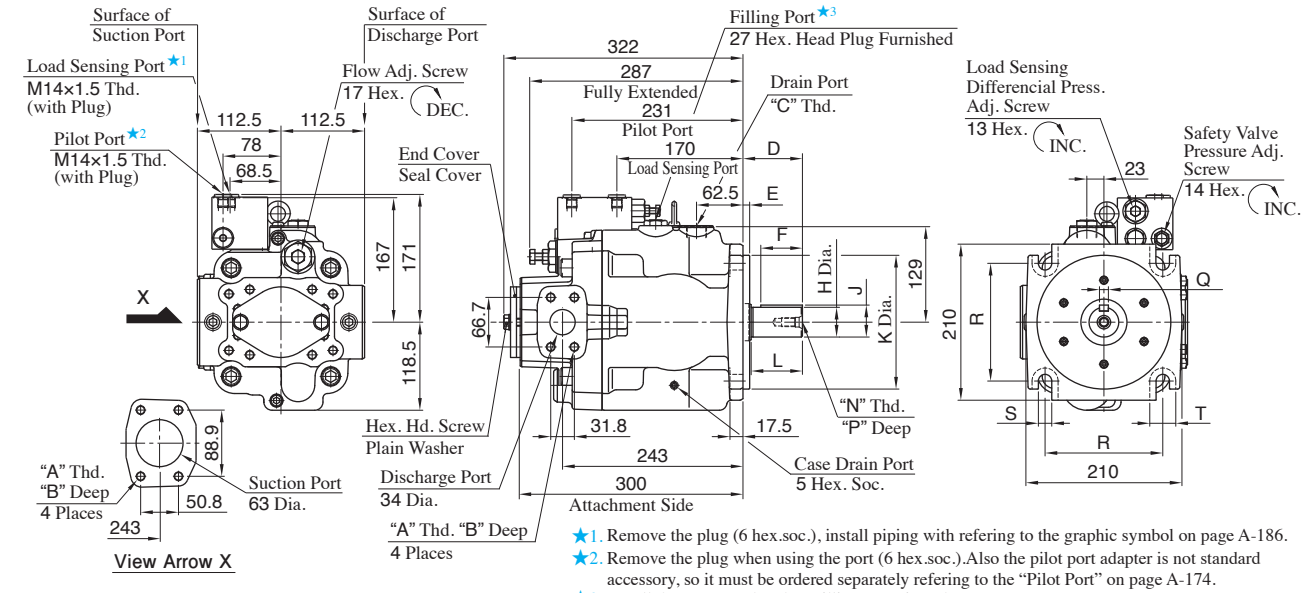
Flange Mtg.:A3HG71-FR14K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the graphic symbol on page A-186.
★2. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★3. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	U	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG71-FR14K-E1D/E2D	M12	22	M27×2	60	9	$32^{+0.018}_{+0.002}$	$35^{+0.018}_{-0.288}$	$160^{0}_{-0.063}$	50	M10	22	$10^{0}_{-0.036}$	190	141.4	18	35	192	Conforms to ISO 3019-2	Metric	Metric
A3HG71-FR14K-U1D	1/2-13 UNC	21	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48	5/16-18 UNC	19	$7.94^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	Unified	Unified
A3HG71-FR14K-U2D	M12	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	BSPP	Metric
A3HG71-FR14K-J1D	M12	22	G 3/4	56	12.7	$31.75^{0}_{-0.05}$	$35.32^{0}_{-0.18}$	$127^{0}_{-0.05}$	48		19	$7.94^{+0.03}_{0}$	143	114.5	13.5	28	155	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg.:A3HG100-FR14K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the graphic symbol on page A-186.
★2. Remove the plug when using the port (6 hex.soc.).Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★3. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG100-FR14K-E1D/E2D	M12	22	M27×2	80	9	56	$40^{+0.018}_{+0.002}$	$43^{+0.018}_{-0.288}$	$180^{0}_{-0.063}$	70	M12	28	$12^{0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG100-FR14K-U1D	1/2-13 UNC	21	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54		28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG100-FR14K-U2D	M12	22	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54	7/16-14 UNC	28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG100-FR14K-J1D	M12	22	G 3/4	62	12.7	45	$38.1^{0}_{-0.05}$	$42.36^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	54		28	$9.53^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Load Sensing Port/Pilot Port

Load sensing port is common to that of pilot port (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

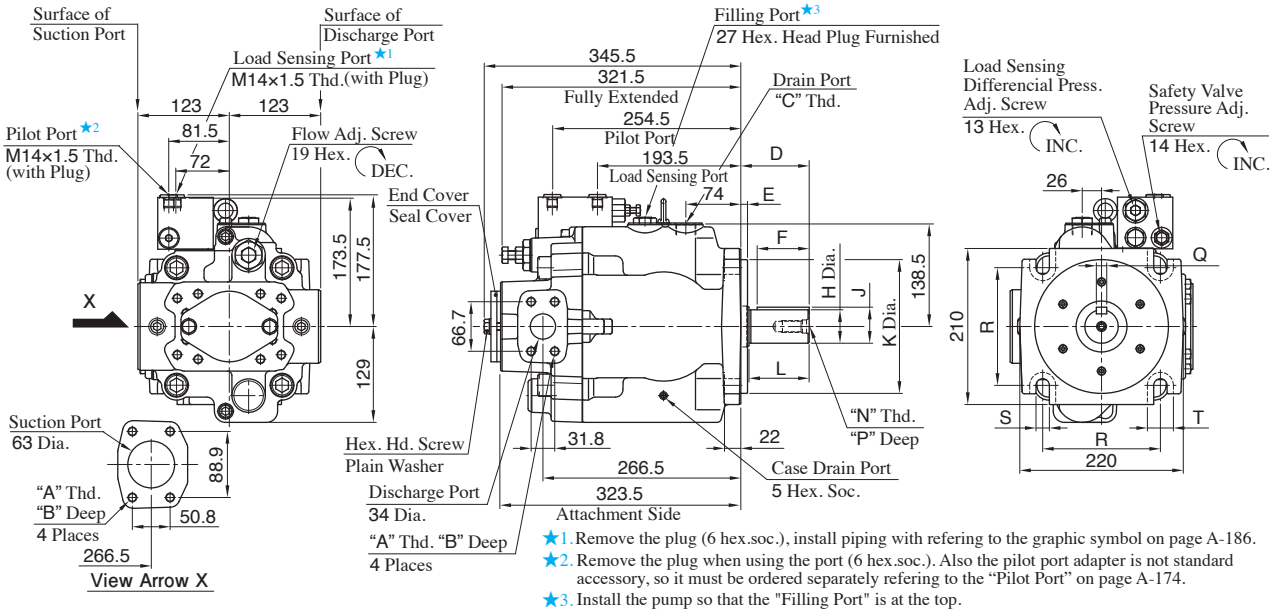
Drain Port

Drain port is common to that of pressure compensator model.Refer to page A-167 or A-168 for the dimensions of drain port.

Foot Mtg.:A3HG71-LR14K-E1D/E2D/U1D/U2D/J1D, A3HG100-LR14K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model (except max. height dimension).
Refer to pages A-167 and A-168 for the dimensions of mounting bracket.

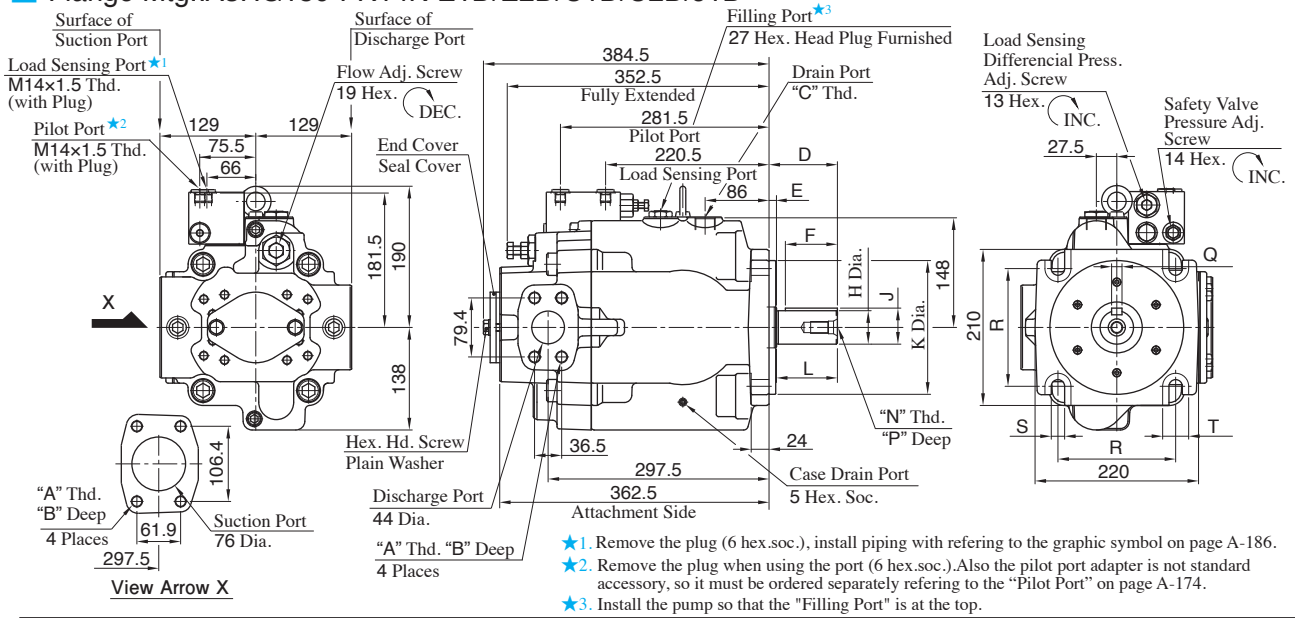
Flange Mtg.:A3HG145-FR14K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the graphic symbol on page A-186.
★2. Remove the plug when using the port (6 hex.soc.). Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★3. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG145-FR14K-E1D/E2D	M12	22	M27×2	92	9	70	$45^{+0.018}_{+0.002}$	$48.5^{+0.018}_{-0.288}$	$180^{0}_{-0.063}$	82	M16	36	$14^{0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG145-FR14K-U1D	1/2-13 UNC	21	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67	1/2-13 UNC	32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG145-FR14K-U2D	M12	22	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67		32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG145-FR14K-J1D	M12	22	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67		32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Flange Mtg.:A3HG180-FR14K-E1D/E2D/U1D/U2D/J1D



★1. Remove the plug (6 hex.soc.), install piping with refering to the graphic symbol on page A-186.
★2. Remove the plug when using the port (6 hex.soc.).Also the pilot port adapter is not standard accessory, so it must be ordered separately refering to the "Pilot Port" on page A-174.
★3. Install the pump so that the "Filling Port" is at the top.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	R	S	T	Mounting Flange	Connecting Port	Pipe Flange Threads
A3HG180-FR14K-E1D/E2D	M16	29	M27×2	92	9	70	$45^{+0.018}_{+0.002}$	$48.5^{+0.018}_{-0.288}$	$180^{0}_{-0.063}$	82	M16	36	$14^{0}_{-0.043}$	158.4	18	35	Conforms to ISO 3019-2	Metric	Metric
A3HG180-FR14K-U1D	5/8-11 UNC	29	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67	1/2-13 UNC	32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Unified	Unified
A3HG180-FR14K-U2D	M16	29	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67		32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	BSPP	Metric
A3HG180-FR14K-J1D	M16	29	G 3/4	75	12.7	56	$44.45^{0}_{-0.05}$	$49.39^{0}_{-0.18}$	$152.4^{0}_{-0.05}$	67		32	$11.11^{+0.03}_{0}$	161.6	21.5	39	Conforms to ISO 3019-1	Rc	Metric

Load Sensing Port/Pilot Port

Load sensing port is common to that of pilot port (except the height dimension from the center of the pump).
Refer to page A-174 for the dimensions of pilot port.

Drain Port

Drain port is common to that of pressure compensator model. Refer to page A-169 or A-170 for the dimensions of drain port.

Foot Mtg.:A3HG145-LR14K-E1D/E2D/U1D/U2D/J1D, A3HG180-LR14K-E1D/E2D/U1D/U2D/J1D

Mounting bracket is common to that of pressure compensator model.
Refer to pages A-169 and A-170 for the dimensions of mounting bracket.

Mounting Interchangeability between Current and New Models

Load sensing type A3HG series piston pumps were remodeled to enhance the reliability of the products.

Major Changes

Control valves were changed.

Design Number

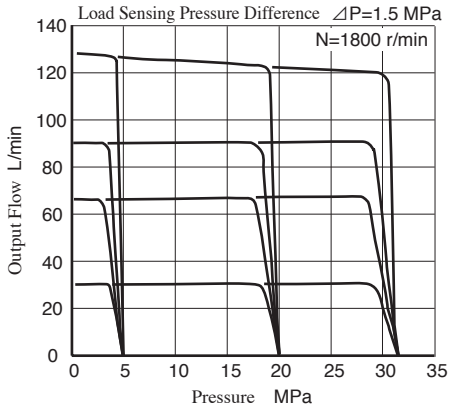
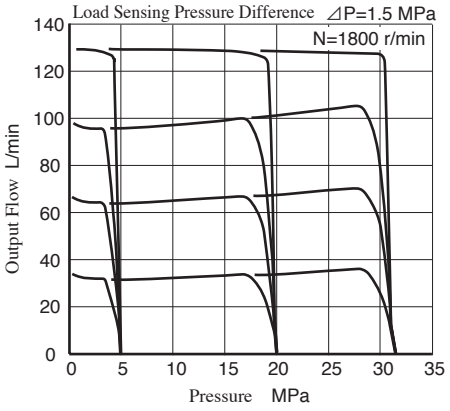
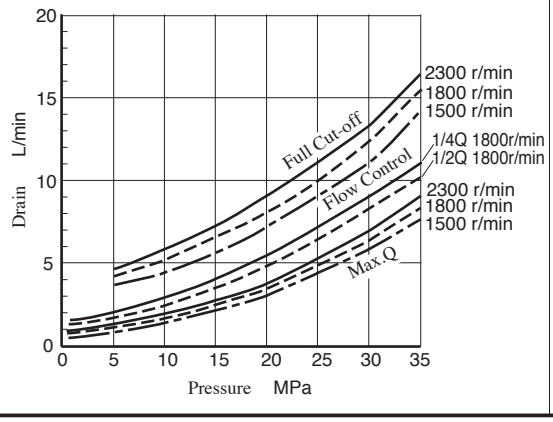
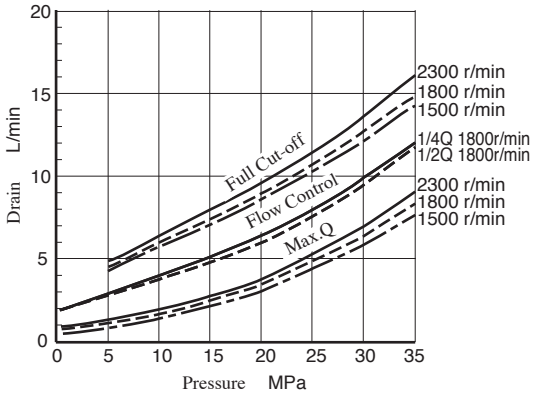
Design Number 10 → Design Number 11

Mounting Interchangeability

Not interchangeable

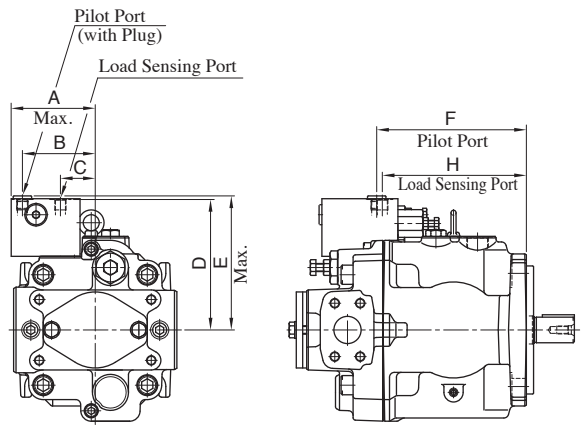
The mounting positions for a load sensing port and a pilot port are changed. See the following page for details.

Performance (Example : A3HG71)

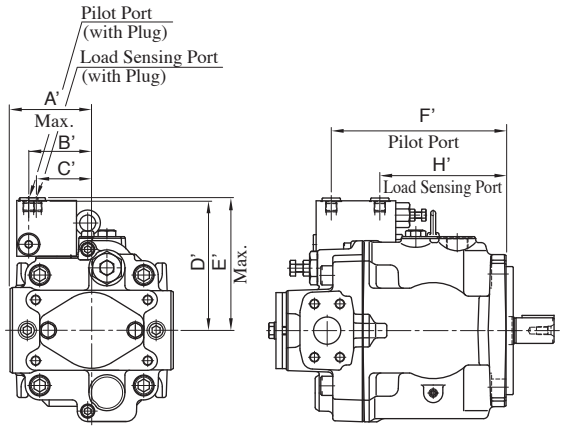
Name	Current Model	New Model
Pressure vs. Output Flow		
Drain		

Dimensions

Current Model



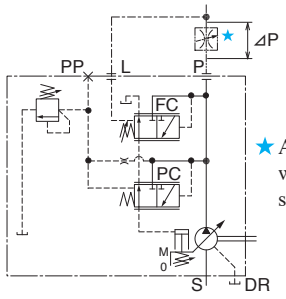
New Model



Current Model								New Model							
Model Numbers	A	B	C	D	E	F	H	Model Numbers	A'	B'	C'	D'	E'	F'	H'
A3HG16-*R14*-*C-10	89.5	75.5	31.5	142	146	138.5	131.5	A3HG16-*R14*-*C-11	80.5	65.5	57.5	140	144	171	110
A3HG37-*R14*-*C-10	91	77	33	146.5	150.5	171	164	A3HG37-*R14*-*C-11	85	67	59	144.5	148.5	203.5	142.5
A3HG37-*R14*-*D-10	91	77	33	146.5	150.5	156.5	149.5	A3HG37-*R14*-*D-11	85	67	59	144.5	148.5	189	128
A3HG56-*R14*-*C-10	94	80	36	157.5	161.5	193.5	186.5	A3HG56-*R14*-*C-11	91	70	62	155.5	159.5	226	165
A3HG56-*R14*-*D-10	94	80	36	157.5	161.5	168.5	161.5	A3HG56-*R14*-*D-11	91	70	62	155.5	159.5	201	140
A3HG71-*R14*-*D-10	105	91	43.5	163.5	167.5	187	180	A3HG71-*R14*-*D-11	102	79	69.5	161.5	165.5	219	158
A3HG100-*R14*-*D-10	112.5	90	42.5	169	173	199	192	A3HG100-*R14*-*D-11	112.5	78	68.5	167	171	231	170
A3HG145-*R14*-*D-10	123	93.5	46	175.5	179.5	222.5	215.5	A3HG145-*R14*-*D-11	123	81.5	72	173.5	177.5	254.5	193.5
A3HG180-*R14*-*D-10	129	87.5	40	183.5	190	249.5	242.5	A3HG180-*R14*-*D-11	129	75.5	66	181.5	190	281.5	220.5

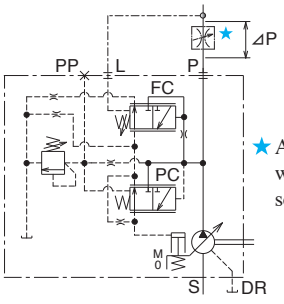
Graphic Symbols

Current Model



★A flow control valve is not included with the pump. Install the valve separately.

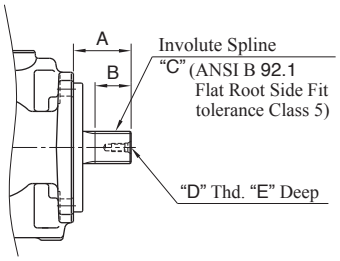
New Model



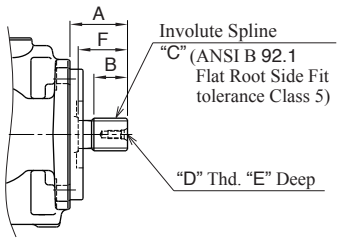
★A flow control valve is not included with the pump. Install the valve separately.

Splined Shaft End

Flange Mtg.:A3HG＊-FR＊＊SP



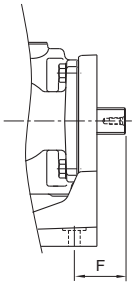
Flange Mtg.:A3HG＊-FR＊＊SP1



Model Numbers	A	B	C	D	E	F★
A3HG16-FR＊＊SP-＊C	38	19.5	11T-16/32DP	1/4-20 UNC	14	—
A3HG16-FR＊＊SP1-＊C	38	17.8	11T-16/32DP	1/4-20 UNC	14	30
A3HG37-FR＊＊SP-＊C	46	25	15T-16/32DP	1/4-20 UNC	16	—
A3HG37-FR＊＊SP1-＊C	46	23.2	15T-16/32DP	1/4-20 UNC	16	38
A3HG37-FR＊＊SP-＊D	56	35	14T-12/24DP	5/16-18 UNC	19	—
A3HG37-FR＊＊SP1-＊D	56	32.7	14T-12/24DP	5/16-18 UNC	19	48
A3HG56-FR＊＊SP-＊C	46	25	15T-16/32DP	1/4-20 UNC	16	—
A3HG56-FR＊＊SP1-＊C	46	23.2	15T-16/32DP	1/4-20 UNC	16	38
A3HG56-FR＊＊SP-＊D	56	35	14T-12/24DP	5/16-18 UNC	19	—
A3HG56-FR＊＊SP1-＊D	56	32.7	14T-12/24DP	5/16-18 UNC	19	48
A3HG71-FR＊＊SP-＊D	56	35	14T-12/24DP	5/16-18 UNC	19	—
A3HG71-FR＊＊SP1-＊D	56	32.7	14T-12/24DP	5/16-18 UNC	19	48
A3HG100-FR＊＊SP-＊D	62	38	17T-12/24DP	7/16-14 UNC	28	—
A3HG100-FR＊＊SP1-＊D	62	35.7	17T-12/24DP	7/16-14 UNC	28	54
A3HG145-FR＊＊SP-＊D	75	45	13T-8/16DP	1/2-13 UNC	32	—
A3HG145-FR＊＊SP1-＊D	75	41.7	13T-8/16DP	1/2-13 UNC	32	67
A3HG180-FR＊＊SP-＊D	75	45	13T-8/16DP	1/2-13 UNC	32	—
A3HG180-FR＊＊SP1-＊D	75	41.7	13T-8/16DP	1/2-13 UNC	32	67

★Frange/Port code:U1C/U2C/J1C or U1D/U2D/J1D

Foot Mtg.:A3HG＊-LR＊＊SP＊



Model Numbers	F
A3HG16-LR＊＊SP＊-＊C	35
A3HG37-LR＊＊SP＊-＊C	38
A3HG37-LR＊＊SP＊-＊D	61
A3HG56-LR＊＊SP＊-＊C	38
A3HG56-LR＊＊SP＊-＊D	61
A3HG71-LR＊＊SP＊-E1D	69
A3HG71-LR＊＊SP＊-U1D/U2D/J1D	61
A3HG100-LR＊＊SP＊-＊D	75
A3HG145-LR＊＊SP＊-＊D	28
A3HG180-LR＊＊SP＊-＊D	28

● For other dimensions, refer to "Flange Mtg.".

Second Pump

The through drive system allows a main pump to be used as a double pump with a connected second pump.

Connecting pump

1. Remove the end cover and seal cover.
2. Insert the O-ring, which is the attachment of seal cover, to the second pump of spigot joint part of boss.
3. Prepare the coupling and adapter (flange) separately and joint the second pump.

For the ISO 3019-1 pump mount flange, through drive kits with components required to connect a second pump, such as couplings and adapters (flanges), are available. For more details, refer to page A-197.

Allowable Input Torque

The maximum torque of pumps is limited by shaft and coupling assembly strength. When determining the second pump type, the value of the torque for a particular pump should not exceed the value shown in the table below.

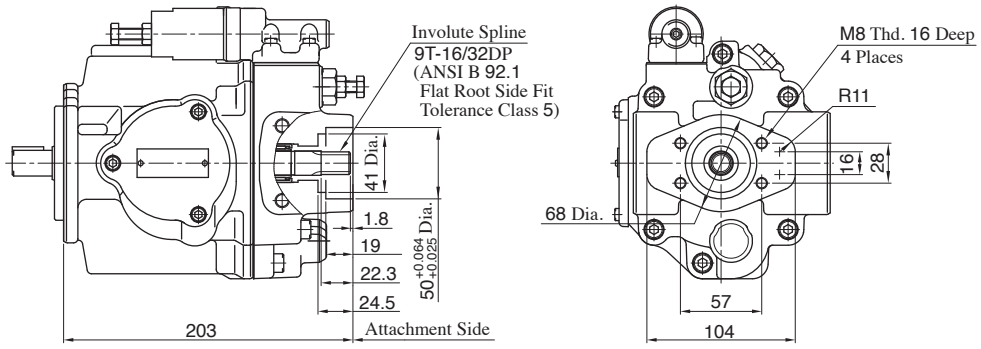
Model Numbers	Number of Pump Mtg. Bolts	(1)Allowable Input Torque T_1+T_2 Nm	(2)Second pump input torque T_2 Nm
A3HG16-＊R＊＊K-E1C	two	94 or less	87 or less
A3HG16-＊R＊＊K-U1C/U2C/J1C		135 or less	
A3HG16-＊R＊＊SP＊-＊C		136 or less	
A3HG37/56-＊R＊＊K-E1C/E2C	two	279 or less	—
A3HG37-＊R＊＊K-U1C/U2C/J1C A3HG56-＊R＊＊K-U1C/U2C/J1C		263 or less	
A3HG37/56-＊R＊＊SP＊-＊C		364 or less	297 or less
A3HG37/56/71-＊R＊＊K-E1D/E2D	four	451 or less	297 or less
A3HG37-＊R＊＊K-U1D/U2D/J1D A3HG56-＊R＊＊K-U1D/U2D/J1D A3HG71-＊R＊＊K-U1D/U2D/J1D		528 or less	
A3HG37/56/71-＊R＊＊SP-＊D		801 or less	
A3HG37/56/71-＊R＊＊SP1-＊D		783 or less	
A3HG100-＊R＊＊K-E1D/E2D	four	789 or less	609 or less
A3HG100-＊R＊＊K-U1D/U2D/J1D		852 or less	
A3HG100-＊R＊＊SP-＊D		1321 or less	
A3HG100-＊R＊＊SP1-＊D		1196 or less	
A3HG145/180-＊R＊＊K-E1D/E2D	four	1295 or less	609 or less
A3HG145-＊R＊＊K-U1D/U2D/J1D A3HG180-＊R＊＊K-U1D/U2D/J1D		1436 or less	
A3HG145/180-＊R＊＊SP-＊D		1965 or less	
A3HG145/180-＊R＊＊SP1-＊D		1686 or less	

★1. T_1: Main Pump Input Torque
T_2: Second Pump Input Torque
Torque Formula

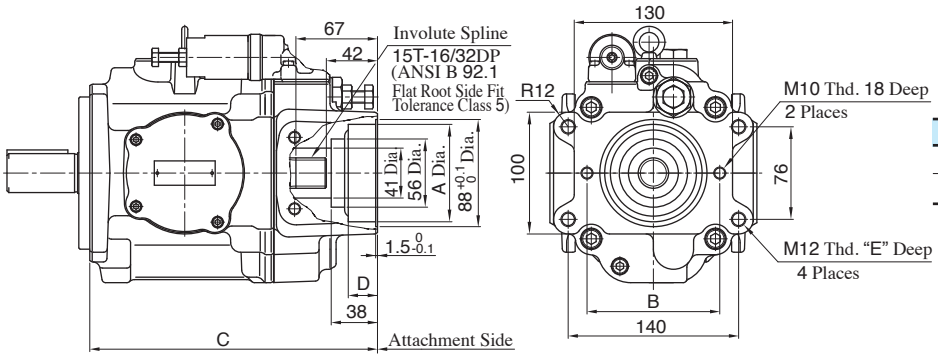
$$T=\frac{P\times q}{2\pi}$$ T: Input Torque [Nm] P: Pressure [MPa] q: Displacement [cm^3/rev]

★2. For selection of the appropriate pump, both values, (1) and (2), should be satisfied.

A3HG16



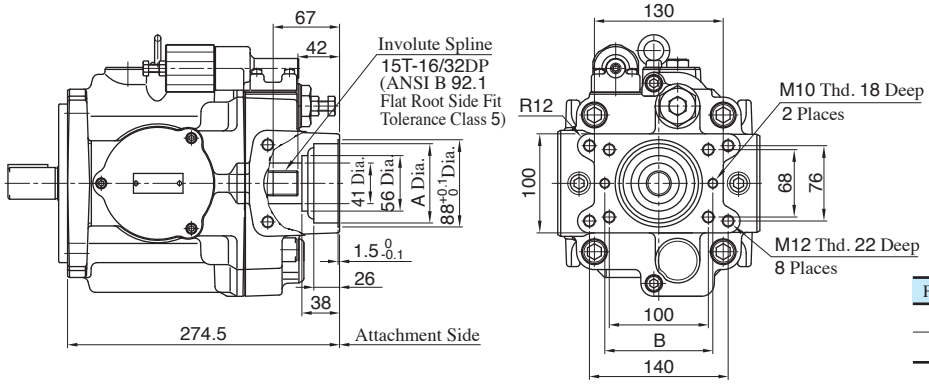
A3HG37/A3HG56



Flange/Port Code	A	B
E1	80 +0.076 +0.030 Dia.	109
E2/U1/U2/J1	82.55 +0.090 +0.036 Dia.	106

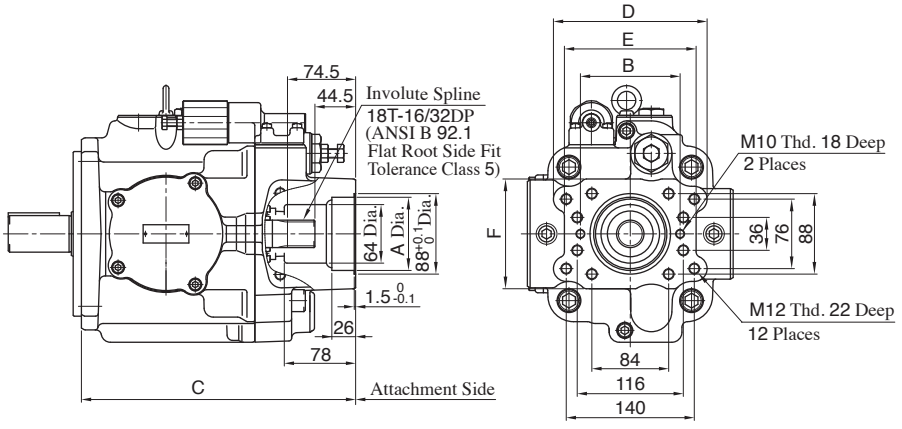
Model Numbers	C	D	E
A3HG37-*R***-*C	251	24	22
A3HG37-*R***-*D	236.5		
A3HG56-*R***-*C	278	28	19
A3HG56-*R***-*D	253		

A3HG71



Flange/Port Code	A	B
E1	80 +0.076 +0.030 Dia.	109
E2/U1/U2/J1	82.55 +0.090 +0.036 Dia.	106

A3HG100/A3HG145/A3HG180



Flange/Port Code	A	B
E1	80 +0.076 +0.030 Dia.	109
E2/U1/U2/J1	82.55 +0.090 +0.036 Dia.	106

Series Number	C	D	E	F
A3HG100	300	168	144	120
A3HG145	323.5	174	146	120
A3HG180	362.5	174	146	146

Through Drive Kit

Pump Mount Flange

Main Pump and Second Pump Flange/Port Code	Pump Mount Flange
E2/U1/U2/J1	ISO 3019-1

Pump Combination

● Key Type

Second Pump \ Main Pump★	A3HG16	A3HG37	A3HG56	A3HG71	A3HG100	A3HG145	A3HG180
A3HG16-*R**K-E2C/U1C/U2C/J1C	TG1-A-A2-ABK	TG1-B-A2-ABK			TG1-C-A2-ABK		
A3HG37-*R**K-E2C/U1C/U2C/J1C		TG1-B-B2-BBK			TG1-C-B2-BBK		
A3HG37-*R**K-E2D/U1D/U2D/J1D		TG1-B-C4-CK			TG1-C-C4-CK		
A3HG56-*R**K-E2C/U1C/U2C/J1C			TG1-B-B2-BBK		TG1-C-B2-BBK		
A3HG56-*R**K-E2D/U1D/U2D/J1D			TG1-B-C4-CK		TG1-C-C4-CK		
A3HG71-*R**K-E2D/U1D/U2D/J1D				TG1-B-C4-CK	TG1-C-C4-CK		
A3HG100-*R**K-E2D/U1D/U2D/J1D					TG1-C-D4-CCK		
A3HG145-*R**K-E2D/U1D/U2D/J1D						TG1-C-D4-DK	
A3HG180-*R**K-E2D/U1D/U2D/J1D							TG1-C-D4-DK

★ Flange/Port Code:E2/U1/U2/J1

● Spline Type

Second Pump \ Main Pump★	A3HG16	A3HG37	A3HG56	A3HG71	A3HG100	A3HG145	A3HG180
A3HG16-*R**SP*E2C/U1C/U2C/J1C	TG1-A-A2-ABSP	TG1-B-A2-ABSP			TG1-C-A2-ABSP		
A3HG37-*R**SP*E2C/U1C/U2C/J1C		TG1-B-B2-BBSP			TG1-C-B2-BBSP		
A3HG37-*R**SP*E2D/U1D/U2D/J1D		TG1-B-C4-CSP			TG1-C-C4-CSP		
A3HG56-*R**SP*E2C/U1C/U2C/J1C			TG1-B-B2-BBSP		TG1-C-B2-BBSP		
A3HG56-*R**SP*E2D/U1D/U2D/J1D			TG1-B-C4-CSP		TG1-C-C4-CSP		
A3HG71-*R**SP*E2D/U1D/U2D/J1D				TG1-B-C4-CSP	TG1-C-C4-CSP		
A3HG100-*R**SP*E2D/U1D/U2D/J1D					TG1-C-D4-CCSP		
A3HG145-*R**SP*E2D/U1D/U2D/J1D						TG1-C-D4-DSP	
A3HG180-*R**SP*E2D/U1D/U2D/J1D							TG1-C-D4-DSP

★ Flange/Port Code:E2/U1/U2/J1

Model Number Designation

TG1	-A	-A	2	-A	K	-10
Series Number	Main Pump	Second Pump Mtg. Flange ISO Code (ISO 3019-1)	Second Pump Number of Mtg. Bolts	Second Pump Shaft End ISO Code (ISO 3019-1)	Second Pump Shaft Extension	Design Number
TG1	A:A3HG16	A: 82	2:Two	AB: 19	K: Keyed Shaft SP: Splined Shaft	10
	B: A3HG37-A3HG71	A: 82	2:Two	AB: 19		
		B: 101	2:Two	BB: 25		
		C: 127	4:Four	C: 32		
	C: A3HG100-A3HG180	A: 82	2:Two	AB: 19		
		B: 101	2:Two	BB: 25		
		C: 127	4:Four	C: 32		
		D: 152	4:Four	CC: 38 D: 44		

Connecting Pump

● Key Type

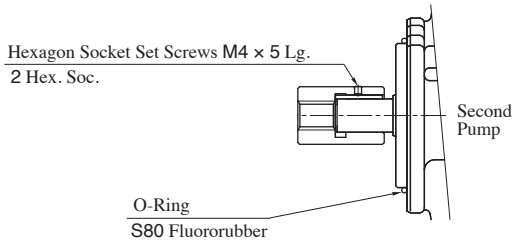
TG1-A-A2-ABK

(1) Mount the gasket and flange to the main pump, and fix it with hexagon socket head cap screws.
Tightening Torque : 30.9 - 37.7 Nm

(2) Insert the coupling into the shaft end of the second pump, position the coupling at a point where it reaches the shaft end, as shown in the figure below, and then fix the coupling with hexagon socket set screws.
Tightening Torque : 1.50 - 1.84 Nm

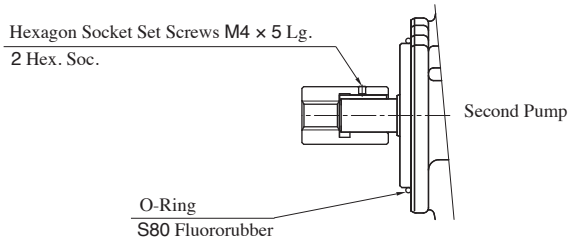
(3) Apply lithium grease to the O-ring, and insert the O-ring into the male spigot of the second pump (see the figure right).

(4) Prepare M10 hexagon head bolts (hardness classification: 10.9) and plain washers (hardness classification: 22H Hv 220-300).
Mount the second pump to the flange with the bolts and washers.



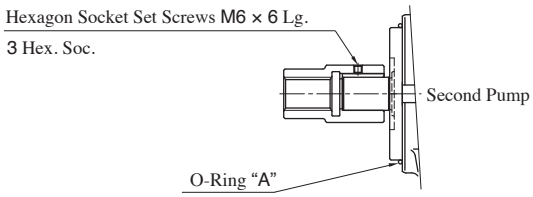
TG1-B-A2-ABK, TG1-C-A2-ABK

(1) Mount the coupling to the shaft end of the second pump, position the coupling at a point where the coupling shaft end reaches the stepped portion of the second pump shaft, as shown in the figure below, and then fix the coupling with hexagon socket set screws.
Tightening Torque : 1.50 - 1.84 Nm
(2) Apply lithium grease to the S80 O-ring, and insert the O-ring into the male spigot of the flange.
(3) Prepare M10 hexagon head bolts (hardness classification: 10.9) and plain washers (hardness classification: 22H Hv 220-300). Mount the second pump to main pump with the bolts and washers.



TG1-B-B2-BBK, TG1-B-C4-CK, TG1-C-B2-BBK, TG1-C-C4-CK

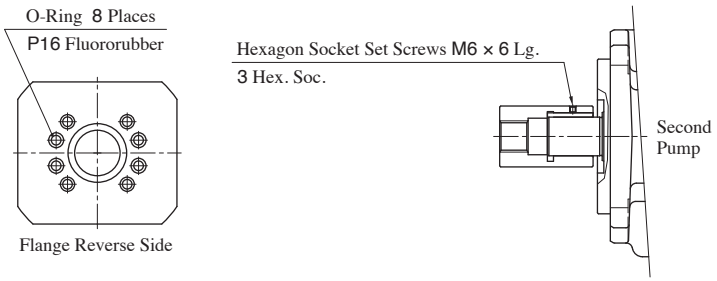
(1) Apply lithium grease to the S80 O-ring, and insert the O-ring into the male spigot of the flange. Mount the flange to the main pump with hexagon socket head cap screws.
Tightening Torque : 104 - 127 Nm
(2) Insert the coupling into the shaft end of the second pump, position the coupling at a point where it reaches the shaft end, as shown in the figure below, and then fix the coupling with hexagon socket set screws.
Tightening Torque : 5.31 - 6.49 Nm
(3) Apply lithium grease to the O-ring, and insert the O-ring into the male spigot of the second pump (see the figure below).
(4) Prepare M12 hexagon head bolts (hardness classification: 10.9) and plain washers (hardness classification: 22H Hv 220-300). Mount the second pump to the flange with the bolts and washers.



Model Numbers	O-Ring "A"
TG1-B-B2-BBK	S100 Fluororubber
TG1-C-B2-BBK	
TG1-B-C4-CK	S125 Fluororubber
TG1-C-C4-CK	

TG1-C-D4-CCK, TG1-C-D4-DK

(1) Mount the P16 O-ring to the O-ring groove on the reverse side of the flange (see the figure below).
(2) Apply lithium grease to the S80 O-ring, and insert the O-ring into the male spigot of the flange. Mount the flange to the main pump with hexagon socket head cap screws.
Tightening Torque : 104 - 127 Nm
(3) Insert the coupling into the shaft end of the second pump, position the coupling at a point where it reaches the shaft end, as shown in the figure below, and then fix the coupling with hexagon socket set screws.
Tightening Torque : 5.31 - 6.49 Nm
(4) Apply lithium grease to the G160 O-ring, and mount the O-ring to the O-ring groove on the flange.
(5) Prepare M20 hexagon head bolts (hardness classification: 10.9) and plain washers (hardness classification: 22H Hv 220-300). Mount the second pump to the flange with the bolts and washers.



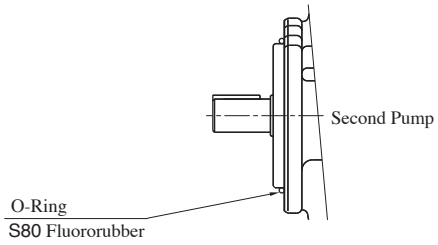
Spline Type

TG1-A-A2-ABSP

(1) Mount the gasket and flange to the main pump, and fix it with hexagon socket head cap screws.
Tightening Torque : 30.9 - 37.7 Nm
(2) Mount the coupling to the shaft end of the second pump or the main pump.
(3) Apply lithium grease to the S80 O-ring, and insert the O-ring into the male spigot of the second pump (see the figure below).
(4) Prepare M10 hexagon head bolts (hardness classification: 10.9) and plain washers (hardness classification: 22H Hv 220-300).
Mount the second pump to the flange with the bolts and washers.

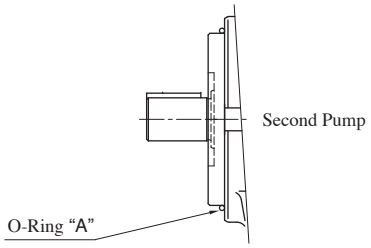
TG1-B-A2-ABSP, TG1-C-A2-ABSP

(1) Mount the coupling to the shaft end of the second pump or the main pump.
(2) Apply lithium grease to the S80 O-ring, and insert the O-ring into the male spigot of the second pump (see the figure below).
(3) Prepare M10 hexagon head bolts (hardness classification: 10.9) and plain washers (hardness classification: 22H Hv 220-300).
Mount the second pump to the main pump with the bolts and washers.



TG1-B-B2-BBSP, TG1-B-C4-CSP, TG1-C-B2-BBSP, TG1-C-C4-CSP

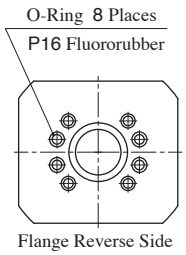
(1) Apply lithium grease to the S80 O-ring, and insert the O-ring into the male spigot of the flange. Mount the flange to the main pump with hexagon socket head cap screws.
Tightening Torque : 104 - 127 Nm
(2) Mount the coupling to the shaft end of the second pump or the main pump.
(3) Apply lithium grease to the O-ring, and insert the O-ring into the male spigot of the second pump (see the figure below).
(4) Prepare M12 hexagon head bolts (hardness classification: 10.9) and plain washers (hardness classification: 22H Hv 220-300).
Mount the second pump to the flange with the bolts and washers.



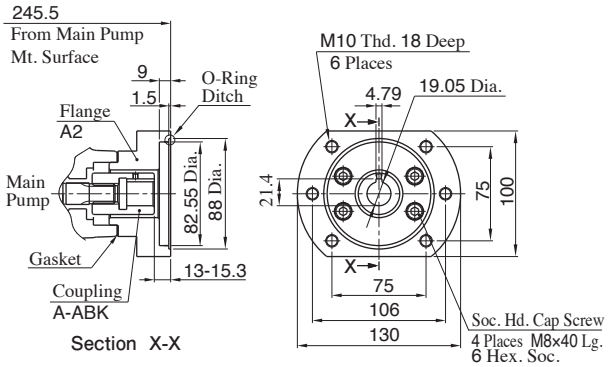
Model Numbers	O-Ring "A"
TG1-B-B2-BBSP	S100 Fluororubber
TG1-C-B2-BBSP	
TG1-B-C4-CSP	S125 Fluororubber
TG1-C-C4-CSP	

TG1-C-D4-CCSP, TG1-C-D4-DSP

(1) Mount the P16 O-ring to the O-ring groove on the reverse side of the flange (see the figure below).
(2) Apply lithium grease to the S80 O-ring, and insert the O-ring into the male spigot of the flange. Mount the flange to the main pump with hexagon socket head cap screws.
Tightening Torque : 104 - 127 Nm
(3) Mount the coupling to the shaft end of the second pump or the main pump.
(4) Apply lithium grease to the G160 O-ring, and mount the O-ring to the O-ring groove on the flange.
(5) Prepare M20 hexagon head bolts (hardness classification: 10.9) and plain washers (hardness classification: 22H Hv 220-300).
Mount the second pump to the flange with the bolts and washers.

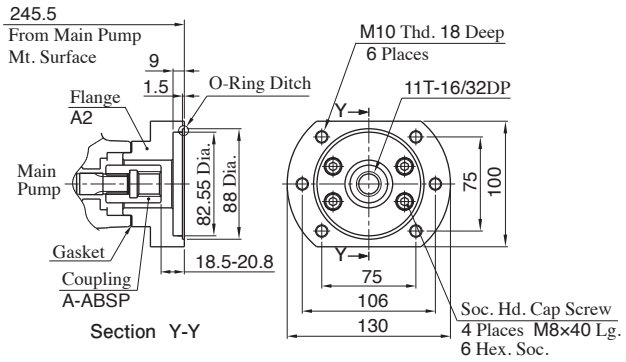


TG1-A-A2-ABK



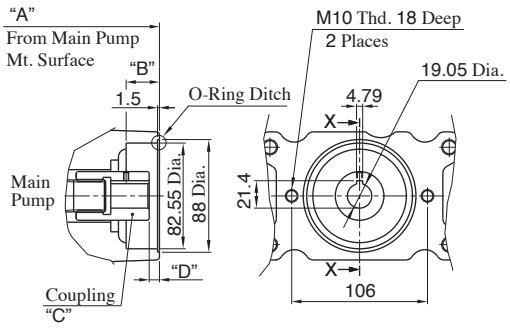
Mass:2.5 kg

TG1-A-A2-ABSP



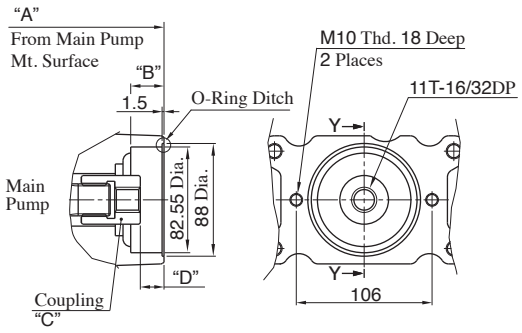
Mass:2.5 kg

TG1-B-A2-ABK/TG1-C-A2-ABK



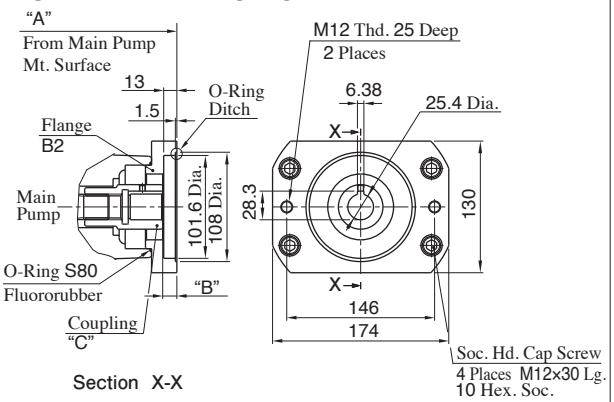
Through Drive Kit	Main Pump	A	B	C	D	Mass kg
TG1-B-A2-ABK	A3HG37-∗R∗∗K-E2C/U1C/U2C/J1C	251	24	B-ABK	8-10	0.3
	A3HG37-∗R∗∗K-E2D/U1D/U2D/J1D	236.5				
	A3HG56-∗R∗∗K-E2C/U1C/U2C/J1C	278	28			
	A3HG56-∗R∗∗K-E2D/U1D/U2D/J1D	253				
	A3HG71-∗R∗∗K-E2D/U1D/U2D/J1D	274.5	26			
TG1-C-A2-ABK	A3HG100-∗R∗∗K-E2D/U1D/U2D/J1D	300	26	C-ABK	8-11.5	0.4
	A3HG145-∗R∗∗K-E2D/U1D/U2D/J1D	323.5				
	A3HG180-∗R∗∗K-E2D/U1D/U2D/J1D	362.5				

TG1-B-A2-ABSP/TG1-C-A2-ABSP



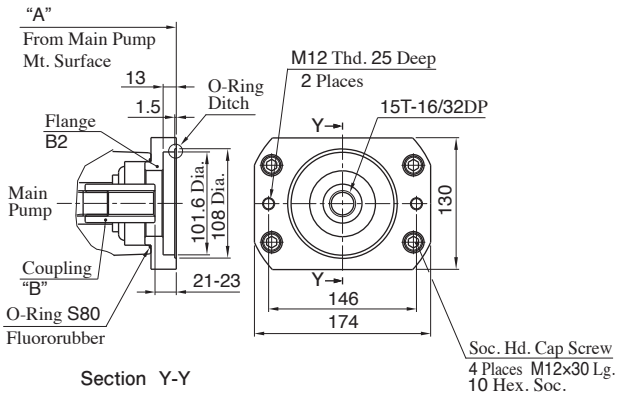
Through Drive Kit	Main Pump	A	B	C	D	Mass kg
TG1-B-A2-ABSP	A3HG37-∗R∗∗SP∗-E2C/U1C/U2C/J1C	251	24	B-ABSP	18.5-21	0.3
	A3HG37-∗R∗∗SP∗-E2D/U1D/U2D/J1D	236.5				
	A3HG56-∗R∗∗SP∗-E2C/U1C/U2C/J1C	278	28			
	A3HG56-∗R∗∗SP∗-E2D/U1D/U2D/J1D	253				
	A3HG71-∗R∗∗SP∗-E2D/U1D/U2D/J1D	274.5	26			
TG1-C-A2-ABSP	A3HG100-∗R∗∗SP∗-E2D/U1D/U2D/J1D	300	26	C-ABSP	18.5-20.5	0.4
	A3HG145-∗R∗∗SP∗-E2D/U1D/U2D/J1D	323.5				
	A3HG180-∗R∗∗SP∗-E2D/U1D/U2D/J1D	362.5				

TG1-B-B2-BBK/TG1-C-B2-BBK



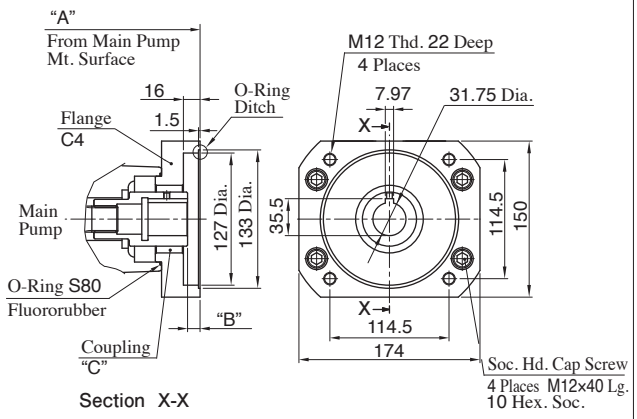
Through Drive Kit	Main Pump	A	B	C	Mass kg
TG1-B-B2-BBK	A3HG37-∗R∗∗K-E2C/U1C/U2C/J1C	276	14-15	B-BBK	3.6
	A3HG37-∗R∗∗K-E2D/U1D/U2D/J1D	261.5			
	A3HG56-∗R∗∗K-E2C/U1C/U2C/J1C	303			
	A3HG56-∗R∗∗K-E2D/U1D/U2D/J1D	278			
	A3HG71-∗R∗∗K-E2D/U1D/U2D/J1D	299.5			
TG1-C-B2-BBK	A3HG100-∗R∗∗K-E2D/U1D/U2D/J1D	325	14-16.5	C-BBK	3.7
	A3HG145-∗R∗∗K-E2D/U1D/U2D/J1D	348.5			
	A3HG180-∗R∗∗K-E2D/U1D/U2D/J1D	387.5			

TG1-B-B2-BBSP/TG1-C-B2-BBSP



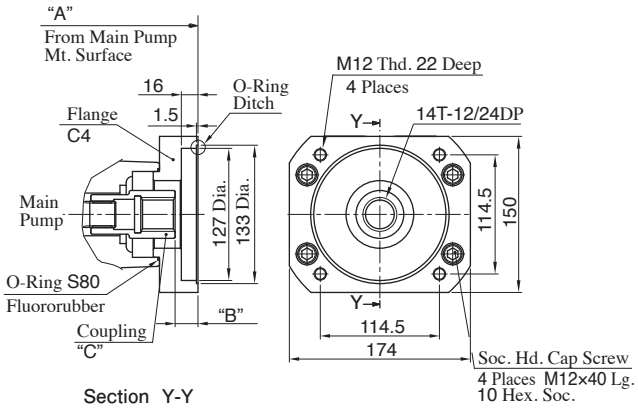
Through Drive Kit	Main Pump	A	B	Mass kg
TG1-B-B2-BBSP	A3HG37-∗R∗∗SP∗-E2C/U1C/U2C/J1C	276	B-BBSP	3.5
	A3HG37-∗R∗∗SP∗-E2D/U1D/U2D/J1D	261.5		
	A3HG56-∗R∗∗SP∗-E2C/U1C/U2C/J1C	303		
	A3HG56-∗R∗∗SP∗-E2D/U1D/U2D/J1D	278		
	A3HG71-∗R∗∗SP∗-E2D/U1D/U2D/J1D	299.5		
TG1-C-B2-BBSP	A3HG100-∗R∗∗SP∗-E2D/U1D/U2D/J1D	325	C-BBSP	3.5
	A3HG145-∗R∗∗SP∗-E2D/U1D/U2D/J1D	348.5		
	A3HG180-∗R∗∗SP∗-E2D/U1D/U2D/J1D	387.5		

TG1-B-C4-CK/TG1-C-C4-CK



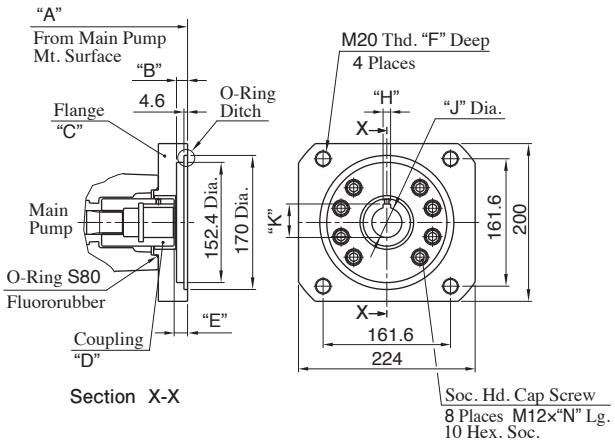
Through Drive Kit	Main Pump	A	B	C	Mass kg
TG1-B-C4-CK	A3HG37-∗R∗∗K-E2C/U1C/U2C/J1C	288	12-14	B-CK	5.8
	A3HG37-∗R∗∗K-E2D/U1D/U2D/J1D	273.5			
	A3HG56-∗R∗∗K-E2C/U1C/U2C/J1C	315			
	A3HG56-∗R∗∗K-E2D/U1D/U2D/J1D	290			
	A3HG71-∗R∗∗K-E2D/U1D/U2D/J1D	311.5			
TG1-C-C4-CK	A3HG100-∗R∗∗K-E2D/U1D/U2D/J1D	337	12-14.5	C-CK	6
	A3HG145-∗R∗∗K-E2D/U1D/U2D/J1D	360.5			
	A3HG180-∗R∗∗K-E2D/U1D/U2D/J1D	399.5			

TG1-B-C4-CSP/TG1-C-C4-CSP



Through Drive Kit	Main Pump	A	B	C	Mass kg
TG1-B-C4-CSP	A3HG37-∗R∗∗SP∗-E2C/U1C/U2C/J1C	288	21-23	B-CSP	5.6
	A3HG37-∗R∗∗SP∗-E2D/U1D/U2D/J1D	273.5			
	A3HG56-∗R∗∗SP∗-E2C/U1C/U2C/J1C	315			
	A3HG56-∗R∗∗SP∗-E2D/U1D/U2D/J1D	290			
	A3HG71-∗R∗∗SP∗-E2D/U1D/U2D/J1D	311.5			
TG1-C-C4-CSP	A3HG100-∗R∗∗SP∗-E2D/U1D/U2D/J1D	337	21-23.5	C-CSP	5.7
	A3HG145-∗R∗∗SP∗-E2D/U1D/U2D/J1D	360.5			
	A3HG180-∗R∗∗SP∗-E2D/U1D/U2D/J1D	399.5			

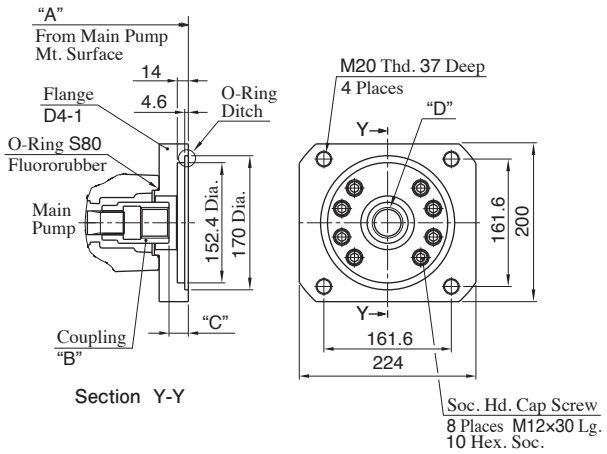
TG1-C-D4-CCK/TG1-C-D4-DK



Through Drive Kit	Main Pump	A	B	C
TG1-C-D4-CCK	A3HG100-∗R∗∗K-E2D/U1D/U2D/J1D	337	14	D4-1
	A3HG145-∗R∗∗K-E2D/U1D/U2D/J1D	360.5		
	A3HG180-∗R∗∗K-E2D/U1D/U2D/J1D	399.5		
TG1-C-D4-DK	A3HG145-∗R∗∗K-E2D/U1D/U2D/J1D	383.5	15	D4-2
	A3HG180-∗R∗∗K-E2D/U1D/U2D/J1D	422.5		

Through Drive Kit	D	E	F	H	J	K	N	Mass kg
TG1-C-D4-CCK	C-CCK	17-19.5	37	9.56	38.1	42.5	30	10.7
TG1-C-D4-DK	C-DK	19-21.5	34	11.14	44.45	49.6	50	16.7

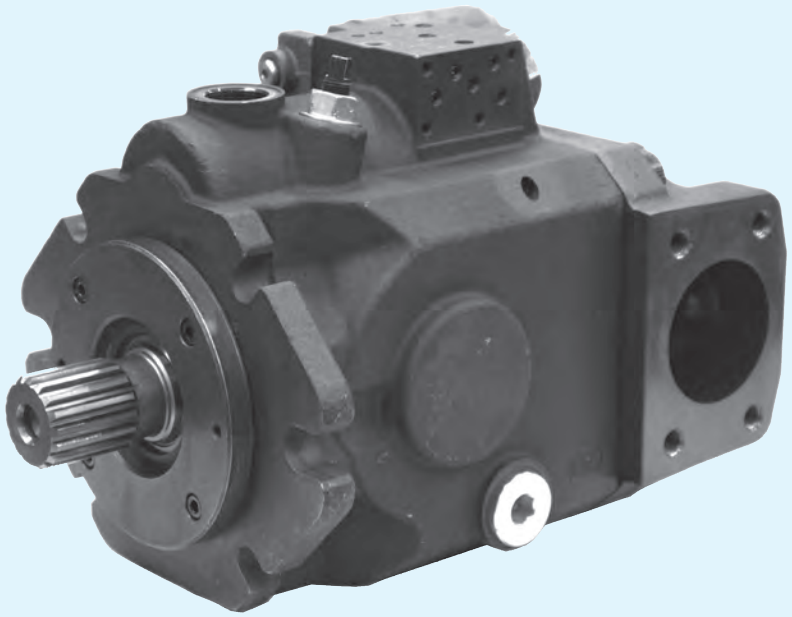
TG1-C-D4-CCSP/TG1-C-D4-DSP



Through Drive Kit	Main Pump	A	B	C
TG1-C-D4-CCSP	A3HG100-∗R∗∗SP∗-E2D/U1D/U2D/J1D	337	C-CCSP	24-26.5
	A3HG145-∗R∗∗SP∗-E2D/U1D/U2D/J1D	360.5		
	A3HG180-∗R∗∗SP∗-E2D/U1D/U2D/J1D	399.5		
TG1-C-D4-DSP	A3HG145-∗R∗∗SP∗-E2D/U1D/U2D/J1D	360.5	C-DSP	30-32.5
	A3HG180-∗R∗∗SP∗-E2D/U1D/U2D/J1D	399.5		

Through Drive Kit	D	Mass kg
TG1-C-D4-CCSP	17T-12/24DP	10
TG1-C-D4-DSP	13T-8/16DP	10.2

A3HM Series High Pressure Variable Displacement Piston Pumps



"A3HM" Series Variable Displacement Piston Pumps

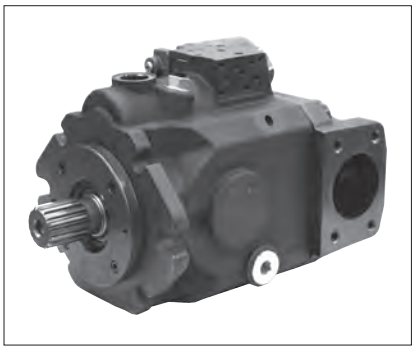
Pump Type	Graphic Symbol	Geometric Displacement cm^3/rev (1 2 5 10 20 50 100 200 300)	Maximum Operating Pressure MPa	Page
A3HM Series High Pressure Variable Displacement Piston Pumps		A3HM18 A3HM28 A3HM45 A3HM63 A3HM85 A3HM100	35	A-203

★ Three control methods are available:
Pressure Compensator Type/Pilot Pressure Control Type Pressure Compensator/Load Sensing Type

● Consult Yuken for "A3HM" Series High Pressure Variable Displacement Piston Pumps details.

A3HM Series Variable Displacement Piston Pumps - Single Pump

"A3HM" series piston for open circuit pumps match the requirements of construction machinery and mobile equipment. Drastically compact and lightweight. Suitable for mobile products.



Features

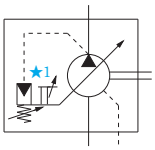
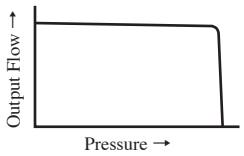
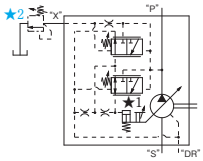
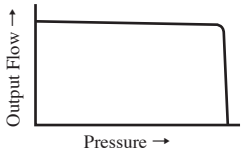
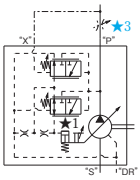
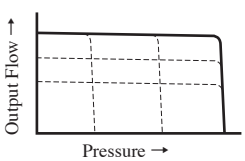
- Compact and lightweight compared with conventional pumps.
- Applicable for medium pressure hydraulic systems: Rated Pressure 31.5 MPa and Max. Pressure 35 MPa.
- We offer 6 models in the geometric displacement range from 18.6 to 100.7 cm³/rev. Available for a wide range of applications.
- Through-drive type is employed for standard models. Driven side pumps with displacement volume up to the same displacement as that of the driving pump can be connected. Wide range of maximum flow due to it.

Specifications

Model Numbers		A3HM18	A3HM28	A3HM45	A3HM63	A3HM85	A3HM100
Geometric Displacement	cm³/rev	18.6	28.7	45.7	63.5	85.6	100.7
Minimum Adj. Flow	cm³/rev	—	17.8	27.5	44.0	61.3	70.5
Rated Pressure	MPa	31.5					
Max.Pressure★1	MPa	35					
Pressure Adj. Range	MPa	3.0 - 31.5					
Allowable Shaft Speed r/min	Max.★2	3400	3200 (3600)	2700 (3300)	2600 (2700)	2500 (2700)	2300 (2600)
	Min.	600					
Suction Pressure		–20 kPa - +400 kPa					
Drain Pressure		Normal Pressure : 0.1 MPa or less Surge Pressure : 0.4 MPa or less (Allowable duration for surge pressure 0.1 sec or less)					
Hydraulic Fluid		Petroleum Based Oils★3					
Seal Material		FKM (Fluoro Rubber)					
Mass★4		12	14	21	24.5/25	36	36

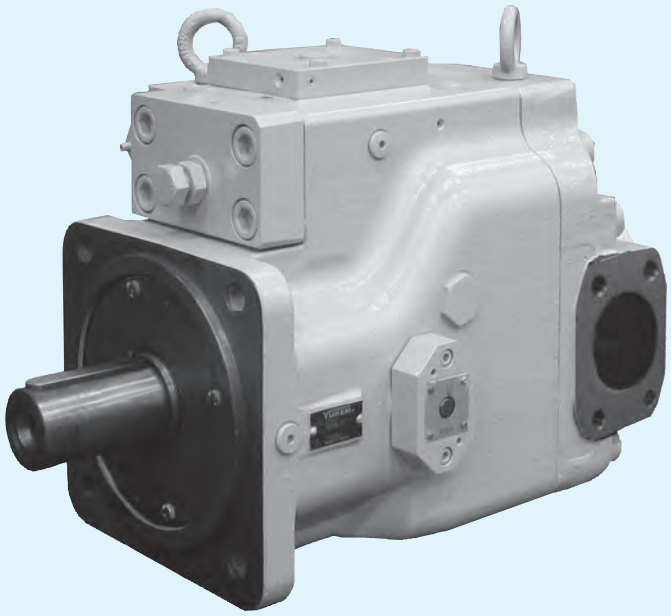
★1. If operating pressure exceeds the rated pressure due to surge pressure, make sure that it does not exceed the max. pressure. Please contact Yuken for further information.
★2. Minimum flow values are shown in brackets.
★3. Please contact Yuken regarding the use of non-petroleum based oils.
★4. Pressure Compensator Control Type

Control Type

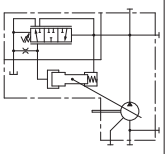
Control Type	Graphic Symbols	Performance Characteristics	Explanation
"01" Pressure Compensator Type			●When the system pressure increases and comes close to the preset cut-off pressure, the pump flow decreases automatically while maintaining the set pressure as it is. ●The output flow and full cut-off pressure can be manually adjusted.
"07" Pilot Pressure Control Type Pressure Compensator			●The pump is used in combination with a pilot relief valve or proportional pressure control valve. ●By controlling the pilot pressure, the full cut-off pressure can be remote-controlled according user requirements.
"14" Load Sensing Type			●This is an energy-saving type control which maintains the pump flow at the absolute minimum necessary level to operate the actuator. ●This type of control automatically regulates the output flow so that the inlet-outlet differential pressure of the flow control valve at the output side is constant.

★1. Flow adjustment function is not available on A3HM18.
★2. Pilot relief valve/ proportional pressure control valve is not supplied with the pump. Please arrange it separately.
★3. Flow control valve is not supplied with the pump. Please arrange it separately.

A7H Series High Pressure Variable Displacement Piston Pumps



"A7H" Series High Pressure Variable Displacement Piston Pumps

Pump Type		Graphic Symbol	Geometric Displacement cm^3/rev (1 2 5 10 20 50 100 200 300)	Maximum Operating Pressure MPa	Page
A7H Series High Pressure Variable Displacement Piston Pumps	Single Pump★		A7H180, A7H265	40	A-205

★ The control type has three kinds of Pressure Compensator Type and Constant Power Control Type and Constant Power Control Type with External Pilot.

● Consult Yuken when material such as dimensions figures is required.

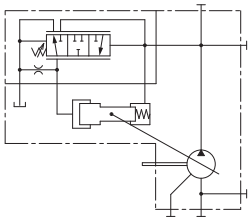
A7H Series High Pressure Variable Displacement Piston Pumps, Pressure Compensator Type

Specifications

Model Numbers	Geometric Displacement cm³/rev	Operating Pressure MPa		Shaft Speed Range r/min	
		Rated	Intermittent	Rated	Max.★
A7H180-＊R01S＊＊-11	180	35	40	1800	1900
A7H265-＊R01S＊＊-11	270	35	40	1200	1600

★ Max. Allowable Shaft Speed is specified when the suction pressure is -0.01 MPa -.

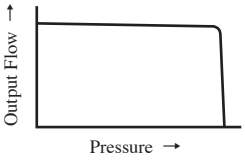
Graphic Symbol



Model Number Designation

A7H180	-F	R	01	S	N	A	-11
Series Number	Mounting	Direction of Rotation	Control Type	Port Position	Pipe Flange	Outboard Pump Mounting Type	Design Number
A7H180 (180 cm³/rev) A7H265 (270 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise	01: Pressure Compensator Type (With Min. Flow Adj. Function)	S: Side Port	None: With Pipe Flange N: Without Pipe Flange	None: Without Mounting (With End Cover) A: SAE A B: SAE B C: SAE C CC: SAE CC D: SAE D	11

Performance Characteristics



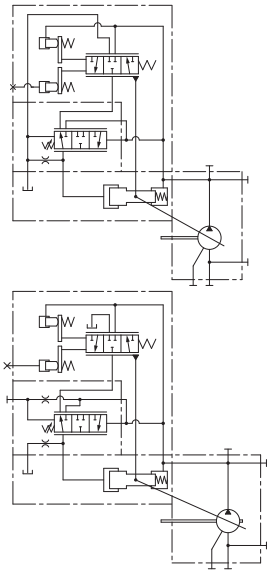
A7H Series High Pressure Variable Displacement Piston Pumps, Constant Power Control Type

Specifications

Model Numbers	Geometric Displacement cm³/rev	Operating Pressure MPa		Shaft Speed Range r/min	
		Rated	Max.★	Rated	Max.★
A7H180-＊R09＊＊＊＊-＊-11	180	35	40	1800	1900
A7H265-＊R09＊＊＊＊-＊-11	270	35	40	1200	1600

★ Max. Allowable Shaft Speed is specified when the suction pressure is -0.01 MPa -.

Graphic Symbols



09R (With External Pilot)

Model Number Designation

A7H180	-F	R	09	R	S	N	A	-M1	-11
Series Number	Mounting	Direction of Rotation	Control Type	External Pilot	Port Position	Pipe Flange	Outboard Pump Mounting Type	Code of Constant Power Control Type	Design Number
A7H180 (180 cm³/rev) A7H265 (270 cm³/rev)	F: Flange Mtg. L: Foot Mtg.	(Viewed from Shaft End) R: Clockwise	09: Constant Power Control Type (With Min. Flow Adj. Function)	None: Without External Pilot R: With External Pilot	S: Side Port	None: With Pipe Flange N: Without Pipe Flange	None: Without Mounting (With End Cover) A: SAE A B: SAE B C: SAE C CC: SAE CC D: SAE D	Refer to Below Code Table	11

Code Table of Constant Power Control Type

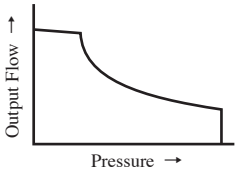
<A7H180>

Motor power kW	970 r/min	1150 r/min	1450 r/min	1750 r/min
30	M4	-	-	-
37	M2	M3	-	-
45	M0	M2	M4	-
55	H3	M0	M2	M4
75	-	H1	MA	M1
90	-	-	H2	MA
110	-	-	-	H2

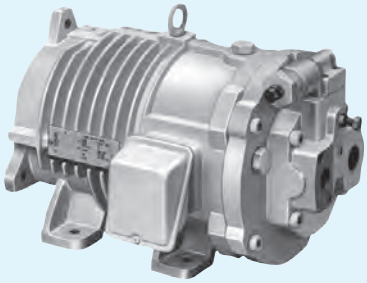
<A7H265>

Motor power kW	970 r/min	1150 r/min	1450 r/min
45	M5	-	-
55	M3	M5	-
75	H3	M1	M4
90	H2	H3	M2
110	-	H1	H4
132	-	-	H2

Performance Characteristics



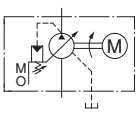
PAL PUMPS & M Series Electric Motors



PAL PUMPS

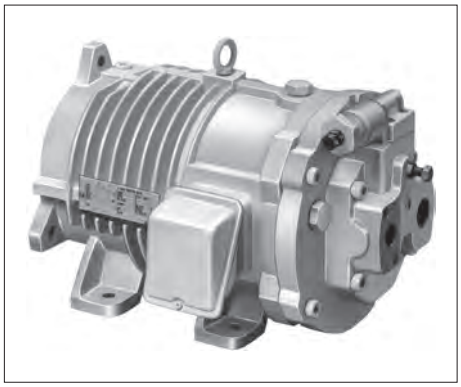
M Series Electric Motors

MOTOR-PUMPS

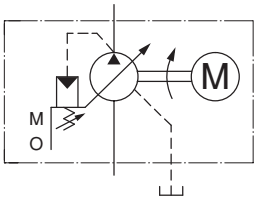
Model Numbers	Graphic Symbol	Geometric Displacement cm^3/rev (1 2 5 10 20 50 100 150)	Maximum Operating Pressure MPa	Page
PM10-01B-＊-31		PM10	7	A-207
PM10-01C-1.5-31			16	
PM16-01＊-＊-30		PM16	16	
PM22-01＊-＊-30		PM22	16	
PM37-01＊-＊-30		PM37	16	

M Series Electric Motors ····· A-209

PAL PUMPS, Pressure Compensator Type



Graphic Symbol



Specifications

Model Numbers	Geometric Displacement cm^3/rev	Minimum Adj. Flow cm^3/rev	Operating Pressure★1 MPa	Electric Motor★2 50 Hz : 200 V AC 60 Hz : 200/220 V AC	Approx Mass. kg
PM10-01B-0.75-31	10.0	2.0	7	0.75 kW × 4P	28.1
PM10-01✻-1.5-31			16	1.5 kW × 4P	41.8
PM16-01✻-1.5-30	15.8	6.0	16	1.5 kW × 4P	39.7
PM16-01✻-2.2-30				2.2 kW × 4P	43.8
PM22-01✻-2.2-30	22.2	8.5	16	2.2 kW × 4P	43.8
PM22-01✻-3.7-30				3.7 kW × 4P	64.2
PM37-01✻-3.7-30	36.9	10	16	3.7 kW × 4P	72.0
PM37-01✻-5.5-30				5.5 kW × 4P	74.0

★1. For pressure adjusting ranges, see the Model Number Designation.
★2. For motors other than those for 200/220 V AC, please contact us.

Model Number Designation

PM16	-01	B	-2.2	-30
Series Number	Control Type	Pres. Adj. Range MPa	Motor Power	Design Number
PM10 (10.0 cm^3/rev)	01 : Pressure Compensator Type	B : 1.2 - 7	0.75 : 0.75 kW × 4P	31
		B : 1.2 - 7 C : 2 - 16	1.5 : 1.5 kW × 4P	
PM16 (15.8 cm^3/rev)		B : 1.2 - 7 C : 2 - 16	1.5 : 1.5 kW × 4P 2.2 : 2.2 kW × 4P	30
PM22 (22.2 cm^3/rev)		B : 1.2 - 7 C : 2 - 16	2.2 : 2.2 kW × 4P 3.7 : 3.7 kW × 4P	30
PM37 (36.9 cm^3/rev)		B : 1.2 - 7 C : 2 - 16	3.7 : 3.7 kW × 4P 5.5 : 5.5 kW × 4P	30

★1. For Two-Pressure Two-Flow Control Type by System Pressure, Two-Pressure Two-Flow Control Type by Solenoid Valve and Pilot Pressure Control Type Pressure Compensator, make inquires separately.

Ratings of Electric Motor

Model Numbers	Voltage-Frequency V – Hz	Rated Current A	Shaft Speed r/min	Inrush Current A	Ambient Conditions Using
PM10-01B-0.75-31	200 – 50 200 – 60 220 – 60	4.2 3.6 3.6	1400 1690 1710	22.5 21.6 23.8	●Location : Indoor Room ●Ambient Temperature Range : 0 to +40 °C ●Ambient Humidity : 95 % RH or less ●Altitude : 1000 m or less ●To be nothing corrosive and explosive gasses and steam.
PM10-01＊-1.5-31 PM16-01＊-1.5-30	200 – 50 200 – 60 220 – 60	6.4 6.2 5.8	1420 1710 1730	43.6 39.4 43.3	
PM16-01＊-2.2-30 PM22-01＊-2.2-30	200 – 50 200 – 60 220 – 60	9.4 8.8 8.4	1420 1710 1730	63.6 59.1 65.1	
PM22-01＊-3.7-30 PM37-01＊v3.7-30	200 – 50 200 – 60 220 – 60	14.6 14.0 13.0	1430 1730 1740	102.0 86.0 94.6	
PM37-01＊-5.5-30	200 – 50 200 – 60 220 – 60	22.8 21.2 19.8	1430 1720 1730	150.0 130.0 143.0	

Pipe Flange Kits

Flange kits are available. When ordering, specify the kits from the table below. In addition, model PM10 does not use pipe flanges. Detail of pipe flange kit is described on pages A-258 and A-259.

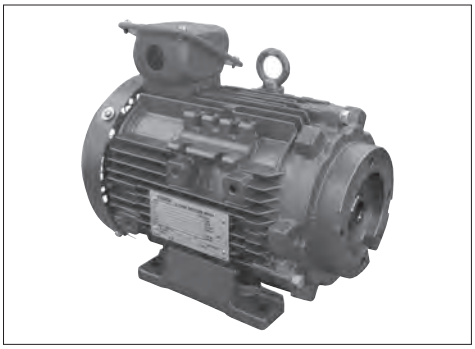
Pump Model Numbers	Name of Port	Pipe Flange Kit Numbers		
		Threaded Connection	Socket Welding Type★1	Welding Neck Type
PM16/PM22	Suction	F5-06-A-1021★2	F5-06-B-1021★2	—
	Discharge	—	—	—
PM37	Suction	F5-10-A-10	F5-10-B-10	F5-10-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10

★1. For the Socket Welding Type F5-06-B-1021 or F5-10-B-10, the operating pressure may be limited due to the flange strength.
★2. Refer to page A-17 for the details of F5-06-A-1021 and F5-06-B-1021.

M Series Electric Motors

AR/A/A3H series variable displacement piston pumps and PV2R series vane pumps can be installed directly to these electric motors. The power output range is from 0.75 to 18.5 kW.
Two types are available: directly connected type in which the pump shaft is directly inserted in the hollow motor shaft (models M1 and M2); and bell housing type in which couplings are used (models M3 to M7).

- Easy to install a pump
- Free from worry about noise and vibration caused by insufficient centering.
- Compact in size, requiring less space for installation.
- Safe because the rotating part is not exposed.



Specifications

Model Numbers	Output × Number of Poles	Voltage-Frequency V Hz	Rated Current A	Starting Current A	Rotational Speed r/min	Insulation Class	Mass kg	Type Ambient Conditions in Using
M1-0.75-41	0.75 kW×4P	200-50 200-60 220-60	3.8 3.4 3.4	27.3 23.8 26.2	1440 1730 1745	F	17.5	●Type Total Enclosed Splash Proof Type (IP44 IC411, IEC60034-1) ●Ambient Conditions in Using Location : Indoor Room Ambient Temperature Range :-20 to +40 °C Ambient Humidity : 100 % RH or less (bedewing must be avoided) Altitude : 1000 m or less To be nothing corrosive and explosive gasses and steam.
M1-1.5-41	1.5 kW×4P	200-50 200-60 220-60	6.8 6.4 6.0	46.6 41.0 45.1	1445 1740 1750	F	22.0	
M1-2.2-41	2.2 kW×4P	200-50 200-60 220-60	10.6 9.4 9.2	96.0 81.0 89.1	1460 1755 1765	F	30.0	
M1-3.7-41 M2-3.7-40	3.7 kW×4P	200-50 200-60 220-60	15.6 14.6 13.8	134 118 130	1460 1755 1765	F	41.0	
M2-5.5-40	5.5 kW×4P	200-50 200-60 220-60	23.4 21.4 20.6	200 166 183	1465 1760 1765	F	62.0	
M3-5.5-40							63.0	
M4-5.5-40							65.0	
M5-5.5-40 M6-5.5-40							68.0	
M2-7.5-40	7.5 kW×4P	200-50 200-60 220-60	30.8 28.6 27.4	264 218 240	1460 1755 1765	F	75.0	
M3-7.5-40							74.0	
M4-7.5-40 M5-7.5-40 M6-7.5-40							76.0	
M7-7.5-40							77.5	
M4-11-40 M5-11-40	11 kW×4P	200-50 200-60 220-60	46.0 42.0 40.0	365 302 332	1475 1770 1775	F	114.0	
M7-11-40							131.0	
M4-15-40 M5-15-40 M7-15-40	15 kW×4P	200-50 200-60 220-60	58.8 55.6 52.0	484 408 449	1470 1760 1770	F	131.0	
M4-18.5-40 M5-18.5-40	18.5 kW×4P	200-50 200-60 220-60	74.0 69.0 65.0	668 524 576	1475 1770 1775	F	193.0	

★1. For motors other than those for 200 / 220 V AC, please contact us.

Application

Model Numbers	Piston Pumps			Vane Pumps★1
	Single Pumps	Double Pumps	Variable / Fixed Double Pumps	
M1-＊-41 M3-＊-40	AR16/AR22/A10/A16/A22	A1616/A1622/A2222	A16R1/A22R1	PV2R1
M2-＊-40 M4-＊-40	A37 (excluding 04E)	–	–	PV2R2★2
M5-＊-40	A37 (04E) /A56	A1637/A2237/A1656/A2256	A37R1/A56R1	–
M6-＊-40	A3H16	–	–	–
M7-＊-40	A3H37	–	–	–

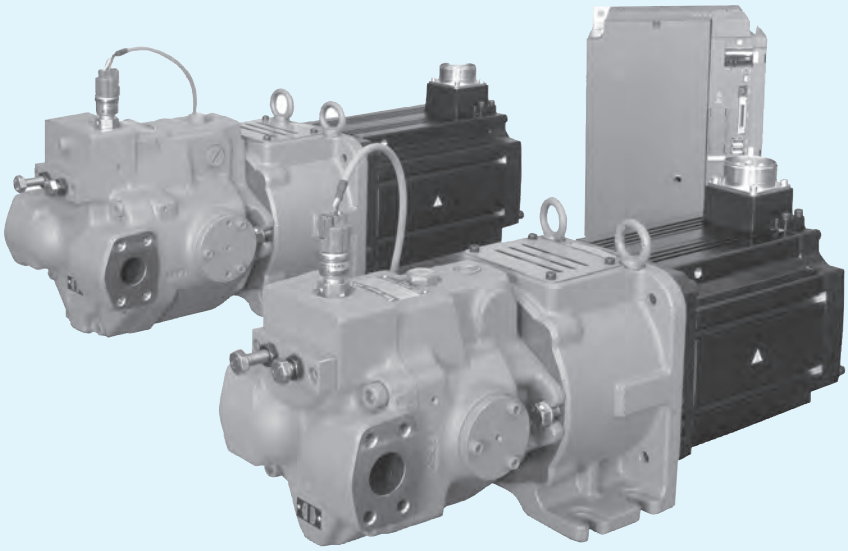
★1. Vane pump is also possible. However, different mounting bolt is required in order to install the vane pumps.
★2. This pump is special designed product. Please contact us for further details.

Model Number Designation

M1	-1.5	-R	-41
Series Number	Motor Capacity	Terminal Box Location★1	Design Number
M1 [For AR16/AR22/A10/A16/A22]	**0.75:** 0.75 kW×4P, **1.5:** 1.5 kW×4P, **2.2:** 2.2 kW×4P, **3.7:** 3.7 kW×4P	[When viewed from the pump mounting surface] **None:** Upper Side (Standard) **R:** Right Side **L:** Left Side	**41**
M2 [For A37 (excluding 04E)]	**3.7:** 3.7 kW×4P, **5.5:** 5.5 kW×4P, **7.5:** 7.5 kW×4P		**40**
M3 [For AR16/AR22/A10/A16/A22]	**5.5:** 5.5 kW×4P, **7.5:** 7.5 kW×4P		
M4 [For A37 (excluding 04E)]	**5.5:** 5.5 kW×4P, **7.5:** 7.5 kW×4P, **11:** 11 kW×4P, **15:** 15 kW×4P, **18.5:** 18.5 kW×4P		
M5 [For A37(04E)/A56]			
M6 [For A3H16]	**5.5:** 5.5 kW×4P, **7.5:** 7.5 kW×4P		
M7 [For A3H37]	**7.5:** 7.5 kW×4P, **11:** 11 kW×4P, **15:** 15 kW×4P		

★1. For the following models, either the left or right side terminal box location is selectable [the upper side (standard) terminal box is not available].
M1-0.75 / M4-18.5 / M5-18.5

ASR Series
AC Servo Motor Driven Pumps



"ASR" Series AC Servo Motor Driven Pumps

Pump Type	Graphic Symbols	Geometric Displacement cm³/rev (0 2 5 10 20 50 100 150)	Maximum Operating Pressure MPa	Page
ASR Series AC Servo Motor Driven Pumps	Single Displacement Type	ASR1	21	A-214
		ASR2	16	
		ASR3	21	
		ASR5		
	Dual Displacement Type	ASR10		

■ AMSR Controller A-226

Hydraulic Fluids

Hydraulic Fluids

Use clean petroleum base oils equivalent to ISO VG32 or 46. The recommended viscosity range is from 20 to 400 mm^2/s and temperature range is from 0 to 60 °C, both of which have to be satisfied for the use of the above hydraulic oils.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the operating oil which can otherwise lead to breakdowns and shorten the life of the unit. Please maintain the degree of contamination within NAS class 9.
The suction port must be equipped with at least 100 μm (150 mesh) reservoir type filter and the return line must have a line type filter of under 10 μm.

Instructions

Transportation

For transportation, use the lifting rings on the pump. Do not use lifting cables at places other than the lifting rings.

Mounting

When installing the pump, the filling port should be positioned upwards.

Suction Pressure

Permissible suction pressure at the inlet port of the pump is between -16.7 and +50 kPa. For piping to the suction port, use pipes of the nominal diameters shown below. Make sure that the height of the pump suction port is lower than the oil level in the reservoir.

Model	Nominal Dia.
ASR1/ASR2	$^3/_4$
ASR3/ASR5	$1\ ^1/_4$
ASR10	2

Hints on Piping

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise. Whenever there is fear of excessive load, please use rubber hoses.

Drain Piping

Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a nominal pressure of less than 0.1 MPa and surge pressure of less than 0.5 MPa.
The length of piping should be less than 1 m. Instead of joining the drain pipe to other return lines, run it independently. The pipe end should be submerged in oil.

[Recommended Drain Piping Size]

Model	Fitting Size	Inside Dia. of Pipe
ASR1/ASR2	3/8 (Inside Dia. 8.5 mm or more)	10 mm or more
ASR3	1/2 (Inside Dia. 12 mm or more)	12 mm or more
ASR5/ASR10	3/4 (Inside Dia. 16 mm or more)	19 mm or more

Starting

Before first starting, fill the pump case with clean operating oil via the filling port. In order to avoid air blockage when first starting, adjust the control valves so that the discharged oil from the pump is returned directly to the reservoir or the actuator moves in a free load.

[Volume of Pre-fill Oil Required]

Model	Volume cm^3
ASR1/ASR2	600
ASR3/ASR5	1200
ASR10	2500

Bleeding Air

It may be necessary to bleed air from the pump case and lines to remove causes of vibration. An air bleed valve (Model Number: ST1004-*-10*, Page A-259) in the outlet line is recommended. For air bleeding with an air bleed valve installed, run the pump at a rotational speed that provides a flow rate equal to/higher than the valve's flow rate to reseating.

Setting Safety Valve (Pressure) and Delivery

At the time of shipment, the unit has been preset to the delivery rate shown below; the safety valve has been set to 21 MPa (19.5 MPa for ASR2). Adjust the preset delivery and safety valve (pressure) to meet your system requirements.

[Default Setting of Delivery]

Model Numbers	Single Displacement Type "X" cm^3/rev	Dual Displacement Type "W" cm^3/rev	
		Large Displacement	Small Displacement
ASR1	15.8	15.8	8
ASR2	22.2	22.2	8
ASR3	36.9	36.9	10
ASR5	56.2	56.2	14
ASR10	100	100	20

Adjustment of Delivery

Turning the flow adjustment screw for the single displacement type or the large displacement side flow adjustment screw for the dual displacement type clockwise decreases delivery. Turning the small displacement side flow adjustment screw for the dual displacement type clockwise increases delivery.

[Volume adjusted by each full turn of the flow adjustment screw]

Model Numbers	Single Displacement Type "X" cm^3/rev	Dual Displacement Type "W" cm^3/rev	
		Large Displacement	Small Displacement
ASR1	1.4	1.4	1.5
ASR2	2.0	2.0	2.1
ASR3	2.9	2.9	2.8
ASR5	3.9	3.9	3.7
ASR10	5.4	5.4	7.9

★ For the relationship between the flow adjustment screw position and flow adjustment, see pages A-217 and A-218.

Adjustment of Safety Valve (Pressure)

・Single Displacement Type

Turning the pressure adjustment screw clockwise increases pressure.
See the chart for the pressure change per turn of the adjustment screw. After adjustment, be sure to tighten the lock nut.

Model Numbers	Pressure Change Per Turn MPa	Max. Setting Value MPa	Min. Setting Value MPa
ASR1/ASR3/ASR5-**-HX	4.4	24.8	8
ASR10-**-HX			2
ASR2-*C-CX		19.5	2

★ For the relationship between the pressure adjustment screw position and pressure adjustment, see page A-217.

・Dual Displacement Type

The dual displacement type does not support the full cut-off function. Provide a safety valve on the pump discharge side. Set the safety valve at a value of the maximum operating pressure + 3 to 3.5 MPa.

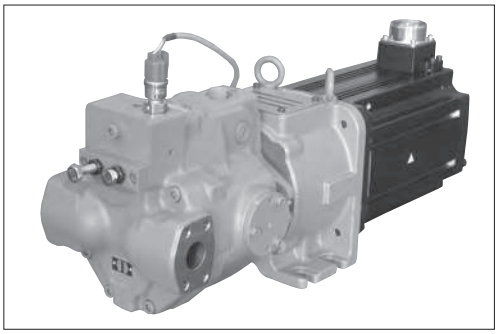
Precautions During Operation

During and for a period after operation, the surface temperature of the AC servo motor and the pump will be hot. Prevent hands and other body parts from coming into contact with them.

Providing flexible flow/pressure control !

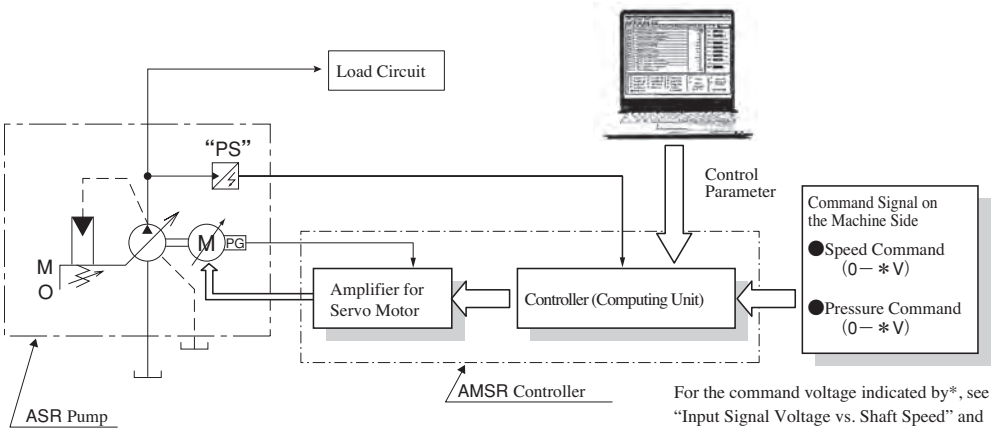
ASR Series AC Servo Motor Driven Pumps

The ASR series provides variable flow by driving a piston pump directly with an AC servo motor and controlling the rotational speed in a range from zero to the maximum level. This series allows precise control of flow/pressure by using a dedicated AMSR controller. It also offers excellent response and repeatability.



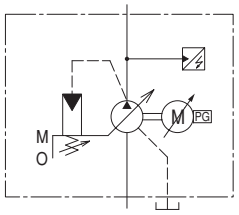
System Configuration

A feedback loop is formed by the AMSR controller that computes deviations between control signals from the machine side (speed and pressure commands) and sensor signals to drive the AC servo motor accordingly. Control parameters can be set digitally by using dedicated software.

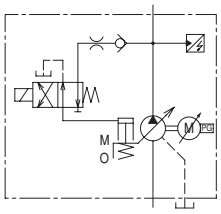


For the command voltage indicated by*, see "Input Signal Voltage vs. Shaft Speed" and "Input Signal Voltage vs. Pressure" on page A-217.

Graphic Symbols



Single Displacement Type
ASR＊－＊＊－＊X＊－

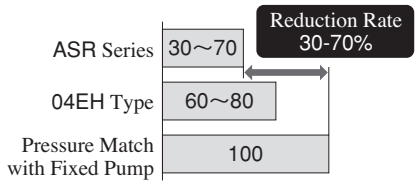


Dual Displacement Type
ASR＊－＊＊－＊W＊－

Energy saving with low heat generation

These pumps run at a rotational speed suitable for mechanical requirements, eliminating unnecessary power loss. They minimize heat generation in the fluid and allow the use of a significantly smaller reservoir.

Example of Power Consumption by Pump Control Type



Low noise

The motor operates at near-zero speed during unloaded operation or pressure control, keeping the noise level extremely low.

High performance

The AC servo motor, which directly controls the pump speed, improves response and stability at low pressures and speeds.

Digital AMSR controller that saves space and wiring

The integration of the amplifier for the servo motor and the controller saves space and wiring. The parameters can be digitally adjusted in an easy and repeatable way.

Dual displacement type for a wider operation range

The dual displacement type has a solenoid operated directional valve to switch between large and small swash plate angles. A single pump unit of the dual displacement type can operate both with low pressure/large flow and with high pressure/small flow. Thus, in comparison to the single displacement type with the same motor capacity, the dual displacement type covers a significantly wider range of operating pressures and flow rates.

Large flow

The AMSR controller has a combination function that supports operation with large flow up to 3200 L/min (ASR10 x 16 units).

Specifications

Descriptions \ Model Numbers			ASR1-	ASR2-	ASR3-		ASR5-		ASR10-	
Power Capacity			C	C	E	G	J		M	
Pump	Flow Control	Max. Flow	39.5 L/min	55.5 L/min	92.3 L/min		129 L/min		200 L/min	
		Min. Adj. Flow	1%							
		Hysteresis	1% or less							
		Repeatability	1% or less							
		Input Signal Voltage	31.6 L/min / 5V	44.4 L/min / 5V	73.8 L/min / 5V		112.4 L/min / 5V		200 L/min / 5V	
		Max. Permissible Input Signal Voltage★	39.5 L/min / 6.25V	55.5 L/min / 6.25V	92.3 L/min / 6.25V		129 L/min / 5.75V			
	Pres. Control	Max. Operating Pres.	21 MPa	16 MPa	21 MPa					
		Min. Adj. Pres.	0.1 MPa							
		Hysteresis	1% or less							
		Repeatability	1% or less							
		Input Signal Voltage	17.5 MPa / 5V	16 MPa / 4.57V	17.5 MPa / 5V					
		Max. Permissible Input Signal Voltage★	21 MPa / 6V		21 MPa / 6V					
AC Servo Motor Specifications	Rated Output		4.5 kW		6 kW	8 kW	11 kW		15 kW	
	Insulation Class		Class F							
	Cooling System		Totally-enclosed Self-cooling				Totally-enclosed Fan-cooling			
		Cooling Fan Power Consumption	———				62W (50Hz) / 76W (60Hz)			
	Environmental Condition	Ambient Temperature	0 - +40 °C (No Freezing)							
		Ambient Humidity	80 %RH or less (No Condensation)							
Mass	Single Displacement Type		54 kg	54 kg	80 kg	87 kg	94 kg	175.5 kg	213 kg	233 kg
	Dual Displacement Type		55 kg	55 kg	82 kg	89 kg	96 kg	177.5 kg	214 kg	234 kg
Applicable Controller Model Number			AMSR-＊C-＊00-10		AMSR-2DE-＊00-10	AMSR-＊FGI-＊00-10	AMSR-＊HJL-＊00-10		AMSR-＊KMO-＊00-10	

★By adjusting the controller, the maximum flow rate/5 V (39.5 L/min/5 V) and the maximum operating pressure/5 V (21 MPa/5 V) can be set.

Model Number Designation

The model numbers below indicate packages each containing an AC servo motor driven pump, AMSR controller, and Regeneration Resisters.

ASR3	-4	G	-H	X	S	A100	N	-A	00	-12
★1 Series Number	Power Supply Voltage	★2 Power Capacity	Max. Operating Pres.	Flow Setting	Port Direction	★4 ★5 Coil Type for Solenoid Operated Directional Valve	★4 ★5 ★6 Electrical Conduit Connection for Solenoid Operated Directional Valve	Function Selection	Parameter Number	Design Number
ASR1	None : 200 V AC 4 : 400 V AC	C	H : 21 MPa	X : Single Displacement Type W : Dual Displacement Type	S : Side None : Axial A:Horizontal B:Vertical	AC A100 :100 V AC A120 :120 V AC A200 :200 V AC A240 :240 V AC DC None :24 V DC D12 :12 V DC D48 :48 V DC D100 :100 V DC D110 :110 V DC D200 :200 V DC D220 :220 V DC AC (AC <-> DC) R100 :100 V AC R110 :110 V AC R200 :200 V AC R220 :220 V AC	None: Terminal Box N:DIN Plug-in Connector (Optional)	A: Single B: Combination★7 (Single Operation Allowed)	00: Standard	12
ASR2		C	C : 16 MPa							12
ASR3		E★3, G	H : 21 MPa							12
ASR5		G, J								12
ASR10		J, M								12

★1. To order an AC servo motor driven pump separately for spare use, prefix "N-" to the model number and omit the Function Selection and Parameter Number.

Example) N-ASR3-4G-HXSA100N-12

★2. For the relationship between the power capacity and the pressure/flow in terms of specification limits, see charts on pages A-219 and A-220.

★3. When selecting the power capacity "E", only an input voltage of 200 V AC is available.

★4. Types shown in the shaded areas are optional. Check the delivery date before selecting them.

★5. This is applicable only when "W" is selected for flow setting.

★6. The following symbol is added the column of electrical wiring system of solenoid valves. (except for ASR2)

M : Terminal Box Type (without manual actuator)

P : Plug-in Connector Type (without manual actuator)

★7. For combination operation, consult us separately regarding the types of hydraulic circuits, components, and electric cables.

Solenoid Ratings

Please see the solenoid ratings on page A-51.

Pipe Flange Kit

No pipe flange kit is included with the pump. The pipe flange kits below are available if required. For the details of the pipe flange kits, see pages A-258 and A-259.

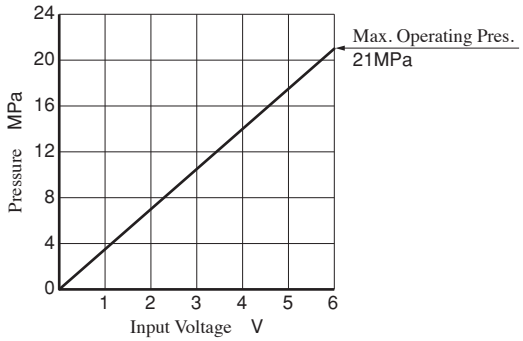
Pump Model Numbers	Name of Port	Pipe Flange Kit Numbers		
		Threaded Connection	Socket Welding★	Butt Welding
ASR1 ASR2	Suction	F5-06-A-10	F5-06-B-10	F5-06-C-10
	Discharge	F5-06-A-10	F5-06-B-10	F5-06-C-10
ASR3 ASR5	Suction	F5-10-A-10	F5-10-B-10	F5-10-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10
ASR10	Suction	F5-16-A-10	F5-16-B-10	F5-16-C-10
	Discharge	F5-10-A-10	F5-10-B-10	F5-10-C-10

★ For the socket welding type F5-06-B-10 or F5-10-B-10, the operating pressure may be limited due to the flange strength.

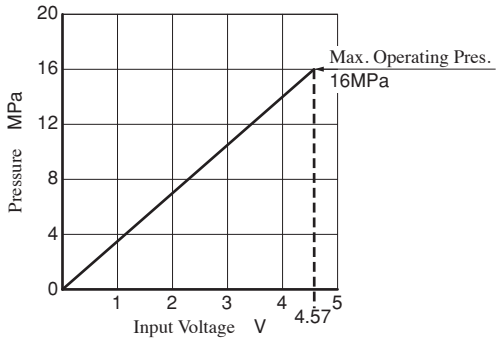
Characteristics of Single Displacement Type

Input Signal Voltage vs. Pressure

● ASR1/ASR3/ASR5/ASR10-＊＊-HX

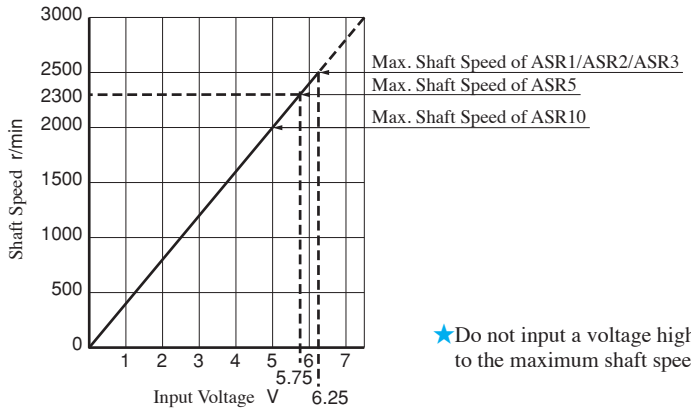


● ASR2-＊C-CX



★Do not input a voltage higher than the level corresponding to the maximum operating pressure.

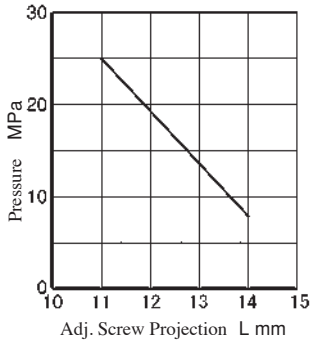
Input Signal Voltage vs. Shaft Speed



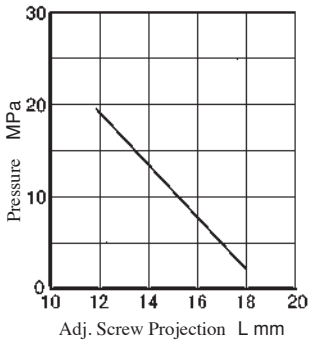
★Do not input a voltage higher than the level corresponding to the maximum shaft speed.

Safety Valve Pressure Adjustment Screw Projection and Safety Valve Setting Pressure

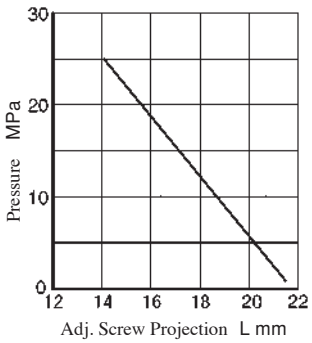
● ASR1/ASR3/ASR5-＊＊-HX

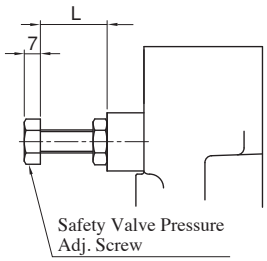


● ASR2-＊C-CX

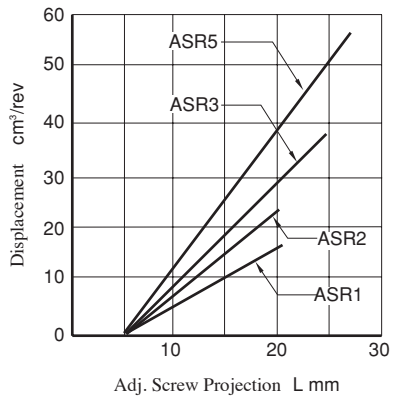


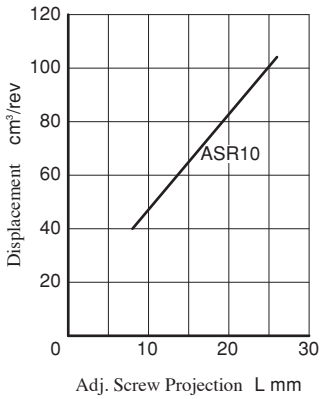
● ASR10-＊＊-HX

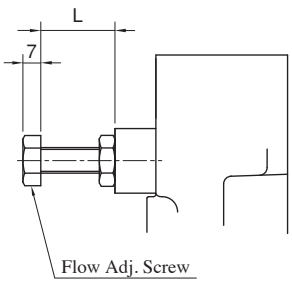




Flow Adjustment Screw Projection and Geometric Displacement







Characteristics of Dual Displacement Type

Input Signal Voltage vs. Pressure

See “Characteristics of Single Displacement Type” (page A-217).

Input Signal Voltage vs. Shaft Speed

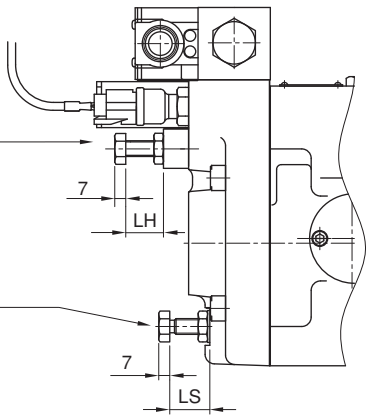
See “Characteristics of Single Displacement Type” (page A-217).

Flow Adjustment Screw Projection and Geometric Displacement

Large Displacement Side Flow Adj. Screw (Check operation with the solenoid operated directional valve “off”.)

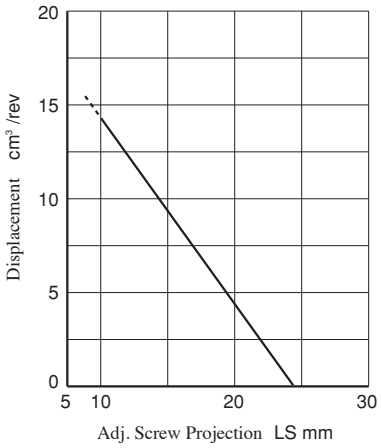
This is the same as the single displacement type. See “Characteristics of Single Displacement Type” (page A-217).
Note that the value cannot be set below the level set by the small displacement side adjustment screw.

Small Displacement Side Flow Adj. Screw
(Check operation with the solenoid operated directional valve “on” and at a load pressure of 3 MPa or more.)

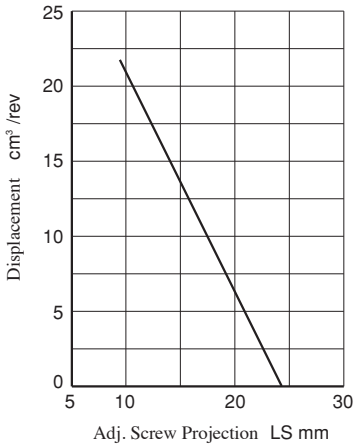


【Small Displacement】

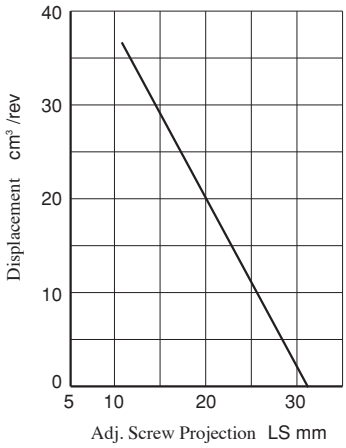
● ASR1-＊C-HW



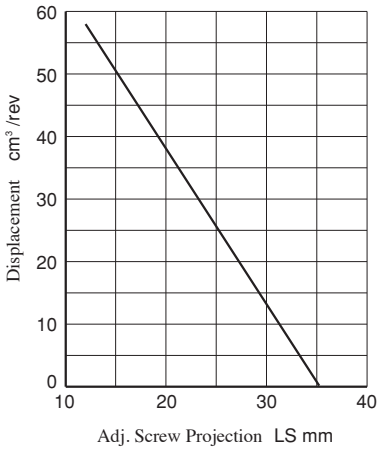
● ASR2-＊C-CW



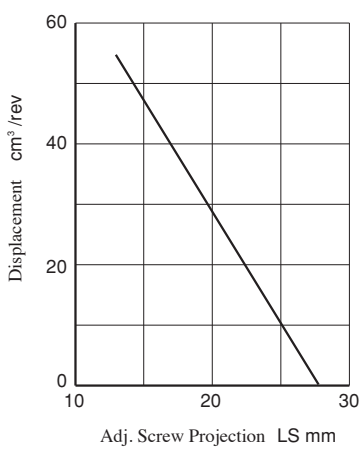
● ASR3-＊＊-HW



● ASR5-＊＊-HW



● ASR10-＊＊-HW

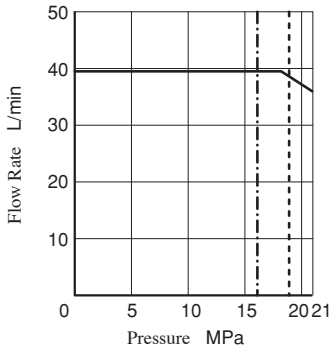


Pressure vs. Discharge Flow (Single Displacement Type "W")(Reference)

-·-·-·-·- Max Continuous Operation Time:100 sec.
---------- Max Continuous Operation Time: 30 sec.

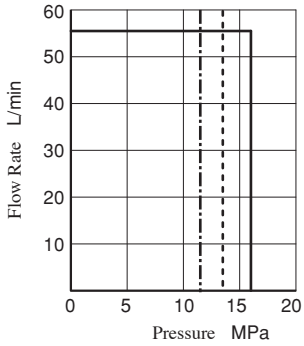
ASR1-＊C-HX＊

Maximum Displacement Range (15.8 cm³/rev)



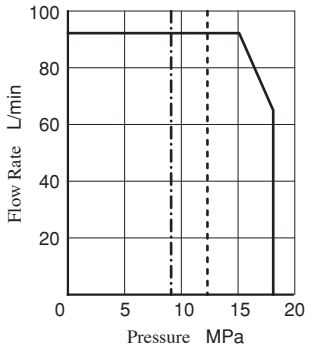
ASR2-＊C-CX＊

Maximum Displacement Range (22.2 cm³/rev)



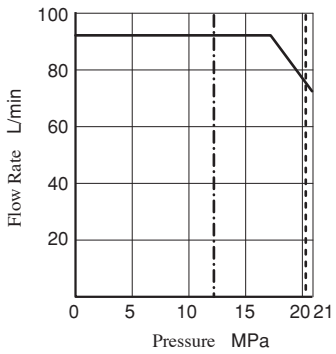
ASR3-E-HX＊

Maximum Displacement Range (36.9 cm³/rev)



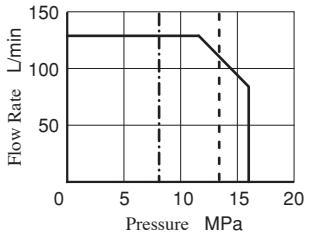
ASR3-＊G-HX＊

Maximum Displacement Range (36.9 cm³/rev)



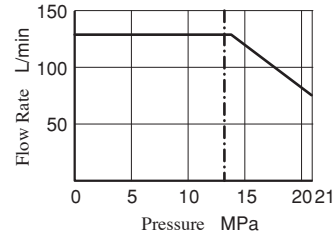
ASR5-＊G-HX＊

Maximum Displacement Range (56.2 cm³/rev)



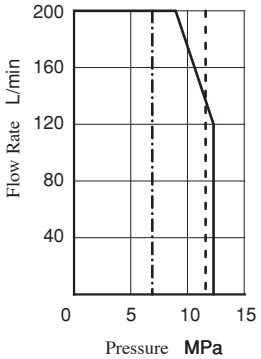
ASR5-＊J-HX＊

Maximum Displacement Range (56.2 cm³/rev)



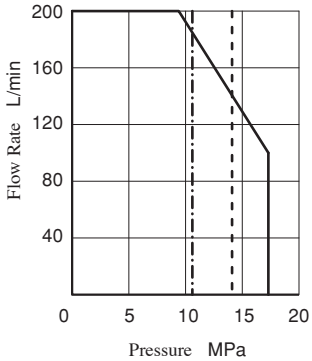
ASR10-＊J-HX＊

Maximum Displacement Range (100.0 cm³/rev)



ASR10-＊M-HX＊

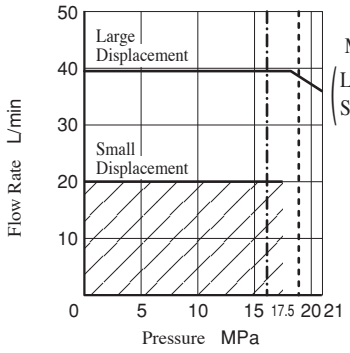
Maximum Displacement Range (100.0 cm³/rev)



Pressure vs. Discharge Flow (Single Displacement Type "W")(Reference)

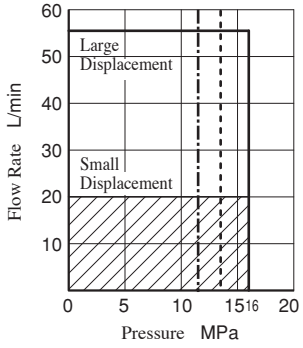
Large Displacement : Max. Continuous Operation Time : 100 sec.
Large Displacement : Max. Continuous Operation Time : 30 sec.
Small Displacement : Max. Continuous Operation Time

ASR1-＊C-HW＊



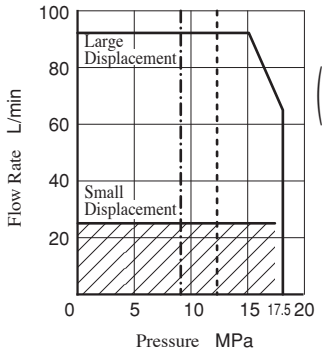
Maximum Displacement Range
Large Displacement:15.8 cm³/rev
Small Displacement:8.0 cm³/rev

ASR2-＊C-CW＊



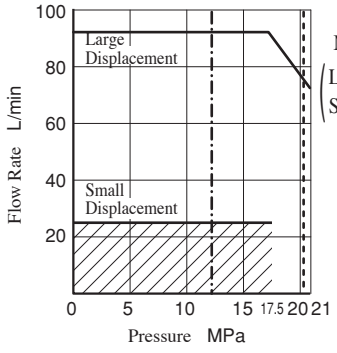
Maximum Displacement Range
Large Displacement:22.2 cm³/rev
Small Displacement:8.0 cm³/rev

ASR3-E-HW＊



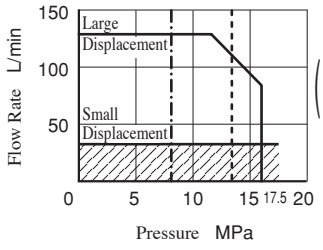
Maximum Displacement Range
Large Displacement:36.9 cm³/rev
Small Displacement:10.0 cm³/rev

ASR3-＊G-HW＊



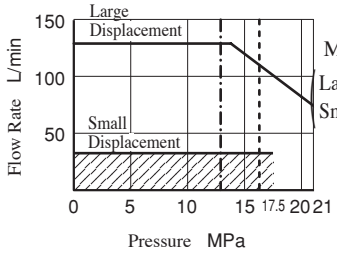
Maximum Displacement Range
Large Displacement:36.9 cm³/rev
Small Displacement:10.0 cm³/rev

ASR5-＊G-HW＊



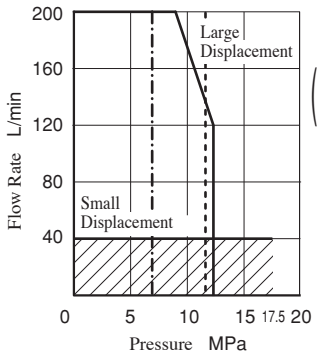
Maximum Displacement Range
Large Displacement:56.2 cm³/rev
Small Displacement:14.0 cm³/rev

ASR5-＊J-HW＊



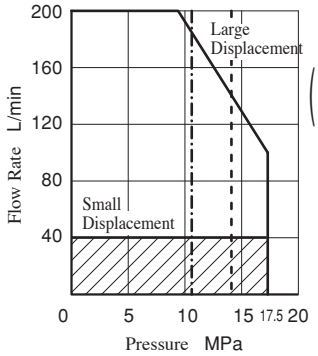
Maximum Displacement Range
Large Displacement:56.2 cm³/rev
Small Displacement:14.0 cm³/rev

ASR10-＊J-HW＊



Maximum Displacement Range
Large Displacement:100 cm³/rev
Small Displacement:20.0 cm³/rev

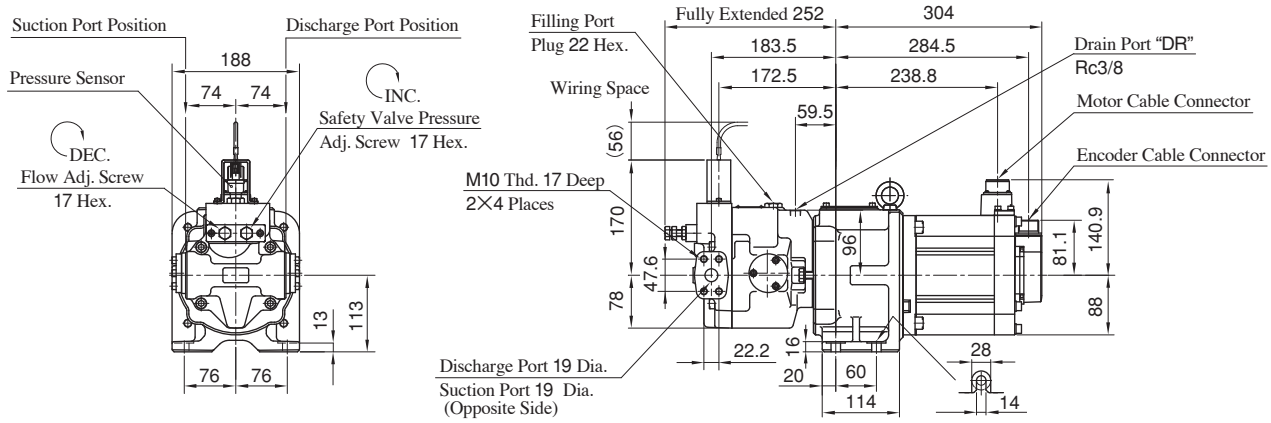
ASR10-＊M-HW＊



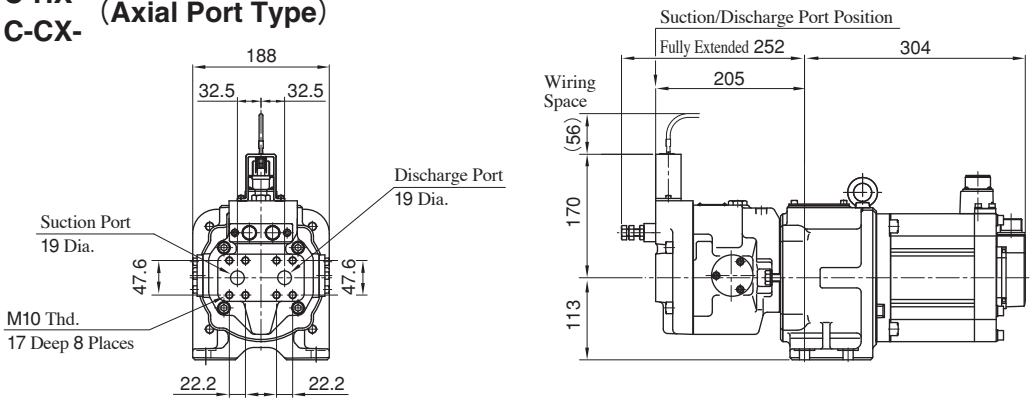
Maximum Displacement Range
Large Displacement:100 cm³/rev
Small Displacement:20.0 cm³/rev

Single Displacement Type

ASR1-＊C-HXS-
ASR2-＊C-CXS- (Side Port Type)



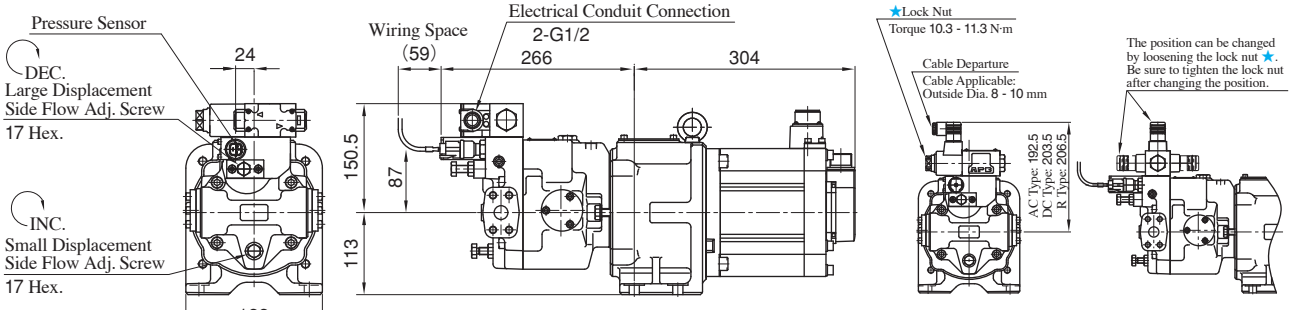
ASR1-＊C-HX-
ASR2-＊C-CX- (Axial Port Type)



● For other dimensions, see the figure for the side port type.

Dual Displacement Type

ASR1-＊C-HWS-
ASR2-＊C-CWS- (Side Port Type)

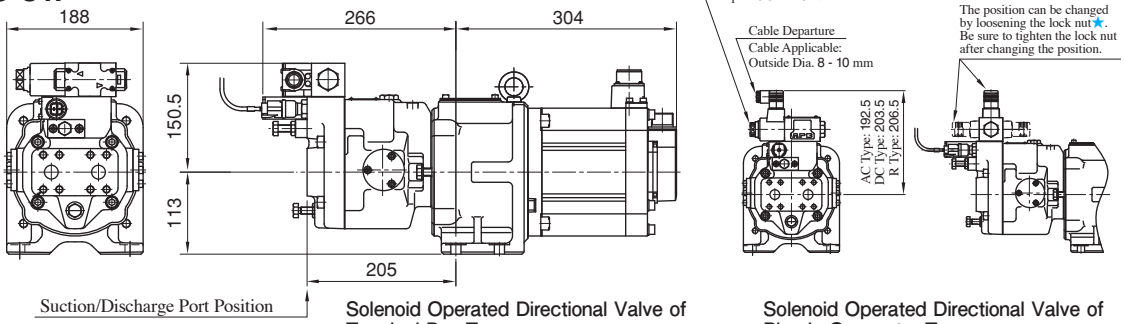


Solenoid Operated Directional Valve of Terminal Box Type

Solenoid Operated Directional Valve of Plug-in Connector Type

● For other dimensions, see the figure for the single displacement type.

ASR1-＊C-HW-
ASR2-＊C-CW- (Axial Port Type)



Solenoid Operated Directional Valve of Terminal Box Type

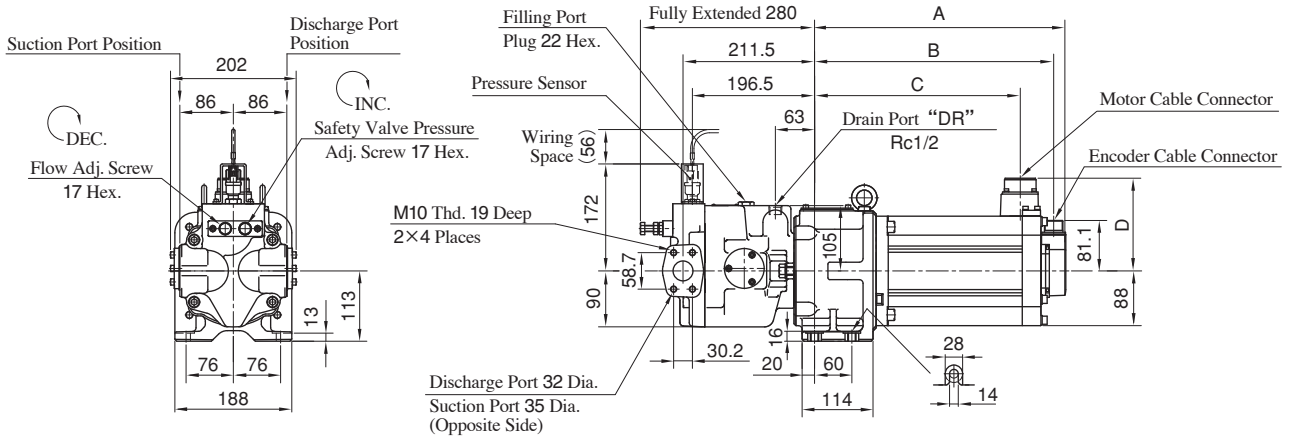
Solenoid Operated Directional Valve of Plug-in Connector Type

● For other dimensions, see the figure for the single displacement type.

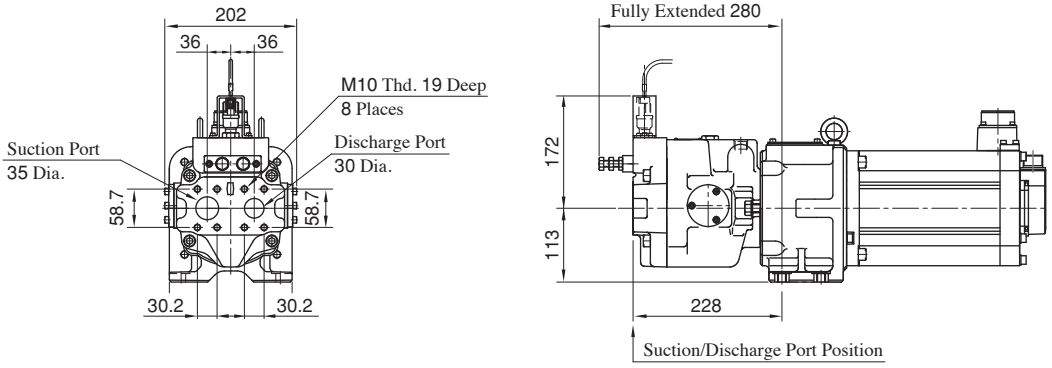
ASR3-＊＊-HXS-（Side Port Type）

Single Displacement Type

Model Numbers	A	B	C	D
ASR3-E-H＊S-	364	344.5	290.8	149.1
ASR3-＊G-H＊S-	404	384.5	330.8	149.1



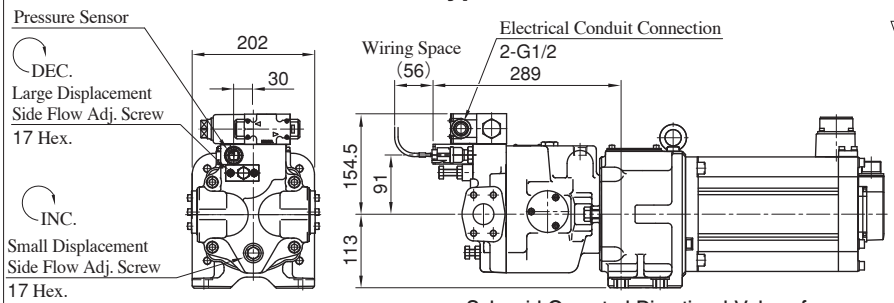
ASR3-＊＊-HX-（Axial Port Type）



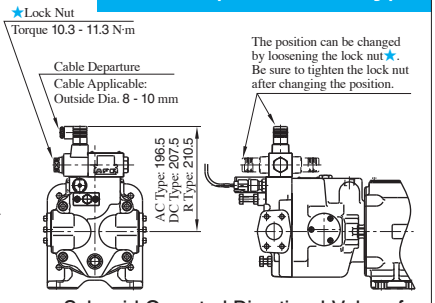
● For other dimensions, see the figure for the side port type.

ASR3-＊＊-HWS-（Side Port Type）

Dual Displacement Type



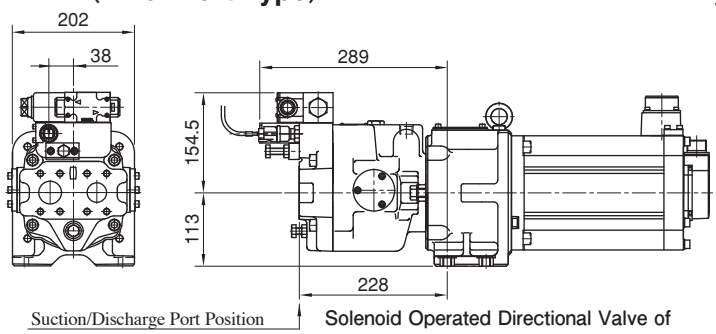
Solenoid Operated Directional Valve of Terminal Box Type



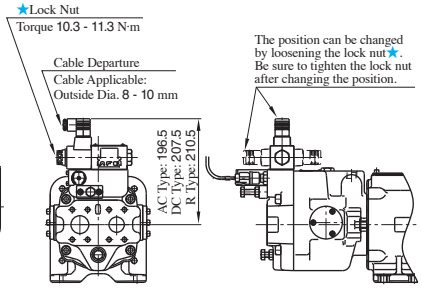
Solenoid Operated Directional Valve of Plug-in Connector Type

● For other dimensions, see the figure for the single displacement type.

ASR3-＊＊-HW-（Axial Port Type）



Solenoid Operated Directional Valve of Terminal Box Type

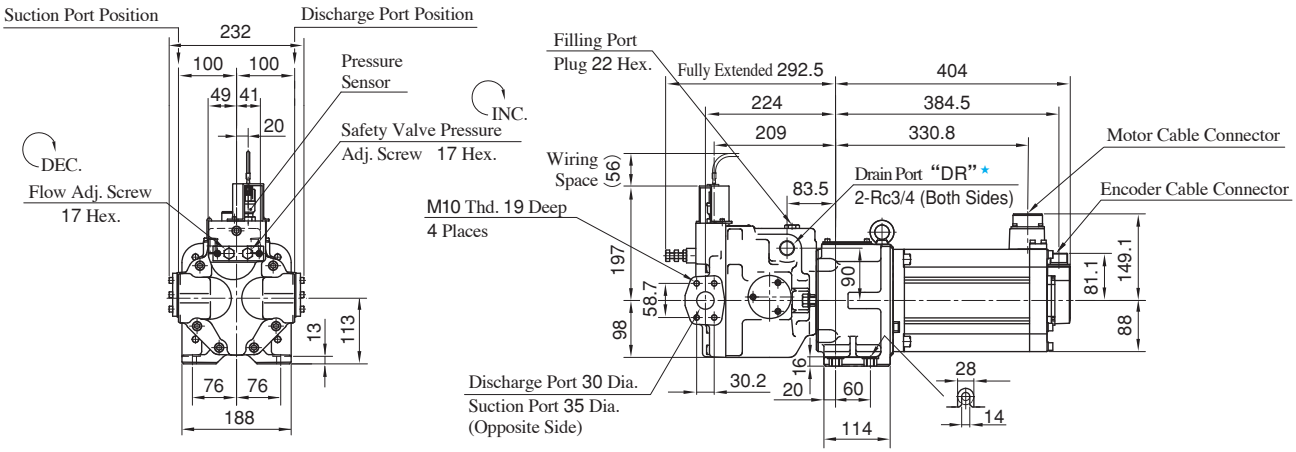


Solenoid Operated Directional Valve of Plug-in Connector Type

● For other dimensions, see the figures for the single displacement type and the dual displacement side port type.

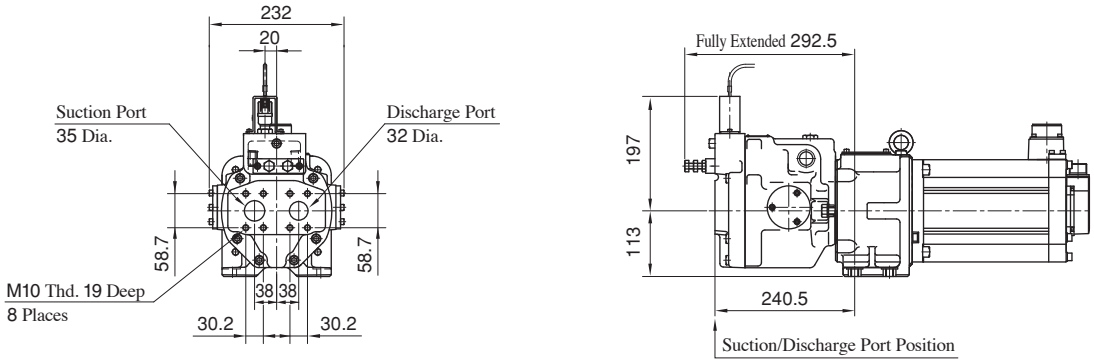
Single Displacement Type

ASR5-＊G-HXS-（Side Port Type）



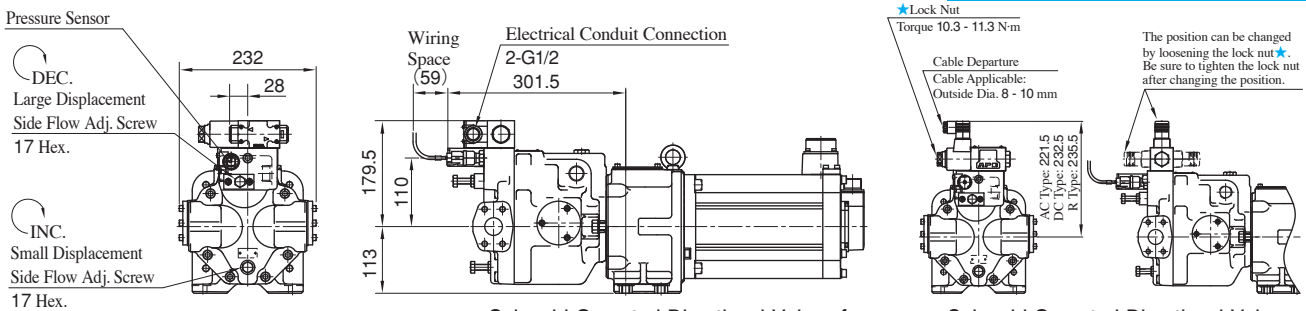
★Use either of two drain ports at your option. Keep the unused port plugged.

ASR5-＊G-HX-（Axial Port Type）



Dual Displacement Type

ASR5-＊G-HWS-（Side Port Type）

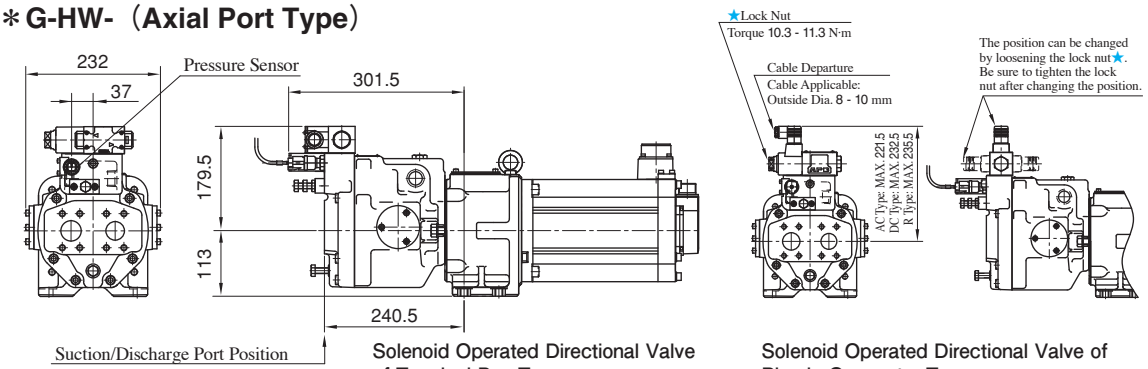


Solenoid Operated Directional Valve of Terminal Box Type

Solenoid Operated Directional Valve of Plug-in Connector Type

● For other dimensions, see the figure for the single displacement type.

ASR5-＊G-HW-（Axial Port Type）



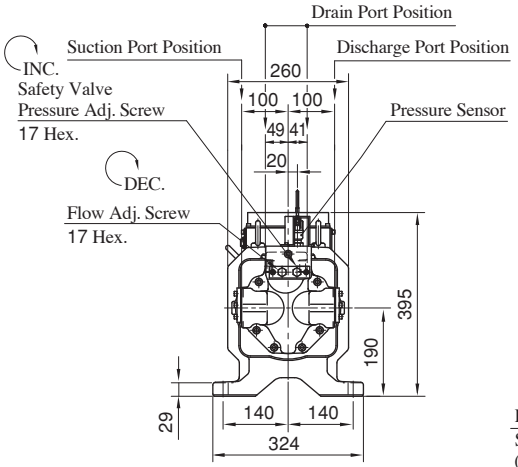
Solenoid Operated Directional Valve of Terminal Box Type

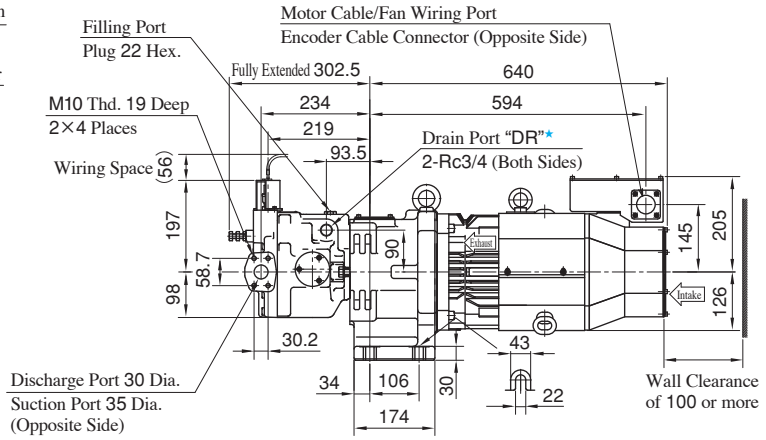
Solenoid Operated Directional Valve of Plug-in Connector Type

● For other dimensions, see the figures for the single displacement type and the dual displacement side port type.

ASR5-＊J-HXS-（Side Port Type）

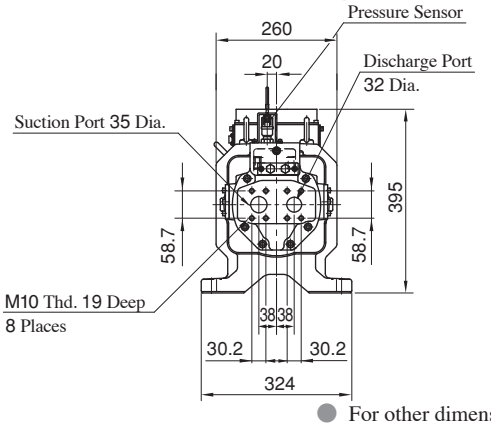
Single Displacement Type

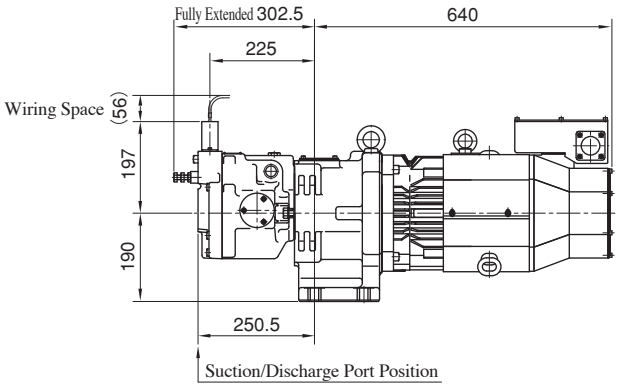




★Use either of two drain ports at your option. Keep the unused port plugged.

ASR5-＊J-HX-（Axial Port Type）

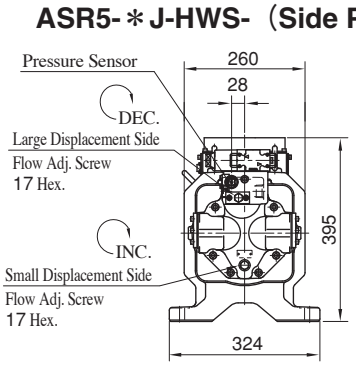


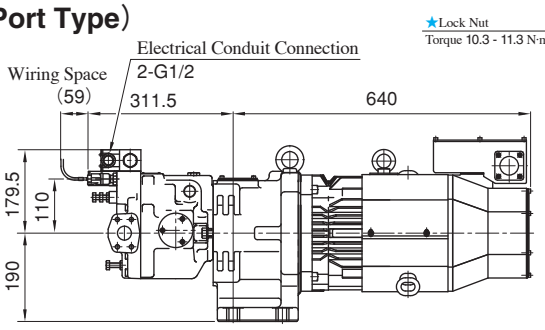


● For other dimensions, see the figure for the side port type.

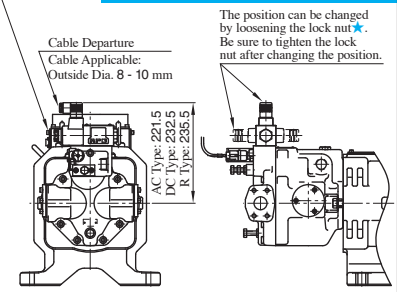
ASR5-＊J-HWS-（Side Port Type）

Dual Displacement Type





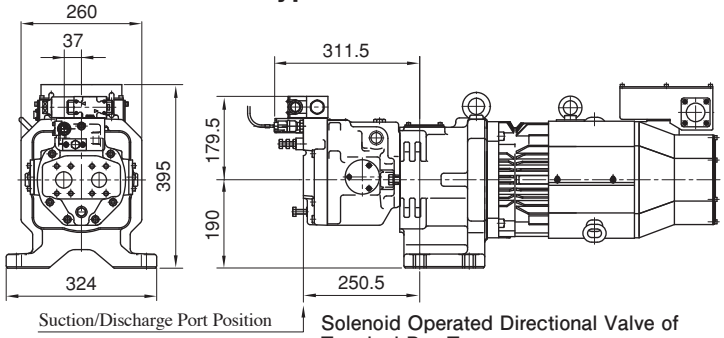
Solenoid Operated Directional Valve of Terminal Box Type



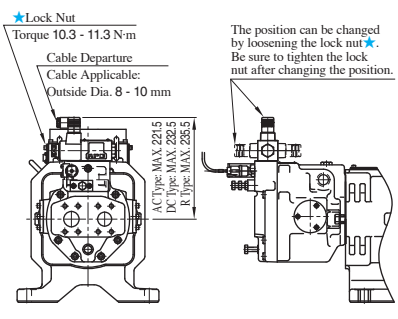
Solenoid Operated Directional Valve of Plug-in Connector Type

● For other dimensions, see the figure for the single displacement type.

ASR5-＊J-HW-（Axial Port Type）



Solenoid Operated Directional Valve of Terminal Box Type

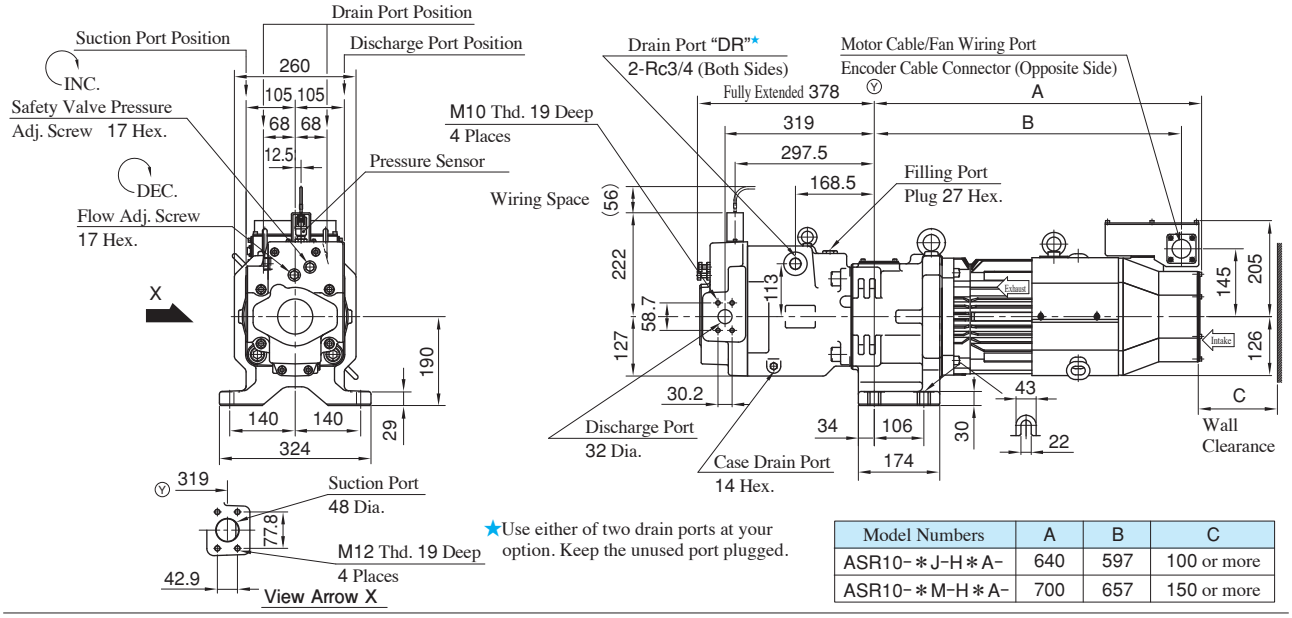


Solenoid Operated Directional Valve of Plug-in Connector Type

● For other dimensions, see the figures for the single displacement type and the dual displacement side port type.

Single Displacement Type

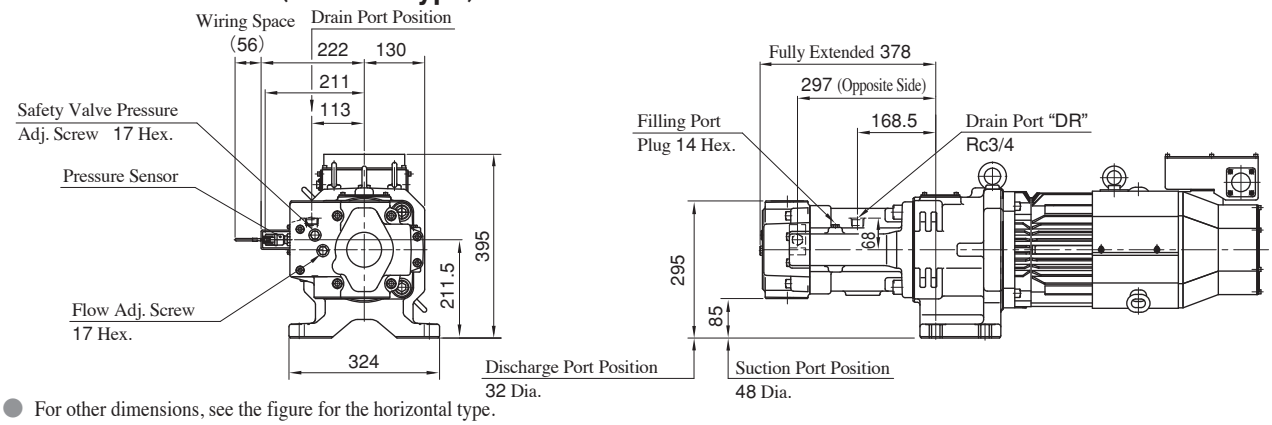
ASR10-＊＊-HXA-（Horizontal Type）



★Use either of two drain ports at your option. Keep the unused port plugged.

Model Numbers	A	B	C
ASR10-＊J-H＊A-	640	597	100 or more
ASR10-＊M-H＊A-	700	657	150 or more

ASR10-＊＊-HXB-（Vertical Type）

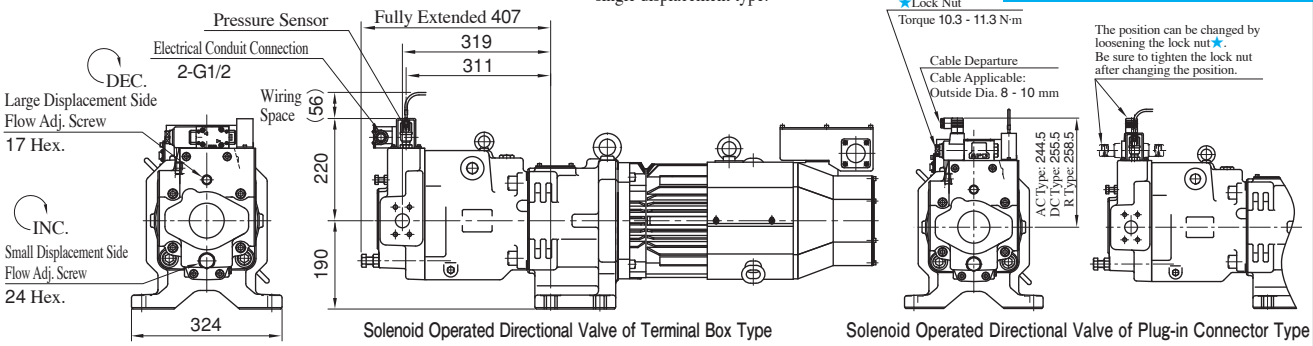


● For other dimensions, see the figure for the horizontal type.

Dual Displacement Type

ASR10-＊＊-HWA-（Horizontal Type）

● For other dimensions, see the figure for the single displacement type.

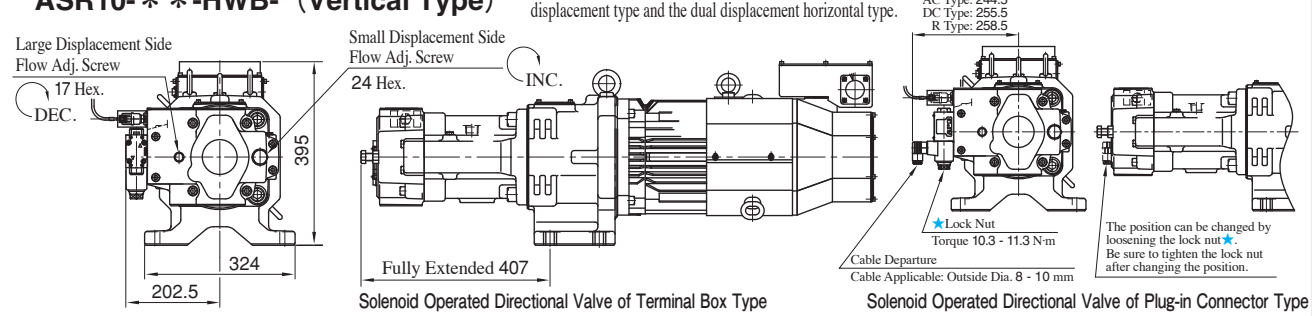


Solenoid Operated Directional Valve of Terminal Box Type

Solenoid Operated Directional Valve of Plug-in Connector Type

ASR10-＊＊-HWB-（Vertical Type）

● For other dimensions, see the figures for the single displacement type and the dual displacement horizontal type.



Solenoid Operated Directional Valve of Terminal Box Type

Solenoid Operated Directional Valve of Plug-in Connector Type

AMSR Controller

The AMSR controller is used to drive ASR series AC servo motor driven pumps. With an optimal design for the ASR pumps, the controller can maximize the pump performance. The AMSR controller is included with the ASR series pumps.

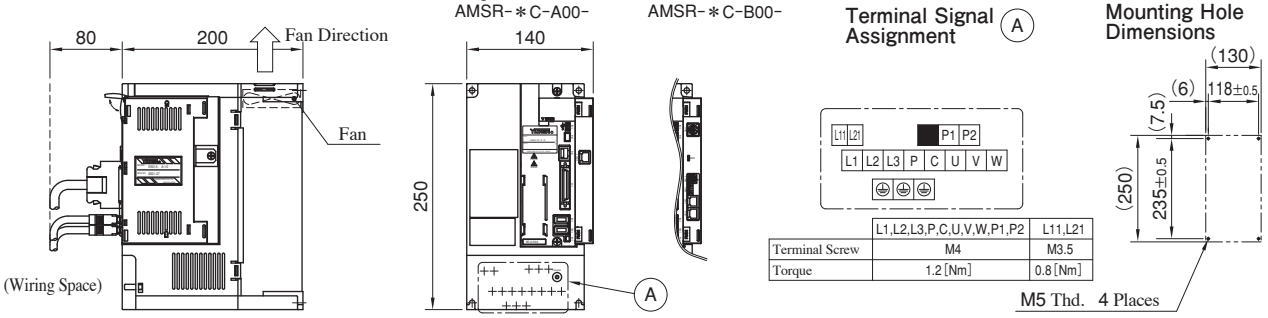
Specifications

Model Numbers			AMSR-＊C-＊00-10	AMSR-2DE-＊00-10	AMSR-＊FGI-＊00-10	AMSR-＊HJL-＊00-10	AMSR-＊KMO-＊00-10
Control Unit Specifications	Command Signal Input Voltage		0 - +10 V DC				
	Command Signal Input Impedance		10 kΩ				
	Monitor Output Voltage		0 - +10 V DC				
	Sequence Input Signal		Photocoupler Input 8ch				
	Sequence Output Signal		Open Collector Output 6ch				
Main Circuit Power	Voltage/Frequency	200 V	200 to 230 V AC, 50/60 Hz, 3-Phase				
		400 V	380 to 480 V AC, 50/60 Hz, 3-Phase				
	Permissible Voltage Fluctuation	200 V	170 to 253 V AC, 3-Phase				
		400 V	323 to 528 V AC, 3-Phase				
	Permissible Frequency Fluctuation		Within ±5%				
	Power Supply Capacity		6.8 kVA	8.6 kVA	12 kVA	16 kVA	22 kVA
Regeneration Resister (Dynamic Brake)			Built-in		External Option		
Cooling System			Fan-cooling, Open (IP 00)				
Environmental Condition	Ambient Temperature		0 - +50 °C (No Freezing)				
	Ambient Humidity		90 %RH or less (No Condensation)				
Protective Functions			・Overcurrent Shutdown ・Servo Motor Overheat Protection ・Undervoltage Protection ・Excess Error Protection		・Regenerative Overvoltage Shutdown ・Encoder Malfunction Protection ・Instantaneous Power Failure Protection		・Overload Shutdown ・Regeneration Malfunction Protection ・Overspeed Protection
Mass kg			4.6	6.2	18		19
Applicable Pump			ASR1-＊C ASR2-＊C	ASR3-E	ASR3-＊G ASR5-＊G	ASR5-＊J ASR10-＊J	ASR10-＊M

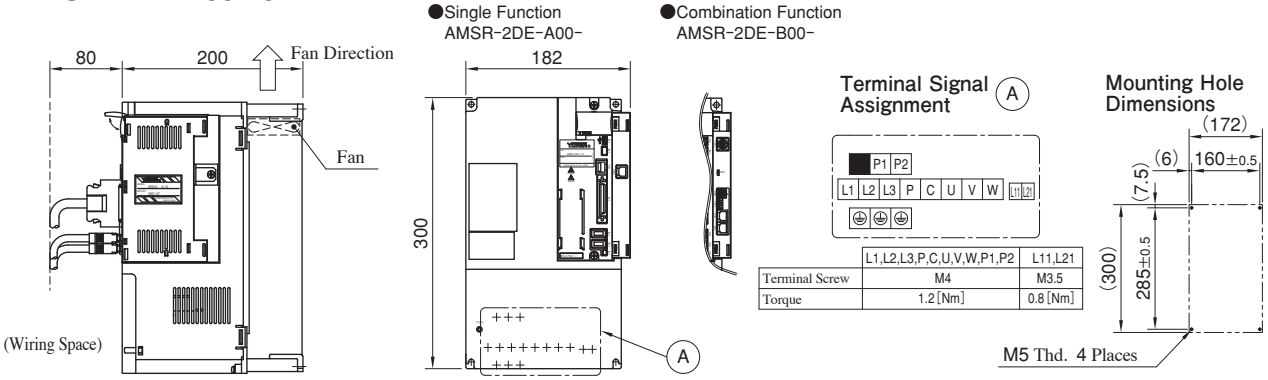
Model Number Designation

AMSR	-2	C	-A	00	-10
Series Numbers	Power Supply Voltage	Amplifier Capacity kW	Function Selection	Parameter Number	Design Number
AMSR： AMSR Controller	2：200 V AC	DE：7.0	A：Single B：Combination (Single Operation Allowed)	00：Standard	10
	2：200 V AC 4：400 V AC	C：5.0 FGI：11.0 HJL：15.0 KMO：22.0			

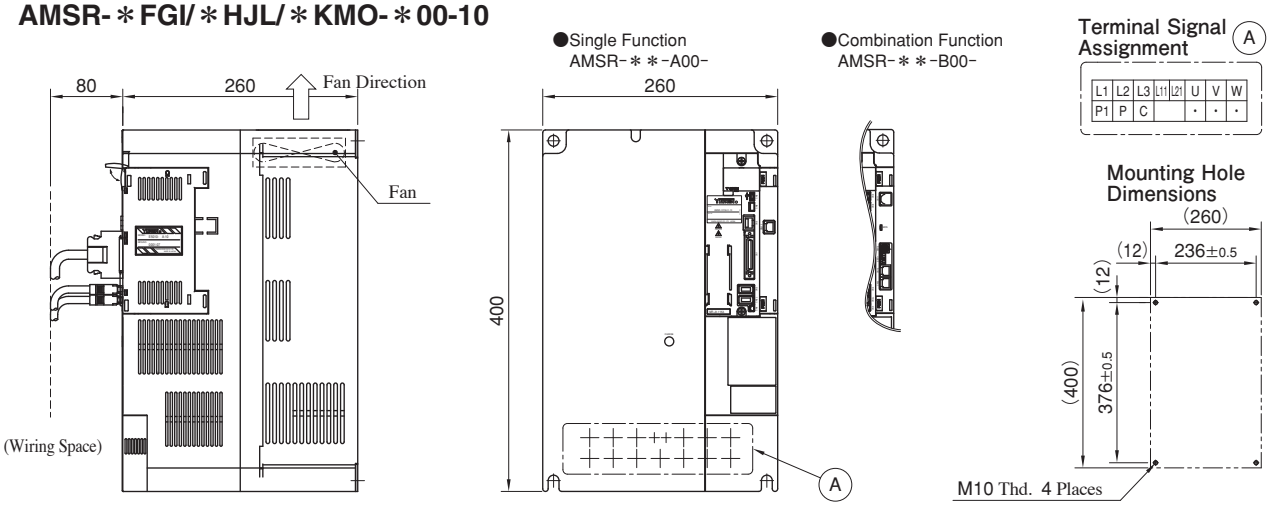
AMSR-＊C-＊00-10



AMSR-2DE-＊00-10



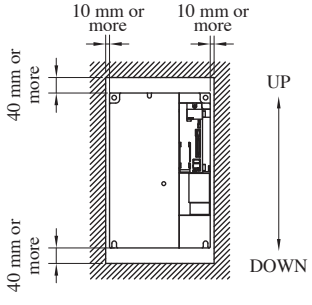
AMSR-＊FGI/＊HJL/＊KMO-＊00-10



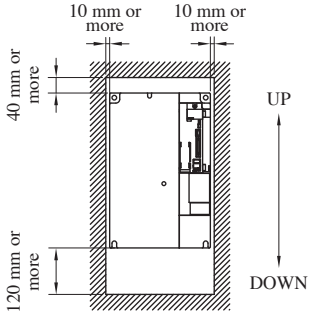
Terminal Symbol		L1-L3, U, V, W, P1, P, C	L11, L12
Terminal Screw Size/ Torque	AMSR-＊FGI/＊HJL-＊00-10	M6/3.0	M4/1.2
	AMSR-＊-KMO-＊00-10	M8/6.0	

Installation Standard

AMSR-＊C/2DE-＊00-10



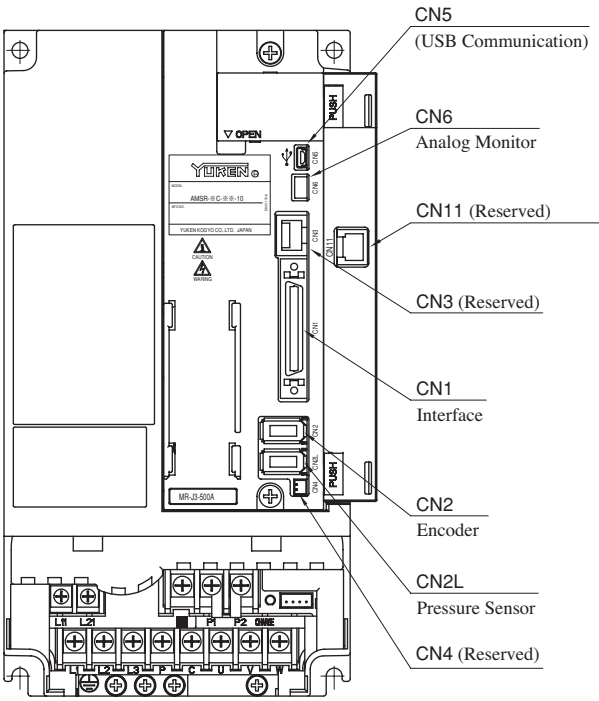
AMSR-＊FGI/＊HJL/＊KMO-＊00-10



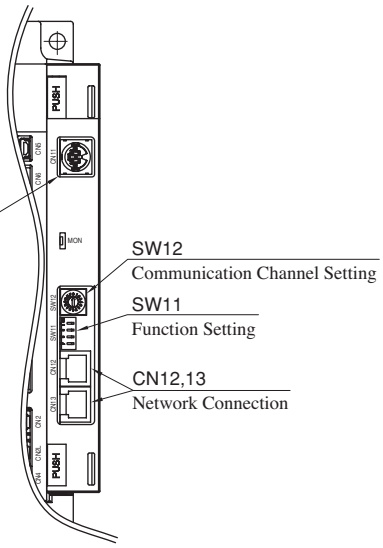
★ Consult us when installing multiple controllers next to each other.

Terminal Names/Appearance

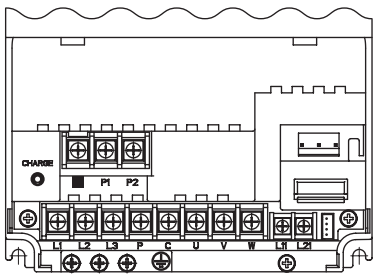
AMSR-＊C-A00- Single Function



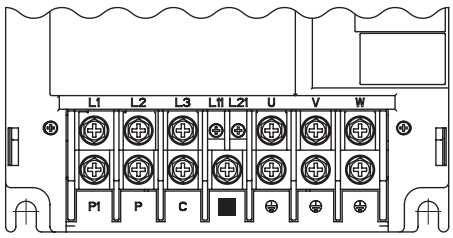
AMSR-＊C-B00- Combination Function



AMSR-2DE-



AMSR-＊FGI/＊HJL/＊KMO-



Function	Symbol	Terminal Name	Terminal Channel	Description
Single/ Combination	CN5	USB Communication	—	With the USB communication function, servo operation, parameter change, and monitor function can be performed on a PC. Recommended Cable USB Cable: Mini B Type
Combination	SW11	Function Selection	1	For the manufacturer's setting. : Always OFF.
			2	Reserved.
			3	For switching single and combination operations. OFF: Combination, ON: Single
			4	For network termination setting. OFF: None, ON: 150 Ω
	SW12	Communication Channel Selection	0	Master station
			1～F	Slave station
	CN12, CN13	Network Connection	—	For connection to the network based on the AMSR controller. Recommended Cable TFL-FST-＊S（SANWA） MJ-FS＊（ELECOM）

Terminal Block

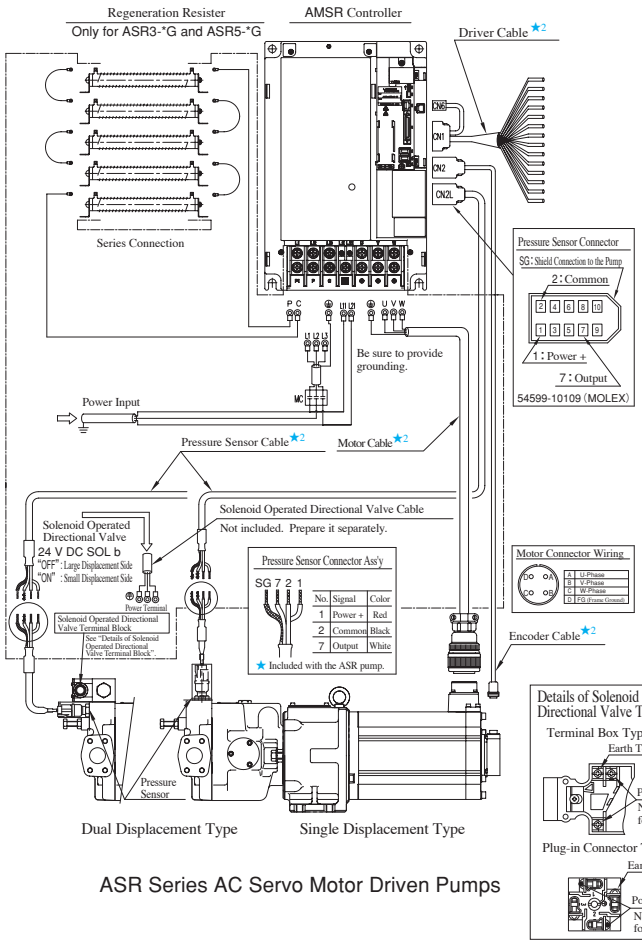
Connection (Use)	Signal Name	Description	
		AMSR-2C/2DE/ 2FGI/2HJL/2KMO	AMSR-4C/4FGI/ 4HJL/4KMO
DC Reactor for Power Factor Improvement	P1	P1 - P2 is short-circuited by default (the DC reactor cannot be used).★1	
	P2		
Regenerative Converter Brake Unit	N	Not connected.★1	

★1 Contact us when connecting the units.

For the details of CN1, CN2L, and CN6, consult us separately.

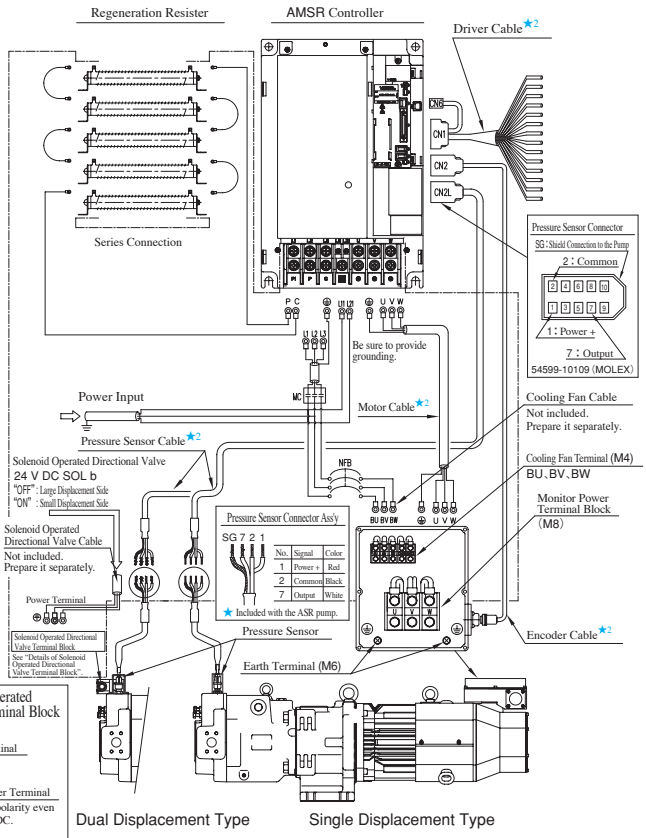
Wire Connection Diagram

ASR1-＊C-H＊＊-A00-12, ASR2-＊C-C＊＊-A00-12
ASR3-E/＊G-H＊＊-A00-12, ASR5-＊G-H＊＊-A00-12



ASR Series AC Servo Motor Driven Pumps

ASR5-＊J-H＊S-A00-12, ASR10-＊J/M-H＊S-A00-12



ASR Series AC Servo Motor Driven Pumps

★1 Wiring within the dashed line will be performed by the customer.
★2 The cables are not included with the pumps. If required, place an order by referring to page A-230.
★3 For the combination function (ASR*-**-***-B00-), modular cables are added to the wiring. When using the pump as a slave, the pressure sensor cable and driver cable are unnecessary.

Connectors

		CN1	CN2L	CN6
Housing		10150-3000VE (3M)	54599-1019 (MOLEX)	51004-0300 (MOLEX)
Terminal		———————		———————
Case		10350-52F0-008 (3M)		50011-8100 (MOLEX)
Cable	Core Size	AWG＃24—＃30	AWG＃18—＃28	AWG＃24—＃34
	Covered Dia.	1.2-1.5 Dia.	MAX 1.6 Dia.	0.8-1.4 Dia.
	Strip Length	2.0—2.5mm	1.5—2.4mm	1.2—2.0mm

Motor Cable Plug/Cable Clamp

Model Numbers	Motor Cable Plug		Cable Clamp
	Straight	L-shaped	
ASR 1/ASR 2	MS3106B22-22S	MS3108B22-22S	MS3057-12A
ASR 3- ＊ G	MS3106B32-17S	MS3108B32-17S	MS3057-20A

DDK Ltd.

Wiring Types

Common Wiring

Terminals and Cables	Wiring mm²
L11 ・ L21	1.25 (AWG16) ★
Pressure Sensor Cable	0.5 (AWG20)

Regeneration Resister

Wiring : 5.5mm² (AWG10) ★

Power Classification

Electric Source	Model Numbers	Wiring mm²	
		Power Input L1, L2, L3 ★ ⏚	Motor Cable U, V, W ★ ⏚
200 V AC 3-Phase	ASR1/ASR2/ASR3-C	5.5 (AWG10)	5.5 (AWG10)
	ASR3-E	8 (AWG8)	8 (AWG8)
	ASR3/ASR5-G	14 (AWG6)	22 (AWG4)
	ASR5/ASR10-J	22 (AWG4)	22 (AWG4)
	ASR10-M	50 (AWG1/0)	30 (AWG2)
400 V AC 3-Phase	ASR1/ASR2/ASR3-4C	5.5 (AWG10)	5.5 (AWG10)
	ASR3/ASR5-4G	8 (AWG8)	8 (AWG8)
	ASR5/ASR10-4J	14 (AWG6)	8 (AWG8)
	ASR10-4M	14 (AWG6)	22 (AWG4)

★ Use a 600 V vinyl-insulated cable.

Cable Numbers

The cables are not included with the ASR pumps. If required, place an order by referring to the list below. The cables other than the motor cable are common for all models.

Motor Cable

ASR Pump Model Numbers	Cable Model Numbers	Remarks
ASR 1-∗C-H∗ ∗-∗00-12	YSDC-M1-29-☆-★-10	☆ : Plug Type S : Straight, L : L-shaped ★ : Cable Length 03 : 3 m 05 : 5 m 10 : 10 m 15 : 15 m 20 : 20 m 30 : 30 m N : Plug and cable clamp only
ASR 2-∗C-C∗ ∗-∗00-12		
ASR 3-E-H∗ ∗-∗00-12	YSDC-M1-44S-☆-★-10	
ASR 3-G-H∗ ∗-∗00-12	YSDC-M1-1A-☆-★-10	
ASR 3-4G-H∗ ∗-∗00-12	YSDC-M1-44S-☆-★-10	
ASR 5-G-H∗ ∗-∗00-12	YSDC-M1-1A-☆-★-10	
ASR 5-4G-H∗ ∗-∗00-12	YSDC-M1-44S-☆-★-10	

Driver Cable/Encoder Cable/Pressure Sensor Cable

Cable Type	Cable Model Numbers	Remarks
Driver Cable	YSDC-D14-00-★-10	★ : Cable Length 01 : 1 m 02 : 2 m 03 : 3 m 05 : 5 m 10 : 10 m 20 : 20 m
Encoder Cable	YSDC-E7-S-★-10	★ : Cable Length 02 : 2 m 05 : 5 m 10 : 10 m
Pressure Sensor Cable	Consult us separately.	

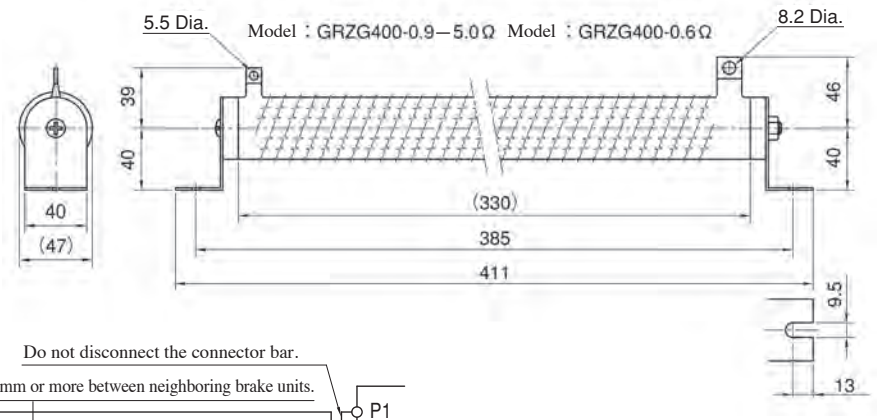
Regeneration Resister

Specifications

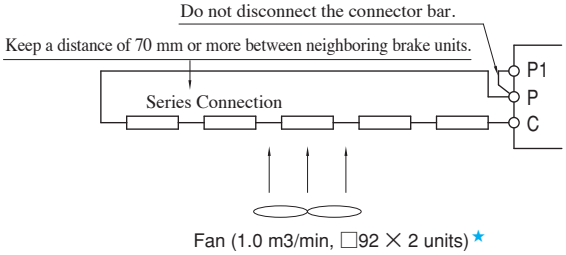
AMSR Controller Model Numbers	Regeneration Resister Model	Qty.	Permissible Regeneration W	Regeneration with Fan W	Resistance Ω	Mass kg
AMSR-2FGI-	GRZG400-1.5Ω	4	500	800	6 (1.5Ω×4)	3.2 (0.8kg×4)
AMSR-2HJL-	GRZG400-0.9Ω	5	850	1300	4.5 (0.9Ω×5)	4.0 (0.8kg×5)
AMSR-2KMO-	GRZG400-0.6Ω				3 (0.6Ω×5)	
AMSR-4FGI-	GRZG400-5.0Ω	4	500	800	20 (5.0Ω×4)	3.2 (0.8kg×4)
AMSR-4HJL-	GRZG400-2.5Ω	5	850	1300	12.5 (2.5Ω×5)	4.0 (0.8kg×5)
AMSR-4KMO-	GRZG400-2.0Ω				10 (2.0Ω×5)	

★1. Regeneration Resisters are included with the ASR pumps.

★2. Regeneration Resisters may become excessively heated. Use heat-resistant and fireproof wires and avoid their contact with the brakes.

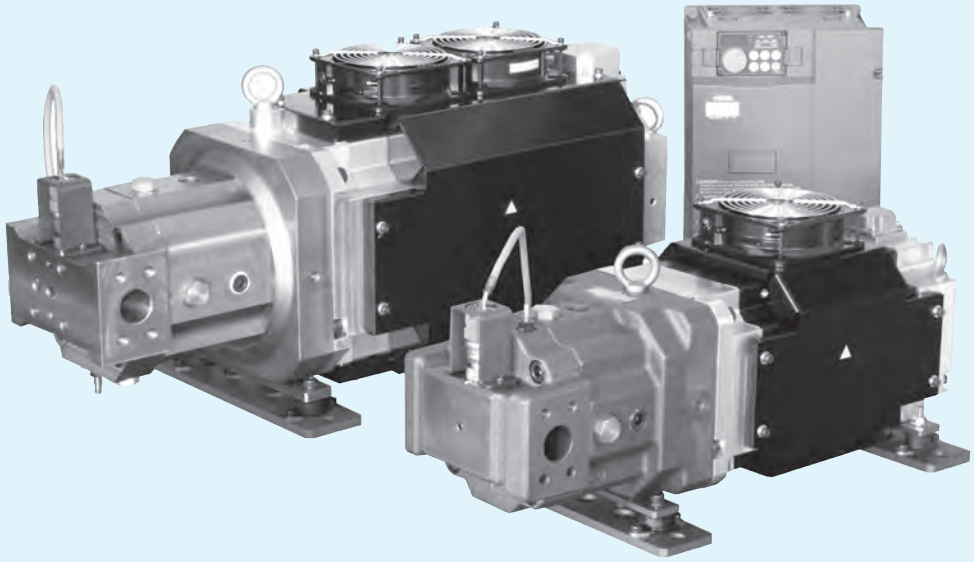


Connection



★Recommended fan capacity for fan cooling. In this case, change the setting of parameter No. PA02 from "0000" to "00FA".

ASE Series
AC Servo Motor Driven Pumps



This product is exclusively use for foreign countries outside of Japan.

"ASE" Series AC Servo Motor Driven Pumps

Pump Type	Graphic Symbols	Geometric Displacement cm³/rev (0 2 5 10 20 50 100 150)	Maximum Operating Pressure MPa	Page
ASE Series AC Servo Motor Driven Pumps	Single Displacement Type	ASE3	17.5	A-234
		ASE5		
		ASE10		
	Dual Displacement Type	ASE10W	21	
		ASE15W		

■ AMSE Controller A-244

Hydraulic Fluids

Hydraulic Fluids

Use clean petroleum base oils equivalent to ISO VG32 or 46. The recommended viscosity range is from 20 to 400 mm^2/s and temperature range is from 0 to 60 °C, both of which have to be satisfied for the use of the above hydraulic oils.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the operating oil which can otherwise lead to breakdowns and shorten the life of the unit. Please maintain the degree of contamination within NAS class 9.
The suction port must be equipped with at least 100 μm (150 mesh) reservoir type filter and the return line must have a line type filter of under 10 μm.

Instructions

Transportation

For transportation, use the lifting rings on the pump. Do not use lifting cables at places other than the lifting rings.

Mounting

When installing the pump, the filling port should be positioned upwards.

Suction Pressure

Permissible suction pressure at the inlet port of the pump is between -16.7 and +50 kPa. For piping to the suction port, use pipes of the nominal diameters shown below. Make sure that the height of the pump suction port is lower than the oil level in the reservoir.

Model	Nominal Dia.
ASE3/ASE5	$1\ ^1/_2$
ASE10	$2\ ^1/_2$
ASE10W	2
ASE15W	3

Hints on Piping

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise. Whenever there is fear of excessive load, please use rubber hoses.

Drain Piping

Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a nominal pressure of less than 0.1 MPa and surge pressure of less than 0.5 MPa.
The length of piping should be less than 1 m. Instead of joining the drain pipe to other return lines, run it independently. The pipe end should be submerged in oil.

[Recommended Drain Piping Size]

Model	Fitting Size	Inside Dia. of Pipe
ASE3/ASE5	1/2 (Inside Dia. 12 mm or more)	12 mm or more
ASE10/ASE10W/ASE15W	3/4 (Inside Dia. 16 mm or more)	19 mm or more

Precautions

This pump does not have a full cut-off function.
Be sure to install an external relief valve for setting the PH pressure (maximum circuit pressure) in the pump discharge line.

Starting

Before first starting, fill the pump case with clean operating oil via the filling port. In order to avoid air blockage when first starting, adjust the control valves so that the discharged oil from the pump is returned directly to the reservoir or the actuator moves in a free load.

[Volume of Pre-fill Oil Required]

Model	Volume cm^3
ASE3/ASE5	600
ASE10	900
ASE10W	2200
ASE15W	3100

Bleeding Air

It may be necessary to bleed air from the pump case and lines to remove causes of vibration. An air bleed valve (Model Number: ST1004, Page A-259) in the outlet line is recommended.
For air bleeding with an air bleed valve installed, run the pump at a rotational speed that provides a flow rate equal to/higher than the valve's flow rate to reseating.

Setting Delivery

At the time of shipment, the unit has been preset to the delivery rate shown below.

[Default Setting of Delivery]

Model Numbers	Single Displacement Type cm^3/rev	Dual Displacement Type "W" cm^3/rev	
		Large Displacement	Small Displacement
ASE3	32.3	—	
ASE5	57.7	—	
ASE10	102.7	—	
ASE10W	—	100	58
ASE15W	—	151	100

Adjustment of Delivery

There is no flow adjustment screw for the single displacement type. Tuning the large displacement side flow adjustment screw for the dual displacement type clockwise decreases the delivery. Turning the small displacement side flow adjustment screw for the dual displacement type clockwise increases the delivery.

[Volume adjusted by each full turn of the flow adjustment screw]

Model Numbers	Dual Displacement Type "W" cm^3/rev	
	Large Displacement	Small Displacement
ASE10W	5.3	7.4
ASE15W	7.2	9.6

★ For the relationship between the flow adjustment screw position and flow adjustment, see pages A-237.

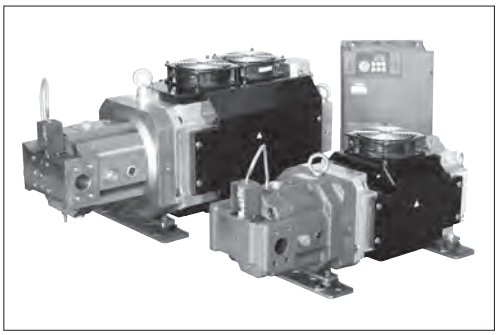
Precautions During Operation

During and for a period after operation, the surface temperature of the AC servo motor and the pump will be hot. Prevent hands and other body parts from coming into contact with them.

Providing flexible flow/pressure control !

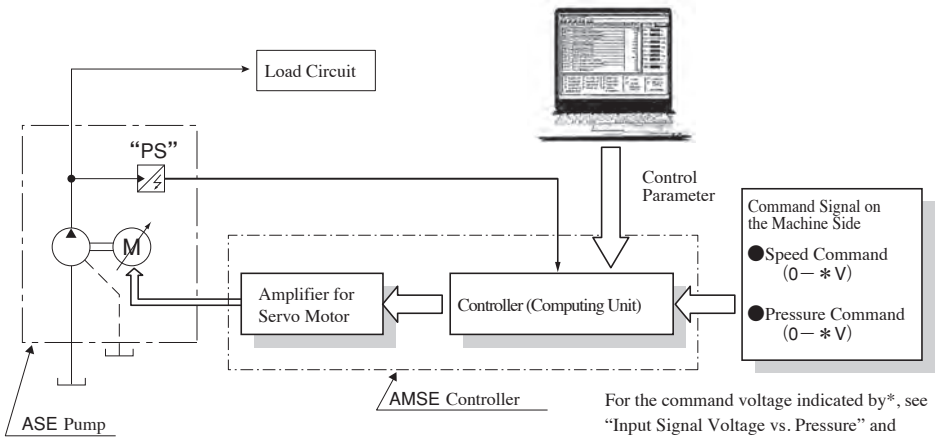
ASE Series AC Servo Motor Driven Pumps

The ASE series pumps inherit the basic concept of the shaft speed control from the ASR series pumps and offer high cost performance. The pumps of this series offer easy shaft speed control for systems that do not require as much precision, response, or repeatability as the ASR series pumps offer.



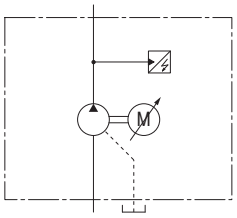
System Configuration

A feedback loop is formed by the AMSE controller that computes deviations between control signals from the machine side (speed and pressure commands) and sensor signals to drive the AC servo motor accordingly. Control parameters can be set digitally by using dedicated software.

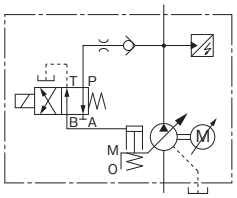


For the command voltage indicated by*, see "Input Signal Voltage vs. Pressure" and "Input Signal Voltage vs. Shaft Speed" on page A-237.

Graphic Symbols



Single Displacement Type
ASE＊



Dual Displacement Type
ASE＊W

Energy saving with low heat generation

These pumps run at a rotational speed suitable for mechanical requirements, eliminating unnecessary power loss. They minimize heat generation in the fluid and allow the use of a significantly smaller reservoir.

Low noise

Noise reduction insulation included as standard.

Less wiring / high reliability

Uses sensor-less rotational speed control.

Digital AMSE controller that saves space and wiring

The integration of the amplifier for the servo motor and the controller saves space and wiring. The parameters can be digitally adjusted in an easy and repeatable way.

Dual displacement type for a wider operation range

The dual displacement type has a solenoid operated directional valve to switch between large and small swash plate angles. A single pump unit of the dual displacement type can operate both with low pressure/large flow and with high pressure/small flow. Thus, in comparison to the single displacement type with the same motor capacity, the dual displacement type covers a significantly wider range of operating pressures and flow rates.

Large flow

The AMSE controller has a combination function that supports operation with large flow up to 4800 L/min (ASE15W × 16 units).

Specifications

Descriptions \ Model Numbers			ASE3	ASE5	ASE10	ASE10W	ASE15W
Power Capacity			AA	BZ	CE	BZ	CE
Pump	Flow Control	Max. Flow	80.8 L/min	132.7 L/min	205.4 L/min	200 L/min	302 L/min
		Min. Adj. Flow	2 %				
		Hysteresis	1 % or less				
		Repeatability	1 % or less				
		Input Signal Voltage	64.6 L/min/5V	115.4 L/min/5V	205.4 L/min/5V	200 L/min/5V	302 L/min/5V
		Max. Permissible Input Signal Voltage★1	80.8 L/min/6.25V	132.7 L/min/5.75V			
	Pres. Control	Max. Operating Pres.	17.5 MPa			17.5 MPa (21 MPa)★2	
		Min. Adj. Pres.	0.1 MPa				
		Hysteresis	1 % or less				
		Repeatability	1 % or less				
		Input Signal Voltage	17.5 MPa/5V			17.5 MPa/5V	
		Max. Permissible Input Signal Voltage★1				21 MPa/6V	
AC Servo Motor Specifications		Rated Output	11 kW	20 kW	35 kW	20 kW	35 kW
		Insulation Class	Class F				
		Cooling System	Totally-enclosed Fan-cooling				
		Cooling Fan Power Consumption	20W(50Hz)/18W(60Hz)	40W(50Hz)/36W(60Hz)	60W(50Hz)/54W(60Hz)	40W(50Hz)/36W(60Hz)	60W(50Hz)/54W(60Hz)
	Environmental Condition	Ambient Temperature	0 - +40 °C (No Freezing)				
		Ambient Humidity	80 %RH or less (No Condensation)				
Mass		200 V AC Type	75 kg	123 kg	185 kg	180 kg	—
		400 V AC Type	79 kg	116 kg	180 kg	173 kg	231.5 kg
Applicable Controller Model Number			AMSE-∗AE-∗∗-10	AMSE-∗BB-∗∗-11	AMSE-∗DE-∗∗-10	AMSE-∗BB-∗∗-11	AMSE-∗DE-∗∗-10

★1. By adjusting the controller, the maximum flow rate/5 V (80.8 L/min/5 V) and the maximum operating pressure/5 V (21 MPa/5 V) can be set.
★2. Depending on the value of geometric displacement.

Model Number Designation

The model numbers below indicate packages each containing an AC servo motor driven pump, AMSE controller, and Regeneration Resisters.

ASE10W	-4	BZ	-G	W	S	A100	N	-B	00	-20
Series Number ★1	Power Supply Voltage	Power Capacity ★2	Max. Operating Pres.	Max. Flow	Port Direction	Coil Type for Solenoid Operated Directional Valve	Electrical Conduit Connection for Solenoid Operated Directional Valve	Function Selection	Parameter Number	Design Number
ASE3	None: 200 V AC 4: 400 V AC	AA	G:17.5 MPa (21 MPa) ★3	80: 80.8 L/min	S:Horizontal B:Vertical	—	—	B: Combination (Single Use Allowed)★4	00: Standard	40
ASE5		BZ		130: 132.7 L/min						40
ASE10		CE		200: 205.4 L/min						30
ASE10W		BZ		W:User Setting "100/58★5" Large Flow (Sol OFF) 100 cm³/rev (200 L/min) Small Flow (Sol ON)★6 58 cm³/rev (133 L/min)		AC A100:100 V AC A120:120 V AC A200:200 V AC A240:240 V AC DC None:24 V DC D12:12 V DC D48:48 V DC D100:100 V DC D110:110 V DC D200:200 V DC D220:220 V DC AC(AC⇔DC) R100:100 V AC R110:110 V AC R200:200 V AC R220:220 V AC	None: Terminal Box N: DIN Plug-in Connector			20
ASE15W	4:400 V	CE		W:User Setting "151/100★5" Large Flow (Sol OFF) 151 cm³/rev (302 L/min) Small Flow (Sol ON) 100 cm³/rev (200 L/min)						20

★1. To order an AC servo motor driven pump separately for spare use, prefix "N-" to the model number and omit the Function Selection and Parameter Number.
Example) N-ASE10W-4BZ-GWSA100N-20
★2. For the relationship between the power capacity and the pressure/flow in terms of specification limits, see charts on page A-238.
★3. For the models ASE10W/ASE15W, it depends on the value of geometric displacement.
★4. For combination operation, consult us separately regarding the types of hydraulic circuits, components, and electric cables.
★5. Ex. The factory-adjusted value can be set to 70/40.[70: 70 cm³/rev (Large Flow) and 40: 40cm³/rev. (Small Flow)]
★6. The maximum revolutions can reach to 2300 r/min if the pump capacity is set to less than 60 cm³/rev.

Solenoid Ratings

See Solenoid Ratings (page A-51).

Pipe Flange Kit

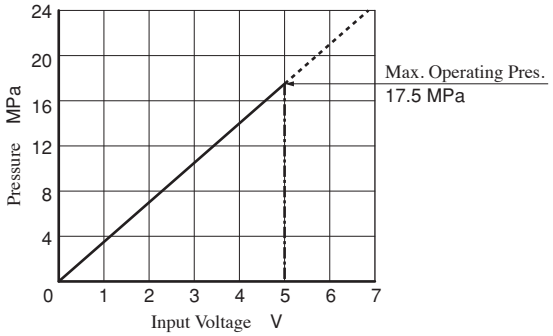
No pipe flange kit is included with the pump. The pipe flange kits below are available if required. For the details of the pipe flange kits, see pages A-258 and A-259.

Pump Model Numbers	Name of Port	Pipe Flange Kit Numbers		
		Threaded Connection	Socket Welding	Butt Welding
ASE3 ASE5	Suction	F5-12-A-10	F5-12-B-10	F5-12-C-10
	Discharge	F5-10-A-10	—	F5-10-C-10
ASE10	Suction	F5-20-A-10	F5-20-B-10	F5-20-C-10
	Discharge	F5-10-A-10	—	F5-10-C-10
ASE10W	Suction	F5-16-A-10	F5-16-B-10	F5-16-C-10
	Discharge	F5-10-A-10	—	F5-10-C-10
ASE15W	Suction	F5-24-A-10	F5-24-B-10	F5-24-C-10
	Discharge	F5-12-A-10	—	F5-12-C-10

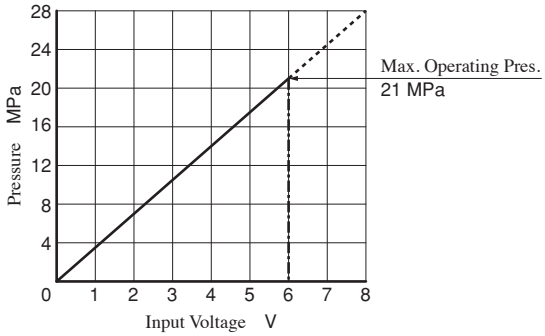
Characteristics of Single Displacement Type

Input Signal Voltage vs. Pressure

● ASE3/ASE5/ASE10

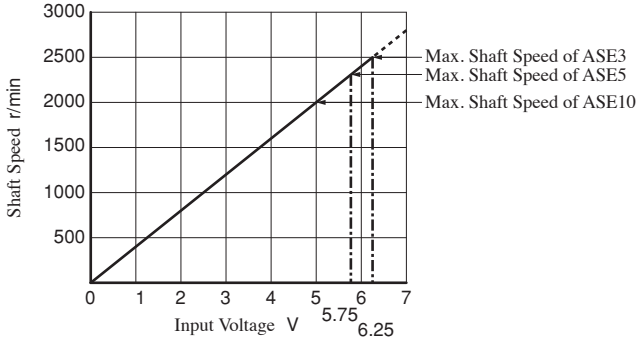


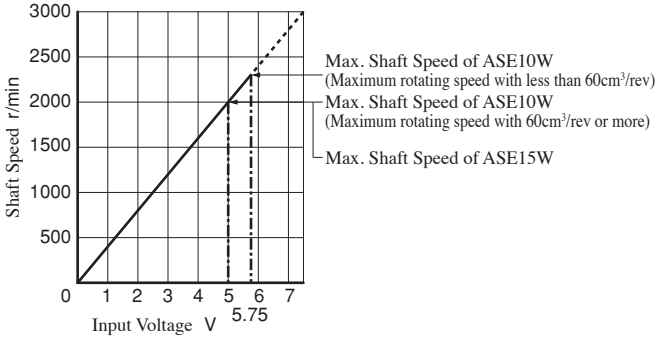
● ASE10W/ASE15W



★Do not input a voltage higher than the level corresponding to the maximum operating pressure.

Input Signal Voltage vs. Shaft Speed



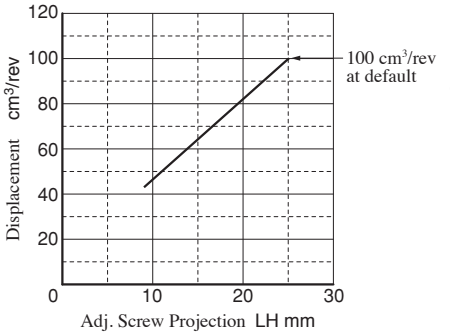


★Do not input a voltage higher than the level corresponding to the maximum shaft speed.

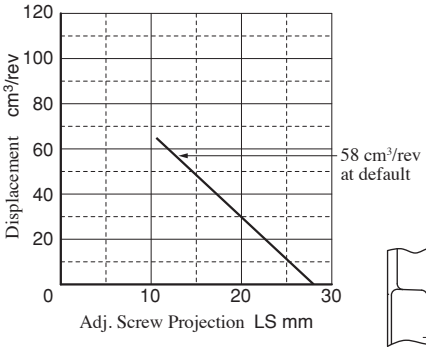
Flow Adjustment Screw Projection and Geometric Displacement

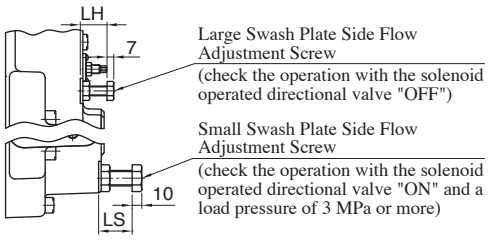
● ASE10W

Large displacement (SOL : OFF)



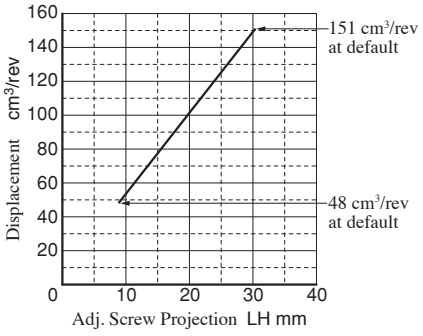
Small displacement (SOL : ON)



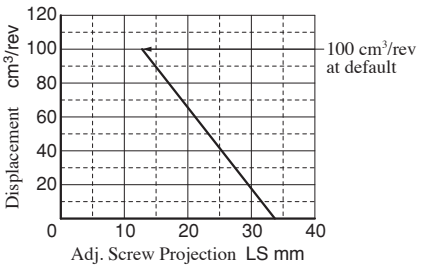


● ASE15W

Large displacement (SOL : OFF)



Small displacement (SOL : ON)

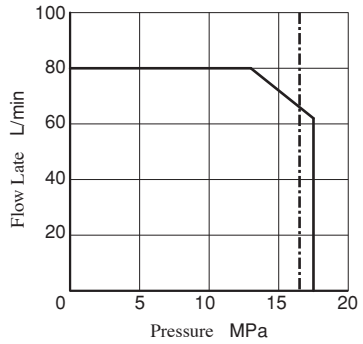


Pressure vs. Discharge Flow (Reference)

-·-·-·-·- Max Continuous Operation Time: 60 sec.

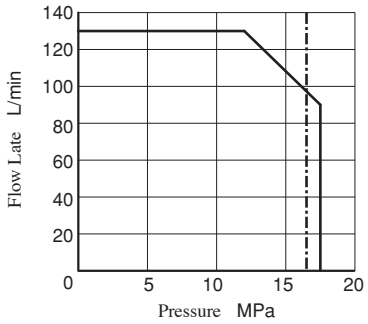
ASE3-＊AA-G80＊-

Pressure enabling continuous operation: 11 MPa or less



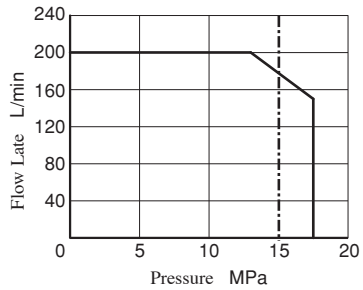
ASE5-＊BZ-G130＊-

Pressure enabling continuous operation: 11 MPa or less



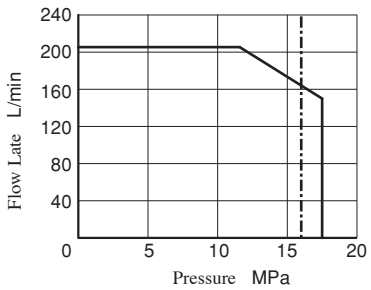
ASE10-CE-G200＊-

Pressure enabling continuous operation: 10 MPa or less



ASE10-4CE-G200＊-

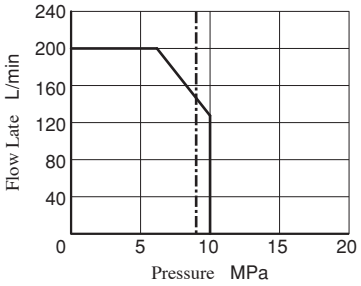
Pressure enabling continuous operation: 11 MPa or less



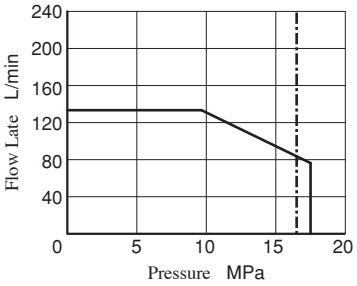
ASE10W-＊BZ-G＊＊＊＊-

Pressure vs. delivery characteristics with 100cm³/rev at the large swash plate side and 58cm³/rev at the small swash plate side
Pressure enabling continuous operation is 6 MPa for the large swash plate side and 11 MPa for the small swash plate side.

100cm³/rev at the large swash plate side



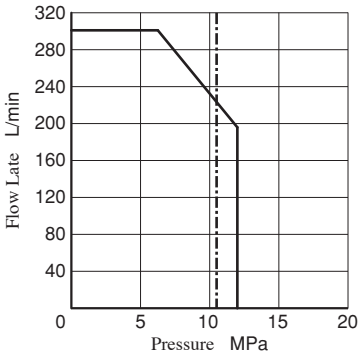
58cm³/rev at the small swash plate side



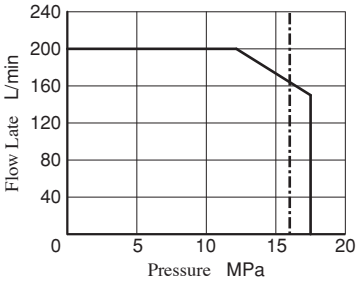
ASE15W-4CE-G＊＊＊＊-

Pressure vs. delivery characteristics with 151cm³/rev at the large swash plate side and 100cm³/rev at the small swash plate side
Pressure enabling continuous operation is 7 MPa for the large swash plate side and 11 MPa for the small swash plate side.

151cm³/rev at the large swash plate side

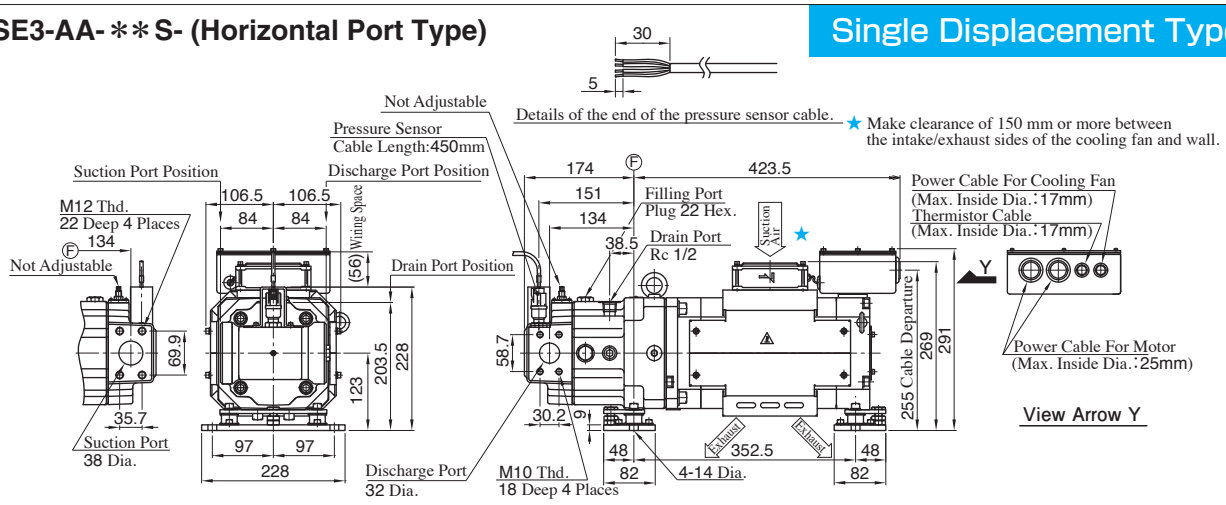


100cm³/rev at the small swash plate side

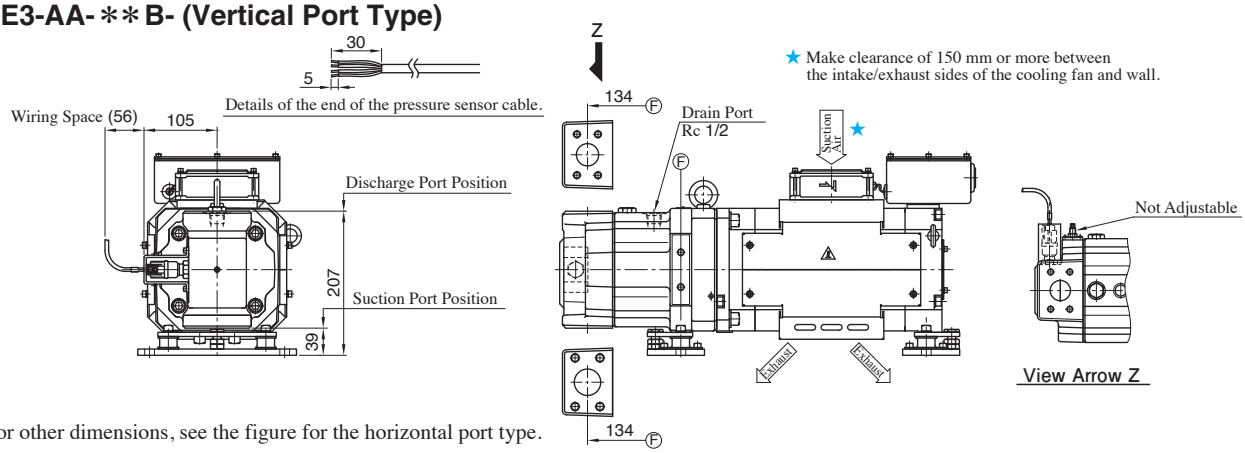


Single Displacement Type

ASE3-AA-＊＊S- (Horizontal Port Type)

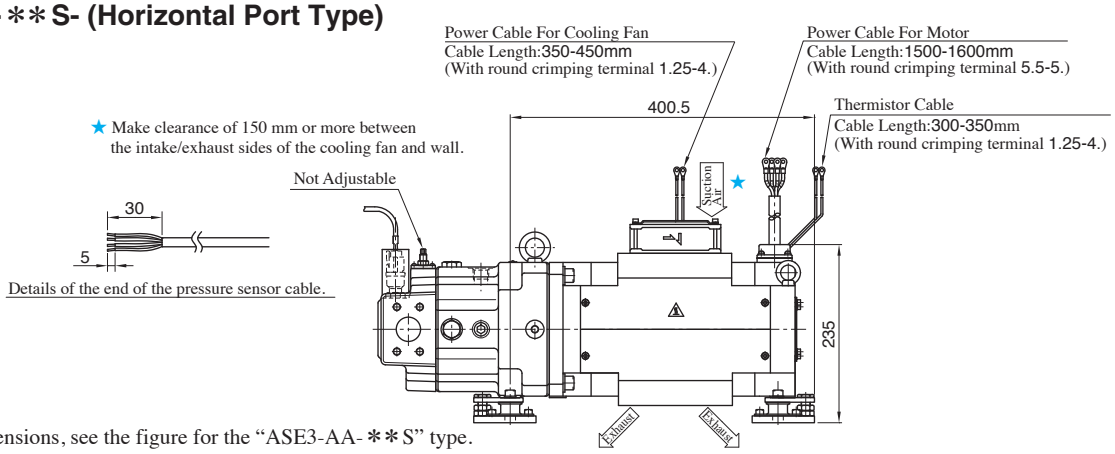


ASE3-AA-＊＊B- (Vertical Port Type)



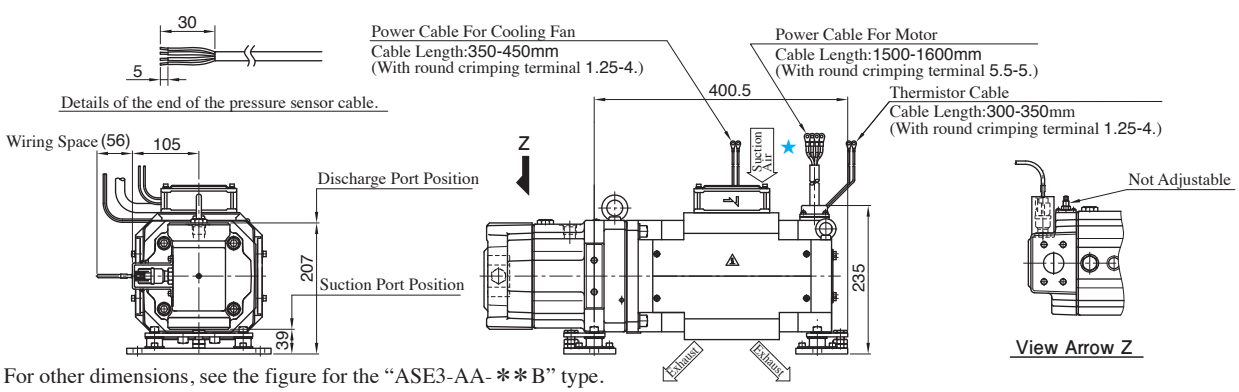
● For other dimensions, see the figure for the horizontal port type.

ASE3-4AA-＊＊S- (Horizontal Port Type)



● For other dimensions, see the figure for the “ASE3-AA-＊＊S” type.

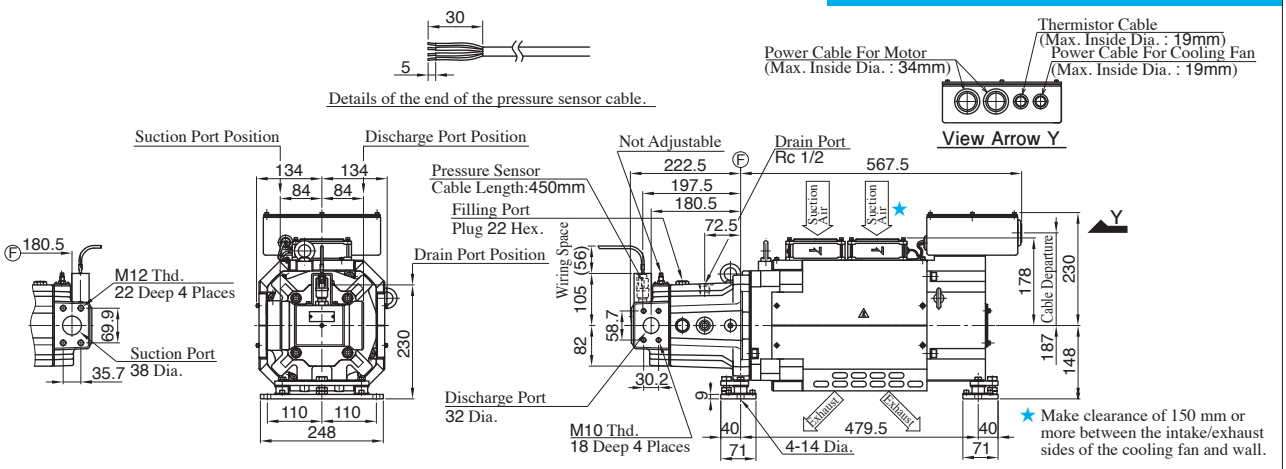
ASE3-4AA-＊＊B- (Vertical Port Type)



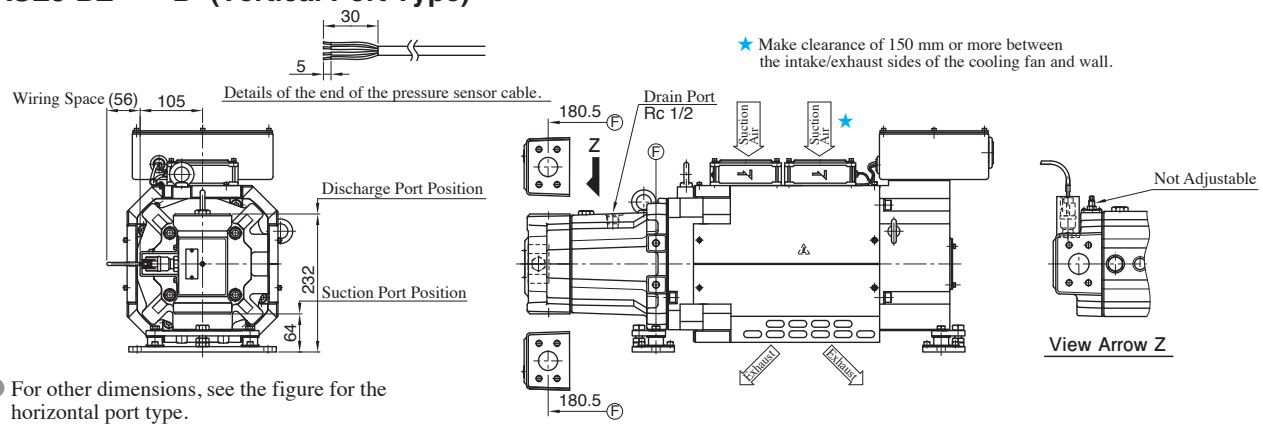
● For other dimensions, see the figure for the “ASE3-AA-＊＊B” type.

ASE5-BZ-＊＊S- (Horizontal Port Type)

Single Displacement Type

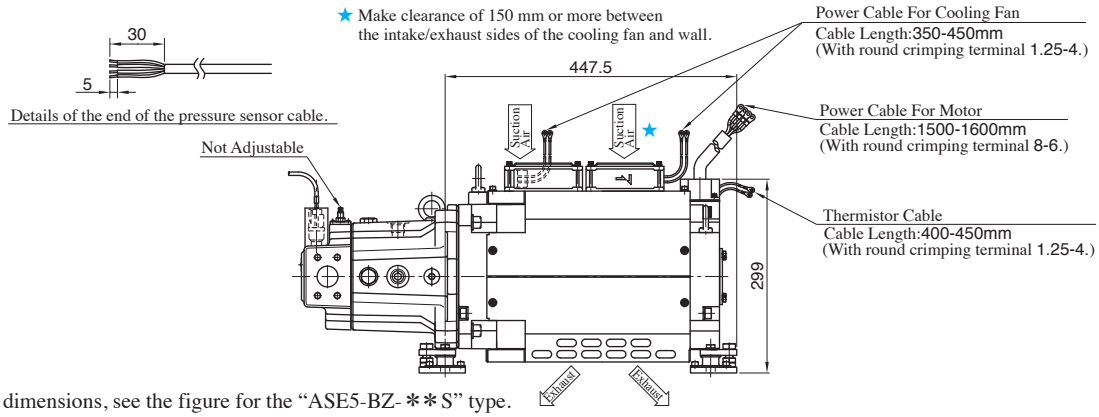


ASE5-BZ-＊＊B- (Vertical Port Type)



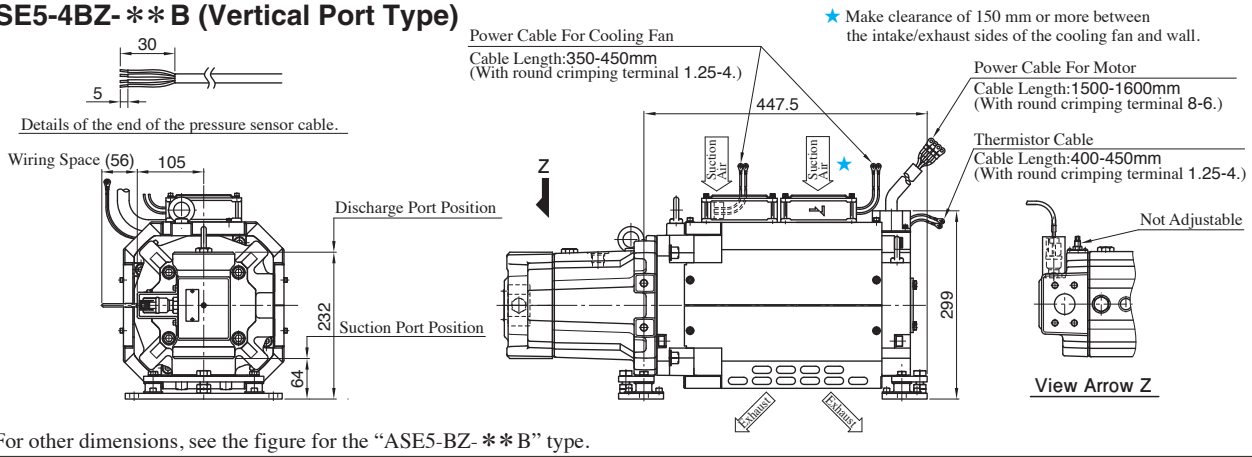
● For other dimensions, see the figure for the horizontal port type.

ASE5-4BZ-＊＊S- (Horizontal Port Type)



● For other dimensions, see the figure for the “ASE5-BZ-＊＊S” type.

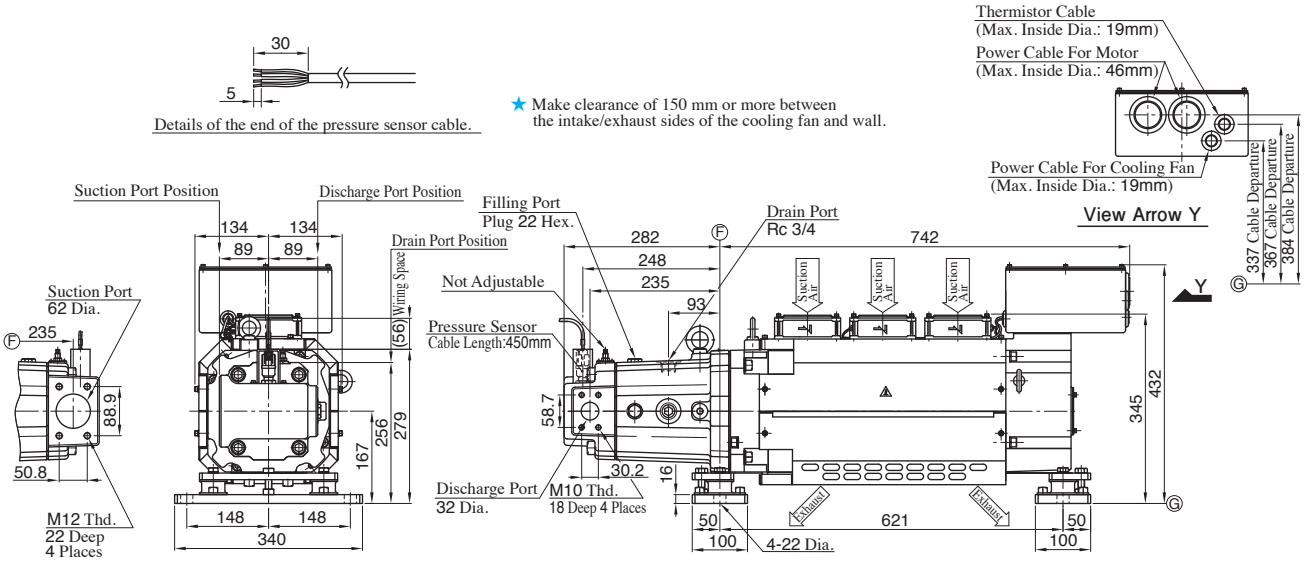
ASE5-4BZ-＊＊B (Vertical Port Type)



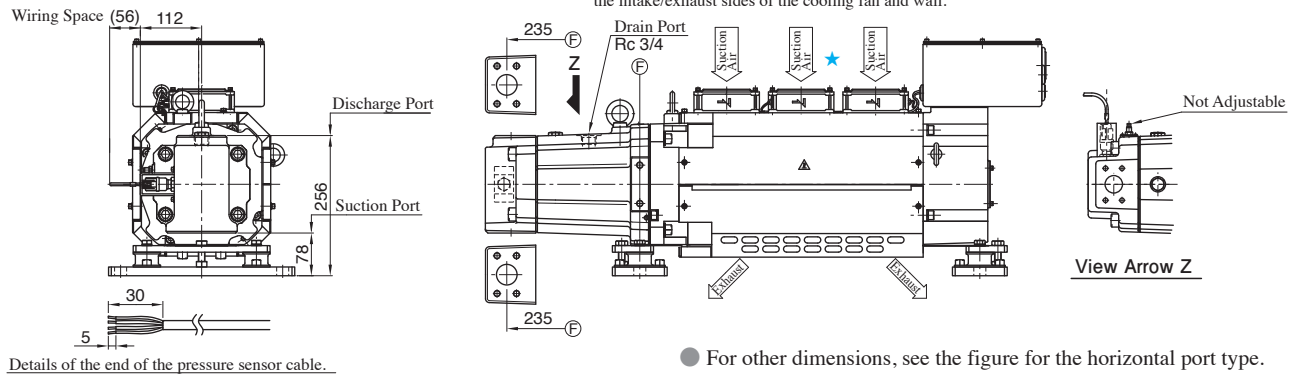
● For other dimensions, see the figure for the “ASE5-BZ-＊＊B” type.

ASE10-CE-＊＊S- (Horizontal Port Type)

Single Displacement Type

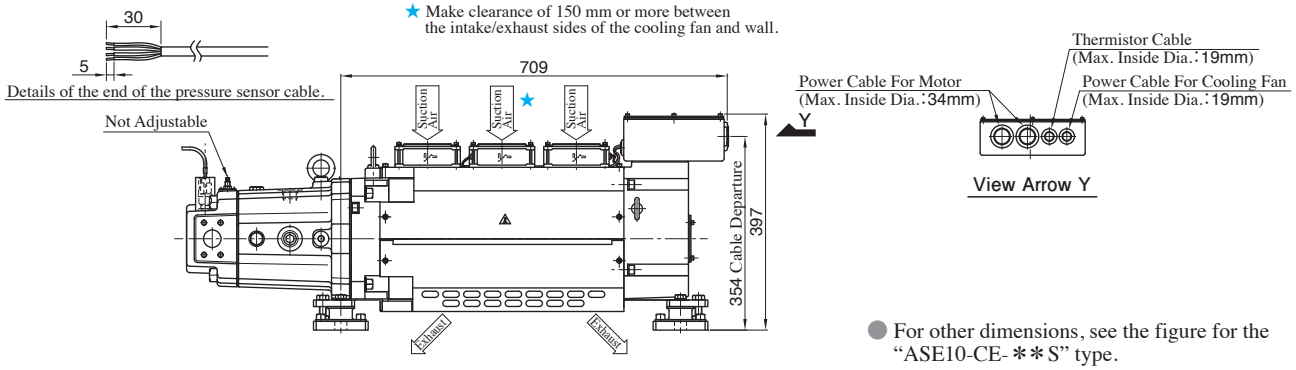


ASE10-CE-＊＊B- (Vertical Port Type)



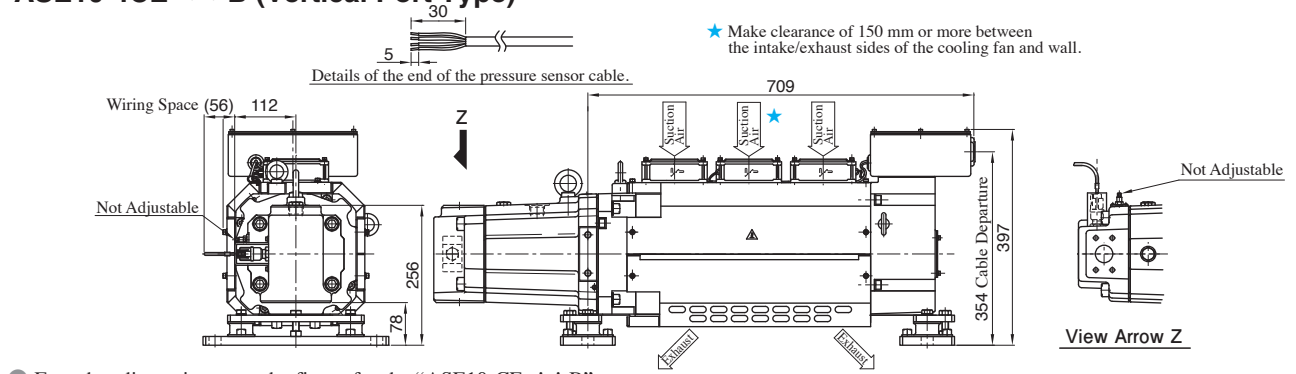
● For other dimensions, see the figure for the horizontal port type.

ASE10-4CE-＊＊S- (Horizontal Port Type)



● For other dimensions, see the figure for the "ASE10-CE-＊＊S" type.

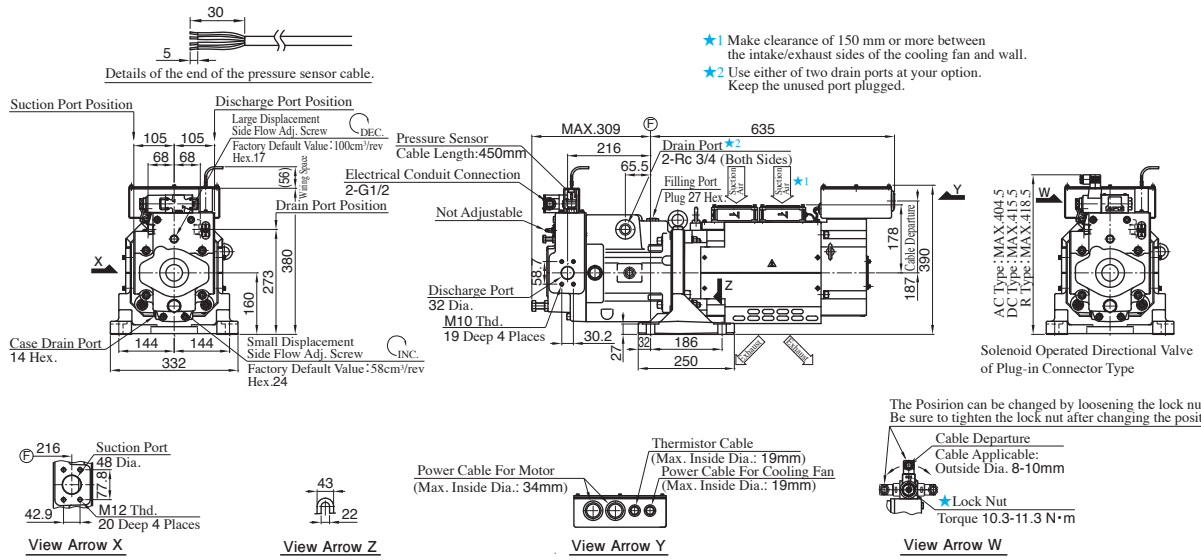
ASE10-4CE-＊＊B (Vertical Port Type)



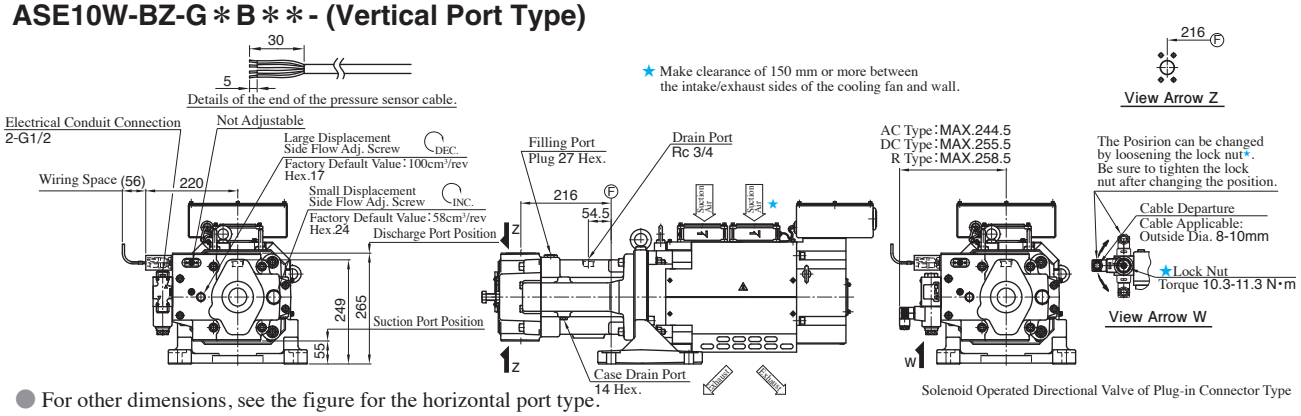
● For other dimensions, see the figure for the "ASE10-CE-＊＊B" type.

ASE10W-BZ-G＊S＊＊- (Horizontal Port Type)

Dual Displacement Type

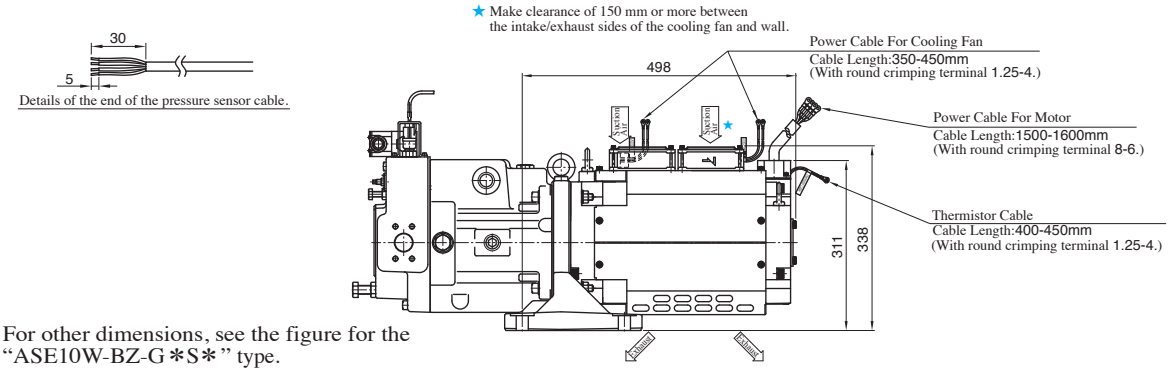


ASE10W-BZ-G＊B＊＊- (Vertical Port Type)



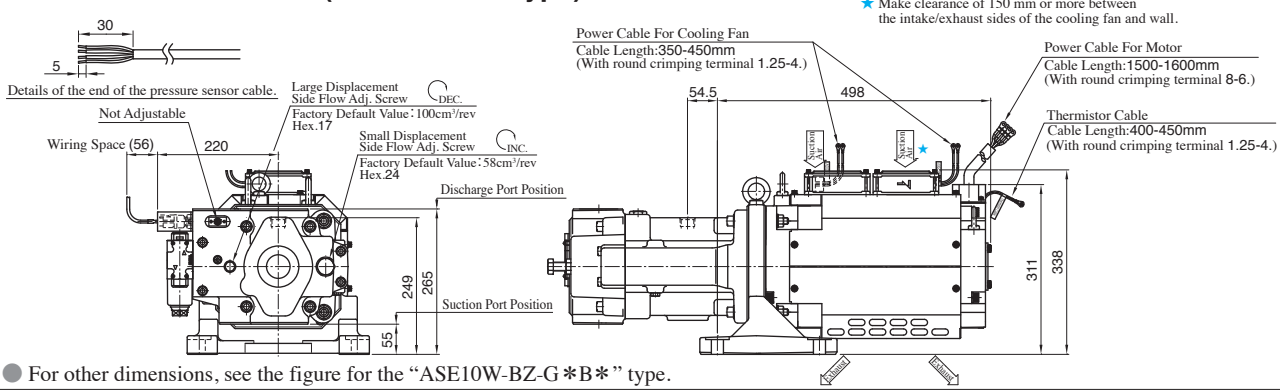
● For other dimensions, see the figure for the horizontal port type.

ASE10W-4BZ-G＊S＊＊- (Horizontal Port Type)



● For other dimensions, see the figure for the "ASE10W-BZ-G＊S＊" type.

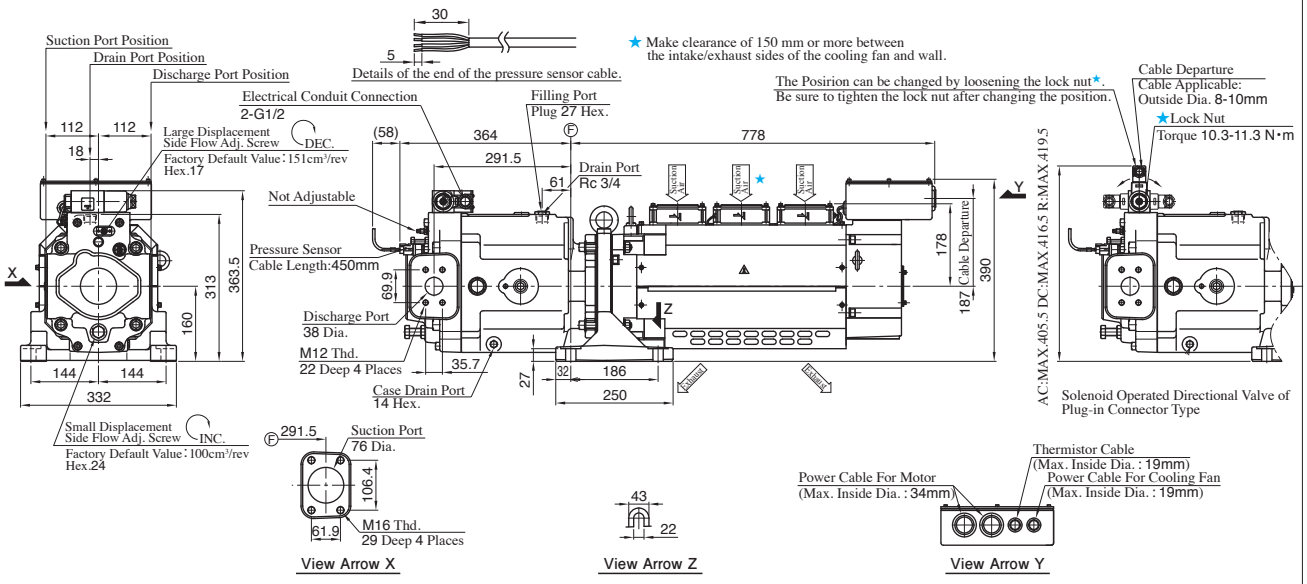
ASE10W-4BZ-G＊B＊＊- (Vertical Port Type)



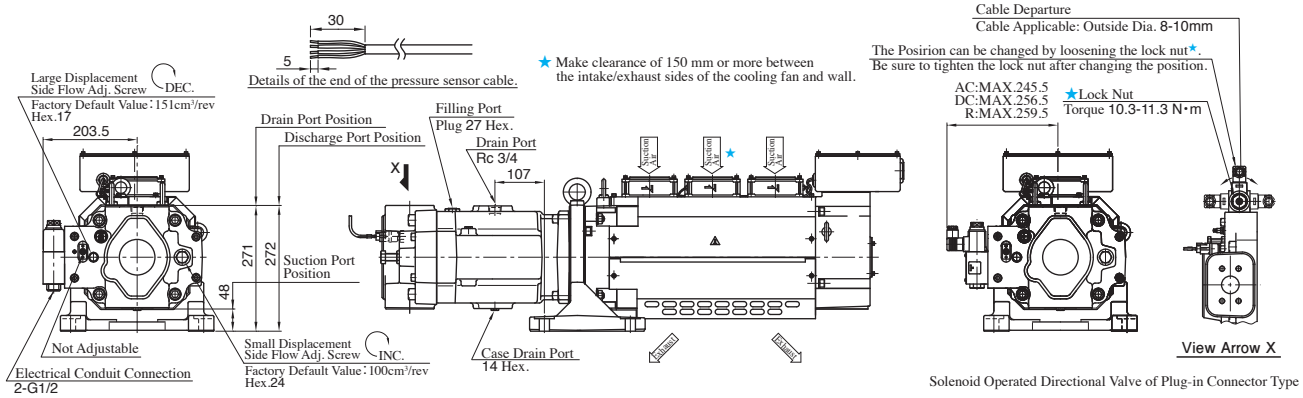
● For other dimensions, see the figure for the "ASE10W-BZ-G＊B＊" type.

ASE15W-4CE-G＊S＊＊- (Horizontal Port Type)

Dual Displacement Type



ASE15W-4CE-G＊B＊＊- (Vertical Port Type)



● For other dimensions, see the figure for the horizontal port type.

AMSE Controller

The AMSE controller is used to drive ASE series AC servo motor driven pumps. With an optimal design for the ASE pumps, the controller can maximize the pump performance. The AMSE controller is included with the ASE series pumps.

Specifications

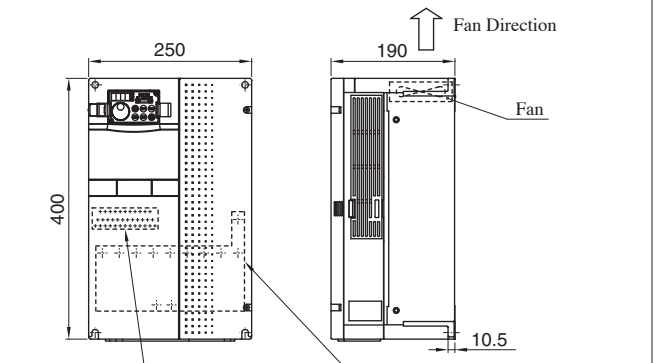
Model Numbers		AMSE-＊AE-＊＊-10		AMSE-＊BB-＊＊-11		AMSE-＊DE-＊＊-10	
		2AE	4AE	2BB	4BB	2DE	4DE
Command Signal Input Voltage		0 - +5 V DC/RATED (MAX. 0 - +10 V)					
Control Method		Vector Control					
		Sensorless					
Monitor Output Voltage		1ch, 0 - +10 V DC					
Digital Monitor		1ch,(FM or Open Collector)					
Sequence Input Signal		12ch,Photo Coupler (Input Resistance : 4.7kΩ) Logic switching is possible by the internal jumper connector (Initial : Sink)					
	Voltage At Opening	21-27 V DC					
	Short-Circuited	4-6 mA					
Sequence Output Signal	Reray	2ch, Contact Capacity : 230 V AC or 30 V DC, 0.3 A					
	Open Collector	5ch, Permissible Load : 24 V DC (Max.27 V DC), 0.1 A					
Voltage/Frequency		200-220 V AC : 50Hz 200-240 V AC : 60Hz 3-Phase	380-480 V AC : 50/60Hz 3-Phase	200-220 V AC : 50Hz 200-240 V AC : 60Hz 3-Phase	380-480 V AC : 50/60Hz 3-Phase	200-220 V AC : 50Hz 200-240 V AC : 60Hz 3-Phase	380-480 V AC : 50/60Hz 3-Phase
Permissible Voltage Fluctuation		170-242 V AC : 50Hz 170-264 V AC : 60Hz 3-Phase	323-528 V AC : 50/60Hz 3-Phase	170-242 V AC : 50Hz 170-264 V AC : 60Hz 3-Phase	323-528 V AC : 50/60Hz 3-Phase	170-242 V AC : 50Hz 170-264 V AC : 60Hz 3-Phase	323-528 V AC : 50/60Hz 3-Phase
Permissible Frequency Fluctuation		Within ±5 %					
Power Supply Capacity★1		28 kVA	27 kVA	41 kVA		80 kVA	
Regeneration Resister (Dynamic Brake)		External Option					
Protection, Cooling		Enclosed Type (IP20), Forced Air Cooling				Open Type (IP00), Forced Air Cooling	
Environmental condition	Ambient Temperature	0 - +50°C (Non-Freezing)					
	Ambient Humidity	90%RH Maximam (No Condensing)					
	Atmosphere	Indoors (Without Corrosive GAS, Flammable GAS, Oil Mist, Dust and Dirt etc.)					
	Altitude	Maximum 1000m Above Sea Level For Standard Operation					
	Vibration	5.9 m/s² or Less					
Protective/Warning Functions		Overcurrent・Overvoltage・Inverter Protection Thermal・Motor Protection Thermal・Heatsink Overheat・Instantaneous Power Failure Occurrence・Undervoltage・Input Phase Loss・Motor Overload・Output Side Earth Fault Overcurrent・Output Phase Loss・CPU Fault・Option Fault・Parameter Error・Power Supply Short Ciruit・Inrush Current Limit Circuit Fault・Communication Fault・Analog Input Fault・Fan Fault・Overcurrent Stall Prevention・Electronic Thermal Relay Function Prealarm・Regenerative Brake Prealarm・Pu Stop・Brake Transistor Alarm・Parameter Write Error・Copyoperation Error・Operation Panel Lock・Parameter Copy Alarm・Pressure Sensor Disconnection・Network Alarm					
Additional Function		-	Resolver Signal Fault・Overspeed・Speed Deviation Large・Z-Phase Tunning Incomplete	-	Resolver Signal Fault・Overspeed・Speed Deviation Large・Z-Phase Tunning Incomplete	-	Resolver Signal Fault・Overspeed・Speed Deviation Large・Z-Phase Tunning Incomplete
Mass		13kg	7.5kg	14kg	13kg	35kg	
Applicable Pump		ASE3-＊AA		ASE5-＊BZ ASE10W-＊BZ		ASE10-＊CE ASE15W-4CE	

★1 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).

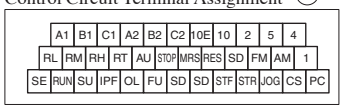
Model Number Designation

AMSE	-2	AE	-B	00	-10
Series Number	Power Supply Voltage	Amplifier Capacity kW	Function Selection	Parameter Number	Design Number
AMSE： AMSE Controller	**2**：200 V AC **4**：400 V AC	**AE**：15.0	**B**：Combination (Single Operation Allowed)	**00**：Standard	**10**
		BB：22.0			**11**
		DE：45.0			**10**

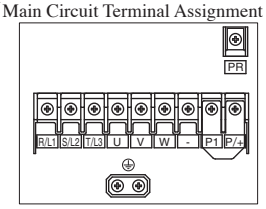
AMSE-2AE-B00-10



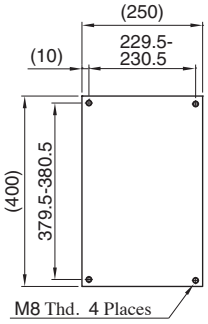
Control Circuit Terminal Assignment Ⓐ



Main Circuit Terminal Assignment Ⓑ



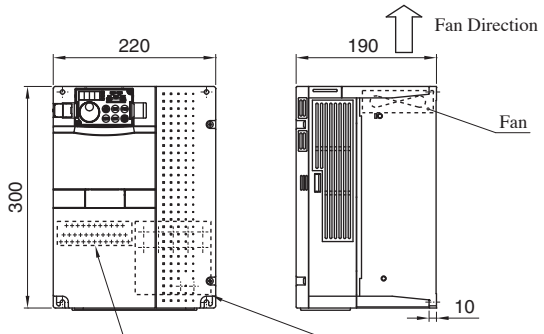
Mountain Hole Dimensions



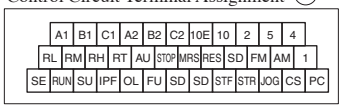
	Main Circuit Terminal R/L1, S/L2, T/L3 U, V, W, P/+, PR, ⏚	Control Circuit Terminal
Terminal Screw	M6	M3.5
Torque [N·m]	4.4	1.2

* Note) Do not connect wiring to the terminals "P1" and "-".

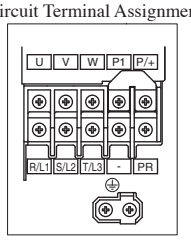
AMSE-4AE-B00-10



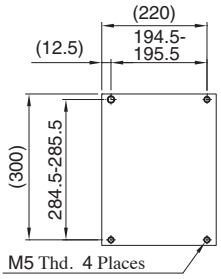
Control Circuit Terminal Assignment Ⓐ



Main Circuit Terminal Assignment Ⓑ



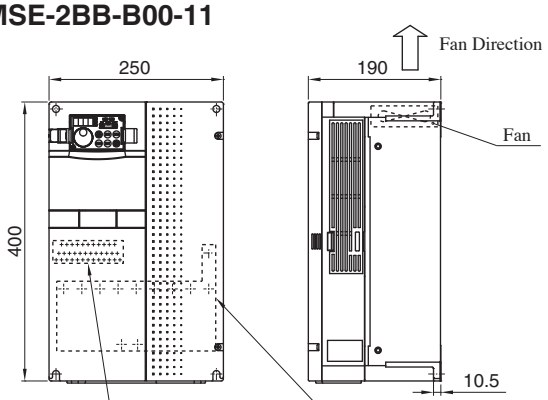
Mountain Hole Dimensions



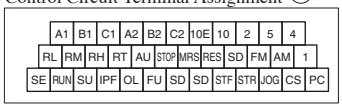
	Main Circuit Terminal U, V, W, P/+, R/L1 S/L2, T/L3, PR, ⏚	Control Circuit Terminal
Terminal Screw	M5	M3.5
Torque [N·m]	2.5	1.2

* Note) Do not connect wiring to the terminals "P1" and "-".

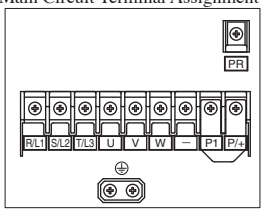
AMSE-2BB-B00-11



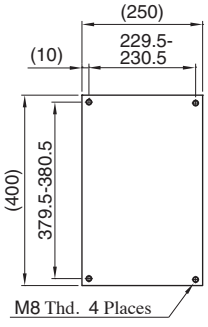
Control Circuit Terminal Assignment Ⓐ



Main Circuit Terminal Assignment Ⓑ



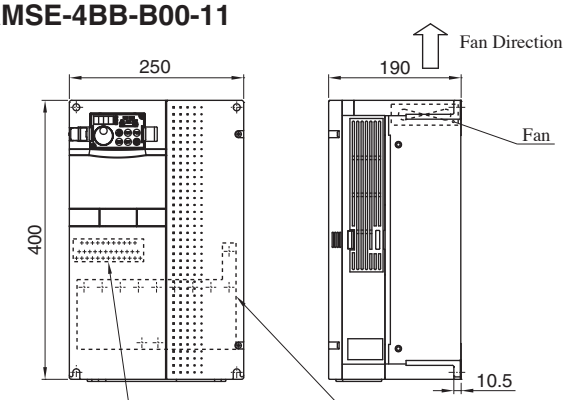
Mountain Hole Dimensions



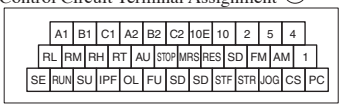
	Main Circuit Terminal R/L1, S/L2, T/L3, U, V, W, P/+, PR,	⏚	Control Circuit Terminal
Terminal Screw	M8	M6	M3.5
Torque [N·m]	7.8	4.4	1.2

* Note) Do not connect wiring to the terminals "P1" and "-".

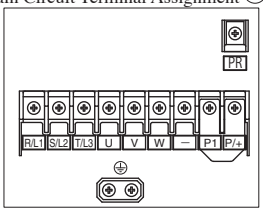
AMSE-4BB-B00-11



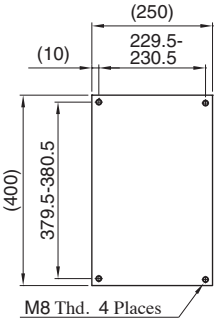
Control Circuit Terminal Assignment Ⓐ



Main Circuit Terminal Assignment Ⓑ



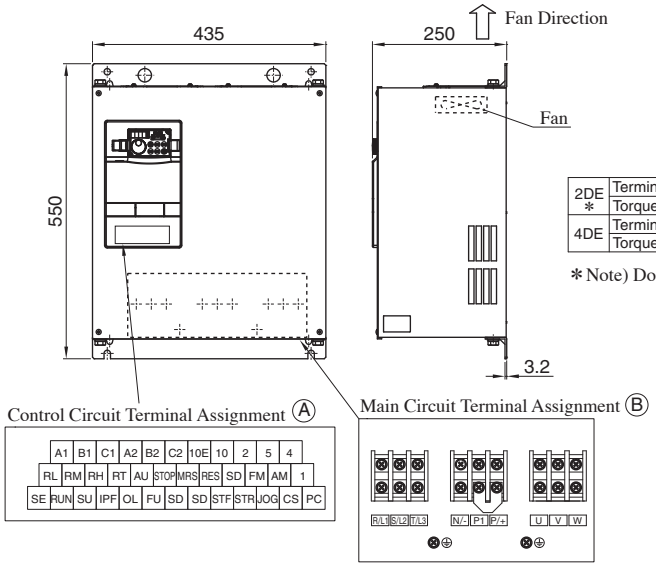
Mountain Hole Dimensions



	Main Circuit Terminal R/L1, S/L2, T/L3, U, V, W, P/+, PR, ⏚	Control Circuit Terminal
Terminal Screw	M6	M3.5
Torque [N·m]	4.4	1.2

* Note) Do not connect wiring to the terminals "P1" and "-".

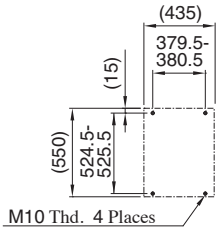
AMSE-＊DE-B00-10



		Main Circuit Terminal U, V, W, P/+, N/-, R/L1 , S/L2 , T/L3	⊕	Control Circuit Terminal
2DE＊	Terminal Screw	M10	M8	M3.5
	Torque [N･m]	14.7	7.8	1.2
4DE	Terminal Screw	M8		M3.5
	Torque [N･m]	7.8		1.2

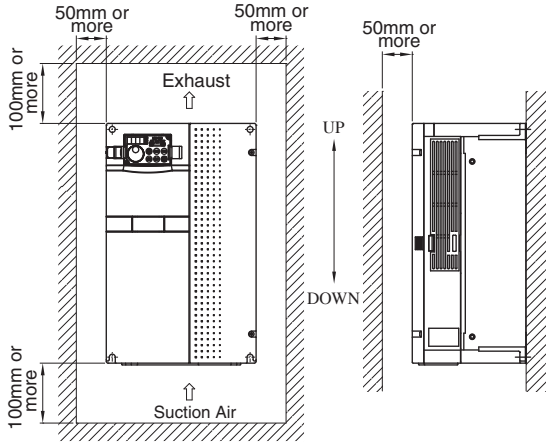
＊Note) Do not connect wiring to the terminals “P1”.

Mountain Hole Dimensions

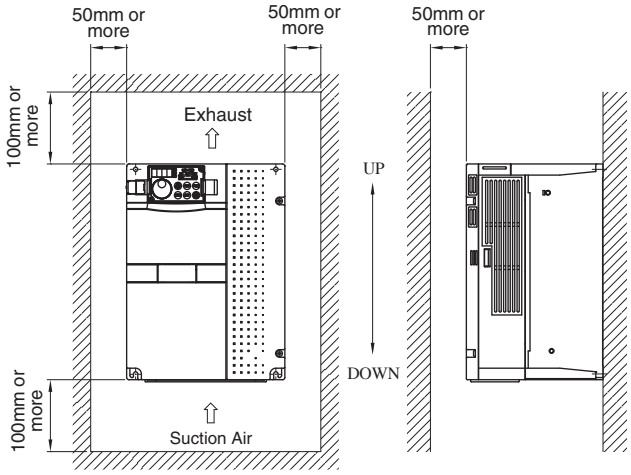


Installation Standard

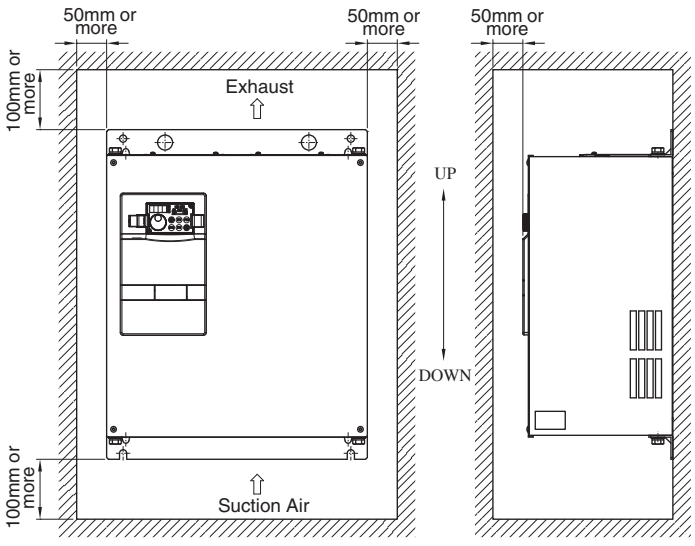
AMSE-2AE＊BB-B00-＊＊



AMSE-4AE-B00-10



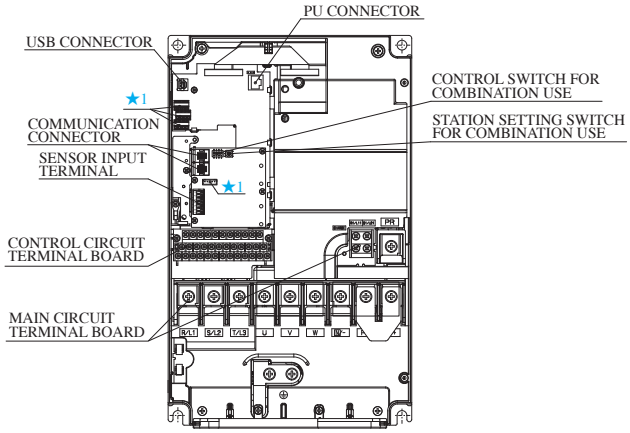
AMSE-＊DE-B00-10



★Consult us when installing multiple controllers next to each other.

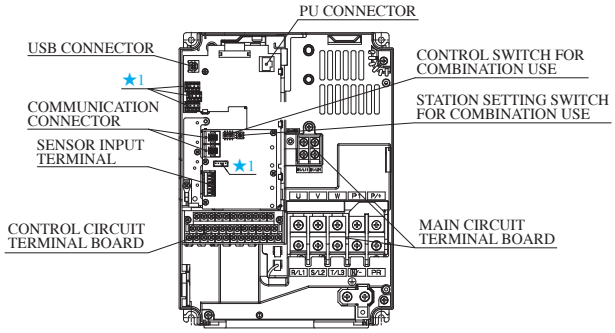
Terminal Names/Appearance

● AMSE-2AE -B00-10
● AMSE-＊BB-B00-11



★1 These are not used in this system.

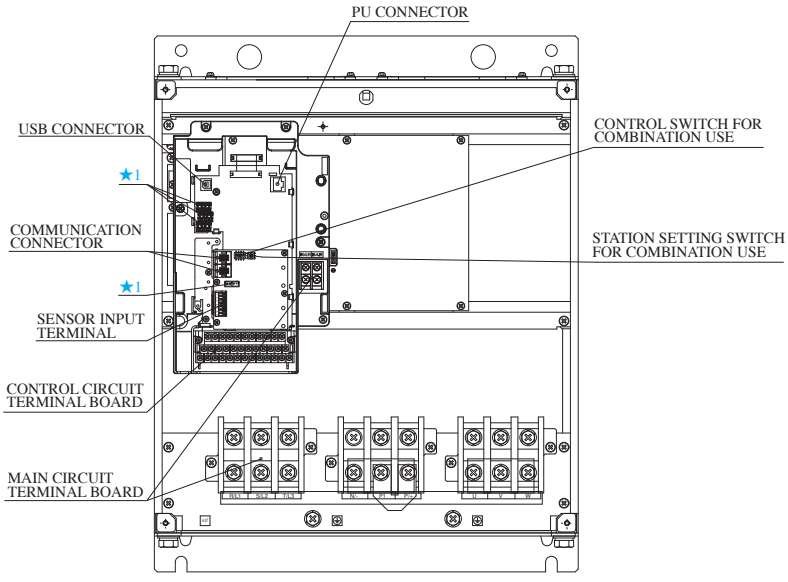
● AMSE-4AE -B00-10



★1 These are not used in this system.

Function	Terminal Name	Terminal Channel	Description
Combination (Single Operation Allowed)	USB Connector (Type:USB B)	-	By using the serial communication function of USB, such as change of parameter, operation of monitor function is possible.
	Control Switch	1	For the manufacturer's setting. : Always OFF.
		2	Reserved.
		3	For switching single and combination operations. OFF: Combination, ON: Single
		4	Network terminal resistance OFF:None, ON:Resistance
	Station Setting Switch	0	Master station
		1-F	Slave station
	Communication Connector	-	Connect this to the network of the ASE controller. Recommended cable: TEL-FST-＊S (SANWA) or MJ-FS＊(ELECOM)

● AMSE-＊DE-B00-10



★1 These are not used in this system.

For the details of PU connector, sensor input terminal, consult us separately.

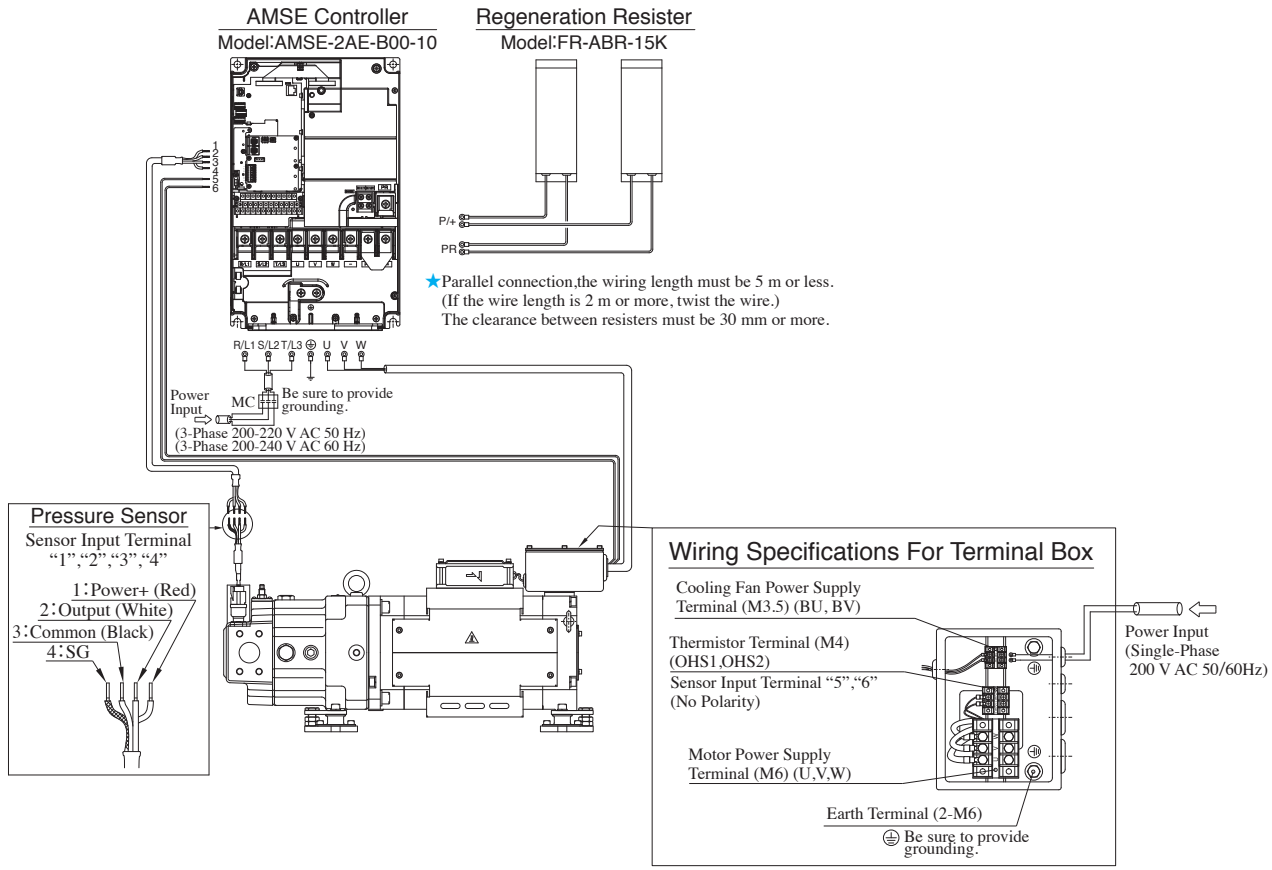
Terminal Block

Connection (Use)	Signal Name	Description		
		AMSE-＊AE/＊BB-B00	AMSE-2DE-B00	AMSE-4DE-B00
DC Reactor for Power Factor Improvement	P1	No Connection★2		
Brake Unit	N/-	No Connection★2	FR-BU2-30K-04★2	FR-BU2-H30K-04★2

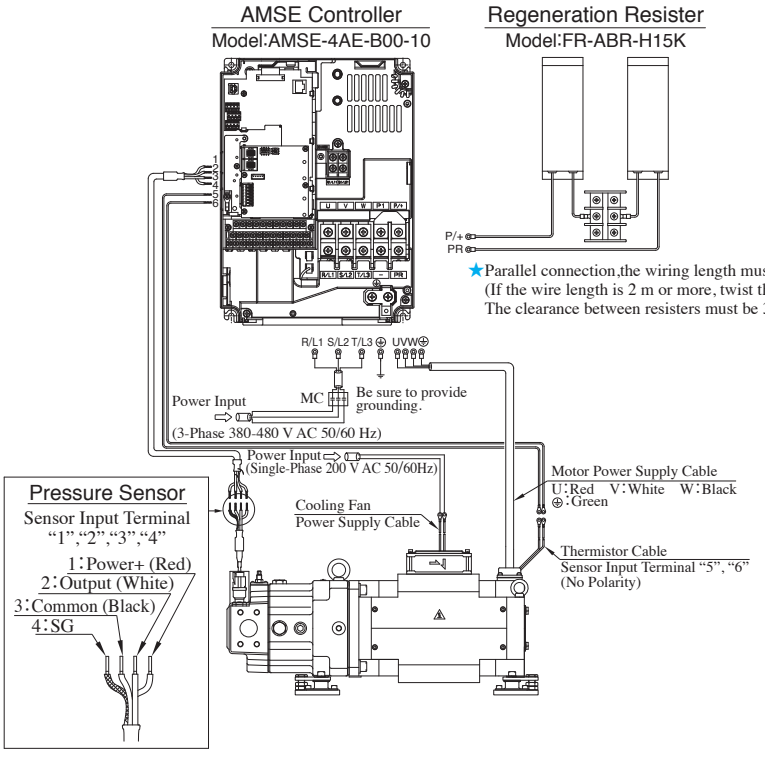
★2 Please contact Yuken, when you connect each unit or connect a DC reactor.

Wire Connection Diagram

ASE3-AA-∗∗∗-B00-40

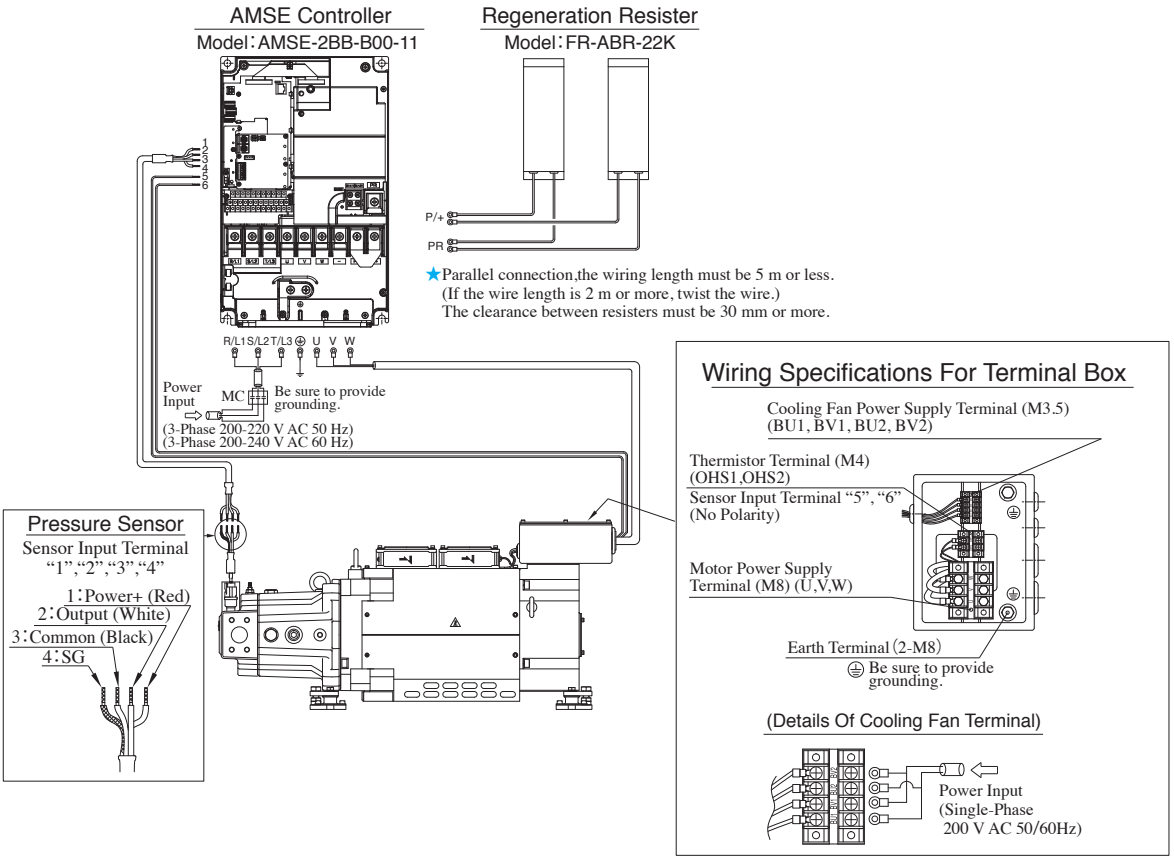


ASE3-4AA-∗∗∗-B00-40

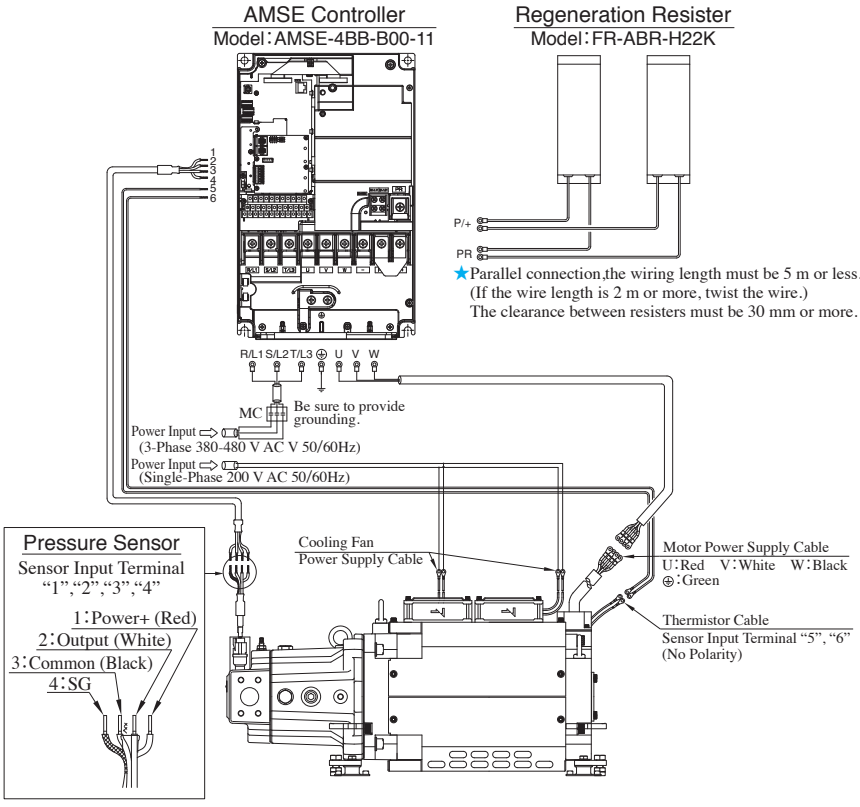


Wire Connection Diagram

ASE5-BZ-＊＊＊-B00-40

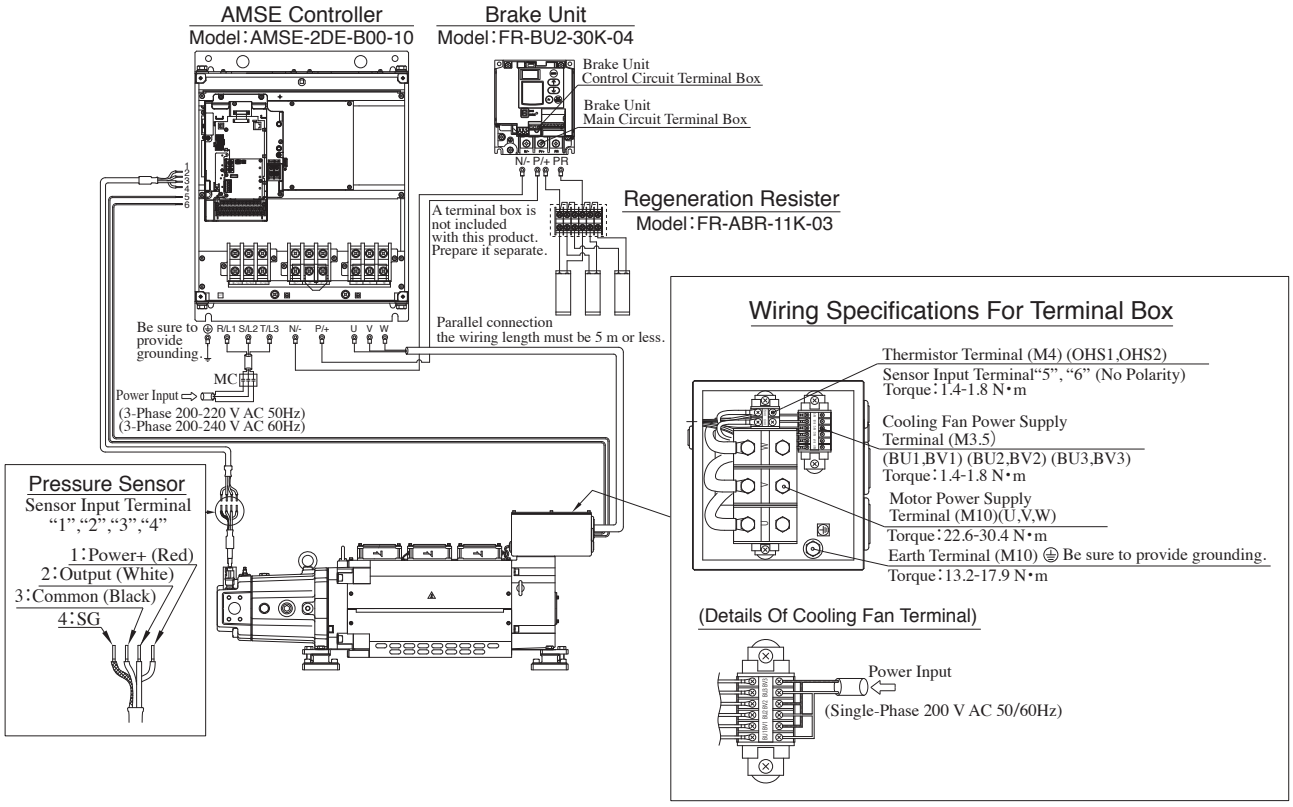


ASE5-4BZ-＊＊＊-B00-40

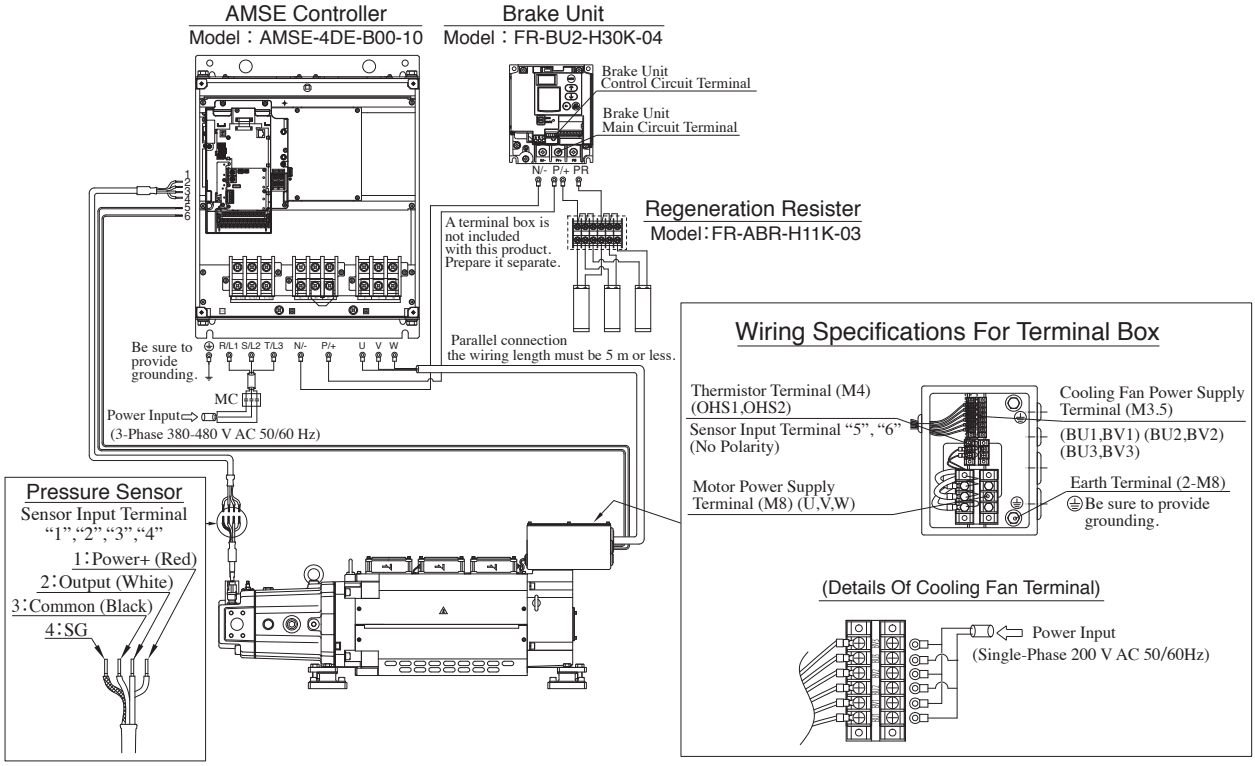


Wire Connection Diagram

ASE10-CE-∗∗∗-B00-30

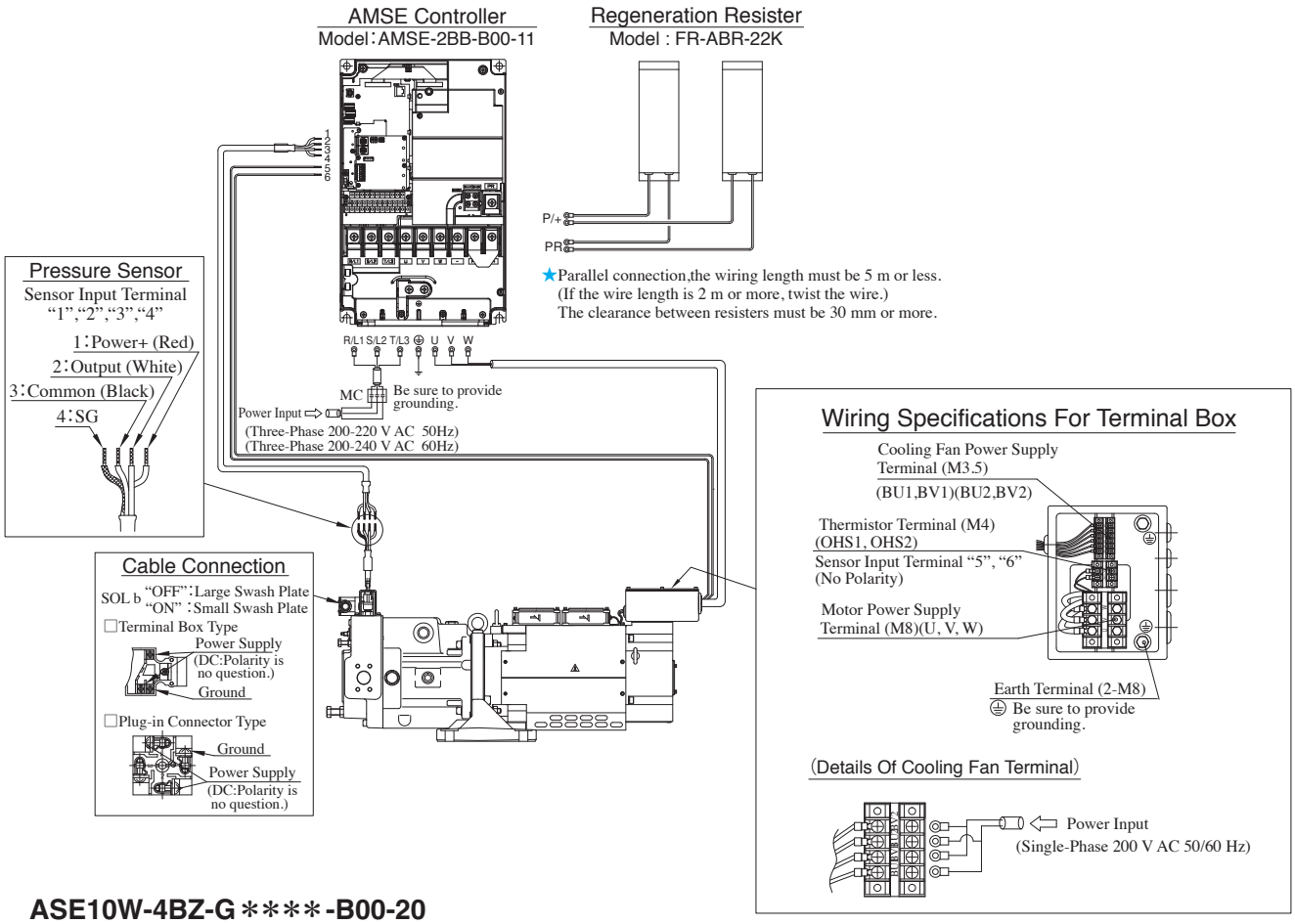


ASE10-4CE-∗∗∗-B00-30

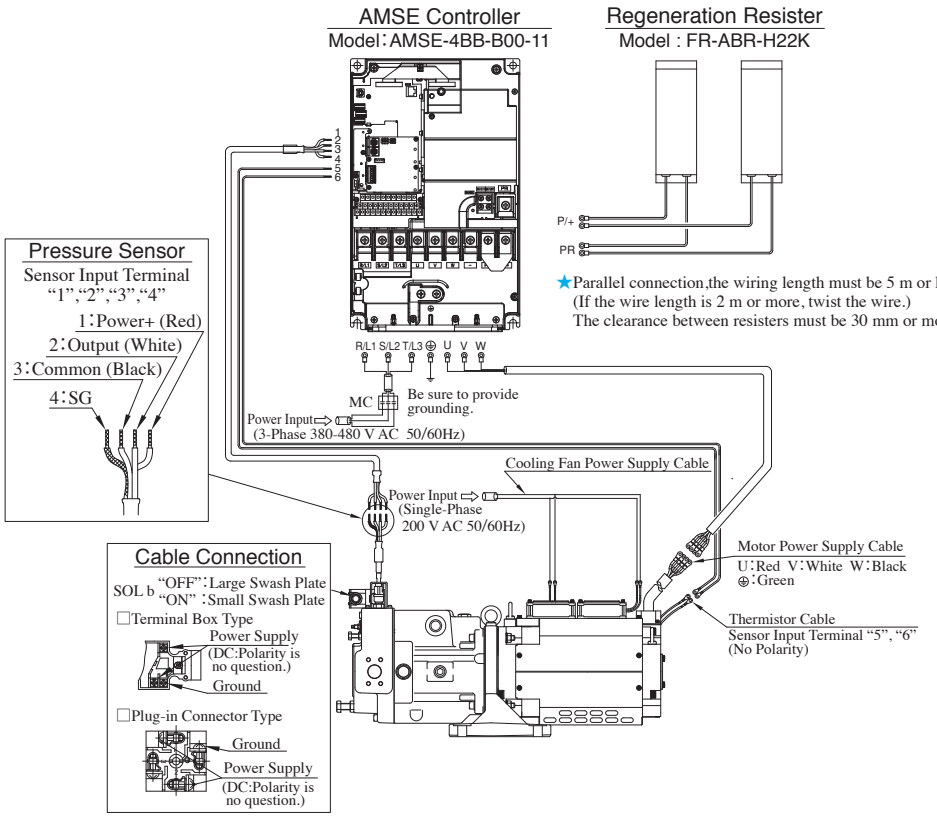


Wire Connection Diagram

ASE10W-BZ-G∗∗∗∗-B00-20

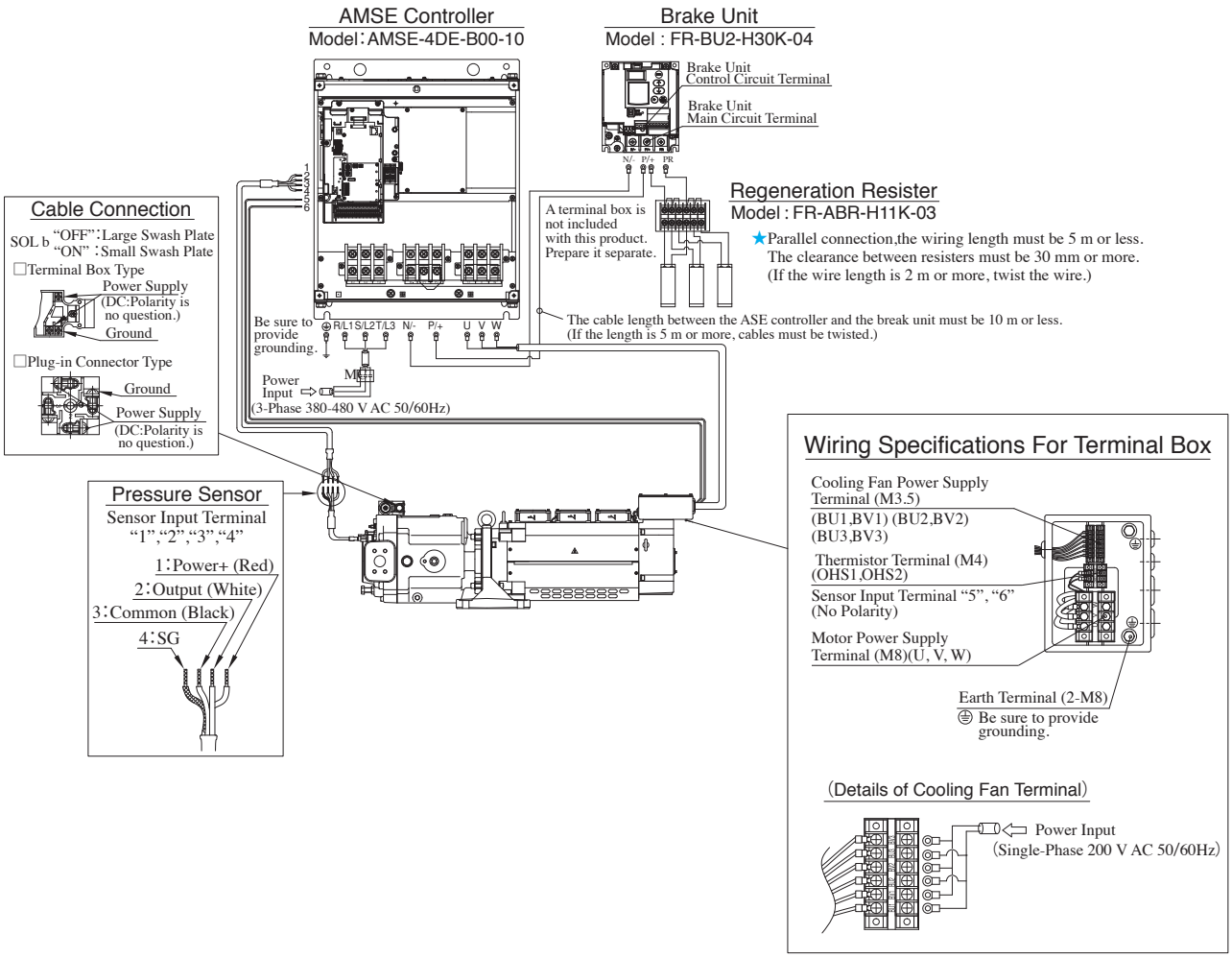


ASE10W-4BZ-G∗∗∗∗-B00-20



Wire Connection Diagram

ASE15W-4CE-G∗∗∗∗-B00-20



Connectors

Control Circuit Terminal

	Cable mm²
Control Circuit Terminal	0.75 (AWG18)

Sensor Input Terminal

	Cable mm²
Pressure Sensor Thermistor	0.5 - 1.3 (AWG20 - 16)

Cooling Fan

	Cable mm²
Cooling Fan Cable	2.0 (AWG14)

AMSE-2AE-＊＊-10

Main Circuit Terminal

	HIV Cable mm²	AWG	PVC Cable mm²
Main Circuit Power R/L1, S/L2, T/L3	22	4	25
Motor Output Power U, V, W	22	4	25
Regeneration Resister P/+, PR	2.1	14	2.5
Earth Wire ⏚	14	6	16

AMSE-4AE-＊＊-10

Main Circuit Terminal

	HIV Cable mm²	AWG	PVC Cable mm²
Main Circuit Power R/L1, S/L2, T/L3	8	8	10
Motor Output Power U, V, W	8	8	10
Regeneration Resister P/+, PR	2.1	14	2.5
Earth Wire ⏚	8	8	10

AMSE-2BB-＊＊-11

Main Circuit Terminal

	HIV Cable mm²	AWG	PVC Cable mm²
Main Circuit Power R/L1, S/L2, T/L3	38	2	35
Motor Output Power U, V, W	38	2	35
Regeneration Resister P/+, PR	2.1	14	2.5
Earth Wire ⏚	22	4	25

AMSE-4BB-＊＊-11

Main Circuit Terminal

	HIV Cable mm²	AWG	PVC Cable mm²
Main Circuit Power R/L1, S/L2, T/L3	14	6	16
Motor Output Power U, V, W	14	6	16
Regeneration Resister P/+, PR	2.1	14	2.5
Earth Wire ⏚	14	6	16

AMSE-2DE-＊＊-10

Main Circuit Terminal

	LMFC Cable mm²	HIV Cable mm²	AWG	PVC Cable mm²
Main Circuit Power R/L1, S/L2, T/L3	60	100	4/0	95
Motor Output Power U, V, W ⏚ (Earth Terminal)	★60			
Brake Unit Regeneration Resister P/+, N/- (PR)		5.5	10	6
Earth Wire ⏚	38	60	4	50

AMSE-4DE-＊＊-10

Main Circuit Terminal

	HIV Cable mm²	AWG	PVC Cable mm²
Main Circuit Power R/L1, S/L2, T/L3	38	1	50
Motor Output Power U, V, W	38	2	50
Brake Unit Regeneration Resister P/+, N/- (PR)	3.5	12	4
Earth Wire ⏚	22	4	25

★Select LMFC wire for motor connection.
Recommended wire: EM-LMFC (Flame-retardant cross-linked polyethylene insulated flexible lead wire) made by Furukawa Electric Industrial Cable Co.,Ltd

●Pressure Sensor Cable
Consult us separately.

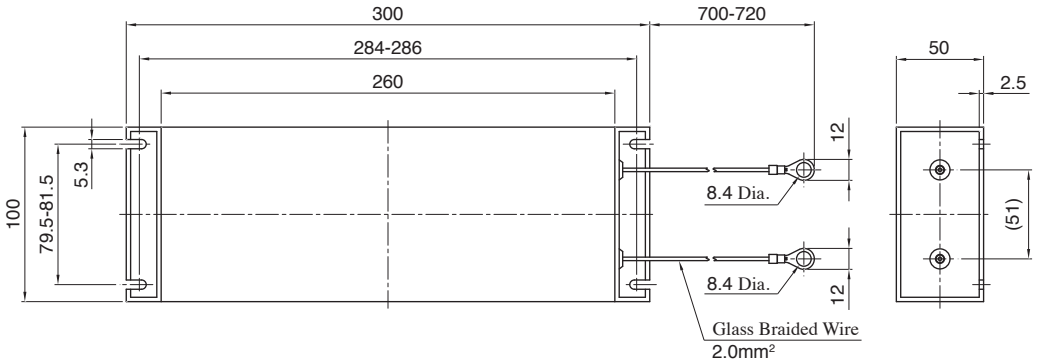
■ Regeneration Resister

●Specifications

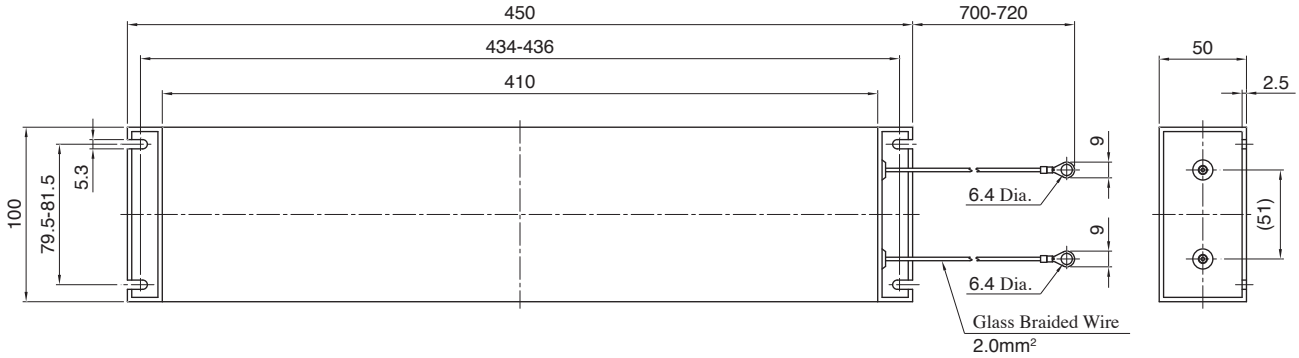
AMSE Controller Model Numbers	Regeneration Resister Model	Qty.	Brake Unit Model	Permissible Regeneration W	Resistance Ω	Mass kg
AMSE-2AE-B00-	FR-ABR-15K	2	-	805	9 (18Ω×2 Parallel)	4.4kg (2.2kg×2)
AMSE-4AE-B00-	FR-ABR-H15K			870	36 (18Ω×2 Series)	
AMSE-2BB-B00-	FR-ABR-22K	2		1120	6.5 (13Ω×2 Parallel)	6.6kg (3.3kg×2)
AMSE-4BB-B00-	FR-ABR-H22K			1060	26 (52Ω×2 Parallel)	7.2kg (3.6kg×2)
AMSE-2DE-B00-	FR-ABR-11K-03	3	FR-BU2-30K-04	1500	4.3 (13Ω×3 Parallel)	9.6kg (3.2kg×3)
AMSE-4DE-B00-	FR-ABR-H11K-03		FR-BU2-H30K-04	1500	17.3 (52Ω×3 Parallel)	

★1. Regeneration resisters are included with the AMSE.
★2. Regeneration resisters may become excessively heated. Use heat-resistant and fireproof wires and avoid their contact with the resisters.
★3. The power (W) stamped on the regeneration resister body is the rated value of the regeneration resister alone, not the permissible regenerations power (W) shown in the table above.

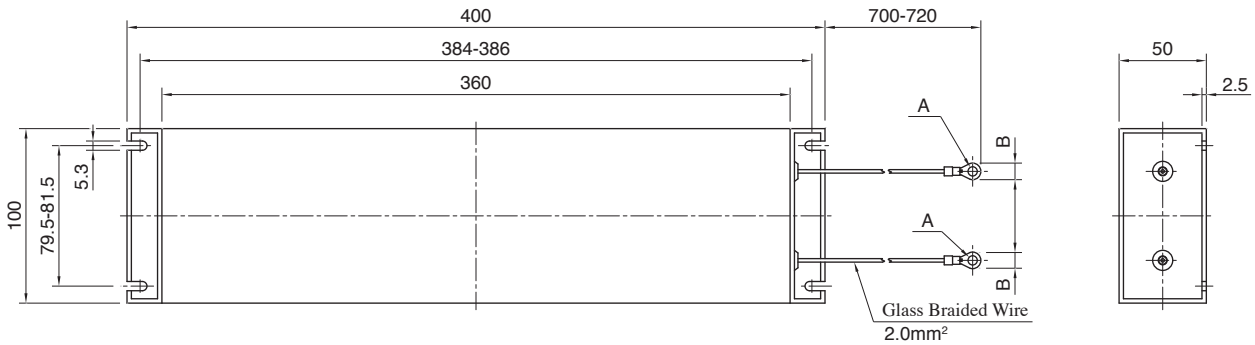
Model:FR-ABR-15K/H15K



Model:FR-ABR-H22K



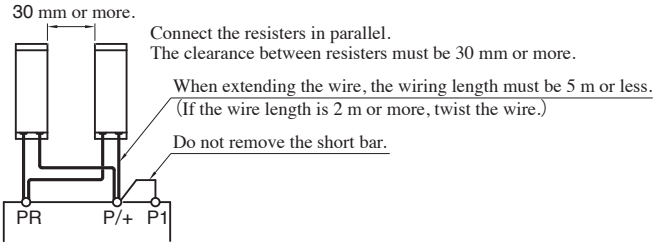
Model:FR-ABR-22K/11K-03/H11K-03



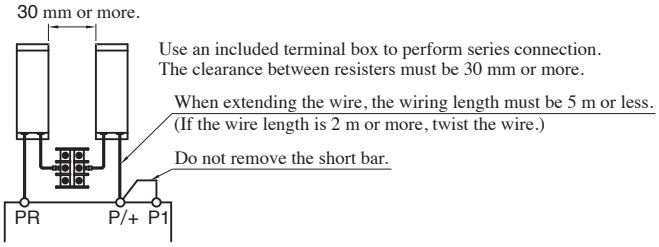
Model	A	B
FR-ABR-22K	8.4 Dia.	12
FR-ABR-11K-03/H11K-03	6.4 Dia.	9

●Customer Setting

FR-ABR-15K/22K/H22K

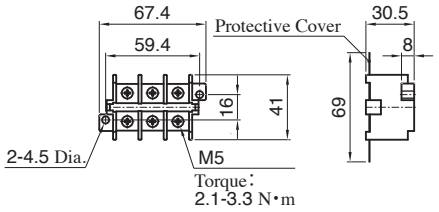


FR-ABR-H15K

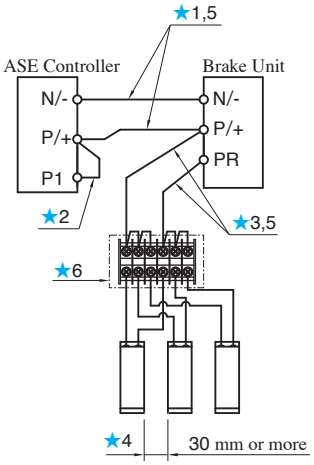


●Attachment

Terminal Box Outline Drawing

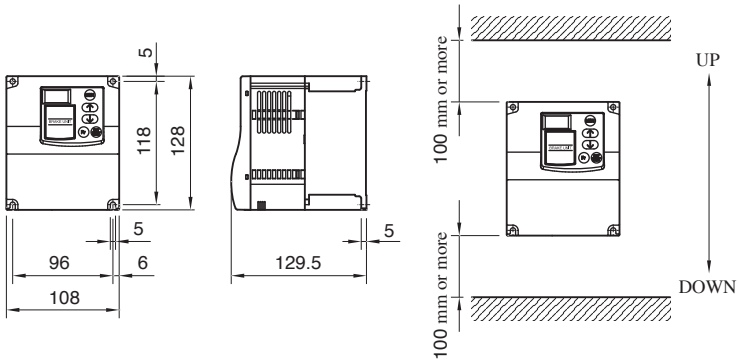


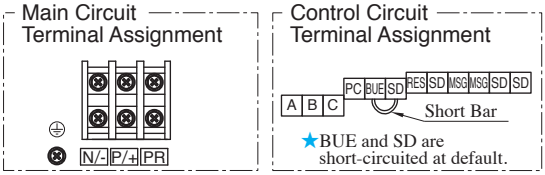
FR-ABR-11K-03
FR-ABR-H11K-03



Brake Unit Outline Drawing

MODEL:FR-BU2-30K-04
FR-BU2-H30K-04





★1. The wiring length between the ASE controller and brake unit must be 10 m or less. (If it is 5 m or more, twist the wire.)
★2. Do not remove the short bar between terminals P1 and P/+ of the ASE controller.
★3. The wiring length between the brake unit and regenerative resister must be 5 m or less. (If the wire length is 2 m or more, twist the wire.)
★4. Connect the resisters in parallel. The clearance between resisters must be 30 mm or more.
★5. Use a wire with the size indicated below or larger.
HIV wires and the like: 5.5 mm² AWG-10, PVC wires and the like: 6 mm² [FR-BU2-30K-04]
HIV wires and the like: 3.5 mm² AWG-12, PVC wires and the like: 4 mm² [FR-BU2-H30K-04]
★6. A terminal box is not included with this product. Prepare it separate.

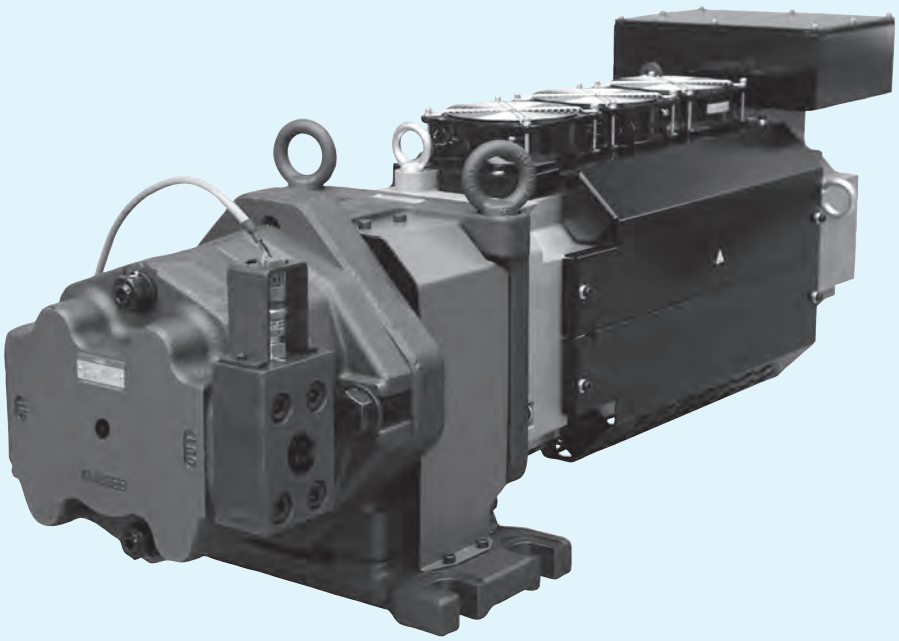
MODEL:FR-BU2-30K-04

	MAIN CIRCUIT TERMINAL P/+, N/-, PR, ⏚	CONTROL CIRCUIT TERMINAL
TERMINAL SCREW	M5	M3
TIGHTENING TORQUE	2.5 [N•m]	0.6 [N•m]

MODEL:FR-BU2-H30K-04

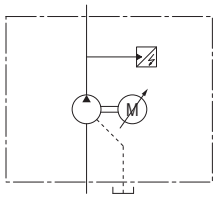
	MAIN CIRCUIT TERMINAL P/+, N/-, PR, ⏚	CONTROL CIRCUIT TERMINAL
TERMINAL SCREW	M4	M3
TIGHTENING TORQUE	1.5 [N•m]	0.6 [N•m]

ASU Series
AC Servo Motor Driven Pumps



This product is exclusively use for foreign countries outside of Japan.

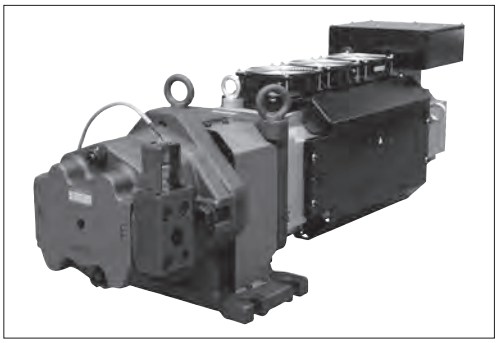
"ASU" Series AC Servo Motor Driven Pumps

Pump Type	Graphic Symbol	Geometric Displacement cm^3/rev	Maximum Operating Pressure MPa	Page
ASU Series AC Servo Motor Driven Pumps		0 2 5 10 20 5 100 150 ASU6 ASU8 ASU10 ASU13	17.5	A-257

● Consult Yuken for "ASU" Series AC Servo Motor Driven Pumps details.

ASU Series AC Servo Motor Driven Pumps

The ASU series follows the basic concept of the ASR series rotational speed control system and achieves low noise at high speeds. The pumps of this series offer easy shaft speed control for systems that do not require as much precision, response, or repeatability as the ASR series pumps offer.



Features

Energy saving with low heat generation

These pumps run at a rotational speed suitable for mechanical requirements, eliminating unnecessary power loss. They minimize heat generation in the fluid and allow the use of a significantly smaller reservoir.

Low noise

The motor operates at near-zero speed during unloaded operation or pressure control, keeping the noise level extremely low. Noise at high speed is also reduced.

Less wiring / high reliability

Use sensor-less rotational speed control.

Digital AMSE controller that saves space and wiring

The integration of the amplifier for the servo motor and the controller saves space and wiring. The parameters can be digitally adjusted in an easy and repeatable way.

Large flow

The AMSE controller has a combination function that supports operation with large flow up to 4080 L/min (ASU13 × 16 units).

Specifications

Descriptions \ Series Number			ASU6	ASU8		ASU10	ASU13
Power Capacity			BZ	BZ	CE	CE	CE
Pump	Flow Control	Max. Flow	143.1 L/min	158.6 L/min		198.2 L/min	255 L/min
		Min. Adj. Flow	2 %				
		Hysteresis	2% or less				
		Repeatability	2% or less				
		Input Signal Voltage	124.4 L/min/5V	158.6 L/min/5V		198.2 L/min/5V	255 L/min/5V
		Max. Permissible Input Signal Voltage★	143.1 L/min/5.75V				
	Pres. Control	Max. Operating Pres.	17.5 MPa				
		Min. Adj. Pres.	0.1 MPa				
		Hysteresis	1% or less				
		Repeatability	1% or less				
		Input Signal Voltage	17.5 MPa/5V				
AC Servo Motor Specifications		Rated Output	20 kW	20 kW	35 kW	35 kW	
		Insulation Class	Class F				
		Cooling System	Totally-enclosed Fan-cooling				
		Cooling Fan Power Consumption	40W(50Hz)/36W(60)Hz	40W(50Hz) 36W(60Hz)	60W(50Hz) 54W(60Hz)	60W(50Hz)/54W(60Hz)	
	Environmental Condition	Ambient Temperature	0 - +40 °C (No Freezing)				
		Ambient Humidity	80%RH or less(No Condensation)				
Mass		200 V AC Type	171 kg	173 kg	227 kg	229 kg	231 kg
		400 V AC Type	164 kg	166 kg	222 kg	224 kg	226 kg
Applicable Controller Model Numbers			AMSE-＊BB	AMSE-＊BB	AMSE-＊DE	AMSE-＊DE	

★By adjusting the controller, the maximum flow rate/5 V (143.1 L/min/5 V) can be set.

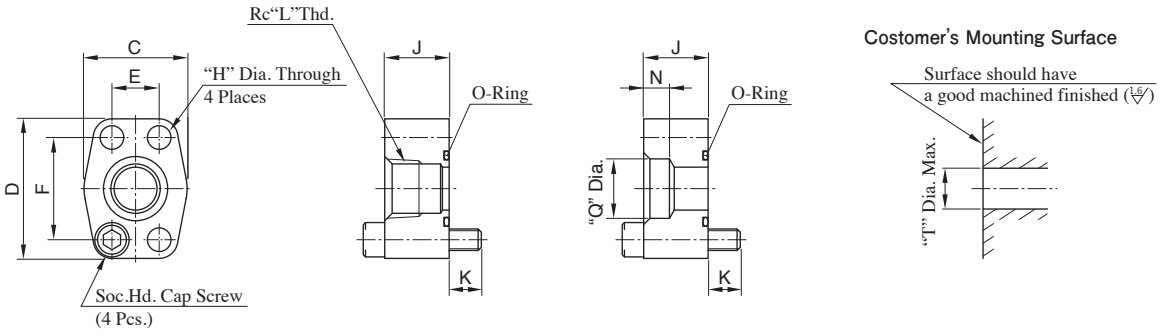
4 Bolt Solid Flanges (SAE)
“F5” Series Pipe Flange Kits

The dimensions of the flange mounting surface are based upon SAE 4 Bolt Split Flange (Standard Pressure Series).

Model Number Designation

F5	—06	—A	—10
Series Number	Flange Size	Type of Pipe Connection	Design Standards
F5	Refer to below table	A : Threaded Connection B : Socket Welding C : Butt Welding	10

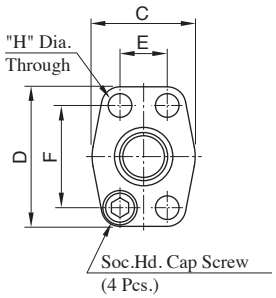
F5−＊−A **F5−＊−B**

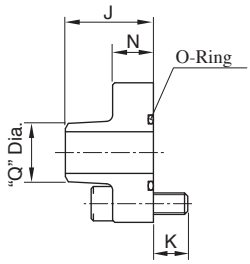


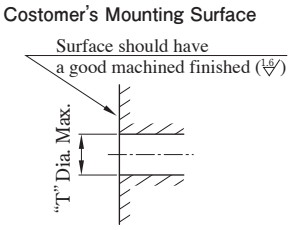
Kit Number	Piping Size	Dimension mm C	D	E	F	H	J	K	L	N	Q	T	O-Ring (OR NBR-90 P(G)＊＊-N)	Socket Head Cap Screw (4 Pcs.)	Max. Operating Pressure MPa	★1 Approx. Mass kg	★2 Tightening Torque Nm Recommendation	Tolerance
F5-04W-A	3/8	40	54	17.5	38.1	8.8	30	10	3/8	–	–	13	P22	M 8 ×40	28	0.5	35	±10%
F5-04W-B									–	9	17.8							
F5-04 -A	1/2								1/2	–	–							
F5-04 -B									–	11	22.2							
F5-06X-A	3/4	48	65	22.2	47.6	8.8	30	15	3/4	–	–	19	G30	M 8 ×45	28	0.7		
F5-06X-B									–	12	27.7							
F5-06 -A						11			3/4	–	–			M10×45	28	0.7		
F5-06 -B									–	12	27.7				14			
F5-08W-A	3/4	55	70	26.2	52.4	11	30	15	3/4	–	–	26	G35	M10×45	28	0.9	68.5	
F5-08W-B									–	12	27.7							
F5-08 -A	1								1	–	–				28			
F5-08 -B									–	14	34.5				14			
F5-10 -A	1 1/4	64	80	30.2	58.7	11	38	17	1 1/4	–	–	32	G40	M10×55	28	1.2		
F5-10 -B									–	16	43.2				14			
F5-12 -A	1 1/2	72	94	35.7	69.9	13.5	38	17	1 1/2	–	–	38	G50	M12×55	21	1.5	118	
F5-12 -B									–	18	49.1				14			
F5-16W-A	1 1/2	85	102	42.9	77.8	13.5	38	17	1 1/2	–	–	48	G60	M12×55	21	1.8		
F5-16W-B									–	18	49.1							
F5-16 -A	2								2	–	–	51	G65		17.5	1.7		
F5-16 -B									–	20	61.1				10.5			
F5-20 -A	2 1/2	102	114	50.8	88.9	13.5	48	17	2 1/2	–	–	63	G75	M12×65	17.5	2.0		
F5-20 -B									–	22	77.1				7			
F5-24 -A	3	116	135	61.9	106.4	17.5	53	17	3	–	–	76	G85	M16×70	3.5	2.7	287	
F5-24 -B							38		–	25	90.0			M16×55				
F5-28 -A	3 1/2	134	153	69.9	120.7	17.5	53	17	3 1/2	–	–	88	G100	M16×70	3.5	3.4		
F5-28 -B							38		–	28	102.8			M16×55				
F5-32 -A	4	150	162	77.8	130.2	17.5	53	17	4	–	–	101	G115	M16×70	3.5	3.7		
F5-32 -B							38		–	28	115.5			M16×55				

★1. Approx. mass is the value including socket head cap screw (4 pcs.).
★2. The values of tightening torque above apply to when these flanges are used for pressure line.

F5−＊−C







Kit Number	Piping Size	Dimension mm										O-Ring (OR NBR-90) P(G)＊＊-N	Socket Head Cap Screw (4 Pcs.)	Max. Operating Pressure MPa	Approx. Mass ★1 kg	Tightening Torque ★2 Nm	
		C	D	E	F	H	J	K	N	Q	T					Recommendation	Tolerance
F5-04-C	1/2	40	54	17.5	38.1	8.8	39	13	17	21.7	13	P22	M 8 ×30	28	0.25	35	
F5-06-C	3/4	48	65	22.2	47.6	11	41	16	19	27.2	19	G30	M10×35	28	0.35	68.5	
F5-08-C	1	55	70	26.2	52.4	11	42	16	19	34	26	G35	M10×35	28	0.45	68.5	
F5-10-C	1 1/4	64	80	30.2	58.7	11	44	16	19	42.7	32	G40	M10×35	28	0.63	68.5	±10%
F5-12-C	1 1/2	72	94	35.7	69.9	13.5	50	18	22	48.6	38	G50	M12×40	21	1.3	118	
F5-16-C	2	85	102	42.9	77.8	13.5	50	18	22	60.5	51	G65	M12×40	17.5	1.3	118	
F5-20-C	2 1/2	102	114	50.8	88.9	13.5	50	20	25	76.3	63	G75	M12×45	14	1.4	118	

★1. Approx. mass is the value including socket head cap screw (4 pcs.).
★2. The values of tightening torque above apply to when these flanges are used for pressure line.

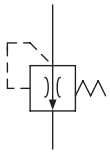
Air Bleed Valves

These air bleed valves are designed to use, at the start-up of the pumps, to bleed off the air enclosed in the suction line or the other lines in the system.

Specifications

Descriptions \ Model Numbers	ST 1004-2-1002	ST 1004-5-10	ST 1004-10-10
Port Size	Rc 3/8 Thd.		
Max. Operating Pressure	25 MPa		
Reseating Pressure	0.15 MPa		
Cracking Pressure	0.34 MPa		
Flow Rate to Reseating	2 L/min	5 L/min	10 L/min
Range of Usage to Pump Output Flow	For Under 20 L/min	For 20 to 75 L/min	For Over 75 L/min

Graphic Symbols



4 Bolt Solid Flanges (SAE)
“F6” Series Pipe Flange Kits

The dimensions of the flange mounting surface are based upon SAE 4 Bolt Split Flange (High Pressure Series).

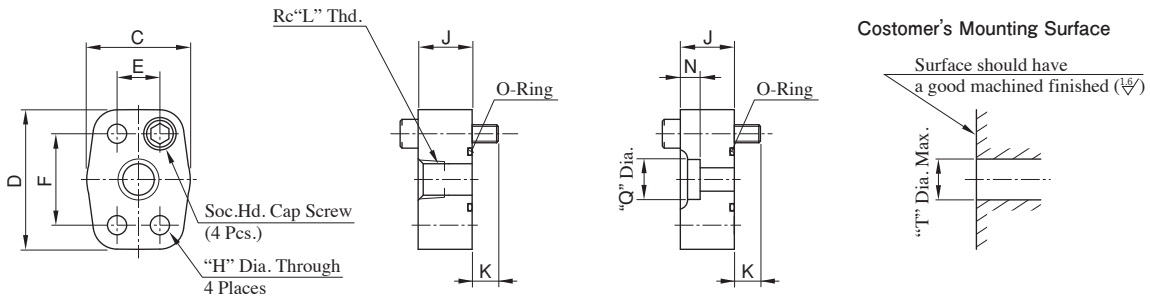
Specifications

Max. Operating Pressure..... 42 MPa
However, Rc Threaded Connection Type..... 31 MPa

Model Number Designation

F6	—04W	—A	—M	—10
Series Number	Flange Size	Type of Pipe Connection	Type of Mounting Bolt	Design Standards
F6	Refer to below table	A : Threaded Connection B : Socket Welding	M : Metric Thd.	10

F6-＊-A **F6-＊-B**



Kit Number	Piping Size	Dimension mm C	D	E	F	H	J	K	L	N	Q	T	O-Ring (OR NBR-90) P(G)＊＊-N	Socket Head Cap Screw (4 Pcs.)	Approx. Mass ★1 kg	Tightening Torque Nm Recommendation	Tightening Torque Nm Tolerance
F6-04W-A	3/8	48	56.5	18.2	40.5	8.8	28	12	3/8	–	–	15	P22	M 8 ×40	0.4	35	±10%
F6-04W-B									–	9	17.8						
F6-04 -A	1/2								1/2	–	–						
F6-04 -B									–	11	22.2						
F6-06W-A	1/2	57.5	77.5	23.8	50.8	11	30	15	1/2	–	–	21	G30	M10×45	0.9	68.5	
F6-06W-B									–	11	22.2						
F6-06 -A	3/4								3/4	–	–						
F6-06 -B									–	12	27.7						
F6-08W-A	3/4	65	81	27.8	57.2	13.5	30	15	3/4	–	–	26	G35	M12×45	1.1		
F6-08W-B									–	12	27.7						
F6-08 -A	1						34	16	1	–	–			M12×50			
F6-08 -B							30	15	–	14	34.5			M12×45			
F6-10W-A	1	72	95	31.8	66.7	13.5	34	16	1	–	–	34	G40	M12×50	1.3	118	
F6-10W-B									–	14	34.5						
F6-10 -A	1 1/4						39		1 1/4	–	–			M12×55			
F6-10 -B							34		–	16	43.2			M12×50			
F6-12W-A	1 1/4	90	113	36.5	79.4	17.5	34	21	1 1/4	–	–	44	G50	M16×55	1.5	287	
F6-12W-B									–	16	43.2						
F6-12 -A	1 1/2						39		1 1/2	–	–			M16×60			
F6-12 -B							34		–	18	49.1			M16×55			

★1. Approx. mass is the value including socket head cap screw (4Pcs.).
★2. The values of tightening torque above apply to when these flanges are used for pressure line.

B

VANE PUMPS

	Pump Type	Graphic Symbols	Output Flow at 1200 r/min at No-Load L/min (1 2 5 10 20 50 100 200 500 1000)	Maximum Operating Pressure MPa	Page
Fixed Displacement	Single Pumps		50T 150T	7	B-5
	"PV2R" Series Single Pumps		PV2R1 PV2R2 PV2R3 PV2R4	21	B-6
	"PV2R" Series Double Pumps		Small Volume: (PV2R1) (PV2R2) (PV2R3); Large Volume: (PV2R2) (PV2R3) (PV2R4)	21	B-18

● The following pumps can also be supplied.

"PV2R4A" Single Pumps
"PV2R24A/PV2R34A" Double Pumps
Consult Yuken for details.

Caution :

In the case of Water Glycol fluid, a slight oil leak occurs from the shaft seal part.
(Criterion : 500ml / 6 months of oil leakages.)
Please install a tray appropriate capacity on the pump-base.

Hydraulic Fluids

Type of Hydraulic Fluids

Any type of hydraulic fluids listed in the Table 1 below can be used. However, the specifications of the pumps such as maximum pressure and maximum pump speed may be changed according to the type of hydraulic fluids to be used.
For details, please refer to the specifications of the pump concerned.

Hydraulic Fluids

(Table 1)

Type of Fluids		Single Pumps	"PV2R" Series Single Pumps "PV2R" Series Double Pumps
Petroleum Base Oils		Use anti-wear type oils or R & O (Rust and Oxidation inhibitor) type oils (equivalent to ISO VG32 or 46)	
Synthetic Fluids		Use phosphate ester type fluids. When phosphate ester type fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.	
Water Containing Fluids	Water-Glycols	Consult Yuken for details.	Standard pumps can be used without conditions. However, if any type other than those in Table 2 is used, the maximum operating pressure is limited.

Anti-Wear Type Water-Glycols

(Table 2)

Fluid Manufacturer	Commercial Trade Name
Shell Lubricants Japan K.K.	Shell HFC Fluid
ENEOS Corporation	HIGHLAND FRZ 46
MORESCO Corporation	HYDOL HAW
COSMO OIL LUBRICANTS Co.,Ltd.	COSMO FLUID GS 46 COSMO FLUID HQ 46

Fluid Viscosity and Temperature

Use the hydraulic fluids which satisfy the recommended viscosity and oil temperature given in the Table 3 below.
However, please note that if any of the pumps listed in the table 4 is started at low speed, the maximum fluid viscosity is limited.

Fluid Viscosity and Temperature

(Table 3)

Fluid	Temperature °C	Viscosity mm²/s
Petroleum Base Oils	0-70	20-400
Phosphate Esters		
Water-Glycols	0-50	

Maximum Viscosity for Low Start-up Speed

(Table 4)

Pump Type	Start-up Speed r/min	Max. Viscosity mm²/s
PV2R1, PV2R12 PV2R13	750	100
	950	200
50T, PV2R2	600	100
PV2R23	950	200

Control of Contamination

Contamination of hydraulic fluids results in pump failures and reduced pump lives. Carry out sufficient contamination control for hydraulic fluids and keep contamination level within NAS class 12.
Also, use a 100 μm tank filter on the suction side, more than 50 mm away from the tank bottom.

Instructions

Alignment of Shaft

Employ a flexible coupling whenever possible, and avoid any stress from bending or thrust.
Maximum permissible misalignment is less than 0.1 mm TIR and maximum permissible misangular is less than 0.2°.

Suction Pressure

Set the suction pressure at pump inlet port at the value given in the table below. Furthermore, use the pipes in the suction side having the diameter as indicated on the installation drawings. In case where the pump is installed on the tank or at the position higher than the tank top cover, the height of the suction port of the pump should be less than 1 meter from the oil level {less than 0.8 meter in case of using phosphate esters or water containing fluids}.

Pump Type		Suction Pressure		
		Minimum		Maximum
		Petroleum Base Oils	Phosphate Esters Water Containing Fluid	
Single Pumps	50T, 150T	−20 kPa	−16 kPa	+140 kPa
"PV2R" Series Single Pumps	PV2R1, PV2R2	−20 kPa	−16 kPa	+30 kPa
	PV2R3, PV2R4	−20 kPa ★		
"PV2R" Series Double Pumps	PV2R12	−20 kPa		
	PV2R13, PV2R23	−20 kPa ★		

★ In relation to the rotating speed of the pump, the minimum suction pressure may be restricted for a certain nominal displacement. For details, please refer to the specifications of the pump concerned.

Precautions at Starting

At an initial operation or at an operation after a long rest, the pump may have difficulty in sucking up fluid. In such cases, an air bleed valve should be installed beforehand on the discharge side (model No. ST1004-✻-10), or discharge air by slightly slackening the connection on the discharge side. At starting, operate the pump intermittently as far as possible with no load. For fluid viscosity at starting, see the item of "Hydraulic Fluids".

Other Precautions

If a pump is used at speed below 1200 r/min, install the pump with the suction port upside so that the pump can suck up fluid easily at starting.

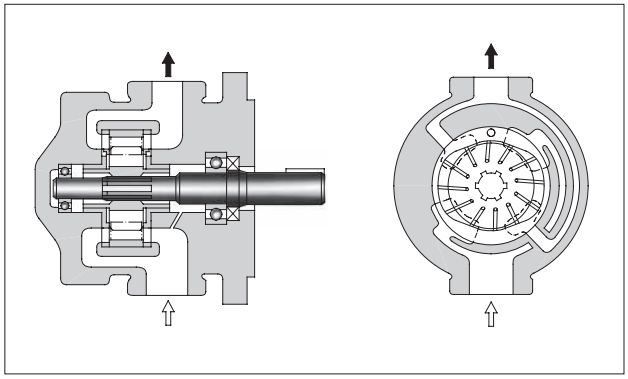
Interchangeability in Installation between Current and New Design

The models shown below have been changed in design.

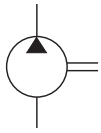
Name	Model Numbers		Interchangeability in Installation	Major Changes
	Current	New		
"PV2R1" Series Single Pumps	PV2R1–＊–＊–RAA–4222	PV2R1–＊–＊–RAA–43	Yes	● Change only design number
"PV2R2" Series Single Pumps	PV2R2–＊–＊–RAA–40	PV2R2–＊–＊–RAA–41	Yes	● Lower noise level
"PV2R3" Series Single Pumps	PV2R3–＊–＊–RAA–30	PV2R3–＊–＊–RAA–31	Yes	● Lower noise level
"PV2R12" Series Double Pumps	PV2R12–＊–＊–＊–REAA–4222	PV2R12–＊–＊–＊–REAA–43	Yes	● Change only design number
"PV2R13" Series Double Pumps	PV2R13–＊–＊–＊–RAAA–4222	PV2R13–＊–＊–＊–RAAA–43	Yes	
"PV2R14" Series Double Pumps	PV2R14–＊–＊–＊–RAAA–3222	PV2R14–＊–＊–＊–RAAA–33	Yes	
"PV2R23" Series Double Pumps	PV2R23–＊–＊–＊–REAA–40	PV2R23–＊–＊–＊–REAA–41	Yes	● Lower noise level
"PV2R33" Series Double Pumps	PV2R33–＊–＊–＊–RAAA–30	PV2R33–＊–＊–＊–RAAA–31	Yes	
"PV2R24" Series Double Pumps	PV2R24–＊–＊–＊–RAAA–30	PV2R24–＊–＊–＊–RAAA–31	Yes	
"PV2R34" Series Double Pumps	PV2R34–＊–＊–＊–REAA–30	PV2R34–＊–＊–＊–REAA–31	Yes	

Single Vane Pumps

Offering stable performance and a wide range of output flow rates, it is widely used as a hydraulic actuation source.



Graphic Symbol



Specifications

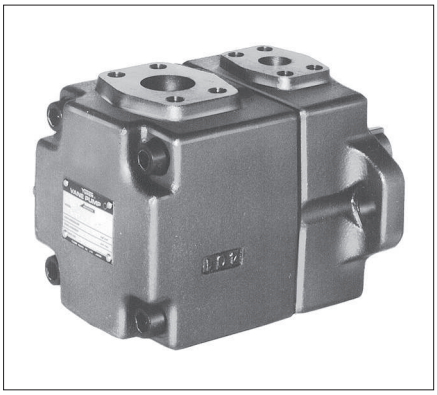
Model Numbers	Geometric Displacement cm³/rev	Max. Operating Pressure MPa			Shaft Speed Range r/min		Approx. Mass kg	
		Petroleum Base Oils		Synthetic Fluids				
		Anti-Wear Type	R & O Type	Phosphate Esters	Max.	Min.	Foot Mtg.	Flange Mtg.
50T– 7	6.8	7	7	7	2000 ★	800	10.5	9.0
50T–12	11.6					600		
50T–17	16.5				1800 ★			
50T–23	22.9							
50T–26	25.9							
50T–36	36.0							
150T– 48	47.7	7	7	7	1500 ★	600	26	25
150T– 61	61.1							
150T– 75	74.9							
150T– 94	93.6				1200			
150T–116	115.6							

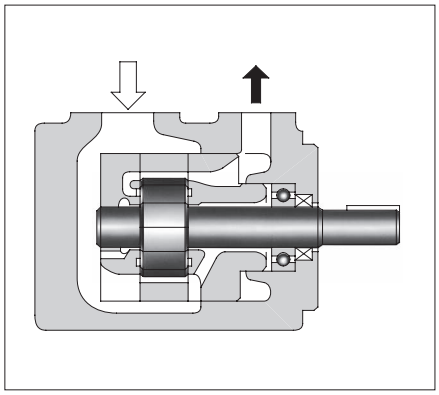
★ If phosphate esters are used, the maximum speed is limited to 1200 r/min.

● Consult Yuken for Single Vane Pump details.

"PV2R" Series Single Vane Pumps

These pumps are of high pressure and high performance, which have been developed especially for low noise operation.
To comply with a variety of applications including injection moulding machines, PV2R series single pumps provide the output flow of such a wide range as from 5.8 to 237 cm³/rev.
The intergral driving parts of the pumps are combined into a kit form and available for supply as a cartridge kit. Therefore, the replacement of the driving parts can be done easily.





Graphic Symbol

Model Number Designation

PV2R1	–6	–L	–R	A	A	–43
Series Number	Nominal Displacement cm³/rev	Type of Mounting	Shaft Rotation	Discharge Port Position	Suction Port Position	Design Number
PV2R1 ★2	6, 8, 10, 12, 14, 17, 19, 23, 25, 31	L : Foot Mounting	(Viewed from Shaft End)	(Viewed from Shaft End)	(Viewed from Shaft End)	43
PV2R2 ★2	41, 47, 53, 59, 65					41
PV2R3 ★2	76, 94, 116	F : Flange Mounting	R : Clockwise ★1 (Normal)	A : Upwards (Normal)	A : Upwards (Normal)	31
PV2R4 ★2	136, 153, 184, 200, 237					30

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
★2. When phosphate esters are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Pipe Flange Kits

Pipe flange kits are not included with the pumps, so please refer to the table below to order them for your use.

Pump Model Numbers	Name of Port	Pipe Flange Kit Numbers		
		Threaded Connection	Socket Welding ★	Butt Welding
PV2R1	Suction	F5–08–A–10	F5–08–B–10	F5–08–C–10
	Discharge	F5–04–A–10	F5–04–B–10	F5–04–C–10
PV2R2	Suction	F5–10–A–10	F5–10–B–10	F5–10–C–10
	Discharge	F5–06–A–10	F5–06–B–10	F5–06–C–10
PV2R3	Suction	F5–16–A–10	F5–16–B–10	F5–16–C–10
	Discharge	F5–10–A–10	F5–10–B–10	F5–10–C–10
PV2R4	Suction	F5–24–A–10	F5–24–B–10	—
	Discharge	F5–12–A–10	F5–12–B–10	F5–12–C–10

★ In case of using socket welding flanges, there is a case where the operating pressure should be set lower than the normal because of strength of the flanges. Therefore, please pay cautious attention to the max. operating pressure when the socket welding flanges are used.

Notes: When phosphate esters are used, prefix "F-" to the model number.

Specifications

Model Numbers	Geometric Displacement cm³/rev	Max. Operating Pressure MPa						Output Flow & Input Power	Shaft Speed Range r/min	
		Petroleum Base Oils		Water Containing Fluids			Synthetic Fluids			
		Anti-Wear Type	R & O Type	Anti-Wear Type Water Glycols ★1	Water Glycols	Water in Oil Emulsions	Phosphate Esters		Max. ★3	Min.
PV2R1– 6	5.8	21 ★5	16	16	7	7	16	Refer to Pages B-11 - B-13	1800 (1200)	750★4
PV2R1– 8	8.0									
PV2R1–10	9.4	21								
PV2R1–12	12.2									
PV2R1–14	13.7									
PV2R1–17	16.6									
PV2R1–19	18.6									
PV2R1–23	22.7									
PV2R1–25	25.3									
PV2R1–31	31.0	16								
PV2R2–41	41.3	21	14	16	7	7	14	Refer to Pages B-13 - B-14	1800 (1200)	600★4
PV2R2–47	47.2									
PV2R2–53	52.5									
PV2R2–59	58.2									
PV2R2–65	64.7									
PV2R3–76	76.4	21	14	16	7	7	14	Refer to Pages B-14 - B-15	1800 (1200)	600
PV2R3–94	93.6									
PV2R3–116	115.6	16							1800★2 (1200)	
PV2R4–136	136	17.5	14	16	7	7	14	Refer to Pages B-15 - B-16	1800 (1200)	600
PV2R4–153	153									
PV2R4–184	184									
PV2R4–200	201									
PV2R4–237	237								1800★2 (1200)	

Mass

Model Numbers	Approx. Mass kg	
	Flange Mtg.	Foot Mtg.
PV2R1	9.0	11.2
PV2R2	15.5	19.8
PV2R3	30.9	40.9
PV2R4	68.5	93.5

★1. For the brands of anti-wear type water-glycols , see the item of "Hydraulic Fluids" on page B-2.

★2. For PV2R3-116 and PV2R4-237, the minimum suction pressure is limited by the shaft speed range as shown in the table below.

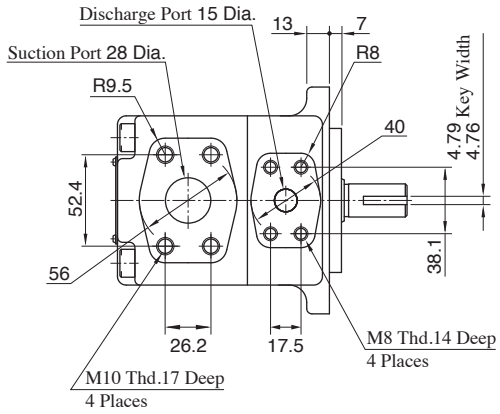
Model Numbers	Min. Suction Pressure MPa	
	Below 1700 r/min	1700 -1800 r/min
PV2R3–116	–20 kPa	0 kPa
PV2R4–237	–20 kPa	–13 kPa

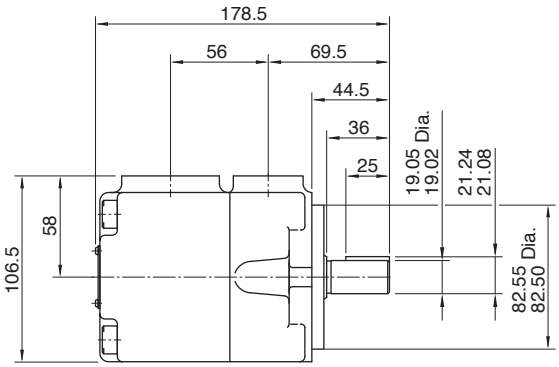
★3. Values in parentheses are for phosphate esters or water containing fluids.

★4. For starting at low speed, the maximum viscosity is limited. For details, see the item of "Hydraulic Fluids" on page B-2.

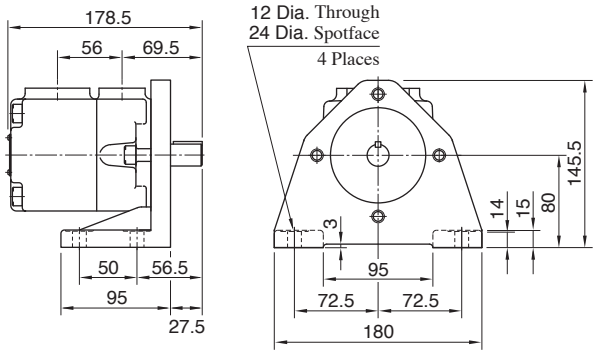
★5. For pressure above 16 MPa, raise the speed over 1450 r/min.

Flange Mtg.: PV2R1-＊-F

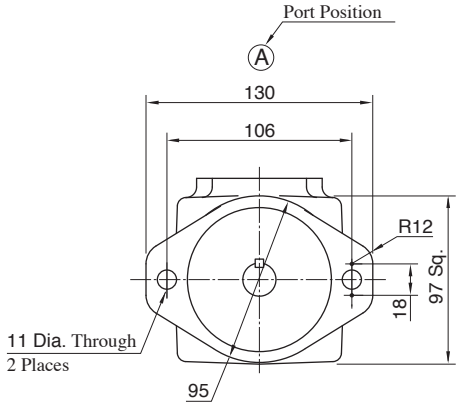




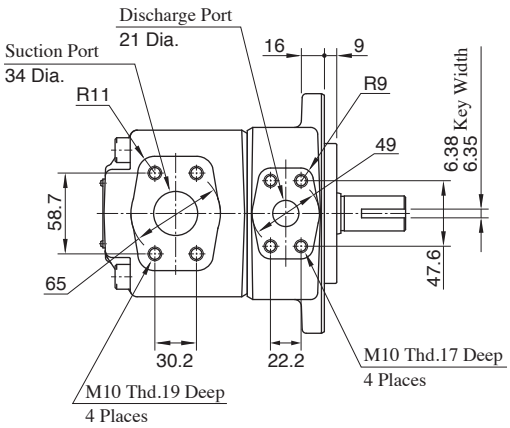
Foot Mtg.: PV2R1-＊-L

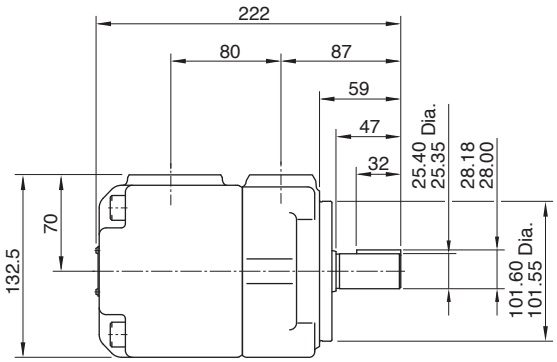


For other dimensions, refer to "Flange Mtg."

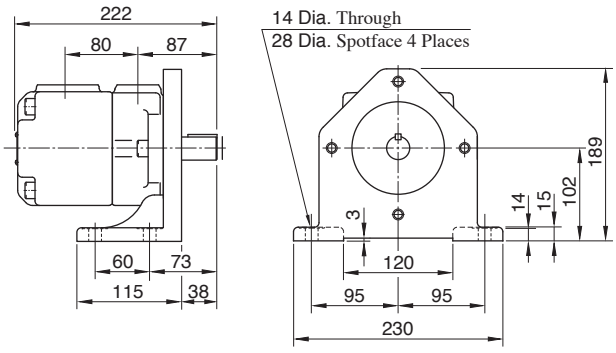


Flange Mtg.: PV2R2-＊-F





Foot Mtg.: PV2R2-＊-L



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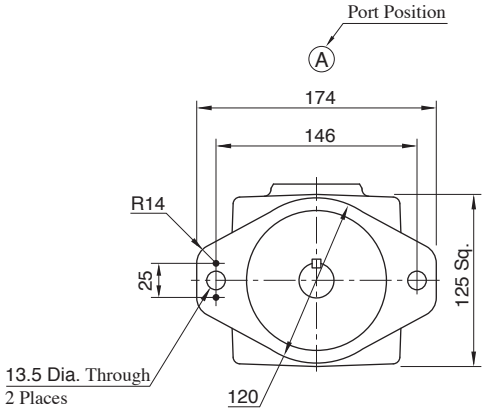
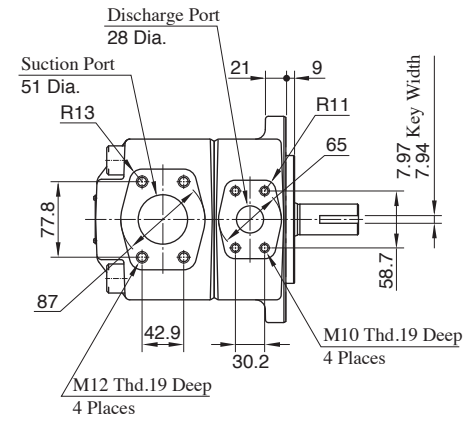
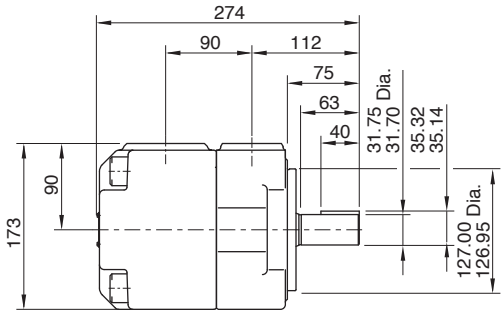
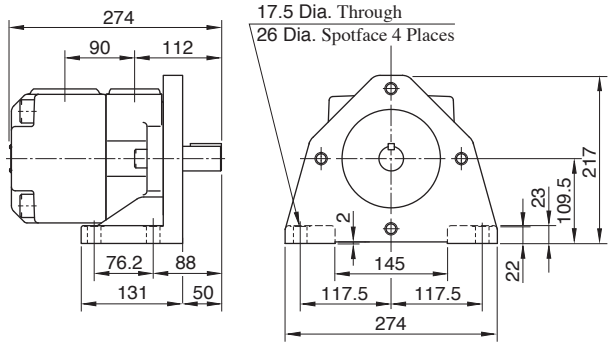


Flange Mtg.: PV2R3-＊-F





Foot Mtg.: PV2R3-＊-L



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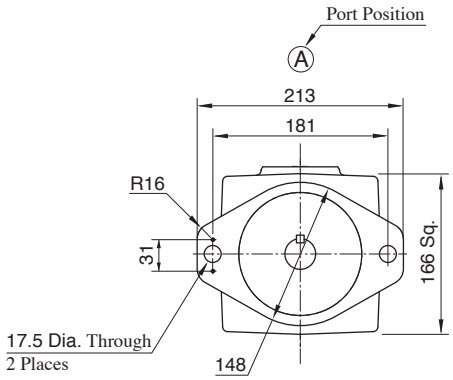
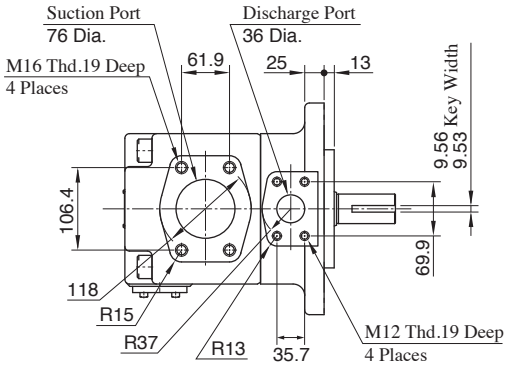
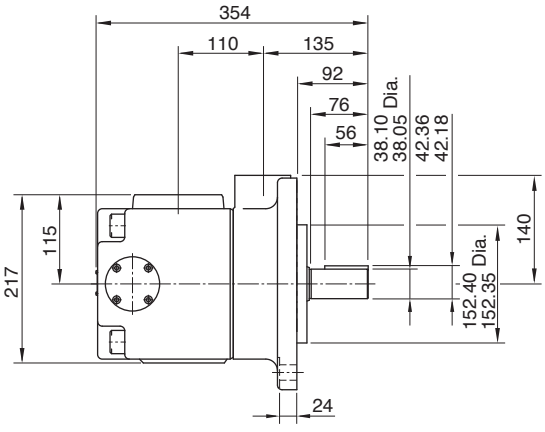
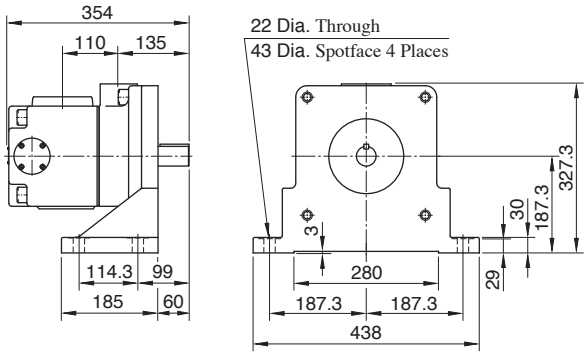


Flange Mtg.: PV2R4-＊-F

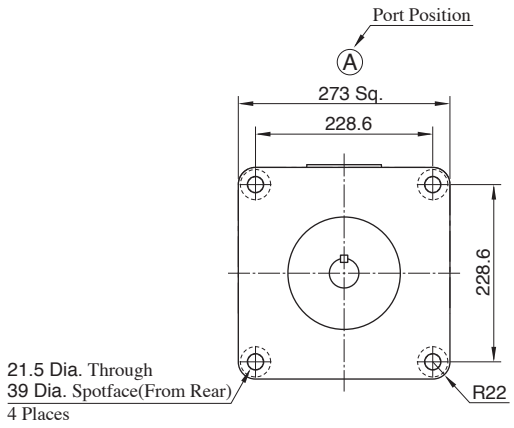




Foot Mtg.: PV2R4-＊-L



For other dimensions, refer to "Flange Mtg."



Noise Level

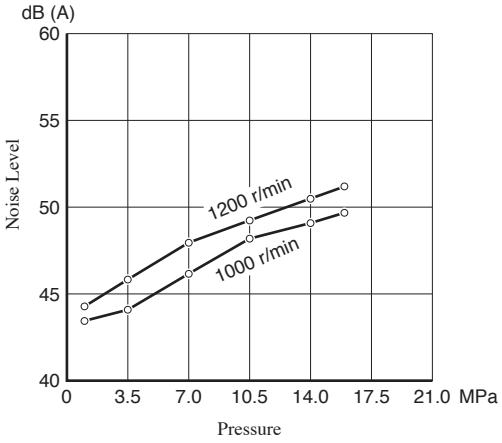
Measuring Conditions

Fluid Viscosity : 20 mm² /s

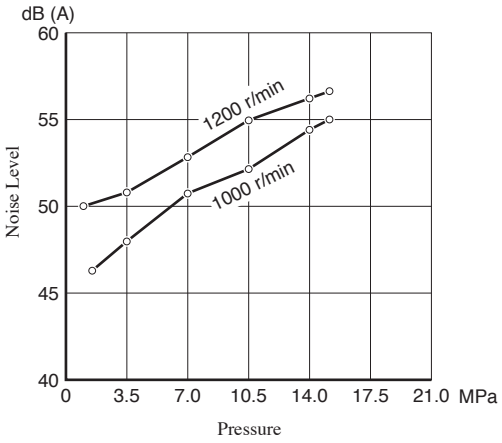
Measurement Point : One meter horizontally away from pump

Back Ground Noise : 40 dB (A)

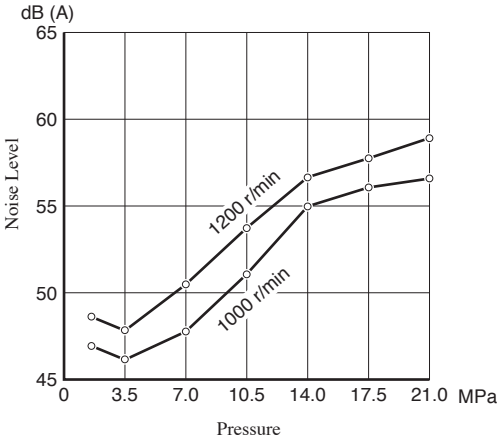
PV2R1-6



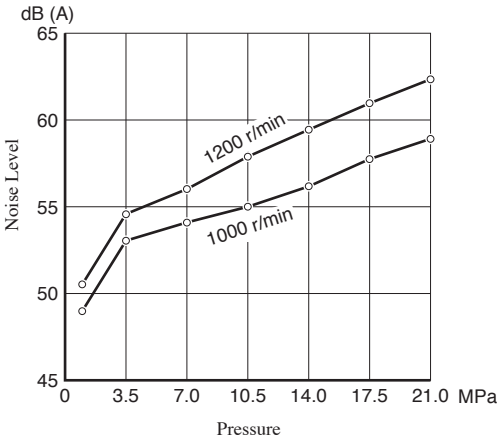
PV2R1-31



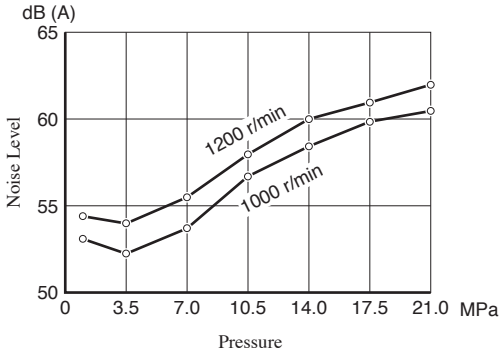
PV2R2-41



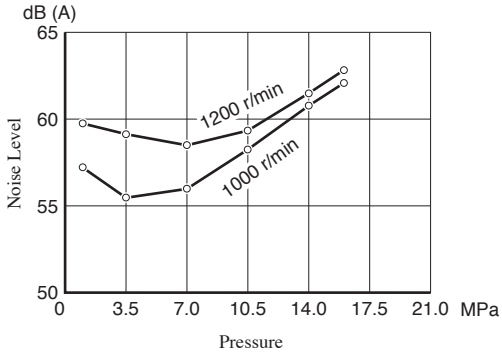
PV2R2-65



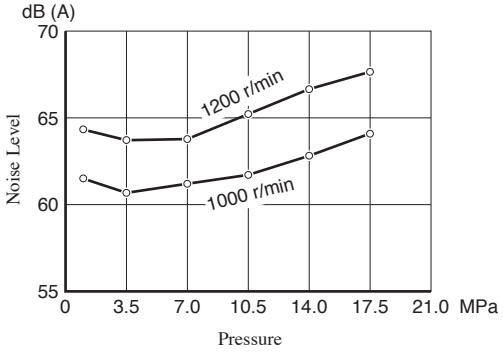
PV2R3-76



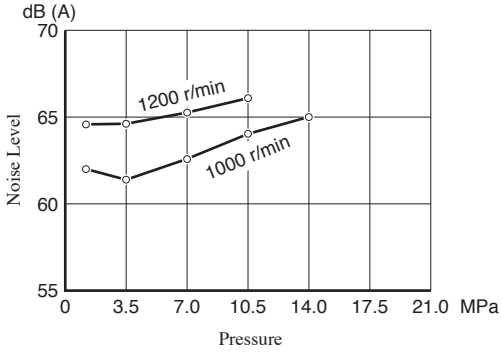
PV2R3-116



PV2R4-136



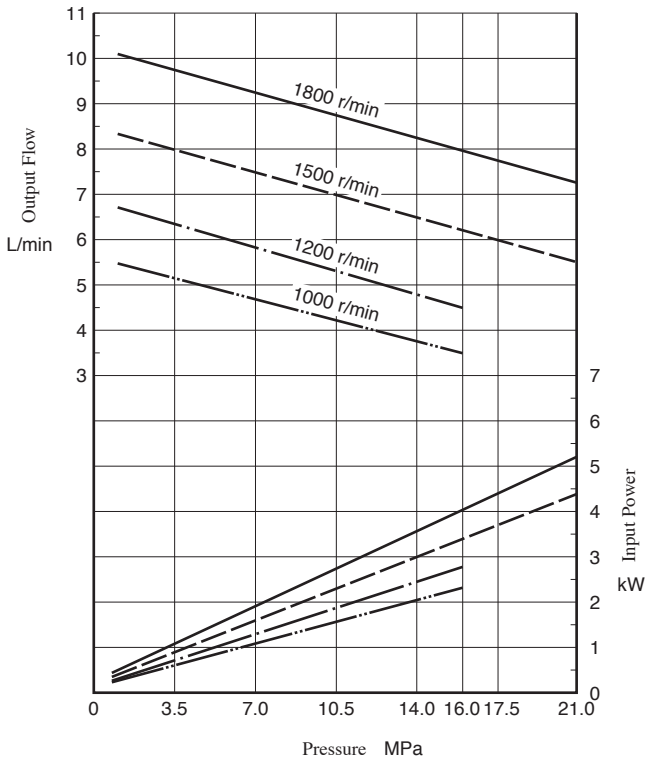
PV2R4-237



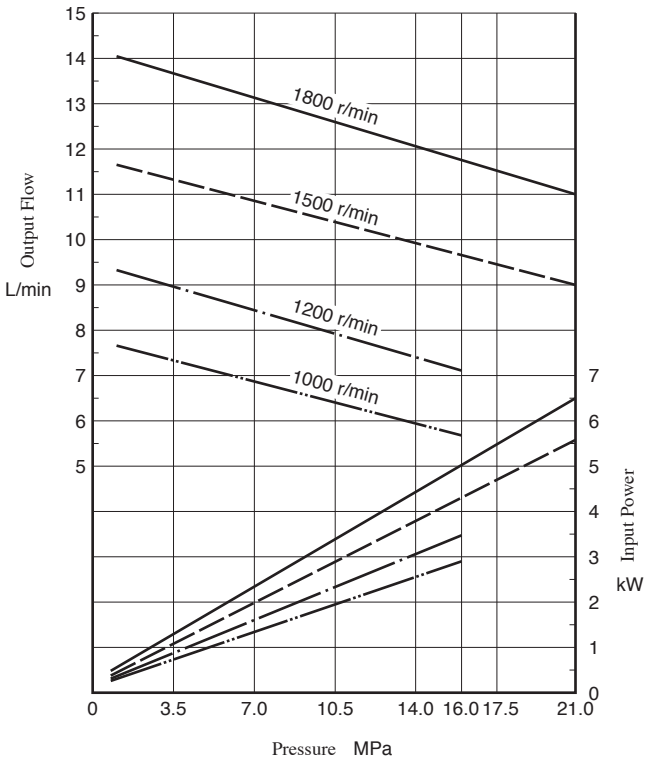
Pressure, Output Flow, and Input Power

Typical Pump Characteristics at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

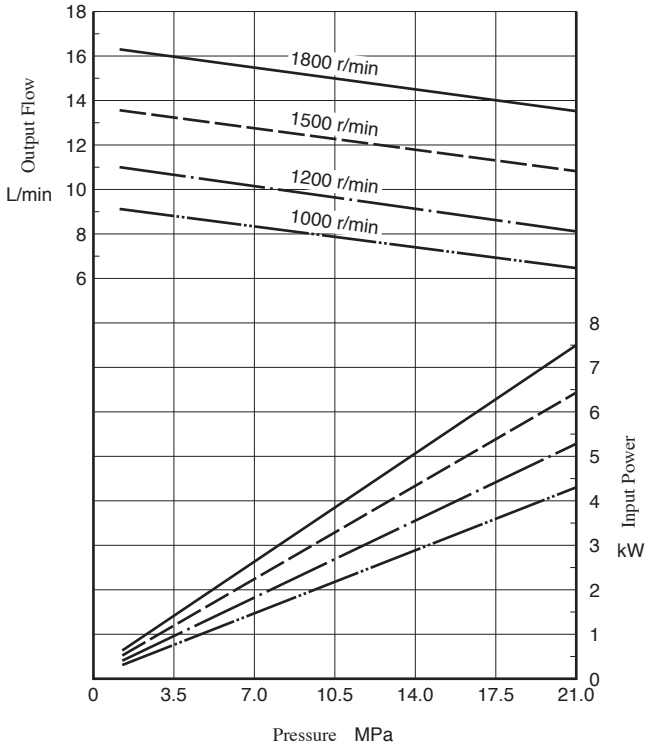
● PV2R1-6



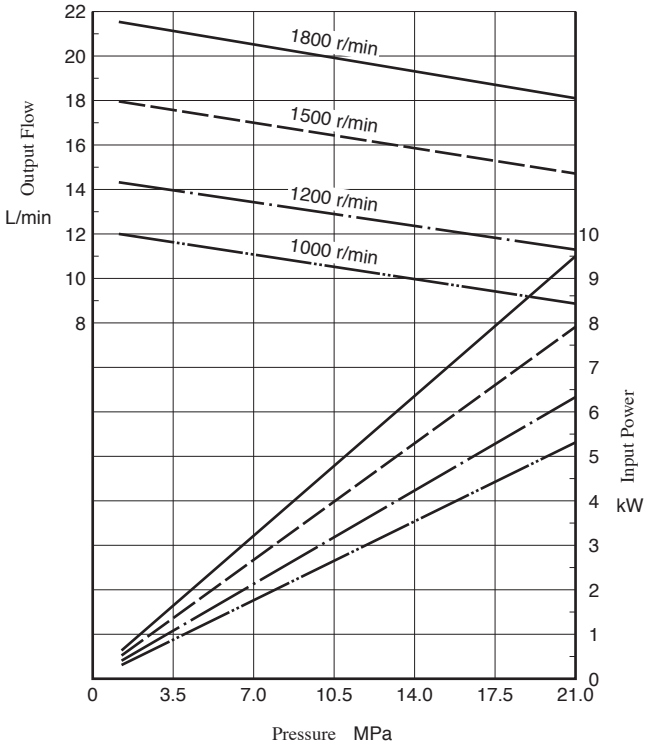
● PV2R1-8



● PV2R1-10



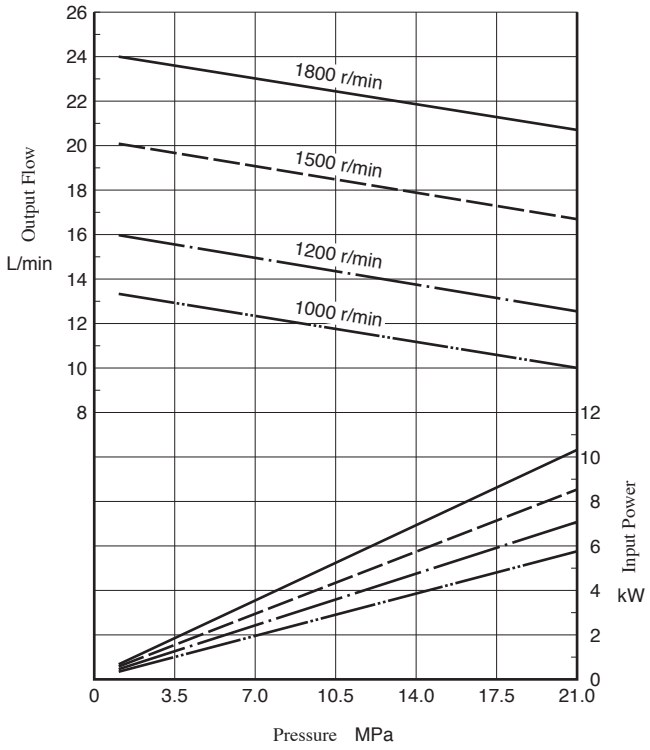
● PV2R1-12



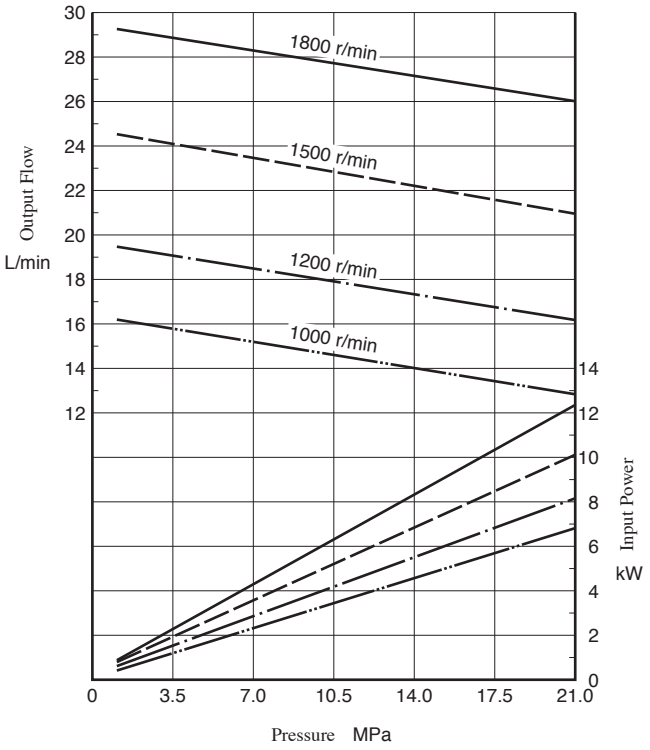
Pressure, Output Flow, and Input Power

Typical Pump Characteristics at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

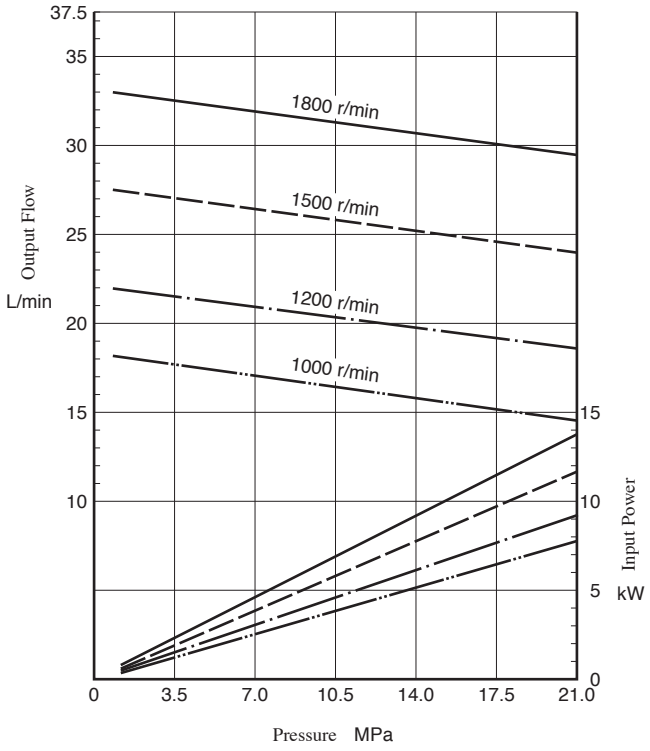
PV2R1-14



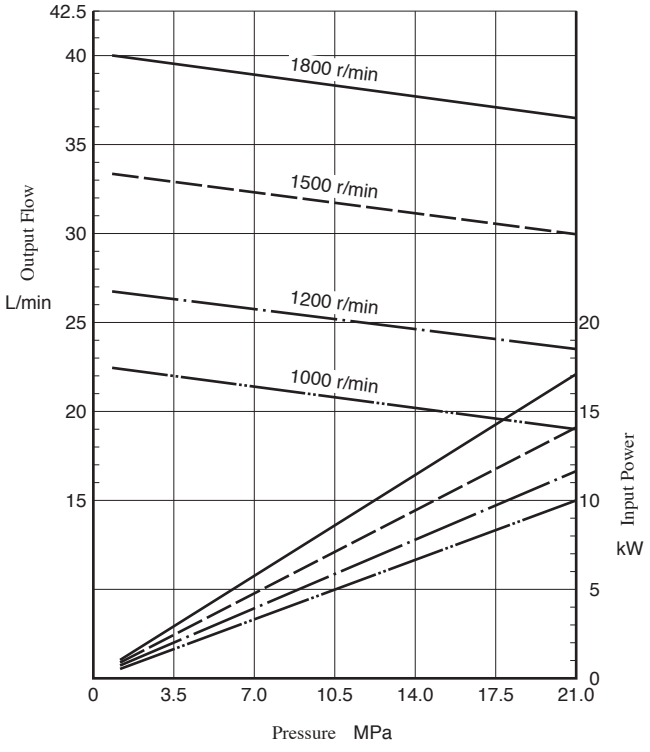
PV2R1-17



PV2R1-19



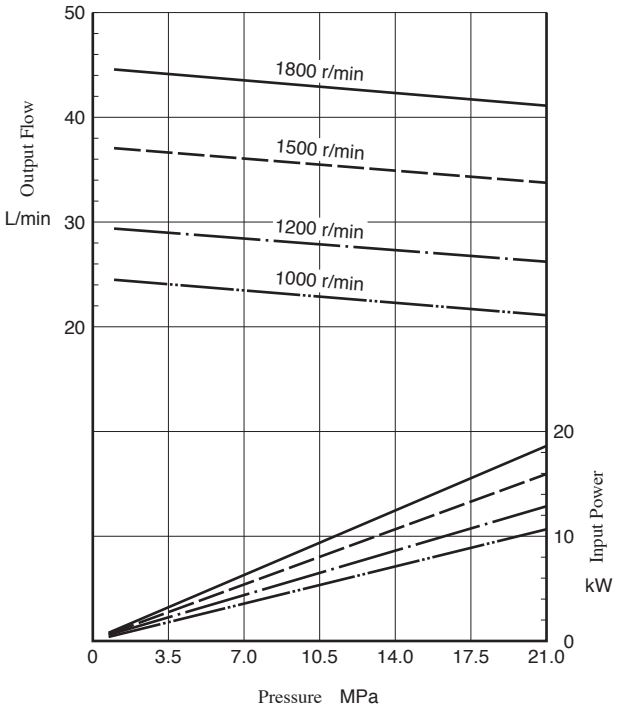
PV2R1-23



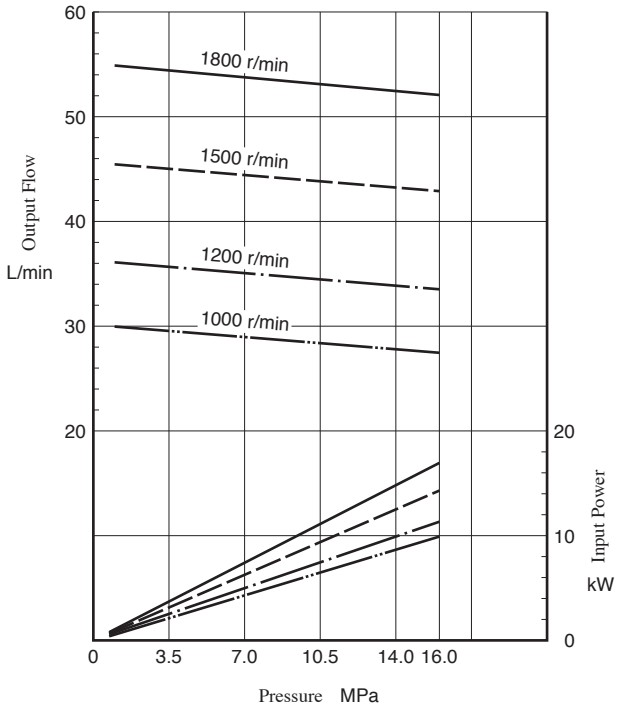
Pressure, Output Flow, and Input Power

Typical Pump Characteristics at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

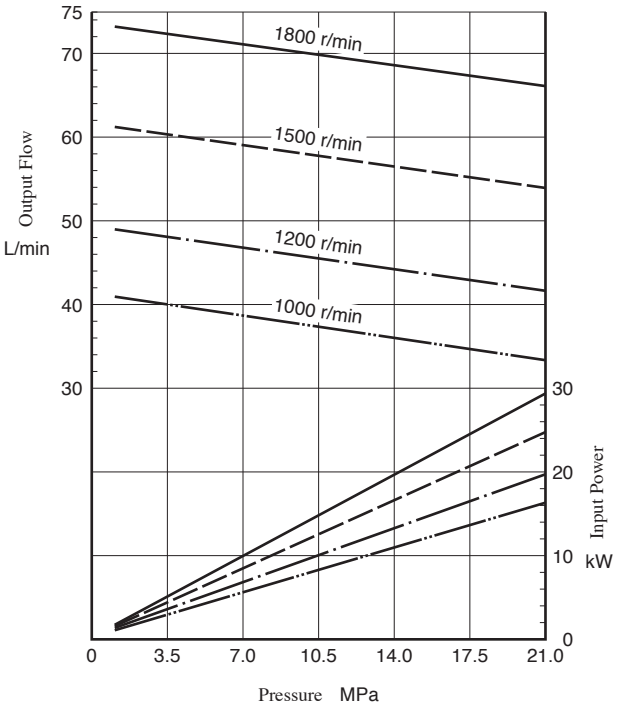
● PV2R1-25



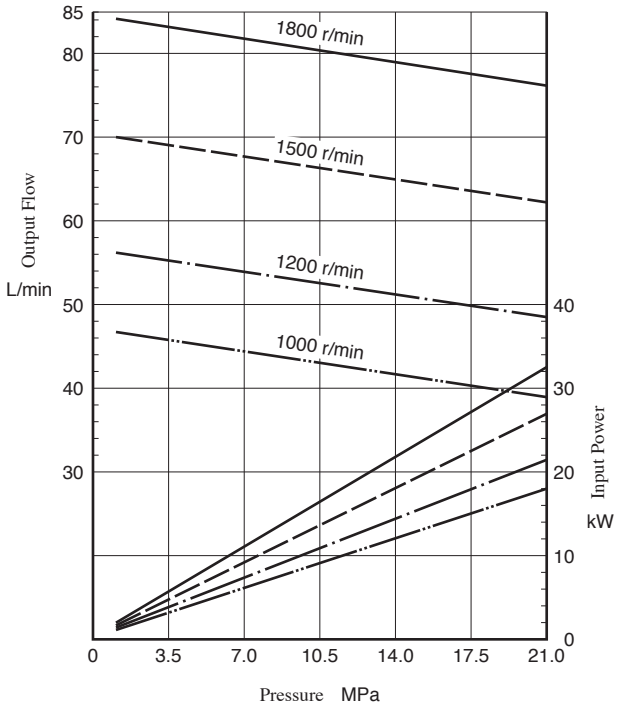
● PV2R1-31



● PV2R2-41



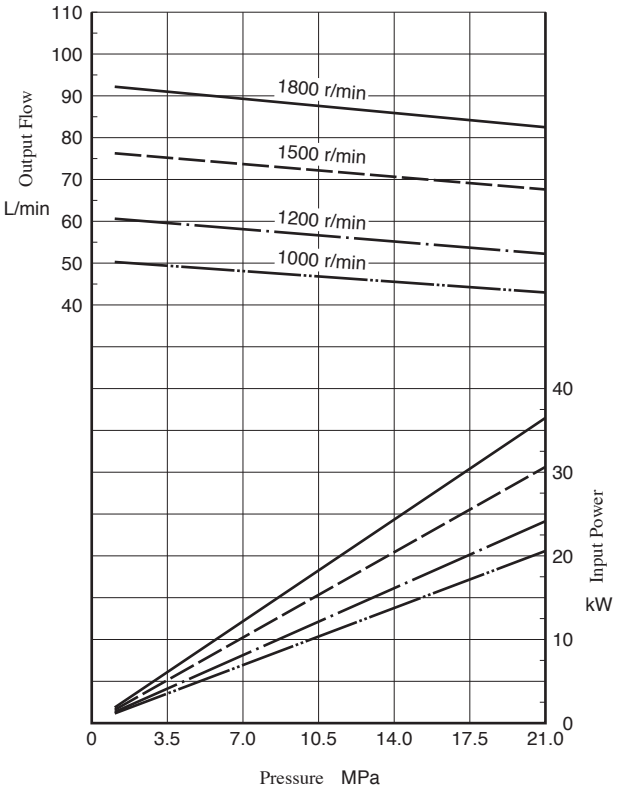
● PV2R2-47



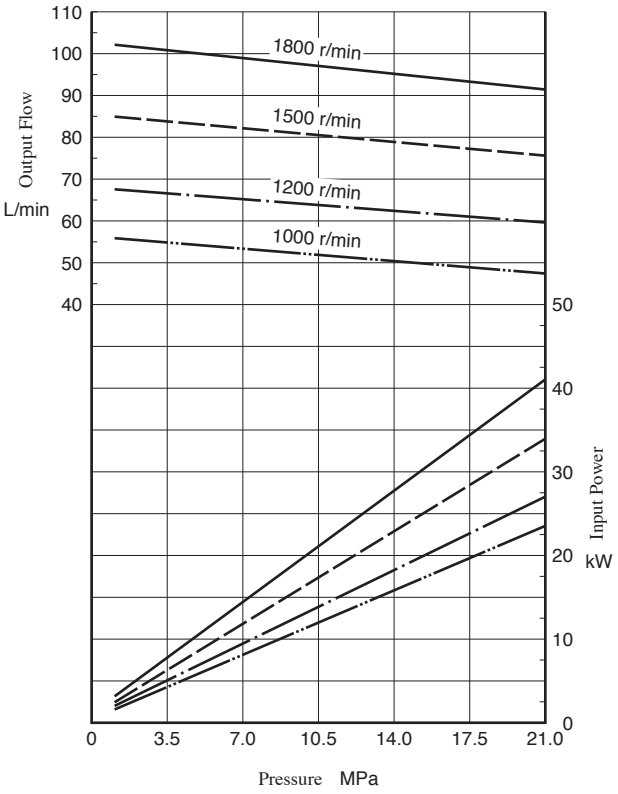
Pressure, Output Flow, and Input Power

Typical Pump Characteristics at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

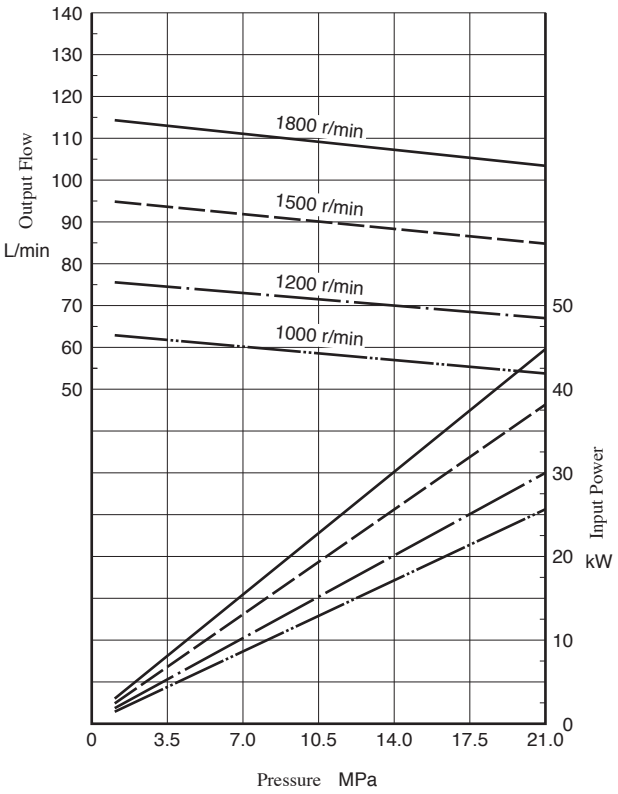
● PV2R2-53



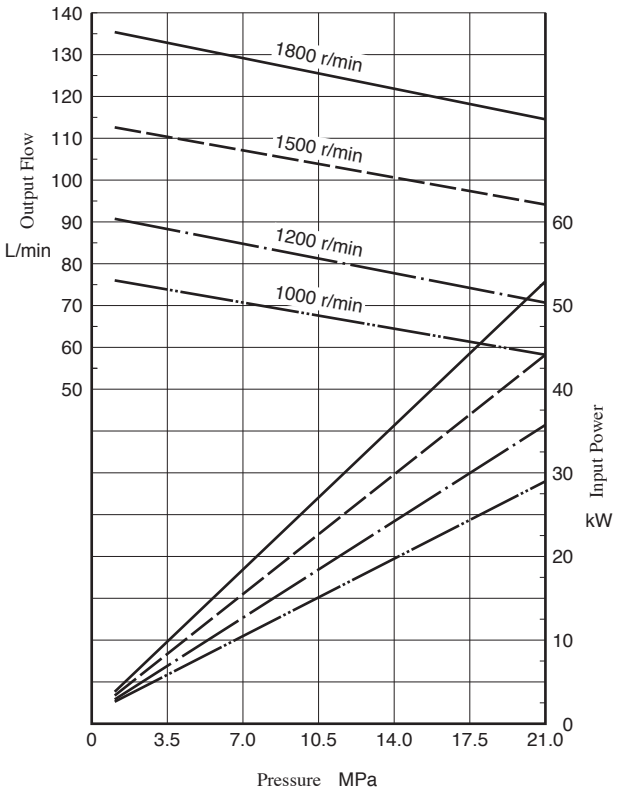
● PV2R2-59



● PV2R2-65



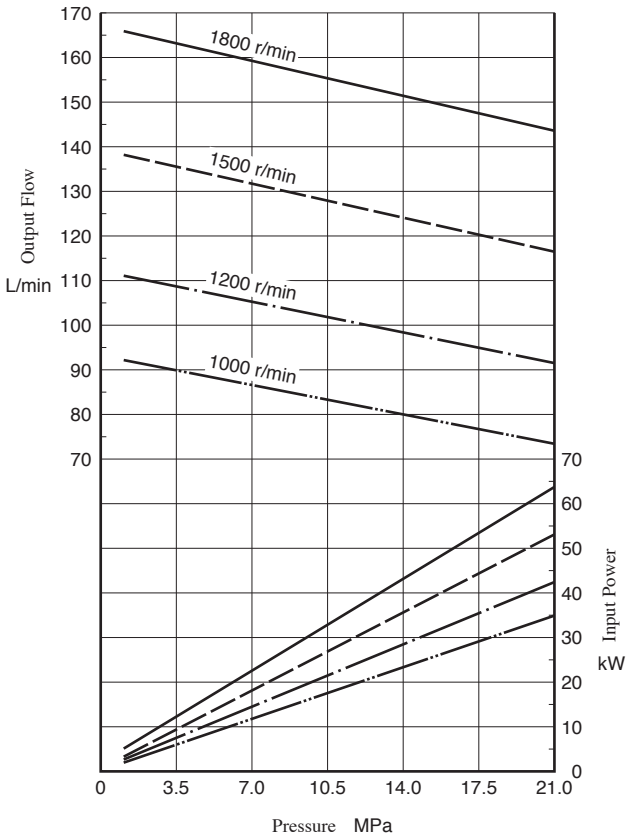
● PV2R3-76



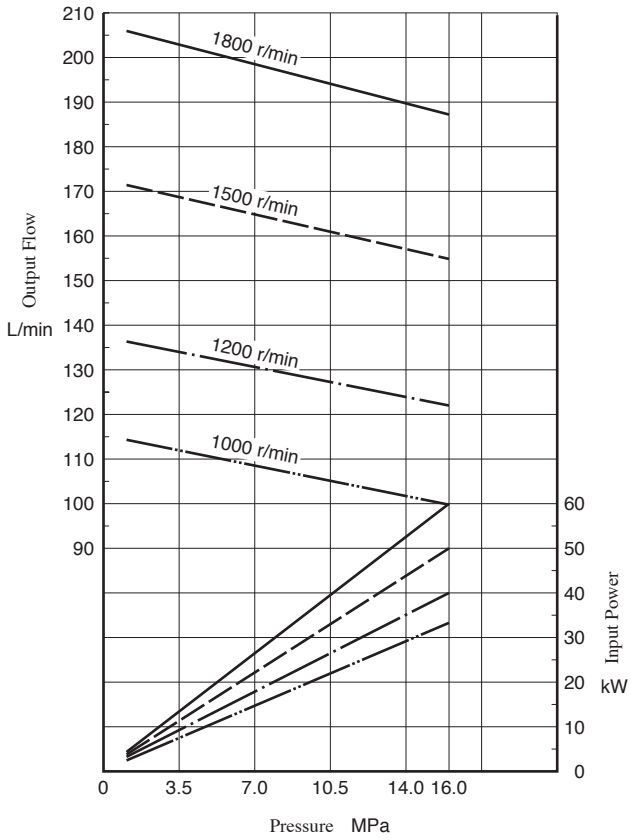
Pressure, Output Flow, and Input Power

Typical Pump Characteristics at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

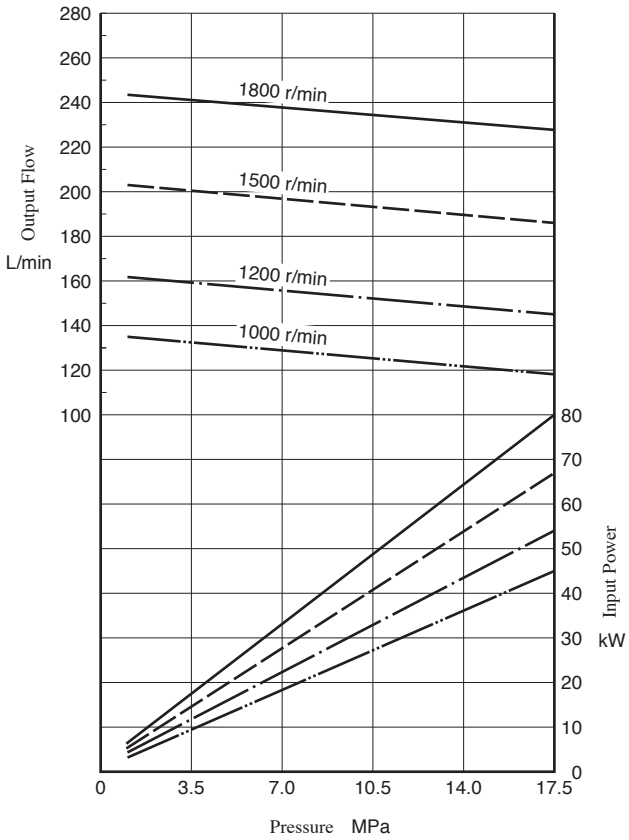
● PV2R3-94



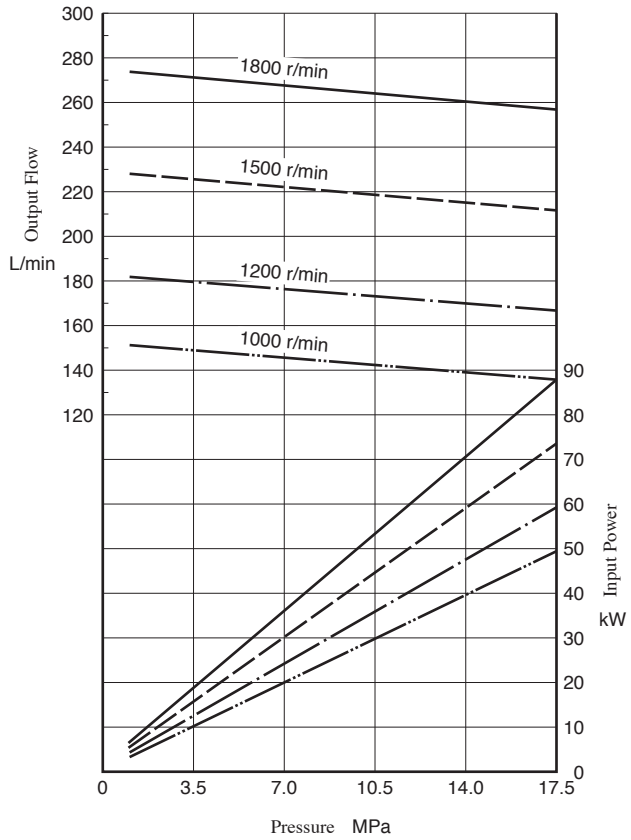
● PV2R3-116



● PV2R4-136



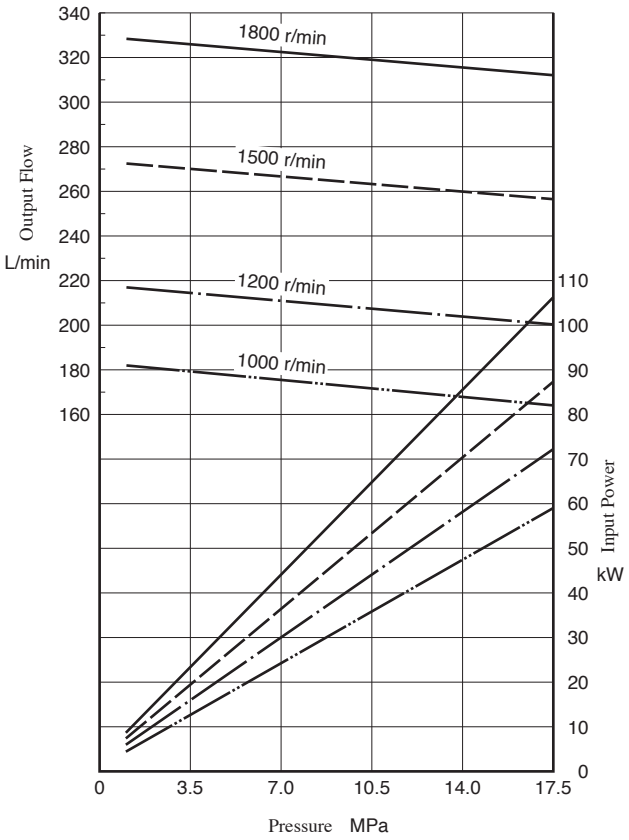
● PV2R4-153



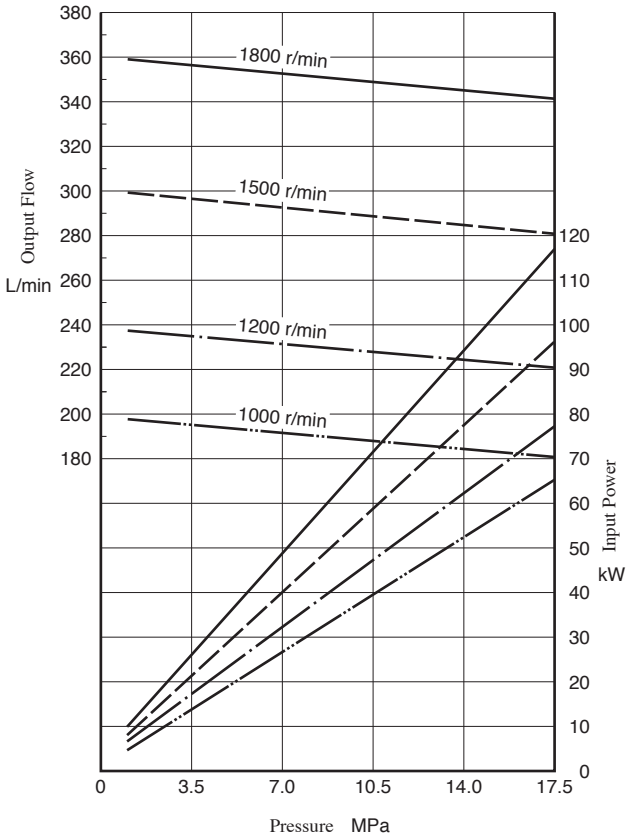
Pressure, Output Flow, and Input Power

Typical Pump Characteristics at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

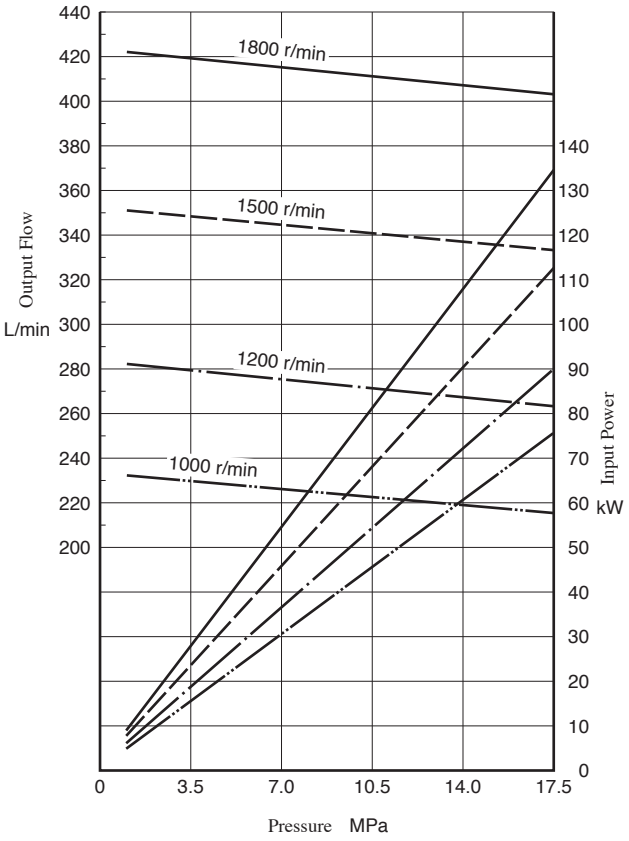
● PV2R4-184



● PV2R4-200

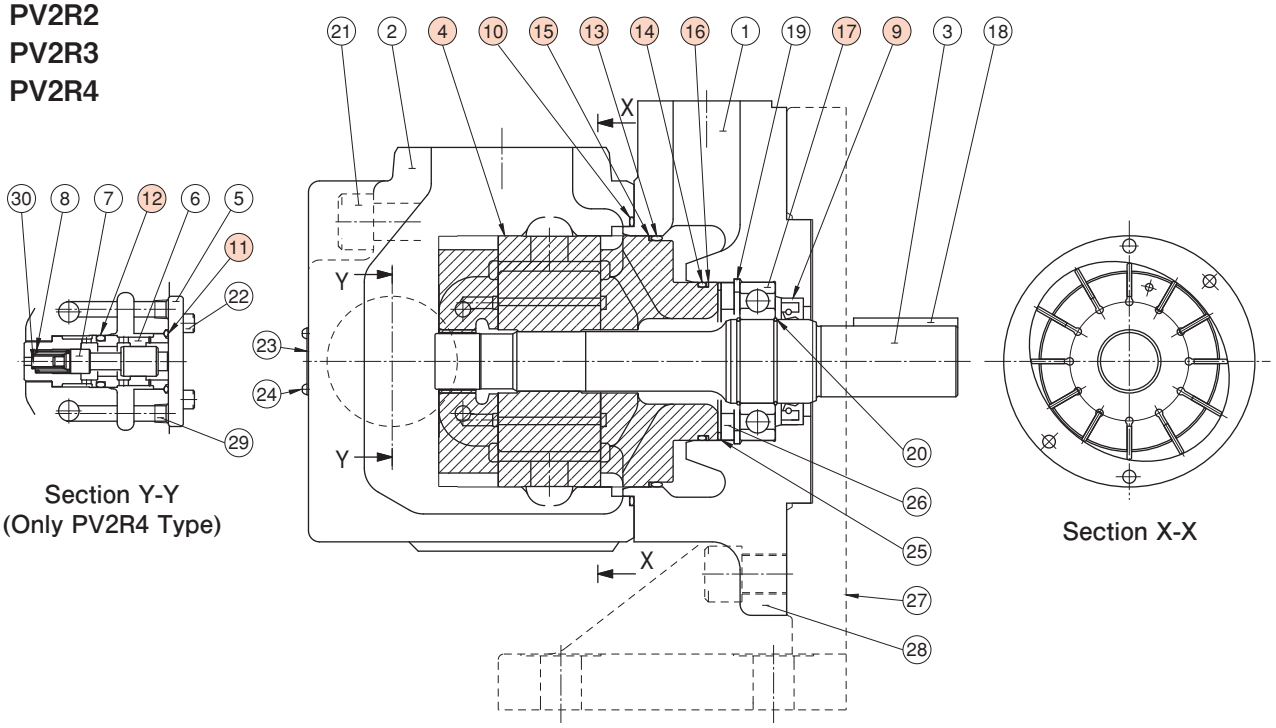


● PV2R4-237



Spare Parts List

PV2R1
PV2R2
PV2R3
PV2R4



Cartridge Kits

Model Numbers	④Cartridge Kit Numbers	Model Numbers	④Cartridge Kit Numbers
PV2R1– 6–＊–RAA–43	CPV2R1– 6–R–43	PV2R2– 41–＊–RAA–41	CPV2R2– 41–R–41
PV2R1– 8–＊–RAA–43	CPV2R1– 8–R–43	PV2R2– 47–＊–RAA–41	CPV2R2– 47–R–41
PV2R1–10–＊–RAA–43	CPV2R1–10–R–43	PV2R2– 53–＊–RAA–41	CPV2R2– 53–R–41
PV2R1–12–＊–RAA–43	CPV2R1–12–R–43	PV2R2– 59–＊–RAA–41	CPV2R2– 59–R–41
PV2R1–14–＊–RAA–43	CPV2R1–14–R–43	PV2R2– 65–＊–RAA–41	CPV2R2– 65–R–41
PV2R1–17–＊–RAA–43	CPV2R1–17–R–43	PV2R3– 76–＊–RAA–31	CPV2R3– 76–R–31
PV2R1–19–＊–RAA–43	CPV2R1–19–R–43	PV2R3– 94–＊–RAA–31	CPV2R3– 94–R–31
PV2R1–23–＊–RAA–43	CPV2R1–23–R–43	PV2R3–116–＊–RAA–31	CPV2R3–116–R–31
PV2R1–25–＊–RAA–43	CPV2R1–25–R–43	PV2R4–136–＊–RAA–30	CPV2R4–136–R–30
PV2R1–31–＊–RAA–43	CPV2R1–31–R–43	PV2R4–153–＊–RAA–30	CPV2R4–153–R–30
		PV2R4–184–＊–RAA–30	CPV2R4–184–R–30
		PV2R4–200–＊–RAA–30	CPV2R4–200–R–30
		PV2R4–237–＊–RAA–30	CPV2R4–237–R–30

Seals & Bearings

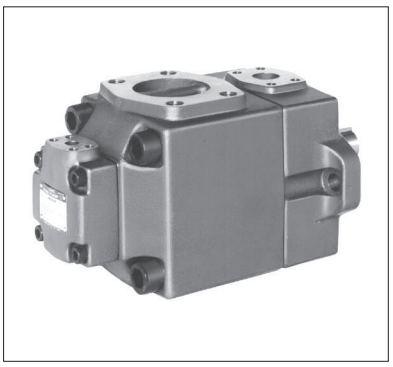
Item	Name of Parts	Part Numbers				Qty.
		PV2R1	PV2R2	PV2R3	PV2R4	
9	Oil Seal	ISD 26 42 8	ISD 30 42 8	ISD 35 55 11	ISD 45 68 12	1
10	O-Ring	OR NBR–90 G80–N	OR NBR–90 G105–N	OR NBR–90 G135–N	OR NBR–90 G145–N	1
11	O-Ring	—	—	—	OR NBR–90 P28–N	1
12	O-Ring	—	—	—	OR NBR–90 P22A–N	1
13	O-Ring	OR NBR–90 G60–N	OR NBR–90 G85–N	OR NBR–90 G115–N	OR NBR–70–1 G130–N	1
14	O-Ring	OR NBR–90 G30–N	OR NBR–90 P46–N	AS 568–231 (NBR–90)	OR NBR–70–1 G80–N	1
15	Back-up Ring	—	—	—	BR JIS B 2401-4–T3–G130	1
16	Back-up Ring	—	—	—	BR JIS B 2401-4–T2–G80	1
17	Bearing	6004	6205	6207	6209	1

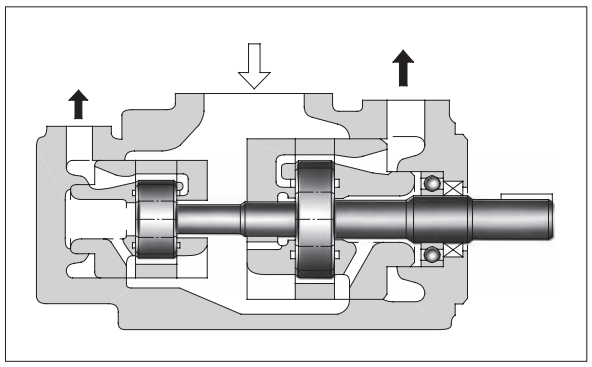
Note: Item No.⑬ and ⑭ (o-rings) and ⑮ and ⑯ (back-up rings) are included in cartridge kit.

● Cartridge kits and seals for pumps for phosphate esters (F-PV2R＊) differ from those in the table above. Consult Yuken for details.

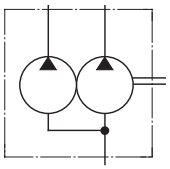
"PV2R" Series Double Pumps

These double pumps consist of two PV2R seires single pumps combined in tandem within a single housing and driven by a common shaft. A single suction port and two discharge ports are provided so that the output flow can be supplied to separate circuits.





Graphic Symbol



Model number designation

PV2R13	–6	–76	–L	–R	A	A	A	–43
Series Number	Small Volume Pump Nominal Displacement cm³/rev	Large Volume Pump Nominal Displacement cm³/rev	Mounting	Direction of Rotation	Small Volume Pump Discharge Port Position	Large Volume Pump Discharge Port Position	Suction Port Position	Design Number
					(Viewed from Shaft End)			
PV2R12 ★2	**6, 8, 10, 12 14, 17, 19, 23 25, 31**	**26, 33, 41, 47 53, 59, 65**	**L:** Foot Mtg. **F:** Flange Mtg.	**R:** ★1 Clockwise (Normal)	**E:** Left 45° Upwards (Normal)	**A:** Upwards (Normal)	**A:** Upwards (Normal)	**43**
PV2R13 ★2	**6, 8, 10, 12 14, 17, 19, 23 25, 31**	**76, 94, 116**			**A:** Upwards (Normal)			**43**
PV2R23 ★2	**41, 47, 53, 59 65**	**52, 60, 66, 76 94, 116**			**E:** Left 45° Upwards (Normal)			**41**

★1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
★2. When phosphate esters are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

The following large-capacity dual pumps are also available.
For details, please contact us for a separate document.

Model Numbers	Max. Operating Pressure・Output Flow・Input Power		Shaft Speed Range r/min
	Small Volume Pump	Large Volume Pump	
PV2R33–＊–＊–＊–RAAA–31	Same as PV2R3	Same as PV2R3	600-1800
PV2R14–＊–＊–＊–RAAA–33	6, 8, 10, 12, 14, 17, 19, 23	Same as PV2R4	750-1800
PV2R24–＊–＊–＊–RAAA–31	26, 33, 41, 47		600-1800
PV2R34–＊–＊–＊–REAA–31	Same as PV2R3		

Specifications

Maximum Operating Pressure

Model Numbers		Max. Operating Pressure MPa				
		Petroleum Base Oils		Water Containing Fluids		Synthetic Fluids
		Anti-Wear Type	R&O Type	Anti-Wear ★1 Type Water Glycols	Water Glycols	Phosphate Esters
PV2R12 ★4	Small Volume Pump	21★2	16	16	7	16
	Large Volume Pump	21	14	16	7	14
PV2R13	Small Volume Pump	21★2	16	16	7	16
	Large Volume Pump	21★3	14	16	7	14
PV2R23	Small Volume Pump	21	14	16	7	14
	Large Volume Pump	21★3	14	16	7	14

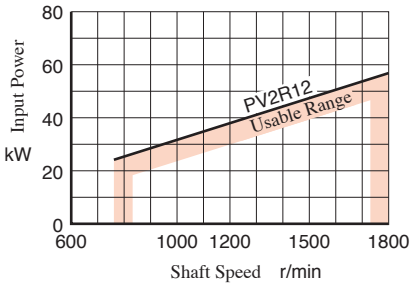
★1. For the brands of anti-wear type water-glycols, see the item of "Hydraulic Fluids" on page B-2.

★2. When using a push-off volume of nominal size "6" or "8" (PV2R12/PV2R13-6, 8) at a pressure exceeding 16 MPa, rotational speed should be 1450 r/min or higher.
The nominal push-off volume "31" (PV2R12/PV2R13-31) is limited to a maximum operating pressure of 16 MPa.

★3. Nominal push-off volume "116" (PV2R13/PV2R23-*-116) limits the maximum operating pressure to 16 MPa.

★4. For the PV2R12 type, the total shaft input power of the small-capacity side pump and the large-capacity side pump is limited to the rotational speed as shown to the right.

PV2R12 Type Allowable Shaft Input



Shaft Speed Range & Output Flow & Input Power, Mass

Model Numbers	Shaft Speed Range r/min				Output Flow & Input Power		Mass kg	
	Petroleum Base Oils		Water Containing Fluids Phosphate Esters					
	Max.	Min.★2	Max.	Min.★2	Small Volume Pump	Large Volume Pump	Flange Mtg.	Foot Mtg.
PV2R12	1800	750	1200	750	Same as single pump "PV2R1", refer to pages B-11 - B-13	Same as single pump "PV2R2", refer to pages B-13 & B-14. However, as for displacement of "26" and "33", refer to page B-22.	25	29.3
PV2R13 ★1	1800	750	1200	750	Same as single pump "PV2R1", refer to pages B-11 - B13	Same as single pump "PV2R3", refer to pages B-14 & B-15	45.6	55.6
PV2R23 ★1	1800	600	1200	600	Same as single pump "PV2R2", refer to pages B-13 & B-14	Same as single pump "PV2R3", refer to pages B-14 & B-15 However, as for displacement of "52", "60" and "66", refer to pages B-22 & B-23	51	61

★1. As for models displacements listed below. Minimum suction pressure is limited in relation to the shaft speed.

★2. For starting at low speed, the maximum viscosity is limited. For details, see the item of "Hydraulic Fluids" on page B-2.

Model Numbers	Min. Suction Pres.	
	Less than 1700 r/min	1700-1800 r/min
PV2R13–*–116 PV2R23–*–116	–20 kPa	0 kPa
PV2R23–*–76 PV2R23–*–94	–20 kPa	–6.7 kPa

Pipe Flange Kits

Pipe flange kits are availabe. When ordering, specify the kit number from the table below.

Pump Model Numbers	Pipe Flange Kit Numbers		
	Suction Port	Large Volume Pump Discharge Port	Small Volume Pump Discharge Port
PV2R12	F5-16-＊-10	F5-06-＊-10	F5-04-＊-10
PV2R13	F5-24-$\frac{A}{B}$-10	F5-10-＊-10	F5-04-＊-10
PV2R23	F5-24-$\frac{A}{B}$-10	F5-10-＊-10	F5-06-＊-10

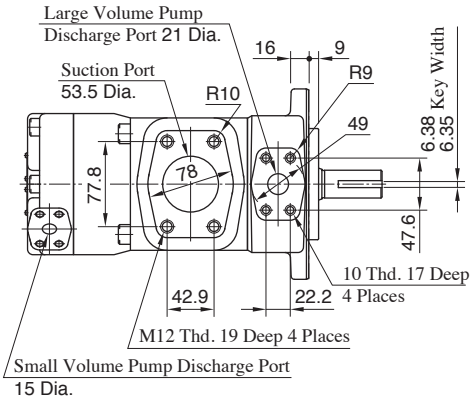
Notes : 1. Letter (A,B,C) indicating pipe connection type is required instead of * symbol in the table above. Please, select a letter referring to the pipe flange kit number designation shown on the right side.
2. In case of using socket welding flanges, there is a case where the operating pressure should be set lower than the normal because of strength of the flanges. Therefore, please pay cautious attention to the operating pressure when the socket welding flanges are used.
3. When phosphate esters are used, prefix "F-" to the model number.

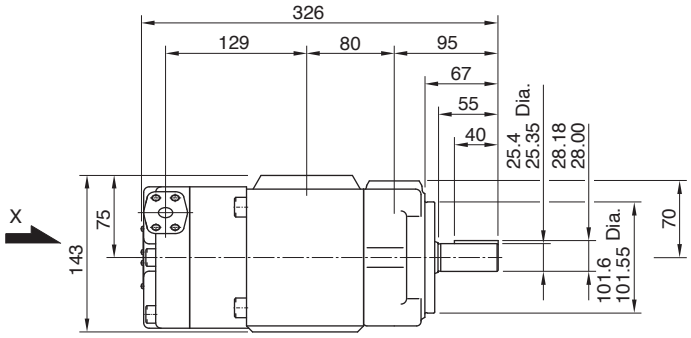
Pipe Flange Kits Numbers Configuration

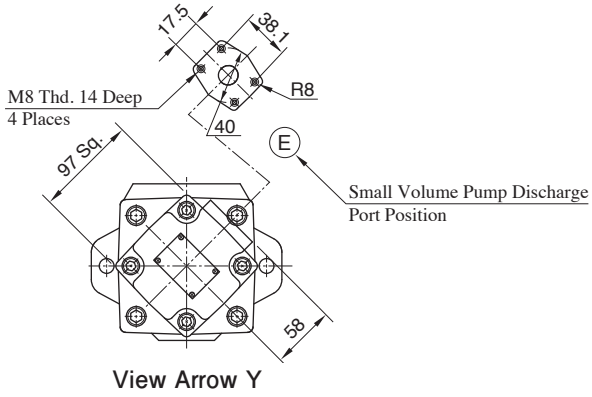
F5-06-＊-10

- Pipe Connection Type
  - A : Rc Threaded Connection
  - B : Socket Welding
  - C : Butt Welding
- Size Nominal

Flange Mtg. : PV2R12-＊-＊-F

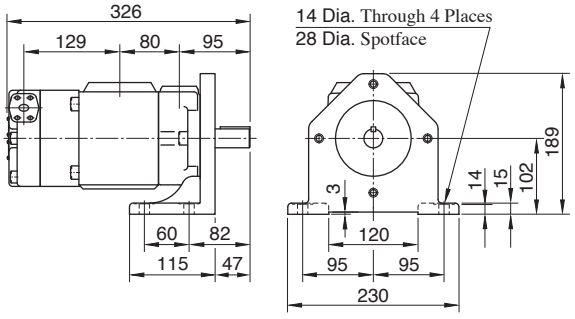




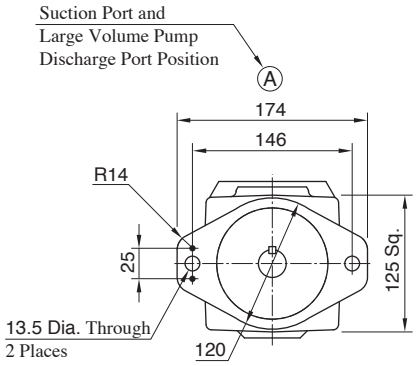


View Arrow Y

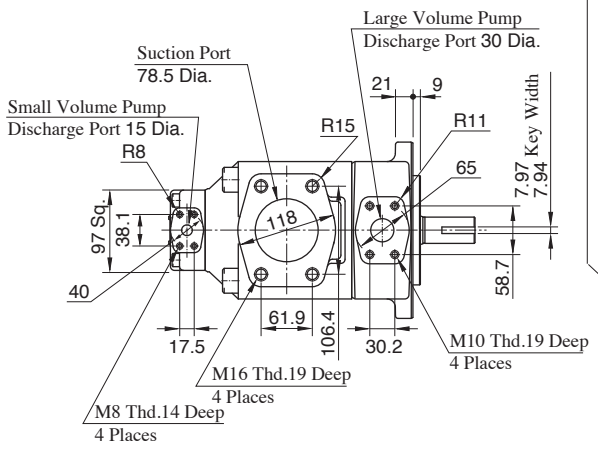
Foot Mtg. : PV2R12-＊-＊-L



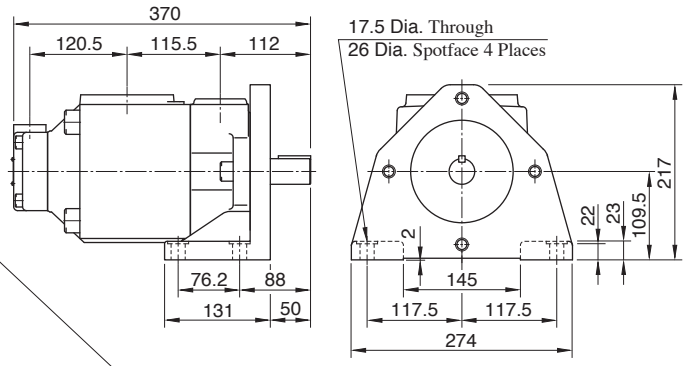
For other dimensions, refer to "Flange Mtg."



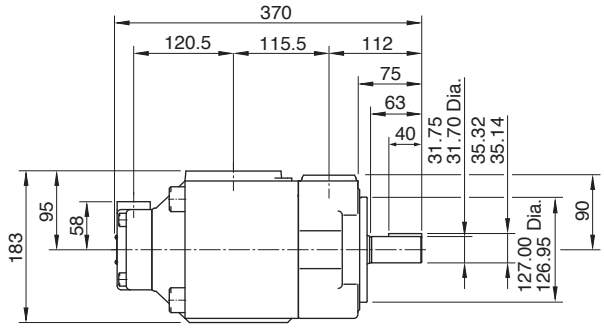
Flange Mtg.: PV2R13-∗-∗-F

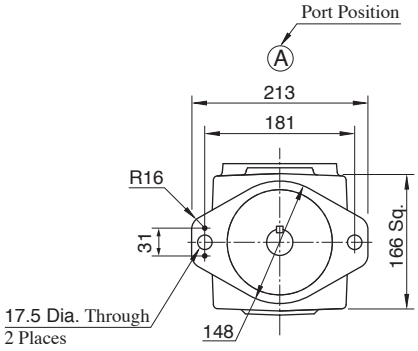


Foot Mtg.: PV2R13-∗-∗-L

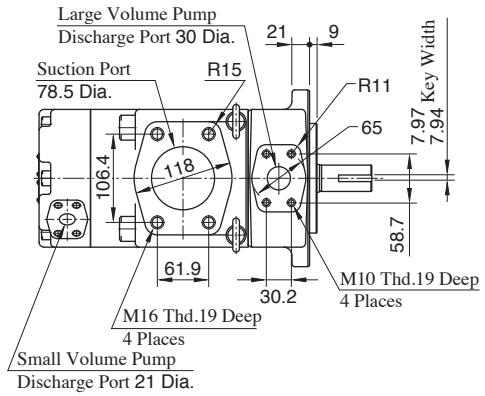


For other dimensions, refer to "Flange Mtg."



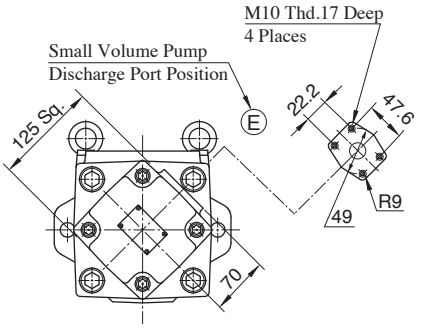


Flange Mtg.: PV2R23-∗-∗-F

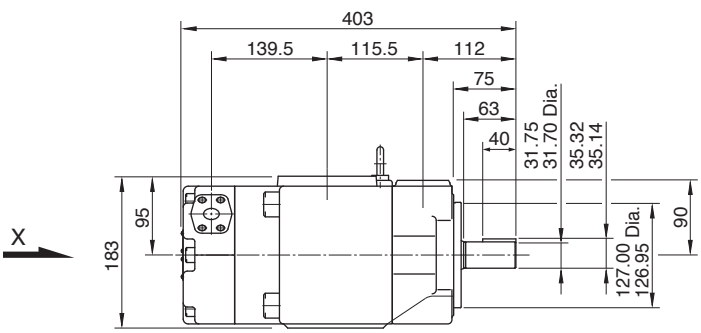


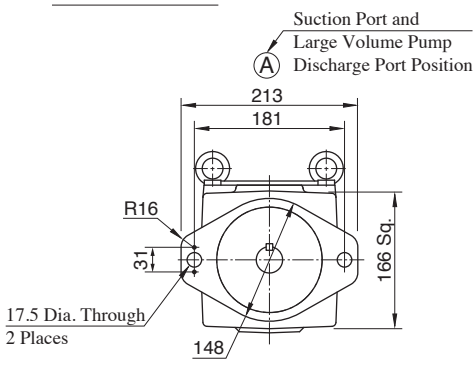
Foot Mtg.: PV2R23-∗-∗-L

Mounting bracket is same as for PV2R13 type. Refer to PV2R13 type above for dimensions related to the bracket.



View Arrow X

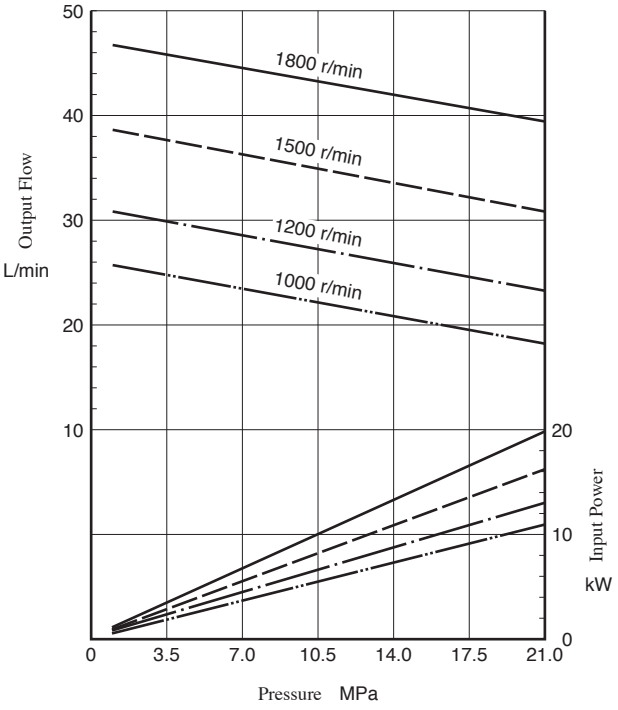




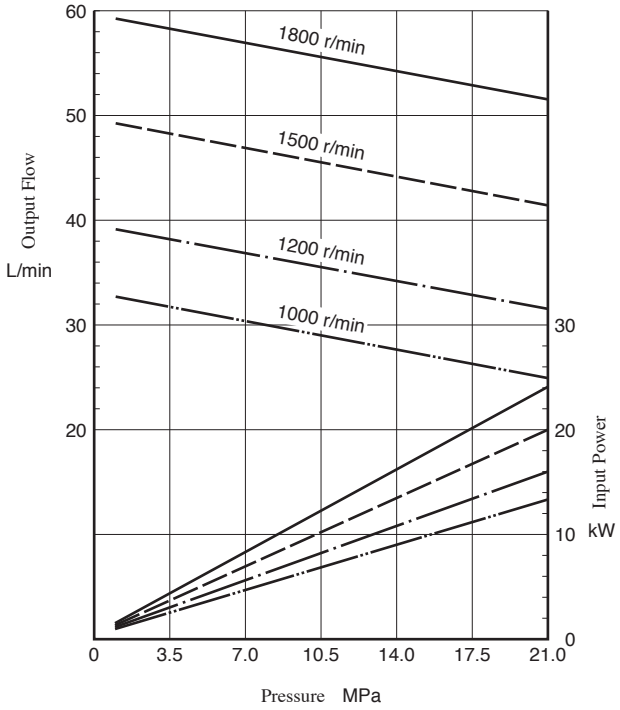
Pressure, Output Flow, and Input Power

Typical Pump Characteristics at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

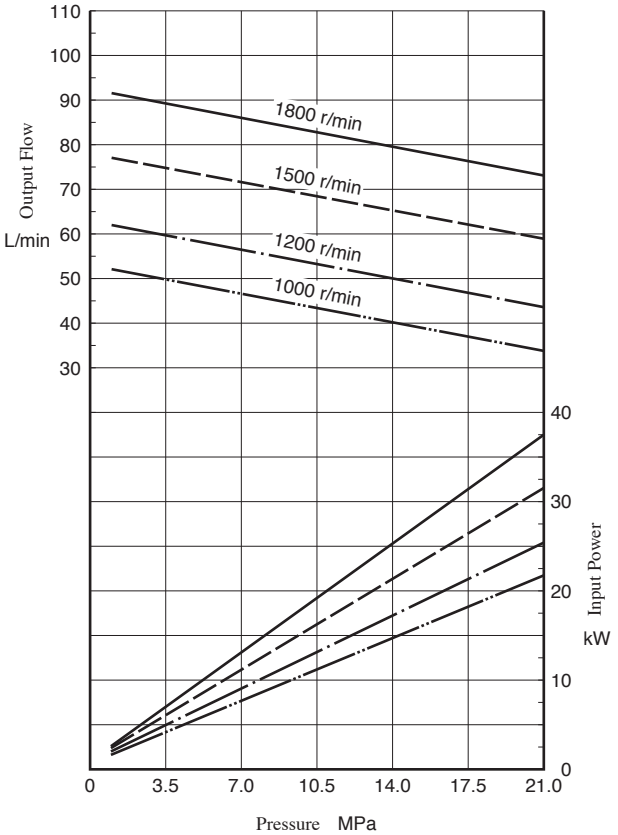
● PV2R12-∗-26



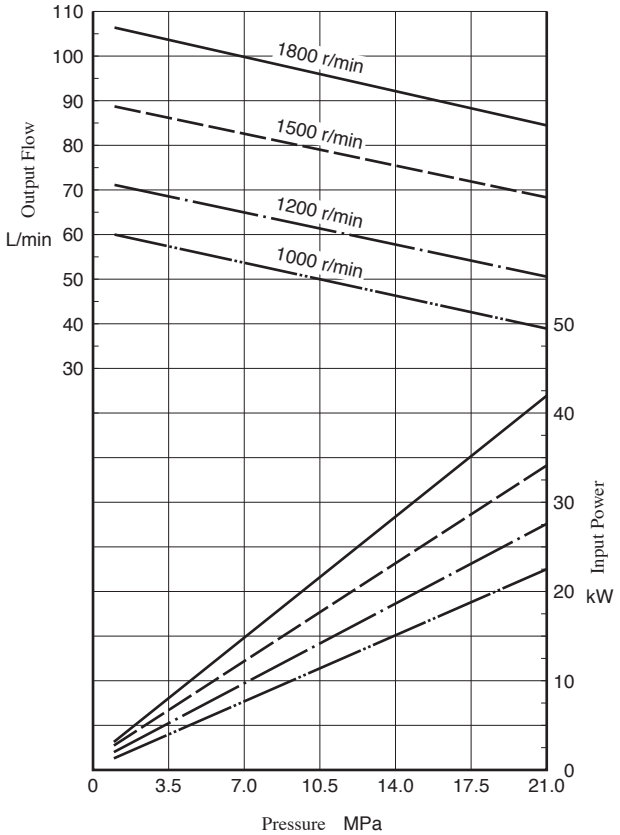
● PV2R12-∗-33



● PV2R23-∗-52



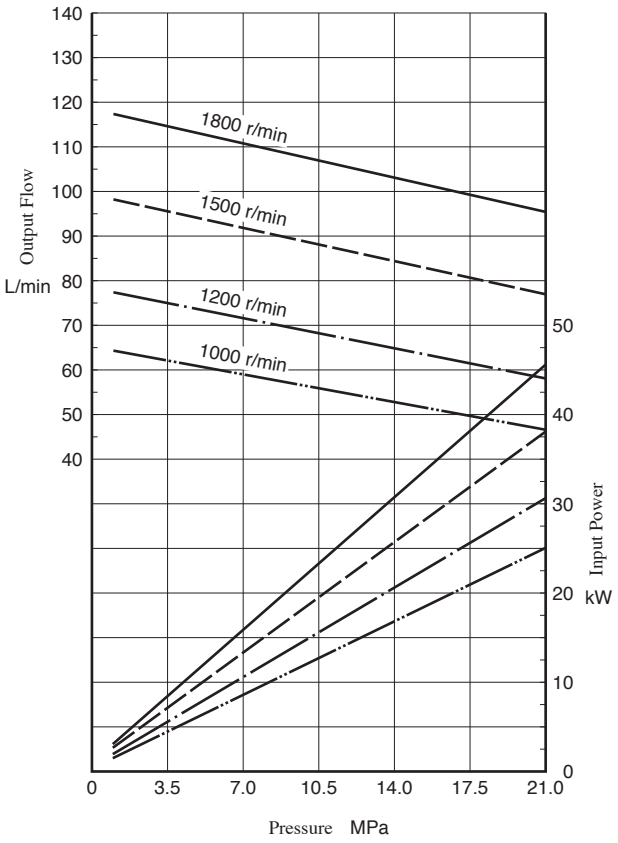
● PV2R23-∗-60



Pressure, Output Flow, and Input Power

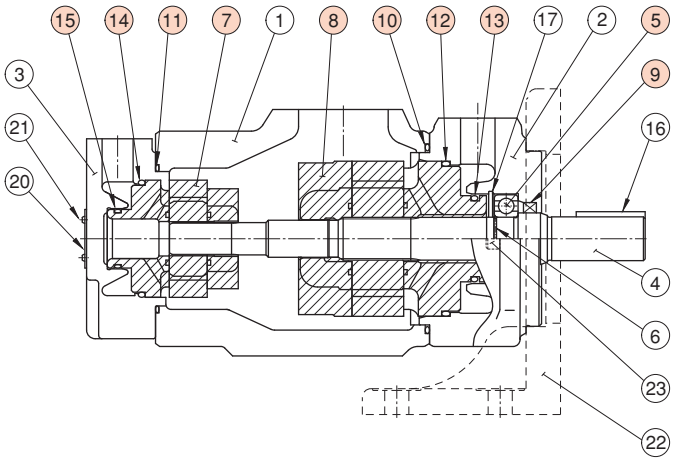
Typical Pump Characteristics at Viscosity 20 mm²/s [ISO VG32 Oils, 50°C]

● PV2R23-＊-66



Spare Parts List

PV2R12
PV2R13
PV2R23



Cartridge Kits

Model Numbers	⑦Small Volume Pump Cartridge Kit Numbers	⑧Large Volume Pump Cartridge Kit Numbers	Model Numbers	⑦Small Volume Pump Cartridge Kit Numbers	⑧Large Volume Pump Cartridge Kit Numbers
PV2R12– 6–★–＊–REAA–43	CPV2R13– 6–L–43	CPV2R2 –★–R–41	PV2R13– 6–★–＊–RAAA–43	CPV2R13– 6–L–43	CPV2R3 –★–R–31
PV2R12– 8–★–＊–REAA–43	CPV2R13– 8–L–43		PV2R13– 8–★–＊–RAAA–43	CPV2R13– 8–L–43	
PV2R12–10–★–＊–REAA–43	CPV2R13–10–L–43		PV2R13–10–★–＊–RAAA–43	CPV2R13–10–L–43	
PV2R12–12–★–＊–REAA–43	CPV2R13–12–L–43		PV2R13–12–★–＊–RAAA–43	CPV2R13–12–L–43	
PV2R12–14–★–＊–REAA–43	CPV2R13–14–L–43		PV2R13–14–★–＊–RAAA–43	CPV2R13–14–L–43	
PV2R12–17–★–＊–REAA–43	CPV2R13–17–L–43		PV2R13–17–★–＊–RAAA–43	CPV2R13–17–L–43	
PV2R12–19–★–＊–REAA–43	CPV2R13–19–L–43		PV2R13–19–★–＊–RAAA–43	CPV2R13–19–L–43	
PV2R12–23–★–＊–REAA–43	CPV2R13–23–L–43		PV2R13–23–★–＊–RAAA–43	CPV2R13–23–L–43	
PV2R12–25–★–＊–REAA–43	CPV2R13–25–L–43		PV2R13–25–★–＊–RAAA–43	CPV2R13–25–L–43	
PV2R12–31–★–＊–REAA–43	CPV2R13–31–L–43		PV2R13–31–★–＊–RAAA–43	CPV2R13–31–L–43	
PV2R23–41–★–＊–REAA–41	CPV2R23–41–L–41	CPV2R3 –★–R–31			
PV2R23–47–★–＊–REAA–41	CPV2R23–47–L–41				
PV2R23–53–★–＊–REAA–41	CPV2R23–53–L–41				
PV2R23–59–★–＊–REAA–41	CPV2R23–59–L–41				
PV2R23–65–★–＊–REAA–41	CPV2R23–65–L–41				

Note: The ★ marks are the spaces for large volume pump nominal displacement. Refer to the model No. designation on page B-18, write correct nominal displacement figures.

Seals & Bearings

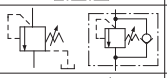
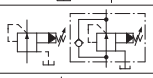
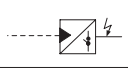
Item	Name of Parts	Part Numbers			Qty.
		PV2R12	PV2R13	PV2R23	
5	Bearing	6205	6207	6207	1
9	Oil Seal	ISD 30 42 8	ISD 35 55 11	ISD 35 55 11	1
10	O-Ring	OR NBR–90 G105–N	OR NBR–90 G135–N	OR NBR–90 G135–N	1
11	O-Ring	OR NBR–90 G80–N	OR NBR–90 G80–N	OR NBR–90 G105–N	1
12	O-Ring	OR NBR–90 G85–N	OR NBR–90 G115–N	OR NBR–90 G115–N	1
13	O-Ring	OR NBR–90 P46–N	AS 568–231 (NBR–90)	AS 568–231 (NBR–90)	1
14	O-Ring	OR NBR–90 G60–N	OR NBR–90 G60–N	OR NBR–90 G85–N	1
15	O-Ring	OR NBR–90 G30–N	OR NBR–90 G30–N	OR NBR–90 G30–N	1

Note: The o-rings under item No. ⑫ and ⑬ are included in the large volume pump cartridge kit and those under item No. ⑭ and ⑮ are included in the small volume pump cartridge kit.

● Cartridge kits and seals for pumps for phosphate esters (F-PV2R＊＊) differ from those in the table above. Consult Yuken for details.

C

PRESSURE CONTROLS

Valve Type	Graphic Symbols	Max. Operating Pressure MPa	Max. Flow L/min (1 2 3 5 10 20 30 50 100 200 300 500 1000 2000)	Page
Remote Control Relief Valves		25	DT DG 01	C-3
Direct Type Relief Valves		21	DT/DG 02	C-5
Pilot Operated Relief Valves		25	BT/BG 03 06 10	C-7
Low Noise Type Pilot Operated Relief Valves		25	S-BG 03 06 10	C-11
Relief Valves (High Pressure Type)		35	B3G 03 06	C-14
Solenoid Controlled Relief Valves		25	BST/BSG 03 06 10	C-17
Solenoid Controlled Relief Valves (High Pressure Type)		35	B3SG 03 06	C-22
H/HC Type Pressure Control Valves		21	HT/HG HCT/HCG 03 06 10 HF16 HCF16	C-25
Pres. Reducing Valves Pres. Reducing and Check Valves		21	RT/RG RCT/RCG 03 06 10 RF RCF 16	C-36
Pressure Reducing and Relieving Valves		03 : 14 06 : 25	RBG 03 06	C-43
Brake Valves		25	UBGR 03 06 10	C-47
Unloading Relief Valves		21	BUCG 06 10	C-47
Semiconductor Type Pressure Switches		35	JT-02	C-48
Pressure Monitoring System		20 35		C-50

Hydraulic Fluids

Fluid Types

Any type of hydraulic fluids listed in the table below can be used.
Use any type of fluids, no change in specifications.

Petroleum base oils	Use fluids equivalent to ISO VG 32 or VG 46.
Synthetic fluids	Use phosphate ester or polyol ester fluid. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
Water containing fluids	Use water-glycol fluid.

Note: For use with hydraulic fluids other than those listed above, please consult your Yuken representatives in advance.
Standard model of Semiconductor Type Pressure Switches can use with phosphate ester and W/O emulsion type fluids.

Recommended Fluid Viscosity and Temperature

Use under conditions where the viscosity and temperature of the hydraulic fluid remain in the ranges indicated in the following table.

Name		Viscosity	Temperature
Remote Control Relief Valves Direct Type Relief Valves Pilot Operated Relief Valves Low Noise Type Pilot Operated Relief Valves Relief Valves Solenoid Controlled Relief Valves★	H Type Pressure Control Valves HC Type Pressure Control Valves Pressure Reducing Valves Pressure Reducing and Check Valves Pressure Reducing and Relieving Valves	15 - 400 mm²/s	–15 - +70°C
Semiconductor Type Pressure Switches		15 - 400 mm²/s	–20 - +70°C

★ If the valve is provided with a vent ristrictor (ex. : A-BSG/B3SG), the viscosity range should be 15 - 200 mm²/s.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valves. Please maintain the degree of contamination within NAS 1638-Grade 12. Use 25 μm or finer line filter.

Instructions

Drain Piping

It is necessary to connect the drain port directly to the reservoir with a back pressure close to the atmospheric pressure.
If neglect this process, there is the risks that system pressure will increase unlimitedly and occur serious accident.

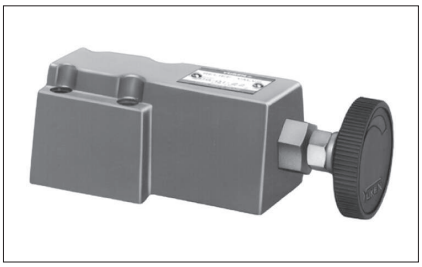
Interchangeability in Installation between Current and New Design

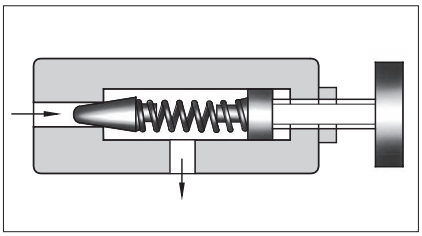
Model change has been made on the following products.

Name	Model Numbers		Mounting Interchangeability	Major Changes	Page
	Current	New			
Solenoid Controlled Relief Valve	BS✻–03,–47	BS✻–03,–48	Yes	● Pilot valves (DSG-01) have been changed in the design numbers 70. ● There are no changes in specifications and mounting dimensions.	—
	BS✻–06,–47	BS✻–06,–48			
	BS✻–10,–47	BS✻–10,–48			

Remote Control Relief Valves

This valve is used as a remote control valve for pilot operated type pressure control valves.





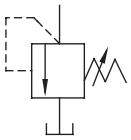
Specifications

Model Numbers		Max. Operating Pressure MPa	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting		DT Type	DG Type
DT–01–22	DG–01–22	25	1.6	1.4

Model Number Designation

D	T	–01	–22
Series Number	Type of Mounting	Valve Size	Design Number
D : Remote Control Relief Valves	T : Threaded Connection	01	22
	G : Sub-plate Mounting		22

Graphic Symbol



Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
DG–01	M5×45L.....4 Pcs.

Sub-plate

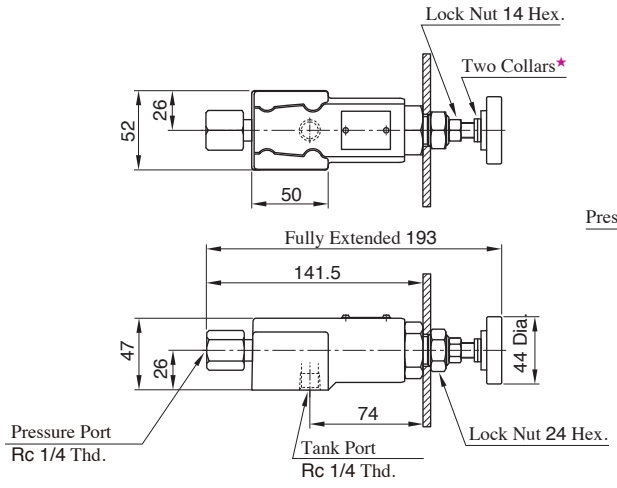
Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DG–01	DGM–02–20	1/4	0.7

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

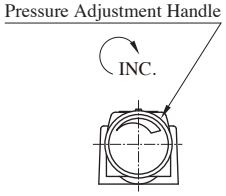
Instructions

- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- If the internal volume of the vent line is too large, chattering is likely to occur, so please use the pipes with 4mm inside diameter.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- In case of using for vent control, if pilot relief valve fully closed, the pressure of system is equal to the setting pressure of main valve.

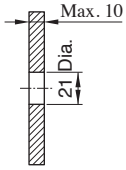
DT-01



★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

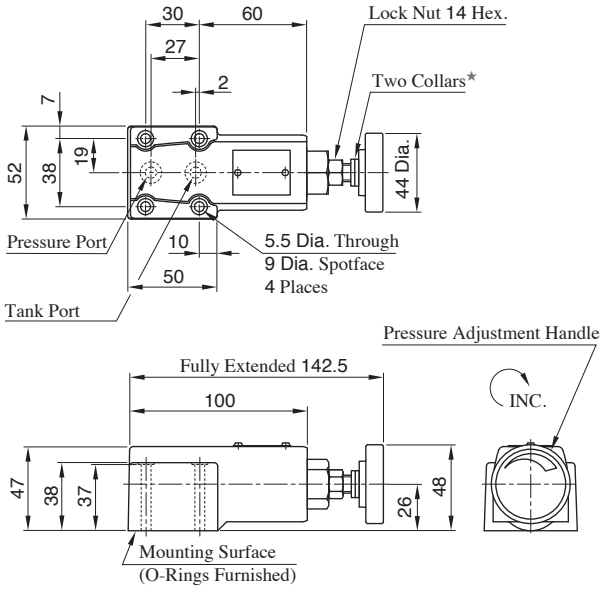


Dimensions of The Panel Mounting Hole

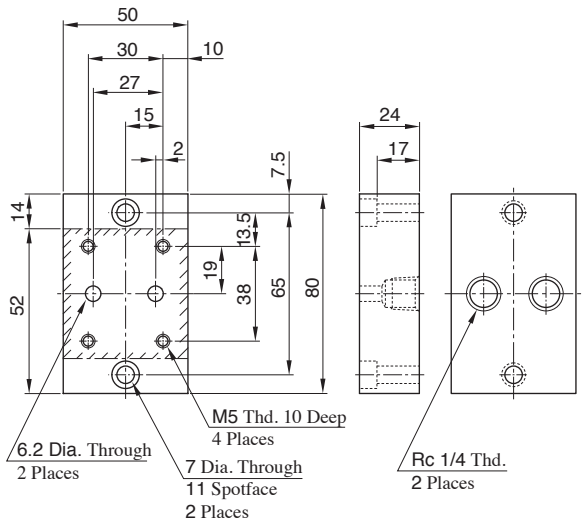


DG-01

★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

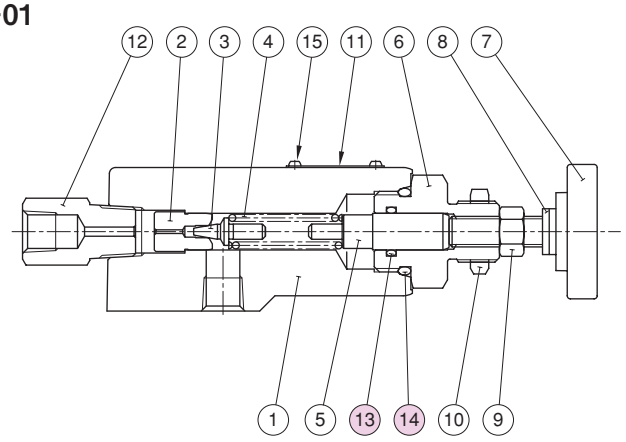


Sub-plate : DGM-02



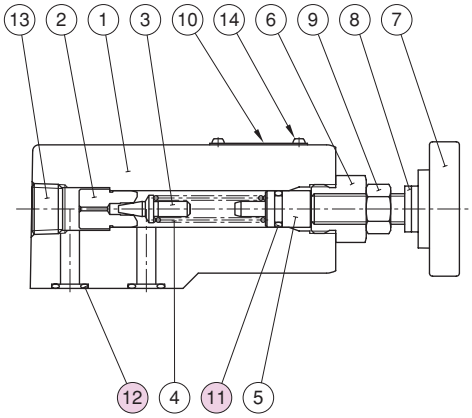
List of Seals

DT-01



Item	Name of Parts	Part Numbers	Qty.
13	O-Ring	OR NBR-70-1 P12-N	1
14	O-Ring	OR NBR-90 P22.4-N	1

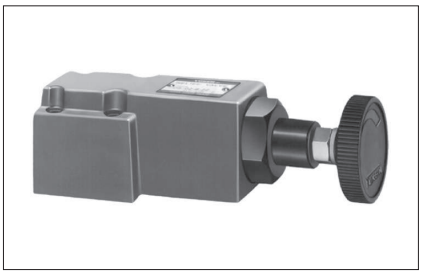
DG-01

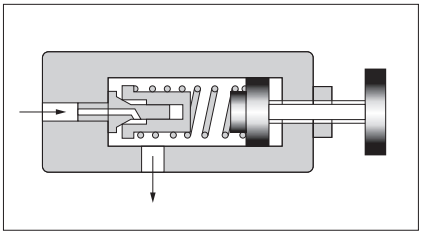


Item	Name of Parts	Part Numbers	Qty.
11	O-Ring	OR NBR-70-1 P9-N	1
12	O-Ring	OR NBR-90 P9-N	2

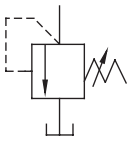
Direct Type Relief Valves

This valve is used in a hydraulic circuit to prevent damage due to over pressure and to adjust the maximum circuit pressure of small capacity.





Graphic Symbol



Specifications

Model Numbers		Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting				DT Type	DG Type
DT–02–∗–22	DG–02–∗–22	21	★	16	1.5	1.5

★ Refer to the model number designation.

Model Number Designation

D	T	–02	– B	–22
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range	Design Number
D : Direct Type Relief Valves	T : Threaded Connection	02	B : ★ - 7 C : 3.5 - 14 H : 7 - 21	22
	G : Sub-plate Mounting			22

★ Refer to the minimum adjustment pressure characteristics.

Instructions

- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.

Accessories

Mounting Bolts

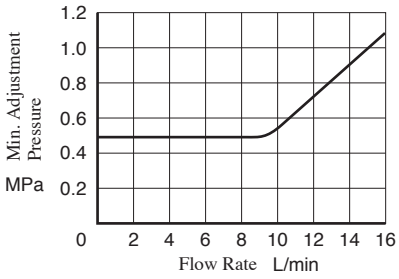
Valve Model Numbers	Socket Head Cap Screw
DG–02	M5×45L……4 Pcs.

Sub-plate

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DG–02	DGM–02–20	1/4	0.7

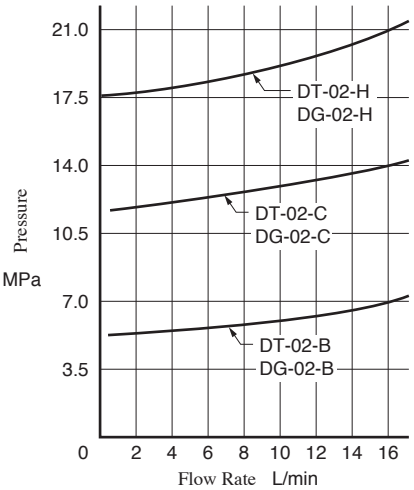
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
- The sub-plates are those for remote control relief valves. For dimensions, see page C-4.

Min. Adjustment Pressure

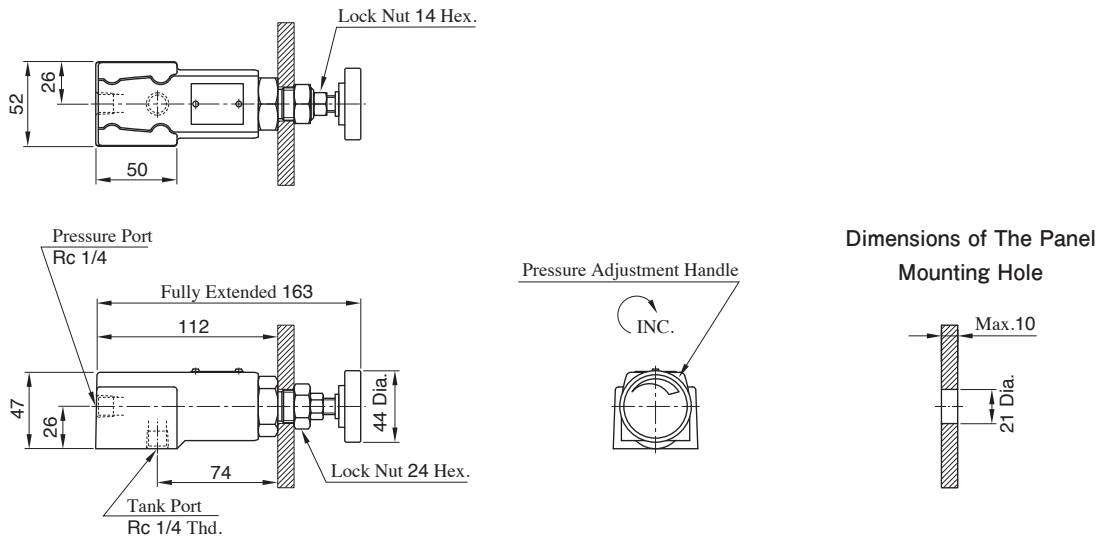


Nominal Override Characteristics

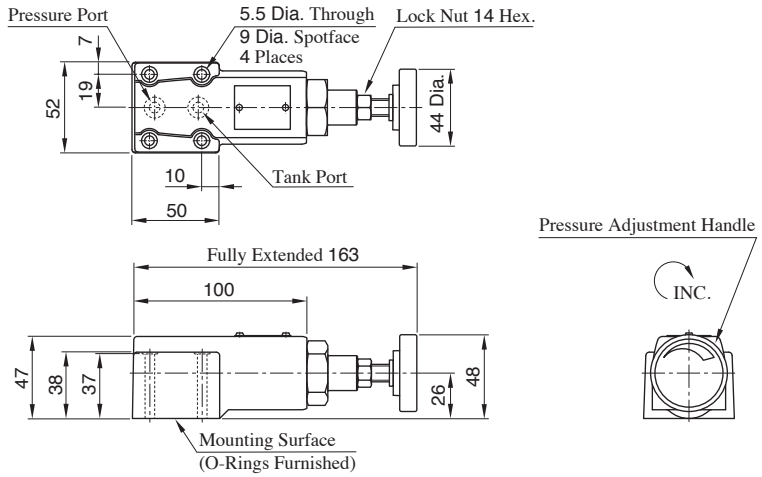
Hydraulic fluid
Viscosity : 35 mm²/s
Specific Gravity : 0.850



DT-02



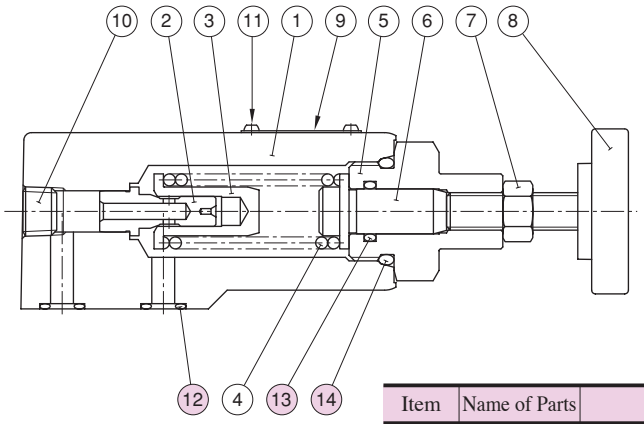
DG-02



Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-4) of the sub-plate used together.

List of Seals

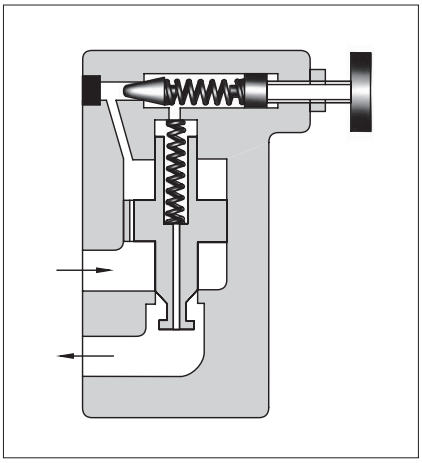
DT-02
DG-02



Item	Name of Parts	Part Numbers	Qty.	Remarks
12	O-Ring	OR NBR-90 P9-N	2	Use only for DG-02
13	O-Ring	OR NBR-70-1 P12-N	1	
14	O-Ring	OR NBR-90 P22.4-N	1	

Pilot Operated Relief Valves

These valves protect the hydraulic system from excessive pressure, and can be used to maintain constant pressure in a hydraulic system. Remote control and unloading are permitted by using vent circuits.



Specifications

Model Numbers		Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting				BT Type	BG Type
BT-03-＊-32	BG-03-＊-32	25	★ - 25	100	5.0	4.7
BT-06-＊-32	BG-06-＊-32			200	5.0	5.6
BT-10-＊-32	BG-10-＊-32			400	8.5	8.7

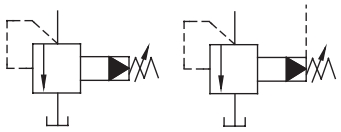
★ Refer to the minimum adjustment pressure characteristics on page C-10.
● For large flow valves (flange connect type), please contact us.

Model Number Designation

B	T	−03	−V	−32
Series Number	Type of Mounting	Valve Size	High Venting ★ Pres. Feature	Design Number
B : Pilot Operated Relief Valves	T : Threaded Connection	03	V : For High Venting Pressure Feature (Omit if not required)	32
		06		32
		10		32
	G : Sub-plate Mounting	03		32
		06		32
		10		32

★ Use high venting pressure type to reduce the changeover time from unload to onload.

Graphic Symbols



Vent Connection

Accessories

● Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
BG-03	M12×70L…2 Pcs., M12×95L…2 Pcs.
BG-06	M16×60L…2 Pcs., M16×80L…2 Pcs.
BG-10	M20×70L…2 Pcs., M20×90L…2 Pcs.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
BG-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
BG-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7
BG-10	BGM-10-20	1 1/4	8.4
	BGM-10X-20	1 1/2	10.3

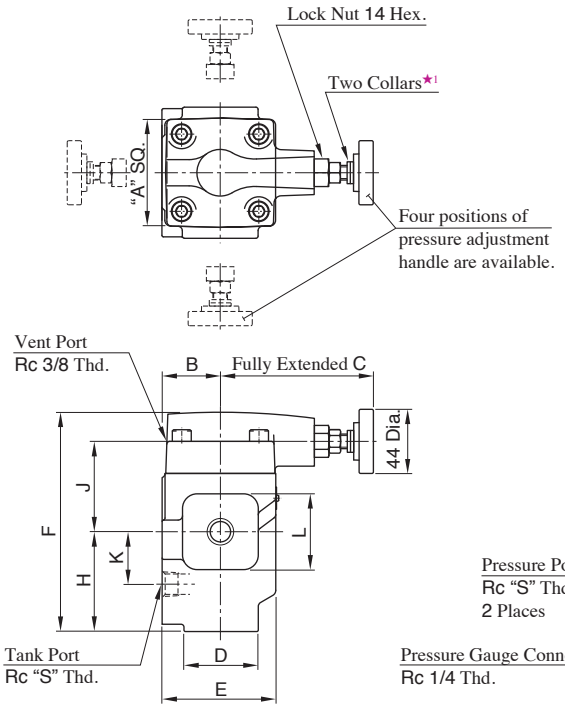
● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (6S)

Instructions

- If a remote control relief valve is used in the vent circuit, see page C-5. In addition, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with a flow rate above the minimum flow as the right chart.

Valve Size	Min. Flow
03	8 L/min
06	
10	15 L/min

BT-03, 06, 10



Model Numbers	A	B	C	D	E	F
BT–03	75	40	105	52	78	150.5
BT–06						
BT–10	85	50	101	80	96	183

Model Numbers	H	J	K	L	N	Q	S
BT–03	68.5	62	36	52	90	45	3/8
BT–06							3/4
BT–10	89	74	49	80	120	60	1 1/4

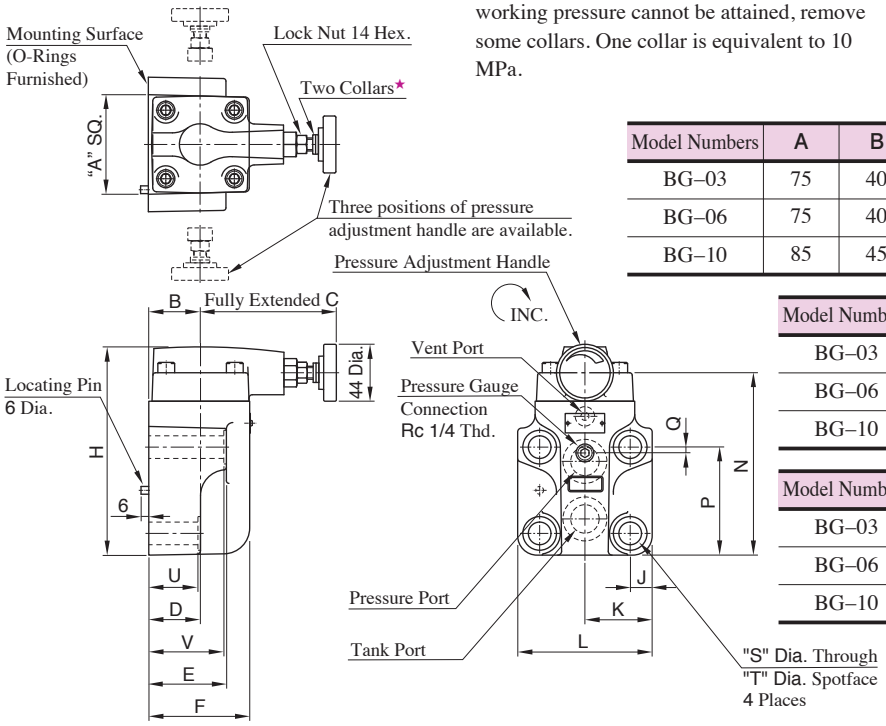
★1. Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

★2. There are two threaded connection pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

BG-03, 06, 10

★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

Mounting Surface
BG-03 : ISO 6264-06-09-1-97
BG-06 : ISO 6264-08-13-1-97
BG-10 : ISO 6264-10-17-1-97

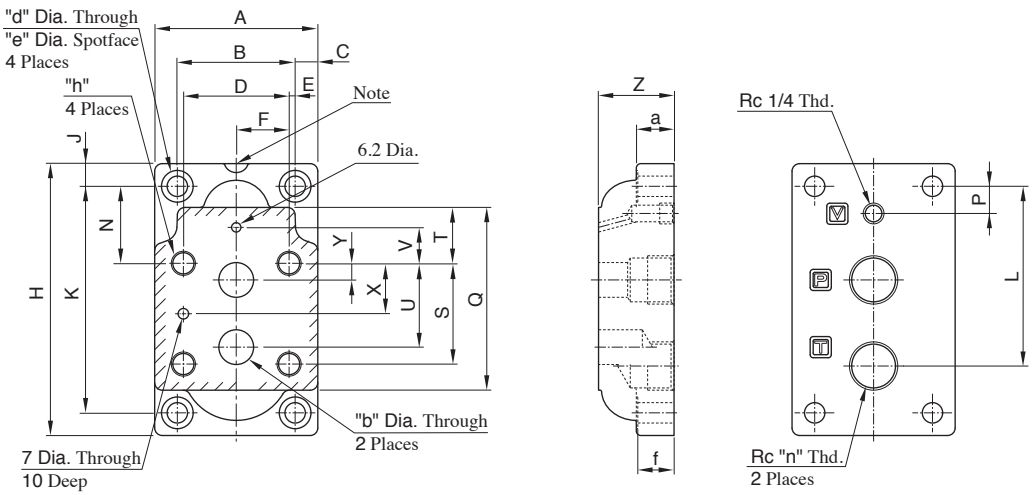


Model Numbers	A	B	C	D	E	F	H
BG–03	75	40	105	57	78	78	137
BG–06	75	40	105	40	60	78	161
BG–10	85	45	101	47	67	84	195

Model Numbers	J	K	L	N	P
BG–03	14.1	41	82	117	77
BG–06	17	52	104	141	83.5
BG–10	20.7	62	124	175	110

Model Numbers	Q	S	T	U	V
BG–03	22	13.5	21	55	77
BG–06	4.5	17.5	26	38	58
BG–10	6	21.5	32	45	65

Sub-plate
BGM−03, 03X
06, 06X
10, 10X



Note) There is the cavity only for BGM-＊X.

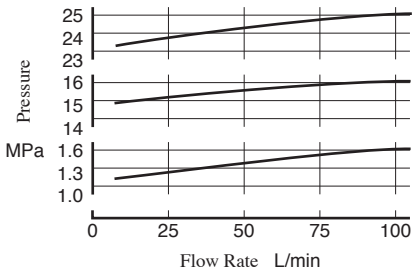
Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	S
BGM-03	86	60	13	53.8	3.1	26.9	149	13	123	86	32	26	97	53.8
BGM-03X										95		21		
BGM-06	108	78	15	70	4	35	180	15	150	106.5	51	27.2	121	66.7
BGM-06X										119		18		
BGM-10	126	94	16	82.6	5.7	41.3	227	16	195	138.2	62	30.2	154	88.9
BGM-10X										158		17		

Model Numbers	T	U	V	X	Y	Z	a	b	d	e	f	h	n
BGM-03	19	47.4	0	22	22	32	20	14.5	11	17.5	19	M12 Thd. 20 Deep	3/8
BGM-03X						40							1/2
BGM-06	37	55.5	23.8	33.4	11	40	25	23	13.5	21	24	M16 Thd. 25 Deep	3/4
BGM-06X						50							1
BGM-10	42	76.2	31.8	44.5	12.7	50	32	28	17.5	26	31	M20 Thd. 28 Deep	1 1/4
BGM-10X						63							1 1/2

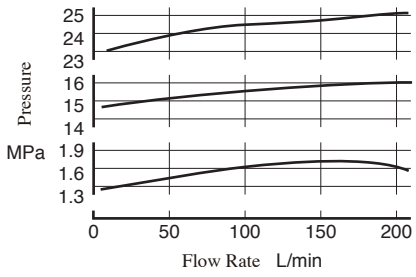
Nominal Override Characteristics

Hydraulic Fluid: Viscosity : 35 mm²/s
Specific Gravity : 0.850

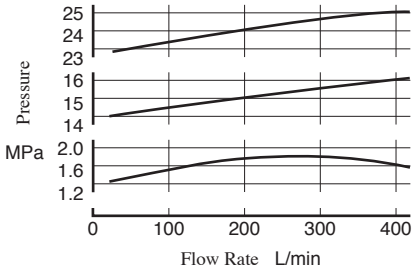
BT-03, BG-03



BT-06, BG-06



BT-10, BG-10

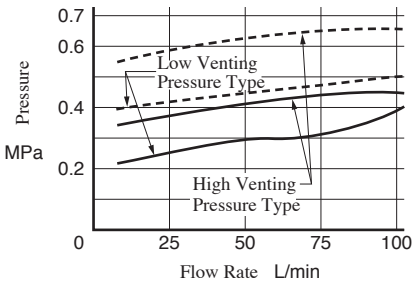


Min. Adj. Pressure & Vent Pressure vs. Flow

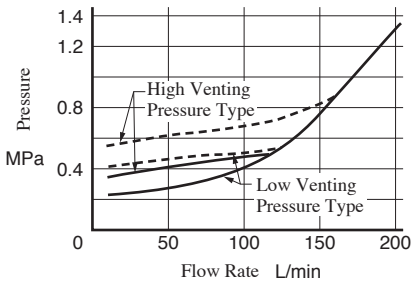
Hydraulic Fluid: Viscosity : 35 mm²/s
Specific Gravity : 0.850

Vent Pressure
Min. Adjustment Pressure

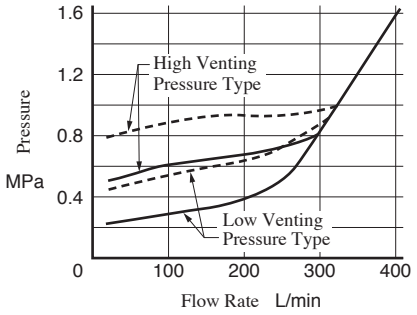
BT-03, BG-03



BT-06, BG-06



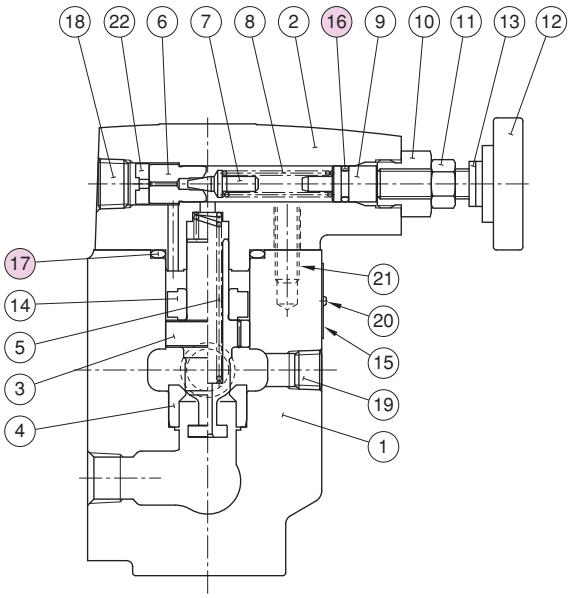
BT-10, BG-10



Note) Venting Pressure is the relieving pressure when the vent port open to tank port.

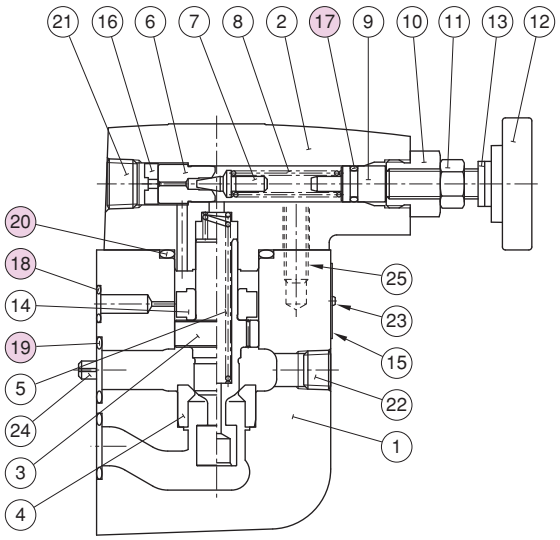
List of Seals

BT-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.
		BT-03	BT-06	BT-10	
16	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
17	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P32-N	1

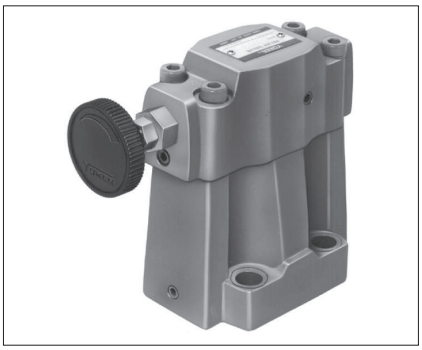
BG-03, 06, 10

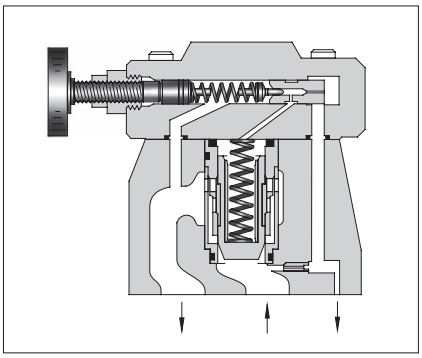


Item	Name of Parts	Part Numbers			Qty.
		BG-03	BG-06	BG-10	
17	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
18	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	OR NBR-90 P9-N	1
19	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2
20	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1

Low Noise Type Pilot Operated Relief Valves

Pilot operated relief valves here have been particularly developed as low-noise types. Able to protect pumps and control valves against excessive pressures, they are used to control the pressure in the hydraulic system to a constant level.
Remote control and unloading are permitted by using vent circuits.





Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg
S-BG-03-∗-∗-40	25	★ - 25	100	4.1
S-BG-06-∗-∗-40			200	5.0
S-BG-10-∗-40			400	10.5

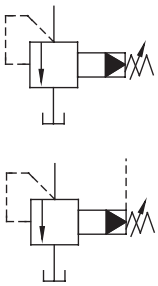
★ See minimum adjustment pressure characteristics on page C-12.

Model Number Designation

S−	B	G	−03	−V	−L	−40
Low Noise Type	Series Number	Type of Mounting	Valve Size	High Venting Pres. Feature★	Direction of Handle	Design Number
S : Low Noise Type	B : Pilot Operated Relief Valves	G : Sub-plate Mounting	03	V : For High Venting Pressure Feature (Omit if not required)	(Viewed from pressure gauge connection) L: Left (Normal) R: Right	40
			06			40
			10		———	40

★ Use the high venting pressure type where it is necessary to reduce the changeover time from unloading to onloading.

Graphic Symbols



Vent Connection

We also product The Low Noise Type Solenoid Controlled Relief Valves as below. For more details, please contact us.

Model Numbers	Max. Operating Pres. MPa	Max. Flow L/min
S-BSG-03-∗-∗-∗-∗-∗-53	25	100
S-BSG-06-∗-∗-∗-∗-∗-53		200
S-BSG-10-∗-∗-∗-∗-53		400

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
S-BG-03	M12×40L …… 4 Pcs.
S-BG-06	M16×50L …… 4 Pcs.
S-BG-10	M20×60L …… 4 Pcs.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
S-BG-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
S-BG-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7
S-BG-10	BGM-10-20	1 1/4	8.4
	BGM-10X-20	1 1/2	10.3

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)
- The sub-plates are those for pilot operated relief valves. For dimensions, see page C-9.

Instructions

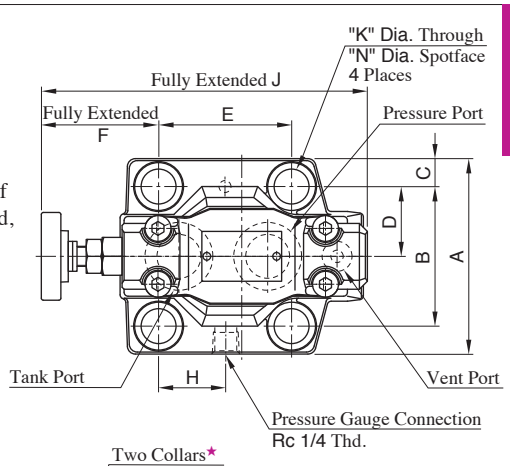
- If a remote control relief valve is used in the vent circuit, see page C-5. In addition, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with minimum flow rate as the table below.

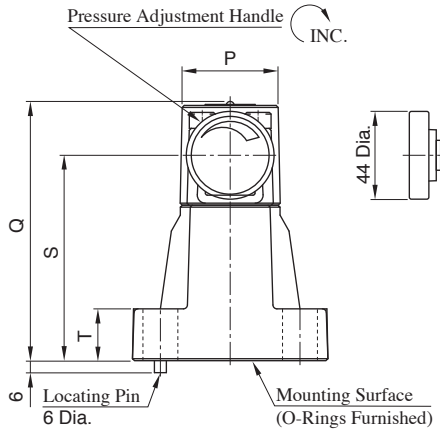
Valve Size	Min. Flow
03	5 L/min
06	
10	8 L/min

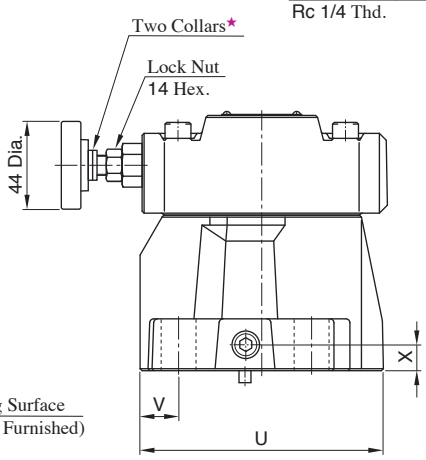
S-BG-$\frac{03}{06}$-＊-L-40

S-BG-10-＊-40

★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.





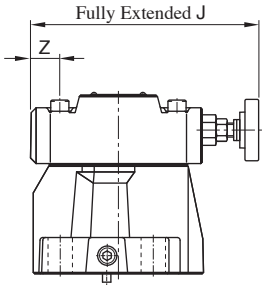


Mounting Surface

S-BG-03 : ISO 6264-06-09-1-97
S-BG-06 : ISO 6264-08-13-1-97
S-BG-10 : ISO 6264-10-17-1-97

Opposite Handle Position

S-BG-$\frac{03}{06}$-＊-R



For other dimensions, see the figures shown left.

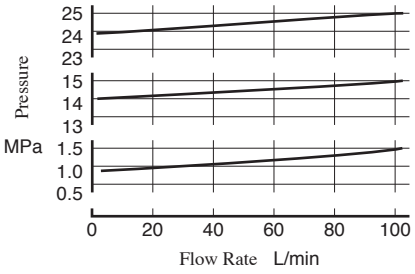
Note: For dimensions of the valve mounting surface, see the dimensional drawing (Page C-9) of the sub-plate used together.

Model Numbers	A	B	C	D	E	F	H	J	K	N	P	Q	S	T	U	V	X	Z
S-BG-03	76	53.8	11.1	26.9	53.8	73.6	26.9	163.5	13.5	21	50	130	103	21.5	106	26.1	13	36.1
S-BG-06	98	70	14	35	66.7	58.8	33.7	163.5	17.5	26	50	130	103	26	122	19.3	13	21.3
S-BG-10	120	82.6	18.7	41.3	88.9	46.1	44.9	180	21.5	32	65	167	135	33.5	155	21.1	18	——

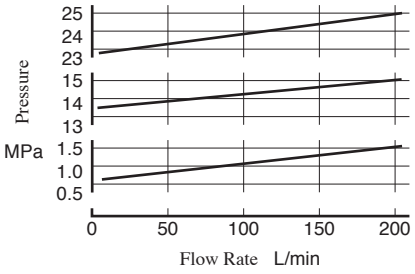
Nominal Override Characteristics

Hydraulic Fluid : Viscosity : 35 mm²/s
Specific Gravity : 0.850

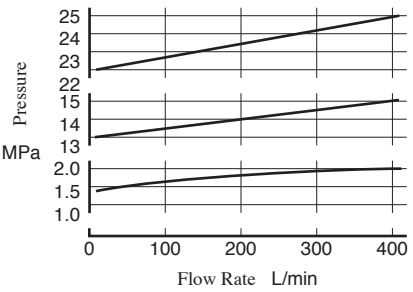
S-BG-03



S-BG-06



S-BG-10

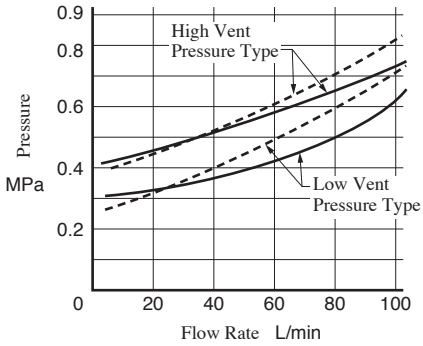


Min. Adj. Pressure and Vent Pressure vs. Flow

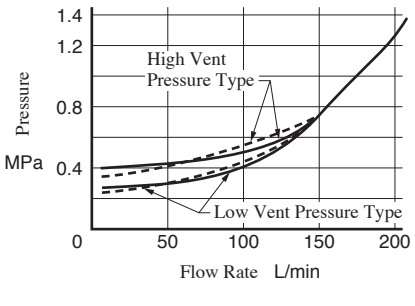
Hydraulic Fluid: Viscosity : 35 mm²/s
Specific Gravity : 0.850

Vent Pressure
Min. Adjustment Pressure

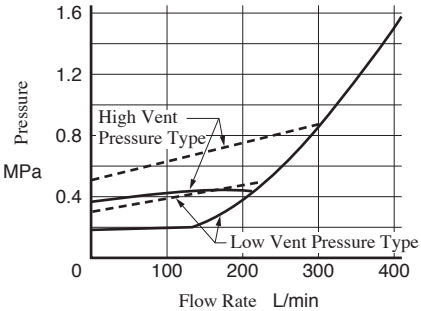
S-BG-03



S-BG-06



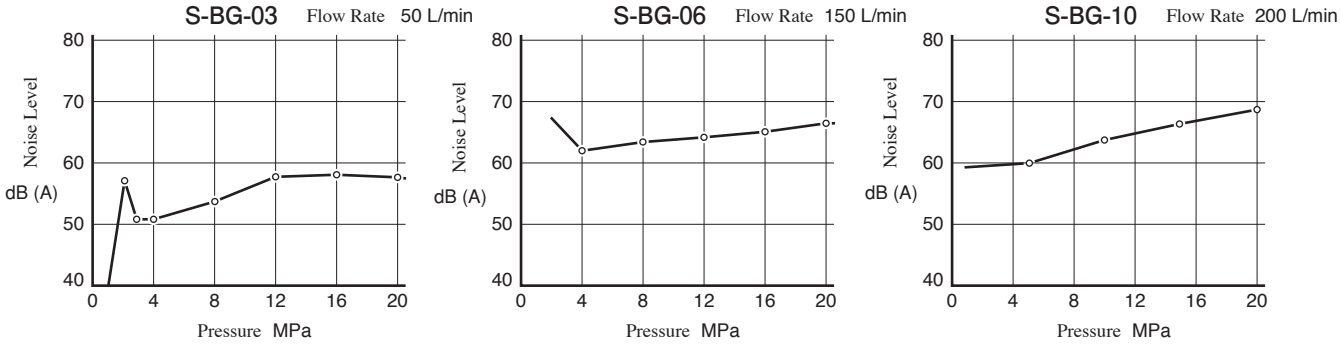
S-BG-10



Note: Vent Pressure means the relief pressure when the vent part open to the tank line.

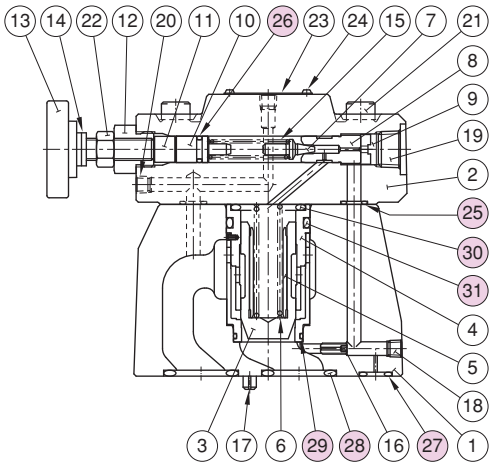
Noise Level

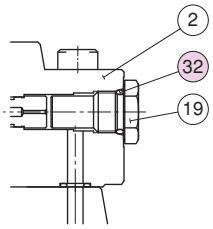
Measuring Condition
Back Pressure : 0.1 MPa Viscosity : 35 mm²/s Measuring Position : At 1m back from the valve front.



List of Seals

S-BG-03, 06, 10





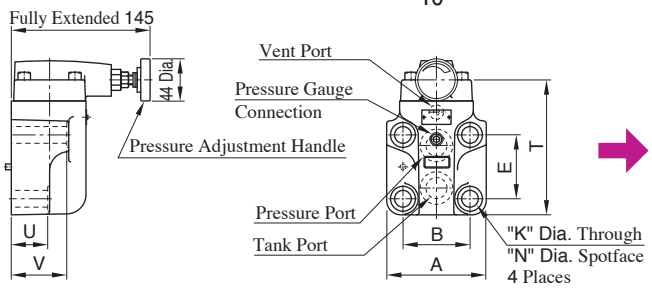
S-BG-10

Item	Name of Parts	Part Numbers			Qty.
		S-BG-03	S-BG-06	S-BG-10	
25	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	2
26	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
27	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	OR NBR-90 P9-N	1
28	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2
29	O-Ring	AS 568-024 (NBR-90)	AS 568-024 (NBR-90)	AS 568-128 (NBR-90)	1
30	O-Ring	OR NBR-90 P28-N	OR NBR-90 P28-N	OR NBR-90 P36-N	1
31	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1
32	O-Ring	———	———	OR NBR-90 P14-N	1

Interchangeability Between Conventional Type and Low Noise Type

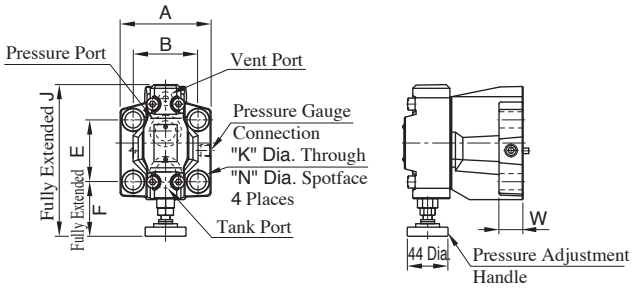
The 40 design of low noise type S-BG-03, 06, 10 has mounting interchangeability with the 32 design of conventional type BG-03, 06, 10. But the outside shape is different, for example the direction of pressure adjustment handle.

Conventional Type : BG-03, 06, 10, 32Design



Model Numbers	A	B	E	K	N	T	U	V
BG-03	82	53.8	53.8	13.5	21	117	55	78
BG-06	104	70	66.7	17.5	26	141	38	58
BG-10	124	82.6	88.9	21.5	32	175	45	65

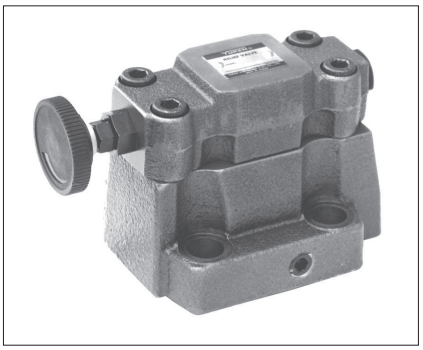
Low noise Type : S-BG-03, 06, 10 40 Design

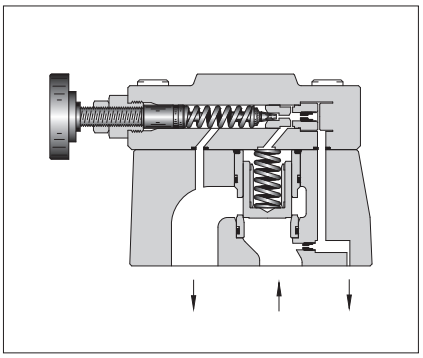


Model Numbers	A	B	E	F	K	N	J	W
S-BG-03	76	53.8	53.8	73.6	13.5	21	163.5	20.5
S-BG-06	98	70	66.7	58.8	17.5	26	163.5	25
S-BG-10	120	82.6	88.9	50.6	21.5	32	180	32.5

Relief Valves (High Pressure Type)

Relief valves here have been particularly developed those be able to adjust pressure to high level of 35 MPa. Able to protect pumps and control valves against excessive pressures, they are used to control the pressure in the hydraulic system to a constant level.
Remote control and unloading are permitted by using vent circuits.





Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg
B3G–03–＊–10	35	★ - 35	250	4.1
B3G–06–＊–10			500	5.1

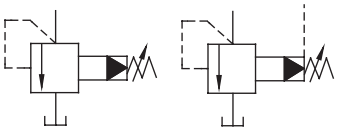
★ See minimum adjustment pressure characteristics on page C-15.

Model Number Designation

B3	G	−03	−V	−10
Series Number	Type of Mounting	Valve Size	High Venting★ Pres. Feature	Design Number
B3 : Relief Valves (High Pressure Type)	G : Sub-plate Mounting	03	V : For High Venting Pressure Feature (Omit if not required)	10
		06		10

★ Use the high venting pressure type where it is necessary to reduce the changeover time from unloading to onloading.

Graphic Symbols



Vent Connection

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
B3G-03	M12×40L …… 4 Pcs.
B3G-06	M16×50L …… 4 Pcs.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
B3G-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
B3G-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
- The sub-plates are those for pilot operated relief valves. For dimensions, see page C-9.

Instructions

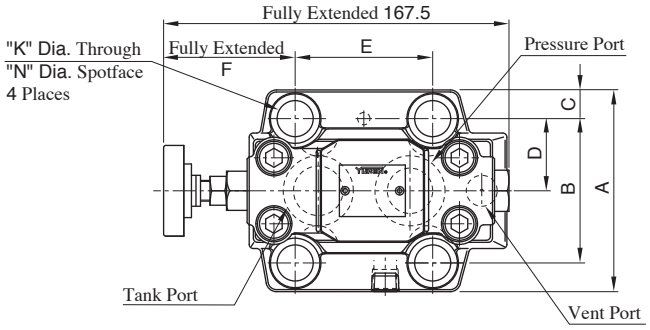
- When control in the vent circuit, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with the minimum flow rate as the below chart.

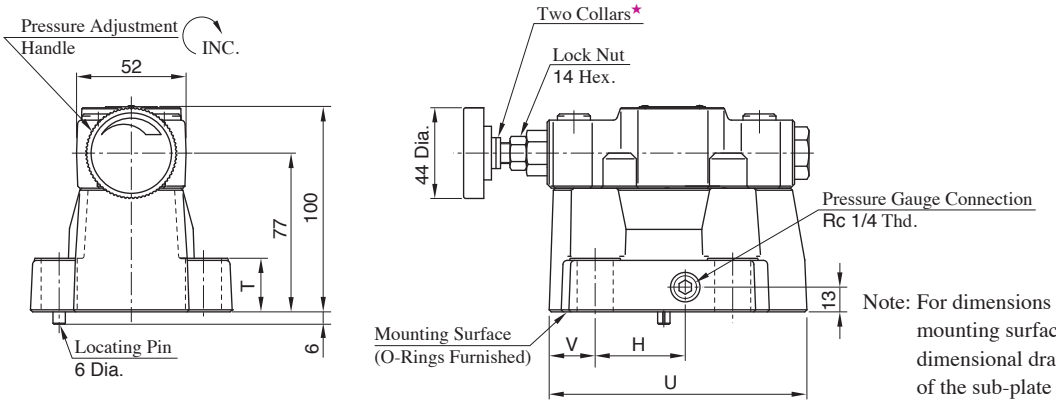
Valve Size	Min. Flow
03	5 L/min
06	

B3G-$\frac{03}{06}$-＊-10

Mounting Surface
B3G-03 : ISO 6264-06-09-1-97
B3G-06 : ISO 6264-08-13-1-97

★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 14 MPa.





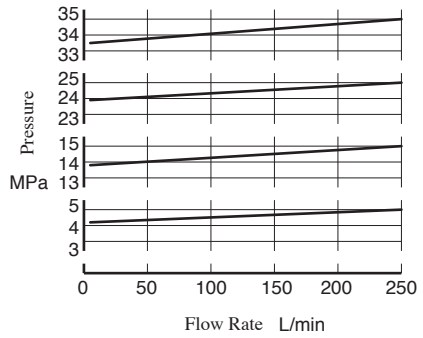
Note: For dimensions of the valve mounting surface, see the dimensional drawing (Page C-9) of the sub-plate used together.

Model Numbers	A	B	C	D	E	F	H	K	N	T	U	V
B3G–03	76	53.8	11.1	26.9	53.8	74.6	29.3	13.5	21	21.5	111	31.2
B3G–06	100	70	15	35	66.7	63.8	43.7	17.5	27	26	125	22.3

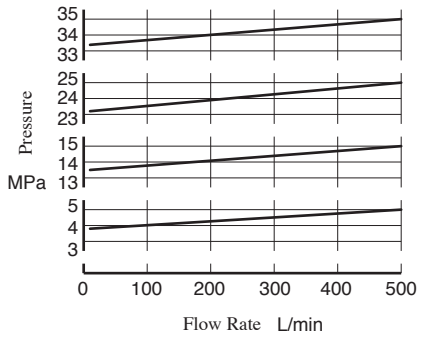
Nominal Override Characteristics

Hydraulic Fluid: Viscosity : 35 mm²/s
Specific Gravity : 0.850

B3G-03



B3G-06

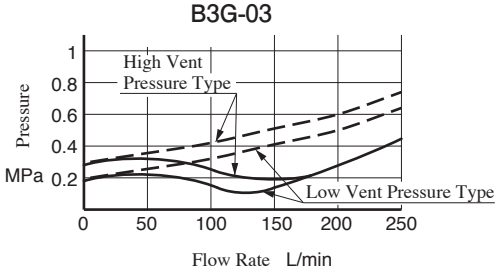


Min. Adj. Pressure and Vent Pressure vs. Flow

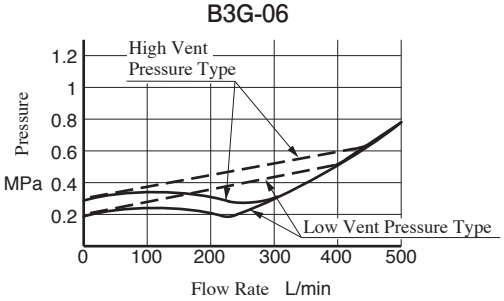
Hydraulic Fluid: Viscosity : 35 mm²/s
Specific Gravity : 0.850

——— Vent Pressure
– – – Min. Adjustment Pressure

B3G-03



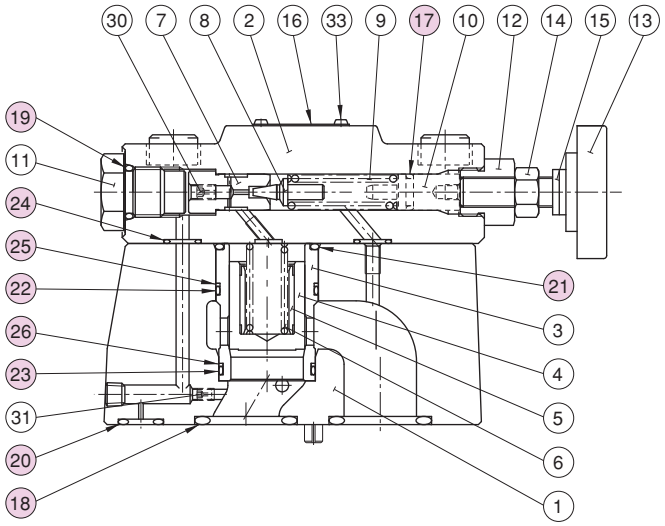
B3G-06



Note: Vent Pressure means the relief pressure when the vent part open to the tank line.

List of Seals

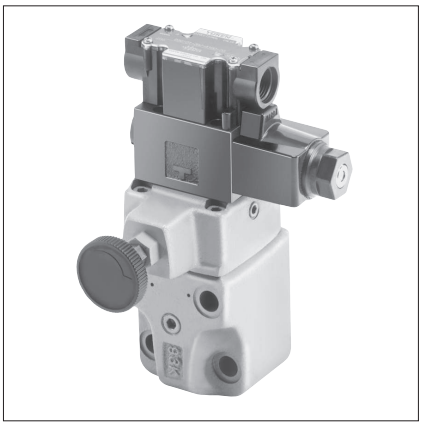
B3G−03, 06

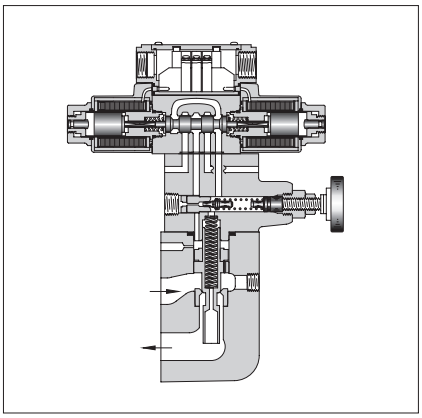


Item	Name of Parts	Part Numbers		Qty.
		B3G-03	B3G-06	
17	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
18	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	2
19	O-Ring	OR NBR-90 P14-N	OR NBR-90 P14-N	1
20	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	1
21	O-Ring	AS568-123 (NBR-90)	AS568-123 (NBR-90)	1
22	O-Ring	AS568-025 (NBR-90)	AS568-025 (NBR-90)	1
23	O-Ring	AS568-024 (NBR-90)	AS568-024 (NBR-90)	1
24	O-Ring	AS568-012 (NBR-90)	AS568-012 (NBR-90)	2
25	Back-up Ring	SO-BRB-34	SO-BRB-34	1
26	Back-up Ring	SO-BRB-32	SO-BRB-32	1

Solenoid Controlled Relief Valves

The solenoid controlled relief valve is a combination of a pilot operated relief valve and a solenoid operated directional valve. It is used for no-load pump operation by using electric signals or, together with a remote control relief valve, for two or three pressure control of the hydraulic system.





Specifications

Model Numbers		Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg
Threaded Connection	Sub-plate Mounting				
BST-03-＊-＊-＊-＊-48	BSG-03-＊-＊-＊-＊-48	25	★ - 25	100	See the chart below.
BST-06-＊-＊-＊-＊-48	BSG-06-＊-＊-＊-＊-48			200	
BST-10-＊-＊-＊-＊-48	BSG-10-＊-＊-＊-＊-48			400	

★ For relief valves, standard pilot operated relief valves are used.
For minimum adjustment pressures and other characteristics, see pages C-9 & C-10.
● For large flow valves (flange connection type), please contact us.

Approx. Mass

Model Numbers	Double Sol.	Single Sol.	With Vent Restrictor
BST-03	7.1 kg	6.6 kg	7.6 kg
BST-06	7.1 kg	6.6 kg	7.6 kg
BST-10	10.8 kg	10.3 kg	11.3 kg
BSG-03	6.8 kg	6.3 kg	7.3 kg
BSG-06	7.7 kg	7.2 kg	8.2 kg
BSG-10	11.0 kg	10.5 kg	11.5 kg

Model Number Designation

A−	BS	T	−03	− V	−2B3A	−A100	− N	−48
With Vent★1 Restrictor	Series Number	Type of Mounting	Valve Size	High Venting★2 Pres. Feature	Vent Type★3	Coil Type★4	Type of Electrical Con.	Design Number
A : With Vent Restrictor (Option) (Omit if not required)	BS : Solenoid Controlled Relief Valves	T : Threaded Connection	03	V : For High Venting Pressure Feature (Omit if not required)	2B3A	AC : A100, A120 A200, A240 DC : D12, D24 D48 AC→DC Rectified : R100, R200	None: Terminal Box Type N : With Plug-in Connector (DIN) (Option)	48
			06		2B3B			48
			10		2B2B			48
		G : Sub-plate Mounting	03		2B2			48
			06		3C2			48
			10		3C3			48

★1. Models with vent restrictor are applicable only for the vent type 2B3A and 2B3B. For details, see page C-19.
★2. Use high venting pressure types to reduce changeover time from unloading to onloading.
★3. For the details of the vent types, see the following page.
★4. The coil codes are the same as for solenoid operated directional valve DSG-01. See the Solenoid Ratings on page C-52.

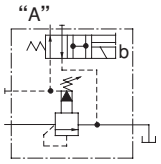
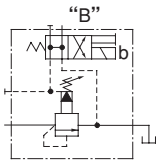
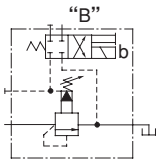
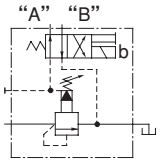
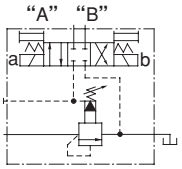
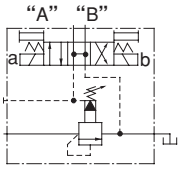
Low Noise Type Solenoid Controlled Relief Valves

Low Noise Type Solenoid Controlled Relief Valves are also available. For details, please contact us.

Request

The coil type numbers in the shaded column are handled as optional extras.
In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Vent Types

Vent Type	Graphic Symbols	Solenoid Operated Directional Valve Model Numbers	Operation		
			SOL"a"	SOL"b"	Vent Connecting
2B3A		DSG-01-2B3A	——	OFF	Connected to port "A".
				ON	Connected to tank (no-load)
2B3B		DSG-01-2B3B	——	OFF	Connected to tank (no-load)
				ON	Connected to port "B".
2B2B		DSG-01-2B2B	——	OFF	Closed state (relief valve setting pressure)
				ON	Connected to port "B".
2B2		DSG-01-2B2	——	OFF	Connected to port "A".
				ON	Connected to port "B".
3C2		DSG-01-3C2	OFF	OFF	Closed state (relief valve setting pressure)
			ON	OFF	Connected to port "A".
			OFF	ON	Connected to port "B".
3C3		DSG-01-3C3	OFF	OFF	Connected to tank (no-load)
			ON	OFF	Connected to port "A".
			OFF	ON	Connected to port "B".

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
BSG-03	M12×70L…2 Pcs. M12×95L…2 Pcs.
BSG-06	M16×60L…2 Pcs. M16×80L…2 Pcs.
BSG-10	M20×70L…2 Pcs. M20×90L…2 Pcs.

Type of Electrical Conduit Connection

Type of electrical conduit connection is same as solenoid operated directional valve DSG-01. For details, see page C-51.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
BSG-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
BSG-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7
BSG-10	BGM-10-20	1 1/4	8.4
	BGM-10X-20	1 1/2	10.3

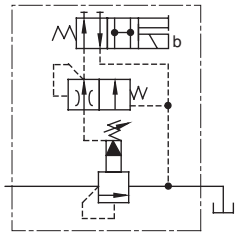
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6S)
- The sub-plates are those for pilot operated relief valves. For dimensions, see page C-9.

Option

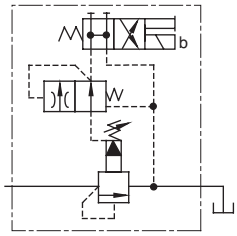
Models with Vent Restrictor

The type with a vent restrictor has a vent restrictor in vent types 2B3A and 2B3B added between a relief valve and a solenoid operated directional valve. If prevents shock to the main circuit by gradually lowering the venting pressure in the shift from the set pressure to unloading.
Unloading pressure are the same as without a vent restrictor.

A-BS＊-＊-2B3A



A-BS＊-＊-2B3B

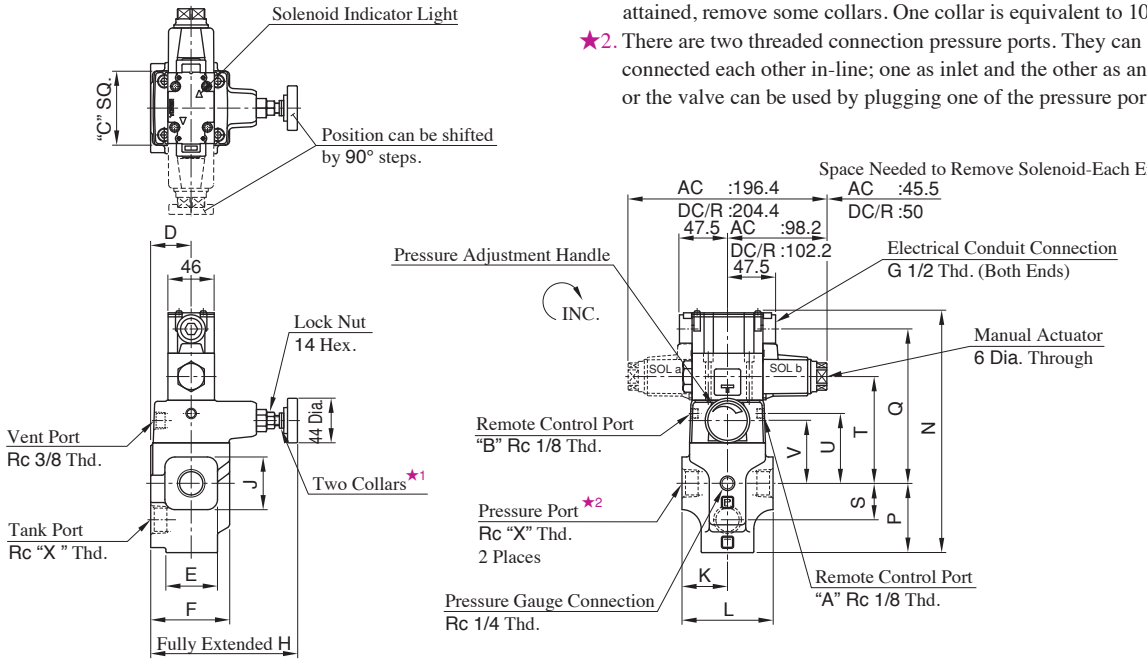


Instructions

- If a remote control relief valve is used in the vent circuit, see page C-3. In addition, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. Pressure change of one handle revolution is about 5 MPa. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with the minimum flow rate as the below chart.

Valve Size	Min. Flow
03	8 L/min
06	
10	15 L/min

BST-03, 06, 10



★1. Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

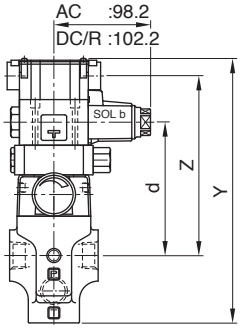
★2. There are two threaded connection pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

Model Numbers	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	X
BST-03	75	40	52	78	145	52	45	90	239.3	68.5	152.5	36	105.5	69	62	3/8
BST-06																3/4
BST-10	85	50	80	96	151	80	60	120	271.8	89	164.5	49	117.5	81	74	1 1/4

Models with Vent Restrictor (Option)
A-BST-03, 06, 10

Model Numbers	Y	Z	d
A-BST-03	269.3	182.5	135.5
A-BST-06			
A-BST-10	301.8	194.5	147.5

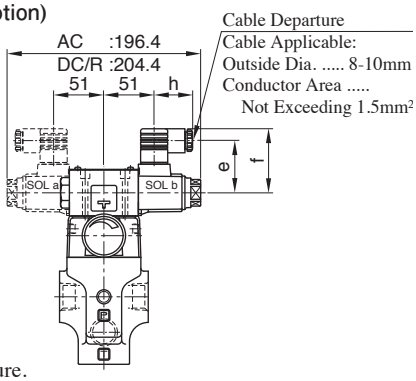
For other dimensions, see the above figure.



Models with Plug-in Connector (Option)
BST-06-＊-＊-＊-N

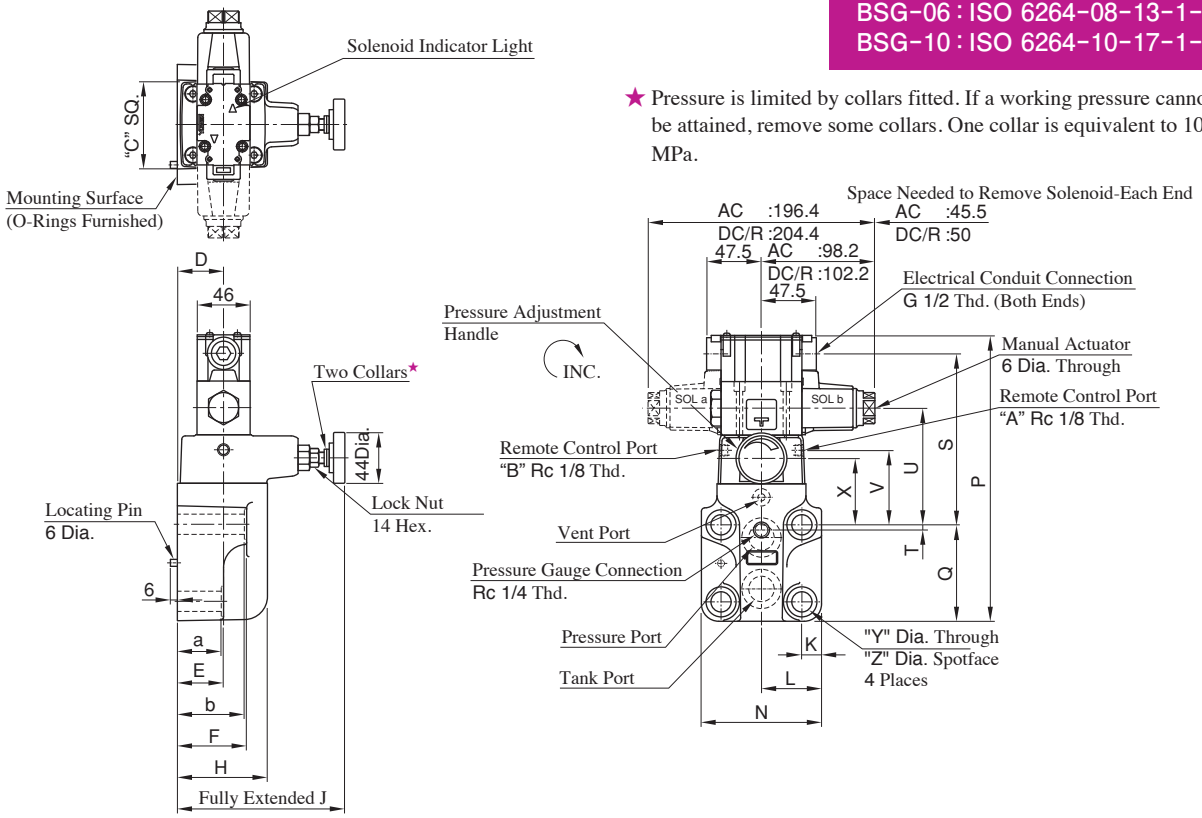
Name	Coil Type	e	f	h
AC Solenoid	A＊	53	65	39
DC Solenoid	D＊	64	76	39
R (AC→DC) Solenoid	R＊	57.2	79	53

For other dimensions, see the above figure.



BSG-03, 06, 10

Mounting Surface
BSG-03 : ISO 6264-06-09-1-97
BSG-06 : ISO 6264-08-13-1-97
BSG-10 : ISO 6264-10-17-1-97

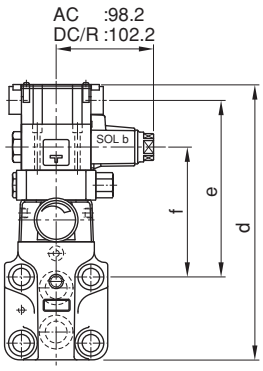


★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

Model Numbers	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	X	Y	Z	a	b
BSG-03	75	40	57	78	78	145	14.1	41	82	225.8	77	130.5	22	83.5	47	40	13.5	21	55	77
BSG-06	75	40	40	60	78	145	17	52	104	249.8	83.5	148	4.5	101	64.5	57.5	17.5	26	38	58
BSG-10	85	45	47	67	84	146	20.7	62	124	283.8	110	155.5	6	108.5	72	65	21.5	32	45	65

Note :For dimensions of the valve mounting surface, see the dimensional drawing (page C-9) of the sub-plate used together.

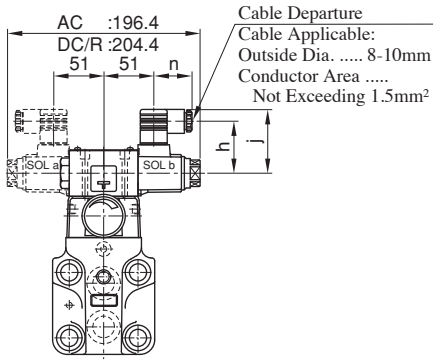
Models with Vent Restrictor (Option)
A-BSG-03, 06, 10



Model Numbers	d	e	f
A-BSG-03	255.8	160.5	113.5
A-BSG-06	279.8	178	131
A-BSG-10	313.8	185.5	138.5

For other dimensions, see the above figure.

Models with Plug-in Connector (Option)
03
BSG-06-∗-∗-∗-N
10

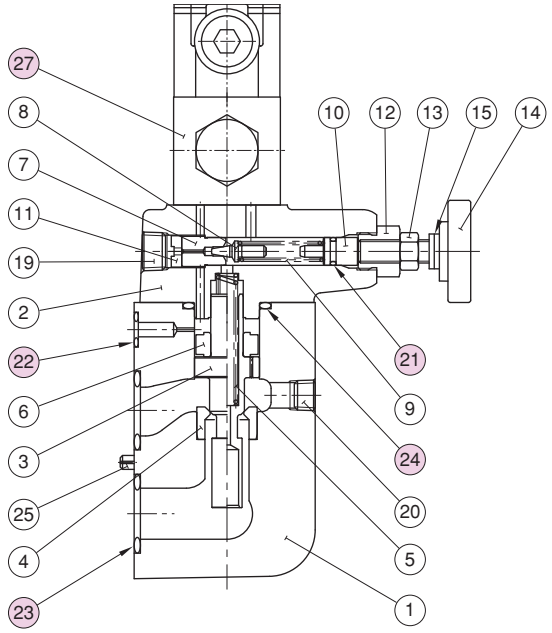


Name	Coil Type	h	j	n
AC Solenoid	A∗	53	65	39
DC Solenoid	D∗	64	76	39
R (AC→DC) Solenoid	R∗	57.2	79	53

For other dimensions, see the above figure.

List of Seals

BST BSG -03, 06, 10



BST-03, 06, 10

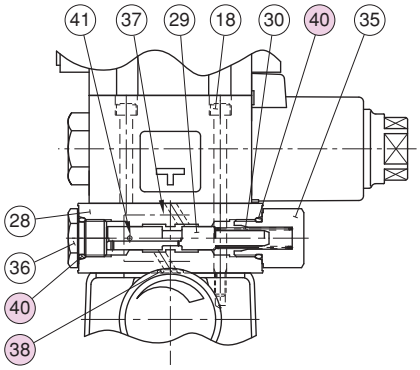
Item	Name of Parts	Part Numbers			Qty.
		BST-03	BST-06	BST-10	
21	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
24	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P32-N	1

BSG-03, 06, 10

Item	Name of Parts	Part Numbers			Qty.
		BSG-03	BSG-06	BSG-10	
21	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
22	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	OR NBR-90 P9-N	1
23	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2
24	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1

Note: The Pilot Valve for item ㉑, see "DSG-01 Series Solenoid Operated Directional Valves" of the catalogue "E: Directional Controls".

A- BST BSG -03, 06, 10 (Models with Vent Restrictor)

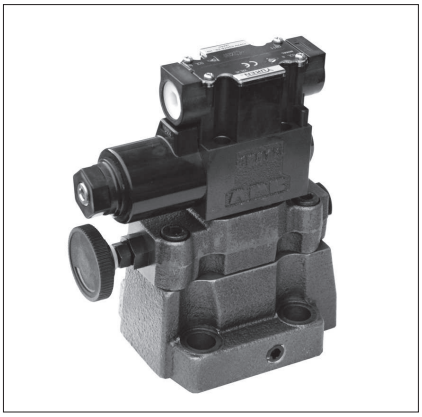


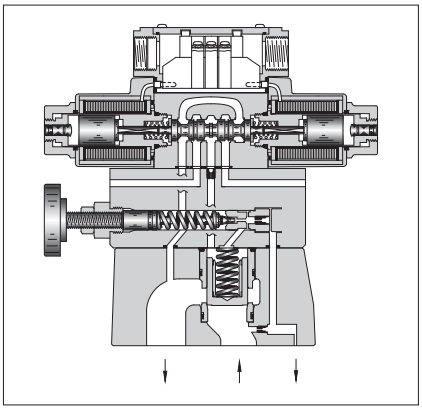
A- BST BSG -03, 06, 10

Item	Name of Parts	Part Numbers	Qty.
38	O-Ring	OR NBR-90 P8-N	2
40	O-Ring	OR NBR-90 P14-N	2

Solenoid Controlled Relief Valves (High Pressure Type)

The solenoid controlled relief valve is a combination of a pilot operated relief valve and a solenoid operated directional valve. It is used for no-load pump operation by using electric signals or, together with a remote control relief valve, for two or three pressure control of the hydraulic system. This valve is able to adjust pressure up to maximum 35 MPa.





Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min
B3SG–03–＊–＊–＊–＊–10	35	★ - 35	250
B3SG–06–＊–＊–＊–＊–10			500

★ For minimum adjustment pressures and other characteristics, see page C-15.

Approx. Mass

Model Numbers	Double Sol.	Single Sol.	With Vent Restrictor
B3SG–03	6.0 kg	5.5 kg	6.6 kg
B3SG–06	7.0 kg	6.5 kg	7.6 kg

Model Number Designation

A–	B3S	G	–03	– V	–2B3A	–A100	– N	–10
With Vent★1 Restrictor	Series Number	Type of Mounting	Valve Size	High Venting★2 Pres. Feature	Vent Type★3	Coil Type★4	Type of Electrical Con.	Design Number
A : With Vent Restrictor (Option) (Omit if not required)	B3S : Solenoid Controlled Relief Valves (High Pressure Type)	G : Sub-plate Mounting	03	V : For High Venting Pressure Feature (Omit if not required)	2B3A 2B3B 2B2B 2B2 3C2 3C3	AC : A100, A120 A200, A240 DC : D12, D24 D48 AC→DC Rectified : R100, R200	None: Terminal Box Type N : With Plug-in Connector (DIN) (Option)	10
			06					10

★1. Models with vent restrictor are applicable only for the vent type 2B3A and 2B3B. For details, see page C-23 “Option”.
★2. Use high venting pressure types to reduce changeover time from unloading to onloading.
★3. The details of the vent types are the same as for solenoid controlled relief valves BST/BSG. See page C-18 “Vent Types”.
★4. The coil codes are the same as for solenoid operated directional valve DSG-01. See the Solenoid Ratings on page C-52.

Request

The coil type numbers in the shaded column are handled as optional extras.
In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
B3SG-03	M12×40L …… 4 Pcs.
B3SG-06	M16×50L …… 4 Pcs.

Type of Electrical Conduit Connection

Electrical conduit connection is same as solenoid operated directional valve DSG-01. For details, see page C-51.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
B3SG-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
B3SG-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7

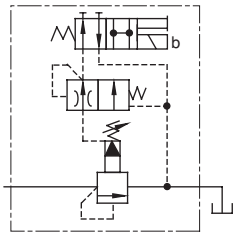
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
- The sub-plates are those for pilot operated relief valves. For dimensions, see page C-9.

Option

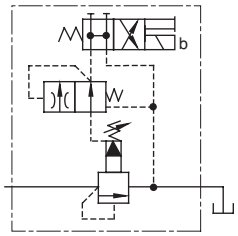
Models with Vent Restrictor

The type with a vent restrictor has a vent restrictor in vent types 2B3A and 2B3B added between a relief valve and a solenoid operated directional valve. If prevents shock to the main circuit by gradually lowering the venting pressure in the shift from the set pressure to unloading.
Unloading pressure are the same as without a vent restrictor.

A-B3SG-＊-2B3A



A-B3SG-＊-2B3B



Instructions

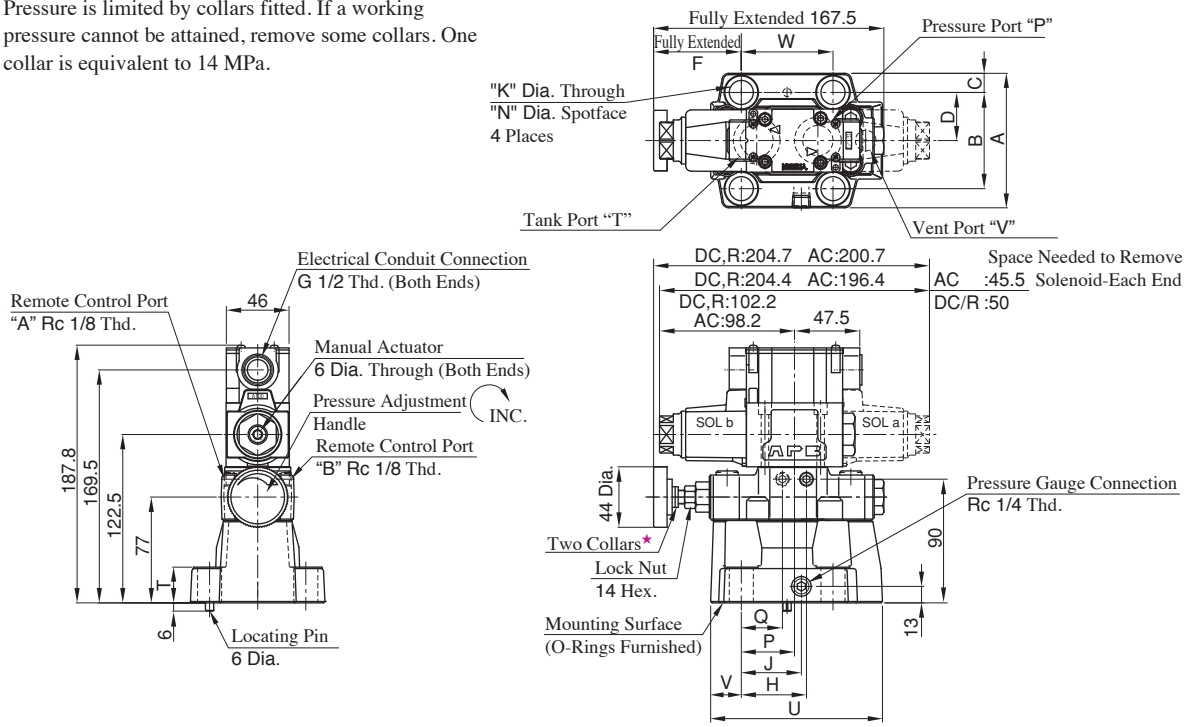
- When control in the vent circuit, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. Pressure change of one handle revolution is about 7 MPa. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with the minimum flow rate as the below chart.

Valve Size	Min. Flow
03	8 L/min
06	

B3SG-03, 06

Mounting Surface
B3SG-03 : ISO 6264-06-09-1-97
B3SG-06 : ISO 6264-08-13-1-97

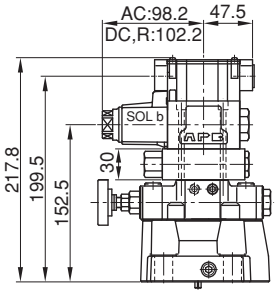
★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 14 MPa.



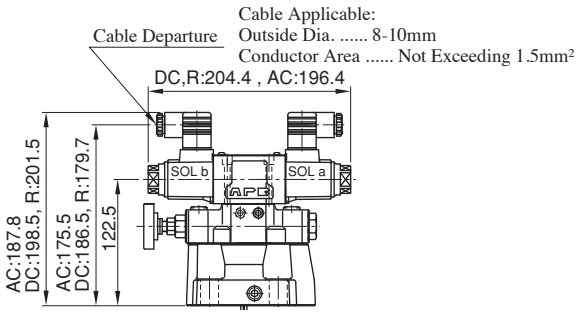
Model Numbers	A	B	C	D	E	F	H	J	K	N	P	Q	T	U	V	W
B3SG-03	76	53.8	11.1	26.9	53.8	74.6	36.6	29.3	13.5	21	27.9	19.1	21.5	111	31.2	53.8
B3SG-06	100	70	15	35	66.7	63.8	47.4	43.7	17.5	27	38.7	29.9	26	125	22.3	66.7

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-9) of the sub-plate used together.

Models with Vent Restrictor (Option) A-B3SG-03, 06

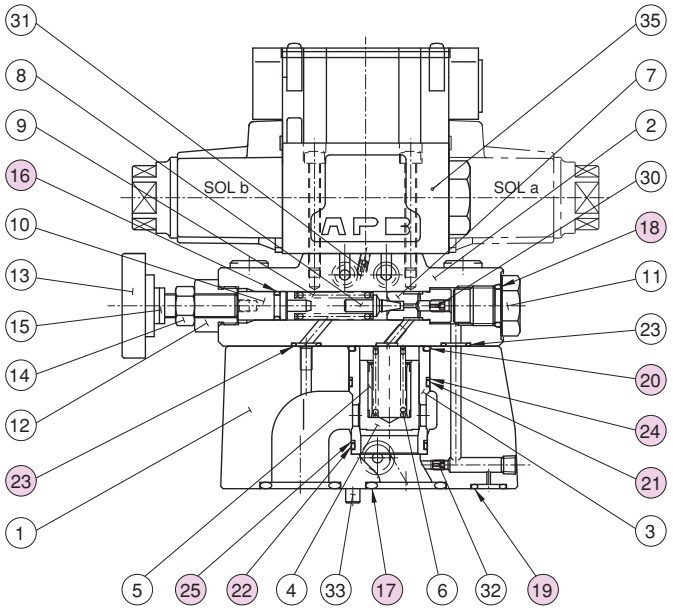


Models with Plug-in Connector (Option) B3SG-03/06-＊-＊-＊-N



List of Seals

B3SG-03, 06

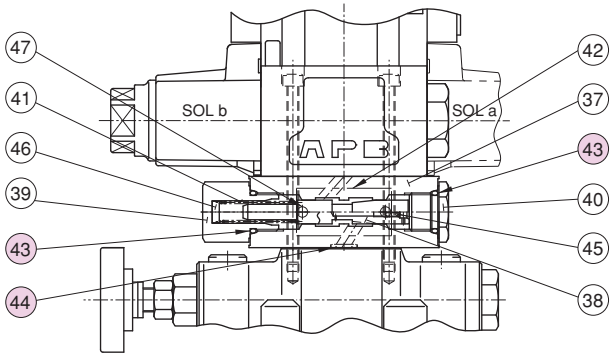


B3SG-03, 06

Item	Name of Parts	Part Numbers		Qty.
		B3SG–03	B3SG–06	
16	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
17	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	2
18	O-Ring	OR NBR-90 P14-N	OR NBR-90 P14-N	1
19	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	1
20	O-Ring	AS568-123 (NBR-90)	AS568-123 (NBR-90)	1
21	O-Ring	AS568-025 (NBR-90)	AS568-025 (NBR-90)	1
22	O-Ring	AS568-024 (NBR-90)	AS568-024 (NBR-90)	1
23	O-Ring	AS568-012 (NBR-90)	AS568-012 (NBR-90)	2
24	Back-up Ring	SO-BRB-34	SO-BRB-34	1
25	Back-up Ring	SO-BRB-32	SO-BRB-32	1

Note: The Pilot Valve for item ㉟, see “Solenoid Operated Directional Valves, DSG-01 Series” of the catalogue “E: Directional Controls”.

A-B3SG-03, 06 (Models with Vent Restrictor)



A-B3SG-03, 06

Item	Name of Parts	Part Numbers	Qty.
43	O-Ring	OR NBR-90 P14-N	2
44	O-Ring	OR NBR-90 P8-N	2

H/HC Type Pressure Control Valves

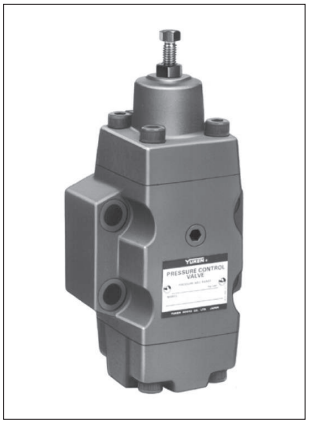
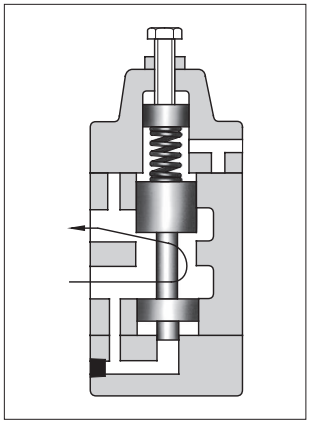
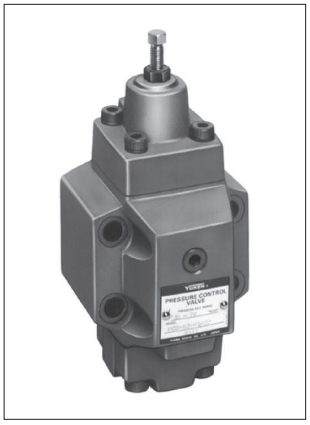
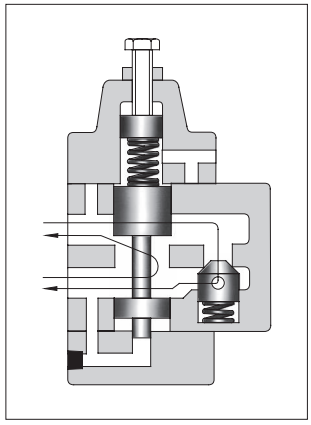
These valves are hydraulically damped, direct operated, pressure control valves which can be actuated by internal or external pilot pressure.

H Type Pressure Control Valves

There are various types of valve including sequence, unloading and low pressure relief valves.

HC Type Pressure Control Valves

They are available with integral check valves for use when free reverse flow from secondary port to the primary port is desired. There are various types of valve including sequence with check and counterbalance valves.

Specifications

Series	Model Numbers		Max. Operating Pres. MPa	Max. Flow L/min	Approx. Mass kg	
	Threaded Connection	Sub-plate Mounting			H/HC Type	HG/HCG Type
H Type Pressure Control Valves	HT-03-＊＊-＊-22	HG-03-＊＊-＊-22	21	50	3.7	4.0
	HT-06-＊＊-＊-22	HG-06-＊＊-＊-22		125	6.2	6.1
	HT-10-＊＊-＊-22	HG-10-＊＊-＊-22		250	12.0	11.0
HC Type Pressure Control Valves	HCT-03-＊＊-＊-22	HCG-03-＊＊-＊-22	21	50	4.1	4.8
	HCT-06-＊＊-＊-22	HCG-06-＊＊-＊-22		125	7.1	7.4
	HCT-10-＊＊-＊-22	HCG-10-＊＊-＊-22		250	13.8	13.8

● For check valve pressure drops of HC type, see free flow pressure drop characteristics.

Yuken can offer flanged connection valves described below.
For details, contact us and request information.

Model Numbers	Max. Operating Pres. MPa	Max. Flow L/min
HF/HCF–10–＊＊–＊–22	21	250
HF/HCF–16–＊＊–＊–20		500

Model Number Designation

H	T	−03	−C	3	−P	−22
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa	Valve Type★1	With Auxiliary Pilot Pressure★2	Design Number
H : H Type Pressure Control Valves	T : Threaded Connection	03	L : 0.25 - 0.45 M : 0.45 - 0.9 N : 0.9 - 1.8 A : 1.8 - 3.5 B : 3.5 - 7.0 C : 7.0 - 14	1 2 3 4	P : With Auxiliary Pilot Pressure	22
		06				22
		10				22
	G : Sub-plate Mounting	03				22
		06				22
		10				22
HC : HC Type Pressure Control Valves	T : Threaded Connection	03				22
		06				22
		10				22
	G : Sub-plate Mounting	03				22
		06				22
		10				22

★1. For the details of valve types, see the following page.

★2. Models with auxiliary pilots are used where valves must be operated under a lower external pilot pressure than the adjusted pressure (types N, A, and B: about 1/8 of adjusted pressure; type C: about 1/16).

For combinations, see the chart below.

Combination List of Pres. Adj. Range and "P" Auxiliary Pilots.

Valve Type / Pres. Adj. Range	Type 1				Type 2		Type 3		Type 4	
	HT, HG		HCT, HCG							
	Without P	With P	Without P	With P	Without P	With P	Without P	With P	Without P	With P
L	○	—	○	—	○	—	○	—	○	—
M	○	—	○	—	○	—	○	—	○	—
N	—		○	○	○	○	○	○	○	○
A	—		○	○	○	○	○	○	○	○
B	—		○	○	○	○	○	○	○	○
C	—		○	○	○	○	○	○	○	○

Instructions

- To adjust the pressure, loosen the lock nut and turn the pressure adjustment screw slowly clockwise to increase pressures or anti-clockwise to decrease pressures. After adjustments, do not forget to tighten the lock nut.
- Connect the secondary side pressure ports of types 1 and 4 (internal drain) and the drain ports of types 2 and 3 (external drain) directly to the reservoir with a back pressure close to the atmospheric pressure.

Accessories

Mounting Bolts

Valve Size / Valve Model Numbers	03	06	10
HG	M10×50L : 4 Pcs.		M10×50L : 6 Pcs.
HCG	M10×70L : 4 Pcs.	M10×80L : 4 Pcs.	M10×100L : 6 Pcs.

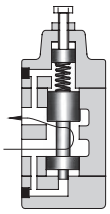
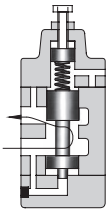
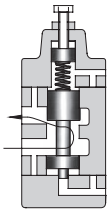
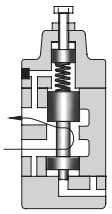
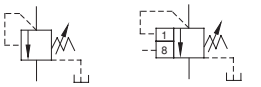
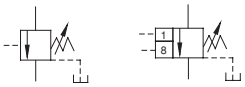
Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
HG/HCG-03-＊＊-22	HGM-03-20	3/8	1.6
	HGM-03X-20	1/2	
HG/HCG-03-＊＊-P-22	HGM-03-P-20	3/8	2.0
	HGM-03X-P-20	1/2	
HG/HCG-06-＊＊-22	HGM-06-20	3/4	2.4
	HGM-06X-20	1	3.0
HG/HCG-06-＊＊-P-22	HGM-06-P-20	3/4	2.4
	HGM-06X-P-20	1	3.0
HG/HCG-10-＊＊-22	HGM-10-20	1 1/4	4.8
	HGM-10X-20	1 1/2	5.7
HG/HCG-10-＊＊-P-22	HGM-10-P-20	1 1/4	4.8
	HGM-10X-P-20	1 1/2	5.7

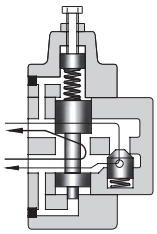
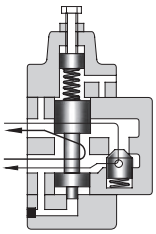
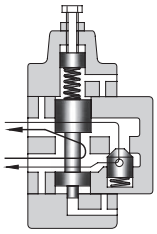
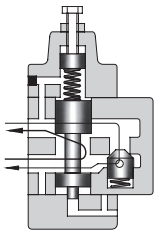
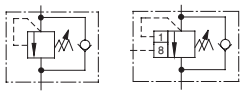
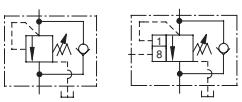
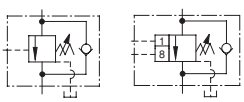
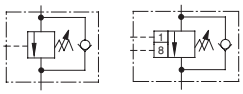
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)
- The sub-plates are those for H Type Pressure Control Valves. For dimensions, see page C-32.

Valve Types

H Type

Valve Type	Type 1: Low Pressure Relief Valve	Type 2: Sequence Valve	Type 3: Sequence Valve	Type 4: Unloading Valve
Pilot-Drain Type	Internal Pilot-Internal Drain	Internal Pilot-External Drain	External Pilot-External Drain	External Pilot-Internal Drain
Operations				
Graphic Symbols		 With auxiliary pilot port	 With auxiliary pilot port	 With auxiliary pilot port
Descriptions	Can be used as low pressure relief valve, but be careful to occurrence of surge pressure.	Used to control the operational sequence of two or more actuators. If primary pressure exceeds the pressure setting, effective fluid is delivered to the secondary side.	Used for the same purpose as for the type 2. Operated by external pilot pressure irrespective of primary pressure.	Used as unloading valve. If external pilot pressure exceeds the pressure setting, the pump is turned no-load by releasing all fluid to the tank.

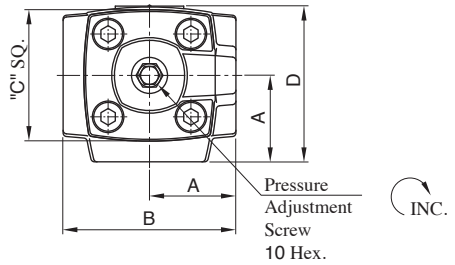
HC Type

Valve Type	Type 1: Counterbalance Valve	Type 2: Sequence and Check Valve	Type 3: Sequence and Check Valve	Type 4: Counterbalance Valve
Pilot-Drain Type	Internal Pilot-Internal Drain	Internal Pilot-External Drain	External Pilot-External Drain	External Pilot-Internal Drain
Operations				
Graphic Symbols	 With auxiliary pilot port	 With auxiliary pilot port	 With auxiliary pilot port	 With auxiliary pilot port
Descriptions	Used to prevent gravitational falls by generating a pressure on the actuator return side. If primary pressure exceeds the pressure setting, fluid is released to keep the pressure constant. Reversed flow is free by a check valve.	Used to control the operating sequence of two or more actuators. If primary pressure exceeds the pressure setting, effective fluid is delivered to the secondary side. Reversed flow is free by a check valve.	Used for the same purpose as for type 2. Operated by external pilot pressure irrespective of primary pressure. Reversed flow is free by a check valve.	Used for the same purpose as for type 1. Operated by external pilot pressure irrespective of primary pressure. Reversed flow is free by a check valve.

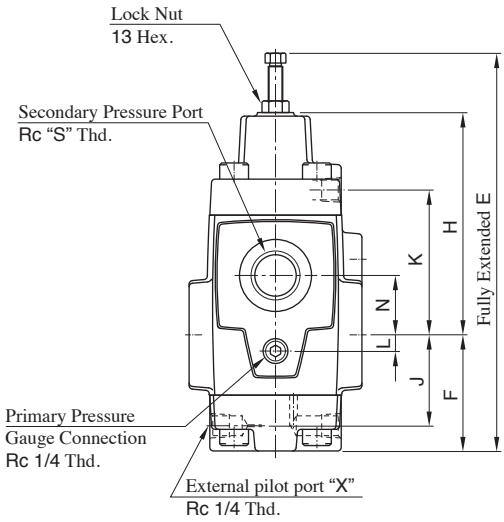
HT-03, 06, 10

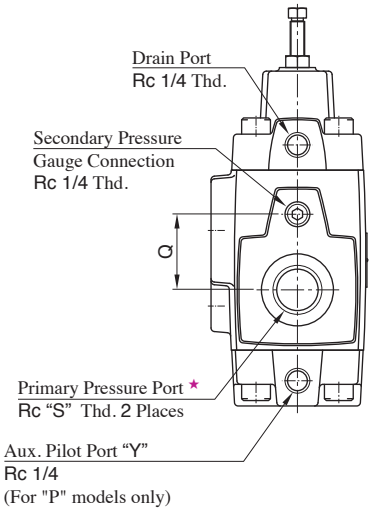
Type 3: Sequence Valve

(External Pilot - External Drain)



★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

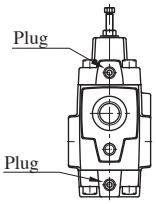




Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Q	S
HT–03	41	82	60	74	191	57	106	43	70	0	28	28	3/8
HT–06	48	96	73	87	221	64.5	123.5	50.5	80.5	9	33	42	3/4
HT–10	66	132	86	112	272	84	149	66	98	12	40	52	1 1/4

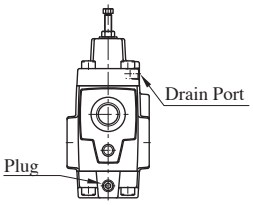
Type 1: Low Pressure Relief Valve

(Internal Pilot - Internal Drain)



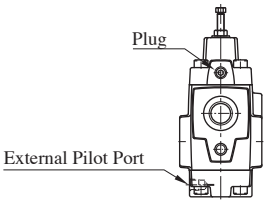
Type 2: Sequence Valve

(Internal Pilot - External Drain)



Type 4: Unloading Valve

(External Pilot - Internal Drain)

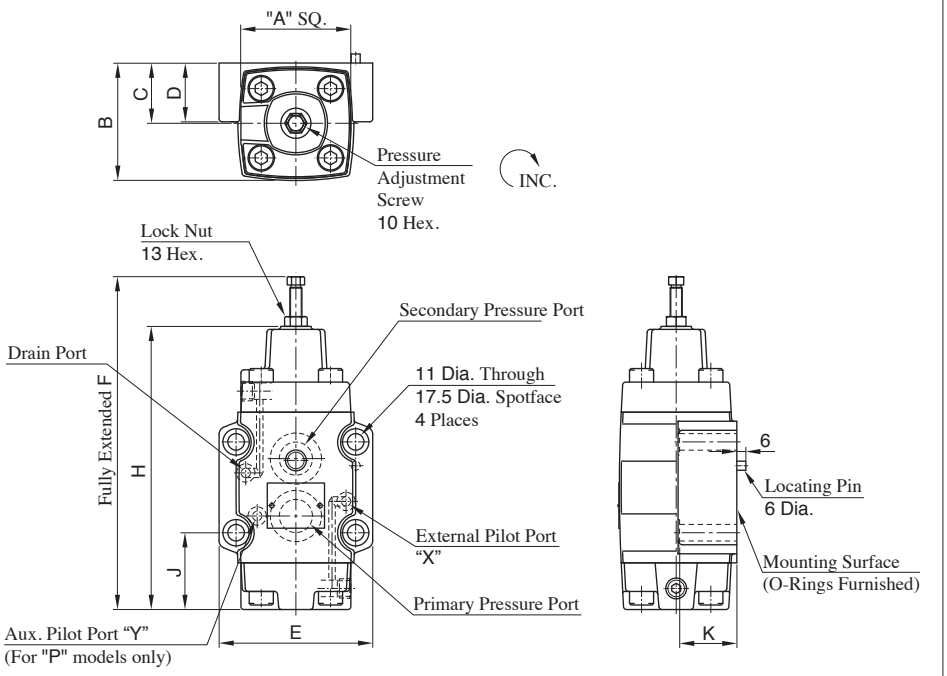


HG-03, 06

Mounting Surface
HG-03 : ISO 5781-06-07-0-00
HG-06 : ISO 5781-08-10-0-00

Type 3: Sequence Valve

(External Pilot - External Drain)

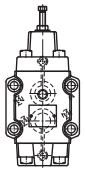


Model Numbers	A	B	C	D	E	F	H	J	K
HG-03	60	67	35	39	89	191	163	49.6	38
HG-06	73	79	40	39	102	221	188	51	38

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

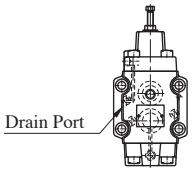
Type 1: Low Pressure Relief Valve

(Internal Pilot - Internal Drain)



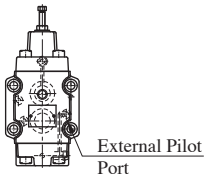
Type 2: Sequence Valve

(Internal Pilot - External Drain)



Type 4: Unloading Valve

(External Pilot - Internal Drain)

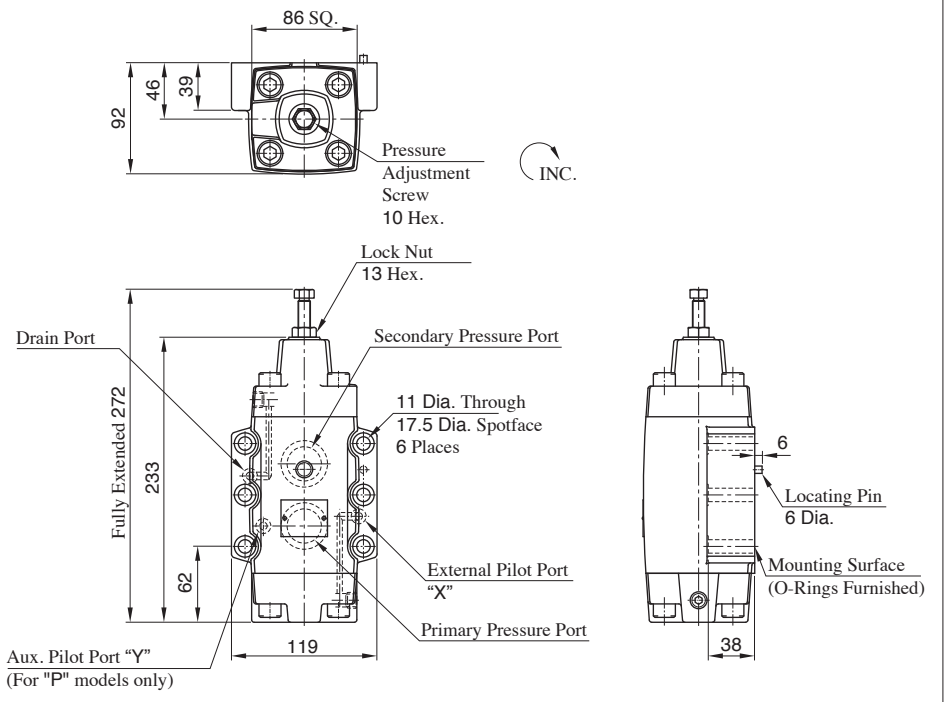


HG-10

Mounting Surface : ISO 5781-10-13-0-00

Type 3: Sequence Valve

(External Pilot - External Drain)



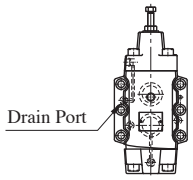
Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

Type 1: Low Pressure Relief Valve

(Internal Pilot - Internal Drain)

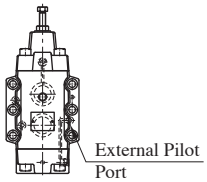
Type 2: Sequence Valve

(Internal Pilot - External Drain)



Type 4: Unloading Valve

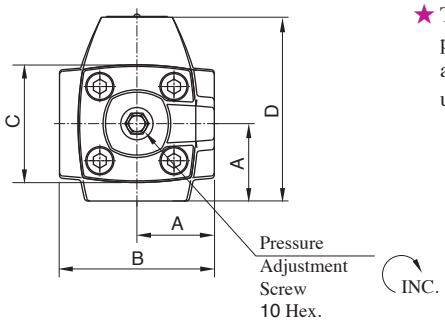
(External Pilot - Internal Drain)



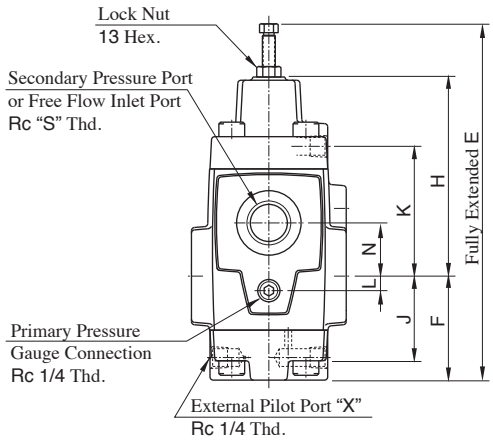
HCT-03, 06, 10

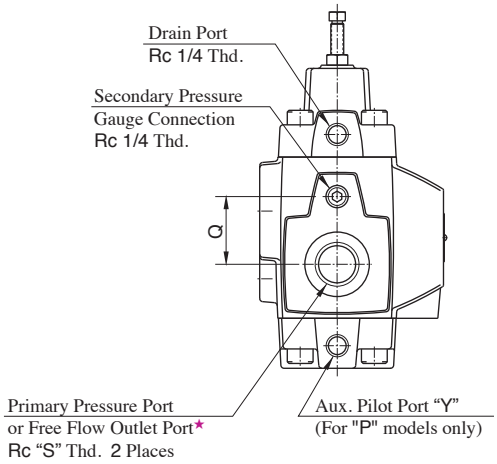
Type 3: Sequence and Check Valve

(External Pilot - External Drain)



★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

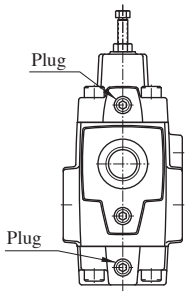




Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Q	S
HCT–03	41	82	60	96	191	57	106	43	70	0	28	28	3/8
HCT–06	48	96	73	116	221	64.5	123.5	50.5	80.5	9	33	42	3/4
HCT–10	66	132	86	152	272	84	149	66	98	12	40	52	1 1/4

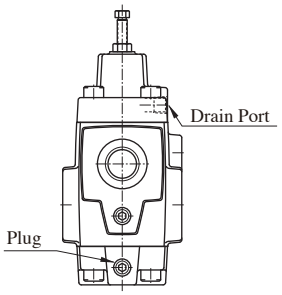
Type 1: Counterbalance Valve

(Internal Pilot - Internal Drain)



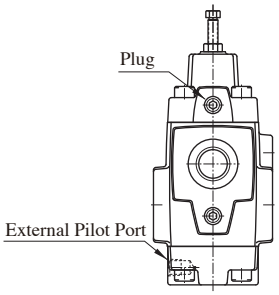
Type 2: Sequence and Check Valve

(Internal Pilot - External Drain)



Type 4: Counterbalance Valve

(External Pilot - Internal Drain)

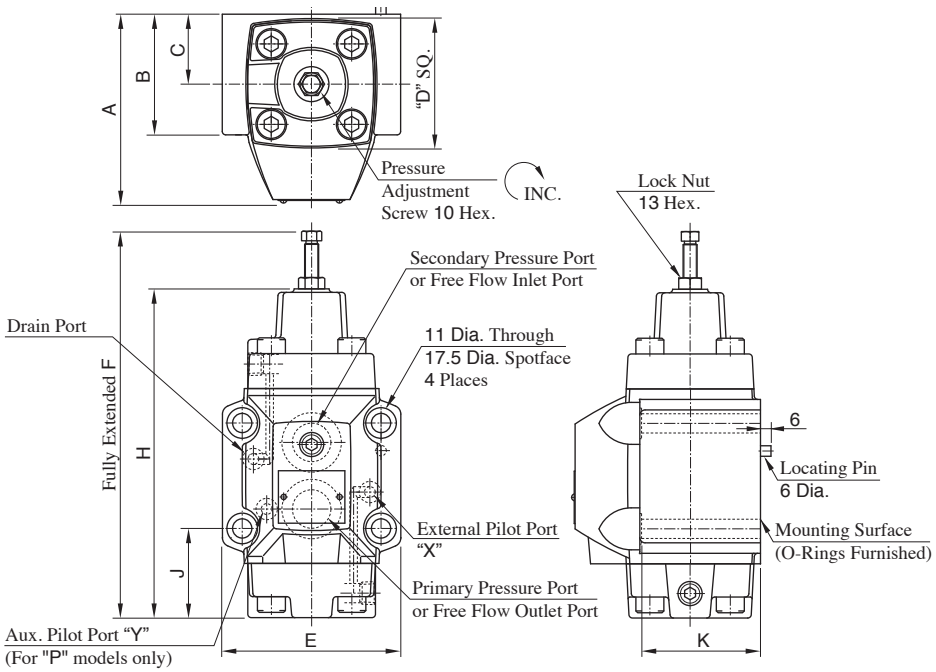


HCG-03, 06

Mounting Surface
HCG-03 : ISO 5781-06-07-0-00
HCG-06 : ISO 5781-08-10-0-00

Type 3: Sequence and Check Valve

(External Pilot - External Drain)

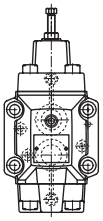


Model Numbers	A	B	C	D	E	F	H	J	K
HCG–03	90	59	35	60	89	191	163	49.6	58
HCG–06	108	69	40	73	102	221	188	51	68

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

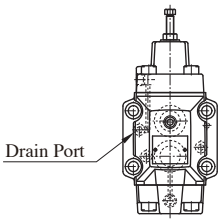
Type 1: Counterbalance Valve

(Internal Pilot - Internal Drain)



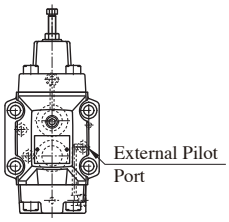
Type 2: Sequence and Check Valve

(Internal Pilot - External Drain)



Type 4: Counterbalance Valve

(External Pilot - Internal Drain)

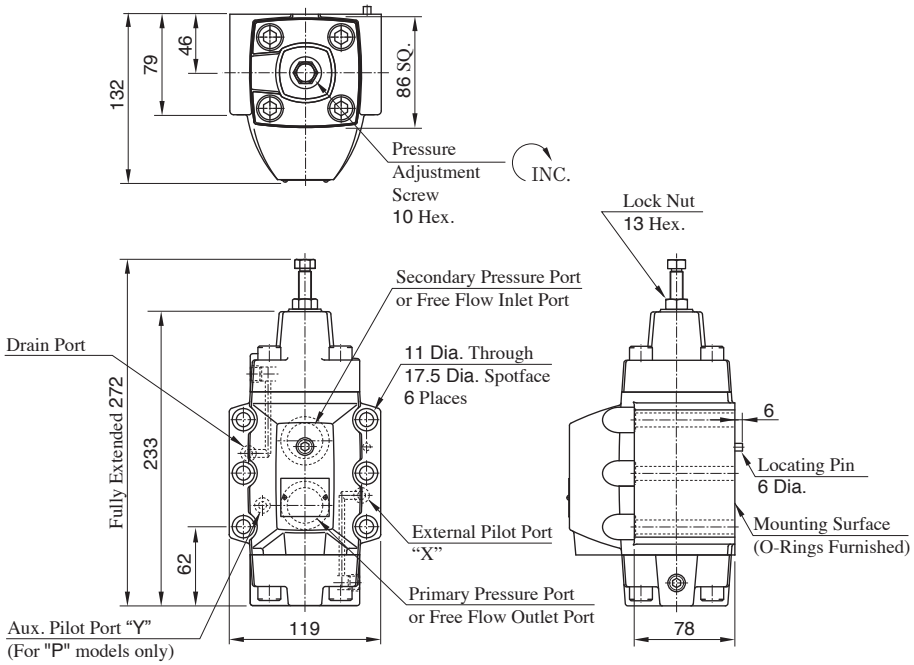


HCG-10

Mounting Surface : ISO 5781-10-13-0-00

Type 3: Sequence Valve

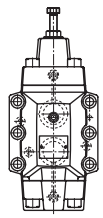
(External Pilot - External Drain)



Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

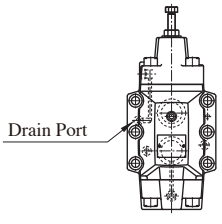
Type 1: Counterbalance Valve

(Internal Pilot - Internal Drain)



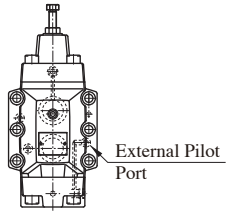
Type 2: Sequence and Check Valve

(Internal Pilot - External Drain)



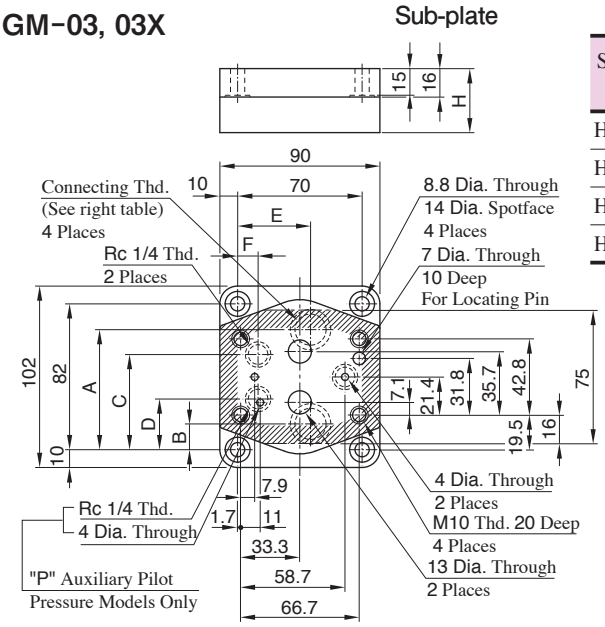
Type 4: Counterbalance Valve

(External Pilot - Internal Drain)



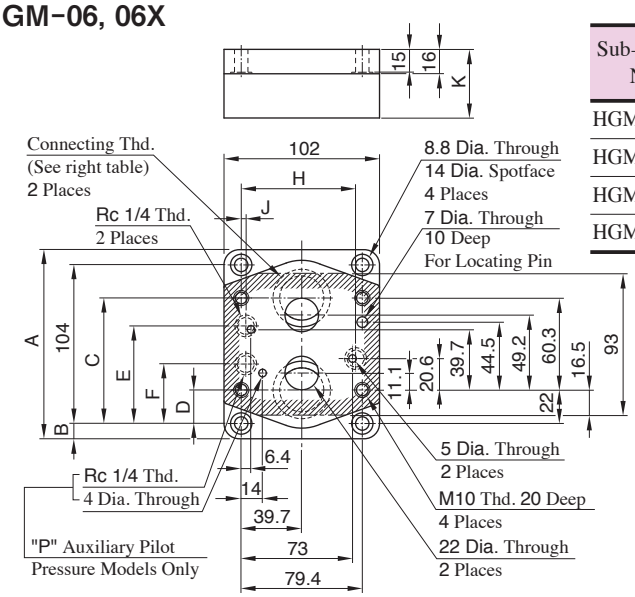
HGM-03, 03X

Sub-plate



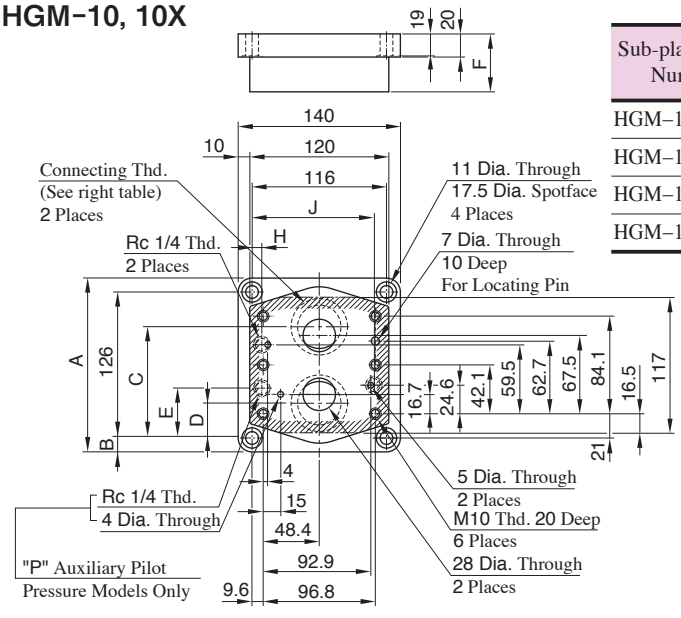
Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H
HGM–03–20	3/8	61	21	40.9	—	35	9.6	32
HGM–03X–20	1/2							
HGM–03–P–20	3/8	69.5	12.5	53.5	28.5	35	11.5	36
HGM–03X–P–20	1/2	67.5	14.5			41		

HGM-06, 06X



Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H	J	K
HGM–06–20	3/4	124	10	77	27	61.7	—	73	6.4	36
HGM–06X–20	1	136	16	82.3	22	61.7	—	75	6.4	45
HGM–06–P–20	3/4	124	10	77	27	64	39	73	3	36
HGM–06X–P–20	1	136	16	82.3	22	64	39	75	3	45

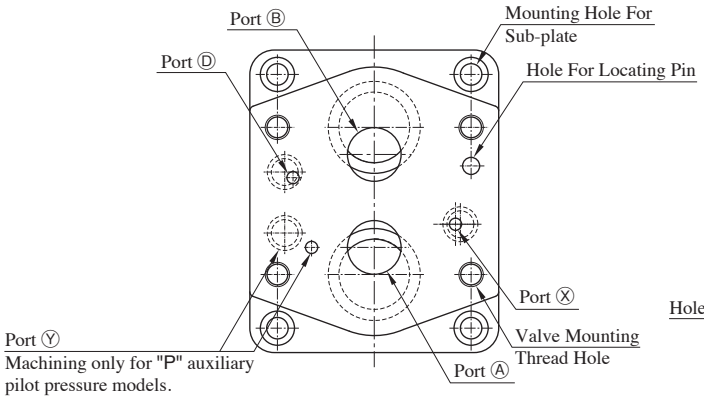
HGM-10, 10X



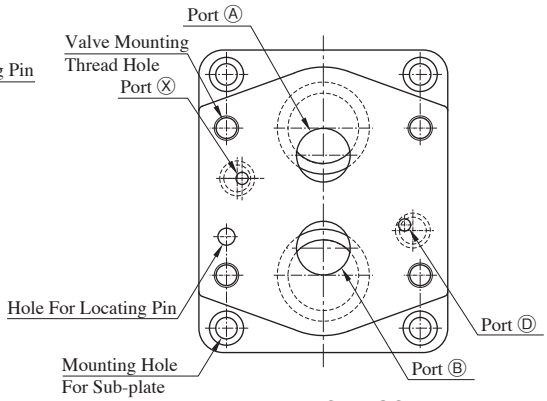
Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H	J
HGM–10–20	1 1/4	150	12	96	30	—	45	13.6	102.5
HGM–10X–20	1 1/2	177	25.5	104	22	—	50	13.6	102.5
HGM–10–P–20	1 1/4	150	12	96	30	43	45	9.6	102.5
HGM–10X–P–20	1 1/2	177	25.5	104	22	43	50	9.6	106

Instructions of HGM Type Sub-plates for Each Control Valves

HGM Type Sub-plates are used for H/HC Type Pressure Control Valves, and for Poppet Type Pressure Control Valves, Pressure Reducing Valves, Pressure Reducing and Check Valves, Pilot Operated Check Valves. See the table below about the connection between each ports and control valves, please use by these indications.



For HG・HCG・CP＊G



For RG・RCG

Name of Ports and Instructions

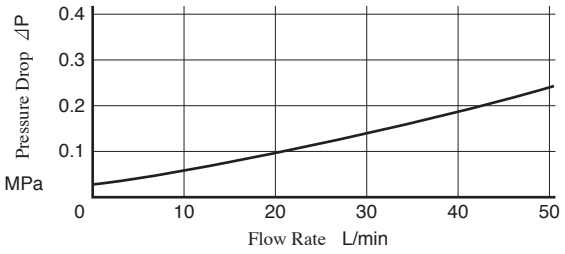
Name of Valves	Valve Model Numbers	Name of Ports				
		Port Ⓐ	Port Ⓑ	Port Ⓓ	Port Ⓧ	Port Ⓨ
H Type Pressure Control Valves	HG 03 -06 10	Primary Pressure Port	Secondary Pressure Port	Drain Port	External Pilot Port	Auxiliary Pilot Port (For "P" models only)
HC Type Pressure Control Valves	HCG 03 -06 10	Primary Pressure Port or Free Flow Outlet Port	Secondary Pressure Port or Free Flow Inlet Port	Drain Port	External Pilot Port	Auxiliary Pilot Port (For "P" models only)
Pressure Reducing Valves	RG 03 -06 10	Primary Pressure Port	Secondary Pressure Port	Not Use	Drain Port	————
Pressure Reducing and Check Valves	RCG 03 -06 10	Primary Pressure Port or Free Flow Outlet Port	Secondary Pressure Port or Free Flow Inlet Port	Not Use	Drain Port	————
Pilot Operated Check Valves	CP＊G 03 -06 10	Free Flow Inlet Port or Reversed Free Flow Outlet Port	Free Flow Inlet Port or Reversed Free Flow Outlet Port	Drain Port ★	Pilot Port	————

★ If use internal drain type valves, have to plug on the drain port Ⓓ of sub-plates.

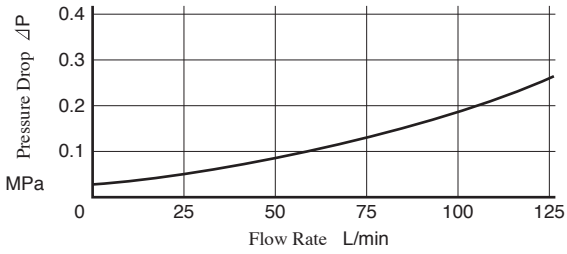
Pressure Drop for Reversed Free Flow

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

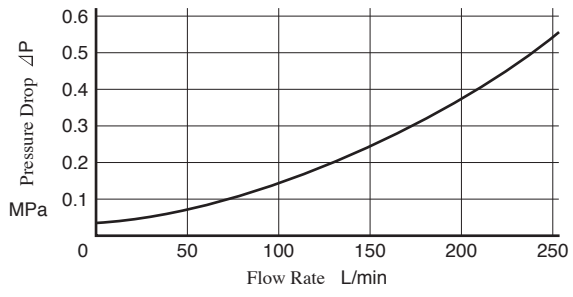
HCT-03
HCG-03



HCT-06
HCG-06



HCT-10
HCG-10



● For any other viscosity, multiply the factors in the table below.

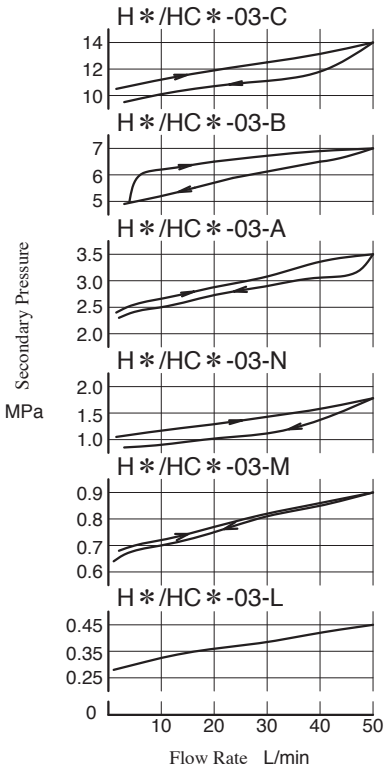
Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

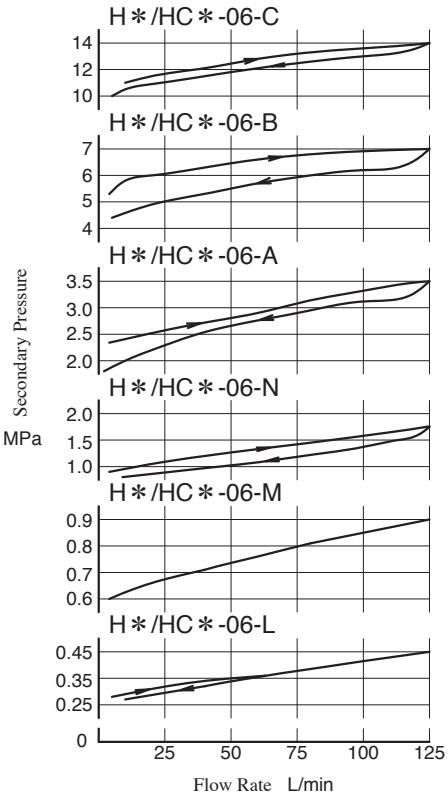
● For any other specific gravity (G'), the pressure drop (P') may be obtained from the formula below.

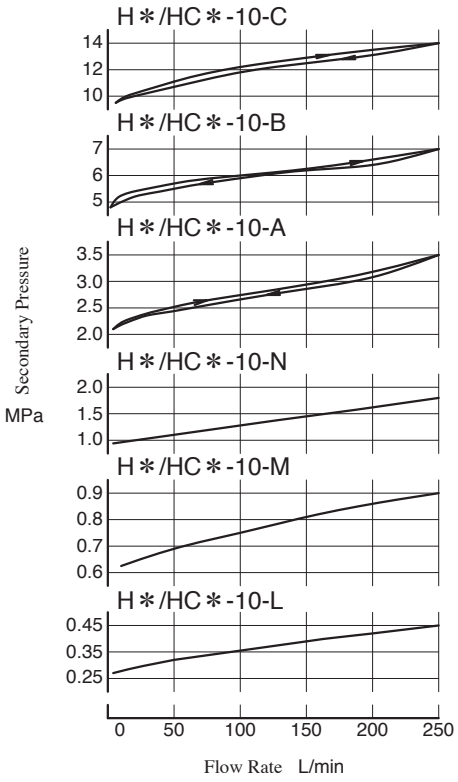
⊿P'= ⊿P (G'/0.850)

Nominal Override Characteristics

Hydraulic Fluid:
Viscosity 35 mm²/s, Specific Gravity 0.850

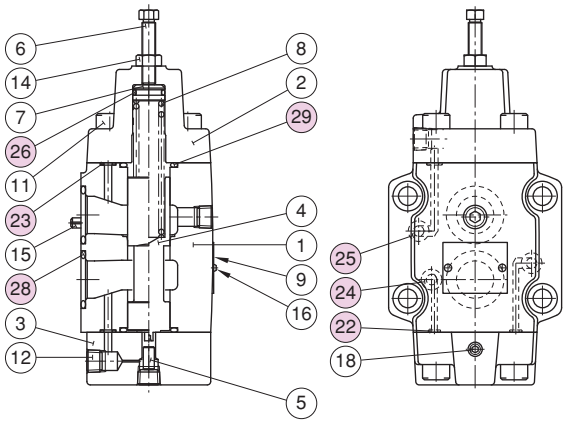






List of Seals

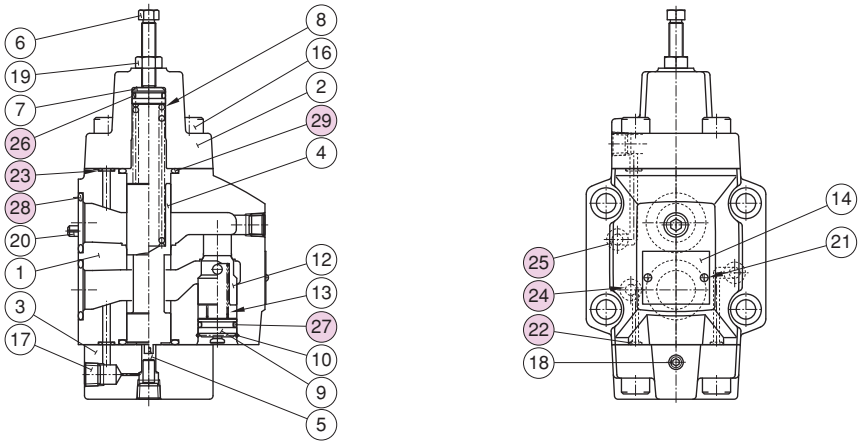
HT-03, 06, 10
HG-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.	
		HT HG -03	HT HG -06	HT HG -10	HT-*	HG-*
22	O-Ring	OR NBR-90 P4-N	OR NBR-90 P4-N	OR NBR-90 P4-N	–	3★
23	O-Ring	OR NBR-90 P6-N	OR NBR-90 P6-N	OR NBR-90 P6-N	4	4
24	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	–	1★
25	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	–	2
26	O-Ring	OR NBR-70-1 P11-N	OR NBR-70-1 P15-N	OR NBR-70-1 P20-N	1	1
28	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	–	2
29	O-Ring	OR NBR-90 P22-N	OR NBR-90 P28-N	OR NBR-90 P36-N	2	2

★ Used only for models with auxiliary pilot pressure (P).

HCT-03, 06, 10
HCG-03, 06, 10

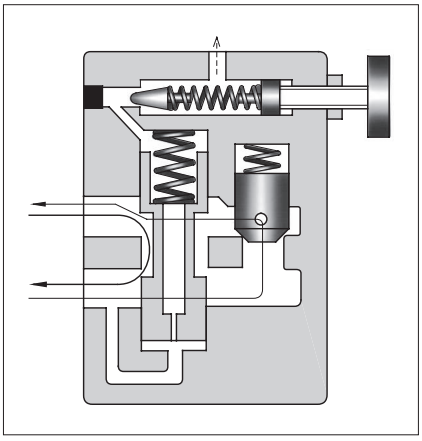


Item	Name of Parts	Part Numbers			Qty.	
		HCT HCG -03	HCT HCG -06	HCT HCG -10	HCT-*	HCG-*
22	O-Ring	OR NBR-90 P4-N	OR NBR-90 P4-N	OR NBR-90 P4-N	–	3★
23	O-Ring	OR NBR-90 P6-N	OR NBR-90 P6-N	OR NBR-90 P6-N	4	4
24	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	–	1★
25	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	–	2
26	O-Ring	OR NBR-70-1 P11-N	OR NBR-70-1 P15-N	OR NBR-70-1 P20-N	1	1
27	O-Ring	OR NBR-90 P12-N	OR NBR-90 P18-N	OR NBR-90 P22A-N	1	1
28	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	–	2
29	O-Ring	OR NBR-90 P22-N	OR NBR-90 P28-N	OR NBR-90 P36-N	2	2

★ Used only for models with auxiliary pilot pressure (P).

Pressure Reducing Valves
Pressure Reducing and Check Valves

Pressure reducing valves are used to set the pressure of a hydraulic circuit below that of the main circuit. In addition, operation under remote control is possible by using the remote control port. Pressure reducing and check valves have check valves, which allow a free flow from the secondary side to the primary.



Specifications

Model Numbers		Max. Operating Pres. MPa	Max. Flow★1		Drain★2 Flow L/min	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting		Setting Pressure MPa	Max. Flow L/min		R∗T Type	R∗G Type
RT RCT-03-∗-22	RG RCG-03-∗-22	21	0.7 - 1.0	40	0.8 - 1.0	RT : 4.3 RCT : 4.8	RG : 4.5 RCG : 5.4
			1.0 - 20.5	50			
RT RCT-06-∗-22	RG RCG-06-∗-22	21	0.7 - 1.0	50	0.8 - 1.1	RT : 6.9 RCT : 7.8	RG : 6.8 RCG : 8.1
			1.0 - 1.5	100			
			1.5 - 20.5	125			
RT RCT-10-∗-22	RG RCG-10-∗-22	21	0.7 - 1.0	130	1.2 - 1.5	RT : 12.0 RCT : 13.8	RG : 11.0 RCG : 13.8
			1.0 - 1.5	180			
			1.5 - 10.5	220			
			10.5 - 20.5	250			

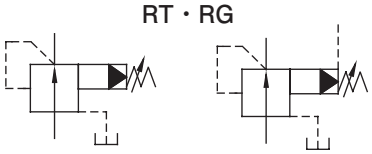
★1. The max. flow rates are those shown at the primary pressure at 21 MPa.
★2. The drain flow rates are equal to pilot flow rates when differential pressure between primary and secondary pressure is at 20.5 MPa.

Yuken can offer flanged connection valves described below.
For details, contact us.

Model Numbers	Max. Operating Pres. MPa	Max. Flow L/min
RF RCF-10-∗-22	21	250
RF RCF-16-∗-20		500

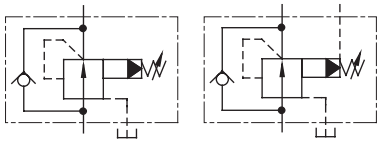
Graphic Symbols

RT・RG



Remote control connection

RCT・RCG



Remote control connection

Model Number Designation

RC	T	−03	−B	−22
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa	Design Number
R : Pressure Reducing Valves	T : Threaded Connection	03	B : 0.7 - 7 C : 3.5 - 14 H : 7 - 20.5	22
		06		22
		10		22
RC : Pressure Reducing and Check Valves	G : Sub-plate Mounting	03		22
		06		22
		10		22

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
RG RCG-03	HGM-03-20	3/8	1.6
	HGM-03X-20	1/2	
RG RCG-06	HGM-06-20	3/4	2.4
	HGM-06X-20	1	3.0
RG RCG-10	HGM-10-20	1 1/4	4.8
	HGM-10X-20	1 1/2	5.7

- Sub-plates are available. Specify the sub-plate model number from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
- The sub-plates are the same as those for H type pressure control valves. With the reducing and check valve, the sub-plate is used in a position 180° turned (upside down) from the normal position. When mounting the sub-plate, be sure to bring the valve locating pin to the sub-plate pin hole. For dimensions, see page C-32. For instruction details, see page C-33.

Instructions

- To adjust the pressure, loosen the lock nut and turn the pressure adjustment handle slowly clockwise for higher pressures and anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Connect the drain port directly to the reservoir in which case the pressure at the drain port should be kept at a low back pressure close to the atmospheric pressure.

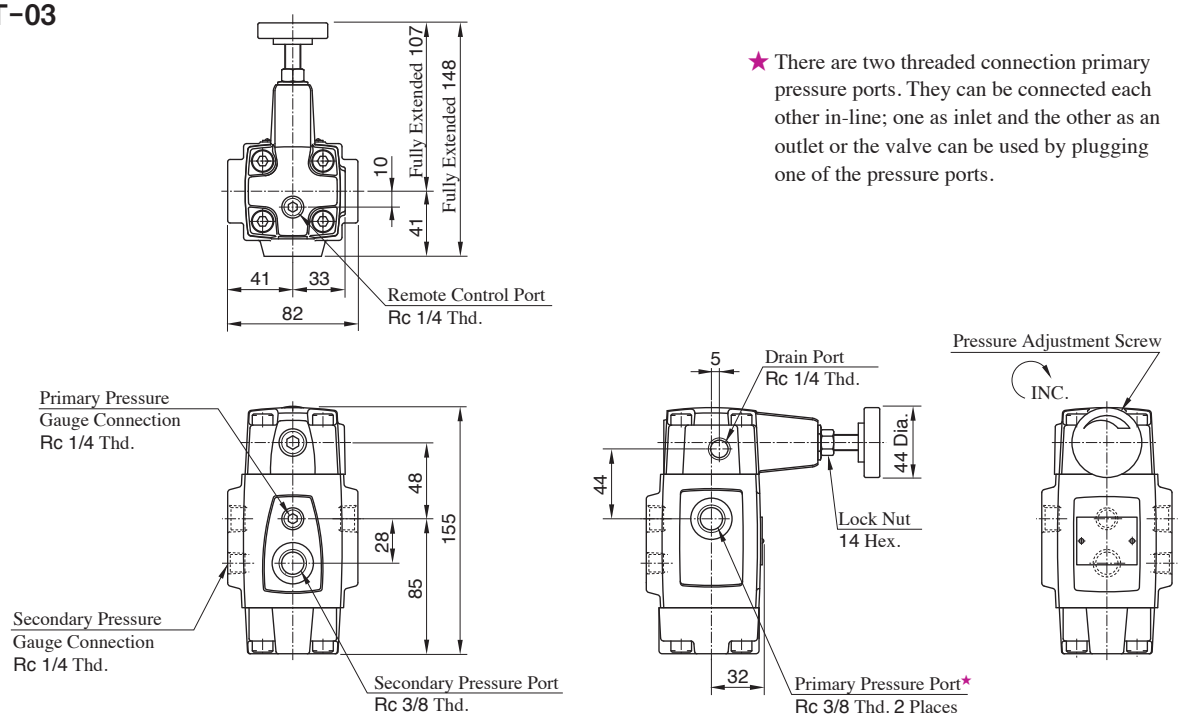
Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
RG–03	M10×50L…4 Pcs.
RG–06	M10×50L…4 Pcs.
RG–10	M10×50L…6 Pcs.

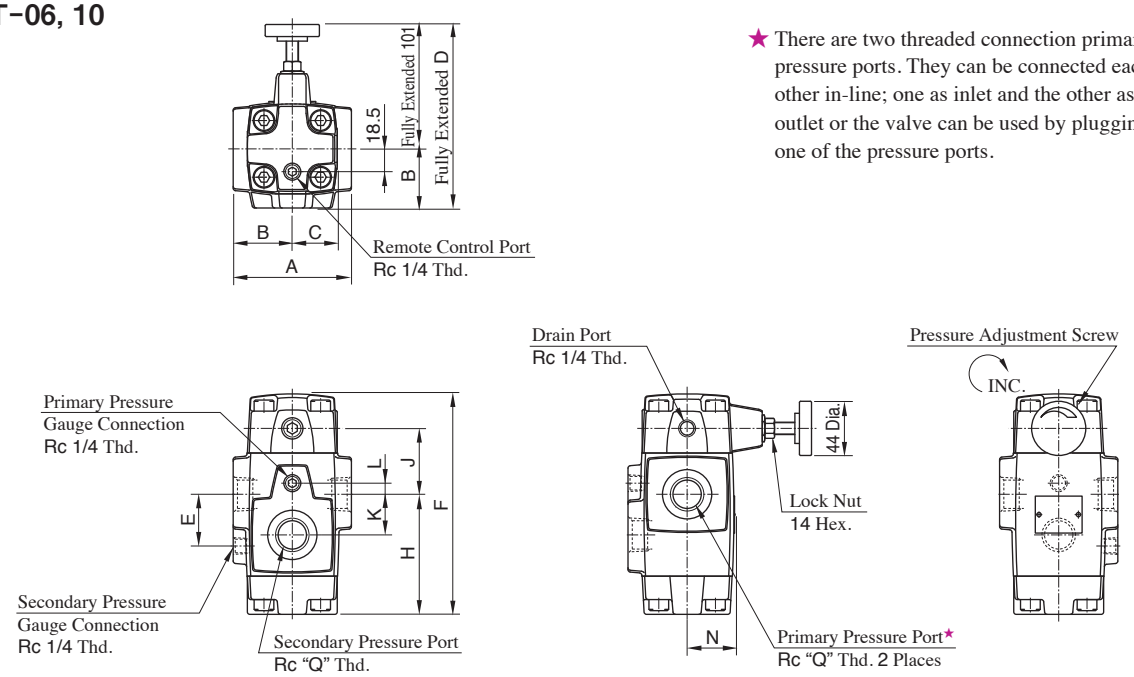
Valve Model Numbers	Socket Head Cap Screw
RCG–03	M10×70L…4 Pcs.
RCG–06	M10×80L…4 Pcs.
RCG–10	M10×90L…6 Pcs.

RT-03



★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

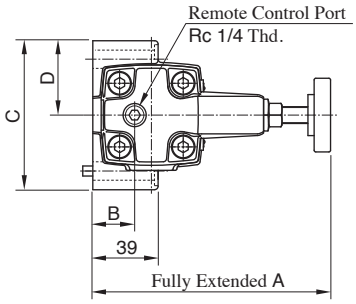
RT-06, 10



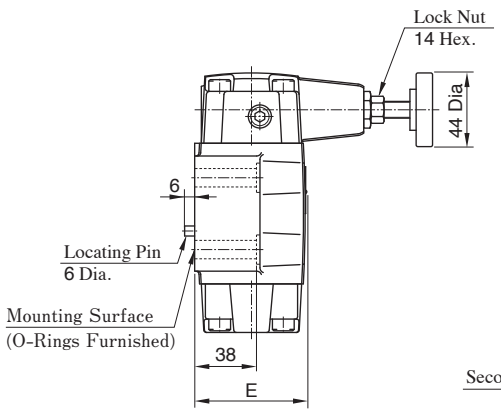
★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

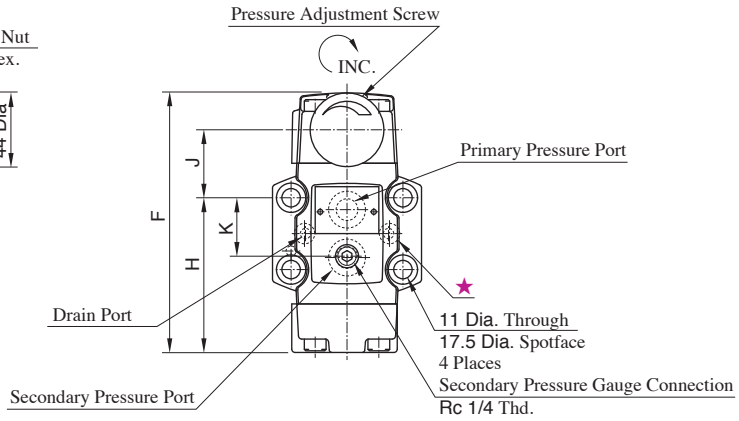
Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Q
RT-06	96	48	36.5	149	42	179	97.5	53.5	33	9	39	3/4
RT-10	132	66	43	167	52	216	124	64	40	12	46	1 1/4

RG-03, 06



★ This port is well machined, but not required. Because the body is used together with H type pressure control valves.

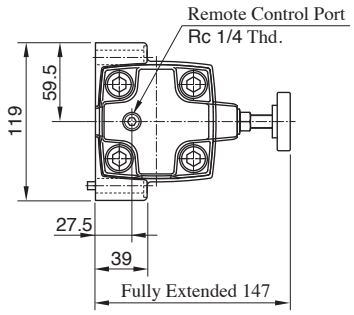




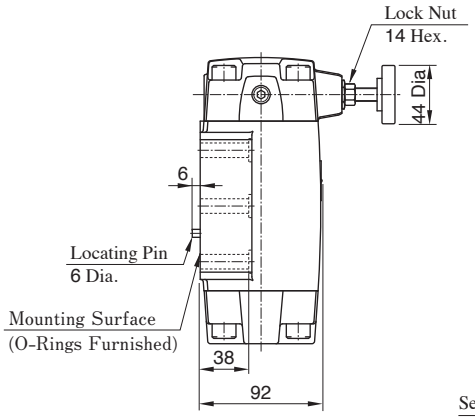
Model Numbers	A	B	C	D	E	F	H	J	K
RG-03	142	25	89	44.5	67	155.5	92.4	40.6	34.9
RG-06	141	21.5	102	51	79	179	111	40	48

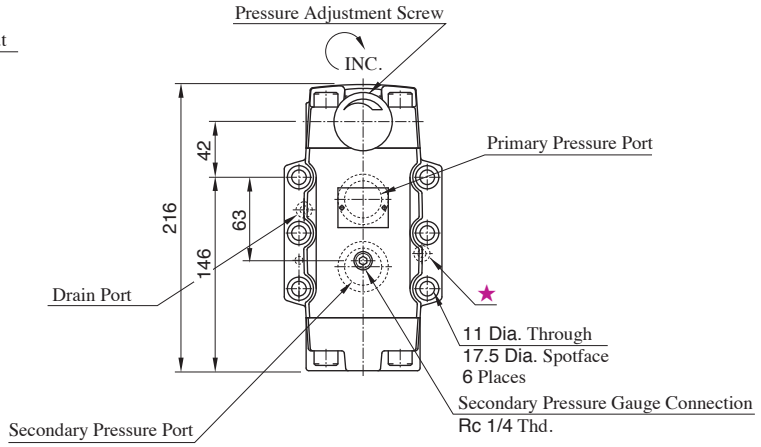
Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

RG-10



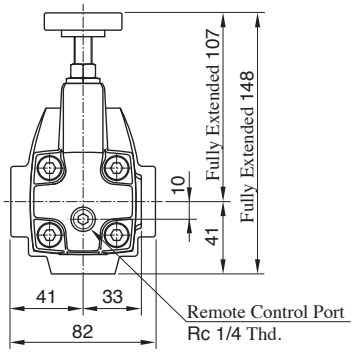
★ This port is well machined, but not required. Because the body is used together with H type pressure control valves.



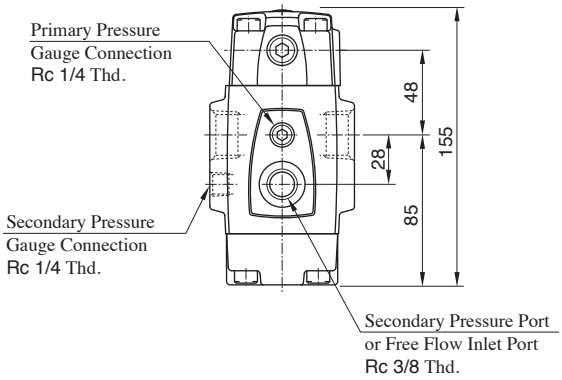


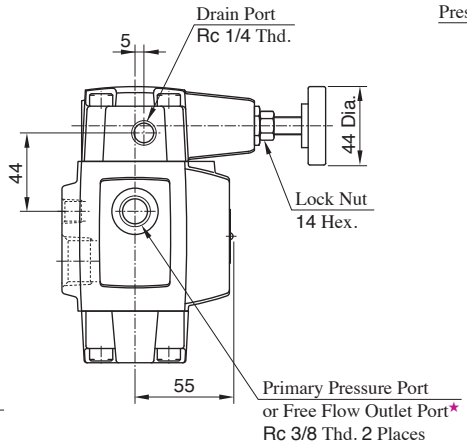
Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

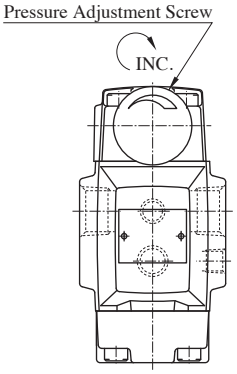
RCT-03



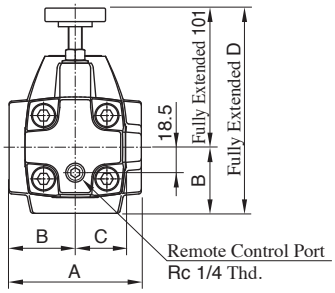
★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.



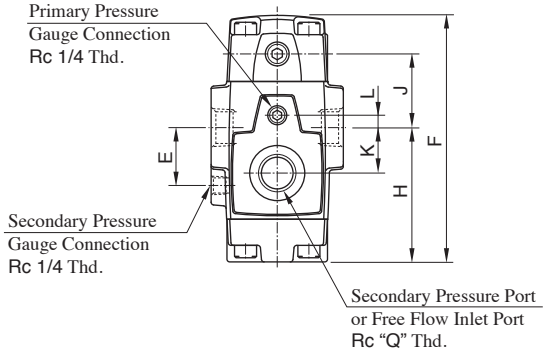


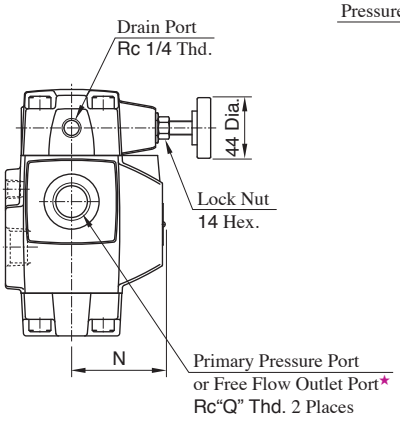


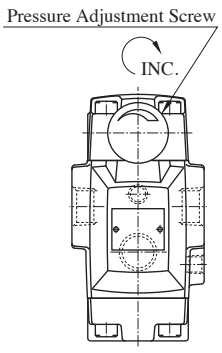
RCT-06, 10



★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

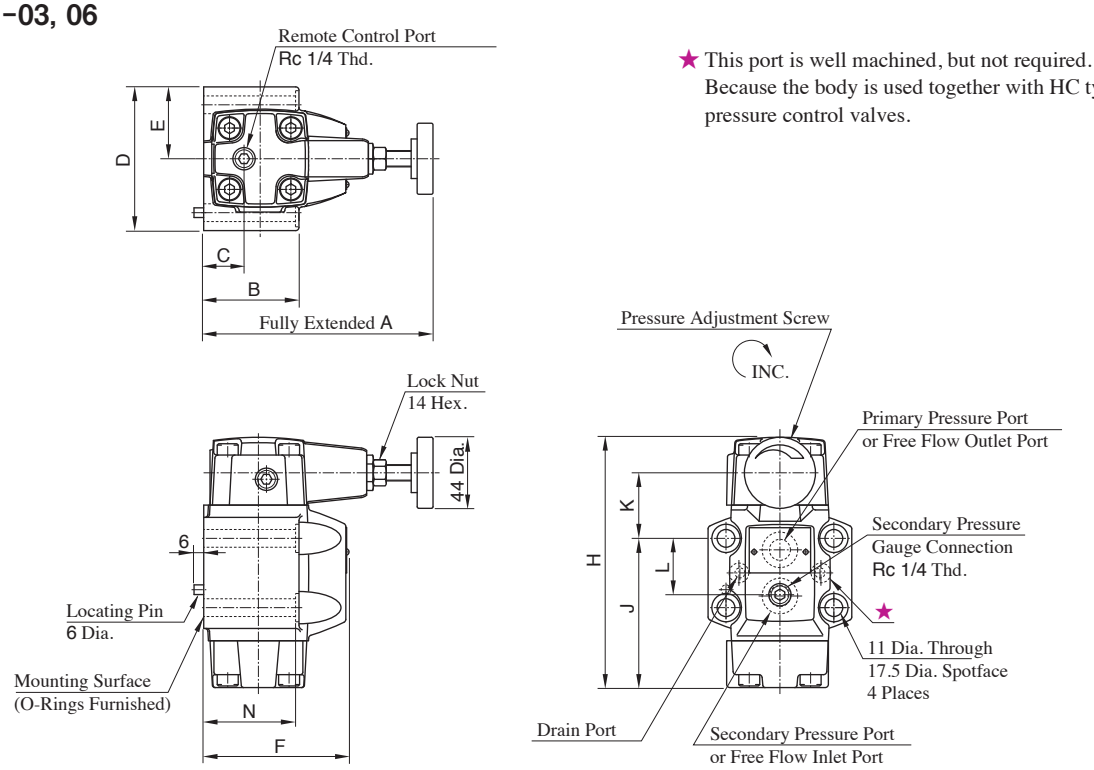






Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Q
RCT-06	96	48	36.5	149	42	179	97.5	53.5	33	9	68	3/4
RCT-10	132	66	43	167	52	216	124	64	40	12	86	1 1/4

RCG-03, 06

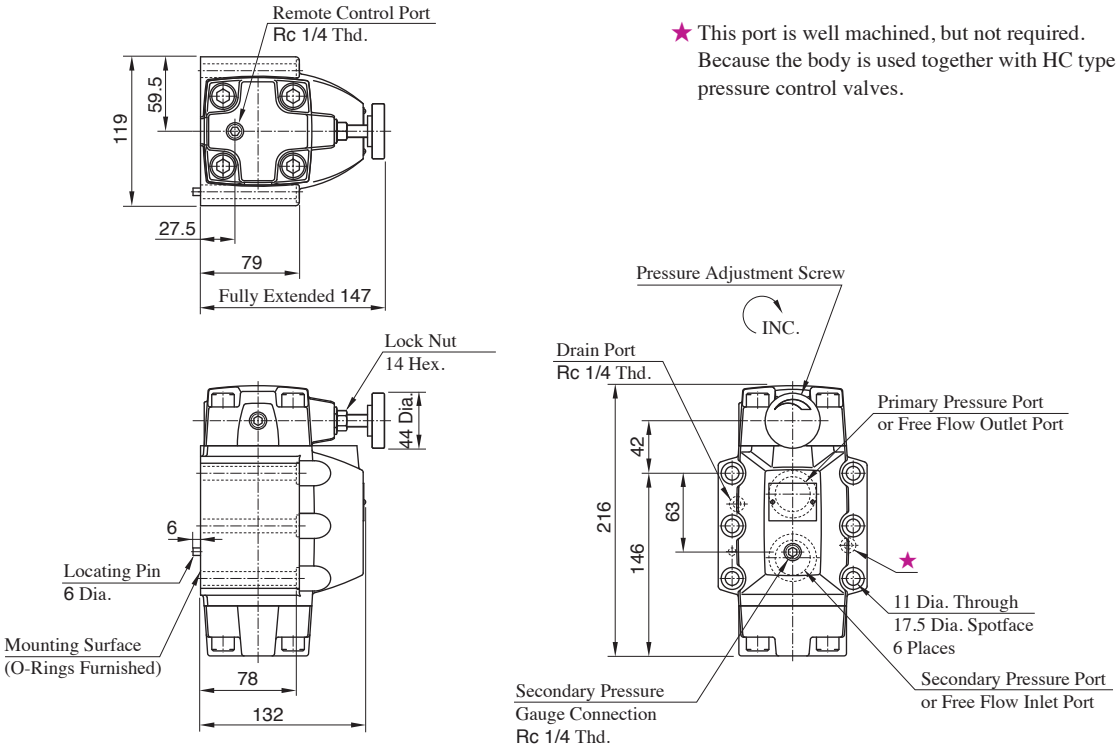


★ This port is well machined, but not required. Because the body is used together with HC type pressure control valves.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N
RCG–03	142	59	25	89	44.5	90	155.5	92.4	40.6	34.9	58
RCG–06	141	69	21.5	102	51	108	179	111	40	48	68

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

RCG-10



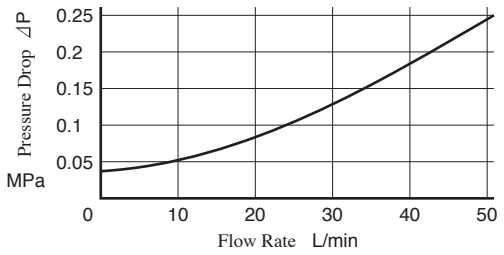
★ This port is well machined, but not required. Because the body is used together with HC type pressure control valves.

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

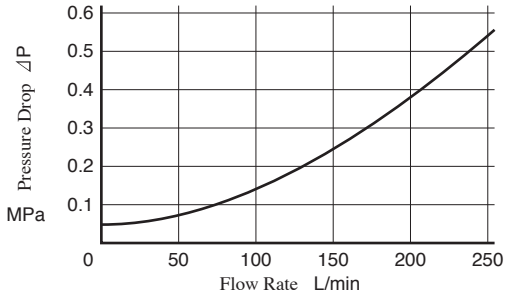
Pressure Drop for Reversed Free Flow

Hydraulic Fluid:
Viscosity 35 mm²/s, Specific Gravity 0.850

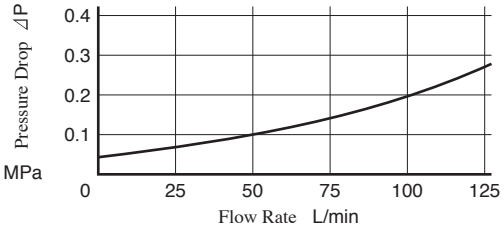
RCT-03
RCG-03



RCT-10
RCG-10



RCT-06
RCG-06



● For any other viscosity, multiply the factors in the table below.

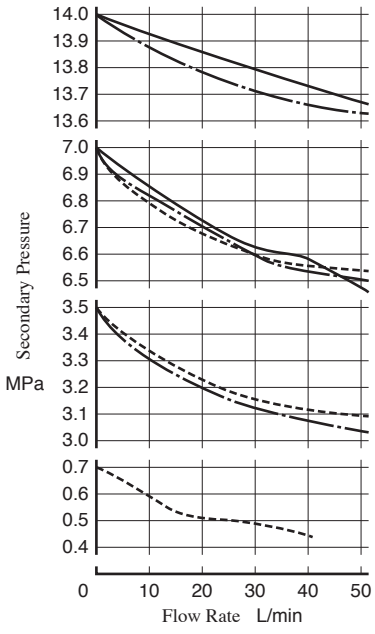
Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

● For any other specific gravity (G'), the pressure drop (P') may be obtained from the formula below.
⊿P'= ⊿P (G'/0.850)

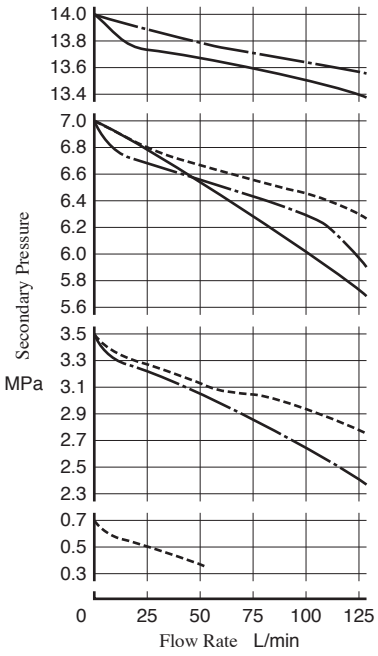
Flow Rate vs. Secondary Pressure

Primary Pressure : 21 MPa
Hydrauric Fluid : Viscosity 35 mm²/s

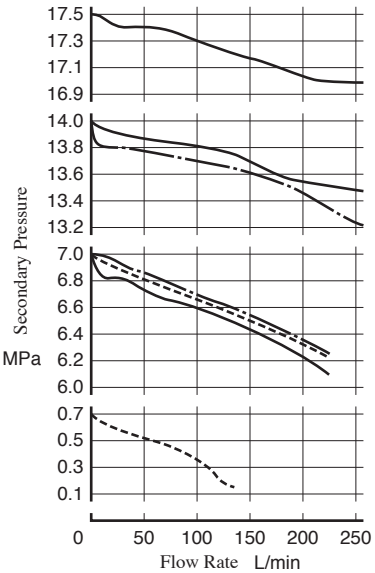
RT/RG-03
RCT/RCG-03



RT/RG-06
RCT/RCG-06



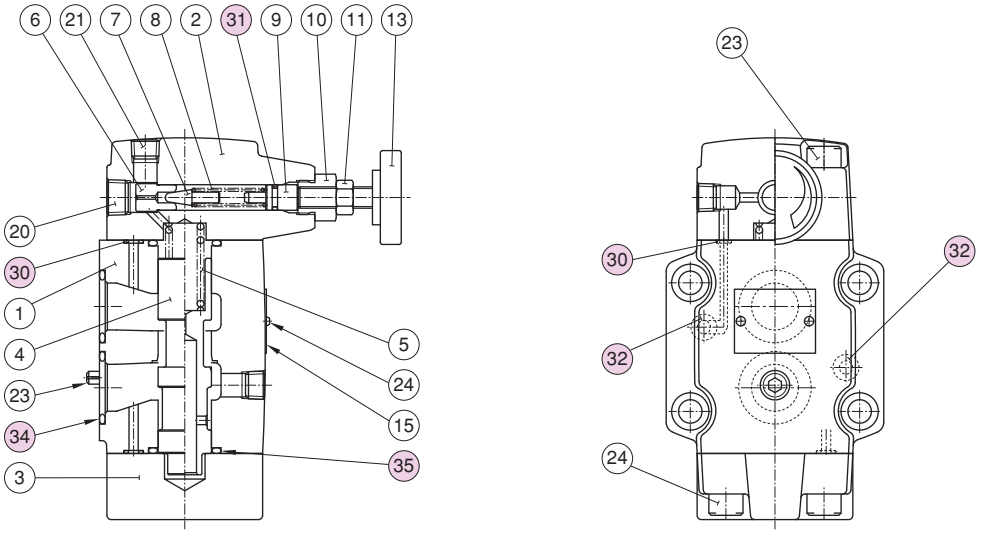
RT/RG-10
RCT/RCG-10



Pressure Adj. Range
---------- : "B"
—·—·— : "C"
———— : "H"

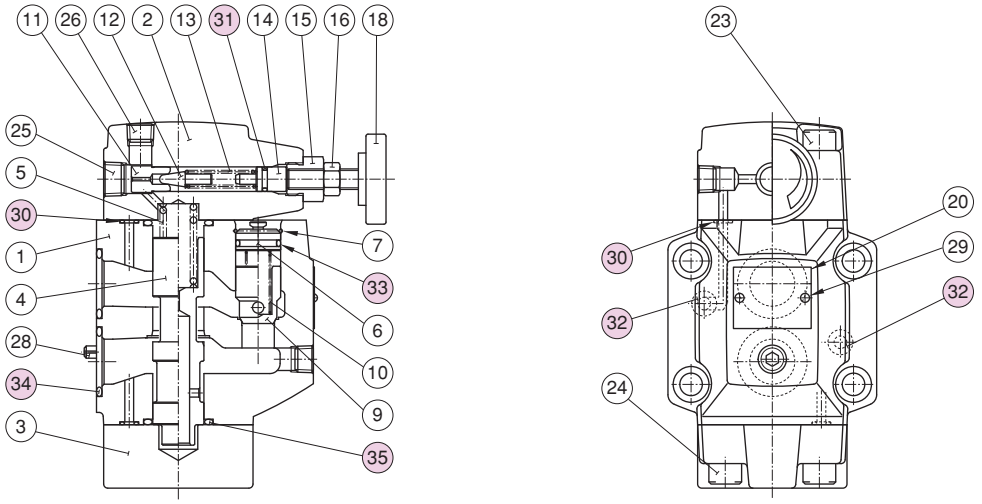
List of Seals

RT-03, 06, 10
RG-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.	
		RT RG -03	RT RG -06	RT RG -10	RT-*	RG-*
30	O-Ring	OR NBR-90 P6-N	OR NBR-90 P6-N	OR NBR-90 P6-N	4	4
31	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1	1
32	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	–	2
34	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	–	2
35	O-Ring	OR NBR-90 P22-N	OR NBR-90 P28-N	OR NBR-90 P36-N	2	2

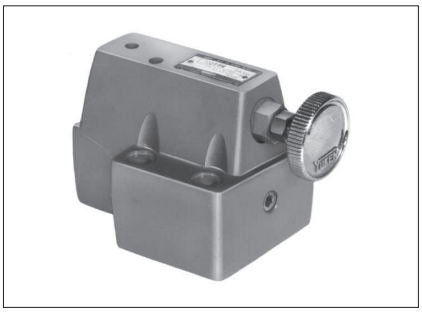
RCT-03, 06, 10
RCG-03, 06, 10

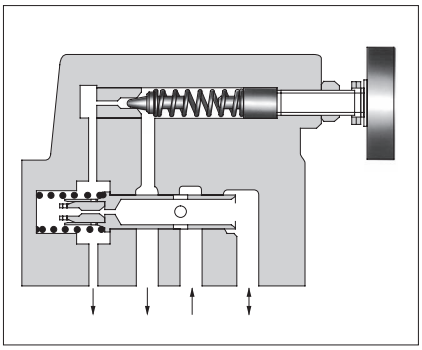


Item	Name of Parts	Part Numbers			Qty.	
		RCT RCG -03	RCT RCG -06	RCT RCG -10	RCT-*	RCG-*
30	O-Ring	OR NBR-90 P6-N	OR NBR-90 P6-N	OR NBR-90 P6-N	4	4
31	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1	1
32	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	–	2
33	O-Ring	OR NBR-90 P12-N	OR NBR-90 P18-N	OR NBR-90 P22A-N	1	1
34	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	–	2
35	O-Ring	OR NBR-90 P22-N	OR NBR-90 P28-N	OR NBR-90 P36-N	2	2

Pressure Reducing and Relieving Valves

Pressure reducing and relieving valves are composite pressure control valves having pressure reducing and counterbalancing functions developed for hydraulic balancing circuits.





Specifications

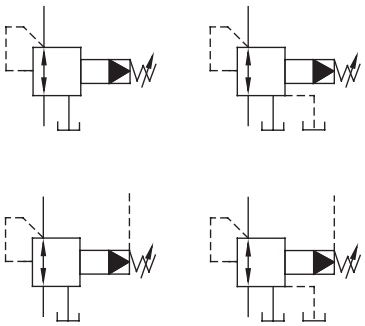
Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min	Relieving Flow L/min	Drain Flow L/min	Approx. Mass kg
RBG-03-*-10	14	0.6 - 13.5	50	50	0.6 - 1	4.2
RBG-06-*-10	25	0.8 - 24.5	125	125	1.5 - 2	11

Model Number Designation

RB	G	−03	−R	−10
Series Number	Type of Mounting	Valve Size	Drain Type	Design Number
RB : Pressure Reducing and Relieving Valves	G : Sub-plate Mounting	03 06	None: Internal Drain R : External Drain	10

Graphic Symbols

Internal Drain | External Drain



Vent Connection

Instructions

- To use remote control relief valve in the venting circuit, see page C-3. If the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the pressure adjustment handle slowly clockwise for higher pressures and anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Connect the tank pipe not to any other line but directly to the reservoir.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
RBG-03	RBGM-03-10	3/8	1.6
	RBGM-03X-10	1/2	
RBG-06	RBGM-06-10	3/4	4.8
	RBGM-06X-10	1	

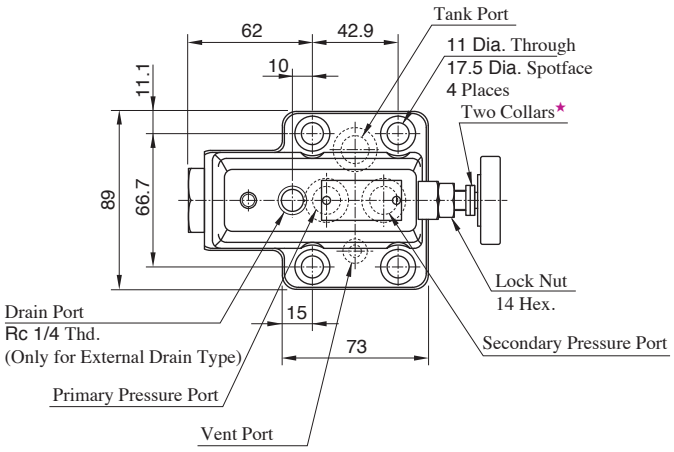
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\sqrt{6.3}$)

Accessories

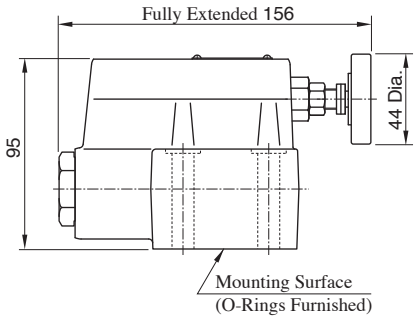
Mounting Bolts

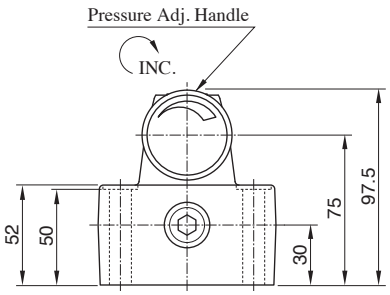
Valve Model Numbers	Socket Head Cap Screw
RBG-03	M10×65L ..... 4 pcs.
RBG-06	M10×70L ..... 4 pcs.

RBG-03



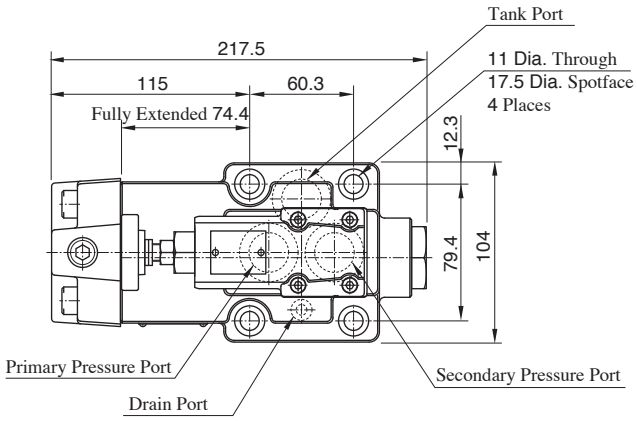
★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

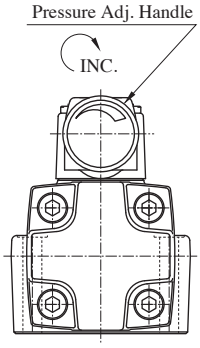


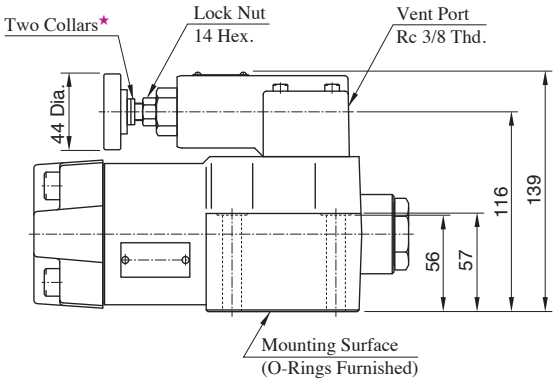


RBG-06

★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

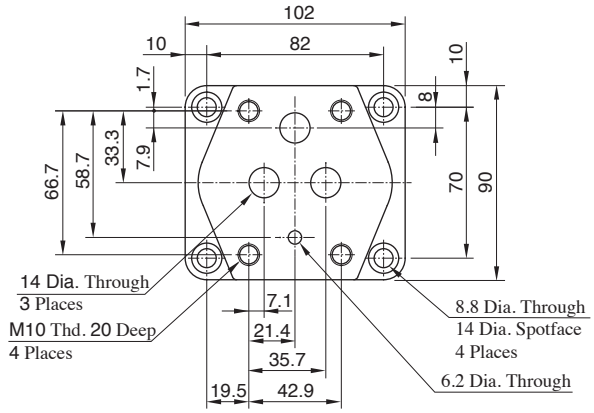


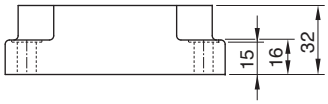


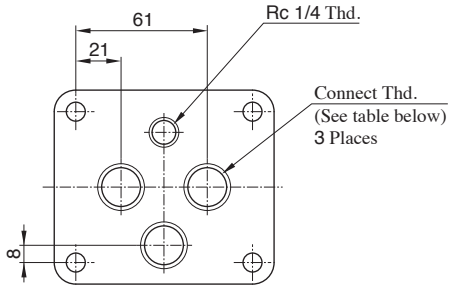


Sub-plate

RBGM−03＊

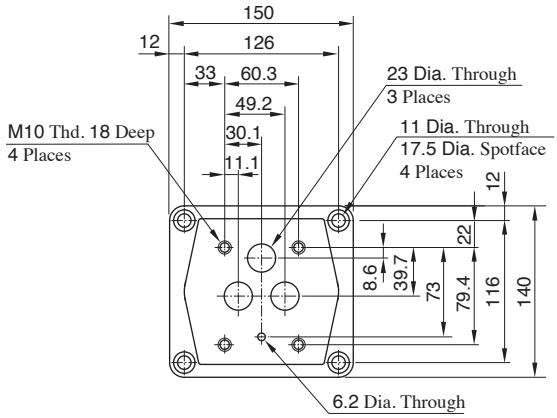


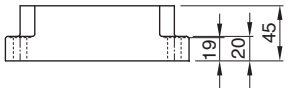


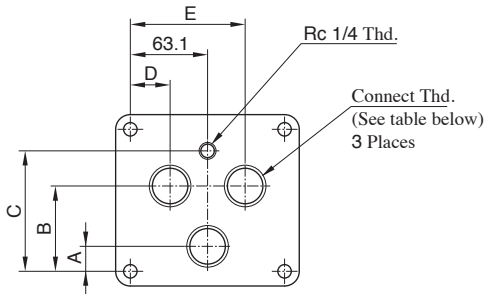


Sub-plate Model Numbers	Thread Size Rc
RBGM-03-10	3/8
RBGM-03X-10	1/2

RBGM−06＊







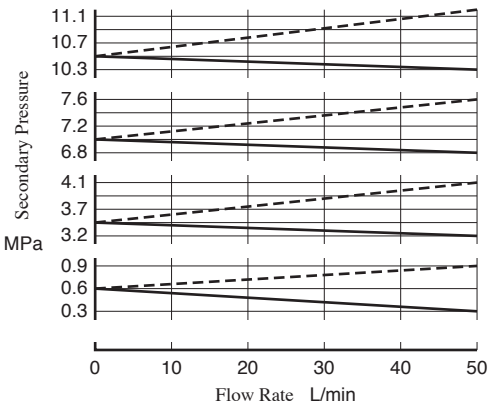
Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E
RBGM-06-10	3/4	20.7	65.7	95	37.1	89.1
RBGM-06X-10	1	20.4	69.7	98.4	32.5	93.8

Nominal Override Characteristics

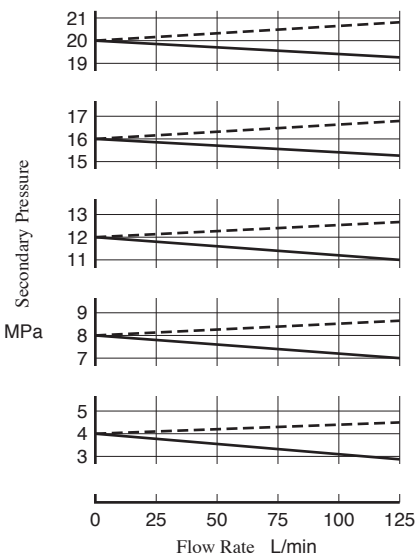
Hydraulic Fluid: Viscosity 35 mm²/s
Specific Gravity 0.850

Relieving
Reducing

RBG-03



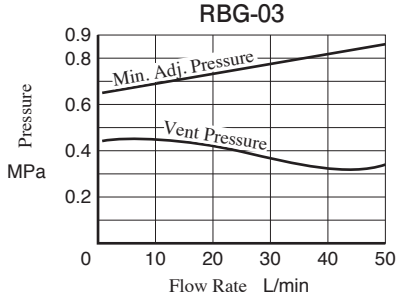
RBG-06



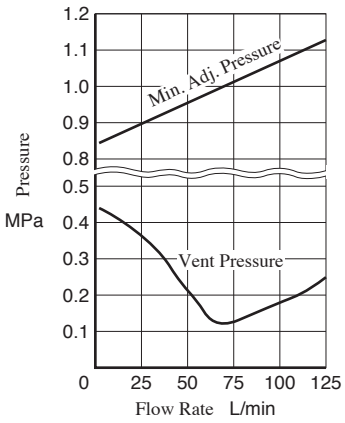
Min. Adj. Pressure & Vent Pressure

Hydraulic Fluid: Viscosity 35 mm²/s
Specific Gravity 0.850

RBG-03



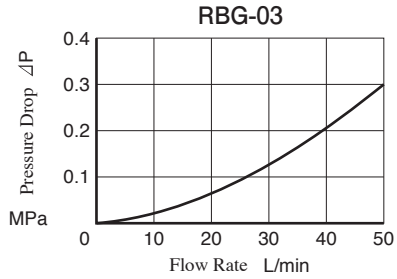
RBG-06



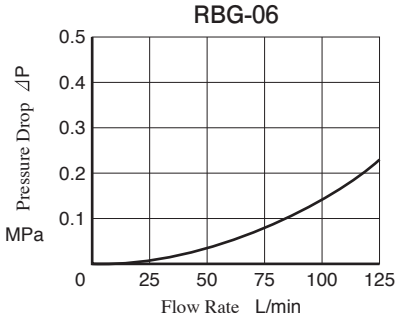
Pressure Drop

Hydraulic Fluid: Viscosity 35 mm²/s
Specific Gravity 0.850

RBG-03



RBG-06

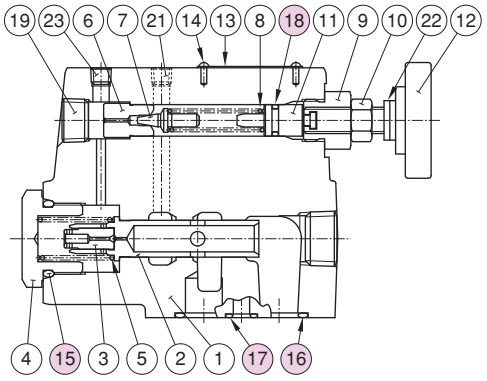


- For any other viscosity, multiply the factors in the table right.
- For any other specific gravity (G'), the pressure drop (P') may be obtained from the formula below.
  ⊿P'= ⊿P (G'/0.850)

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

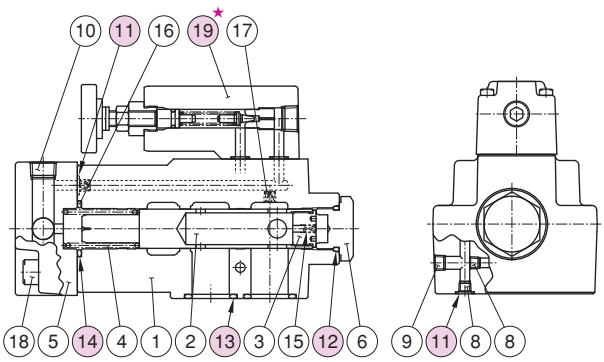
List of Seals

RBG-03



Item	Name of Parts	Part Numbers	Qty.
15	O-Ring	OR NBR-90 P24-N	1
16	O-Ring	OR NBR-90 P18-N	3
17	O-Ring	OR NBR-90 P9-N	1
18	O-Ring	OR NBR-70-1 P9-N	1

RBG-06

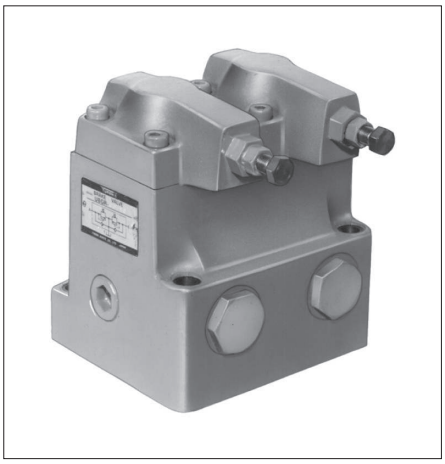


Item	Name of Parts	Part Numbers	Qty.
11	O-Ring	OR NBR-90 P9-N	2
12	O-Ring	OR NBR-90 P24-N	1
13	O-Ring	OR NBR-90 P28-N	3
14	O-Ring	OR NBR-90 P30-N	1

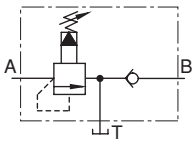
★ For details of pilot relief valves item ⑲, see page C-4, DG-01.

Brake Valves

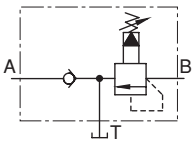
Brake valves are used on hydraulic cylinders and in brake circuits of hydraulic motors. They can brake with any pressure, permitting smooth stopping.



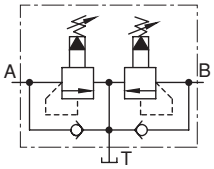
Graphic Symbols



03
UBGR-06-A
10



03
UBGR-06-B
10



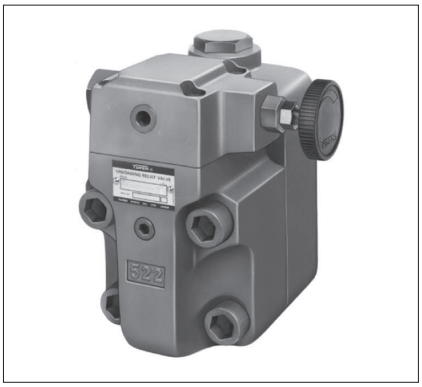
03
UBGR-06-W
10

Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min
UBGR-03-＊-B-20	25	0.7 - 7.0	50
UBGR-03-＊-H-20		3.5 - 25	
UBGR-06-＊-20		0.7 - 25	125
UBGR-10-＊-20		0.7 - 25	200

Unloading Relief Valves

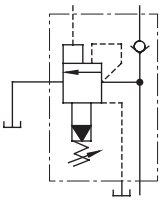
These valves are used to operate the pumps with minimum load in accumulator circuits or in high-low pump circuits.



Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min
BUCG-06-＊＊-30	21	B：2.5 - 7.0 C：3.5 - 14 H：7.0 - 21	125
BUCG-10-＊＊-25			250

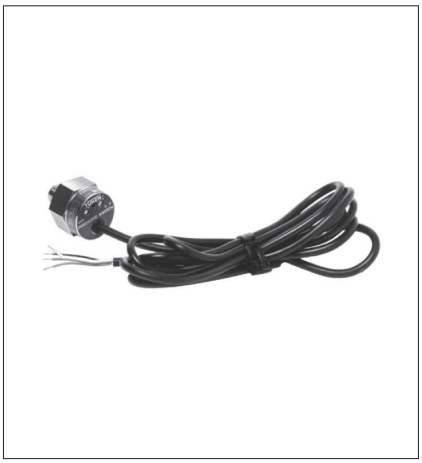
Graphic Symbol



For details about Brake Valves and Unloading Relief Valves, please contact us.

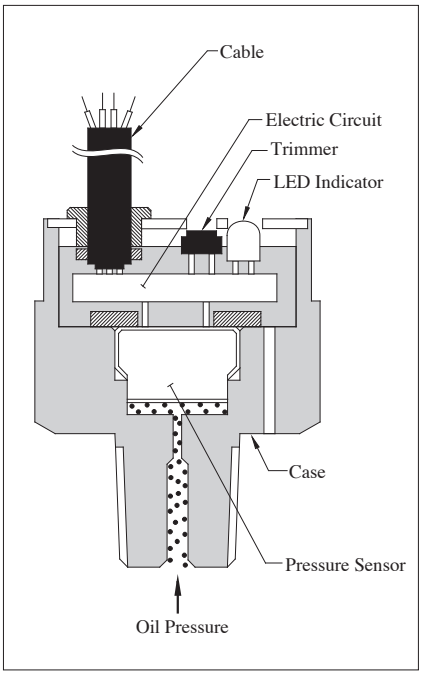
Semiconductor Type Pressure Switches

These pressure switches have built-in electronic circuit on a semiconductor pressure sensor and an open collector insulated by a photocoupler has been used as output. As the use of semiconductor has put movable parts away from the sensor section, high reliability and durability can be obtained.
These pressure switches are suitable for the applications not only compact, light weight and vibration-proof are required but also better substitute to conventional pressure switches.



Model Number Designation

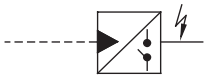
J	T	−02	−100	−11
Series Number	Type of Mounting	Valve Size	Max. Setting Pressure MPa	Design Number
J : Semiconductor Type Pressure Switch	T : Threaded Connection	02	35 : 3.5 100 : 10 200 : 20 350 : 35	11



Descriptions \ Model Numbers	JT-02 -35-11	JT-02 -100-11	JT-02 -200-11	JT-02 -350-11
Max. Operating Pressure MPa	10	10	20	35
Proof Pressure MPa	20	20	40	50
Pressure Setting Range MPa	0.1 - 3.5	1 - 10	2 - 20	3.5 - 35
Pressure Setting (ON Pressure Setting)	Single adjustment: ON trimmer setting (variable resistor)★			
Differential Pressure Setting (OFF Pressure Setting)	Single adjustment: DIFF trimmer setting ★ (-1 to -10% of the ON pressure setting)			
Sign on act	When the ON pressure, the LED indicator lights.			
Output System	Open collector (photocoupler insulated) Maximum operating voltage : 35 VDC; maximum current: 100 mA			
Power Source	10 to 28 VDC (ripple included). A constant-voltage power supply must be used. Current consumption: 10 mA.			
Insulation Resistance	100 MΩ or more			
Response Time	1.5ms (no damper)	20 ms (damper contained)		
Repeatability	Approx. 0.5 %			
Operating Temperature Range	–20 - +70℃			
Setting Fluctuation with Temperature Drift	1% or less of the maximum operating pressure relative to 10 °C change.			
Storage Temperature Range	–40 - +105℃			
Dust-proofness / Water-Proofness	IEC Pub. 529 IP54			
Vibration-resistance	98m/s² (10 - 55 Hz) X direction : 2h, Y direction : 2h, Z direction : 2h			
Shock-resistance	98 m/s²			
Mass	175g			

★ Trimmer Rotation Angle: 0 to 260°

Graphic Symbol



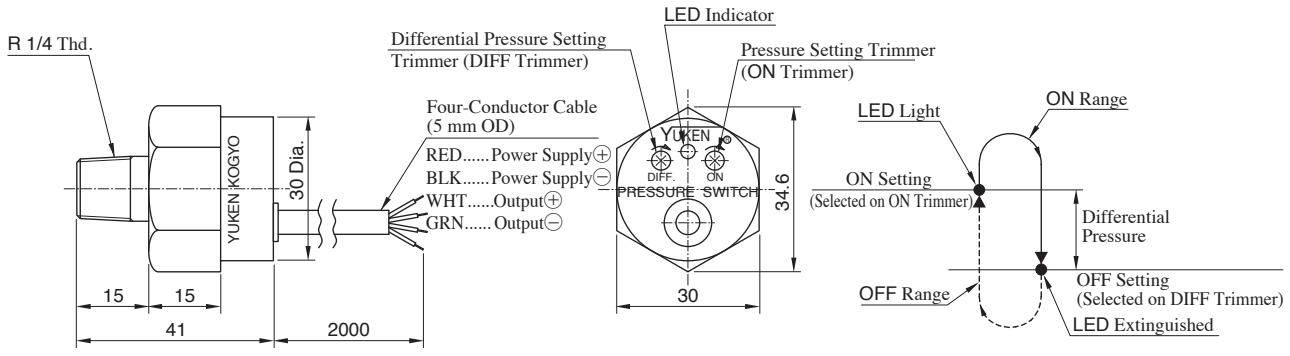
Instructions

Voltage-proof test should not be carried out as semiconductor has been used.

With Protect Cover

The models with protect cover those dust-proofness / water-proofness grade up to IP65 level is available.
(Example) JT-02-35-S-11
└ With Protect Cover

For details of the models with protect cover, please contact us.

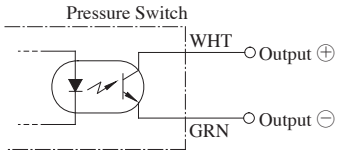


Adjustment

1. Before starting, turn the ON and DIFF trimmers fully clockwise. (Trimmer Rotation Angle:0 – 260°)
2. Turn on the power.
3. < ON pressure setting >
   Apply required pressure to the switch. Turn ON trimmer slowly anti-clockwise and stop it when LED indicator lights, ON setting obtained.
4. < Differential pressure setting >
   Gradually reduce pressure to obtain the required OFF pressure. Then, turn DIFF trimmer anti-clockwise slowly and stop it when LED indicator goes off. The OFF setting is now obtained.
5. Make sure if "ON" or "OFF" setting is correct by working of LED indicator when applying or reducing pressure repeatedly several times.

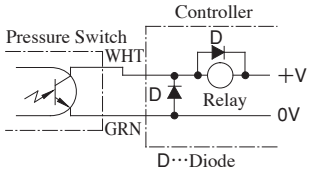
Application Examples of Electrical Circuit

Output Circuit of Semiconductor Type Pressure Switch (Internal Circuit)



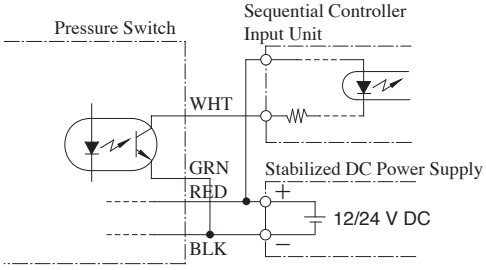
Direct Relay Drive

- Use relay operatable at 100 mA or lower.
- Connect surge voltage absorption diode (D) in parallel with the relay coil.
- Connect pretective diode (D) between the white and green wires.

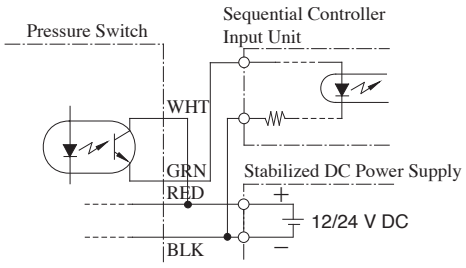


Connection to Sequential Controller

1. Sink System



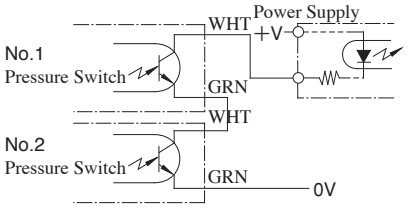
2. Source System



The usage below is possible because output circuit is insulated by a photocoupler.

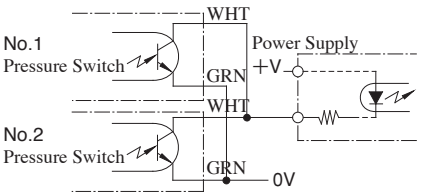
1. When AND circuit Two Pressures

The sequential controller is signaled only when pressure switches No. 1 and 2 are both ON.



2. When OR circuit two pressures

The sequential controller is signaled when either of pressure switches No. 1 and 2 is ON.



Pressure Monitoring System

The pressure monitoring system is for watching hydraulic system pressure and is composed of highly reliable pressure sensor (SJT*-02-10) and easy-to-use digital pressure monitor (DP*-*-*-10). There is no specific model number code for the pressure monitoring system itself, therefore, when ordering, specify the digital pressure monitor and pressure sensor with respective model number code.

● Remote Pressure Indication

Even if the monitor is located away from the unit, remote pressure indication can be obtained by combination with special sensors.

● Remote-Setting Pressure Switches

The pressure sensor can be used as a pressure switch with two contacts: top and bottom. Pressure can be set and checked without using any other pressure gauge, moreover, such pressure setting and pressure check can be made when no pressure is applied in the hydraulic system.

Digital Pressure Monitors

The digital pressure monitor indicates the system pressure and also dispatches signals when the system pressure reaches to the preset pressure. The monitor can be separated from the sensor and installed away from the sensor. The monitor and the sensor so separately installed can be connected by wire, therefore, a long hydraulic piping is not required. The digital pressure monitor provides high accuracy when it is used with a special pressure sensor (SJT*-02-10).

■ Specifications

Model Numbers	Input Voltage	Output System	Pressure Setting
DP20-∗-∗-10	0 - 4.5V/0 - 19.6 MPa	Open-collection output × 2 40 V - 100 mA (max.)	Total 4 points: high (HI) and low (LO) limits for 2 channels (each set independently)
DP35-∗-∗-10	0 - 4.5V/0 - 34.3 MPa		

Pressure Sensors

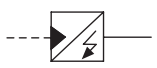
The pressure sensor uses semiconductors and has no moving parts for high reliability and durability.
It provides high accuracy when combined with the special monitor (DP*-*-*-10)

■ Specifications

Model Numbers	Rated Pres. Range	Output Range ★	Power Supply
SJT20-02-10	0 - 20 MPa	0.5 - 4.5V	DC 5.0±0.5V
SJT35-02-10	0 - 35 MPa		

★ Proportional to supply voltage if this voltage is 5.00 V

Graphic Symbol



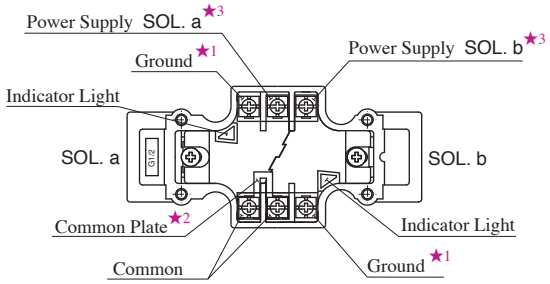
——— For details about Pressure Monitoring System, please contact us. ———

Electrical Conduit Connection

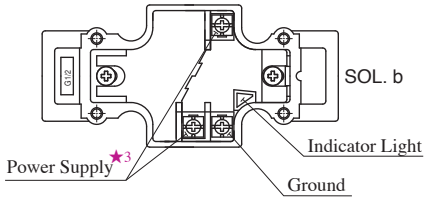
Details of Receptacle

Terminal Box Type

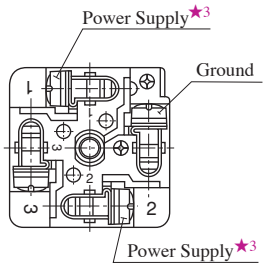
Double Solenoid Type



Single Solenoid Type (Sol b)



Plug-in Connector Type

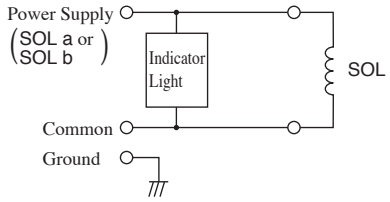


★1. There are two grounding terminals. You can use either one.
★2. If you do not need the common plate, remove it.
★3. With DC solenoids, polarity is no question.

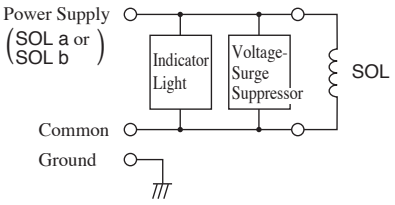
Electrical Circuit (In Case of Single Solenoid Type)

Terminal Box Type

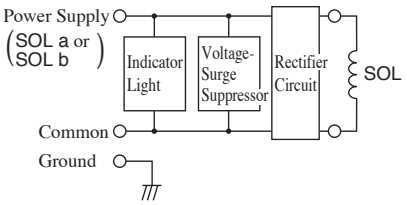
AC



DC

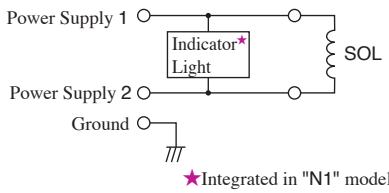


AC→DC Rectified



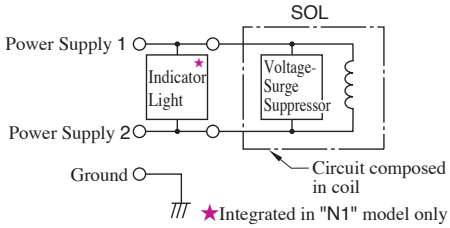
Plug-in Connector Type

AC



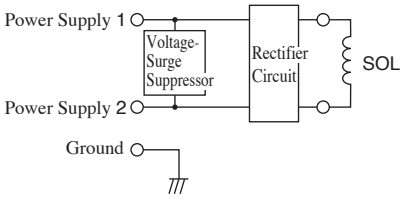
★Integrated in "N1" model only

DC



★Integrated in "N1" model only

AC→DC Rectified



⚠ DANGER

- Do not perform wiring while the power is on.
  Doing so may result in electric shock, burns or death.
- Make the wiring properly. Improper wiring will cause an irregular movement of the machine, resulting in a grave accident.

Solenoid Ratings

Valve Type	Electric Source	Coil Type ★3	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
				Source Rating	Serviceable Range	Inrush ★2 (A)	Holding (A)	Power (W)
Standard Type	AC ★1	A100	50	100	80 - 110	2.42	0.51	——
			60	100	90 - 120	2.14	0.37	
				110		2.35	0.44	
		A120	50	120	96 - 132	2.02	0.42	
			60		108 - 144	1.78	0.31	
		A200	50	200	160 - 220	1.21	0.25	
			60	200	180 - 240	1.07	0.19	
				220		1.18	0.22	
		A240	50	240	192 - 264	1.01	0.21	
			60		216 - 288	0.89	0.15	
Shockless Type	DC (K Series)	D12	——	12	10.8 - 13.2	——	2.45	29
		D24		24	21.6 - 26.4		1.23	
		D48		48	43.2 - 52.8		0.61	
	AC→ DC Rectified	R100	50/60	100	90 - 110	——	0.33	29
		R200		200	180 - 220		0.16	

★1. AC Solenoid
AC solenoid is not available in shockless type.
R type models with built-in current rectifier is recommended for shockless operation with AC power.

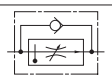
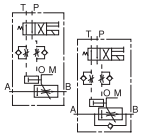
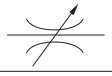
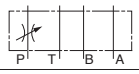
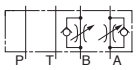
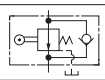
★2. Inrush Current
Inrush current in the above table show rms values at maximum stroke.

★3. There are more coil types other than the above. For details, please make inquiries.

The coil type numbers in the shaded column are handled as opotinal extras. In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

D

FLOW CONTROLS

Valve Type	Graphic Symbols	Maximum Operating Pressure MPa	Maximum Flow L/min (1 2 3 5 10 20 30 50 100 200 300 500 1000 2000 3000 5000)	Page
Flow Control Valves		21	FG 01 02 03 06 10	D-3
Flow Control and Check Valves		21	FCG 01 02 03 06 10	D-3
Pilot Operated Flow Control Valves		21	FHG 02 03 06 10	D-12
Pilot Operated Flow Control and Check Valves		21	FHCG 02 03 06 10	D-12
Restrictors		25	SRT/SRG 03 06 10 (Rated Flow)★	D-13
One Way Restrictors		25	SRCT/SRCG 03 06 10 (Rated Flow)★	D-13
Throttle Modules		25	TC1G 01 03	D-18
Throttle & Check Modules		25	TC2G 01 03	D-18
Deceleration Valves		21	ZT/ZG 03 06 10	D-22
Deceleration & Check Valves		21	ZCT/ZCG 03 06 10	D-22
Feed Control Valves		14	UCF1G/UCF2G 01 03 04	D-23
Needle Valves		35	GCT GCTR 02	D-24

★Rated flow stands for approximate flow rate when the pressure drop between inlet and outlet ports of the valve in fully opened condition becomes 0.3 MPa maximum at fluid's specific gravity of 0.85 and viscosity of 20 mm²/s.

Hydraulic Fluids

Fluid Types

Any type of hydraulic fluids listed in the table below can be used.
Regardless of which hydraulic fluid is used, the specifications, etc., remain the same.

Hydraulic Fluids	Special Remarks
Petroleum Based Oils	Use fluids equivalent to ISO VG 32 or VG 46.
Synthetic Fluids	Use phosphate ester or polyol ester fluid. When phosphate ester type fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
Water Containing Fluids	Use water-glycol fluid.

Note: Please consult us separately when using hydraulic fluids other than those listed above.
Standard products of restrictors and one-way restrictors valves respectively can be used for W/O type emulsion hydraulic oil.

Recommended Viscosity and Oil Temperatures

Use hydraulic fluids which satisfy the recommended viscosity and oil temperatures given below.

Name	Viscosity	Temperature
Flow Control Valves Flow Control and Check Valves Pilot Operated Flow Control Valves Pilot Operated Flow Control and Check Valves Feed Control Valves	20 - 200 mm^2/s	−15 - +70°C
Restrictors One Way Restrictors Throttle Modules Throttle and Check Modules Deceleration Valves Deceleration and Check Valves Needle Valves	15 - 400 mm^2/s	

Control of Contamination

Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valves. Please maintain the degree of contamination within NAS 1638-Grade 12. Use 25 μm or finer line filter.

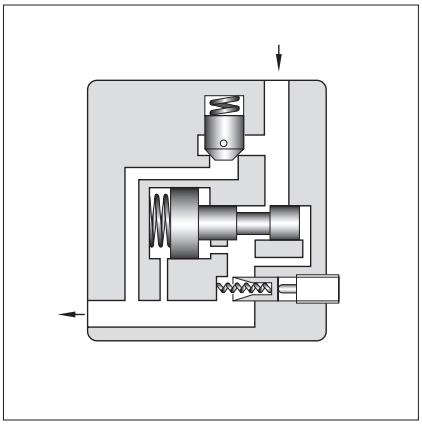
Interchangeability in Installation between Current and New Design

The model change is as follows.

Name	Model Numbers	Design Number		Interchangeability in Installation	Major Changes
		Current	New		
Needle Valves	GCT–02 GCTR–02	33	34	Yes	Improved assembly workability

Flow Control Valves / Flow Control and Check Valves

These valves are pressure and temperature compensating type valves and maintain a constant flow rate independent of change in system pressure (load) and temperature (viscosity of the fluid). They control flow rate of the hydraulic circuit and eventually control speed of the actuator precisely.
Valves with an integral check valve allow a controlled flow and reverse free flow. Repeated resetting can be made easily with a digital readout.(Valve size "01" is excluded)



Specifications

Model Numbers	Max. Metered Flow Capacity L/min	Min. Metered Flow Capacity L/min	Max.Operating Pressure MPa	Approx. Mass kg
FG FCG -01- 4 8 -∗-11	4 8	0.02 (0.04)★	14	1.3
FG FCG -02-30-∗-30	30	0.05	21	3.8
FG FCG -03-125-∗-30	125	0.2		7.9
FG FCG -06-250-∗-30	250	2		23
FG FCG -10-500-∗-30	500	4		52

★The figures in parentheses are for pressures above 7 MPa.

Model Number Designation

FC	G	−01	−8	−N	−11
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pres. Compensator★ Stroke Adjustment	Design Number
F : Flow Control Valves FC : Flow Control and Check Valves	G : Sub-Plate Mounting	01	4·8	N : Applicable only for Pres. Compensator Stroke Adjustment (Option)	11
		02	30		30
		03	125		30
		06	250		30
		10	500		30

★Pres. Compensator Stroke Adjustment : This is used to reduce the jumping phenomenon at actuator startup.

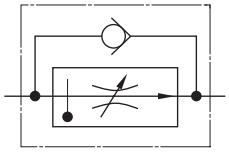
Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
FG FCG -01	M 5 × 55L.....4pcs.
FG FCG -02	M 8 × 50L.....4pcs.
FG FCG -03	M10× 75L.....4pcs.
FG FCG -06	M16×130L.....4pcs.
FG FCG -10	M20×160L.....4pcs.

Graphic Symbols

FG



FCG

Sub-Plates

Valve Model Numbers	Sub-Plate Model No.	Thread Size Rc	Mass kg
FG FCG -01	FGM-01X-10	1/4	0.8
FG FCG -02	FGM-02-20	1/4	2.3
	FGM-02X-20	3/8	2.3
	FGM-02Y-20	1/2	3.1
FG FCG -03	FGM-03-20	3/8	3.9
	FGM-03X-20	1/2	3.9
	FGM-03Y-20	3/4	5.7
	FGM-03Z-20	1	5.7
FG FCG -06	FGM-06X-20	1	12.5
	FGM-06Y-20	1 1/4	16
	FGM-06Z-20	1 1/2	16
FG FCG -10	FGM-10Y-20	1 1/2, 2, (used with pipe flange)	37

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish ($\sqrt{}^{1.6}$).
- When ordering FGM-10Y, please order F3 pipe flange kit separately also. Please consult your Yuken representatives in advance separately for details on F3 pipe flange kit.

Instructions

Min. Required Pressure Difference

The minimum differential pressure between inlet and outlet port is required to obtain the optimum pressure compensation. It varies according to the flow rate to be set. For details, please refer to the performance curves.

Flow Adjustment

[F∗G-01]

Loosen the locking screw and turn the flow adjustment dial clockwise for increase, and anti-clockwise for decrease. The dial makes about 4 revolutions from zero to full flow and the valve opening is indicated on the revolution indicator.

(Refer to characteristics of "Dial Position vs. Flow").

After flow adjustments, be sure to tighten the locking screw to the specified torque.

[F∗G-02, 03, 06, 10]

Loosen the locking screw and turn the flow adjustment handle clockwise for increase, and anti-clockwise for decrease.

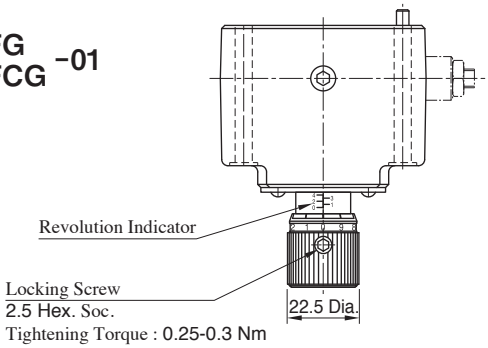
Open condition is indicated in digital-scale in built-in revolution indicator and each rotation of handle increase or decrease the number by 100 (Refer to the characteristics of "Dial Position vs. Flow").

After flow adjustments, be sure to tighten the locking screw.

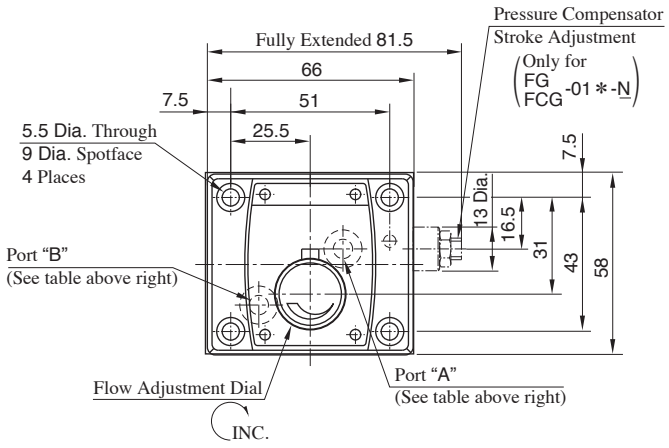
Line Filter

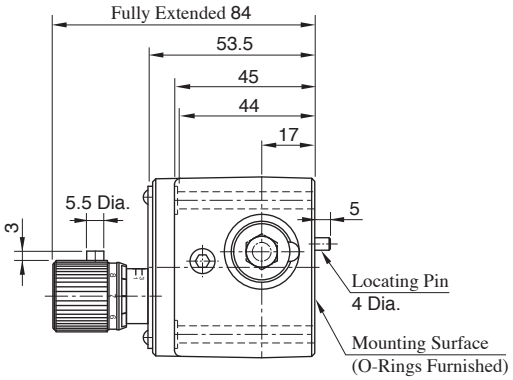
To carry out flow adjustments by as small degree as 2 L/min or less, be sure to use a line filter of 10 μm or finer and install it near the valve inlet.

FG FCG -01



Model No.	Port "A"	Port "B"
FG-01	Controlled Flow Inlet	Controlled Flow Outlet
FCG-01	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet

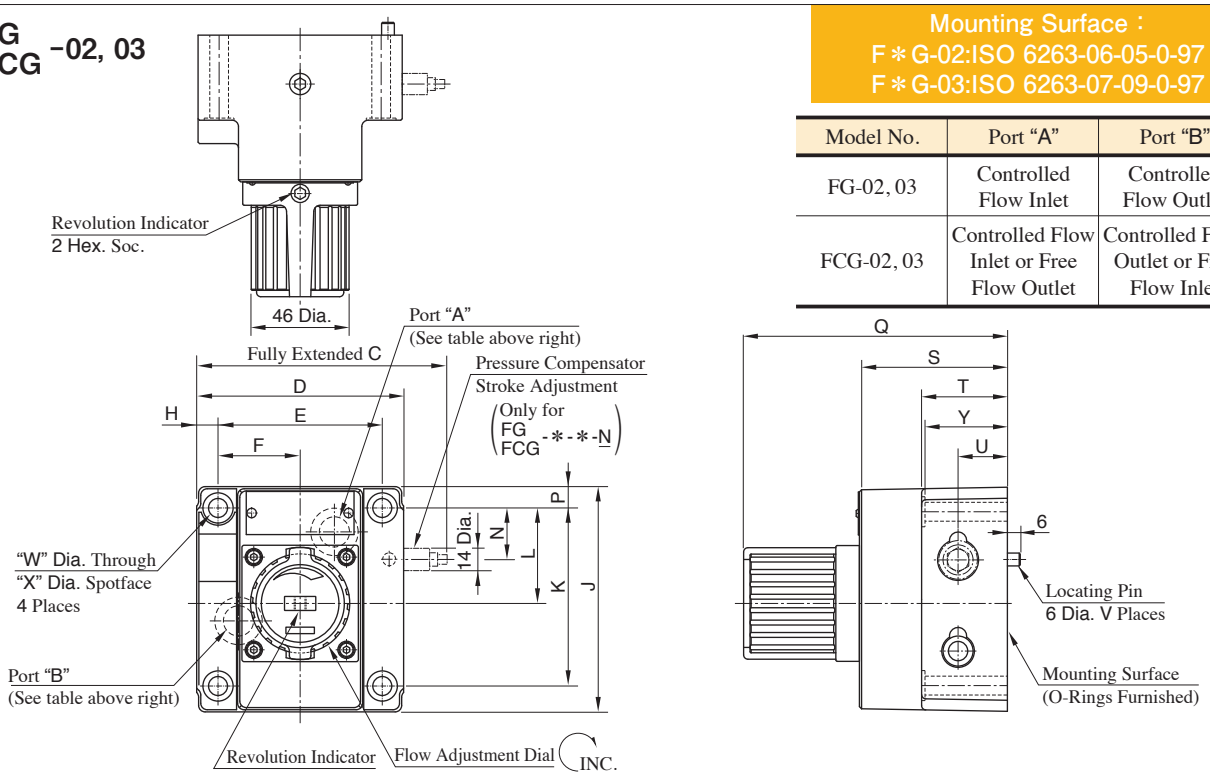




FG FCG -02, 03

Mounting Surface :
F＊G-02:ISO 6263-06-05-0-97
F＊G-03:ISO 6263-07-09-0-97

Model No.	Port "A"	Port "B"
FG-02, 03	Controlled Flow Inlet	Controlled Flow Outlet
FCG-02, 03	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet

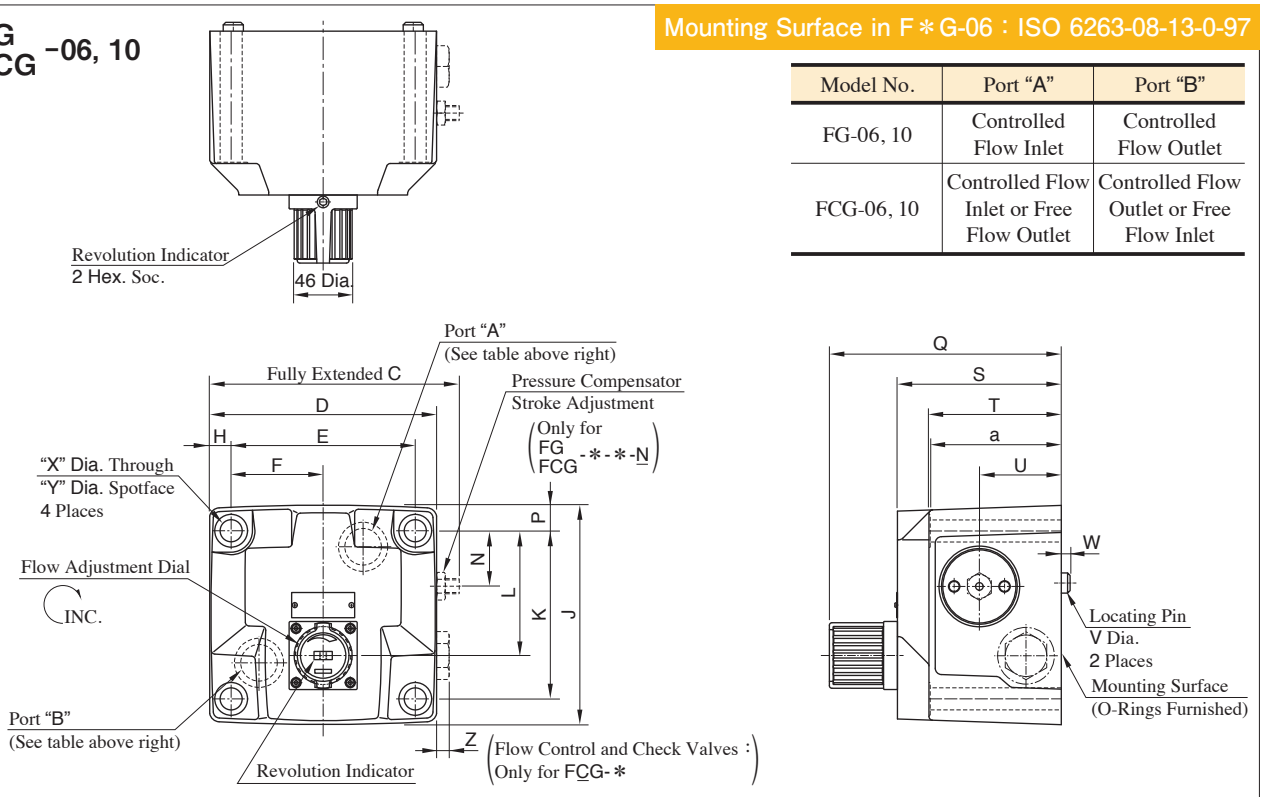


Model No.	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	W	X	Y
FG FCG -02	116	96	76.2	38.1	9.9	104.5	82.6	44.3	24	9.9	123	69	40	23	1	8.8	14	39
FG FCG -03	145	125	101.6	50.8	11.7	125	101.6	61.8	29.8	11.7	152	98	64	41	2	11	17.5	63

FG FCG -06, 10

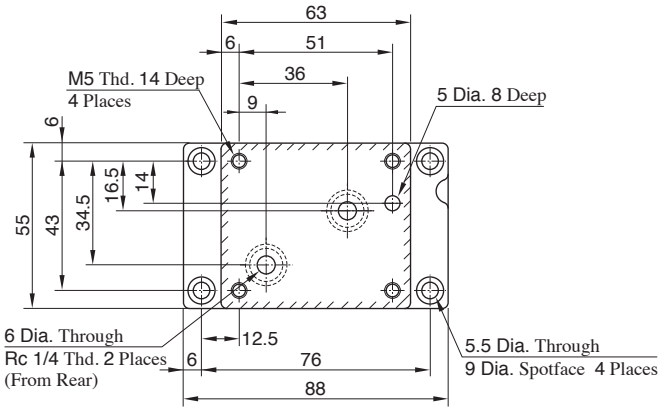
Mounting Surface in F＊G-06 : ISO 6263-08-13-0-97

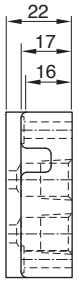
Model No.	Port "A"	Port "B"
FG-06, 10	Controlled Flow Inlet	Controlled Flow Outlet
FCG-06, 10	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet



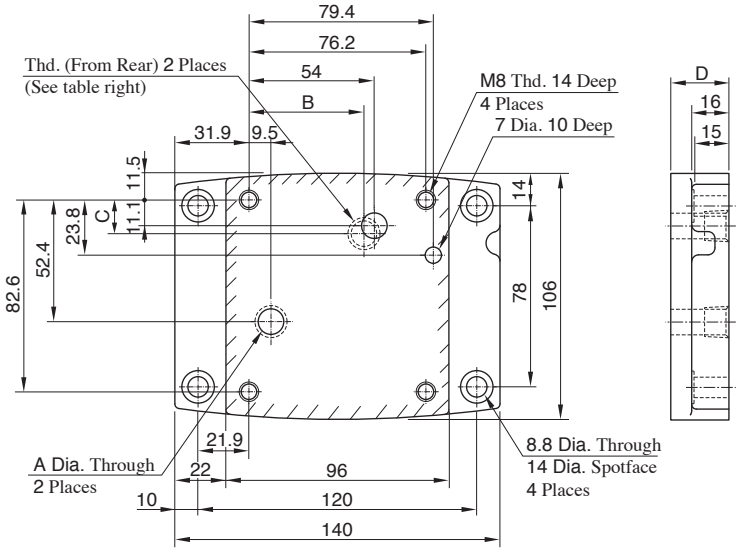
Model No.	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	W	X	Y	Z	a
FG FCG -06	198	180	146.1	73	17	174	133.4	99	44	20.3	184	130	105	65	16	7	17.5	26	10	103
FG FCG -10	267	244	196.9	98.5	23.5	228	177.8	144.5	61	25	214	160	137	85	18	10	21.5	32	7.5	135

Sub-Plate:FGM-01X





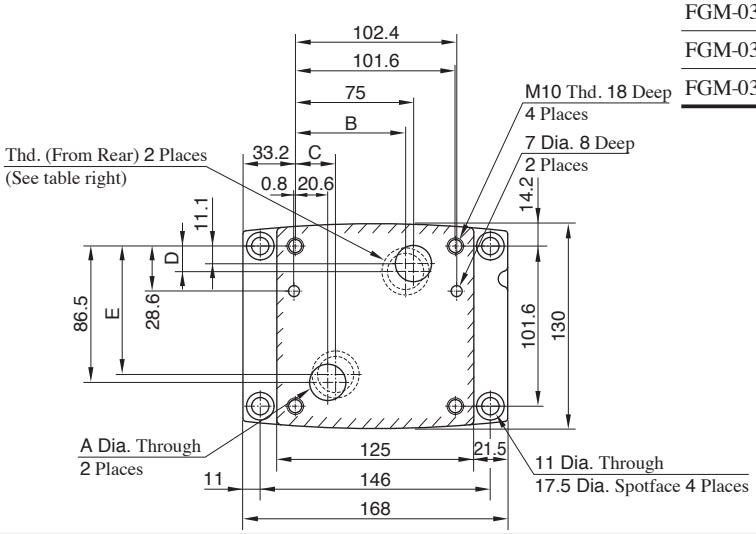
Sub-Plate:FGM-02, 02X, 02Y

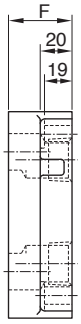


Sub-Plate Model Numbers	Thread Size Rc	A	B	C	D
FGM-02-20	1/4	11	54	11.1	25
FGM-02X-20	3/8	14	54	11.1	25
FGM-02Y-20	1/2	14	51	14	35

Sub-Plate:FGM-03, 03X, 03Y, 03Z

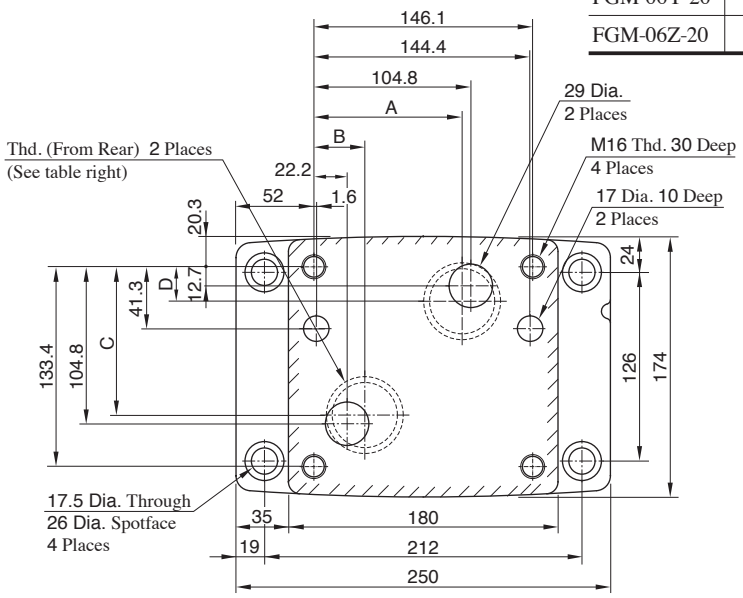
Sub-Plate Model Numbers	Thread Size Rc	A	B	C	D	D	F
FGM-03-20	3/8	14	75	20.6	11.1	86.5	25
FGM-03X-20	1/2	17.5	75	20.6	11.1	86.5	25
FGM-03Y-20	3/4	23	70	25.6	16.1	81.5	40
FGM-03Z-20	1	23	70	25.6	16.1	81.5	40

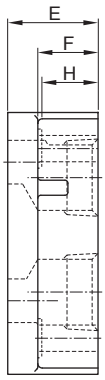




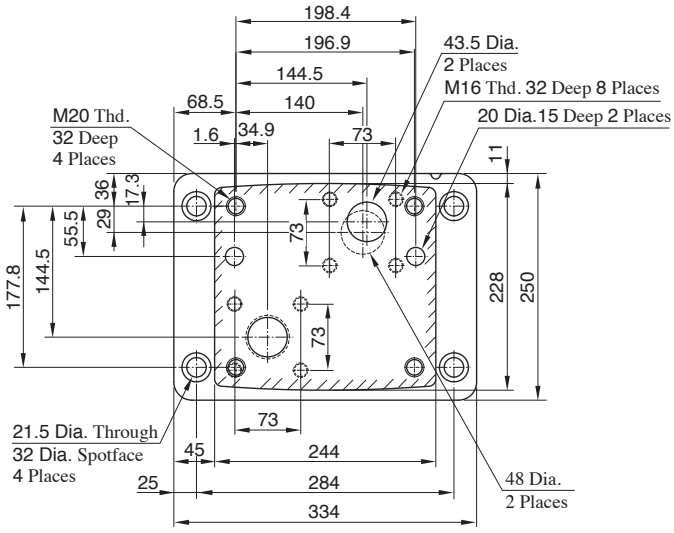
Sub-Plate:FGM-06X, 06Y, 06Z

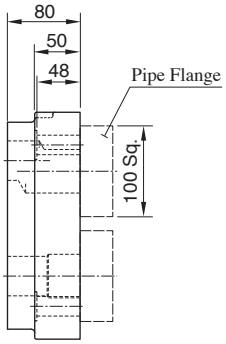
Sub-Plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H
FGM-06X-20	1	104.8	22.2	104.8	18	45	35	34
FGM-06Y-20	1 1/4	99	34	99	23	60	40	39
FGM-06Z-20	1 1/2	99	34	99	23	60	40	39





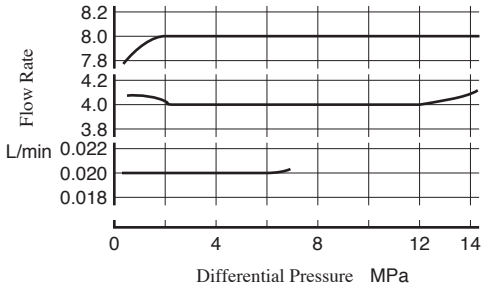
Sub-Plate:FGM-10Y



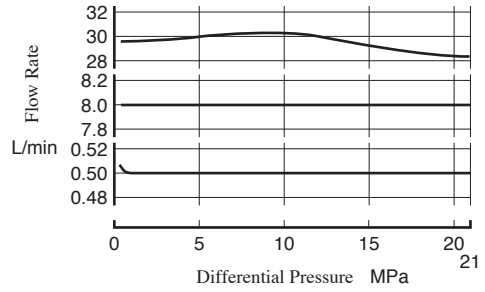


Differential Pressure vs. Flow

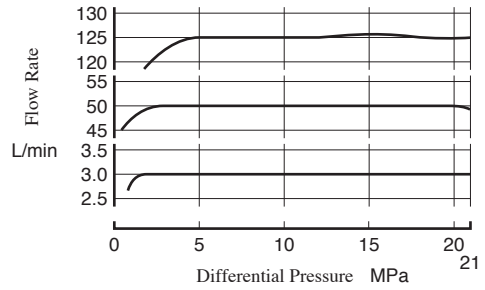
FG/FCG-01



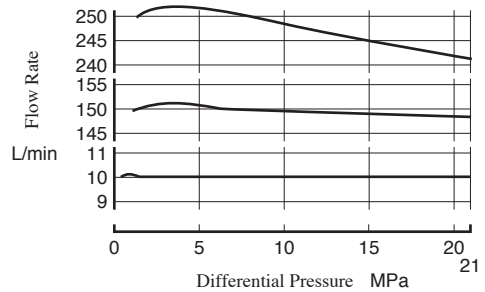
FG/FCG-02



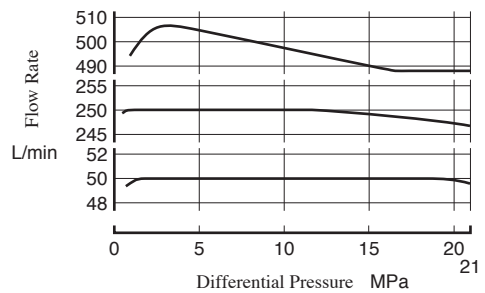
FG/FCG-03



FG/FCG-06

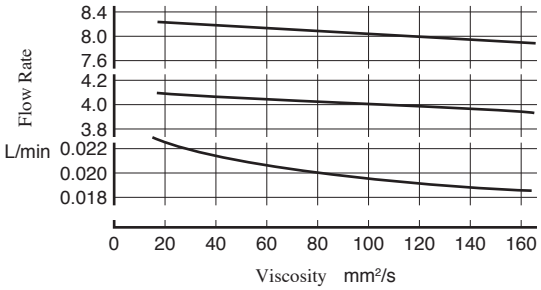


FG/FCG-10

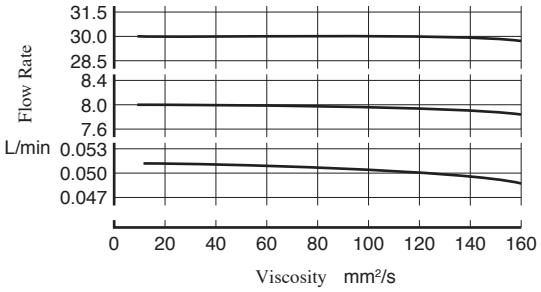


Viscosity vs.Flow

FG/FCG-01



FG/FCG-02



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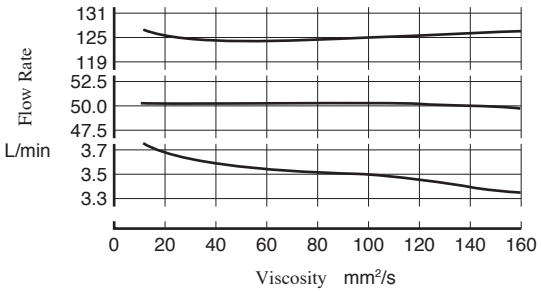

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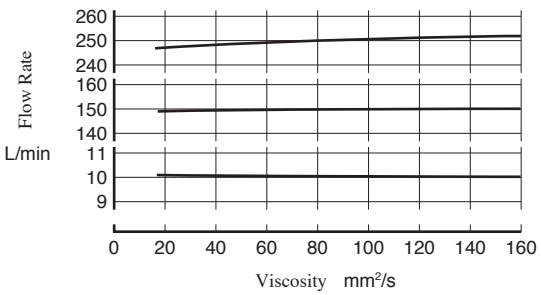
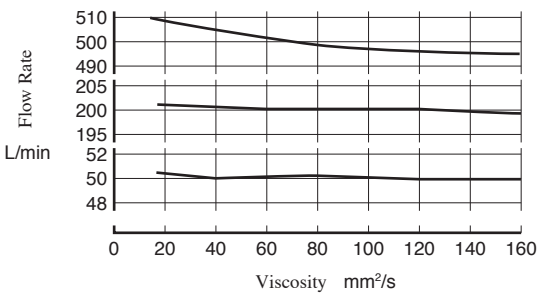
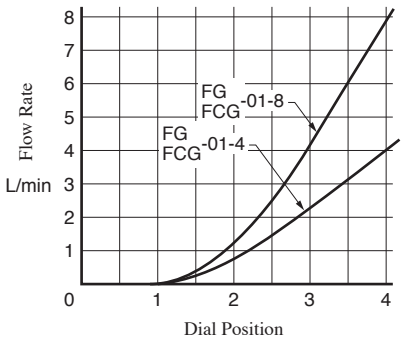


FG/FCG-10

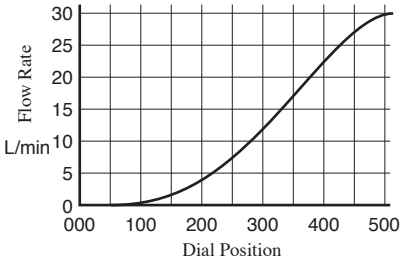


Dial Position vs. Flow

FG FCG-01



FG FCG-02



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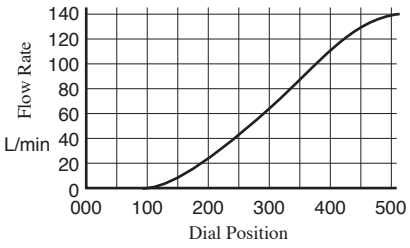

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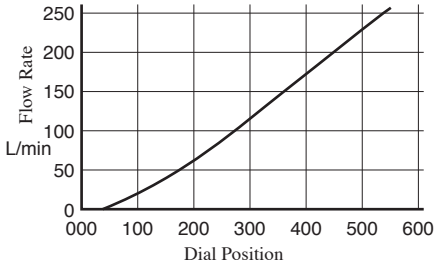

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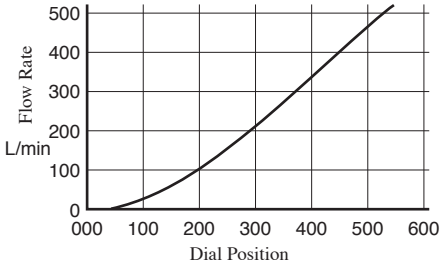
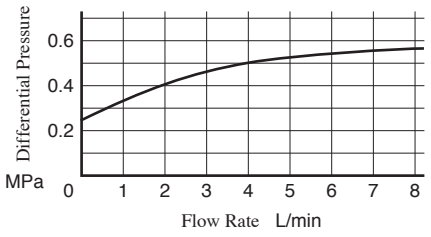
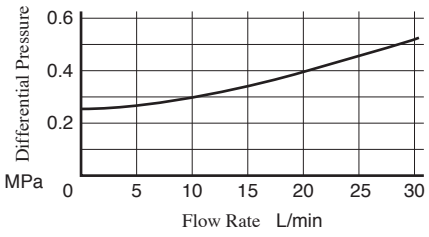


Min. Required Pressure Difference

FG FCG-01



FG FCG-02



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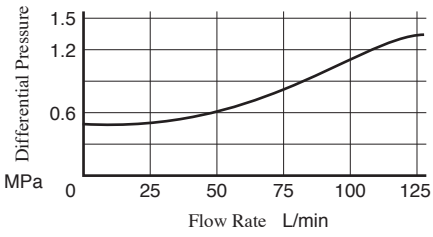
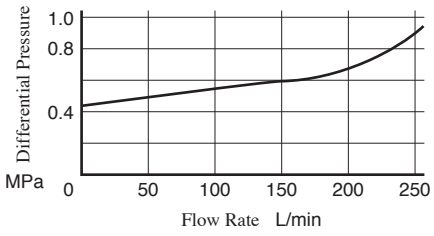


FG FCG-06



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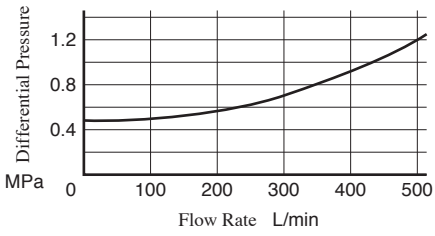
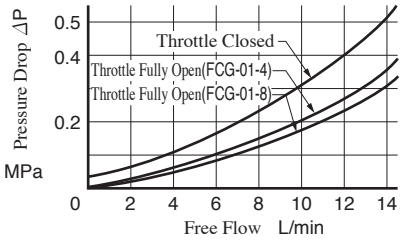


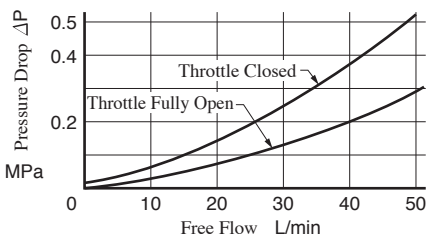
Pressure Drop for Free Flow (Only for with check valve)

Hydraulic Fluid : Viscosity 35 mm²/s, Specific Gravity 0.850

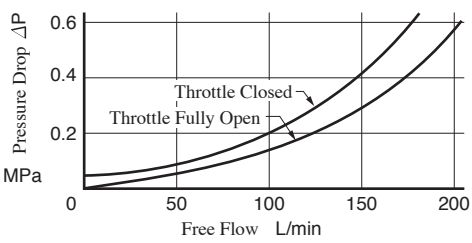
FCG-01



FCG-02



FCG-03



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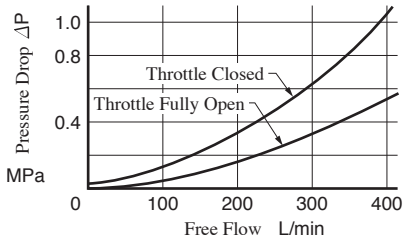
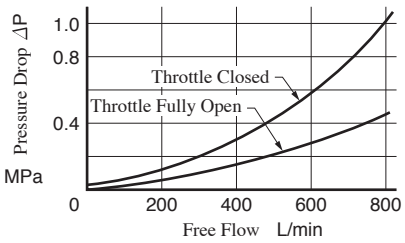


FCG-10



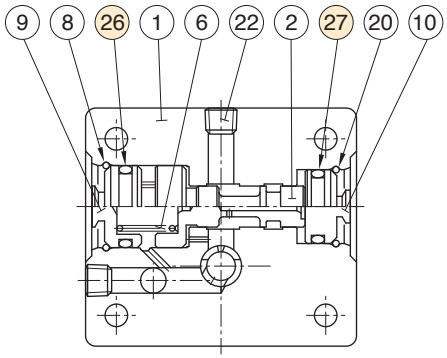
●For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	20	40	60	80	100
Factor	0.87	1.03	1.14	1.23	1.30

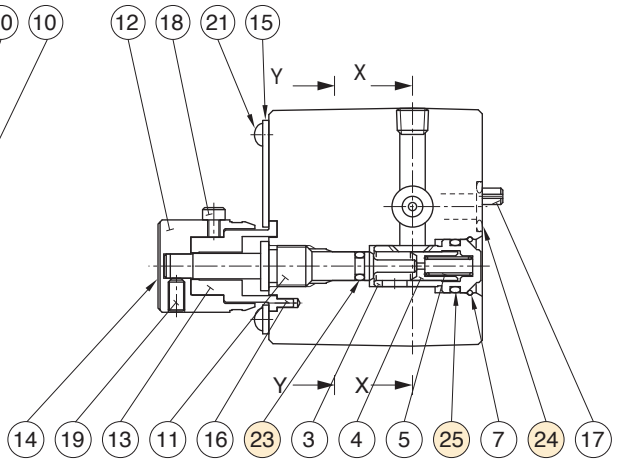
●Please use $\Delta P' = \Delta P \frac{G'}{G}$ for specific gravity change. However, ΔP is the value in the diagram and G is 0.850.

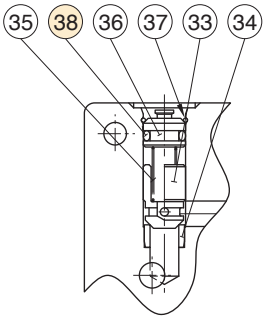
List of Seals

FG FCG -01

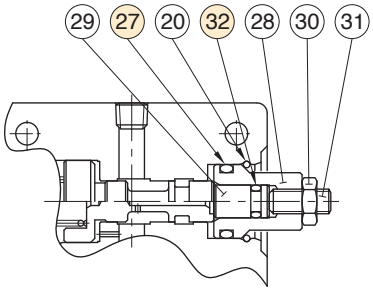


Section X-X
(FG-01)





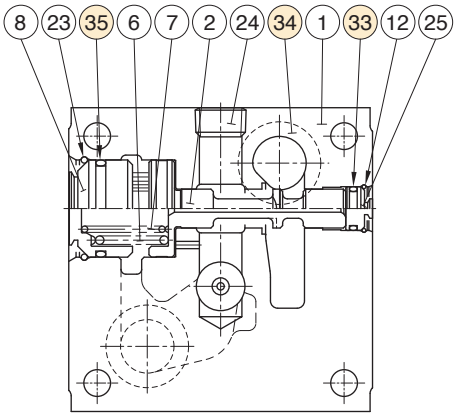
Section Y-Y
(FCG-01)



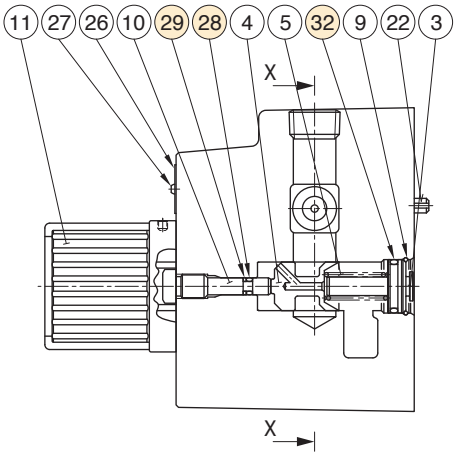
Section X-X
(FG/FCG-01-*-N)

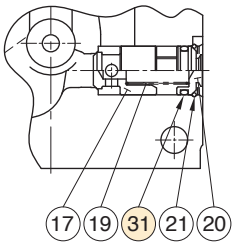
Item	Name of Parts	Part Numbers	Qty.
23	O-Ring	OR NBR-70-1 P4-N	1
24	O-Ring	OR NBR-90 P9-N	2
25	O-Ring	OR NBR-90 P10-N	1
26	O-Ring	OR NBR-90 P16-N	1
27	O-Ring	OR NBR-90 P14-N	1
32	O-Ring	OR NBR-70-1 P5-N	1
38	O-Ring	OR NBR-90 P7-N	1

FG FCG -02, 03

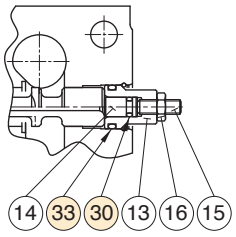


Section X-X
(FG-＊)





(FCG-＊)

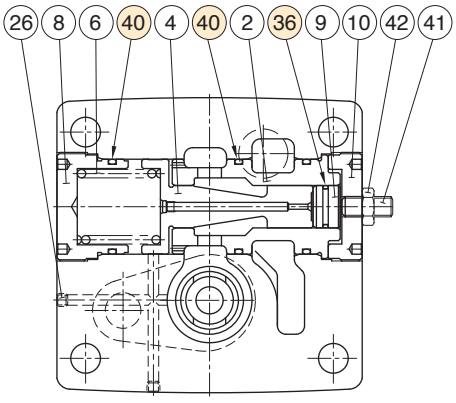


(FG FCG -＊-＊-N)

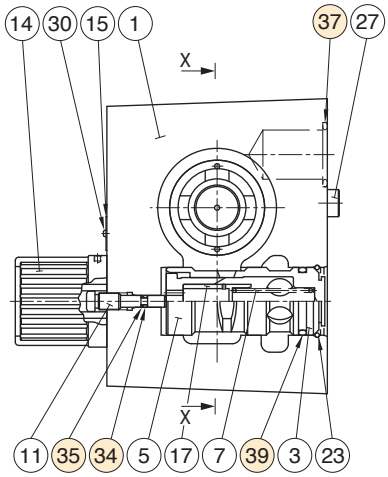
Section X-X

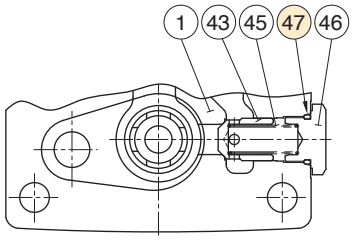
Item	Name of Parts	Part Numbers		Qty.
		FG FCG -02	FG FCG -03	
28	O-Ring	OR NBR-70-1 P4-N	OR NBR-70-1 P4-N	1
29	Back Up Ring	BR JIS B 2401-4-T2-P4	BR JIS B 2401-4-T2-P4	1
30	O-Ring	OR NBR-90 P5-N	OR NBR-90 P5-N	1
31	O-Ring	OR NBR-90 P10A-N	OR NBR-90 P16-N	1
32	O-Ring	OR NBR-90 P12-N	OR NBR-90 P18-N	1
33	O-Ring	OR NBR-90 P14-N	OR NBR-90 P14-N	1
34	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	2
35	O-Ring	OR NBR-90 G25-N	OR NBR-90 G35-N	1

FG FCG -06, 10

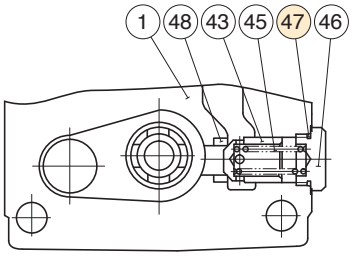


Section X-X
(FG-＊)





Section X-X
(FCG-06)

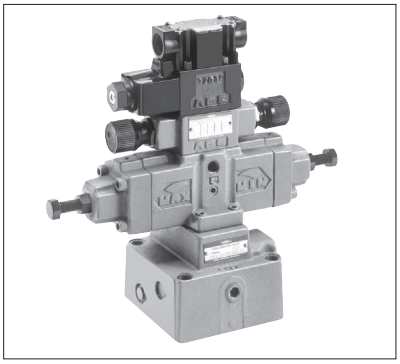


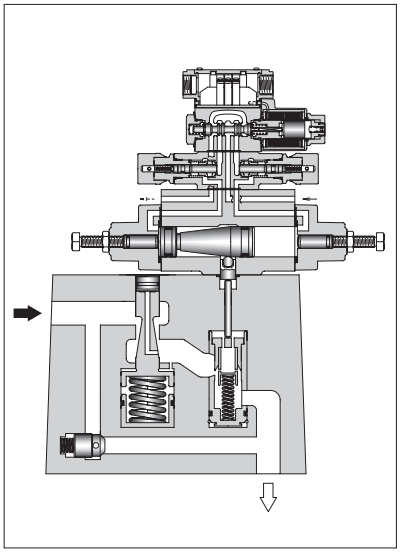
Section X-X
(FCG-10)

Item	Name of Parts	Part Numbers		Qty.
		FG FCG -06	FG FCG -10	
34	O-Ring	OR NBR-70-1 P4-N	OR NBR-70-1 P4-N	1
35	Back Up Ring	BR JIS B 2401-4-T2-P4	BR JIS B 2401-4-T2-P4	1
36	O-Ring	OR NBR-90 P21-N	OR NBR-90 P34-N	1
37	O-Ring	OR NBR-90 P32-N	OR NBR-90 P48-N	2
39	O-Ring	OR NBR-90 P34-N	OR NBR-90 P50-N	1
40	O-Ring	OR NBR-90 P50-N	OR NBR-90 P75-N	3
47	O-Ring	AS568-020 (NBR-90)	OR NBR-90 P32-N	1

Pilot Operated Flow Control Valves / Pilot Operated Flow Control and Check Valves

The function of the flow control handle of the flow control valve is performed by a hydraulic cylinder. With these valves, smooth flow characteristics allow control without shocks during acceleration and deceleration. With the compensator for the pressure and temperature, stable flow control can be obtained regardless of the changes in the pressure (load) and temperature (oil viscosity).





Specifications

Model Numbers	Max. Metered Flow L/min	Min. Metered Flow L/min	Max. Operating Pressure MPa	Min. Pilot Pressure MPa	Mass kg
FH＊G-02-30-＊-13	30	0.05	21	1.5	13
FH＊G-03-125-＊-13	125	0.2			17
FH＊G-06-250-＊-13	250	2			32
FH＊G-10-500-＊-13	500	4			61

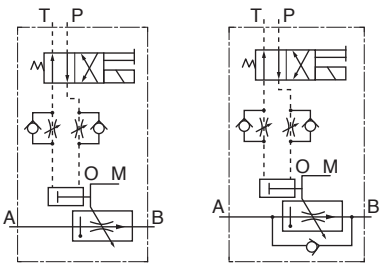
Model Number Designation

FHC	G	−02	−30	−N	−O	−A100	−N	−13
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pressure Compensator Stroke Adj. ★3	With No Pilot Valve ★1	Coil Type ★2	Type of Electrical Connections	Design Number
FH： Pilot Operated Flow Control Valves FHC： Pilot Operated Flow Cont. & Check Valves	G： Sub-Plate Mounting	02	30	N： Applicable only for Pres. Compensator Stroke Adjustment (Option)	O： Applicable only for Without Pilot Valve	AC： A100, A120 A200, A240 DC： D12, D24 D48 AC→DC Rectified： R100, R200	None： Terminal Box Type N： With Plug-in Connector Type (Option)	13
		03	125					13
		06	250					13
		10	500					13

★1. Both solenoid operated directional valve (DSG-01) and throttle check modular valve (MSW-01) can be used as a pilot valve.
If no pilot valve is required, there is no needs to specify the coil type and the electrical connection type of solenoid operated directional valve.
★2. The coil types are same as those for DSG-01 Series solenoid operated directional valves. See page D-27.
★3. Pres. Compensator Stroke Adjustment：This is used to reduce the jumping phenomenon at actuator startup.

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

Graphic Symbols

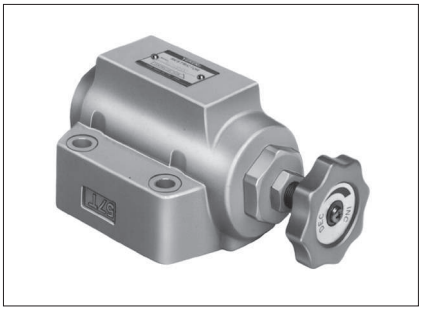


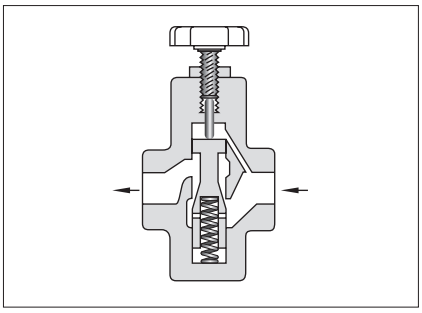
FHG　　FHCG

●Please contact us separately for the details of Pilot Operated Flow Control Valves／Pilot Operated Flow Control and Check Valves.

Restrictors / One Way Restrictors

This valve is used to regulate an actuator speed in a circuit where line pressure is almost steady and small fluctuation of oil flow due to pressure changes is permitted. Integrated check valve allows reversed free flow from outlet to inlet port. Pressure balanced construction provides less effort in adjustment at high pressure.





Specifications

Model Numbers			Rated Flow★ L/min	Max. Operating Pres. MPa	Mass kg
	Restrictor	One Way Restrictor			
Threaded Connection	SRT-03-50	SRCT-03-50	30	25	1.5
	SRT-06-50	SRCT-06-50	85		3.8
	SRT-10-50	SRCT-10-50	230		9.1
Sub-Plate Mounting	SRG-03-50	SRCG-03-50	30	25	2.5
	SRG-06-50	SRCG-06-50	85		3.9
	SRG-10-50	SRCG-10-50	230		7.5

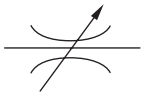
★Rated flow stands for approximate flow rate when the pressure drop between inlet and outlet ports of the valve in fully opened condition becomes 0.3 MPa maximum at fluid's specific gravity of 0.85 and viscosity of 20 mm²/s.

Yuken can offer flanged connection valves described below.

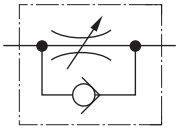
For details, contact us.

Model Numbers	Rated Flow L/min	Max. Operating Pressure MPa
SRF SRCF -10-50	230	25
SRF SRCF -16-50	500	

Graphic Symbols



SR＊



SRC＊

Model Number Designation

SR	T	−03	−50
Series Number	Type of Mounting	Valve Size	Design Number
SR : Restrictor	T : Threaded Connection	03	50
		06	50
		10	50
SRC : One Way Restrictor	G : Sub-Plate Mounting	03	50
		06	50
		10	50

Sub-Plates

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
SRG SRCG -03	CRGM-03-50	3/8	1.6
	CRGM-03X-50	1/2	1.6
SRG SRCG -06	CRGM-06-50	3/4	2.4
	CRGM-06X-50	1	3.0
SRG SRCG -10	CRGM-10-50	1 1/4	4.8
	CRGM-10X-50	1 1/2	5.7

- Sub-plates are available. Specify the sub-plate model number from the left table. When sub-plates are not used, the mounting surface should have a good machined finish (1.6▽).
- Sub-plates are common with right angle check valves. For dimensions, see page D-26.

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
SRG SRCG -03	M10×45L	4
SRG SRCG -06	M10×50L	4
SRG SRCG -10	M10×55L	6

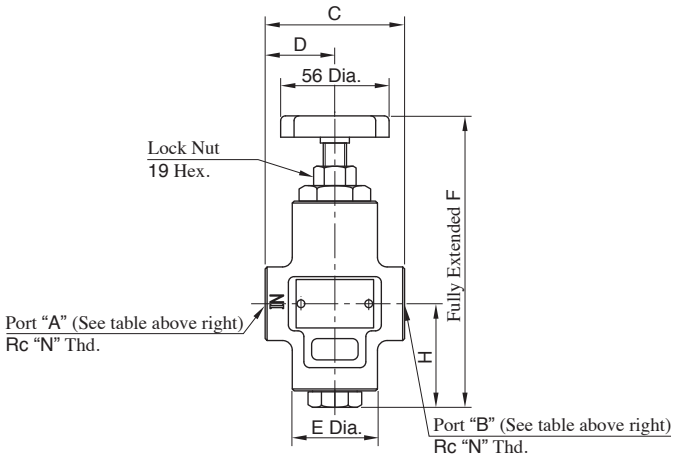
Instructions

Flow Adjustment

Loosen the lock nut and turn the flow adjustment handle clockwise to increase. After adjustment, be sure to tighten the lock nut.

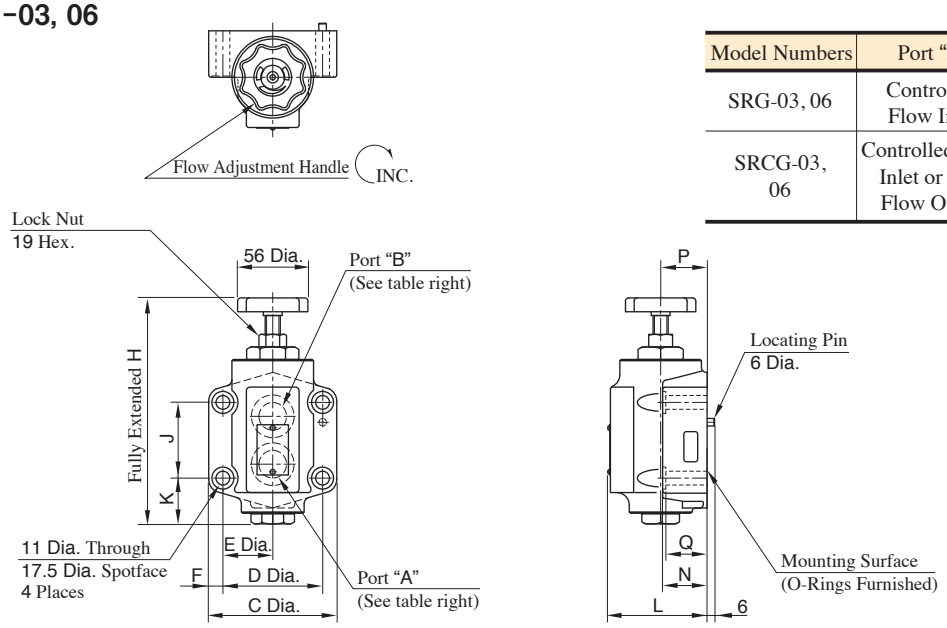
SRT SRCT -03, 06, 10

Model Numbers	Port "A"	Port "B"
SRT-*	Controlled Flow Inlet	Controlled Flow Outlet
SRCT-*	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet



Model Numbers	C	D	E	F	H	J	K	L	N
SRT SRCT -03	72	36	44	150.5	53.5	38 Dia.	46	22	3/8
SRT SRCT -06	100	50	58	180	66.5	62 Sq.	64	31	3/4
SRT SRCT -10	138	69	80	227	86	80 Sq.	82	40	1 1/4

SRG SRCG -03, 06



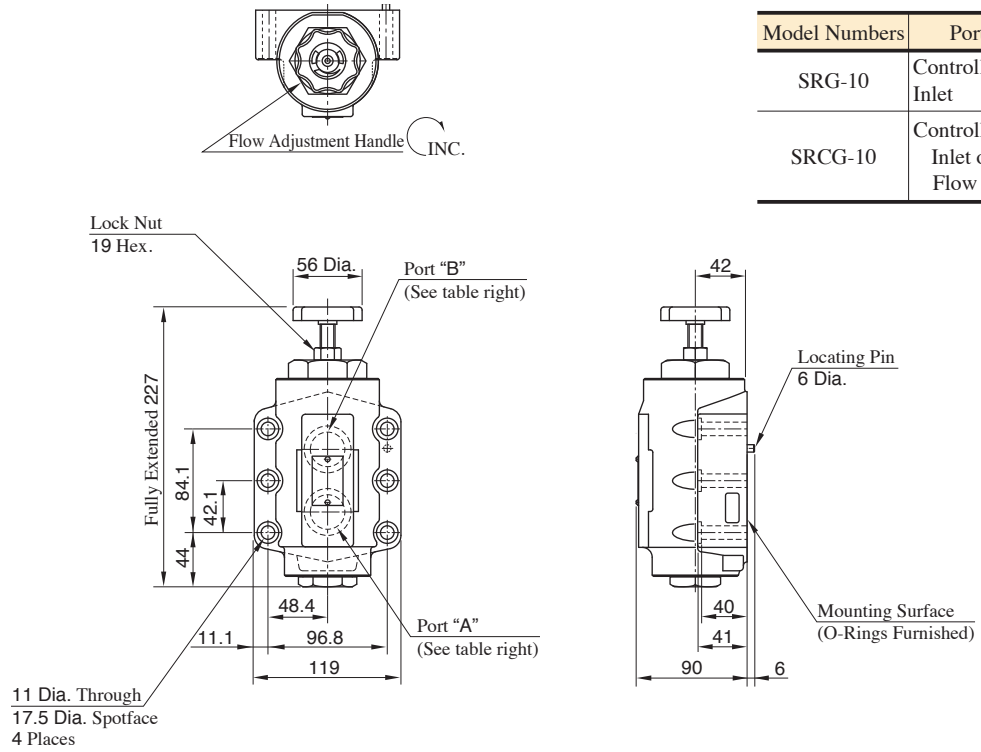
Model Numbers	Port "A"	Port "B"
SRG-03, 06	Controlled Flow Inlet	Controlled Flow Outlet
SRCG-03, 06	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet

Model Numbers	C	D	E	F	H	J	K	L	N	P	Q	Mounting Surface
SRG SRCG -03	90	66.7	33.3	11.7	150.5	42.9	32	64	31	31	30	ISO 5781-06-07-0-00
SRG SRCG -06	102	79.4	39.7	11.3	180	60.3	36.5	79	36	37	35	ISO 5781-08-10-0-00

Note: For dimensions of the valve mounting surface, see the page D-26.

SRG SRCG -10

Mounting Surface : ISO 5781-10-13-0-00



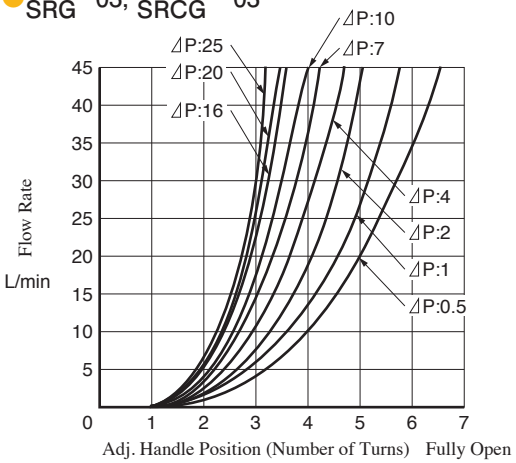
Model Numbers	Port "A"	Port "B"
SRG-10	Controlled Flow Inlet	Controlled Flow Outlet
SRCG-10	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet

Note: For dimensions of the valve mounting surface, see the page D-26.

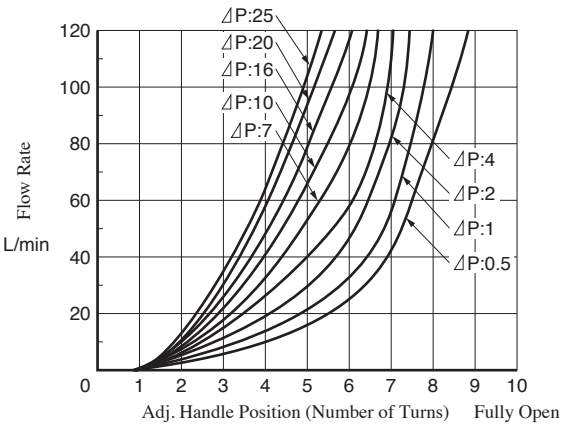
Adjustment Handle Position vs. Flow

Viscosity : 30 mm²/s [ΔP : Differential Pressure (MPa)]

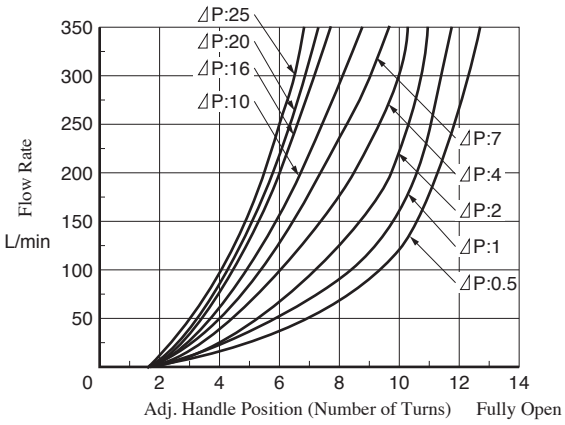
SRT SRG -03, SRCT SRCG -03



SRT SRG -06, SRCT SRCG -06



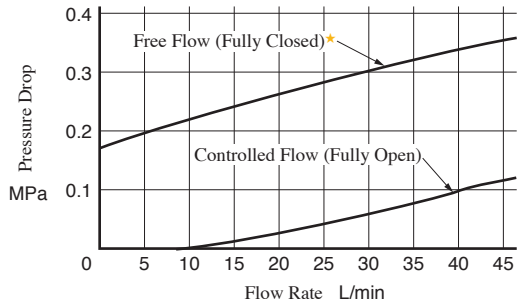
SRT SRG -10, SRCT SRCG -10



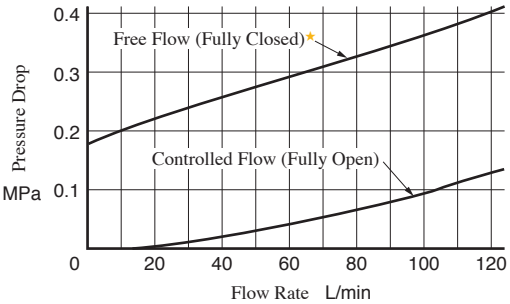
Pressure Drop

Viscosity : 30 mm²/s

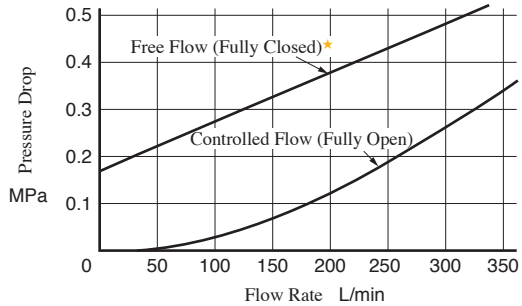
SRT SRG -03, SRCT SRCG -03



SRT SRG -06, SRCT SRCG -06



SRT SRG -10, SRCT SRCG -10

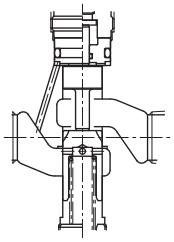


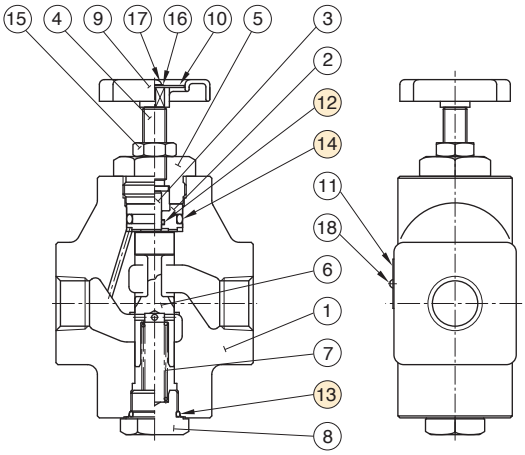
★Applicable only for one way restrictor (Model No. SRC*)

List of Seals

SRT SRCT -03, 06, 10

For SRCT

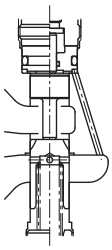


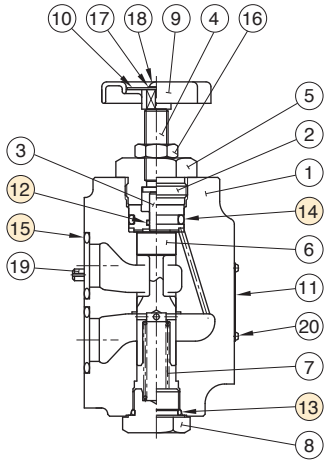


Item	Name of Parts	Part Numbers			Qty.
		SRT SRCT -03	SRT SRCT -06	SRT SRCT -10	
12	O-Ring	OR NBR-90 P7-N	OR NBR-90 P7-N	OR NBR-90 P7-N	1
13	O-Ring	OR NBR-90 P15-N	OR NBR-90 P21-N	OR NBR-90 P29-N	1
14	O-Ring	OR NBR-90 P20-N	OR NBR-90 P22.4-N	OR NBR-90 P36-N	1

SRG SRCG -03, 06, 10

For SRCG

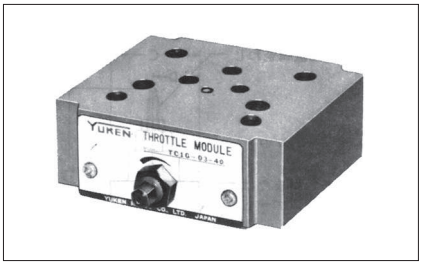


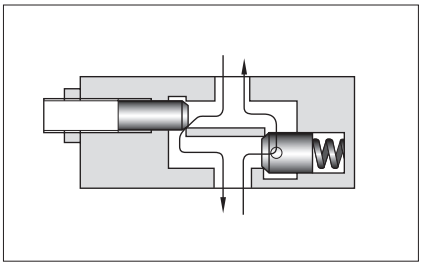


Item	Name of Parts	Part Numbers			Qty.
		SRG SRCG -03	SRG SRCG -06	SRG SRCG -10	
12	O-Ring	OR NBR-90 P7-N	OR NBR-90 P7-N	OR NBR-90 P7-N	1
13	O-Ring	OR NBR-90 P15-N	OR NBR-90 P21-N	OR NBR-90 P29-N	1
14	O-Ring	OR NBR-90 P20-N	OR NBR-90 P22.4-N	OR NBR-90 P36-N	1
15	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2

Throttle Module / Throttle and Check Module

Used as pilot choke valves for solenoid controlled pilot operated directional valves and pilot operated directional valves.





Specifications

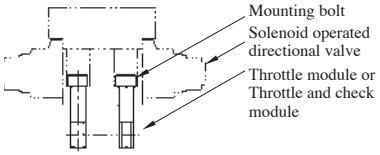
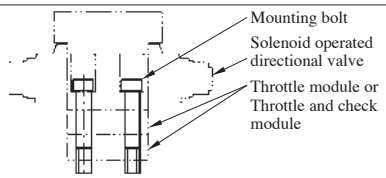
Model Numbers	Nominal Flow L/min	Max. Operating Pressure MPa	Mass kg
TC1G-01-40	30	25	0.6
TC2G-01-40			0.65
TC1G-03-＊-40	80		1.6
TC2G-03-＊-40			1.8

Model Number Designation

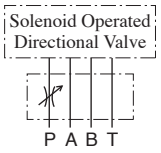
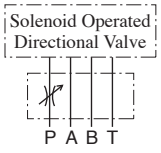
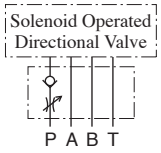
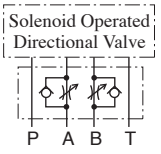
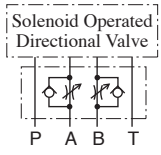
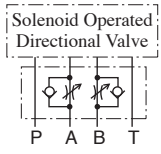
TC1	G	−03	−C	−40
Series Number	Type of Mounting	Valve Size	Valve Type	Design Number
TC1 : Throttle Module TC2 : Throttle and Check Module	G : Gasket Mounting	01	—	40
TC1 : Throttle Module		03	None : Std. C : With Check Valve	40
TC1 : Throttle and Check Module			None : Std. (Meter-Out) A : Meter-In	

Mounting Bolts

If mounting bolts are necessary, order suitable ones selected from the table below. If mounting bolts from other companies are used, their strength must be 8.8 or up JIS B1176 standards.

Solenoid Operated Directional Valve	Socket Head Cap Screw	
	TC＊G–01	TC＊G–03
	M5×70L (4pcs.)	M6×70L (4pcs.)
	M5×95L (4pcs.)	M6×100L (4pcs.)

Graphic Symbols

Valve Size 01	Valve Size 03
 TC1G-01-40	 TC1G-03-40
—	 TC1G-03-C-40
 TC2G-01-40	 TC2G-03-40
—	 TC2G-03-A-40

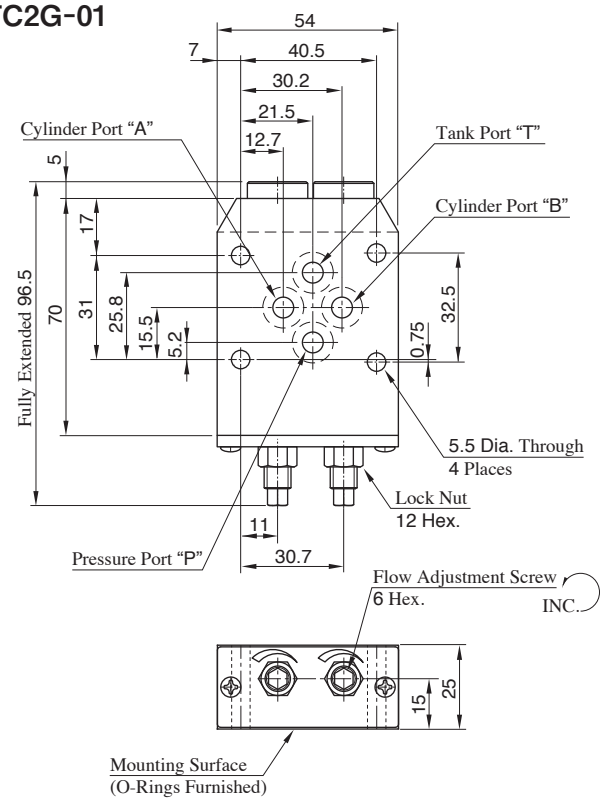
Instructions

Flow Adjustment

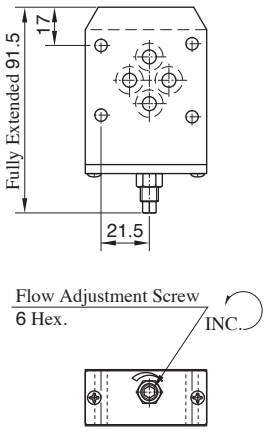
Loosen the lock nut and turn the flow adjustment handle clockwise to increase. After adjustment, be sure to tighten the lock nut.

Mounting Surface : ISO 4401-03-02-0-05

TC2G-01



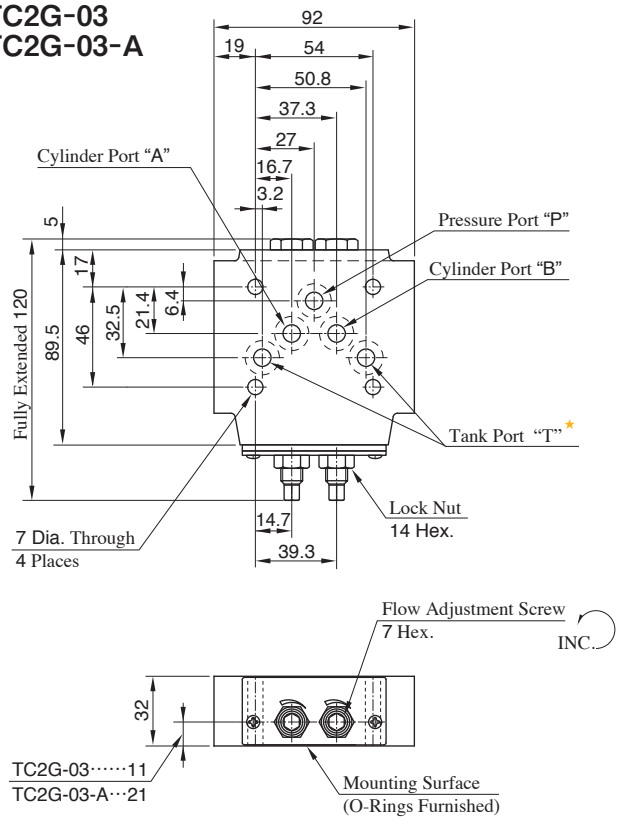
TC1G-01



For other dimensions, see the figures shown TC2G-01.

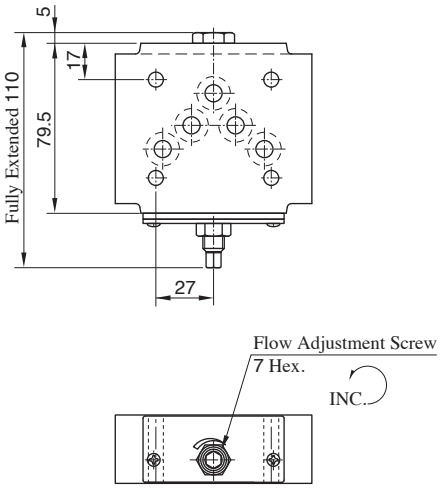
Mounting Surface : ISO 4401-05-04-0-05

TC2G-03
TC2G-03-A



★With standard sub-plate, the left one of the two tank ports "T" is used but either one may be used.

TC1G-03
TC1G-03-C

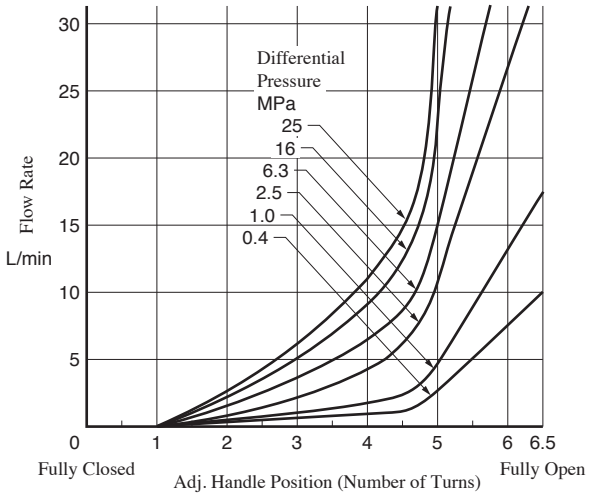


For other dimensions, see the figures shown TC2G-03.

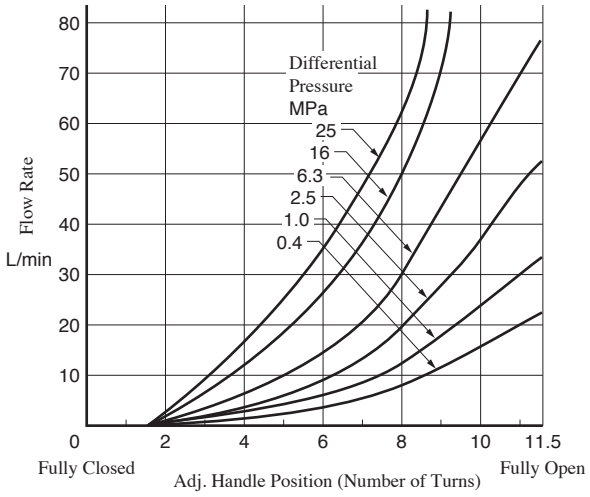
Adjustment Handle Position vs. Flow

Viscosity : 35 mm²/s

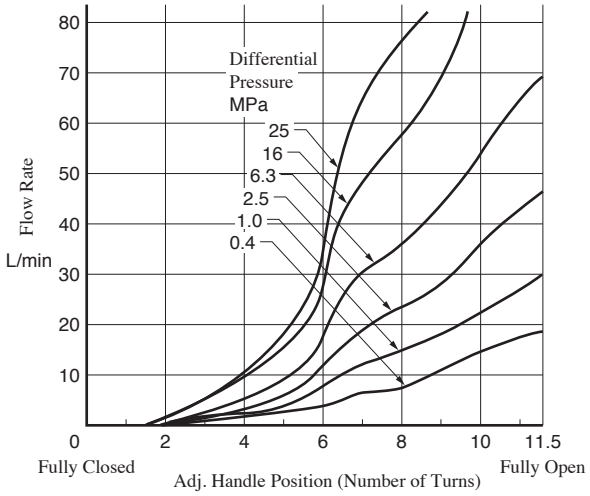
TC1G-01
TC2G-01



TC1G-03
TC2G-03



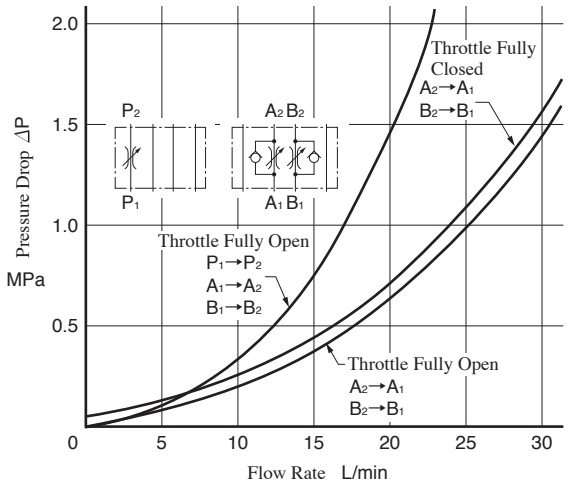
TC1G-03-C



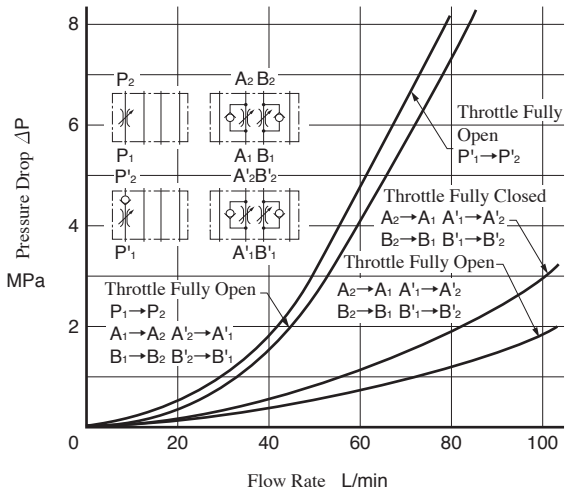
Pressure Drop

Viscosity : 35 mm²/s

TC1G-01
TC2G-01



TC1G-03-＊
TC2G-03-＊



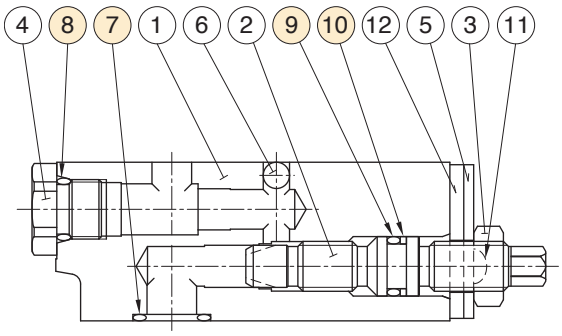
●For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

●Please use $\Delta P' = \Delta P \frac{G'}{G}$ for specific gravity change. However, ΔP is the value in the diagram and G is 0.850.

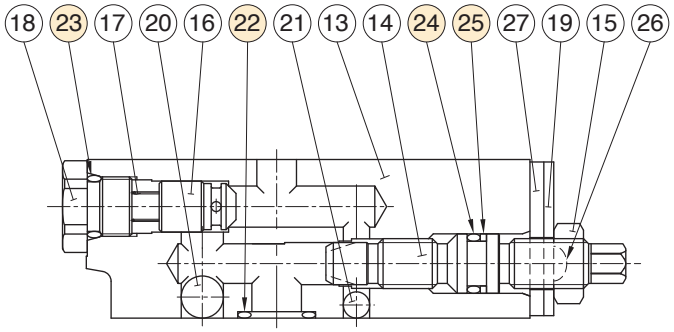
List of Seals

TC1G-01, 03



Item	Name of Parts	Part Numbers		Qty.	
		TC1G-01	TC1G-03	TC1G-01	TC1G-03
7	O-Ring	OR NBR-90 P9-N	AS 568-014 (NBR-90)	4	5
8	O-Ring	——	OR NBR-90 P10-N	—	1
9	O-Ring	OR NBR-70-1 P7-N	OR NBR-70-1 P9-N	1	1
10	Back Up Ring	BR JIS B 2401-4-T2-P7	BR JIS B 2401-4-T2-P9	1	1

TC2G-01, 03

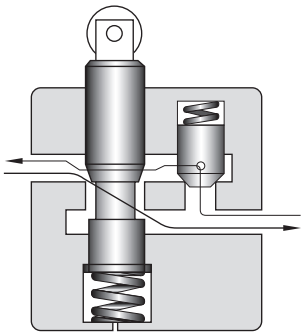


Item	Name of Parts	Part Numbers		Qty.	
		TC2G-01	TC2G-03	TC2G-01	TC2G-03
22	O-Ring	OR NBR-90 P9-N	AS 568-014 (NBR-90)	4	5
23	O-Ring	OR NBR-90 P10-N	OR NBR-90 P10-N	2	2
24	O-Ring	OR NBR-70-1 P7-N	OR NBR-70-1 P9-N	2	2
25	Back Up Ring	BR JIS B 2401-4-T2-P7	BR JIS B 2401-4-T2-P9	2	2

Deceleration Valves / Deceleration and Check Valves

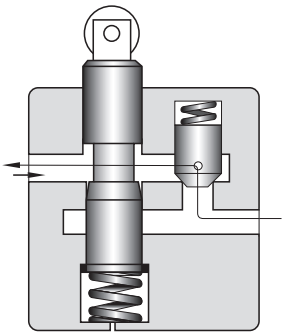
Cam operation easily increases or decreases the flow rate and opens or closes the valve's internal passageway.
This valve is used when you want the actuator to perform acceleration/deceleration and stop necessary for machine tool table feed, etc.
The check valve allows free flow in the opposite direction of the controlled flow regardless of the cam position.

Normally Open Type



Pushing down on the spool throttles the flow rate.

Normally Closed Type



Pushing down on the spool increases the flow rate.

Specifications

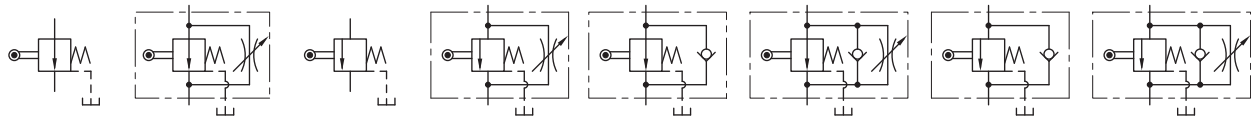
Model Numbers		Max. Flow L/min	Max. Operating Pressure MPa	Mass kg	
Threaded Connection	Sub-Plate Mounting			Z∗T	Z∗G
Z∗T-03-∗-∗-22	Z∗G-03-∗-∗-22	30	21	4.3	4.3
Z∗T-06-∗-∗-22	Z∗G-06-∗-∗-22	80		8.7	8.7
Z∗T-10-∗-∗-22	Z∗G-10-∗-∗-22	200		17	17

Model Number Designation

ZC	T	−03	−T	−C	−22
Series Number	Type of Mounting	Valve Size	With Adjustable Needle★ Valve for By-Pass Line	Spool Type	Design Number
Z : Deceleration Valve ZC : Deceleration and Check Valve	T : Threaded Connection	03	T : Applicable only with Adjustable Needle Valve for By-Pass Line (Option)	None : Normally Open Type	22
		06			22
		10			22
	G : Sub-Plate Mounting	03			22
		06		C : Normally Closed Type	22
		10			22

★The throttle valve for By-Pass Line allows the actuator to be fed at a low speed by allowing regulated flow between the ports even when the passage is blocked by a spool.

Graphic Symbols

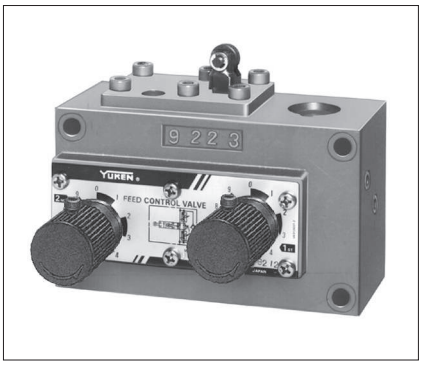


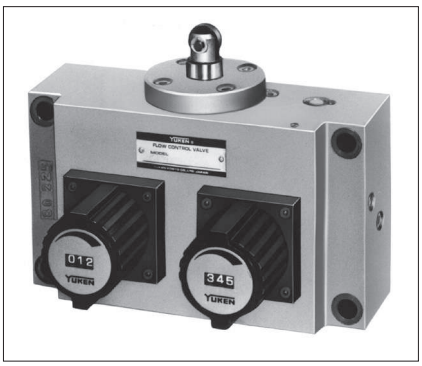
ZT ZG-∗ | ZT ZG-∗-T | ZT ZG-∗-C | ZT ZG-∗-T-C | ZCT ZCG-∗ | ZCT ZCG-∗-T | ZCT ZCG-∗-C | ZCT ZCG-∗-T-C

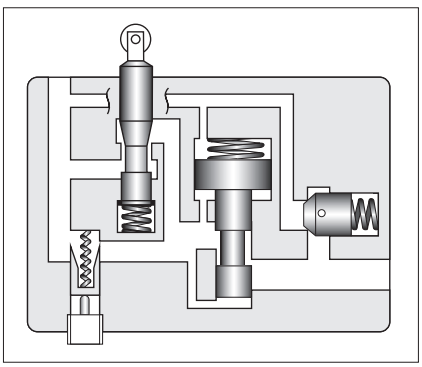
●Please contact us separately for the details of Deceleration Valves / Deceleration and Check Valves.

Feed Control Valves

This valve is a compact combination of a flow control valve with check valve and a deceleration valve, and is mainly used for machine tools. The switching from rapid feed to cutting feed is done by a cam, and the cutting feed speed can be adjusted as desired. Since this is a pressure/temperature compensated type, the set flow rate is constant regardless of changes in pressure (load) and temperature (hydraulic oil viscosity). Therefore, precise speed control is possible. The valve size "04" is digitally graduated for easy flow reproduction. The return can be quickened regardless of the position of the cam.







Specifications

Model Numbers	Max. Flow L/min ★1	Metered Flow Range L/min		Max. Reversed Free Flow L/min	Max. Operating Pressure MPa	Mass kg
		Feed	Fine Feed			
UCF1G-01-4-A-＊-11	16 (12)	0.03 - 4 (0.05 - 4) ★2	—	20	14	1.6
UCF1G-01-4-B-＊-11	12 (8)					
UCF1G-01-4-C-＊-11	8 (4)					
UCF1G-01-8-A-＊-11	20 (12)	0.03 - 8 (0.05 - 8) ★2	—			
UCF1G-01-8-B-＊-11	16 (8)					
UCF1G-01-8-C-＊-11	12 (4)					
UCF1G-03-4-＊-10	40 (40)	0.05 - 4	—	40		2.6
UCF1G-03-8-＊-10		0.05 - 8	—			
UCF2G-03-4-＊-10	40 (40)	0.1 - 4	0.05 - 4	40		2.7
UCF2G-03-8-＊-10		0.1 - 8	0.05 - 4			
UCF1G-04-30-30	80 (40)	0.1 - 22	—	80		6.5
UCF2G-04-30-30		0.1 - 22	0.1 - 17			9.2

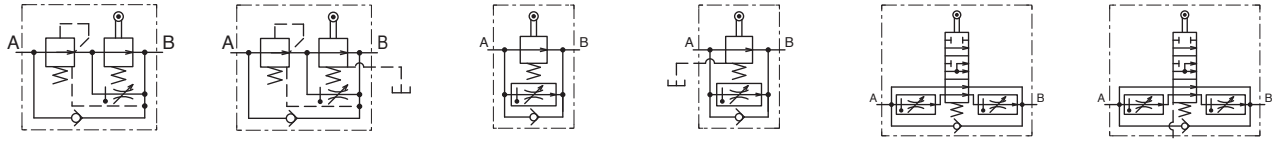
★1. The maximum flow rates are values with the deceleration valve and the flow control valve fully open. The values in parentheses are maximum flow rates with the deceleration valve fully open and the flow control valve fully closed.

★2. The values in parentheses are for pressures above 7 MPa .

Model Number Designation

UCF1	G	−01	−4	−A	−E	−11
Series Number	Type of Mounting	Valve Size	Nominal Metered Flow L/min	Deceleration Valve Max. Flow L/min	Drain Connection	Design Number
UCF1 : Single Feed Control	G : Gasket Mounting	01	4・8	A : 12, B : 8, C : 4	None : Internal Drain, E : External Drain	11
		03	4・8	—		10
		04	30	—	None : External Drain	30
UCF2 : Double Feed Control		03	4・8	—	None : Internal Drain, E : External Drain	10
		04	30	—	None : External Drain	30

Graphic Symbols



UCF1G-01-＊-＊-11 | UCF1G-01-＊-＊-E-11 | UCF1G-03-＊-10 | UCF1G-03-＊-E-10 UCF1G-04-30-30 | UCF2G-03-＊-10 | UCF2G-03-＊-E-10 UCF2G-04-30-30

●Please contact us separately for the details of Feed Control Valves.

Needle Valves

Used as stop valves for pressure gauge lines and small-capacity line. Also can be used as restrictors for regulating flow rates in pilot lines.

Specifications

Model Numbers		Max. Flow L/min	Max. Operating Pressure MPa	Mass kg
In-Line Type	Angle Type			
GCT–02–34	GCTR–02–34	★	35	0.34

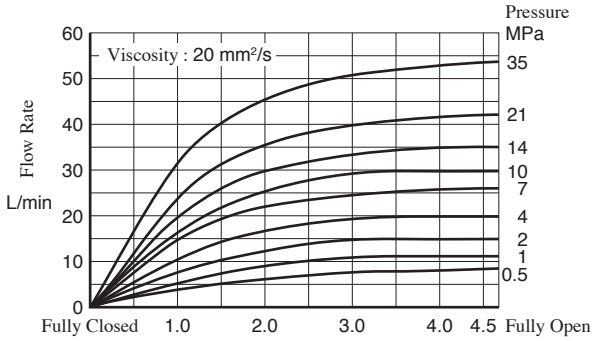
★Depends on allowable pressure drops. See Adjustment Handle Position vs. Flow characteristics and Pressure Drop at Fully Open characteristics.

Model Number Designation

GCT	–02	–34
Series Number	Valve Size	Design Number
GCT : In-line Type Needle Valve, Threaded Connection GCTR : Angle Type Needle Valve, Threaded Connection	02	34

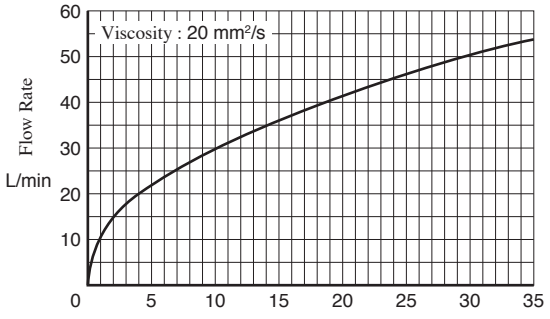
Graphic Symbol

Adjustment Handle Position vs. Flow



Adj. Handle Position (Number of Turns from Fully Closed)

Pressure Drop at Fully Open



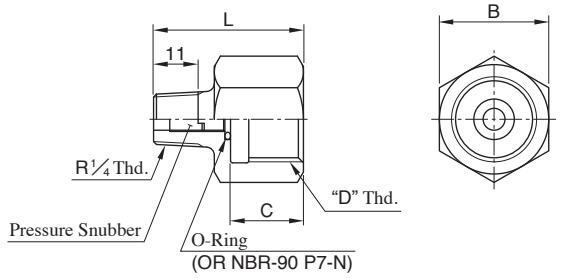
Pressure Drop MPa

Adapter

Used where pressure gauges are attached directly to needle valves. Equipped with pressure snubber for reducing harmful surges to protect pressure gauges. Adapters are not accessories to needle valves. Order them referring to the table below.

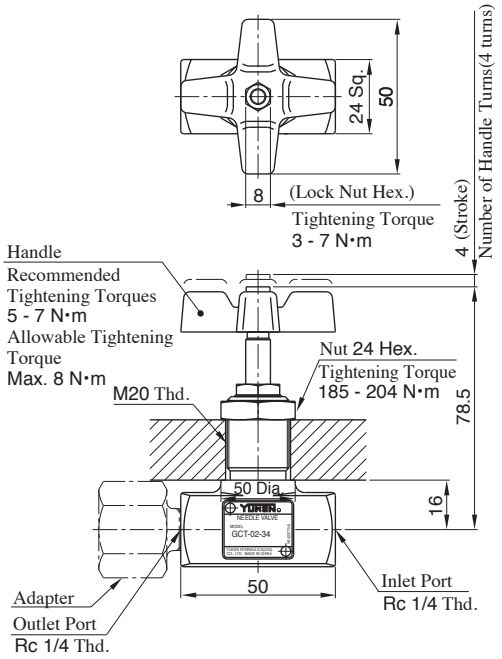
Adapter Type	Thread Size "D" Thd.	B	C	L	Mass kg
AG-02S	G 1/4	24	14	32	0.075
AG-03S	G 3/8	24	16	35	0.075
AG-04S	G 1/2	27	18	37	0.08

AG–02S, 03S, 04S

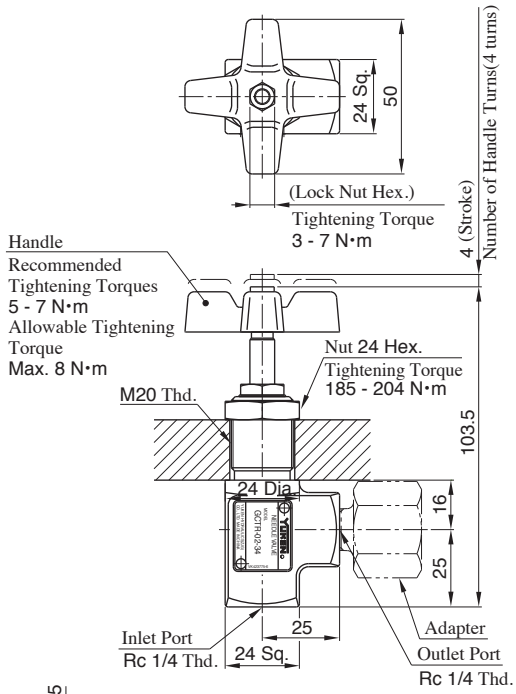


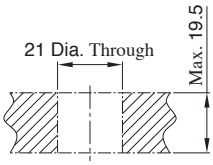
Note: See table above for dimensions.

GCT-02



GCTR-02

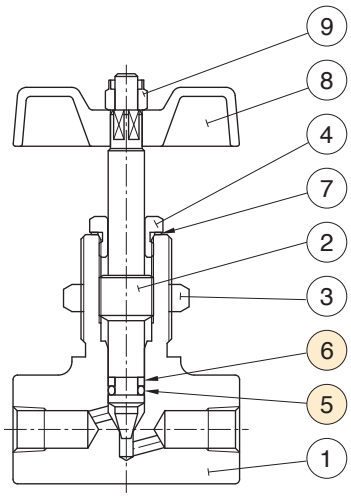




Panel Mounting Dimensions

List of Seals

GCT GCTR -02



Item	Name of Parts	Part Numbers	Qty.
5	O-Ring	OR NBR-70-1 P5-N	1
6	Back Up Ring	BR JIS B 2401-4-T2-P5	1

Installation

Refer to the following procedures to fit the valve with a panel. Figure in a circle below is shown on the left drawing.

1. Remove the nut ⑨ then take off the handle ⑧.
2. Take off the nut ③.
3. Insert the needle valve to a panel hole.
4. Screw the nut ③ on to the valve and fix the valve with the panel.
5. Fit the handle ⑧ and fix it with the nut ⑨.

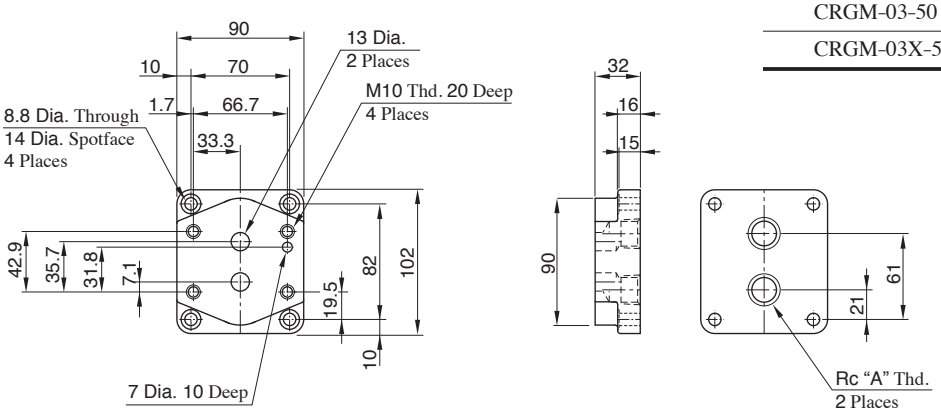
Interchangeability in Installation between Current and New Design

The needle valve has changed model from a 33 to a 34 design to improve assembly workability. There are no changes in specifications, external dimensions, or installation. The nameplate mounting position is on the opposite face of the current design.

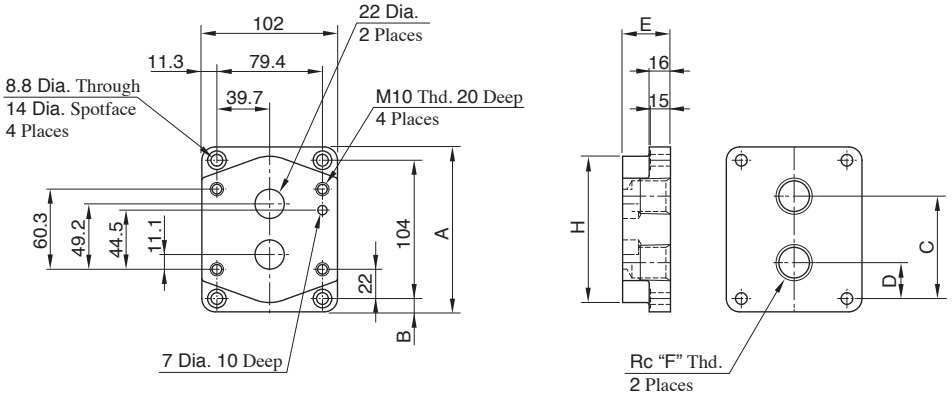
Sub-Plate

CRGM－03, 03X

Sub-Plate Model Numbers	A
CRGM-03-50	3/8
CRGM-03X-50	1/2

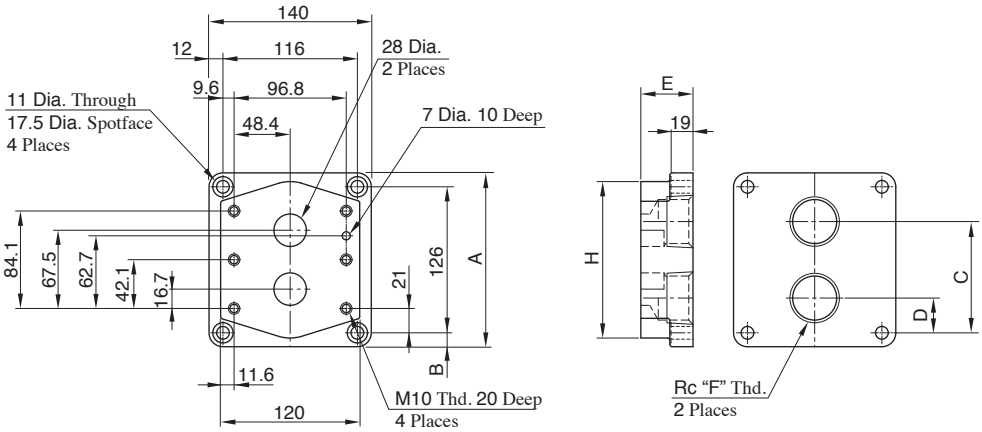


CRGM－06, 06X



Sub-Plate Model Numbers	A	B	C	D	E	F	H
CRGM-06-50	124	10	77	27	36	3/4	110
CRGM-06X-50	136	16	82.3	22	45	1	130

CRGM－10, 10X



Sub-Plate Model Numbers	A	B	C	D	E	F	H
CRGM-10-50	150	12	96	30	45	1 1/4	135
CRGM-10X-50	177	25.5	104	22	50	1 1/2	167

Solenoid Ratings

Valve Type	Electric Source	Coil Type ★3	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
				Source Rating	Serviceable Range	Inrush ★2 (A)	Holding (A)	Power (W)
Standard Type	AC ★1	A 100	50	100	80 - 110	2.42	0.51	—
			60	100	90 - 120	2.14	0.37	
				110		2.35	0.44	
		A 120	50	120	96 - 132	2.02	0.42	
			60		108 - 144	1.78	0.31	
		A 200	50	200	160 - 220	1.21	0.25	
			60	200	180 - 240	1.07	0.19	
				220		1.18	0.22	
		A 240	50	240	192 - 264	1.01	0.21	
			60		216 - 288	0.89	0.15	
Shockless Type	DC (K Series)	D 12	—	12	10.8 - 13.2	—	2.45	29
		D 24		24	21.6 - 26.4		1.23	
		D 48		48	43.2 - 52.8		0.61	
	AC→ DC Rectified (R)	R 100	50/60	100	90 - 110	—	0.33	29
		R 200		200	180 - 220		0.16	

★1. AC solenoid is not available in shockless type.
R type models with built-in current rectifier is recommended for shockless operation with AC power.
★2. Inrush current in the above table show rms values at maximum stroke.
★3. There are more coil types other than the above. For details, please make inquiries.

The coil type numbers in the shaded column are handled as opotinal extras.
In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

E

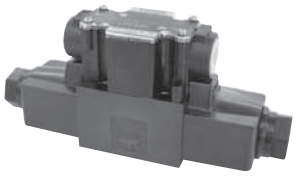
DIRECTIONAL CONTROLS

- Solenoid Operated Directional Valves ..... Page E-5
- Solenoid Controlled Pilot Operated Directional Valves ..... Page E-5
- "G" Series Shockless Type Directional Valves ..... Page E-5
- Pilot /Manually/ Mechanically Operated Directional Valves ..... Page E-5
- Poppet Type Directional Valves ..... Page E-100
- Check /Pilot Controlled Check Valves ..... Page E-136

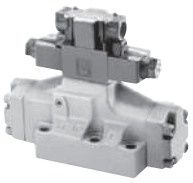
Directional Valves

These valves are used for shifting oil flow direction of hydraulic circuit and for actuator starting/stopping as well as the operating direction shifting of actuator.

Solenoid Operated Directional Valves



Solenoid Controlled Pilot Operated Directional Valves



"G" Series Shockless Type Directional Valves

Pilot/Manually/Mechanically Operated Directional Valves

Poppet Type Directional Valves

Check/Pilot Controlled Check Valves

Hydraulic Fluids

Type of Fluids

Any type of hydraulic fluid listed in the table below can be used.

Type of Fluids	Remarks
Petroleum Base Oils	Use fluids equivalent to ISO VG32 or VG46.
Synthetic Fluids	Use phosphate ester or polyol ester type. When phosphate ester type fluid is to be used, prefix "F-" to the model number because a special seal (fluororubber) will be used.
Water Containing Fluids	Use water-glycol fluids or W/O emulsion type fluids.

Notes 1: Synthetic fluids not applicable with G-DSG and G-DSHG series valves.

2: For two types of manually operated directional valves, DMT-$\begin{matrix}06\\06*\end{matrix}$ and DMT-$\begin{matrix}10\\10*\end{matrix}$, only petroleum base oils and polyol ester type fluids are available.

3: Water-glycol fluids cannot be used for two types of solenoid operated poppet type two-way valves; CDST-03＊ and CDSG-03.

4: For use with hydraulic fluids other than those listed above, please consult your Yuken representatives in advance.

Recommended Viscosity and Oil Temperature

Use hydraulic fluids which satisfy the both recommended viscosity and oil temperature given in the table below.

Name	Viscosity	Oil Temperature	Contamination Degree
DSG-005 series Solenoid Operated Directional Valves DSG-007 series Solenoid Operated Directional Valves	20 - 200 mm²/s	−15 - +60°C	Within NAS Grade 11
Solenoid Operated Directional Valves (Except for DSG-005/007 Series) Solenoid Controlled Pilot Operated Directional Valves Manually Operated Directional Valves Mechanically Operated Directional Valves Poppet Type Solenoid Operated Directional Valves Shut-off Type Solenoid Operated Directional Valves Check Valves Pilot Controlled Check Valves In-Line Prefill Valves	15 - 400 mm²/s	−15 - +70°C	Within NAS Grade 12
G Series Shockless Type Solenoid Operated Directional Valves Shockless Type Solenoid Controlled Pilot Operated Directional Valves	15 - 200 mm²/s	−15 - +60°C	

Control of Contamination

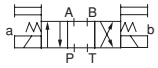
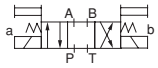
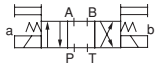
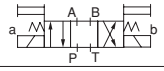
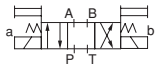
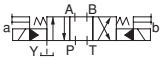
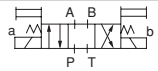
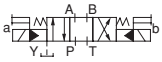
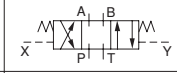
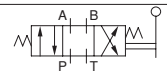
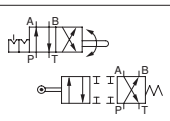
Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorter the life of the valve. Please maintain the degree of contamination above and use 25 μm or finer line filter (In case of DSG-005/007 series Solenoid Operated Directional Valves use 20 μm or finer line filter).

■ Water-Proof, Dust-Proof and Vibration-Resistance

Item	Standard	Type	Descriptions		Compliance					
					DSG-005 DSG-007	(L-/S-/T-)DSG-01 E-DSG-01 DSHG-01 DSHG-03 (S-)DSHG-04 (S-)DSHG-06 (S-)DSHG-10	(L-/S-/E-/T-)DSG-03	G-DSG-01 G-DSG-03 G-DSHG-04 G-DSHG-06	DSLG DSLHG DSP*	CDS*
Water-proof ★2	Current JIS F 8001 Water-proof test for marine electric appliance	Class 1 water spray	Drip-proof construction		○	○	○	○	○	○
		Class 2 water spray	Froth-proof construction		×	○	○	○	○	○
	JIS D 0203 Damp-proof and Water-proof test for automobile parts	Damp-proof test M1	Test to examine damp-resistance of parts		×	○	○	○	○	○
		Damp-proof test M2	Test to examine functions of part under high temperature and high humidity		×	○	○	○	○	○
		Splash-proof test R1	Test to examine functions of parts which are likely to be exposed to water splash.		○	○	○	○	○	○
		Splash-proof test R2	Test to examine functions of parts which are indirectly exposed to stormy weather or water splash.		×	○	○	○	○	○
	International Electrotechnical Commission (I.E.C) Pub. 529 JIS C 0920 Water-proof test for electromechanical parts and protection level against the ingress of solid objects	Protection Class 2: Drip-proof type (2)	Not affected by water drip falling at vertical angle of 15 degrees or less.		○	○	○	○	○	○
		Protection Class 3: Rain-proof type	Not affected by rain falling at vertical angle of 60 degrees or less.		×	○	○	○	○	○
		Protection Class 4: Froth-proof type	Not affected by water drip from any direction.		×	○	○	○	○	○
		Protection Class 5: Jet-flow proof type	Not affected by jet flow from any direction.		×	○	×	×	○ ★3	×
Dust-proof ★2	International Electrotechnical Commission (I.E.C) Pub. 529 JIS C 0920 Water-proof test for electromechanical parts and protection level against the ingress of solid objects	Protection Class 6	Fully protected from entry of dust.		○	○	○	○	○	○
Vibration-resistance	JIS C 0911 Vibration test for small electric appliances	Resonace test (IC)	Vibration range: 7-59.5 Hz Duplex amplitude: 0.1 m		×	○	○	○	○	○
		Fixed frequency resistance test (IIC)	Frequency: 20 Hz	Grade 1: duplex amplitude-0.5 mm	×	○	○	○	○	○
				Grade 2: duplex amplitude-1.2 mm	×	○ ★1	○ ★1	○ ★1	○	○
				Grade 3: duplex amplitude-1.8 mm	×	○ ★1	○ ★1	○ ★1	○	○
				Grade 4: duplex amplitude-2.4 mm	×	○ ★1	○ ★1	○ ★1	○	○
		Variable frequency resistance test (IIIC)	Frequency range: 7-59.5 Hz	Grade 1: duplex amplitude-0.3 mm	×	○ ★1	○ ★1	○ ★1	○	○
				Grade 2: duplex amplitude-0.5 mm	×	○ ★1	○ ★1	○ ★1	○	×
				Grade 3: duplex amplitude-0.75 mm	×	○ ★1	○ ★1	○ ★1	○	×
	JIS D 1601 Vibration test for automobile parts	Class 1: mainly for parts of passenger car	Grade A: Parts mounted on spring of body or chassis having relatively high vibration.		×	○	○	○	○	×
			Grade B: Parts mounted on spring of body or chassis having relatively high vibration.		×	○	○	○	○	×
			Grade C: Parts mounted on spring of body or chassis having relatively low vibration.		×	○	○	×	○	×

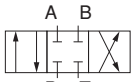
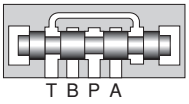
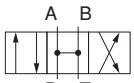
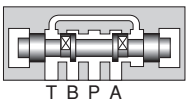
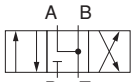
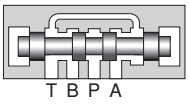
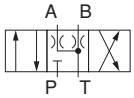
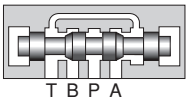
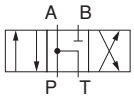
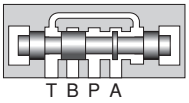
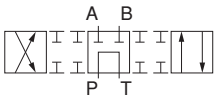
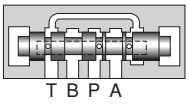
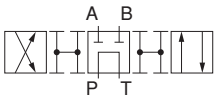
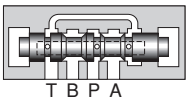
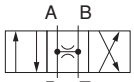
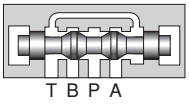
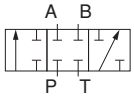
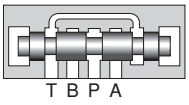
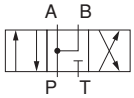
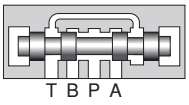
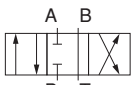
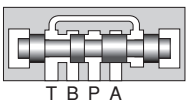
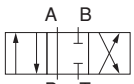
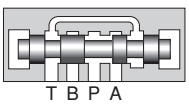
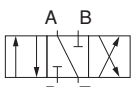
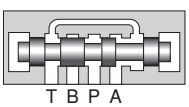
★1. No-spring detented type (2D*) and No-spring type (2N*) can be used when energised continous for position holding.
★2. For outdoor use, protect equipment with a cover, etc., to prevent direct exposure to water.
For the terminal-box type connecting port for electric wire tube, use each standard tube and make bushing construction.
★3. DSP*-01 can be used.

Solenoid Operated Directional Valves
Solenoid Controlled Pilot Operated Directional Valves
"G" Series Shockless Type Directional Valves
Pilot/Manually/Mechanically Operated Directional Valves

Valve Type	Graphic Symbols	Max. Operating Pressure MPa	Max. Flow L/min (1 2 5 10 20 50 100 200 500 1000 2000 5000)	Page
Solenoid Operated Directional Valves		25	DSG-005	E-10
		25	DSG-007	E-16
		16	L-DSG-01	E-22
		25	S-DSG-01	
		35	DSG-01	
		16	L-DSG-03	E-37
		25	S-DSG-03	
		31.5	DSG-03	
Low Wattage (5W) Type Solenoid Operated Directional Valves		16	E-DSG-01 E-DSG-03	E-53
Electronic Relay Incorporated Solenoid Operated Directional Valves		25	T-S-DSG-01	E-62
		35	T-DSG-01	
		25	T-S-DSG-03	E-62
		31.5	T-DSG-03	
Explosion Proof (Flameproof) Type Solenoid Operated Directional Valves		31.5	DSG-01-***-**X* DSG-03-***-**X*	E-66
Explosion Proof (Increased Safety) Type Solenoid Operated Directional Valves		31.5	DSG-01-***-**Y* DSG-03-***-**Y*	E-68
Solenoid Controlled Pilot Operated Directional Valves		21	DSHG-01	E-69
		25	DSHG-03	
		31.5	DSHG-04/S-DSHG-04 DSHG-06/S-DSHG-06 DSHG-10/S-DSHG-10	
G Series Shockless Type Solenoid Operated Directional Valves		25	G-DSG-01 G-DSG-03	E-94
G Series Shockless Type Solenoid Controlled Pilot Operated Directional Valves		25	G-DSHG-04 G-DSHG-06	E-94
Pilot Operated Directional Valves		31.5	DHG-04 06 10	E-97
Manually Operated Directional Valves		21	Thread Connection (DMT) 03 06 10	E-98
		31.5	Sub-plate Connection (DMG) 01 03 04 06 10	
Mechanically Operated Directional Valves		7	Rotary (DR^{T}_{G}) 02	E-99
		25	Cam Operated (DC^{T}_{G}) 01 03	

Spool Types

Spool types are classified to the condition of flow at the neutral position.

Spool Types	Graphic Symbols	Schematic Drawing (Center Position)	Functions and Applications
"2" Closed Center All Ports			Holds pump pressure and cylinder position at neutral. Care should be paid if used as a 2-position type because shock occurs when each port is blocked in transit.
"3" Open Center All Ports			Pump can be unloaded and actuator is floating at neutral. If a 2-position type is used, shock is reduced as each ports is released to tank in transit.
"4" Open Center A, B&T			Pump pressure is held and actuator is floating at neutral. 2-position type is used when system pressure is required to be held in transit. Shock during transit is less compared to spool type "2".
"40" Open Center A, B&T Restricted Flow			In a variation of spool type "4", a restrictor is provided in A-T and B-T ports. Making it faster at stopping the actuator.
"5" Open Center P, A&T			It can be used when a pump is unloading at neutral and actuator is halted at one way flow.
"6" Open Center P&T (Closed Crossover)			Pump is unloading and actuator position held at neutral. Suitable for series operation.
"60" Open Center P&T (Open Crossover)			It is a variation of spool type "6". Shock is reduced as each port is released to tank on transit.
"7" Open Center All Ports Restricted Flow			Mainly used as a 2-position type. Shock is reduced on transit.
"8" 2-Way			Pump pressure and cylinder position is held at neutral in the same way as spool type "2". It is used as 2 way type.
"9" Open Center P, A&B			Regenerative circuit is provided at neutral.
"10" Open Center B&T			Prevent actuator from one direction drift by leakage of P port at neutral.
"11" Open Center P&A			Halt actuator movement positively at B, T ports blocked P, A ports connected at neutral.
"12" Open Center A&T			Prevent actuator from one direction drift by leakage of P port at neutral.

Mounting Surface

Mounting surface dimensions conform to ISO 4401, Hydraulic fluid power-Four-Port directional control valves mounting surfaces.

Model Numbers	ISO Code of Mounting Surface
DSG–007	ISO 4401–02–01–0–05
(L–/S–/E–/HE–/T–/G–) DSG–01 DSHG–01 DMG–01 DCG–01	ISO 4401–03–02–0–05
(L–/S–/E–/T–/G–) DSG–03 DMG–03 DCG–03	ISO 4401–05–04–0–05
DSHG–03	ISO 4401–05–05–0–05
(S–/G–) DSHG–04 DHG–04 DMG–04	ISO 4401–07–07–0–05
(S–/G–) DSHG–06 DHG–06 DMG–06	ISO 4401–08–08–0–05
(S–) DSHG–10 DHG–10 DMG–10	ISO 4401–10–09–0–05

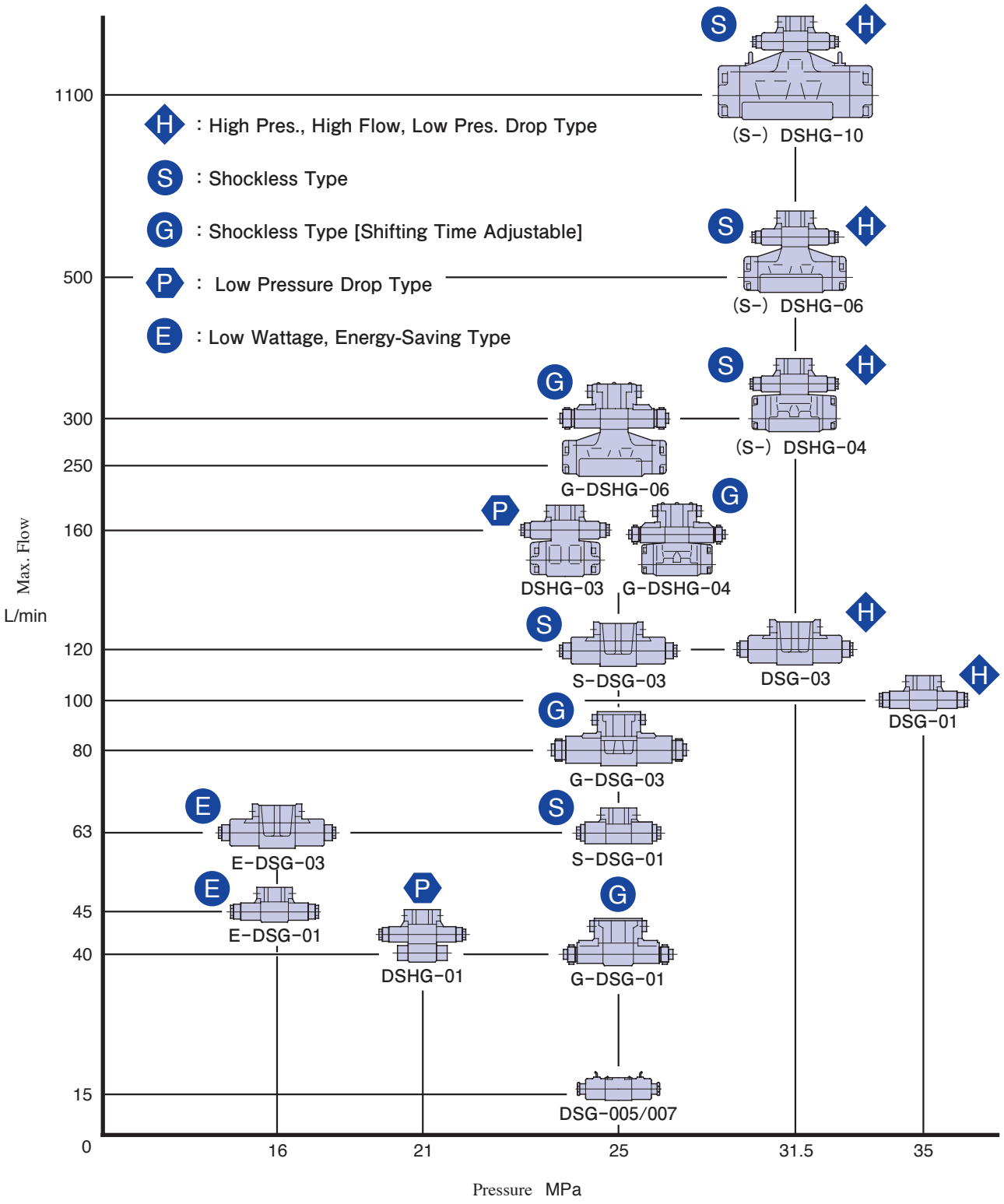
Note: Mounting surface of DSG-005 is YUKEN original standard.

Interchangeability in Installation between Current and New Design

Model change has been made on the following product.
The difference between current and new design has been described on the paragraph of "Interchangeability in Installation between Current and New Design." Refer to relevant pages on each series.

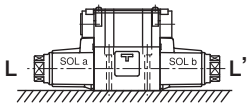
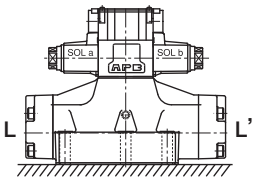
Name	Model Numbers		Interchangeability in Installation	Related Page	Major Changes
	Currrent	New			
DSG–005 Series Solenoid Operated Directional Valves	DSG-005-＊＊＊-＊-30	DSG–005–＊＊＊–＊–40 DSG–005–＊＊＊–＊–N/N1–40	Yes	—	● High Flow ● Low Pressure Drop ● Din-connector type solenoid in addition
DSG–01 Series Solenoid Operated Directional Valves	(S-/T-) DSG-01-＊＊＊-＊-60	(S-/T-) DSG-01-＊＊＊-＊-70	Yes	E-32	● High Pressure ● High Flow ● High Max. T-Line Back Pressure ● Low Pressure Drop ● Small Mass
Low Wattage (5W) Type Solenoid Operated Directional Valves	E-DSG-01-＊＊＊-＊-60	E-DSG-01-＊＊＊-＊-70	Yes	E-61	● High Flow
Explosion Proof (Flameproof) Type Solenoid Operated Directional Valves	DSG-01-＊＊＊-＊X＊-50 DSG-03-＊＊＊-＊X＊-50	DSG-01-＊＊＊-＊X＊-70 DSG-03-＊＊＊-＊X＊-51	Yes	E-67	● Change Cable Lead-in Port ● High Pressure ● High Flow
Solenoid Controlled Pilot Operated Directional Valves	DSHG-01-＊＊＊-＊-13 DSHG-03-＊＊＊-＊-13 (S-) DSHG-04-＊＊＊-＊-51 (S-) DSHG-06-＊＊＊-＊-52 (S-) DSHG-10-＊＊＊-＊-42	DSHG-01-＊＊＊-＊-14 DSHG-03-＊＊＊-＊-14 (S-) DSHG-04-＊＊＊-＊-52 (S-) DSHG-06-＊＊＊-＊-53 (S-) DSHG-10-＊＊＊-＊-43	Yes	—	● Pilot valve has been changed from DSG-01, 60 design to 70 design.
G Series Shockless Type Solenoid Operated Directional Valves	G-DSG-01-＊-＊＊＊-＊-50 G-DSG-03-＊-＊＊＊-＊-50	G-DSG-01-＊-＊＊＊-＊-51 G-DSG-03-＊-＊＊＊-＊-51	Yes	E-96	● Use Digital Control Amplifier

Wide Range of Models – Choose the optimum valve to meet your needs from a large selection available.



Instructions

Mounting

DSG–005 DSG–007	No mounting restrictions for any model.
✻–DSG–01 ✻–DSG–03	No-spring detented models not energised continuously must be installed so that the spool axis L-L' is horizontal. Otherwise there is no mounting restrictions.  ✻-DSG-01/03
DSHG–01 DSHG–03 (S–) DSHG–04 (S–) DSHG–06 (S–) DSHG–10	No-spring models not energised continuously must be installed so that the spool axis L-L' is horizontal. Otherwise there is no mounting restrictions.  ✻-DSHG

Energisation

1. On double solenoid valves do not energise both at the same time as it will result in coils burning out.
2. If use No-Spring Type, one of two solenoids should be energised continuously to avoid malfunction.

Valve Tank Port 【Solenoid Operated / Solenoid Controlled Pilot Operated Directional Valves (Internal Drain Type)】

Avoid connecting the valve tank port to a line with possible surge pressure.
Solenoid Operated Directional Valve is wet type, so piping have to constantly fill the tank line with operating oil.
Piping end of tank line should be submerged in oil.

Pilot Drain Port for Solenoid Controlled Pilot Operated Directional Valve

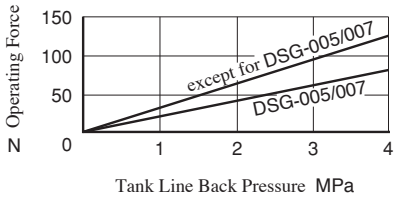
Avoid connecting the valve pilot drain port to a line with possible surge pressure.
Solenoid Controlled Pilot Operated Directional Valve is wet type, so piping have to constantly fill the Pilot Operated Directional valve with operating oil.

Shockless Type

In order to benefit from a shockless operation, it is necessary to fill the tank line with operating oil.
Only after the tank line has been filled with operating oil should the valve be used on a regular basis.

Operating Force by Manual Actuator

Take care as the operating force by the manual actuator increases in proportion to the tank line back pressure. (See the graph right.)



Solenoid

Solenoid connector (DIN connector)

The solenoid connector is in accordance with the international standard ISO 4400 (Fluid power systems and components-Three-pin electrical plug connectors characteristics and requirements).

AC Solenoid

50-60 Hz common service solenoids do not require rewiring when the applied frequency is changed.

DC Solenoid

DC Solenoid is K-series with good reputation.

★Three Characteristics of K-series★

1. Avoid malfunction of computers.
   (The surge voltage is low, so these valves do not give bad influences like noise to electronic devices)
2. The relays last for long time.
   (The spark between the relay contacts has been eliminated and therefore drastically decrease damages of contacts)
3. Time lag on de-energisation is reduced.

R type Models with Current Rectifier and DC Solenoid

Specially designed DC solenoid and receptacle (or connector) containing AC-DC rectifier and transient peak suppressor are provided. Connection to be made to AC power source as with conventional AC solenoid.
Remarkably high reliability and long life and other advantages including quiet valve operation. No overheating of coil due to the spool sticking and protection against transient voltage peaks are assured.

RQ type Models with Current rectifier and Quick Return Solenoid

Valve characteristics are identical to R type except for the fast return time of the spool after deenergisation.

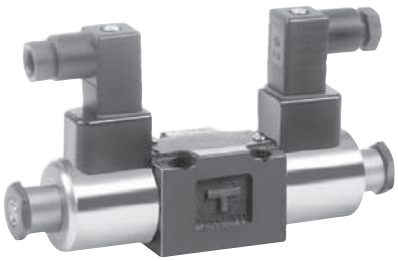
Insulation Class of Solenoid

Model Numbers	Insulation Class
DSG–005, DSG–007 (S–/E–/T–) DSG–01 DSG–03, S–DSG–03, E–DSG–03, T–DSG–03 DSHG–01/03/04/06/10 S–DSHG–04/06/10	Class H

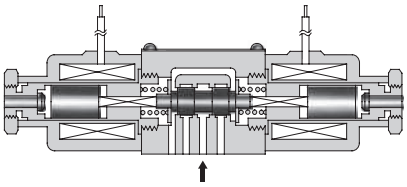
DSG-005 Series Solenoid Operated Directional Valves

These DSG-005 series solenoid directional valves are the products newly developed as a “Mini-series”.
The valves are much more compactly manufactured but enjoy a maximum operating pressure of 25 MPa and a maximum flow rate of 15 L/min, while contributing further to a space saving requirement.
Moreover, using wet armature solenoids, the valves ensure the long life and low noise.

Flying Lead Wire Type



Plug-in Connector Type



Specifications

Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. Tank-Line Back Pressure MPa	Max. Changeover Frequency min^{-1}	Approx. Mass kg
DSG–005–3C∗–∗–40	15	25	7	120	0.5
DSG–005–2B∗–∗–40					0.4

★ The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.
The maximum flow differs according to the type and operating conditions. For details, please refer to the “List of Standard Models and The Maximum Flow” on page E-12.

Solenoid Ratings

Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
			Source Rating	Serviceable Range	Inrush★1 (A)	Holding (A)	Power (W)
AC	A 100	50	100	80 – 110	0.36	0.16	—
		60		90 – 120	0.34	0.11	
	A 200	50	200	160 – 220	0.18	0.08	
		60		180 – 240	0.17	0.05	
DC★2	D12	—	12	10.8 – 13.2	—	1.2	15
	D24		24	21.6 – 26.4		0.6	

★1. Inrush current in the above table shows rms values at maximum stroke.
★2. The Plug-in Connector Type DC solenoid has a built-in surge absorber.
The Flying Lead Wire type has no surge absorber equipped. Install a surge absorber separately.

Model Number Designation

DSG	–005	–3	C	2	–D24	–N	–40
Series Number	Valve Size	Number of Valve Positions	Spool-Spring Arrangement	Spool Type	Coil Type	Electrical Conduit Connection	Design Number
DSG : Solenoid Operated Directional Valve (Sub-plate Mount Type)	005	3	C: Spring Centered	2, 3 40	AC A100 A200 DC D12 D24	None : Flying Lead Wire Type N : Plug-in Connector Type N1: Plug-in Connector with Indicator Light	40
		2	B: Spring Offset	2, 3			

Note: Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Sub-plates

Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSGM–005X–20	1/8	0.8
DSGM–005Y–20	1/4	

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
  And the port hole diameter should below 4.3 Dia..

Accessories

Mounting Bolts	Tightening Torque
Soc. Hd. Cap Screw : M4×35L…4Pcs.	2.5 - 3.5 Nm

Electrical Conduit Connection

The solenoid common use 50 & 60 Hz, so no need to change connection by difference of frequency.
The solenoid polarity is irrelevant with connection.

Typical Changeover Time (Example)

Changeover time varies according to oil viscosity, spool type and hydraulic circuit.

[Test Conditions]

Pressure : 16 MPa

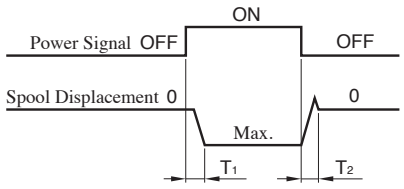
Flow Rate : 7.5 L/min

Viscosity : 30 mm²/s

Voltage : Rated Voltage (After coil temperature rise and saturated)

Direction of Flow : P → A → B → T, P → B → A → T

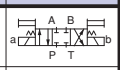
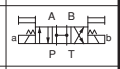
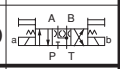
[Result of Measurement]



Model Numbers	Time ms	
	T1	T2
DSG–005–3C2–A✻	16	60
DSG–005–3C2–D✻	23	40
DSG–005–2B2–A✻	14	45
DSG–005–2B2–D✻	15	33

List of Standard Models

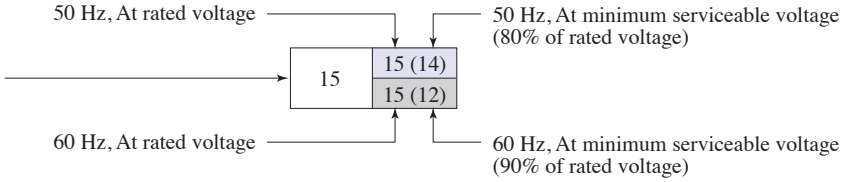
Models with AC Solenoids : DSG-005-＊＊＊-A＊

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min: P→A, B→B, B→A, A→T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	DSG–005–3C2		15	15	15	15	15 (14) 15 (12)	15 (7) 12 (3)	12 (3) 5 (1)	4 (0.5) 1 (0.5)	15 (14) 15 (12)	15 (7) 12 (3)	12 (3) 5 (1)	4 (0.5) 1 (0.5)
		DSG–005–3C3		12	12	12	12	15	15	15	15	15	15	15	15
		DSG–005–3C40		15	15	15	15	15 (14) 15 (10)	15 (6) 12 (5)	12 (2) 5 (2)	4 (0.5) 1 (0.5)	15 (14) 15 (10)	15 (6) 12 (5)	12 (2) 5 (2)	4 (0.5) 1 (0.5)
Two Positions	Spring Offset	DSG–005–2B2		14	14	14	14	2	1	1	1	15 (14) 15 (14)	15 (10) 14 (9)	13 (5) 8 (4)	6 (0.5) 4 (0.5)
		DSG–005–2B3		13.5	13.5	13.5	13.5	3	3	3	3	15	15 (14) 15 (14)	15 (11) 15 (11)	15 (9) 15 (9)

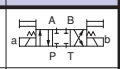
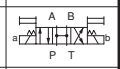
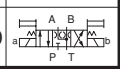
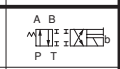
Notes: The relation between the maximum flow in the table above and the frequency/voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of 50 Hz or 60 Hz and of any voltage variants within the serviceable voltage



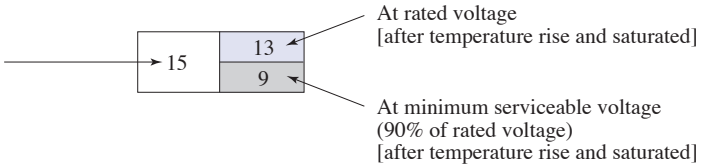
Models with DC Solenoids : DSG-005-＊＊＊-D＊

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min: P→A, B→B, B→A, A→T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	DSG–005–3C2		15	15	15	15	15 12	8 5	5 3	3 2	15 12	8 5	5 3	3 2
		DSG–005–3C3		15	15	15	15	15	15	15	15	15	15	15	15
		DSG–005–3C40		15	15	15	15	15	13 9	8 5.5	5 3.5	15	13 9	8 5.5	5 3.5
Two Positions	Spring Offset	DSG–005–2B2		14	14	14	14	8.5	4.5	6.5	6.5	15	15 11	11 7.5	9 5.5
		DSG–005–2B3		13.5	13.5	13.5	13.5	8	7	8	9	15	15	15	13.5 10.5

Notes: The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

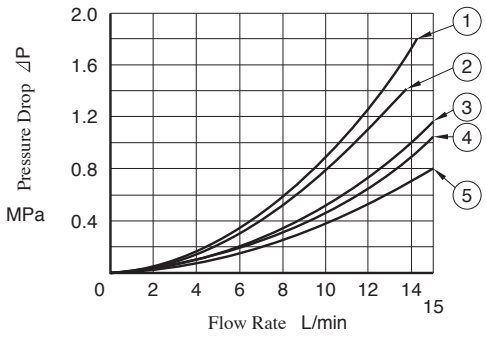
(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage



Pressure Drop

Pressure drop curves based on viscosity of 30 mm²/s and specific gravity of 0.850.



Model Numbers	Pressure Drop Curve Numbers				
	P→A	B→T	P→B	A→T	P→T
DSG-005-3C2	④	④	④	④	—
DSG-005-3C3	⑤	⑤	⑤	⑤	③
DSG-005-3C40	④	④	④	④	—
DSG-005-2B2	①	①	④	④	—
DSG-005-2B3	②	②	④	④	—

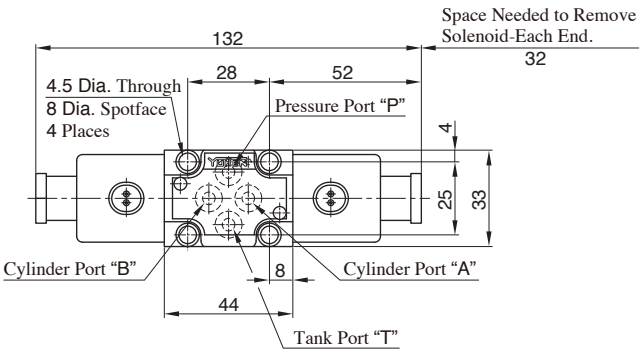
● For any other viscosity, multiply the factors in the table below.

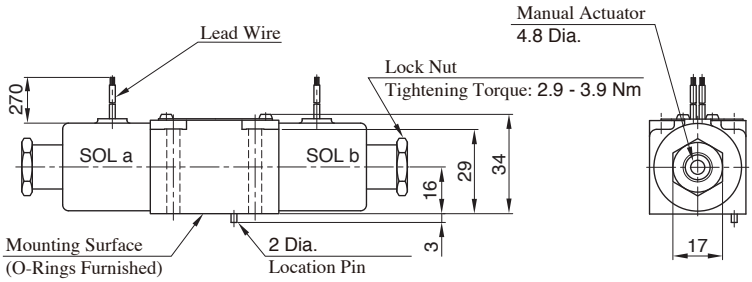
Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.84	0.91	1.00	1.07	1.14	1.19	1.24	1.28	1.32	1.35

● For any other specific gravity (G'), the pressure drop (ΔP) may be obtained from the formula below.
ΔP' = ΔP (G'/0.850)

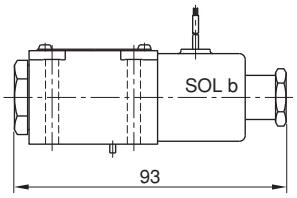
Flying Lead Wire Type

● Spring Centered : **DSG-005-3C∗-A∗/D∗**





● Spring Offset : **DSG-005-2B∗-A∗/D∗**

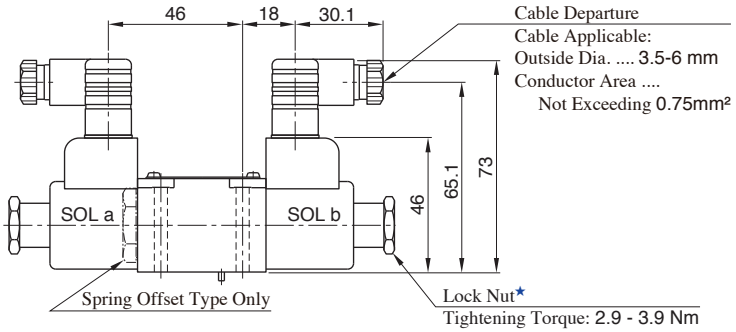


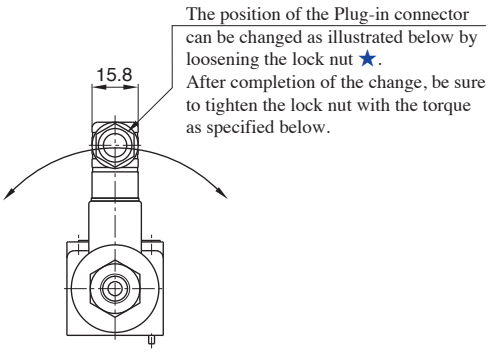
● For other dimensions, refer to "Spring Centered" type.

DIN Connector Type / DIN Connector with Indicator Light

● Spring Centered : **DSG-005-3C∗-A∗/D∗-N/N1**

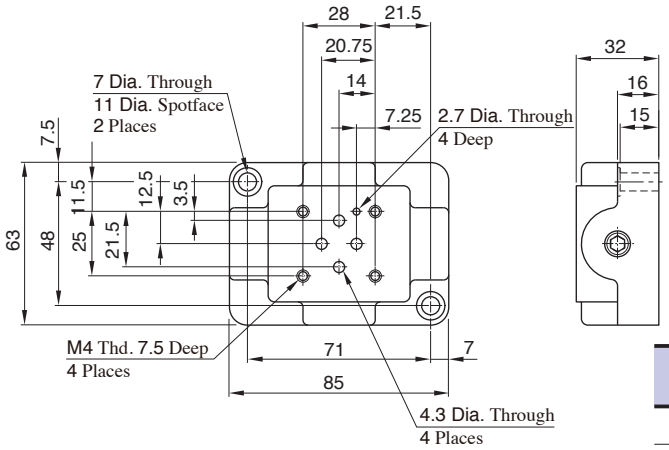
● Spring Offset : **DSG-005-2B∗-A∗/D∗-N/N1**

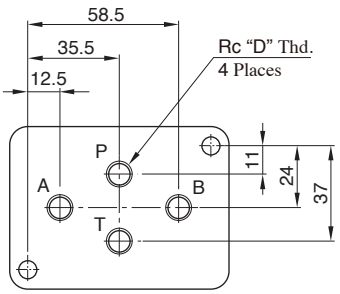




● For other dimensions, refer to "Flying Lead Wire Type".

Sub-plate : DSGM-005X, 005Y



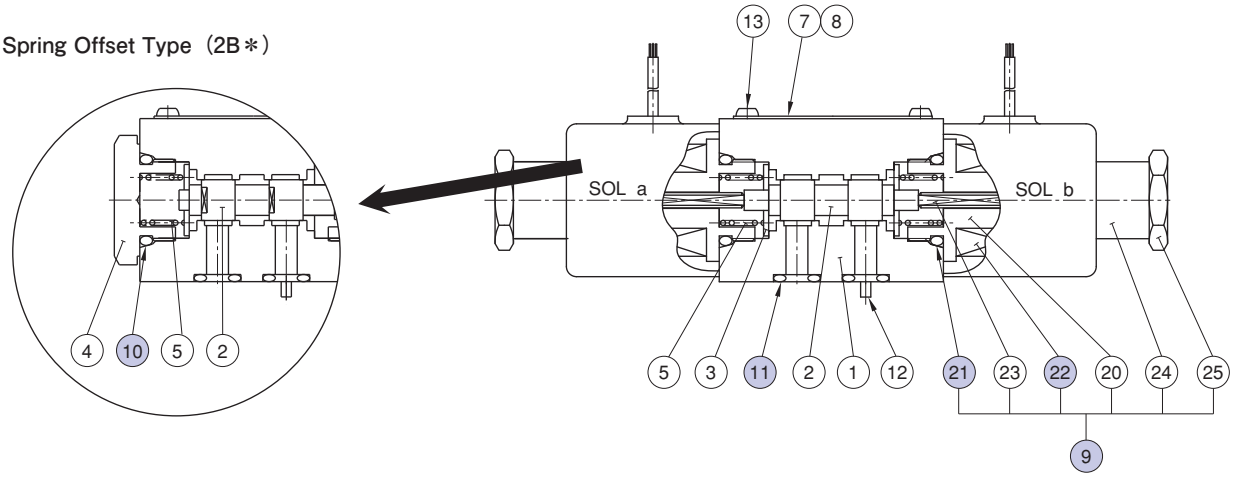


Sub-plate Model Numbers	D	Approx. Mass kg
DSGM-005X-20	1/8	0.8
DSGM-005Y-20	1/4	

List of Seals, Solenoid Ass'y

DSG-005

Spring Offset Type (2B∗)



List of Seals

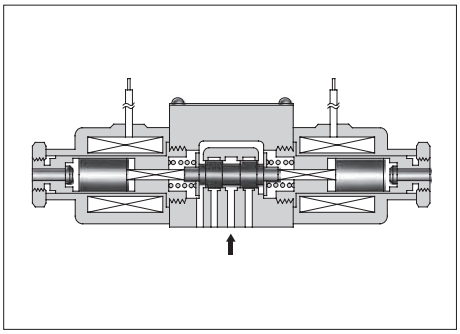
Item	Name of Parts	Part Numbers	Qty.		Remarks
			3C∗	2B∗	
10	O-Ring	OR NBR-90 P14-N	—	1	
11	O-Ring	OR NBR-90 P6-N	4	4	
21	O-Ring	OR NBR-90 P14-N	2	1	Included in Solenoid Ass'y ⑨

Solenoid Ass'y, Coil Ass'y No.

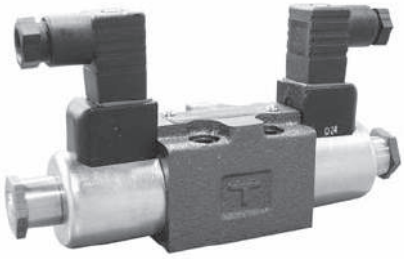
Valve Model Numbers	⑨Solenoid Ass'y No.	㉒ Coil Ass' y No.	Remarks
DSG-005-∗∗∗-A100	SA05-100-40	C-SA05-100-40	Flying Lead Wire Type
DSG-005-∗∗∗-A200	SA05-200-40	C-SA05-200-40	
DSG-005-∗∗∗-D12	SD05-12-40	C-SD05-12-40	
DSG-005-∗∗∗-D24	SD05-24-40	C-SD05-24-40	
DSG-005-∗∗∗-A100-N/N1	SA05-100-N-40	C-SA05-100-N-40	Plug-in Connector Type /Plug-in Connector with Indicator Light
DSG-005-∗∗∗-A200-N/N1	SA05-200-N-40	C-SA05-200-N-40	
DSG-005-∗∗∗-D 12-N/N1	SD05- 12-N-40	C-SD05- 12-N-40	
DSG-005-∗∗∗-D 24-N/N1	SD05- 24-N-40	C-SD05- 24-N-40	

DSG-007 Series Solenoid Operated Directional Valves

These DSG-007 series solenoid directional valves are the products based on the DSG-005 series and mounting surface dimensions are suit for ISO standard.
The valves are much more compactly manufactured but enjoy a maximum operating pressure of 25 MPa and a maximum flow rate of 15 L/min, while contributing further to a space saving requirement.
Moreover, using wet armature solenoids, the valves ensure the long life and low noise.



Flying Lead Wire Type



Plug-in Connector Type

Specifications

Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. Tank-Line Back Pressure MPa	Max. Changeover Frequency min^{-1}	Approx. Mass kg
DSG–007–3C∗–∗–10	15	25	7	120	0.7
DSG–007–2B∗–∗–10					0.57

★ The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.
The maximum flow differs according to the type and operating conditions. For details, please refer to the “List of Standard Models and Maximum Flow” on pages E-18 to E-19.

Solenoid Ratings

Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
			Source Rating	Serviceable Range	Inrush★1 (A)	Holding (A)	Power (W)
AC	A 100	50	100	80 - 110	0.36	0.16	—
		60		90 - 120	0.34	0.11	
	A 200	50	200	160 - 220	0.18	0.08	
		60		180 - 240	0.17	0.05	
DC★2	D12	—	12	10.8 - 13.2	—	1.2	15
	D24		24	21.6 - 26.4		0.6	

★ 1. Inrush current in the above table shows rms values at maximum stroke.
★ 2. The Plug-in Connector Type DC solenoid has a built-in surge absorber.
The Flying Lead Wire type has no surge absorber equipped. Install a surge absorber separately.

Model Number Designation

DSG	–007	–3	C	2	–D24	–N	–10
Series Number	Valve Size	Number of Valve Positions	Spool-Spring Arrangement	Spool Type	Coil Type	Electrical Conduit Connection	Design Number
DSG : Solenoid Operated Directional Valve (Sub-plate Mount Type)	007	3	C : Spring Centered	2, 3 4, 40	AC A100 A200 DC D12 D24	None: Flying Lead Wire Type N: Plug-in Connector Type N1: Plug-in Connector with Indicator Light	10
		2	B : Spring Offset	2, 3, 8			

Note: Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Sub-plates

Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSGM-007X-10	1/8	0.8
DSGM-007Y-10	1/4	

● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
And the port hole diameter should below 4.3 Dia..

Accessories

Mounting Bolts	Tightening Torque
Soc. Hd. Cap Screw : M5×40L···4Pcs.	5.0 - 7.0 Nm

Electrical Conduit Connection

The solenoid common use 50 & 60 Hz, so no need to change connection by difference of frequency.
The solenoid polarity is irrelevant with connection.

Typical Changeover Time (Example)

Changeover time varies according to oil viscosity, spool type and hydraulic circuit.

[Test Conditions]

Pressure : 16 MPa

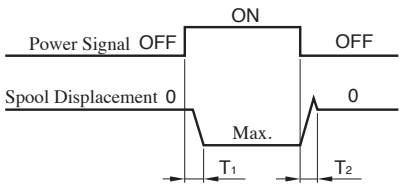
Flow Rate : 7.5 L/min

Viscosity : 30 mm²/s

Voltage : Rated Voltage (After coil temperature rise and saturated)

Direction of Flow : P ⇄ A → B ⇄ T, P ⇄ B → A ⇄ T

[Result of Measurement]



Model Numbers	Time ms	
	T1	T2
DSG–007–3C2–A✻	16	60
DSG–007–3C2–D✻	23	40
DSG–007–2B2–A✻	14	45
DSG–007–2B2–D✻	15	33

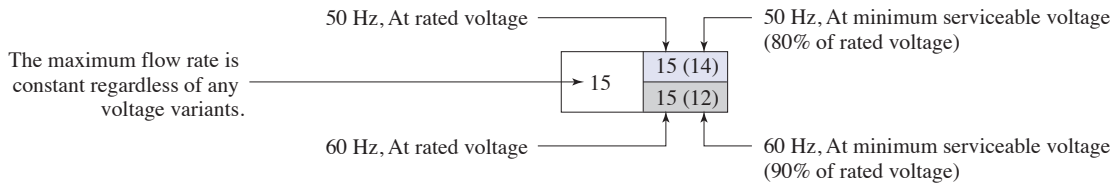
List of Standard Models

Models with AC Solenoids : DSG-007-＊＊＊-A＊

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P→A→B→T, B→A				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	DSG–007–3C2		15	15	15	15	15(14)	15(7)	12(3)	4(0.5)	15(14)	15(7)	12(3)	4(0.5)
								15(12)	12(3)	5(1)	1(0.5)	15(12)	12(3)	5(1)	1(0.5)
		DSG–007–3C3		12	12	12	12	15	15	15	15	15	15	15	15
		DSG–007–3C4		13	13	13(6)	8(2)	15(14)	15(6)	12(2)	4(0.5)	15(14)	15(6)	12(2)	4(0.5)
						9(4)	4(1)	15(10)	12(5)	5(2)	1(0.5)	15(10)	12(5)	5(2)	1(0.5)
		DSG–007–3C40		15	15	15	15	15(14)	15(6)	12(2)	4(0.5)	15(14)	15(6)	12(2)	4(0.5)
								15(10)	12(5)	5(2)	1(0.5)	15(10)	12(5)	5(2)	1(0.5)
Two Positions	Spring Offset	DSG–007–2B2		14	14	14	14	2	1	1	1	15(14)	15(10)	13(5)	6(0.5)
												15(14)	14(9)	8(4)	4(0.5)
		DSG–007–2B3		13.5	13.5	13.5	13.5	3	3	3	3	15	15(14)	15(11)	15(9)
													15(14)	15(11)	15(9)
		DSG–007–2B8		—	—	—	—	3	1	1	0.5	15(5)	14(1)	6(0.5)	2(0.5)
												14(5)	3(1)	1(0.5)	1(0.5)

Notes: The table above based on viscosity of 30mm²/s.
The relation between the maximum flow and the voltage (within the serviceable voltage) is as shown below.

(Example)



● Models with DC Solenoids : DSG-007-＊＊＊-D＊

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P→A→B→T, P→B→A→T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	DSG–007–3C2		15	15	15	15	15	8	5	3	15	8	5	3
								12	5	3	2	12	5	3	2
		DSG–007–3C3		15	15	15	15	15	15	15	15	15	15	15	15
		DSG–007–3C4		15	15	8.5	4.5	15	9.5	5.5	3.5	15	9.5	5.5	3.5
					7.5	3.5	2	14.5	6	3.5	2	14.5	6	3.5	2
		DSG–007–3C40		15	15	15	15	15	13	8	5	15	13	8	5
									9	5.5	3.5		9	5.5	3.5
Two Positions	Spring Offset	DSG–007–2B2		14	14	14	14	8.5	4.5	6.5	6.5	15	15	11	9
													11	7.5	5.5
		DSG–007–2B3		13.5	13.5	13.5	13.5	8	7	8	9	15	15	15	13.5
															10.5
		DSG–007–2B8		—	—	—	—	15	3.5	2	1.5	15	4	2.5	2
												9	3	1.5	1.5

Notes: The table above based on viscosity of 30mm²/s.
The relation between the maximum flow and the voltage (within the serviceable voltage) is as shown below.

(Example)

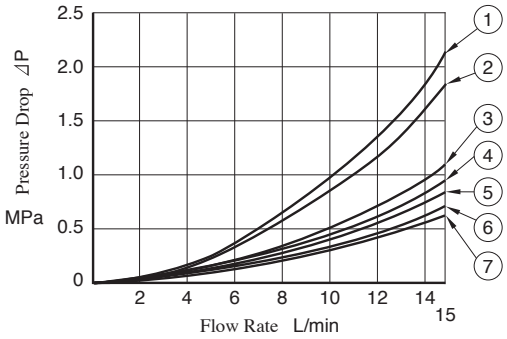
The maximum flow rate is constant regardless of any voltage variants → 15

15 — At rated voltage [after temperature rise and saturated]

12 — At minimum serviceable voltage (90% of rated voltage) [after temperature rise and saturated]

■ Pressure Drop

Pressure drop curves based on viscosity of 30 mm²/s and specific gravity of 0.850.



Model Numbers	Pressure Drop Curve Numbers				
	P→A	B→T	P→B	A→T	P→T
DSG–007–3C2	⑤	⑤	⑤	⑤	—
DSG–007–3C3	⑥	⑥	⑥	⑥	③
DSG–007–3C4	⑤	⑦	⑤	⑦	—
DSG–007–3C40	⑤	⑤	⑤	⑤	—
DSG–007–2B2	①	①	④	④	—
DSG–007–2B3	②	②	⑤	⑥	—
DSG–007–2B8	⑤	—	④	—	—

● For any other viscosity, multiply the factors in the table below.

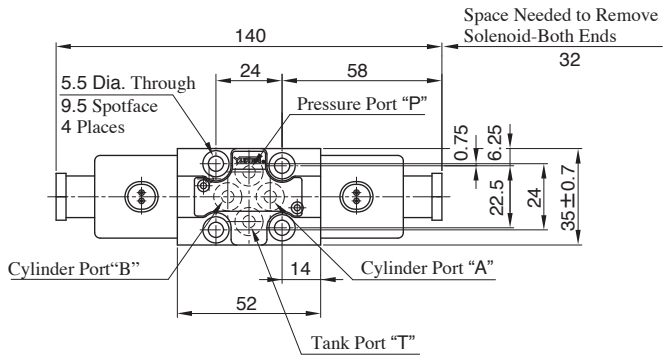
Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.84	0.91	1.00	1.07	1.14	1.19	1.24	1.28	1.32	1.35

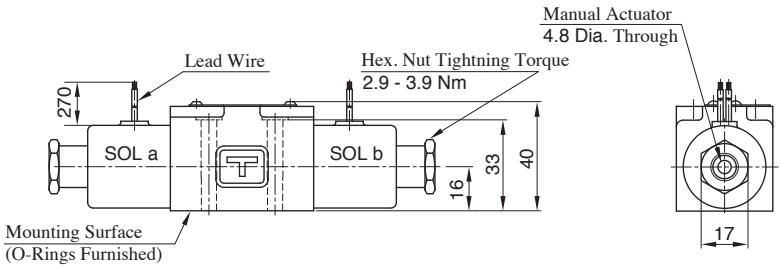
● For any other specific gravity (G'), the pressure drop (ΔP) may be obtained from the formula below.
ΔP' = ΔP (G'/0.850)

Mounting Surface : ISO 4401-02-01-05

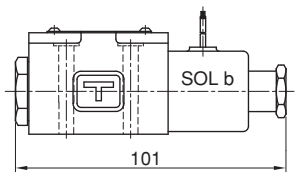
■ Flying Lead Wire Type

● Spring Centered : **DSG-007-3C*-A*/D***





● Spring Offset : **DSG-007-2B*-A*/D***

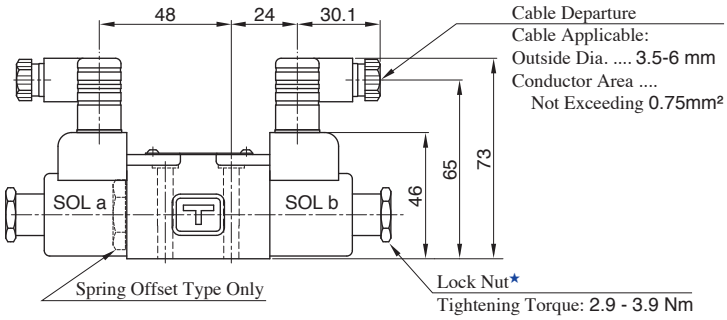


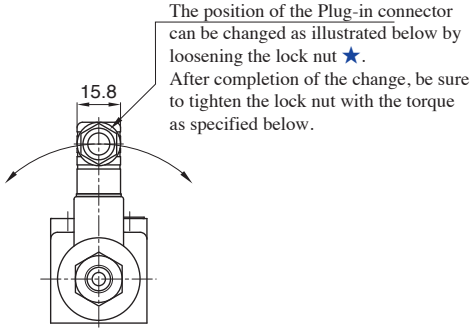
●For other dimensions, refer to "Spring Centered" type.

■ DIN Connector Type / DIN Connector with Indicator Light

● Spring Centered : **DSG-007-3C*-A*/D***-N/N1**

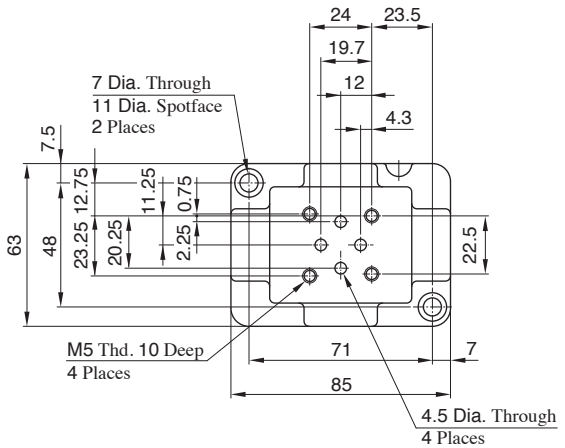
● Spring Offset : **DSG-007-2B*-A*/D***-N/N1**

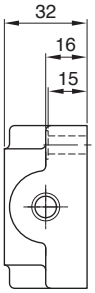


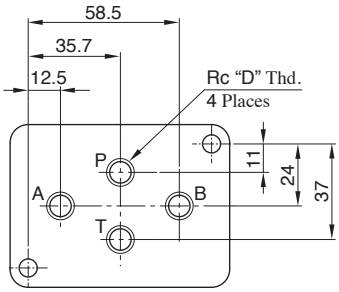


●For other dimensions, refer to "Flying Lead Wire Type".

■ Sub-plate : DSGM-007X, 007Y





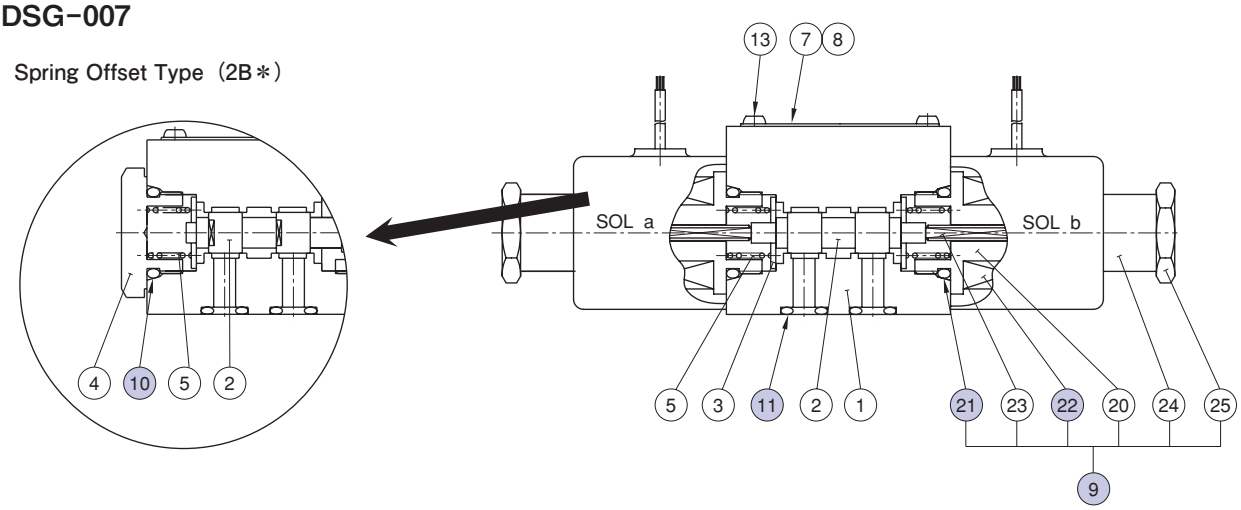


Sub-plate Model Numbers	D	Approx. Mass kg
DSGM–007X–10	1/8	0.8
DSGM–007Y–10	1/4	

List of Seals, Solenoid Ass'y

DSG-007

Spring Offset Type (2B∗)



● List of Seals

Item	Name of Parts	Part Numbers	Qty.		Remarks
			3C∗	2B∗	
10	O-Ring	OR NBR-90 P14-N	—	1	
11	O-Ring	OR NBR-90 P7-N	4	4	
21	O-Ring	OR NBR-90 P14-N	2	1	Included in Solenoid Ass'y ⑨

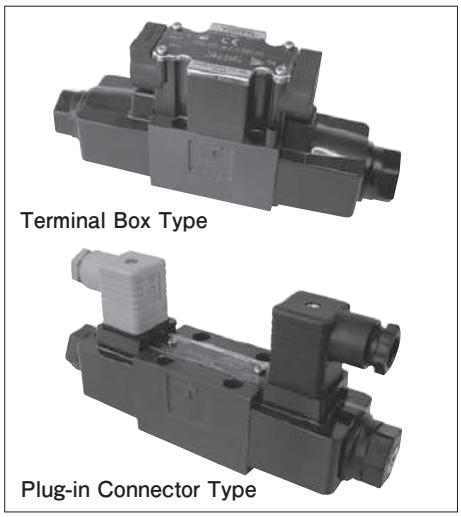
■ Solenoid Ass'y, Coil Ass'y No.

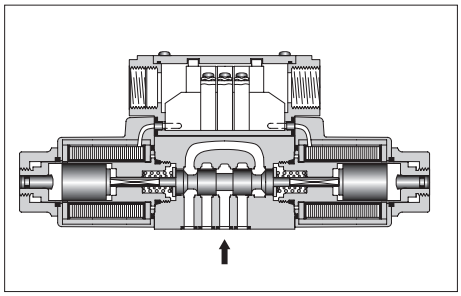
Valve Model Numbers	⑨Solenoid Ass'y No.	㉒Coil Ass'y No.	Remarks
DSG-007-∗∗∗-A100	SA05-100-40	C-SA05-100-40	Flying Lead Wire Type
DSG-007-∗∗∗-A200	SA05-200-40	C-SA05-200-40	
DSG-007-∗∗∗-D12	SD05-12-40	C-SD05-12-40	
DSG-007-∗∗∗-D24	SD05-24-40	C-SD05-24-40	
DSG-007-∗∗∗-A100-N/N1	SA05-100-N-40	C-SA05-100-N-40	Plug-in Connector Type / Plug-in Connector with Indicator Light
DSG-007-∗∗∗-A200-N/N1	SA05-200-N-40	C-SA05-200-N-40	
DSG-007-∗∗∗-D 12-N/N1	SD05- 12-N-40	C-SD05- 12-N-40	
DSG-007-∗∗∗-D 24-N/N1	SD05- 24-N-40	C-SD05- 24-N-40	

The World's Highest Level of High Pressure, High Flow and Low Pressure Drop

DSG-01 Series Solenoid Operated Directional Valves

These Solenoid Operated Directional Valves realized the world's highest level of high pressure, high flow and low pressure drop, the features of which can be materialized by employing a powerful wet type solenoid and the rational flow channel design including 5 chamber system.





● High Pressure & High Flow Rate

In comparison to our existing lines, both the pressure and flow of these valves are much increased.

- Max. Operating Pressure: approx. 10 % increased [31.5→35 MPa]
- Max. T-Line Back Pressure: approx. 30 % increased [16→21 MPa]
- Max. Flow : approx. 60 % increased [63→100 L/min]

● Low Pressure Drop

The pressure drop of these valves is reduced by 10 % from 1.0 to 0.9 MPa, in comparison to our existing lines*; the valves effectively reduce the energy consumption of the unit.

★At Flow Rate: 60 L/min, Spool Type: 3C2 (P→A)

● Compact & Small Mass

Despite of high pressure, high flow and low pressure drop, these valve bodies are compact and lightweight with DC double solenoids; the overall length and mass are reduced from 210 to 205 mm and from 2.2 to 1.85 kg, respectively.

● Shockless type available

In addition to the standard valves for high pressure and high flow, a shockless type capable of minimizing noise and vibration in piping during spool changeover is also available.

● Stable Operation

Due to the powerful magnetic and spring force of the solenoids, these valves exhibit a high tolerance to contaminants and especially stable operation.

● IP65-equivalent high dust- and water-proof

These valves demonstrate excellent dust- and water-proof characteristics, in compliance with I. E. C. Pub. 529. IP65 and JIS C 0920 IP65 (dust- and jet-proof type). The Deutsch Connector Type in compliance with IP67 is also available.

● Usable in products of various standards

These standard valves are CE certified for installation in equipment overseas. UL/CSA certified products are also available. (UL/CSA certified products are special design products, so for details, please contact us.)

● Various Type of Connection

In addition to the current Terminal Box Type and Plug-in Connector Type, according usage you can select M12-4 Pin Connector Type suitable for serial transfer, Center Plug-in Connector Type to contribute shortening the wiring man-hour, Deutsch Connector Type with good water-proof characteristics.

■ Specifications

Valve Type	Model Numbers	Max. Flow★2 L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min^{-1}	Mass kg
Standard Type	DSG-01-3C✻-✻-70	100	35	21	300 (R Type Sol. Only 120)	1.85
	DSG-01-2D2-✻-70					
	DSG-01-2B✻-✻-70					1.4
Shockless Type	S-DSG-01-3C✻-✻-70	63	25	21	120	1.85
	S-DSG-01-2B2-✻-70					1.4
Low Wattage (14W) Type★1	L-DSG-01-3C✻-✻-70	40	16	16	300 (R Type Sol. Only 120)	1.85
	L-DSG-01-2D2-✻-70					
	L-DSG-01-2N✻-✻-70					
	L-DSG-01-2B✻-✻-70					1.4

★1. For details of Low Wattage (14W) Type, please contact us.

★2. The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve. The maximum flow differs according to the spool type and operating conditions. For details, please refer to the "List of Standard Models" on pages E-25 to E-27.

■ Sub-plates

Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSGM-01-31	1/8	0.8
DSGM-01X-31	1/4	
DSGM-01Y-31	3/8	

● Sub-plates are available. Specify the sub-plate model number from the table above.
When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

Solenoid Ratings

Valve Type	Electric Source	Coil Type★3	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
				Source Rating	Serviceable Range	Inrush★2 (A)	Holding (A)	Power (W)
Standard Type / Shockless Type	AC★1	A 100	50	100	80 - 110	2.42	0.51	—
			60	100	90 - 120	2.14	0.37	
				110		2.35	0.44	
		A 120★4	50	120	96 - 132	2.02	0.42	
			60		108 - 144	1.78	0.31	
		A 200	50	200	160 - 220	1.21	0.25	
			60	200	180 - 240	1.07	0.19	
				220		1.18	0.22	
		A 240★4	50	240	192 - 264	1.01	0.21	
			60		216 - 288	0.89	0.15	
	DC (K Series)	D 12★4	—	12	10.8 - 13.2	—	2.45	29
		D 24★4		24	21.6 - 26.4		1.23	
		D 48		48	43.2 - 52.8		0.61	
	AC→ DC Rectified (R)	R 100	50/60	100	90 - 110	—	0.33	29
		R 200		200	180 - 220		0.16	

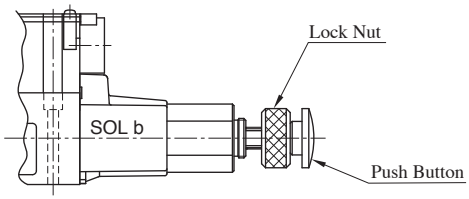
★1. AC solenoid is not available in shockless type.
R type models with built-in current rectifier is recommended for shockless operation with AC power.
★2. Inrush current in the above table show rms values at maximum stroke.
★3. There are more coil types other than the above. For details, please make inquiries.
★4. UL certified products are only available for the voltages above.

The coil type numbers in the shaded column are handled as opotinal extras.
In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Options

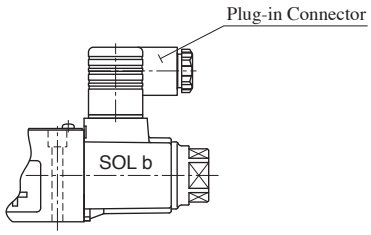
Push Button with Lock Nut

Can be used for manual changeover of spool. The push button can be locked in the pressed condition.



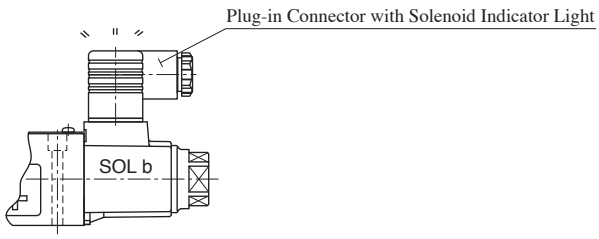
Plug-in Connector Type

Electrical conduit connecting part is plug-in type, so can mount/ dismount valves without disconnecting.



Plug-in Connector with Solenoid Indicator Light

These are the indicator light incorporated plug-in connector type solenoids. Energisation or de-energisation of the solenoid can be easily identified with the incorporated indicator light.



Special connector type (M12-4 Pin Connector Type, Center Plug-in Connector Type, Center Plug-in M12-4 Connector Type, Deutsch Connector Type), refer to pages E-35 & E-36.

Model Number Designation

S–	DSG	–01	–2	B	2	A	–D24	–C	–N★4	–70	–L
Shockless Type	Series Number	Valve Size	Number of Valve Positions	Spool Spring Arrangement	Spool Type	Input Only Valves Using Neutral Position & Side Position	Coil Type	Manual Override	Electrical Conduit Connection	Design Number	Models with Reverse Mtg. of Solenoid
None: Standard Type	DSG: Solenoid Operated Directional Valve (Sub-plate Mounting Type)	01	3	C : Spring Centered	2, 3, 4, 40, 60, 9, 10, 11, 12	——	AC : A100, A120, A200, A240 DC : D12, D24, D48 R : (AC→DC) R100, R200	None: Manual Override Pin C : Push Button and Lock Nut (Option)	None: Terminal Box Type N : Plug-in Connector Type (Option) ★2 N1 : Plug-in Connector Type with Indicator Light (Option)	70	——
			2	D : No-Spring Detented	2	——					L : Input only for reverse mtg. of solenoid.
				B : Spring Offset	2, 3, 8	A : ★1 Using Neutral Position & SOL a Energised Position B : ★1 Using Neutral Position & SOL b Energised Position					
S : Shockless Type			3	C : Spring Centered	2, 4	——	DC : D12, D24, D48 R : (AC→DC) R100, R200				——
			2	B : Spring Offset	2	——					L : Input only for reverse mtg. of solenoid.

★1. In case of Valves Using Neutral Position and Side Position, please refer to page E-28 for details.
★2. "N1: Plug-in Connector Type with Indicator Light" is not available for R type (AC→DC).
★3. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
★4. Special connector types, " M12-4 Pin Connector Type ", " Center Plug-in Connector Type ", " Center Plug-in M12-4 Connector Type ", " Deutsch Connector Type ", please refer to pages E-35 & E-36.

Attention

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

List of Standard Models

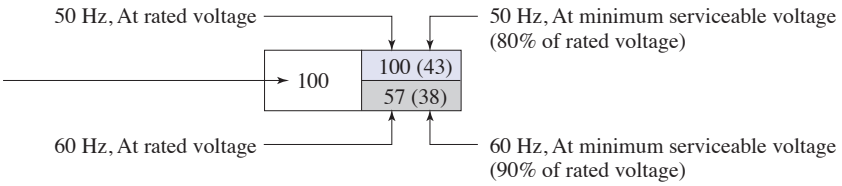
● Models with AC Solenoids : DSG-01-＊ ＊ ＊-A＊

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min															
				P→A→B→T, P→B→A→T					P → A [Port "B" Blocked]					P → B [Port "A" Blocked]					
				Working Pressure MPa					Working Pressure MPa					Working Pressure MPa					
				10	16	25	31.5	35	10	16	25	31.5	35	10	16	25	31.5	35
Three Positions	Spring Centered	DSG-01-3C2		100	100	100	100	100	100 (43)	100 (41)	80 (21)	60 (17)	38 (15)	100 (43)	100 (41)	80 (21)	60 (17)	38 (15)
									57 (38)	53 (31)	29 (17)	19 (10)	13 (9)	57 (38)	53 (31)	29 (17)	19 (10)	13 (9)
		DSG-01-3C3		100 (80)	100 (80)	100 (80)	100 (77)	100 (77)	70 (46)	70 (46)	70 (46)	70 (46)	70 (46)	70 (46)	70 (46)	70 (46)	70 (46)	70 (46)
				90 (63)	90 (63)	90 (63)	90 (63)	90 (63)	45 (30)	45 (30)	45 (30)	45 (30)	45 (30)	45 (30)	45 (30)	45 (30)	45 (30)	45 (30)
		DSG-01-3C4		90	90	90	90 (22)	35 (18)	100 (38)	76 (28)	67 (15)	57 (10)	35 (7)	100 (38)	76 (28)	67 (15)	57 (10)	35 (7)
						90 (26)	43 (14)	30 (11)	50 (31)	38 (20)	20 (10)	16 (7)	12 (5)	50 (31)	38 (20)	20 (10)	16 (7)	12 (5)
		DSG-01-3C40		85	85	85	80 (40)	80 (22)	85 (40)	85 (35)	85 (24)	60 (16)	55 (12)	85 (40)	85 (35)	85 (24)	60 (16)	55 (12)
				80	80	80 (30)	63 (15)	25 (10)	70 (26)	50 (24)	32 (16)	22 (13)	18 (10)	70 (26)	50 (24)	32 (16)	22 (13)	18 (10)
		DSG-01-3C60★		43 (23)	43 (23)	42 (23)	42 (23)	42 (23)	54 (32)	54 (32)	52 (32)	52 (32)	52 (32)	54 (32)	54 (32)	52 (32)	52 (32)	52 (32)
				40 (23)	40 (23)	38 (23)	36 (23)	35 (23)	48 (30)	47 (30)	47 (30)	47 (30)	47 (30)	48 (30)	47 (30)	47 (30)	47 (30)	47 (30)
		DSG-01-3C9		100	100	100	100	100	20	15	10	10	8	20	15	10	10	8
		DSG-01-3C10◆		100	100	100 (63)	100 (33)	100 (27)	100 (50)	100 (37)	100 (20)	78 (16)	62 (13)	100 (50)	100 (37)	100 (20)	78 (16)	62 (13)
					100 (70)	80 (20)	70 (20)	40 (19)	100 (37)	55 (25)	29 (14)	20 (11)	15 (10)	100 (37)	55 (25)	29 (14)	20 (11)	15 (10)
		DSG-01-3C11◆		100	100	100	100	100	23	20	13	10	5	100 (65)	85 (52)	72 (45)	65 (34)	60 (27)
														70 (50)	57 (40)	50 (25)	43 (19)	35 (18)
		DSG-01-3C12◆		100	100	100 (63)	100 (33)	100 (27)	100 (50)	100 (37)	100 (20)	78 (16)	62 (13)	100 (50)	100 (37)	100 (20)	78 (16)	62 (13)
					100 (70)	80 (20)	70 (20)	40 (19)	100 (37)	55 (25)	29 (14)	20 (11)	15 (10)	100 (37)	55 (25)	29 (14)	20 (11)	15 (10)
Two Positions	No-Spring Detented	DSG-01-2D2		80	80	80	80	80	45	45	45 (21)	45 (16)	38 (13)	50	50 (45)	50 (42)	45 (40)	45 (40)
											36 (18)	28 (13)	22 (12)		50 (45)	50 (42)	45 (40)	45 (40)
	Spring Offset	DSG-01-2B2		85	85	85	85	85	20	16	16	15	13	85 (63)	80 (50)	63 (40)	44 (32)	44 (32)
														85 (30)	60 (33)	50 (28)	40 (28)	40 (28)
		DSG-01-2B3		70	70	70	70	70	50	50	50	50	50	80 (70)	80 (70)	80 (70)	80 (70)	80 (70)
														70 (48)	70 (48)	70 (48)	70 (48)	70 (48)
		DSG-01-2B8		–	–	–	–	–	26	17	13	11	10	80 (50)	70 (40)	60 (20)	45 (10)	30 (10)
														35 (20)	23 (15)	15 (8)	10 (5)	7 (5)

Notes: 1. The relation between the maximum flow in the table above and the frequency/voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of 50 Hz or 60 Hz and of any voltage variants within the serviceable voltage



2. For the maximum flow rate in P → T of the valves with a ★ mark, please see page E-27.

The valve models with a ◆ mark are handled as options. If you choose such valves, check the time of delivery beforehand.

List of Standard Models

● Models with DC or R Type Solenoids : DSG-01-＊ ＊ ＊-D＊/R＊

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min															
				P→A→B→T, B→A					P → A [Port "B" Blocked]					P → B [Port "A" Blocked]					
				Working Pressure MPa					Working Pressure MPa					Working Pressure MPa					
				10	16	25	31.5	35	10	16	25	31.5	35	10	16	25	31.5	35
Three Positions	Spring Centered	DSG-01-3C2		100	100	100	100	100	100	45	28	25	22	100	45	28	25	22
									55	35	23	19	17	55	35	23	19	17
		DSG-01-3C3		100	100	100	100	100	78	78	78	78	75	78	78	78	78	75
				80	80	80	80	80	70	70	70	70	70	70	70	70	70	70
		DSG-01-3C4		90	90	90	50	38	100	58	38	31	29	100	58	38	31	29
						42	26	20	62	48	30	25	23	62	48	30	25	23
		DSG-01-3C40		85	85	65	40	33	85	52	30	26	24	85	52	30	26	24
						45	30	26	65	36	25	21	19	65	36	25	21	19
		DSG-01-3C60★		50	50	50	50	50	66	66	66	66	66	66	66	66	66	66
				41	41	41	41	41	58	58	58	58	58	58	58	58	58	58
		DSG-01-3C9		100	100	100	100	100	20	15	10	10	8	20	15	10	10	8
		DSG-01-3C10◆		85	85	85	80	40	100	56	36	28	24	100	56	36	28	24
						35	23	20	74	43	28	20	19	74	43	28	20	19
		DSG-01-3C11◆		100	100	100	100	100	23	20	13	10	5	100	60	40	36	32
														85	46	32	28	24
		DSG-01-3C12◆		85	85	85	80	40	100	56	36	28	24	100	56	36	28	24
						35	23	20	74	43	28	20	19	74	43	28	20	19
Two Positions	No-Spring Detented	DSG-01-2D2		75	75	75	75	75	45	45	40	30	27	50	50	50	45	45
				70	70	70	70	70			30	25	22		45	42	40	40
	Spring Offset	DSG-01-2B2		80	80	80	80	80	20	16	16	15	13	46	31	24	22	22
														32	23	19	18	18
		DSG-01-2B3		70	70	70	70	70	50	50	50	50	50	75	75	75	75	75
														65	65	65	65	65
		DSG-01-2B8		—	—	—	—	—	26	17	13	11	10	53	35	23	19	17
														35	30	17	13	12

Notes: 1. The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage → 100 / 55

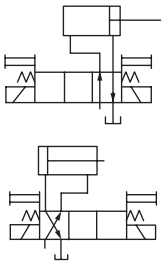
- 100: At rated voltage [after temperature rise and saturated]
- 55: At minimum serviceable voltage (90% of rated voltage) [after temperature rise and saturated]

2. For the maximum flow rate in P → T of the valves with a ★ mark, please see page E-27.

The valve models with a ◆ mark are handled as Options. If you choose such valves, check the time of delivery beforehand.

Maximum Flow Rate in P → T Flow

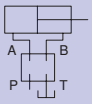
In valve type 3C60, in case where the actuator is put on in between the cylinder ports A and B as illustrated below and where the actuator moves and suspended at its stroke end and where the valve is then shifted to the neutral position in the suspended state of the actuator, the maximum flow rates available are those as shown as the table below regardless of any voltage in the range of serviceable voltage.



Model Numbers	Graphic Symbol	Max. Flow L/min				
		10 MPa	16 MPa	25 MPa	31.5 MPa	35 MPa
DSG–01–3C60–A＊/D＊/R＊		55	44	30	26	22

List of Standard Models (Shockless Type)

● Models with DC or R Type Solenoids：S-DSG-01-＊ ＊ ＊-D＊/R＊

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min								
				P → A → B → T, P → B → A → T			P → A [Port "B" Blocked]			P → B [Port "A" Blocked]		
												
				Working Pressure MPa			Working Pressure MPa			Working Pressure MPa		
				10	16	25	10	16	25	10	16	25
Three Positions	Spring Centered	S-DSG-01-3C2		63	63	40	40	32	25	40	32	25
							32	20	16	32	20	16
		S-DSG-01-3C4		60	50	40	40	32	16	40	32	16
					40	20	32	16	12	32	16	12
Two Positions	Spring Offset	S-DSG-01-2B2		50	45	45	30	30	30	60	40	40
				45	40	40						

Notes: The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage → 60 | 50 / 40

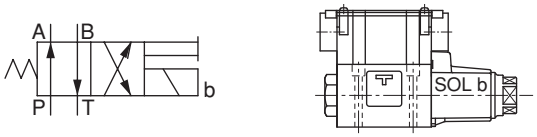
At rated voltage [after temperature rise and saturated]

At minimum serviceable voltage (90% of rated voltage) [after temperature rise and saturated]

Reverse Mounting of Solenoid

In spring offset type, it is a standard configuration that the solenoid is mounted onto the valve in the SOL b position (side). However, in this particular spool-spring arrangement, the mounting of the solenoid onto the valve in the reverse position -SOL a side- is also available. The graphic symbol for this reverse mounting is as shown below.

As for the valve type 2B*A and 2B*B, please refer to the explanation under the heading of "Valves Using Neutral Position and Side Position" given below.



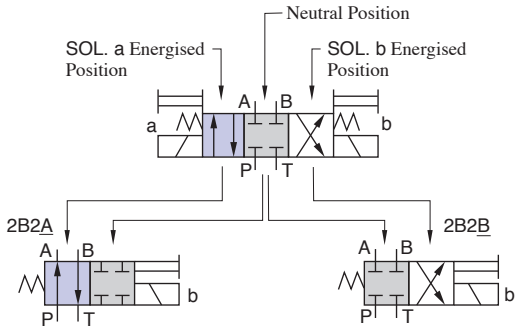
Standard Mtg. of Solenoid

Reverse Mtg. of Solenoid

Valves Using Neutral Position and Side Position

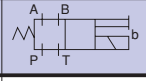
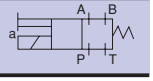
Besides the use of the standard 2-position valves aforementioned in the "List of Standard Models", the 3-position valves also can be used as the 2-position valves using the two of their three positions. In this case, there are two kinds of the valve available. One is the valve using the neutral position and SOL a position (2B*A) and another is the valve using the neutral position and SOL b position (2B*B).

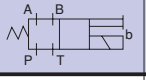
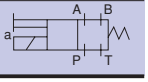
(Example) In case of Spool Type "2"



"A" Use of Neutral and SOL. a Energised Position

"B" Use of Neutral and SOL. b Energised Position

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
DSG-01-2B＊A		
DSG-01-2B2A		——

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
DSG-01-2B＊B		
DSG-01-2B2B		——
DSG-01-2B3B		——
DSG-01-2B4B		
DSG-01-2B60B		——
DSG-01-2B10B		——

In the above table, the graphic symbols in mounting type highlighted with shade are optional extra, therefore, please confirm the time of delivery with us before ordering.

Typical Changeover Time (Example)

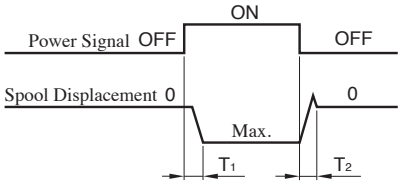
Changeover time varies according to oil viscosity, spool type and hydraulic circuit.

Standard Type (Without Shockless Function)

[Test Conditions]

Pressure：16 MPa
Flow Rate：31.5 L/min
Viscosity：35 mm²/s
Voltage：100 %V at rated voltage
(After coil temperature rise and saturated)

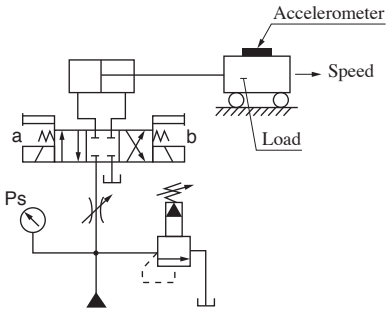
[Result of Measurement]



Type	Model Numbers	Time ms	
		T1	T2
Standard Type	DSG–01–3C2–A＊	15	23
	DSG–01–3C2–D＊	48	19
	DSG–01–3C2–R＊	50	100

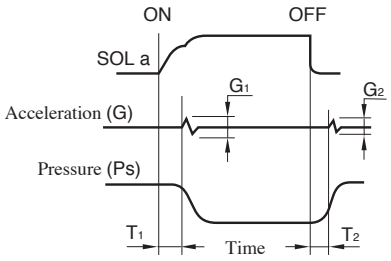
Shockless Type

[Test Circuit and Conditions]



Setting Pressure (Ps) : 7 MPa
Load (W) : 1000 kg
Cylinder Speed : 8 m/min
Viscosity : 35 mm²/s

[Result of Measurement]



Type	Model Nmbers	Time ms		Acceleration m/s²	
		T1	T2	G1	G2
Shockless Type	S–DSG–01–3C2–D＊	70	30	12	7
Reference: Standard Type	DSG–01–3C2–D＊	35	25	18	15

Mounting Bolts

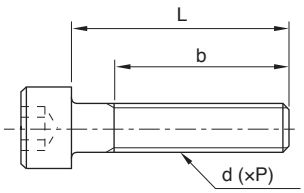
Mounting bolts are not available, please order separately.

Type/Dimension/Quantity

Item	Details
Type	Soc. Hd. Cap Screw (SCM)
Thread Size d	M5
Thread Pitch P mm	0.8
Bolt Length L mm	45
Thread Length (Reference) b mm	22
Quantity	4

Specifications/Machinery Characteristics

Item	Details
Material	Steel SCM
Screw Type	Meter Coarse Screw
Finishing	Black Oxide Film
Class of Strength	12.9
Standard	Based on JIS B 1176(2014)

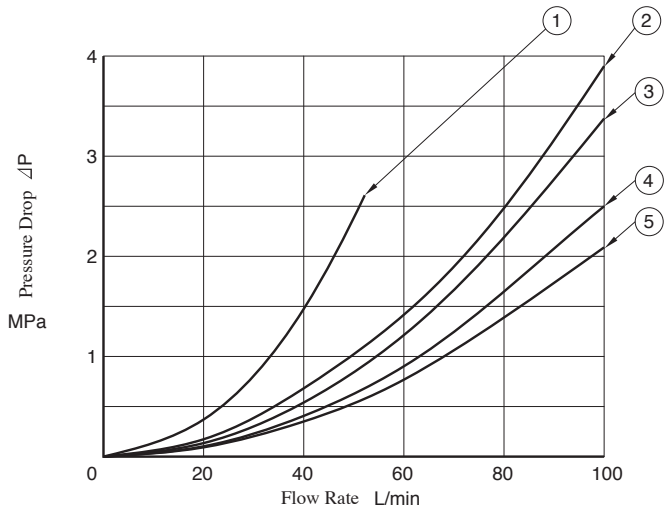


★If order to us, please use the model numbers below.
MBK-01-05-＊
(＊is the newest design number)

Pressure Drop

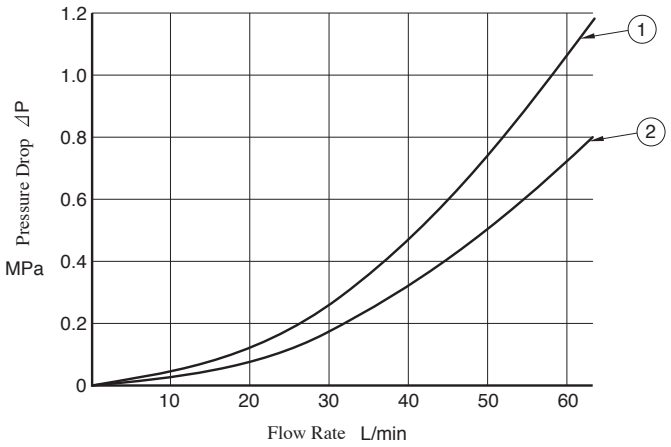
Pressure drop curves based on viscosity of 35 mm² /s and specific gravity of 0.850.

Standard Type



Model Numbers	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T
DSG–01–3C2	④	④	④	④	—
DSG–01–3C3	⑤	⑤	⑤	⑤	②
DSG–01–3C4	④	④	④	④	—
DSG–01–3C40	④	④	④	④	—
DSG–01–3C60	①	①	①	①	②
DSG–01–3C9	⑤	③	⑤	③	—
DSG–01–3C10	④	⑤	④	④	—
DSG–01–3C11	④	④	④	④	—
DSG–01–3C12	④	④	④	⑤	—
DSG–01–2D2	⑤	④	⑤	④	—
DSG–01–2B2	⑤	④	⑤	④	—
DSG–01–2B3	⑤	⑤	⑤	⑤	—
DSG–01–2B8	⑤	—	④	—	—

Shockless Type : S-DSG-01



Model Numbers	Pressure Drop Curve Number			
	P→A	B→T	P→B	A→T
S–DSG–01–3C2	①	①	①	①
S–DSG–01–3C4	①	②	①	②
S–DSG–01–2B2	①	①	①	①

● For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

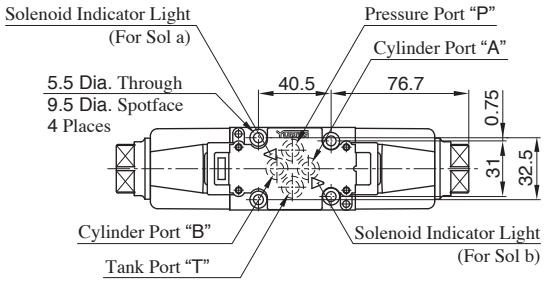
● For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.
⊿P' = ⊿P (G'/0.850)

Mounting Surface: ISO 4401-03-02-0-05

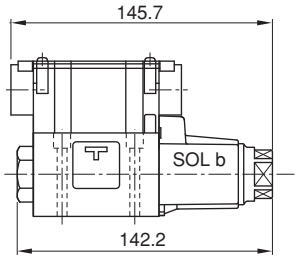
Terminal Box Type (Standard)

■ Models with AC Solenoids : DSG-01-＊＊＊-A＊

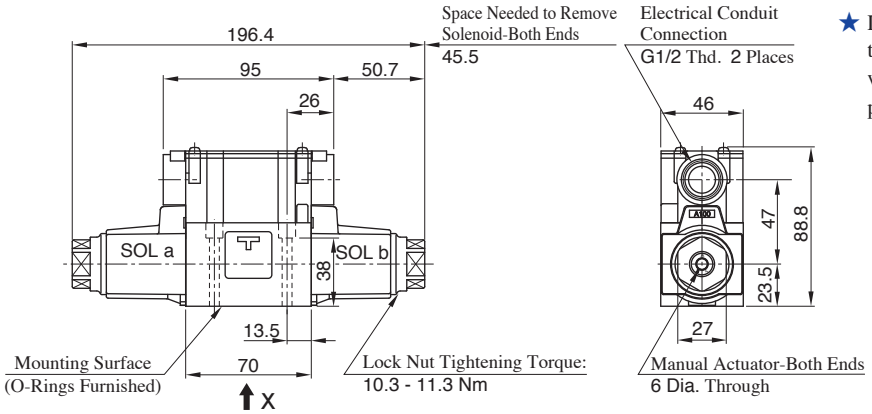
● Spring Centered & No-Spring Detented



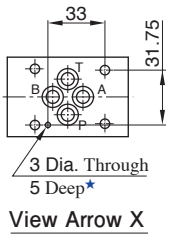
● Spring Offset



● For other dimensions, refer to the drawing left.
● Solenoid being mounted in the reverse position SOL a side is also available.



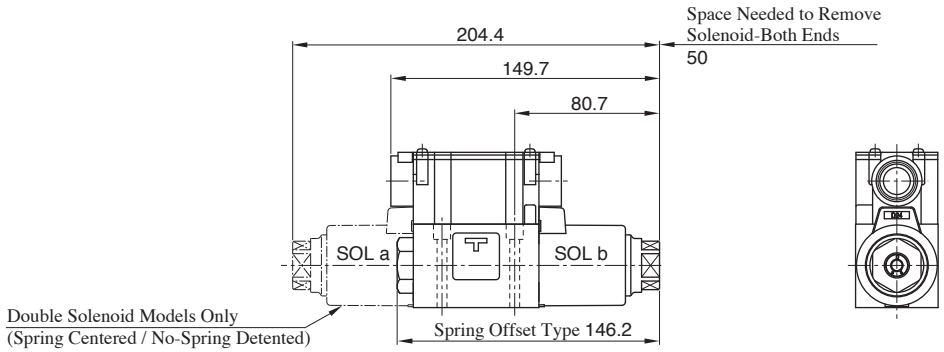
★ Locating pin can be fitted to this hole to conform with ISO standard. Valve with locating pin is also available, please consult Yuken for details.



■ Models with DC Solenoids : (S-) DSG-01-＊＊＊-D＊

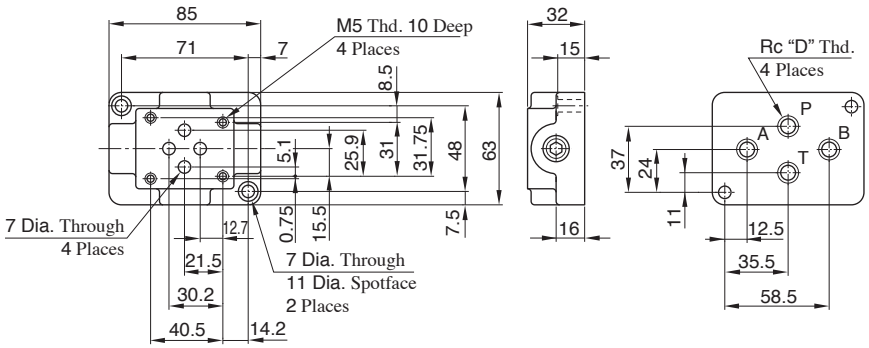
■ Models with R Type Solenoids : (S-) DSG-01-＊＊＊-R＊

● Spring Centered / No-Spring Detented / Spring Offset



● For other dimensions, refer to models with AC solenoids drawing above.

■ Sub-plates : DSGM−01, 01X, 01Y

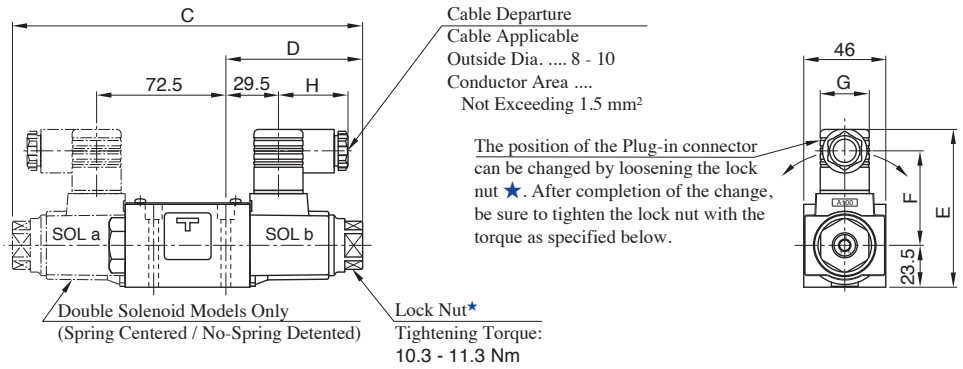


Sub-plate Model Numbers	D
DSGM–01–31	1/8
DSGM–01X–31	1/4
DSGM–01Y–31	3/8

Options

Plug-in Connector Type / Plug-in Connector with Indicator Light

- Models with AC Solenoids : **DSG-01-＊＊＊-A＊-N/N1**
- Models with DC Solenoids : **(S-) DSG-01-＊＊＊-D＊-N/N1**
- Models with R Solenoids : **(S-) DSG-01-＊＊＊-R＊-N**

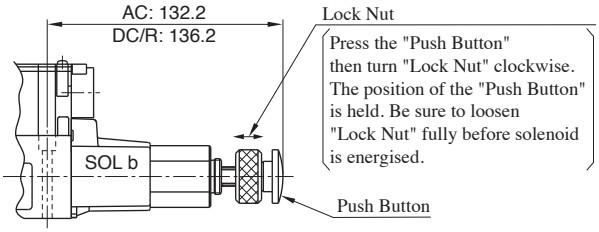


Model Numbers	C	D	E	F	G	H
DSG-01-＊＊＊-A＊-N＊	196.4	76.7	88.5	53	27.5	39
(S-) DSG-01-＊＊＊-D＊-N＊	204.4	80.7	99.5	64	27.5	39
(S-) DSG-01-＊＊＊-R＊-N	204.4	80.7	102.5	61.1	34	53

● For other dimensions, refer to "Terminal Box Type" (Page E-31).

Models with Push Button & Lock Nut

(S-) DSG-01-＊＊＊-＊-C



Interchangeability in Installation Current and New Design

In order to achieve higher pressure, higher flow, lower pressure drop and more compact, DSG-01 valves has been upgraded from the 60 design series to the 70 design series.

The figures in the table below are the comparison between current and new design valves.

Specifications

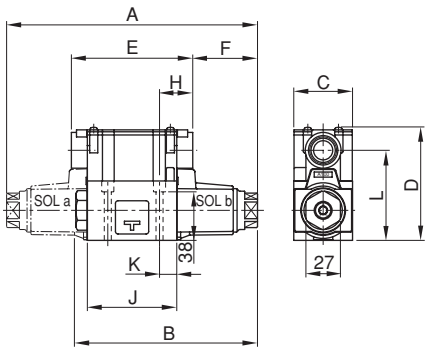
Design Number	Max. Flow L/min	Max. Operating Pressure MPa	Max. Tank-Line Back Pres. MPa	Max. Changeover Frequency min^{-1}	Pressure Drop★ MPa	Mass kg	
						3C＊/2D＊	2B＊
New Design : 70	100	35	21	300	0.9	1.85	1.4
Current Design : 60	63	31.5	16	(R Type sol. Only 120)	1.0	2.2	1.6

★Flow Rate: 60 L/min, Viscosity: 30 mm^2/s, Spool type "2" (Closed center)

● The specifications of solenoid are not change between current and new designs.

Interchangeability in Installation

Interchangeability in installation is maintained though there are minor differences in demension as in the following table.



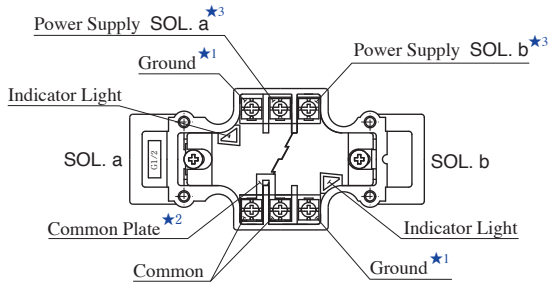
Solenoid Type	Design Number	A	B	C	D	E	F	H	J	K	L
AC	New Design : 70	196.4	142.2	46	88.8	95	50.7	26	70	13.5	70.5
	Current Design : 60	191.4	142.7	48	90.3	90	50.7	23.5	65	11	72
DC R	New Design : 70	204.4	146.2	46	88.8	95	54.7	26	70	13.5	70.5
	Current Design : 60	210	152	48	90.3	90	60	23.5	65	11	72

Electrical Conduit Connection

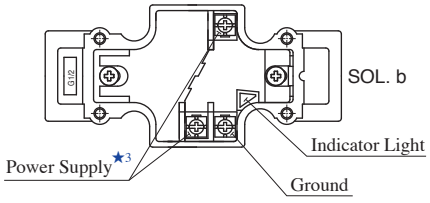
Details of Receptacle

Terminal Box Type

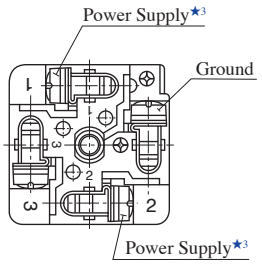
Double Solenoid Type



Single Solenoid Type (SOL b)



Plug-in Connector Type

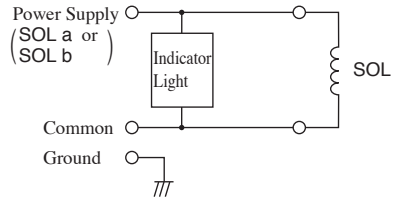


★1. There are two grounding terminals. You can use either one.
★2. If you do not need the common plate, remove it.
★3. With DC solenoids, polarity is no question.

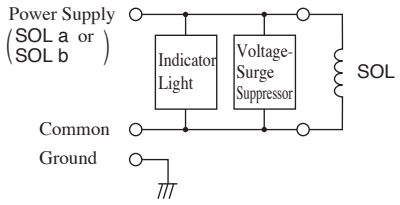
Electrical Circuit (Single Solenoid Type)

Terminal Box Type

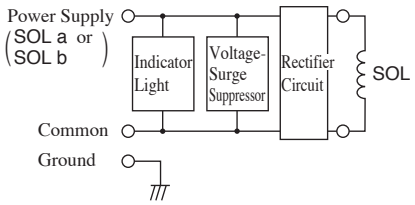
AC



DC

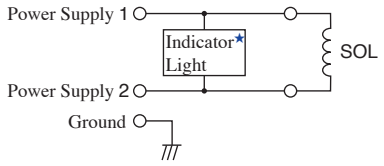


AC→DC Rectified



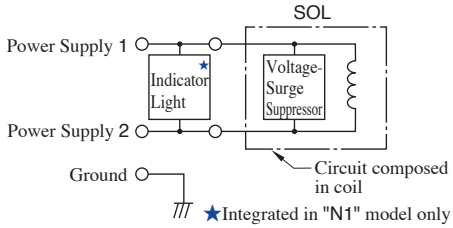
Plug-in Connector Type

AC



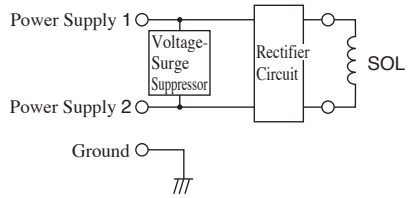
★Integrated in "N1" model only

DC



★Integrated in "N1" model only

AC→DC Rectified



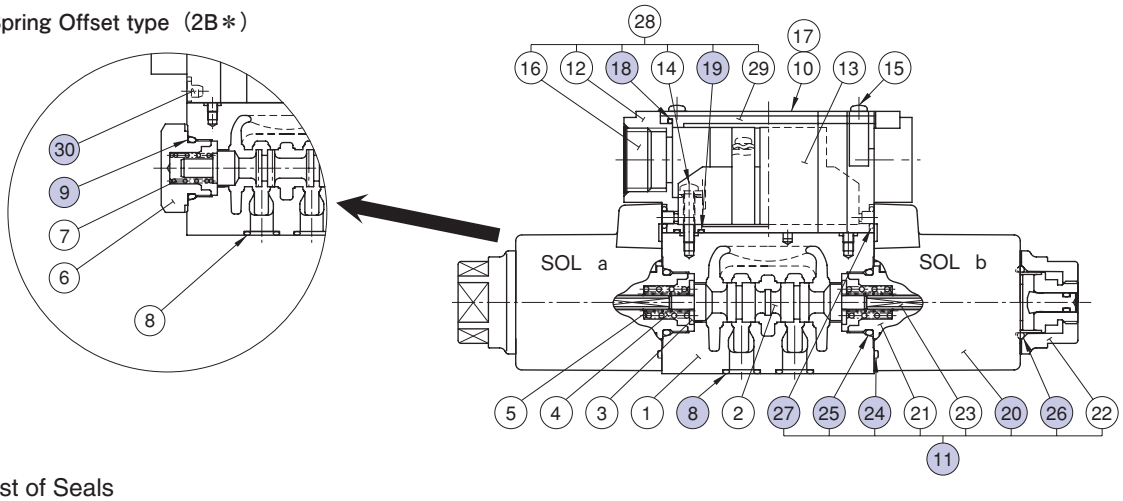
⚠ DANGER

- Do not perform wiring while the power is on.
  Doing so may result in electric shock, burns or death.
- Make the wiring properly. Improper wiring will cause an irregular movement of the machine, resulting in a grave accident.

List of Seals and Solenoid Ass'y

(S-) DSG-01-＊＊＊

Spring Offset type (2B＊)



List of Seals

Item	Name of Parts	Part Numbers	Qty.			Remarks
			3C＊	2D＊	2B＊	
8	O-Ring	AS 568-012 (NBR-90)	4	4	4	
9	O-Ring	OR NBR-90 P18-N	—	—	1	
18	Packing	1790S-VK421290-8	1	1	1	
19	O-Ring	S6	2	2	2	
24	O-Ring	AS 568-026 (NBR-70-1)	2	2	1	Included in Solenoid Ass'y (Item ⑪)
25	O-Ring	OR NBR-90 P18-N	2	2	1	
26	O-Ring	OR NBR-70-1 P20-N	2	2	1	
27	O-Ring	OR NBR-70-1 P4-N	4	4	2	
30	Plug	1790S-VK418329-9	—	—	2	

Solenoid Ass'y, Coil Ass'y No.

Model Numbers	⑪ Solenoid Ass'y No.	⑳ Coil Ass'y No.	Remarks
DSG-01-＊＊＊-A100	SA1-100-70	C-SA1-100-70	Terminal Box Type
DSG-01-＊＊＊-A120	SA1-120-70	C-SA1-120-70	
DSG-01-＊＊＊-A200	SA1-200-70	C-SA1-200-70	
DSG-01-＊＊＊-A240	SA1-240-70	C-SA1-240-70	
DSG-01-＊＊＊-D12	SD1-12-70	C-SD1-12-70	
DSG-01-＊＊＊-D24	SD1-24-70	C-SD1-24-70	
DSG-01-＊＊＊-D48	SD1-48-70	C-SD1-48-70	
DSG-01-＊＊＊-R100	SR1-100-70	C-SR1-100-70	
DSG-01-＊＊＊-R200	SR1-200-70	C-SR1-200-70	
DSG-01-＊＊＊-A100-N/N1	SA1-100-N-70	C-SA1-100-N-70	Plug-in Connector Type
DSG-01-＊＊＊-A120-N/N1	SA1-120-N-70	C-SA1-120-N-70	
DSG-01-＊＊＊-A200-N/N1	SA1-200-N-70	C-SA1-200-N-70	
DSG-01-＊＊＊-A240-N/N1	SA1-240-N-70	C-SA1-240-N-70	
DSG-01-＊＊＊-D12-N/N1	SD1-12-N-70	C-SD1-12-N-70	
DSG-01-＊＊＊-D24-N/N1	SD1-24-N-70	C-SD1-24-N-70	
DSG-01-＊＊＊-D48-N/N1	SD1-48-N-70	C-SD1-48-N-70	
DSG-01-＊＊＊-R100-N	SR1-100-N-70	C-SR1-100-N-70	
DSG-01-＊＊＊-R200-N	SR1-200-N-70	C-SR1-200-N-70	

● As of solenoid Ass'y of shockless type and models with push button & lock nut, please order as below.

(Example)SD1-12-S-C-N-70

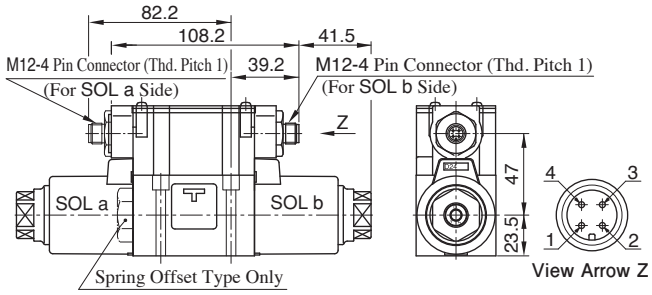
C : Only for the models with push button & lock nut (option).

S : Only for the models of shockless type.

Coil Ass'y numbers are same with those in above chart.

Special Electrical Conduit Connection

M12-4 Pin Connector Type



● For other dimensions, refer to page E-31 for Standard Terminal Box Type.

Model Numbers

DSG-01-2B2-D24-M1-70-L

M12-4 Pin Connector Electrical Conduit Connection
- M1 : Load Side Common Minus (PNP Type) Terminal Box SOL b Side Conduit Connection
- M2 : Load Side Common Minus (PNP Type) Terminal Box SOL a Side Conduit Connection
- M3 : Load Side Common Plus (NPN Type) Terminal Box SOL b Side Conduit Connection
- M4 : Load Side Common Plus Terminal Box SOL a Side Conduit Connection

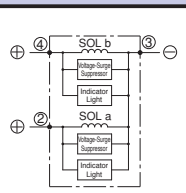
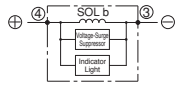
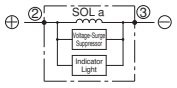
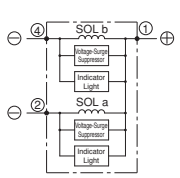
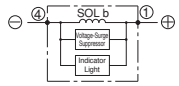
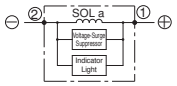
Coil numbers only for D12 and D24

● For other items, refer to page E-24 for Standard Model Number Designation.

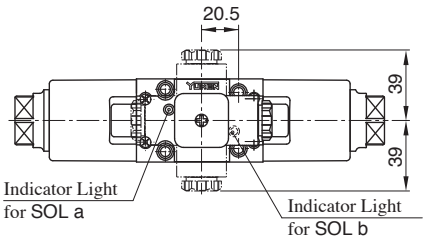
● Pin No.

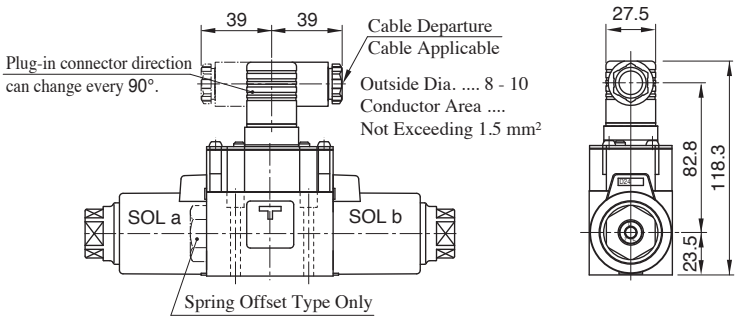
	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
Terminal	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused
Connector Departure Direction	M1: SOL b Side M2: SOL a Side	M3: SOL b Side M4: SOL a Side	M1: SOL b Side M2: Plug Side	M3: SOL b Side M4: Plug Side	M1: Plug Side M2: SOL a Side	M3: Plug Side M4: SOL a Side

Connection Circuit

	Double Solenoid Type	Single Solenoid Type	
		Standard Mounting	Reverse Mounting
Load Side Common Minus			
Load Side Common Plus			

Center Plug-in Connector Type





Model Numbers

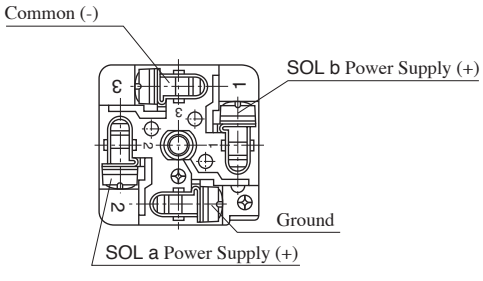
DSG-01-2B2-D24-S-70-L

Center Plug-in Connector Electrical Conduit Connection Type

Coil Numbers Only for D12, D24, A100, A120, A200 & A240

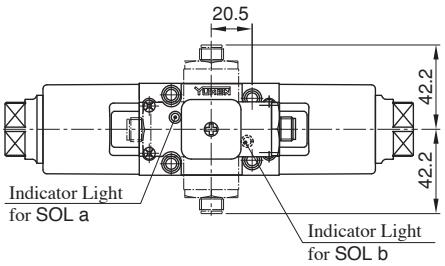
● For other items, refer to page E-24 for Standard Model Number Designation.

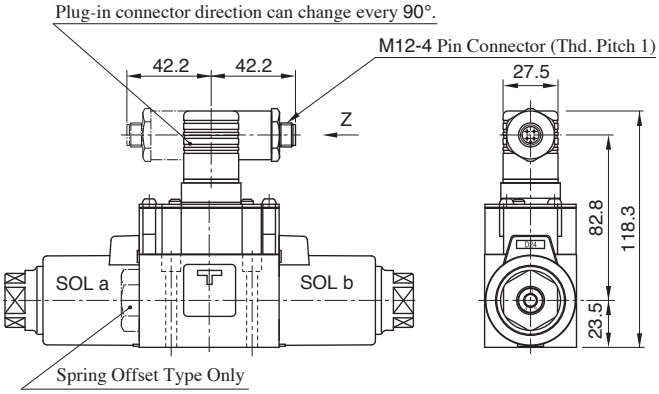
Details of Receptacle



● For other dimensions, refer to page E-31 for Standard Terminal Box Type.

Center Plug-in Connector M12-4 Pin Connector Type





● For other dimensions, refer to page E-31 for Standard Terminal Box Type.

Pin No.

Terminal	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused

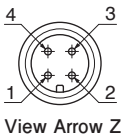
Model Numbers

DSG-01-2B2-D24-S1-70-L

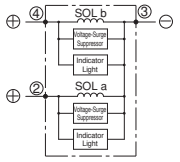
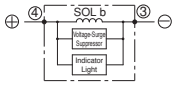
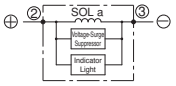
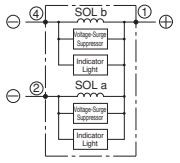
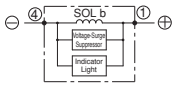
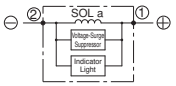
- Center Plug-in M12 Connector 4 Pins Electrical Conduit Connection
  - S1 : Load Side Common Minus (PNP Type)
  - S2 : Load Side Common Plus (NPN Type)

Coil numbers only for D12 and D24

● For other items, refer to page E-24 for Standard Model Number Designation.

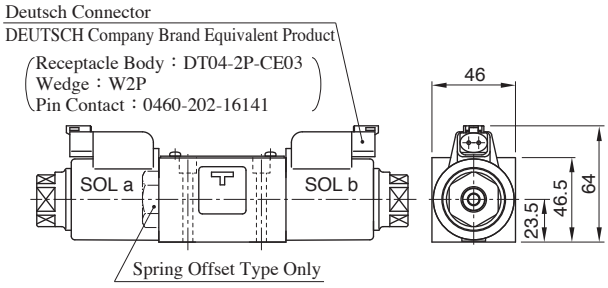


Connection Circuit

	Double Solenoid Type	Single Solenoid Type	
		Standard Mounting	Reverse Mounting
Load Side Common Minus			
Load Side Common Plus			

Deutsch Connector Type

Dust-proof / Water-proof property : IP67



● For other dimensions, refer to page E-31 for Standard Terminal Box Type.

Model Numbers

DSG-01-2B2-D24-D-70-L

- Deutsch Connector Electrical Conduit Connection
  - D : No Diode
  - D1 : Built-in Diode Type

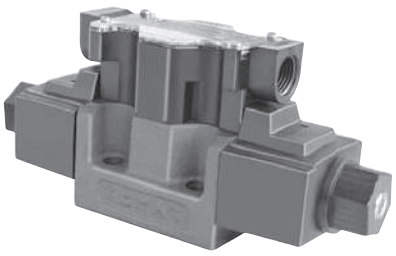
Coil numbers only for D12 and D24

・For other items, refer to page E-24 for Standard Model Number Designation.

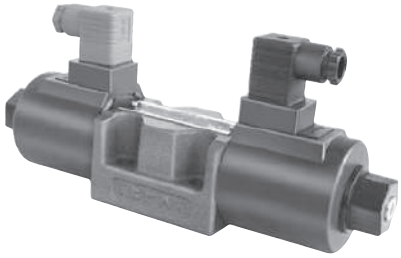
★ This valve needs another connector for electrical conduit connection.
The applicable connector as below.
Manufacturer : DEUTSCH Company
- ・Plug : DT06-2S-CE05
- ・Plug Wedge : W2S-P012
- ・Socket Contact : 0462-201-16141

DSG-03 Series Solenoid Operated Directional Valves

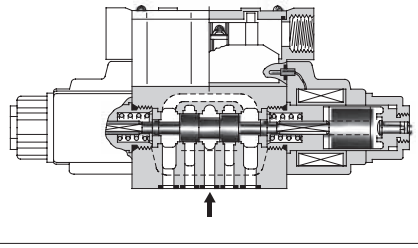
These are epoch-making solenoid operated valves of high pressure, high flow which have been developed incorporating a unique design concept into every part of the valve including the solenoid.
With wet type solenoids, these valves ensure the low noise and the long life, moreover, ensure no leakage of oil outside of the valves.



Terminal Box Type



Plug-in Connector Type



Wide Range of Models

Choose the optimum valve to meet your need from a large selection available. The DSG-03 series solenoid operated directional valves are classified into the two basic models.

- Standard type …… Usable at high pressure: 31.5 MPa and high flow: 120 L/min.
- Shockless type …… A noise at spool changeover and a vibration in piping can be reduced to a minimum.

Stable Operation

With a strong magnet and spring force, the valves are tough against contamination and thus ensure a stable operation.

Usable in products of various standards

These standard valves are CE certified for installation in equipment overseas. UL/CSA certified products are also available. (UL/CSA certified products are special design products, so for details, please contact us.)

Various Type of Connection

In addition to the current Terminal Box Type and Plug-in Connector Type, according usage you can select M12-4 Pin Connector Type suitable for serial transfer, Center Plug-in Connector Type to contribute shortening the wiring man-hour.

Specifications

Valve Type	Model Numbers	Max. Flow★2 L/min	Max. Operating Pressure MPa	Max. T-Line Back Pres. MPa	Max. Changeover Frequency min⁻¹	Approx. Mass kg	
						Type of Solenoid	
						AC	DC,R,RQ
Standard Type	DSG-03-3C✻-✻-50	120	31.5 (Spool Type 60 Only) 25	16	240 (R Type Sol. Only) 120	3.6	5
	DSG-03-2D2-✻-50						
	DSG-03-2B✻-✻-50					2.9	3.6
Shockless Type	S-DSG-03-3C✻-✻-50	120	25	16	120	—	5
	S-DSG-03-2B2-✻-50						3.6
Low Wattage (14W)★1	L-DSG-03-3C✻-✻-50	60	16	16	240 (R Type Sol. Only) 120	3.6	4.8
	L-DSG-03-2D2-✻-50						
	L-DSG-03-2B✻-✻-50					2.9	3.5

★1. For details of L-DSG-03, please contact us.
★2. The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve. The maximum flow differs according to the spool type and operating conditions. For details, please refer to the "List of Standard Models" on pages E-40 to E-42.

Sub-plates

Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSGM-03-40	3/8	3
DSGM-03X-40	1/2	
DSGM-03Y-40	3/4	4.7

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

Solenoid Ratings

Valve Type	Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
				Source Rating	Serviceable Range	Inrush★2 (A)	Holding (A)	Power (W)
Standard Type	AC ★1	A 100	50	100	80 - 110	5.37	0.90	——
			60	100	90 - 120	4.57	0.63	
				110		5.03	0.77	
		A 120★3	50	120	96 - 132	4.48	0.75	
			60		108 - 144	3.81	0.52	
		A 200	50	200	160 - 220	2.69	0.45	
			60	200	180 - 240	2.29	0.31	
				220		2.52	0.38	
		A 240★3	50	240	192 - 264	2.24	0.37	
			60		216 - 288	1.91	0.26	
Shockless Type	DC (K Series)	D 12★3	——	12	10.8 - 13.2	——	3.16	38
		D 24★3		24	21.6 - 26.4		1.57	
		D 100		100	90 - 110		0.38	
	AC→DC Rectified	R 100	50/60	100	90 - 110	——	0.43	38
		R 200		200	180 - 220		0.21	
	AC→DC Rectified (Quick Return)	RQ100	50/60	100	90 - 110	——	0.43	38

★1. AC solenoid
AC solenoid (A＊) is not available in shockless type. AC→DC rectified type solenoid (R＊) or AC→DC rectified (quick return) type solenoid (RQ100) models are recommended for shockless operation with AC power.

★2. Inrush Current
Inrush current in the above table show rms values at maximum stroke.

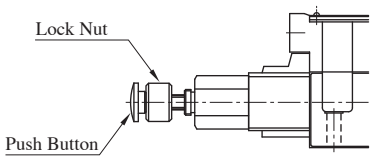
★3. UL certified products are only available for the voltages above.

The coil type numbers in the shaded column are handled as optional extras. In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Options

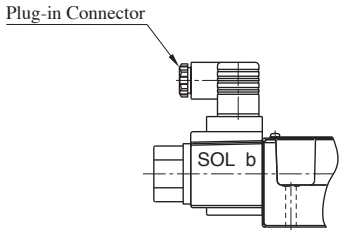
Push Button with Lock Nut

Can be used for manual changeover of spool. The push button can be locked in the pressed condition.



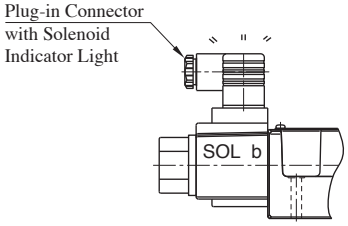
Plug-in Connector Type

Electrical conduit connecting part is plug-in type, so can mount/dismount valves without disconnecting.



Plug-in Connector with Solenoid Indicator Light

These are the indicator light incorporated plug-in connector type solenoids. Energisation or de-energisation of the solenoid can be easily identified with the incorporated indicator light.



M8 Mounting Bolts

As the mounting bolts, M6 socket head cap screws are used for the standard valves, however, M8 socket head cap screws are also available for supply as optional extras. In case the M8 screws are required, suffix "02" to the design number of both valve and sub-plate model number like below.

(Example) Valve：DSG-03-3C2-A100-5002
Sub-plate：DSGM-03-4002

The valve is supplied with 4 pcs. hexagon socket head cap screws M8 × 38 L.

Special connector type (M12-4 Pin Connector Type, Center Plug-in Connector Type, Center Plug-in M12-4 Connector Type), refer to pages E-51 & E-52.

Model Number Designation

S–	DSG	–03	–2	B	2	A	–D24	–C	–N★5	–50	–L
Shockless Type	Series Number	Valve Size	Number of Valve Positions	Spool Spring Arrangement	Spool Type	Input Only Valves Using Neutral Position & Side Position.	Coil Type	Manual Override	Electrical Conduit Connection	Design Number	Models with Reverse Mtg. of Solenoid
None: Standard Type	DSG: Solenoid Operated Directional Valve (Sub-plate Mounting Type)	03	3	C : Spring Centered	2 , 3 4 , 40 5, 60 9 , 10 11, 12	——	AC : A100 A120 A200 A240 DC : D12 D24 D100 R : (AC→DC) R100 R200 RQ : (AC→DC) RQ100	None: Manual Override Pin C : Push Button and Lock Nut (Option)	None: Terminal Box Type N : ★2 Plug-in Connector Type (Option) N1 : ★3 Plug-in Connector Type with Indicator Light (Option)	50	—— L : Input only for reverse mtg. of solenoid.
			2	D : No-Spring Detented	2	——					
			2	B : Spring Offset	2 3 8	A : ★1 Using Neutral Position & SOL a Energised Position B : ★1 Using Neutral Position & SOL b Energised Position					
S : Shockless Type			3	C : Spring Centered	2 4	——	DC : D12 D24 D48 R : (AC→DC) R100 R200 RQ : (AC→DC) RQ100				—— L : Input only for reverse mtg. of solenoid.
			2	B : Spring Offset	2	A : ★1 Using Neutral Position & SOL a Energised Position B : ★1 Using Neutral Position & SOL b Energised Position					

★1. In case of Valves Using Neutral Position and Side Position, please refer to page E-43 for details.
★2. "N: Plug-in Connector Type" is not available for RQ-type (AC→DC) solenoids (coil type: RQ100).
★3. "N1: Plug-in Connector Type with Indicator Light" is not available for R type (AC→DC) solenoids (coil type: R*) and RQ-type (AC→DC) solenoids (coil type: RQ100).
★4. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
★5. Special connector types, " M12-4 Pin Connector Type ", " Center Plug-in Connector Type ", " Center Plug-in M12-4 Connector Type ", please refer to pages E-51 & E-52.

Attention

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

List of Standard Models

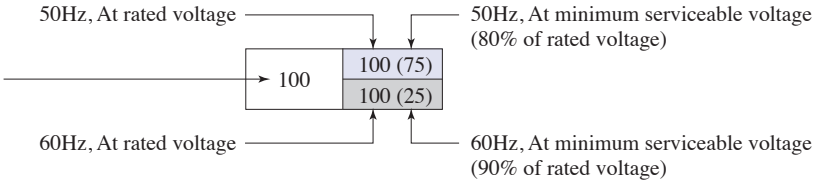
Models with AC Solenoids : DSG-03-＊＊＊-A＊

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min: P→A→B→T, P↔A↔B→T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				10	16	25	31.5	10	16	25	31.5	10	16	25	31.5
Three Positions	Spring Centered	DSG-03-3C2		100	100	100	100	100 (70)	100 (48)	96 (28)	65 (24)	100 (70)	100 (48)	96 (28)	65 (24)
								90 (49)	53 (30)	34 (19)	26 (15)	90 (49)	53 (30)	34 (19)	26 (15)
		◆★ DSG-03-3C3		90	90	90	90	100 (81)	100 (81)	100 (81)	100 (81)	100 (81)	100 (81)	100 (81)	100 (81)
								100 (81)	100 (81)	100 (81)	100 (81)	100 (81)	100 (81)	100 (81)	100 (81)
		DSG-03-3C4		80	80	80 (65)	80 (25)	100 (58)	100 (33)	76 (22)	46 (19)	100 (58)	100 (33)	76 (22)	46 (19)
						75 (20)	30 (15)	90 (47)	50 (26)	28 (18)	22 (15)	90 (47)	50 (26)	28 (18)	22 (15)
		DSG-03-3C40		100	100	100	100 (75)	100 (62)	100 (39)	84 (21)	48 (18)	100 (62)	100 (39)	84 (21)	48 (18)
							100 (25)	62 (40)	47 (26)	27 (16)	20 (12)	62 (40)	47 (26)	27 (16)	20 (12)
		◆★ DSG-03-3C5		30	30	30	30	26	21	18	16	30	28	28	28
		★ DSG-03-3C60		70	70	70	—	100	100	100	—	100	100	100	—
		DSG-03-3C9		100	100	100	100	60	60	60	60	60	60	60	60
		◆ DSG-03-3C10		80	80	80 (30)	80 (20)	100 (55)	100 (36)	60 (21)	34 (16)	100 (55)	100 (36)	60 (21)	34 (16)
						30 (25)	20 (15)	60 (38)	47 (24)	23 (14)	17 (11)	60 (38)	47 (24)	23 (14)	17 (11)
		◆ DSG-03-3C11		100	100	100	100	100 (80)	100 (65)	85 (35)	62 (28)	100 (80)	100 (65)	85 (35)	62 (28)
								80 (60)	70 (46)	51 (32)	45 (25)	80 (60)	70 (46)	51 (32)	45 (25)
		◆ DSG-03-3C12		90	90	90 (30)	90 (20)	100 (55)	100 (36)	60 (21)	34 (16)	100 (55)	100 (36)	60 (21)	34 (16)
						40 (20)	20 (15)	60 (38)	47 (24)	23 (14)	17 (11)	60 (38)	47 (24)	23 (14)	17 (11)
Two Positions	No-Spring Detented	DSG-03-2D2		100	100	100	100	40	40	30	28	60	60	40	35
	Spring Offset	DSG-03-2B2		100	100	100	100	34	24	20	19	100 (62)	100 (62)	100 (44)	94 (37)
				100 (90)	100 (90)	100 (90)	100 (90)					80 (42)	73 (36)	63 (34)	51 (33)
		DSG-03-2B3		100	100	100	100	57	57	57	57	100 (79)	100 (72)	100 (64)	100 (59)
				100 (75)	100 (75)	100 (75)	100 (75)					92 (55)	89 (46)	78 (28)	70 (27)
		◆ DSG-03-2B8		—	—	—	—	26	19	18	16	100 (35)	87 (15)	61 (9)	49 (7)
												45 (21)	34 (12)	15 (9)	11 (6)

Notes) 1. The relation between the maximum flow in the table above and the frequency/voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of 50 Hz or 60 Hz and of any voltage variants within the serviceable voltage.



2. For the maximum flow rate in P → T of the valves with a mark ★, please see page E-42.

The valve models with a ◆ mark are handled as options. If you choose such valves, check the time of delivery beforehand.

List of Standard Models

- Models with DC Solenoids : **DSG-03-＊＊＊-D＊**
- Models with R Type Solenoids : **DSG-03-＊＊＊-R＊**
- Models with RQ Type Solenoids : **DSG-03-＊＊＊-RQ100**

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P → A → B → T, P → B → A → T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				10	16	25	31.5	10	16	25	31.5	10	16	25	31.5
Three Positions	Spring Centered	DSG-03-3C2		120	120	120	120	120	120 100	80 54	55 43	120	120 100	80 54	55 43
		DSG-03-3C3 ◆★		120	120	120	120	120	120	120	120	120	120	120	120
		DSG-03-3C4		120	120	120	120	120	120	84 65	64 53	120	120	84 65	64 53
		DSG-03-3C40		120	120	120	120	120	120 104	62 57	49 42	120	120 104	62 57	49 42
		DSG-03-3C5 ◆★		50	50	50	50	35	24	21	20	45	45	45	45
		DSG-03-3C60 ★		120	120	120	—	120	120	120	—	120	120	120	—
		DSG-03-3C9		120	120	120	120	100	100	100	100	100	100	100	100
		DSG-03-3C10 ◆		120	120	120 65	65 50	120	112 69	60 46	51 40	120	112 69	60 46	51 40
		DSG-03-3C11 ◆		120	120	120	120	100	100	80 62	65 52	100	100	80 62	65 52
		DSG-03-3C12 ◆		120	120	120 65	65 50	120	120 86	62 47	51 40	120	120 86	62 47	51 40
Two Positions	No-Spring Detented	DSG-03-2D2		120	120	120	120	45	37	30	28	60	60	40	35
	Spring Offset	DSG-03-2B2		110 100	110 100	110 100	110 100	68	47	38	38	120	114 83	75 58	63 48
		DSG-03-2B3		120	120	120	120	77	77	77	77	120	120	120	120 103
		DSG-03-2B8 ◆		—	—	—	—	53	33	24	23	120	120 62	62 40	47 37

Notes) 1. The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage. → 120 / 120 / 65

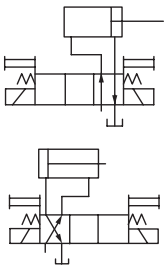
- 120: At rated voltage [after temperature rise and saturated]
- 65: At minimum serviceable voltage (90% of rated voltage) [after temperature rise and saturated]

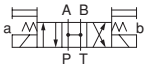
2. For the maximum flow rate in P → T of the valves with a ★ mark, please see page E-42.

The valve models with a ◆ mark are handled as options. If you choose such valves, check the time of delivery beforehand.

Maximum Flow Rate in P → T Flow

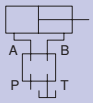
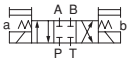
In valve type 3C3, 3C5, 3C60, in case where the actuator is put on between the cylinder ports A and B as illustrated below and where the actuator moves and suspended at its stroke end and where the valve is then shifted to the neutral position in the suspended state of the actuator, the maximum flow rates available are those as shown as the table below regardless of any voltage in the range of serviceable voltage.



Model Numbers	Graphic Symbols	Max. Flow L/min			
		10 MPa	16 MPa	25 MPa	31.5 MPa
DSG–03–3C3–A✻		100	100	100	100
DSG–03–3C3–D✻/R✻/RQ100		120	120	120	120
DSG–03–3C5–A✻		26	21	18	16
DSG–03–3C5–D✻/R✻/RQ100		35	24	21	20
DSG–03–3C60–A✻		84	52	52	—
DSG–03–3C60–D✻/R✻/RQ100		68	65	61	—

List of Standard Models (Shockless Type)

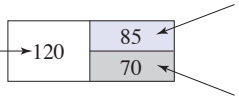
- Models with DC Solenoids : **S-DSG-03—✻✻✻-D✻**
- Models with R Type Solenoids : **S-DSG-03—✻✻✻-R✻**
- Models with RQ Type Solenoids : **S-DSG-03-✻✻✻-RQ100**

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P ⇄ A → B ⇄ T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
															
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	S-DSG-03-3C2		120	120	120	120	120	120	75	50	120	120	75	50
									105	65	40		105	65	40
		S-DSG-03-3C4		120	120	85	65	120	120	75	40	120	120	75	40
						70	45		100	65	35		100	65	35
Two Positions	Spring Offset	S-DSG-03-2B2		120	100	75	40	39	39	39	39	120	120	105	60
														85	50

Note) 1. The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage.



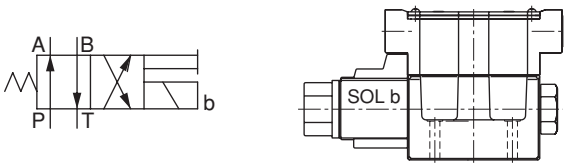
At rated voltage
[after temperature rise and saturated]

At minimum serviceable voltage
(90% of rated voltage)
[after temperature rise and saturated]

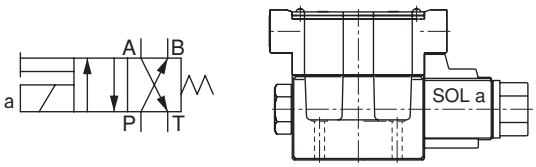
Reverse Mounting of Solenoid

In spring offset type, it is a standard configuration that the solenoid is mounted onto the valve in the SOL b position (side). However, in this particular spool-spring arrangement, the mounting of the solenoid onto the valve in the reverse position -SOL a side- is also available. The graphic symbol for this reverse mounting is as shown below.

As for the valve type 2B*A and 2B*B, please refer to the explanation under the heading of "Valves Using Neutral Position and Side Position" given below.



Standard Mtg. of Solenoid

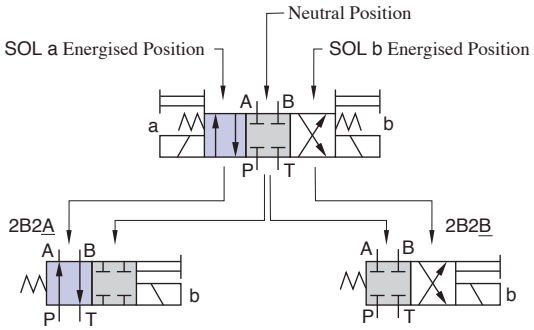


Reverse Mtg. of Solenoid

Valves Using Neutral Position and Side Position

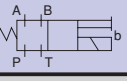
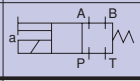
Besides the use of the standard 2-position valves aforementioned in the "List of Standard Models", the 3-position valves also can be used as the 2-position valves using the two of their three positions. In this case, there are two kinds of the valve available. One is the valve using the neutral position and SOL a position (2B*A) and another is the valve using the neutral position and SOL b position (2B*B).

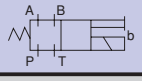
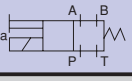
(Example) In case of Spool Type "2"



"A" Use of Neutral and SOL. a Energised Position

"B" Use of Neutral and SOL. b Energised Position

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
(S-) DSG-03-2B＊A		
(S-) DSG-03-2B2A		——

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
＊-DSG-03-2B＊B		
(S-) DSG-03-2B2B		
DSG-03-2B3B		——
(S-) DSG-03-2B4B		——
DSG-03-2B60B		——
DSG-03-2B10B		——

In the above table, the graphic symbols in mounting type highlighted with shade are optional extra, therefore, please confirm the time of delivery with us before ordering.

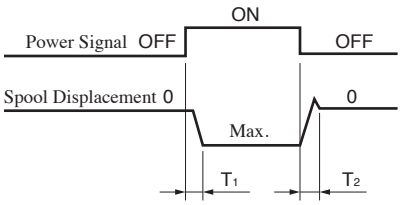
Typical Changeover Time (Example)

Standard Type (Without Shockless Function)

[Test Conditions]

Pressure：16 MPa
Flow Rate：70 L/min
Viscosity：30 mm²/s
Voltage：100 %V at rated voltage
(After temperature rise and saturated)

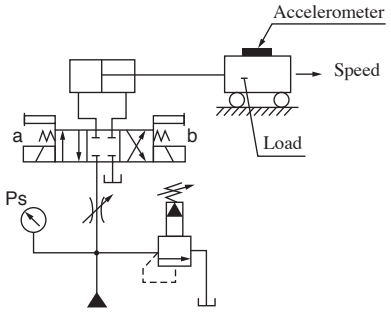
[Result of Measurement]



Type	Model Numbers	Time ms	
		T1	T2
Standard Type	DSG-03-3C2-A＊	27	22
	DSG-03-3C2-D＊	97	30
	DSG-03-3C2-R＊	97	204
	DSG-03-3C2-RQ100	97	41

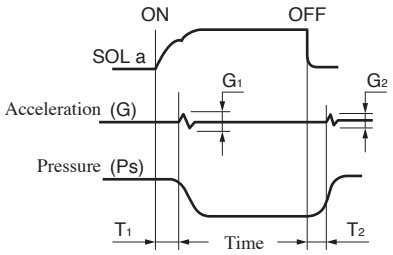
Shockless Type

[Test Circuit and Conditions]



Setting Pressure (Ps)：7 MPa
Load (W)：1000 kg
Cylinder Speed：8.8 m/min
Viscosity：30 mm²/s

[Result of Measurement]



Type	Model Numbers	Time ms		Acceleration m/s²	
		T1	T2	G1	G2
Shockless Type	S-DSG-03-3C2-D＊	110	120	6.4	6.4
	S-DSG-03-3C2-R＊	110	220		
	S-DSG-03-3C2-RQ100	110	120		

Mounting Bolts

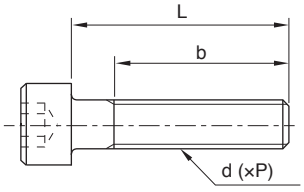
Mounting bolts are not available, please order separately.

Type/Dimension/Quantity

Item		Details
Type		Soc. Hd. Cap Screw （SCM）
Thread Size d		M6
Thread Pitch P	mm	1
Bolt Length L	mm	35
Thread Length (Reference) b	mm	24
Quantity		4

Specifications/Machinery Characteristics

Item	Details
Material	Steel SCM
Screw Type	Meter Coarse Screw
Finishing	Black Oxide Film
Class of Strength	12.9
Standard	Based on JIS B 1176 (2014)

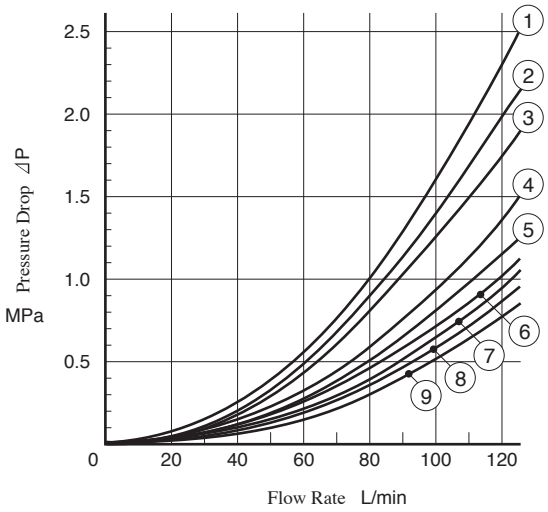


★If order to us, please use the model numbers below.
MBK-03-05-＊
(＊is the newest design number)

Pressure Drop

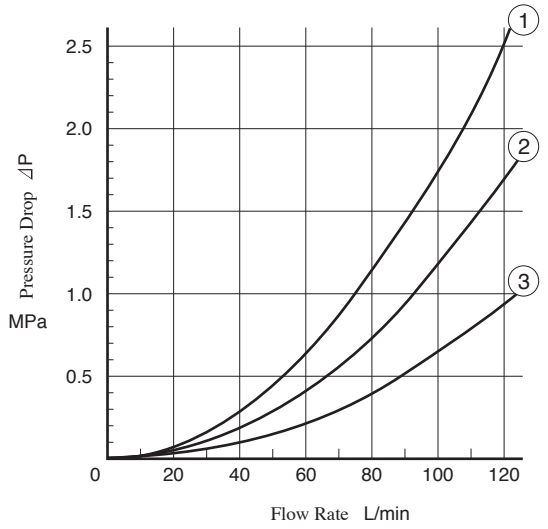
Pressure drop curves based on viscosity of 35 mm²/s and specific gravity of 0.850.

Standard Type : DSG-03



Model Numbers	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T
DSG-03-3C2	⑦	⑦	⑦	⑦	—
DSG-03-3C3	⑨	⑨	⑨	⑨	⑤
DSG-03-3C4	⑦	⑧	⑦	⑧	—
DSG-03-3C40	⑦	⑦	⑦	⑦	—
DSG-03-3C5	⑨	⑦	⑦	⑨	①
DSG-03-3C60	⑥	⑤	⑥	⑤	①
DSG-03-3C9	⑨	⑦	⑨	⑦	—
DSG-03-3C10	⑦	⑧	⑦	⑦	—
DSG-03-3C11	⑨	⑦	⑦	⑦	—
DSG-03-3C12	⑦	⑦	⑦	⑧	—
DSG-03-2D2	④	③	⑥	⑥	—
DSG-03-2B2	②	①	⑦	⑦	—
DSG-03-2B3	③	②	⑨	⑨	—
DSG-03-2B8	⑥	—	⑤	—	—

Shockless Type : S-DSG-03



Model Numbers	Pressure Drop Curve Number			
	P→A	B→T	P→B	A→T
S-DSG-03-3C2	②	②	②	②
S-DSG-03-3C4	②	②	③	③
S-DSG-03-2B2	①	②	②	②

● For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

● For any other specific gravity (G'), the pressure drop (⊿ P') may be obtained from the formula below.
⊿ P' = ⊿ P (G'/0.850)

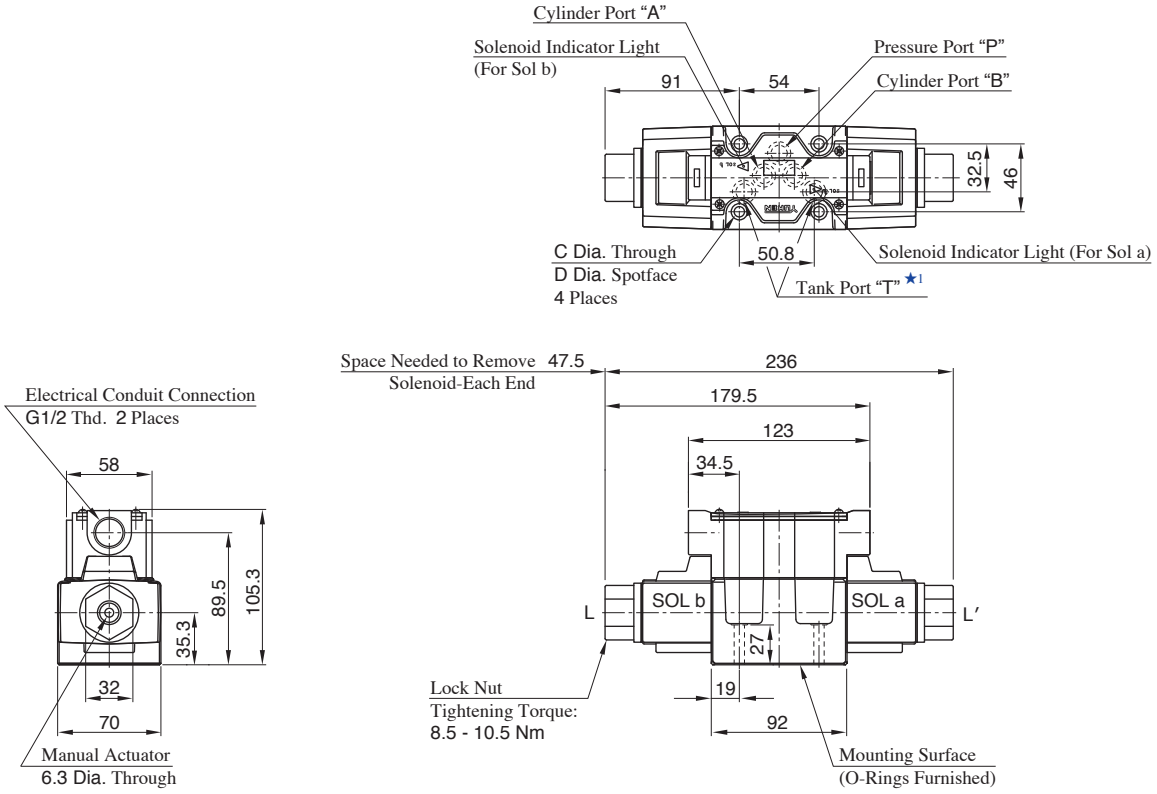
Mounting Surface: ISO 4401-05-04-0-05

Terminal Box Type (Standard)

■ Models with AC Solenoids : **DSG-03-＊＊＊-A＊**

● Spring Centered

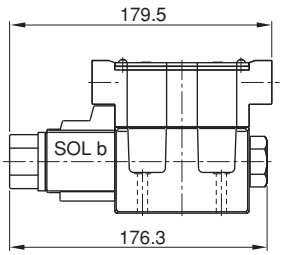
● No-Spring Detented



Model Numbers	C	D	Remarks
DSG-03-＊＊＊-A＊-50	7	11	Standard
DSG-03-＊＊＊-A＊-5002	8.8	14	Option

★1. Of the two of tank port "T", the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

● Spring Offset

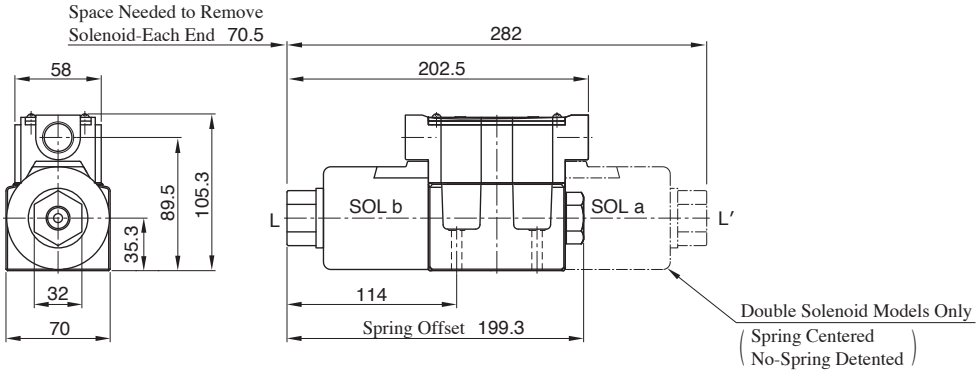


● For other dimensions, refer to the drawing above.

● Solenoid being mounted in the reverse position -SOL a side- is also available.

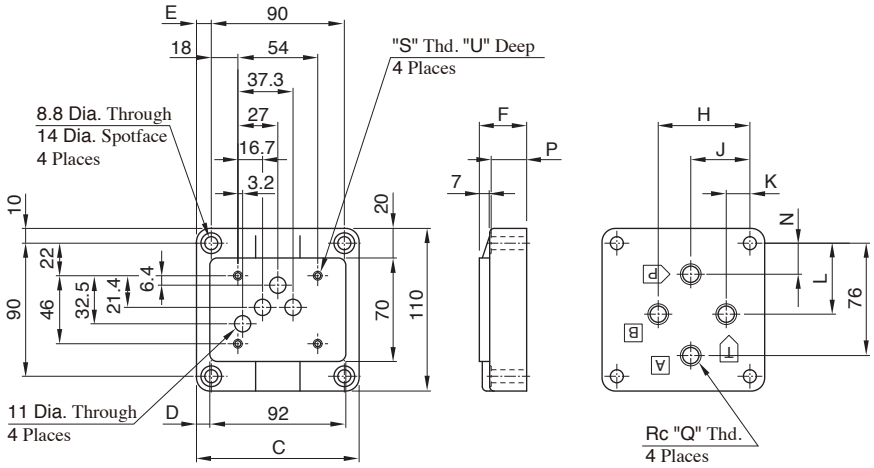
■ Models with DC Solenoids：(S-) DSG-03-＊＊＊-D＊
■ Models with R Type Solenoids：(S-) DSG-03-＊＊＊-R＊
■ Models with RQ Type Solenoids：(S-) DSG-03-＊＊＊-RQ100

- Spring Centered
- No-Spring Detented
- Spring Offset



● For other dimensions, refer to Models with AC solenoids (Page E-46).

■ Sub- plates：DSGM-03/03X/03Y



Sub-plate Model Numbers	C	D	E	F	H	J	K	L	N	P	Q
DSGM–03–40/4002	110	9	10	32	62	40	16	48	21	24	3/8
DSGM–03X–40/4002											1/2
DSGM–03Y–40/4002	120	14	15	50	80	45	10	47	16	42	3/4

Sub-plate Model Numbers	S	U	Remarks
DSGM–03＊–40	M6	13	Standard
DSGM–03＊–4002	M8	14	Option

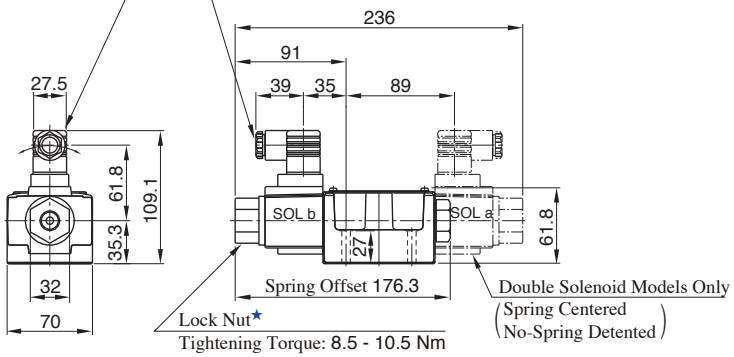
Options

■ Plug-in Connector Type/Plug-in Connector with Indicator Light

● Models with AC Solenoids：**DSG-03-＊＊＊-A＊-N/N1**

The position of the Plug-in connector can be changed by loosening the lock nut ★ . After completion of the change, be sure to tighten the lock nut with the torque as specified below.

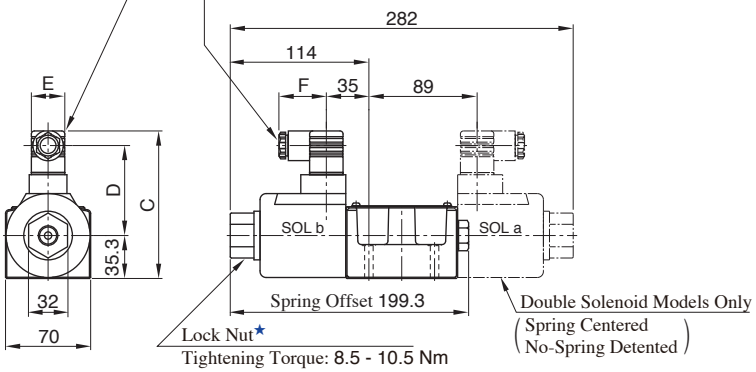
Cable Departure
Cable Applicable:
Outside Dia. 8-10mm
Conductor Area ..... Not Exceeding 1.5mm²



● Models with DC Solenoids：**(S-) DSG-03-＊＊＊-D＊-N/N1**
● Models with R Type Solenoids：**(S-) DSG-03-＊＊＊-R＊-N**

The position of the Plug-in connector can be changed by loosening the lock nut ★. After completion of the change, be sure to tighten the lock nut with the torque as specified below.

Cable Departure
Cable Applicable:
Outside Dia. 8-10mm
Conductor Area ..... Not Exceeding 1.5mm²



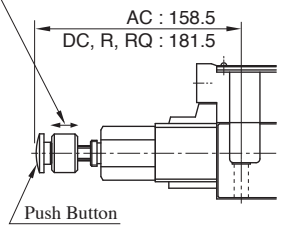
Model Numbers	C	D	E	F
DSG–03–＊＊＊–D＊–N/N1	121.1	73.8	27.5	39
DSG–03–＊＊＊–R＊–N	124.9	66.5	34	53

●For other dimensions, refer to "Terminal Box Type" (Page E-46 – E-47).

■ Models with Push Button & Lock Nut

(S-) DSG-03-＊＊＊-＊-C

Lock Nut
Press the "Push Button" then turn "Lock Nut" clockwise. The position of the "Push Button" is held. Be sure to loosen "Lock Nut" fully before solenoid is energised.

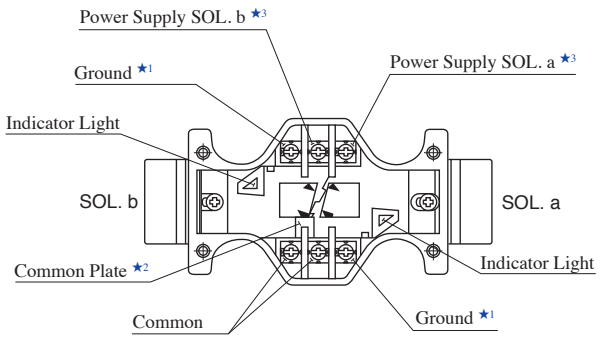


Electrical Conduit Connection

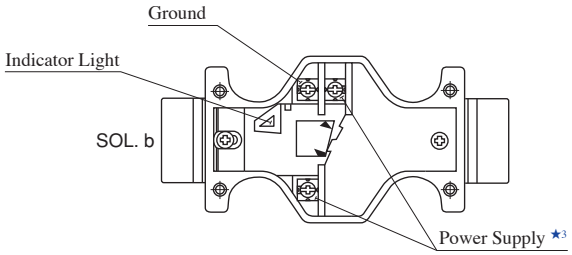
Details of Receptacle

Terminal Box Type

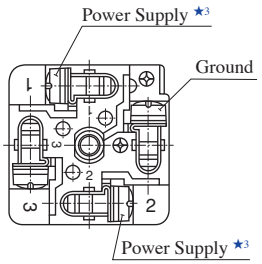
Double Solenoid Type



Single Solenoid Type (SOL b)



Plug-in Connector Type

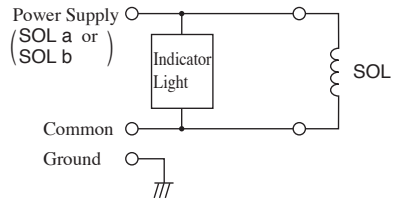


★1. There are two grounding terminals. You can use either one.
★2. If you do not need the common plate, remove it.
★3. With DC solenoids, polarity is no question.

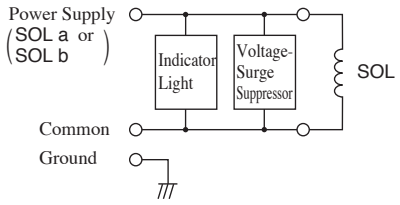
Electrical Circuit (Single Solenoid Type)

Terminal Box Type

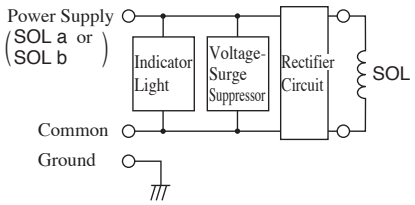
AC



DC

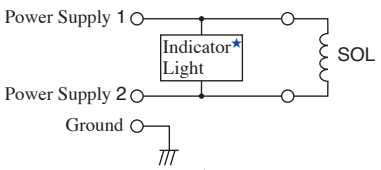


AC→DC Rectified



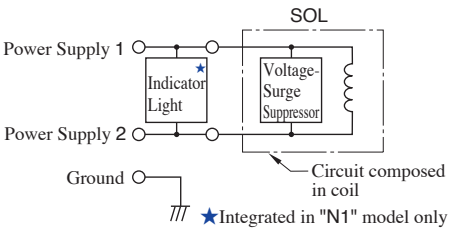
Plug-in Connector Type

AC



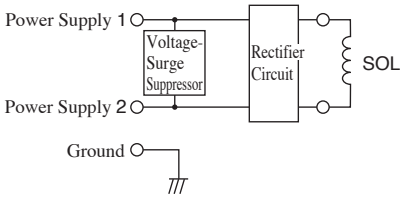
★Integrated in "N1" model only

DC



★Integrated in "N1" model only

AC→DC Rectified

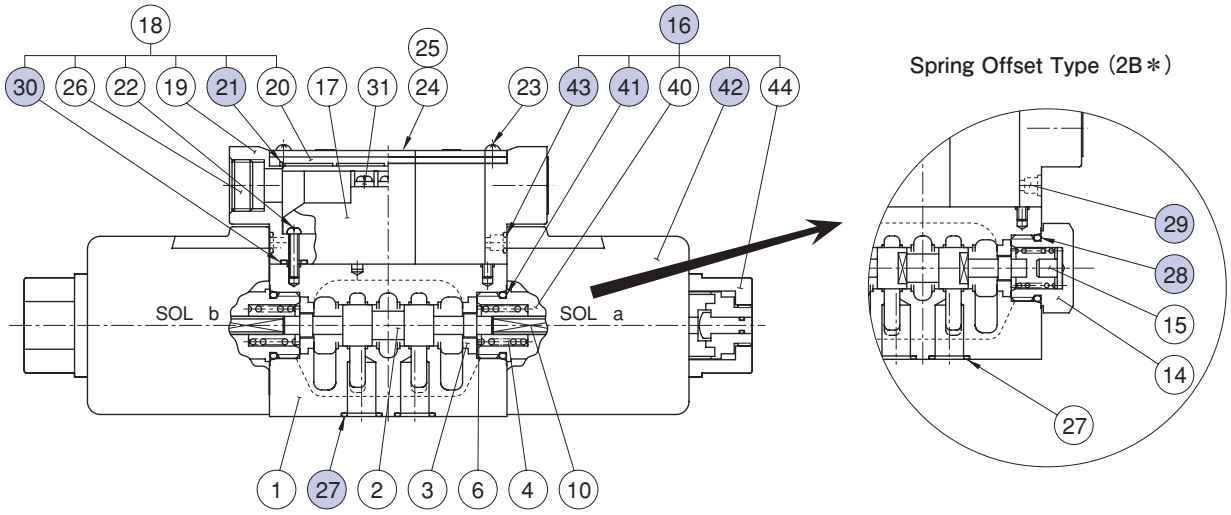


⚠ DANGER

- Do not perform wiring while the power is on.
  Doing so may result in electric shock, burns or death.
- Make the wiring properly. Improper wiring will cause an irregular movement of the machine, resulting in a grave accident.

List of Seals and Solenoid Ass'y

(S-) DSG-03-＊＊＊



List of Seals

Item	Name of Parts	Part Numbers	Qty.			Remarks
			3C＊	2D＊	2B＊	
21	Gasket	1751S-VK418689-6	1	1	1	
27	O-Ring	AS 568-014 (NBR-90)	5	5	5	
28	O-Ring	OR NBR-90 P21-N	—	—	1	
29	Plug	1790S-VK418329-9	—	—	2	
30	O-Ring	S 6	2	2	2	
41	O-Ring	OR NBR-90 P21-N	2	2	1	Included in Solenoid Ass'y ⑯
43	O-Ring	OR NBR-70-1 P4-N	4	4	2	

List of Solenoid Ass'y and Coil Ass'y

Model Numbers	⑯ Solenoid Ass'y No.	㊷ Coil No.	Remarks
DSG-03-＊＊＊-A100	SA3-100-51	C-SA3-100-51	Terminal Box Type
DSG-03-＊＊＊-A120	SA3-120-51	C-SA3-120-51	
DSG-03-＊＊＊-A200	SA3-200-51	C-SA3-200-51	
DSG-03-＊＊＊-A240	SA3-240-51	C-SA3-240-51	
DSG-03-＊＊＊-D12	SD3-12-51	C-SD3-12-51	
DSG-03-＊＊＊-D24	SD3-24-51	C-SD3-24-51	
DSG-03-＊＊＊-D48	SD3-48-51	C-SD3-48-51	
DSG-03-＊＊＊-R100/RQ100	SR3-100-51	C-SR3-100-51	
DSG-03-＊＊＊-R200	SR3-200-51	C-SR3-200-51	
DSG-03-＊＊＊-A100-N/N1	SA3-100-N-51	C-SA3-100-N-51	Plug-in Connector Type
DSG-03-＊＊＊-A120-N/N1	SA3-120-N-51	C-SA3-120-N-51	
DSG-03-＊＊＊-A200-N/N1	SA3-200-N-51	C-SA3-200-N-51	
DSG-03-＊＊＊-A240-N/N1	SA3-240-N-51	C-SA3-240-N-51	
DSG-03-＊＊＊-D12-N/N1	SD3-12-N-51	C-SD3-12-N-51	
DSG-03-＊＊＊-D24-N/N1	SD3-24-N-51	C-SD3-24-N-51	
DSG-03-＊＊＊-D48-N/N1	SD3-48-N-51	C-SD3-48-N-51	
DSG-03-＊＊＊-R100-N	SR3-100-N-51	C-SR3-100-N-51	
DSG-03-＊＊＊-R200-N	SR3-200-N-51	C-SR3-200-N-51	

● As of solenoid Ass'y of shockless type and models with push button & lock nut, please order as below.

(Example) SD3-12-S-C-N-51

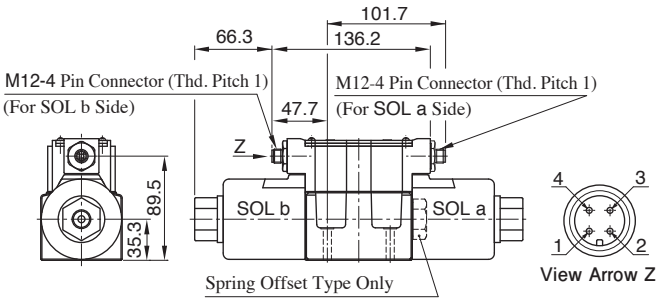
C : Only for the models with push button & lock nut (option)

S : Only for the models of shockless type

Coil Ass'y numbers are same with those in the above chart.

Special Electrical Conduit Connection

M12-4 Pin Connector Type



● For other dimensions, refer to page E-47 for Standard Terminal Box Type.

Model Numbers

DSG-03-2B2-D24-M1-50-L

M12-4 Pin Connector Electrical Conduit Connection

M1 : Load Side Common Minus (PNP Type) Terminal Box SOL b Side Conduit Connection

M2 : Load Side Common Minus (PNP Type) Terminal Box SOL a Side Conduit Connection

M3 : Load Side Common Plus (NPN Type) Terminal Box SOL b Side Conduit Connection

M4 : Load Side Common Plus Terminal Box SOL a Side Conduit Connection

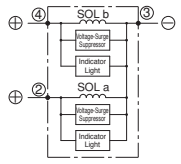
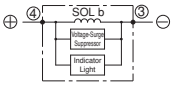
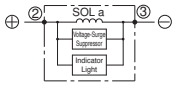
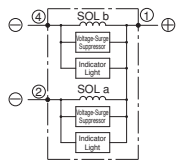
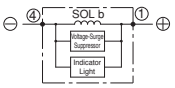
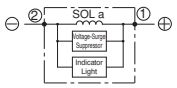
Coil numbers only for D12 and D24

● For other items, refer to page E-39 for Standard Model Number Designation.

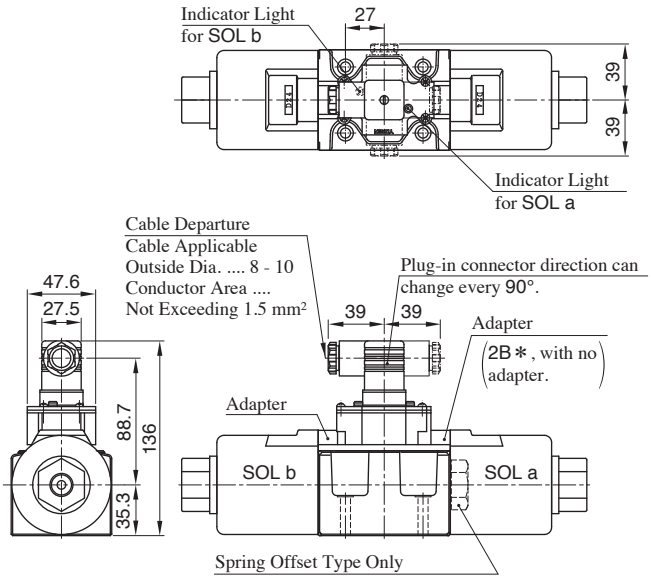
● Pin No.

	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
Terminal	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused
Connector Departure Direction	M1: SOL b Side M2: SOL a Side	M3: SOL b Side M4: SOL a Side	M1: SOL b Side M2: Plug Side	M3: SOL b Side M4: Plug Side	M1: Plug Side M2: SOL a Side	M3: Plug Side M4: SOL a Side

Connection Circuit

	Double Solenoid Type	Single Solenoid Type	
		Standard Mounting	Reverse Mounting
Load Side Common Minus			
Load Side Common Plus			

Center Plug-in Connector Type



Model Numbers

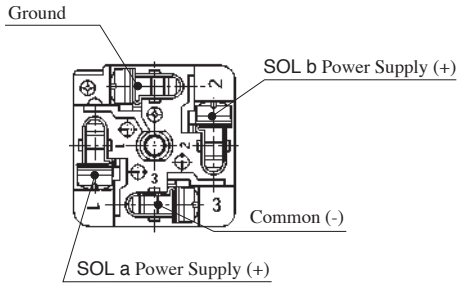
DSG-03-2B2-D24-S-50-L

Center Plug-in Connector Electrical Conduit Connection Type

Coil Numbers Only for D12, D24, A100, A120, A200 & A240

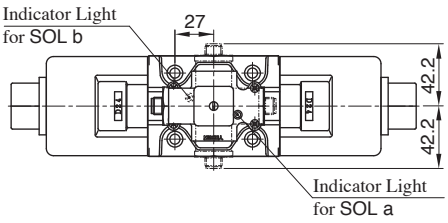
● For other items, refer to page E-39 for Standard Model Number Designation.

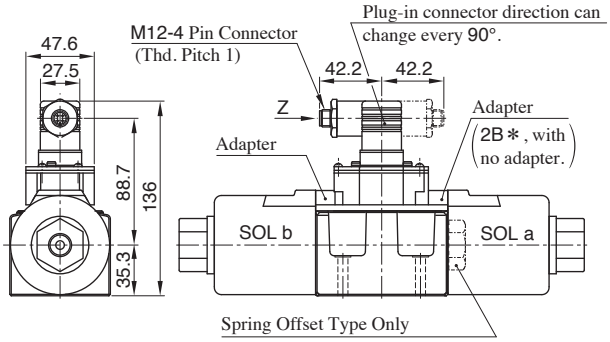
Details of Receptacle



● For other dimensions, refer to page E-47 for Standard Terminal Box Type.

Center Plug-in Connector M12-4 Pin Connector Type





● For other dimensions, refer to page E-47 for Standard Terminal Box Type.

● Pin No.

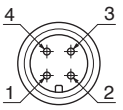
Terminal	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused

Model Numbers

DSG-03-2B2-D24-S1-50-L

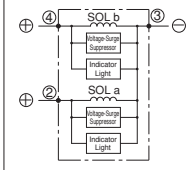
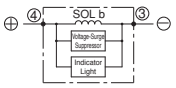
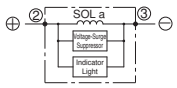
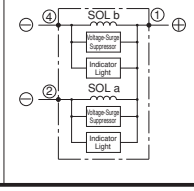
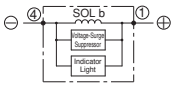
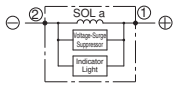
- Center Plug-in M12 Connector 4 Pins Electrical Conduit Connection
  - S1 : Load Side Common Minus (PNP Type)
  - S2 : Load Side Common Plus (NPN Type)
- Coil numbers only for D12 and D24

● For other items, refer to page E-39 for Standard Model Number Designation.



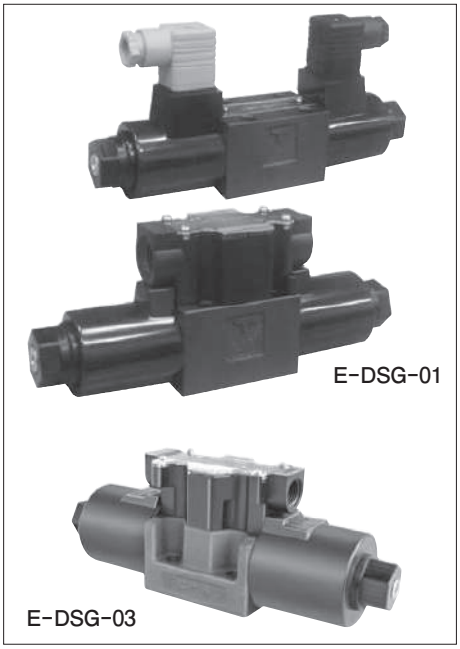
View Arrow Z

Connection Circuit

	Double Solenoid Type	Single Solenoid Type	
		Standard Mounting	Reverse Mounting
Load Side Common Minus			
Load Side Common Plus			

Low Wattage (5W) Type Solenoid Operated Directional Valves

Two types of Direct Acting Type Solenoid Operated Directional Valves, E-DSG-01/03, with suppressed consumption power 5W are launched in series.



Enable Savings In Operating Cost

Because these valves only 5W of power which enables remarkable reduction of operating cost.

Standard DSG Series
DSG-01 : 29W
DSG-03 : 38W

→

Low Wattage Type E-DSG Series
E-DSG-01 : 5W
E-DSG-03 : 5W

Enable Savings In Initial Cost

Since these valves operate on only 5W, they can be driven through the output circuit of a programmed or sequence controller. This feature simplifies the electric circuitry and enables savings in initial cost.

Low Coil Surface Temperature

These low wattage valves minimize coil surface temperature.

CE Certified Products Available

Because E-DSG-03 models are for the European equipment market, so CE certified products are also available.
(For more details, please contact us.)

Specifications

Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min^{-1}	Mass kg
E–DSG–01–3C✻–D✻–70	45	16	16	240	2.0
E–DSG–01–2D2–D✻–70					2.0
E–DSG–01–2B✻–D✻–70					1.5
E–DSG–03–3C✻–D✻–50	63	16	16	240	5
E–DSG–03–2D2–D✻–50					5
E–DSG–03–2B2–D✻–50					3.6

★ The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.
The maximum flow differs according to the spool type and operating conditions. For details, please refer to the "List of Standard Models" on page E-55.

Solenoid Ratings

Model Numbers	Electric Source	Coil Type	Voltage (V)		Current & Power at Rated Voltage	
			Source Rating	Serviceable Range	Inrush (A)	Power (W)
E–DSG–01	DC (K Series)	D 24	24	21.6 - 26.4	0.22	5
E–DSG–03		D 12	12	10.8 - 13.2	0.44	5
		D 24	24	21.6 - 26.4	0.22	

The coil type numbers in the shaded column are handled as optional extras. In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Mass kg
E-DSG-01	DSGM-01-31	1/8	0.8
	DSGM-01X-31	1/4	
	DSGM-01Y-31	3/8	
E-DSG-03	DSGM-03-40	3/8	3
	DSGM-03X-40	1/2	
	DSGM-03Y-40	3/4	4.7

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.(▽)
- Sub-plates are same with those for DSG 01/03 series. For dimensions, refer to pages E-31 & E-47.

Mounting Bolts

Mounting bolts are not available, so please order separately. For details, please refer to pages E-29 & E-44.

Special Electrical Conduit Connection

"M12-4 Pin Connector Type", "Center Plug-in Connector Type" "Center Plug-in M12-4 Pin Connector Type" are available, please refer to page E-61 for details.

Model Number Designation

E–DSG	–01	–2	B	2	A	–D24	–N	–70	–L
Series Number	Valve Size	Number of Valve Positions	Spool Spring Arrangement	Spool Type	Input Only Valves Using ★1 Neutral Position & Side Position	Coil Type	Electrical Conduit Connection	Design Number	Models with Reverse Mtg. of Solenoid
E–DSG : Low Wattage (5W) Solenoid Operated Directional Valve (Sub-plate Mounting Type)	01	3	C : Spring Centered	2, 3, 4 11, 40	———	D24	None: Terminal Box Type (Standard) N : Plug-in Connector Type	70	———
		2	D : No-Spring Detented	2	———				———
			B : Spring Offset	2, 3, 8	———				L : Input only for reverse mtg. of solenoid.
				2, 4 40	A : Using Neutral Position & SOL a Energised Position B : Using Neutral Position & SOL b Energised Position				
	03	3	C : Spring Centered	2, 4	———	D12 D24	N1 : Plug-in Connector Type with Indicator Light	50	———
		2	D : No-Spring Detented	2	———				———
			B : Spring Offset	2	B : Using Neutral Position & SOL b Energised Position				L : Input only for reverse mtg. of solenoid.

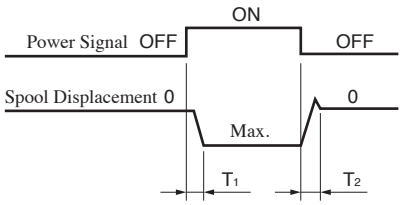
★1. In case of Valves Using Neutral Position and Side Position, please refer to page E-56 for details.
★2. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Attention

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

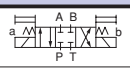
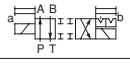
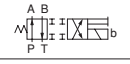
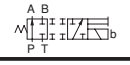
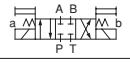
Typical Changeover Time (Example)

Changeover time varies according to oil viscosity, spool type and hydraulic circuit.



Valve Size	Model Numbers	Time ms		Test Conditions			
		T_1	T_2	Pressure MPa	Flow Rate L/min	Viscosity mm2/s	Voltage
01	E–DSG–01–3C2	125	37	16	30	30	100 %V at rated voltage (After temperature rise and saturated)
03	E–DSG–03–3C2	190	70	16	50	35	
	E–DSG–03–2B2	190	100		40		

LIst of Standard Models

Valve Size	No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min: P → A, B → T (P → A, B → A)			P → A [Port "B" Blocked]			P → B [Port "A" Blocked]		
					Working Pressure MPa			Working Pressure MPa			Working Pressure MPa		
					3.5	7	16	3.5	7	16	3.5	7	16
01	Three Positions	Spring Centered	E-DSG-01-3C2		45	45	45	45	45 30	20 15	45	45 30	20 15
			E-DSG-01-3C3		45	45	45	45	45	45	45	45	45
			E-DSG-01-3C4		45	45	45 35	45	45 30	20 15	45	45 30	20 15
			E-DSG-01-3C40		45	45	45 25	45	45 30	20 15	45	45 30	20 15
			E-DSG-01-3C11		45	45	45	16	8	3	45	25 14	9 6
	Two Positions	No-Spring Detented	E-DSG-01-2D2		40	40	40	40	30 23	20 12	40	30 23	20 12
		Spring Offset	E-DSG-01-2B2		45	45	45	30	10	9	45	20 13	12 6
			E-DSG-01-2B3		45	45 30	45 30	35	35 22	25 22	45 35	45 35	45 35
			E-DSG-01-2B8		—	—	—	16	5	2	40	25 14	9 6
03	Three Positions	Spring Centered	E-DSG-03-3C2		63	63	50	50	48 35	22 16	50	48 35	22 16
			E-DSG-03-3C4		63	63 50	30 18	50	45 32	32 22	50	45 32	32 22
	Two Positions	No-Spring Detented	E-DSG-03-2D2		63	63	50	34	34	25 20	34	34	25 20
		Spring Offset	E-DSG-03-2B2		50	50	40	16	12	10	50 35	32 18	16 10

Note) 1. The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

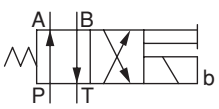
(Example)

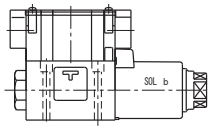
The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage → 45 / 35

- 45: At rated voltage [after temperature rise and saturated]
- 35: At minimum serviceable voltage (90% of rated voltage) [after temperature rise and saturated]

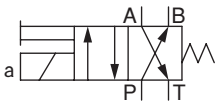
Reverse Mounting of Solenoid

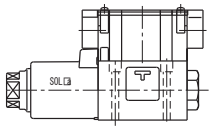
In spring offset type, it is a standard configuration that the solenoid is mounted onto the valve in the SOL b position (side). However, in this particular spool-spring arrangement, the mounting of the solenoid onto the valve in the reverse position -SOL a side- is also available. The graphic symbol for this reverse mounting is as shown below.
As for the valve type 2B*A and 2B*B, please refer to the explanation under the heading of "Valves Using Neutral Position and Side Position" given below.





Standard Mtg. of Solenoid



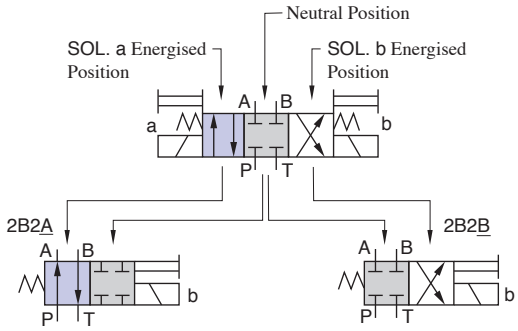


Reverse Mtg. of Solenoid

Valves Using Neutral Position and Side Position

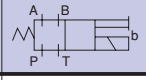
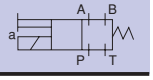
Besides the use of the standard 2-position valves aforementioned in the "List of Standard Models", the 3-position valves also can be used as the 2-position valves using the two of their three positions. In this case, there are two kinds of the valve available. One is the valve using the neutral position and SOL a position (2B*A) and another is the valve using the neutral position and SOL b position (2B*B).

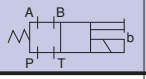
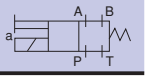
(Example) In case of Spool Type "2"



"A" : Use of Neutral and SOL. a Energised Position

"B" : Use of Neutral and SOL. b Energised Position

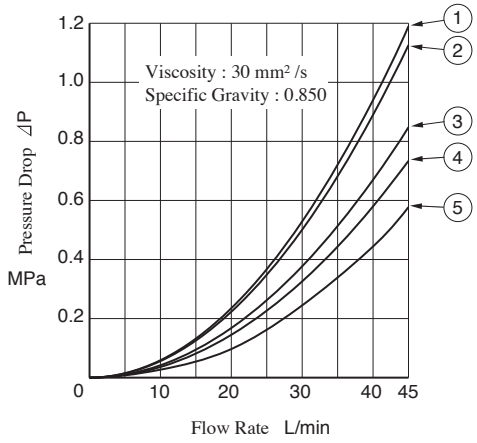
Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
E-DSG-01-2B＊A		
E-DSG-01-2B2A		——

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
E-DSG-$\frac{01}{03}$-2B＊B		
E-DSG-$\frac{01}{03}$-2B2B		——
E-DSG-$\frac{01}{03}$-2B4B		

In the above table, the graphic symbols in mounting type highlighted with shade are optional extra, therefore, please confirm the time of delivery with us before ordering.

Pressure Drop

E-DSG-01



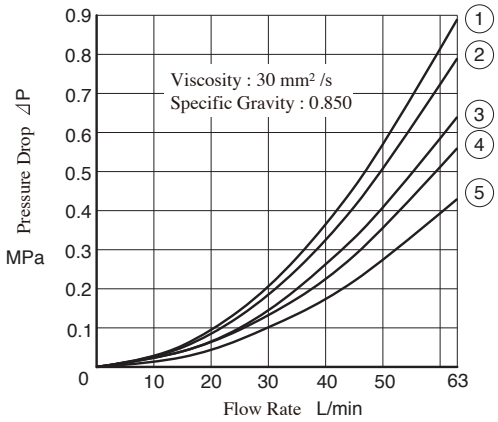
Model Numbers	Pressure Drop Curve Number			
	P→A	B→T	P→B	A→T
E–DSG–01–3C2	①	①	①	①
E–DSG–01–3C3	⑤	⑤	⑤	⑤
E–DSG–01–3C4	①	④	①	④
E–DSG–01–3C40	①	①	①	①
E–DSG–01–3C11	⑤	①	①	①
E–DSG–01–2D2	②	②	②	②
E–DSG–01–2B2	②	②	②	②
E–DSG–01–2B3	③	③	③	③
E–DSG–01–2B8	②	—	②	—

● For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

● For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.
⊿P' = ⊿P (G'/0.850)

E–DSG–03



Model Numbers	Pressure Drop Curve Number			
	P→A	B→T	P→B	A→T
E-DSG-03-3C2	③	③	③	③
E-DSG-03-3C4	③	④	③	④
E-DSG-03-2D2	①	①	⑤	⑤
E-DSG-03-2B2	②	②	③	③

● For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

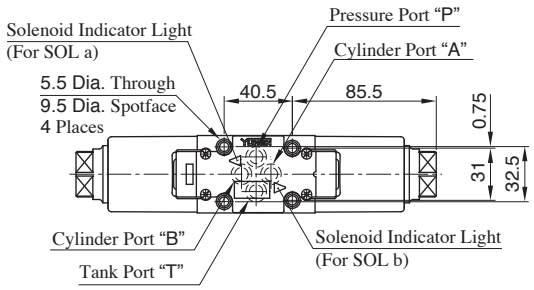
● For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.
⊿P' = ⊿P (G'/0.850)

Mounting Surface: ISO 4401-03-02-0-05

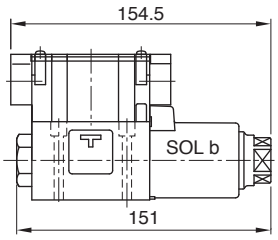
Terminal Box Type (Standard)

■ E-DSG-01-＊＊＊-D24

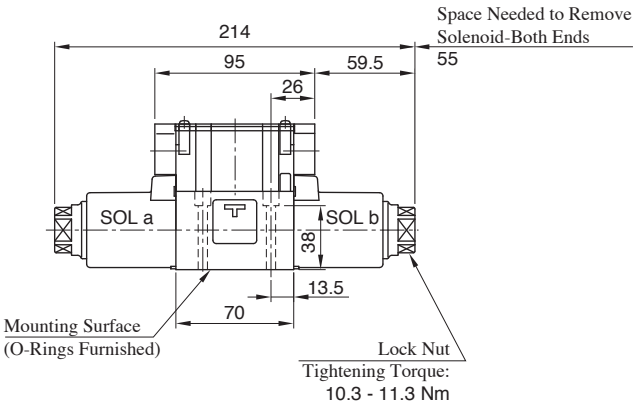
● Spring Centered & No-Spring Detented

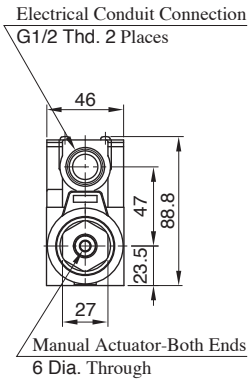


● Spring Offset



●For other dimensions, refer to the drawing left.
●Solenoid being mounted in the reverse position SOL a side is also available.

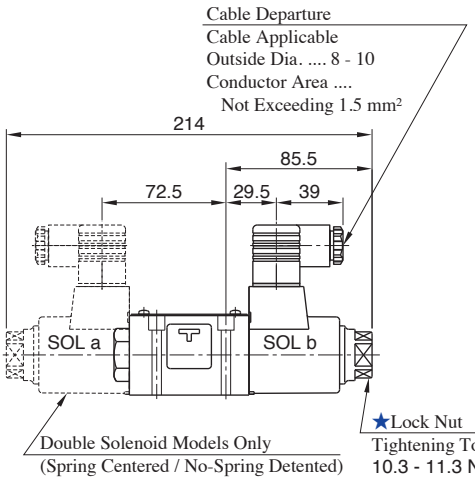


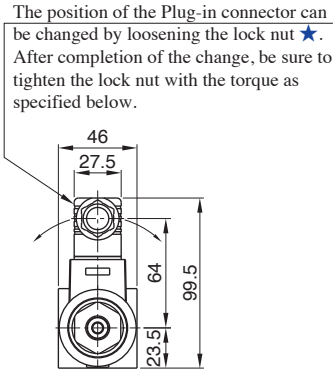


Note : Dimensions of valve mounting surface, refer to page E-31 for shared sub-plates dimensions.

Options

■ Plug-in Connector Type / Plug-in Connector with Indicator Light：E-DSG-01-＊＊＊-D24-N/N1





● For other dimensions, refer to "Terminal Box Type" drawing above.

■ E-DSG-03-＊＊＊-D＊

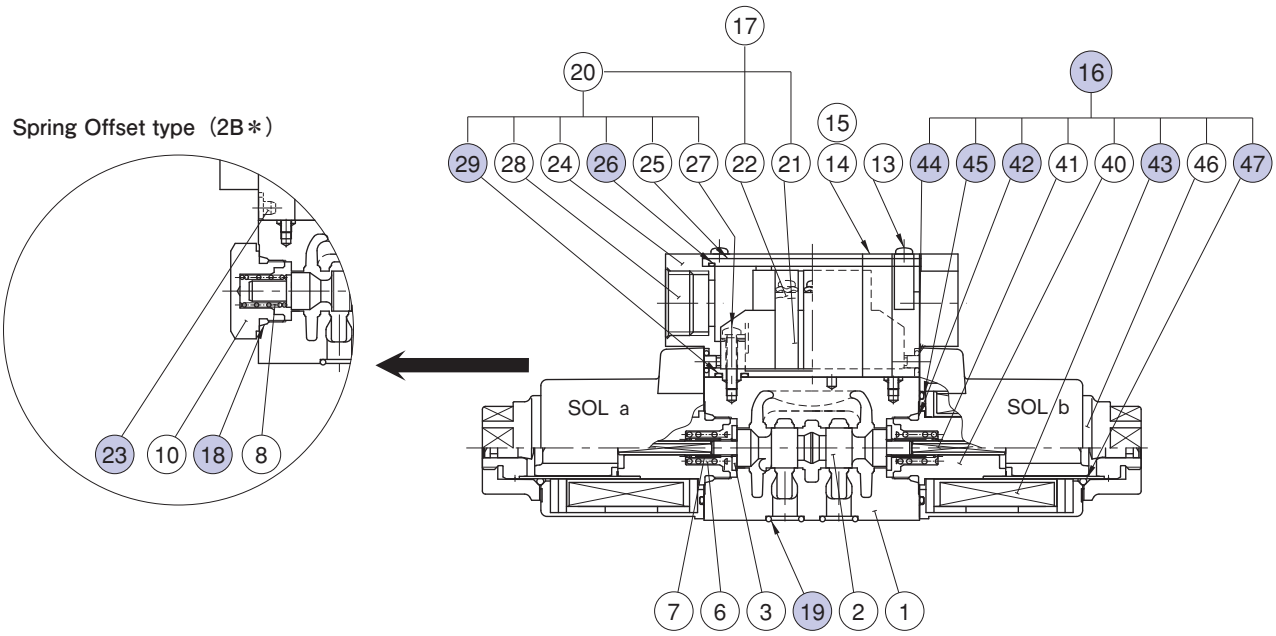
Outside dimensions are same with DSG-03 series solenoid operated directional valves, refer to pages E-47 & E-48.

Electrical Conduit Connection

As of details of receptacle and electrical circuit, please refer to page E-33 & E-49 for standard DSG-01 / DSG-03 series solenoid operated directional valves.

List of Seals and Solenoid Ass'y

E-DSG-01-＊＊＊-D24



● List of Seals

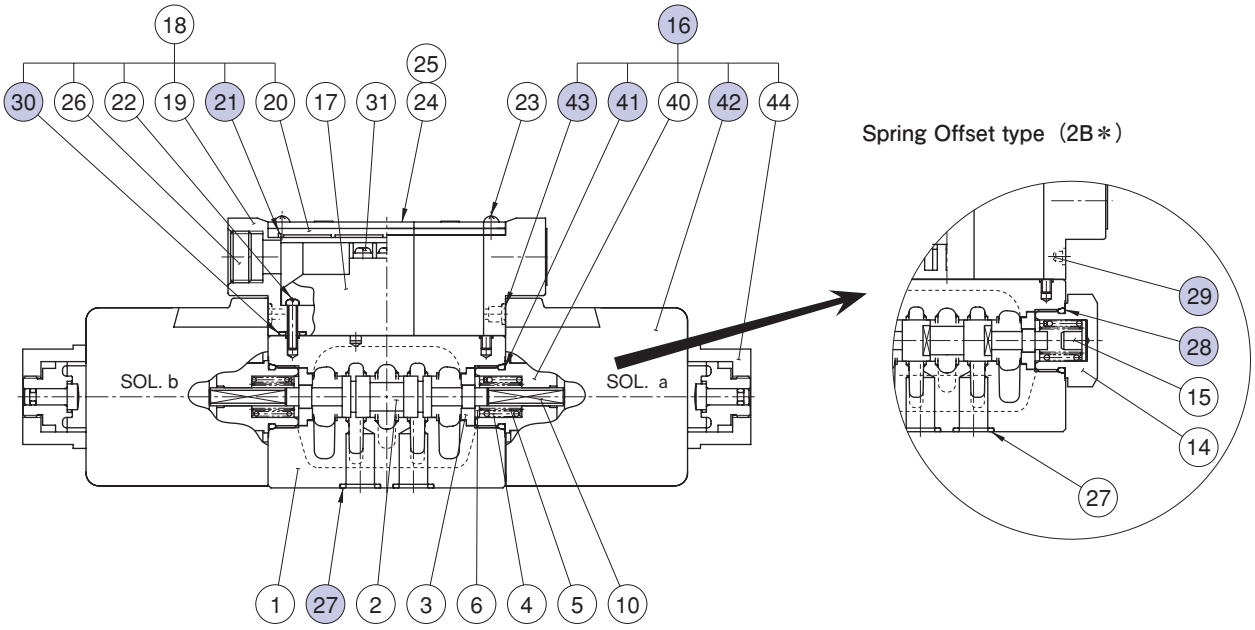
Item	Name of Parts	Part Numbers	Qty.			Remarks
			3C＊	2D＊	2B＊	
18	O-Ring	OR NBR-90 P18-N	—	—	1	
19	O-Ring	AS568-012 (NBR-90)	4	4	4	
23	Packing	1790S-VK418329-9	—	—	2	
26	Gasket	1790S-VK421290-8	1	1	1	
29	O-Ring	S 6	2	2	2	
42	O-Ring	OR NBR-90 P18-N	2	2	1	Included in Solenoid Ass'y (Item ⑯)
44	O-Ring	OR NBR-70-1 P4-N	4	4	2	
45	O-Ring	AS568-026 (NBR-70-1)	2	2	1	
47	O-Ring	OR NBR-70-1 P20-N	2	2	1	

Solenoid Ass'y, Coil Ass'y No.

Model Numbers	⑯ Solenoid Ass'y No.	㊸ Coil Ass'y No.	Remarks
E–DSG–01–＊＊＊–D24	E–SD1H–24–70	C–E–SD1H–24–70	Terminal Box Type
E–DSG–01–＊＊＊–D24–N/N1	E–SD1H–24–N–70	C–E–SD1H–24–N–70	Plug-in Connector Type / Plug-in Connector with Indicator Light

List of Seals and Solenoid Ass'y

E-DSG-03-＊＊＊-D＊



List of Seals

Item	Name of Parts	Part Numbers	Qty.			Remarks
			3C＊	2D＊	2B＊	
21	Gasket	1751S-VK418689-6	1	1	1	
27	O-Ring	AS 568-014 (NBR-90)	5	5	5	
28	O-Ring	OR NBR-90 P21-N	—	—	1	
29	Plug	1790S-VK418329-2	—	—	2	
30	O-Ring	S 6	2	2	2	
41	O-Ring	OR NBR-90 P21-N	2	2	1	Included in Solenoid Ass'y (Item ⑯)
43	O-Ring	OR NBR-70-1 P4-N	4	4	2	

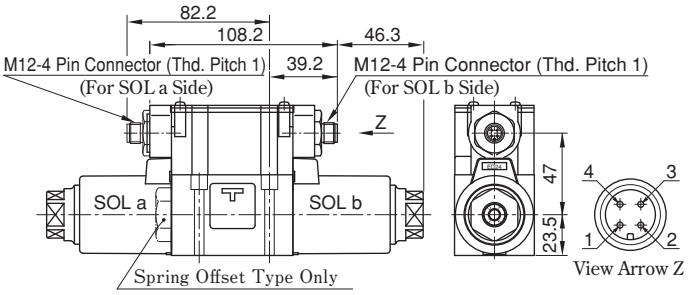
Solenoid Ass'y, Coil Ass'y No.

Model Numbers	⑯ Solenoid Ass'y No.	㊷ Coil Ass'y No.	Remarks
E–DSG–03–＊＊＊–D12	E–SD3–12–51	C–E–SD3–12–51	Terminal Box Type
E–DSG–03–＊＊＊–D24	E–SD3–24–51	C–E–SD3–24–51	
E–DSG–03–＊＊＊–D12–N/N1	E–SD3–12–N–51	C–E–SD3–12–N–51	Plug-in Connector Type / Plug-in Connector with Indicator Light
E–DSG–03–＊＊＊–D24–N/N1	E–SD3–24–N–51	C–E–SD3–24–N–51	

Special Electrical Conduit Connection

E-DSG-01-＊＊＊-D＊-M＊

● M12-4 Pin Connector Type



Model Numbers

E-DSG-01-2B2-D24-M1-70-L

M12-4 Pin Connector Electrical Conduit Connection

M1：Load Side Common Minus (PNP Type) Terminal Box SOL b Side Conduit Connection

M2：Load Side Common Minus (PNP Type) Terminal Box SOL a Side Conduit Connection

M3：Load Side Common Plus (NPN Type) Terminal Box SOL b Side Conduit Connection

M4：Load Side Common Plus Terminal Box SOL a Side Conduit Connection

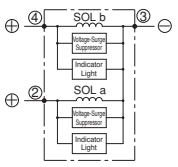
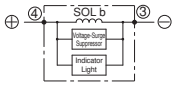
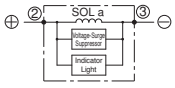
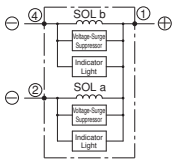
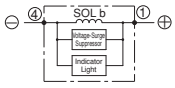
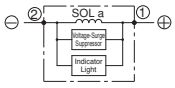
● For other dimensions, refer to page E-58 for Standard Terminal Box Type.

● For other items, refer to page E-54 for Standard Model Number Designation.

● Pin No.

Terminal	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused
Connector Departure Direction	M1: SOL b Side M2: SOL a Side	M3: SOL b Side M4: SOL a Side	M1: SOL b Side M2: Plug Side	M3: SOL b Side M4: Plug Side	M1: Plug Side M2: SOL a Side	M3: Plug Side M4: SOL a Side

● Connection Circuit

	Double Solenoid Type	Single Solenoid Type	
		Standard Mounting	Reverse Mounting
Load Side Common Minus			
Load Side Common Plus			

E-DSG-03-＊＊＊-D＊-M＊/S/S＊

● M12-4 Pin Connector Type / Center Plug-in Connector Type / Center Plug-in M12-4 Pin Connector Type

Outside dimensions are same with DSG-03 series solenoid operated directional valves, refer to page E-47, E-51 & E-52.

Interchangeability in Installation between Current and New Design

E-DSG-01 model products made change from 60 design to 70 design, enables hige flow and compact.

● Specifications / Characteristics

①Max. Flow：30 → 45 L/min

②Spool Type：Spool types are limited as below.

3C2, 3C3, 3C4, 3C40, 3C11, 2D2, 2B2, 2B3, 2B8

(If use neutral position and side position, please refer to page E-56.)

● Standard Solenoid Type

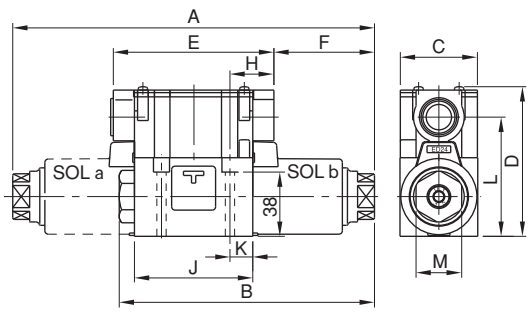
There are no changes in specifications, but coil type is limited only for D24.

● Special Electrical Conduit Connection

Electrical conduit connection is limited only for M12-4 pin connector type.

● Interchangeability in Mounting between Current and New Design

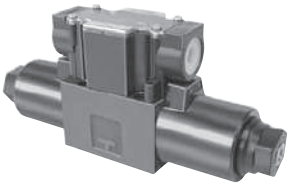
Position of electrical conduit connection port is changed a little, but has interchangeability in mounting.



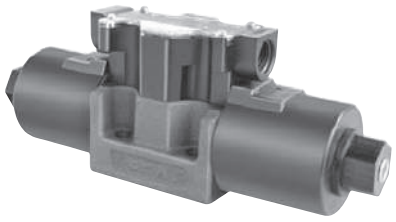
Design Number	A	B	C	D	E	F	H	J	K	L	M
(New) 70 Design	214	151	46	88.8	95	59.5	26	70	13.5	70.5	27
(Current) 60 Design	216	155	48	90.3	90	63	23.5	65	11	72	22

Electronic Relay Incorporated Solenoid Operated Directional Valves

The valve is actuated by operating a built-in switch using a very small current signal (about 10 mA) when the solenoid is energised.



T-DSG-01



T-DSG-03

● A Direct drive by the programmable controller is now possible

As the valve can be actuated by a very small current signal (about 10 mA), a Direct Drive is possible on the output circuit of the programmable controller or sequence controller.

● Simple construction and stable operation

Since the valve is a direct type, the construction is quite simple. Also the solenoid is the well proven wet armature type, which can withstand contamination. Therefore a stable operation can be obtained.

■ Specifications and Characteristics of Standard Solenoid

Standard solenoid specifications and pressure drop are same with DSG-01/03 series, please refer to relevant pages.

■ Dimensions

Dimensions are same with DSG-01/03 series, please refer to relevant pages.

■ Sub-plates and Mounting Bolts

Sub-plates use same models with DSG-01/03 series. Mounting bolts are same with DSG-01/03 series, please refer to relevant pages.

■ Specifications

Valve Type	Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min^{-1}	Mass kg
Standard Type	T-DSG-01-3C✻-D24✻-70	100	35	21	300	1.85
	T-DSG-01-2D2-D24✻-70					
	T-DSG-01-2B✻-D24✻-70					1.4
Shockless Type	T-S-DSG-01-3C✻-D24✻-70	63	25	21	120	1.85
	T-S-DSG-01-2B2-D24✻-70					1.4
Standard Type	T-DSG-03-3C✻-D24✻-50	120	31.5 (Spool Type 60 Only) 25	16	240	5
	T-DSG-03-2D2-D24✻-50					
	T-DSG-03-2B✻-D24✻-50					3.6
Shockless Type	T-S-DSG-03-3C✻-D24✻-50	120	25	16	120	5
	T-S-DSG-03-2B2-D24✻-50					3.6

★ Maximum flow indicates a ceiling flow. As the ceiling flow depends on the type of spool and operating condition same as those for standard DSG-01/03, refer to the List of Standard Models for details.

● Pages for List of DSG-01/03 Standard Models

Valve Size	Type : Model Numbers	Pages for List of Standard Models
01	Standard Type : DSG–01–✻✻✻–D✻–70	E-26
	Shockless Type : S–DSG–01–✻✻✻–D✻–70	E-27
03	Standard Type : DSG–03–✻✻✻–D✻–50	E-41
	Shockless Type : S–DSG–03–✻✻✻–D✻–50	E-42

■ Signal Power Voltage (External Signal Power Type)

Valve Size	Signal Power Voltage	Current on Signal Cable
01	20 - 65 V DC★1	About 10 mA Constant★2
03		

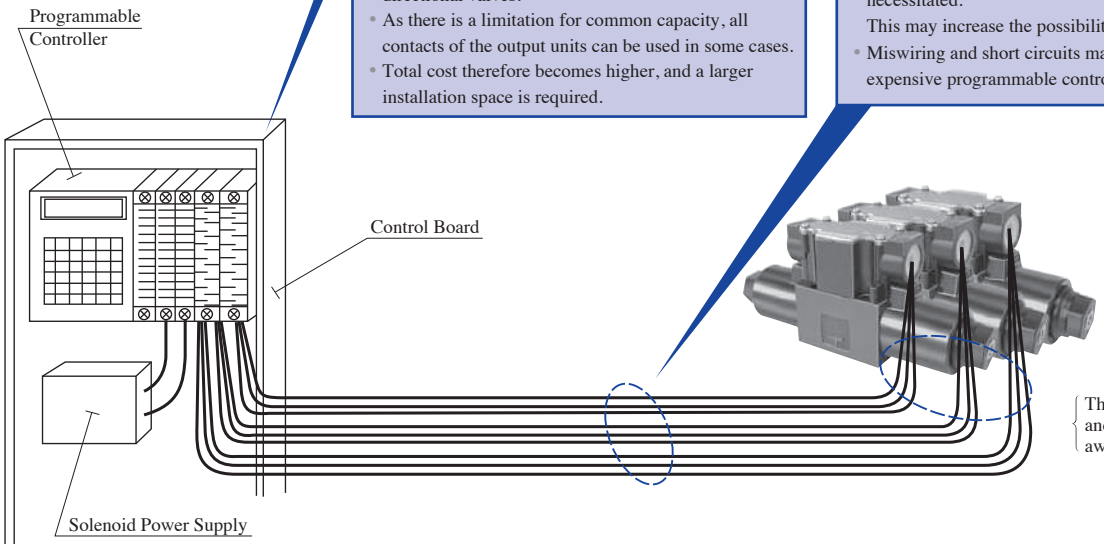
★1. If use at the range of 5 - 20 V DC, please contact us.
★2. Current does not increase with voltage increase, so no need to district current by resistor etc.

Characteristics and Effect

Characteristics	Merit	Effect (Example)
● Changeover signal current is very small as one hundredth of the conventional type. Changeover Signal Current : 10 mA Constant (Voltage 20 - 65V DC)	◆Enable to wiring by the cables thinner than conventional ones. ◆Can changeover directly from programmable controller ! ◆Programmable controller enable to be more compact and cut costs. ◆Enable to increase number of simultaneous changeover contacts. ◆Not influence on surge voltage in the sequence output unit.	■Cable occupied spaces reduce to one third. ■No need to relay for changeover. ■16 contacts output unit Conventional Type.....Max. 3 Contacts Electronic Relay Incorporated Type..... Max. 16 Contacts
● Protect of Output Circuit	◆Not influence on the output side even if over current by defective solenoid changeover for some reason.	■Only to replace solenoid operated valve in case of trouble.

Comparison of The Conventional Type and The Electronic Relay Incorporated Type

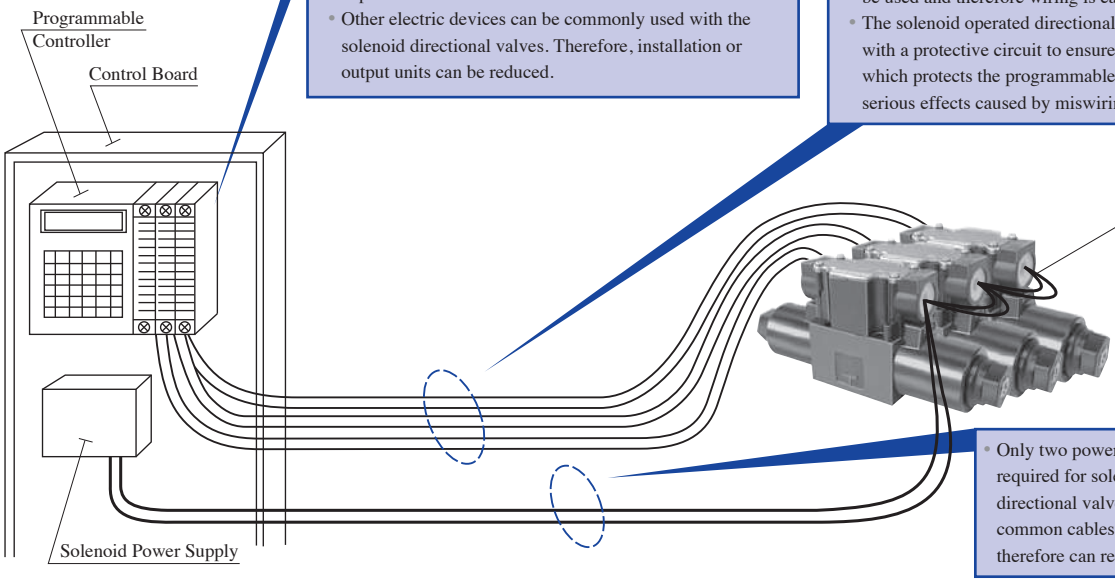
Conventional Type



● Output Unit
- Large capacity output units (approximately 2A per unit) are required to operate solenoid operated directional valves.
- As there is a limitation for common capacity, all contacts of the output units can be used in some cases.
- Total cost therefore becomes higher, and a larger installation space is required.

● Power Supply Cables
- As each double solenoid valve requires a minimum of three cables, it is obvious that the more valves you use, the more power supply cables and wiring is necessitated.
  This may increase the possibility of miswiring.
- Miswiring and short circuits may damage a very expensive programmable controller and output units.

Electronic Relay Incorporated Type



● Output Unit
- Standard small capacity output unit, which is usually less expensive can be used.
- Other electric devices can be commonly used with the solenoid directional valves. Therefore, installation or output units can be reduced.

● Signal Output Cables
- Thinner cable, compared with power supply cable, can be used and therefore wiring is easier.
- The solenoid operated directional valve is provided with a protective circuit to ensure a constant current, which protects the programmable controller from serious effects caused by miswiring.

- Only two power supply cables are required for solenoid operated directional valves and use only common cables for adding valves, therefore can reduce wiring man-hour.

Model Number Designation

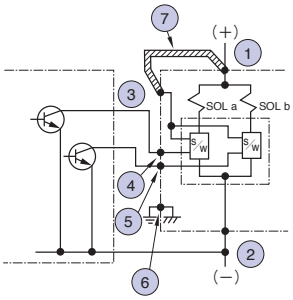
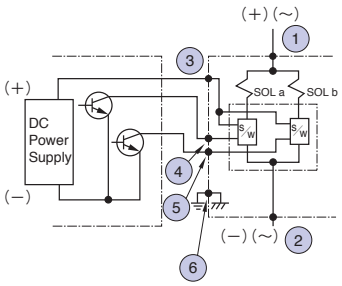
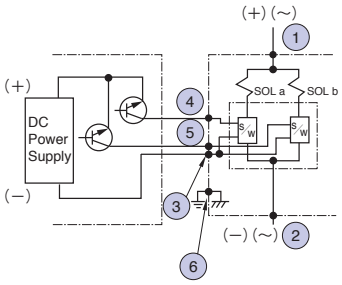
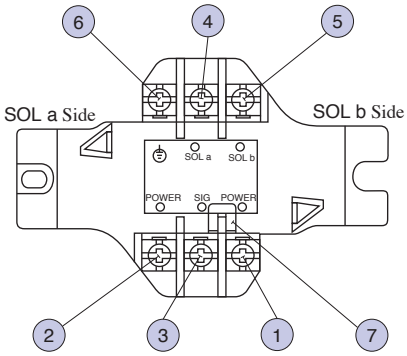
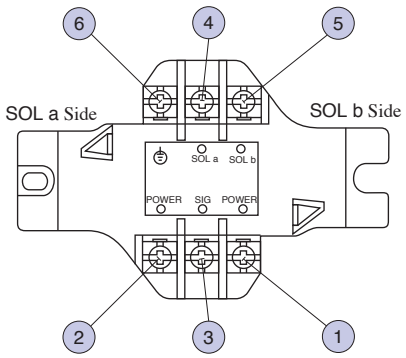
T–	S–	DSG	–01	–2	B	2	A	–D24	M	–70	–L
Control Type	Type	Series Number	Valve Size	Number of Valve Positions	Spool-Spring Arrangement	Spool Type	Input Only Valves Using Neutral Position & Side Position	Coil Type	Supply Type of Signal Power	Design Number	Models with Reverse Mtg. of Solenoid
T: Electronic Relay Incorporated Type	None: Standard Type	DSG: Solenoid Operated Directional Valve (Sub-plate Mounting Type)	01	3	C: Spring Centered	2, 3, 4, 40, 60, 9, 10, 11, 12	——	DC: D24	None: Internal Signal Power M: External Signal Power Sink Type MS: External Signal Power Source Type	70	—— L: Input only for reverse mtg. of solenoid.
				2	D: No-Spring Detented	2	——				
					B: Spring Offset	2, 3, 8	A★1, B★1				
	S: Shockless Type			3	C: Spring Centered	2, 4	——	DC: D24	None: Internal Signal Power M: External Signal Power Sink Type MS: External Signal Power Source Type		—— L: Input only for reverse mtg. of solenoid.
				2	B: Spring Offset	2	——				
	None: Standard Type		03	3	C: Spring Centered	2, 3, 4, 40, 5, 60, 9, 10, 11, 12	——	DC: D24	None: Internal Signal Power M: External Signal Power Sink Type MS: External Signal Power Source Type	50	—— L: Input only for reverse mtg. of solenoid.
				2	D: No-Spring Detented	2	——				
					B: Spring Offset	2, 3, 8	A★1, B★1				
	S: Shockless Type			3	C: Spring Centered	2, 4	——	DC: D24	None: Internal Signal Power M: External Signal Power		—— L: Input only for reverse mtg. of solenoid.
				2	B: Spring Offset	2	A★1, B★1				

★1. In case of Valves Using Neutral Position and Side Position, please refer to pages E-28 & E-43 for details.
★2. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Attention

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

Details of Receptacle

Item	Internal Signal Power	External Signal Power	
		Sink Type	Source Type
Electrical Circuit The numbers in circle on drawing right represent terminal numbers. Refer to the chart below for more details.	 ● The power of semiconductor switch operating signal is supplied from solenoid power source. ● When signal cable short circuit to the minus side of power source, approximate 10 mA current flow into signal cable. If solenoid power voltage increase, 10 mA current does not change.	 ● The power of semiconductor switch operating signal is supplied from the other power sources. ● Signal terminal and power terminal are insulated absolutely.	
Receptacle			

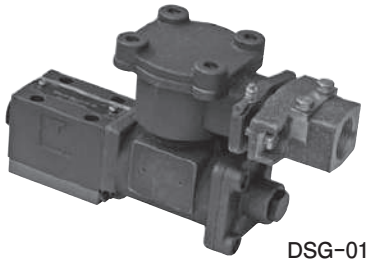
★ This drawing shows double solenoid type. Single solenoid type does not have terminal ④.

Terminal Number	Name of Terminals		
	Internal Signal Power	External Signal Power	
		Sink Type	Source Type
①	Power Terminal (24V DC ⊕ Terminal)	Power Terminal (24V DC ⊕ Terminal)	
②	Power Terminal (24V DC ⊖ Terminal)	Power Terminal (24V DC ⊖ Terminal)	
③	Short circuit to terminal ① by common plate. (Unused)	Signal Power Terminal (⊕ Terminal)	Signal Power Terminal (⊖ Terminal)
④	SOL a Signal Terminal (Single solenoid does not have this terminal.)		
⑤	SOL b Signal Terminal		
⑥	Ground Terminal (Connect to body of solenoid operated directional valve)		
⑦	Common Plates	———	

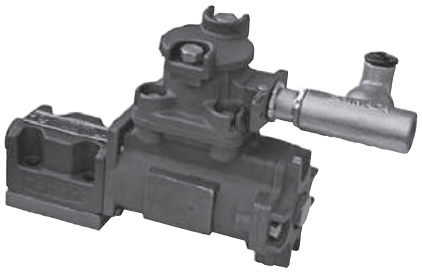
- Please wire correctly to the receptacle. Power terminals are fixed (+) and (-) sides. Please use smoothing power source for DC power supply.
- There is no time lag between signal output cables switch (ON/OFF) and solenoid switching (ON/OFF).
- Signal output cables do not need to use shield cables.
- This valves of external signal type, the signal terminal and power terminal are insulated. So that surge voltage which generated when solenoid off will not affect to control units connecting signal output cables. (Internal signal type generate surge voltage, so please install surge killer as required.)

Explosion Proof (Flameproof) Type Solenoid Operated Directional Valves

"Even if explosive gas invasion from outside into vessel cause internal ignition or explosion, substantially isolate ignition source in vessel by special elaborating to vessel structure for avoiding any bad influence externally." is the point of pressure & explosion proof construction.
On this point of view, YUKEN's Explosion Proof Type Solenoid Operated Directional Valves involve solenoid and receptacle in the vessel with all closed pressure proof structure.
If explosion of explosive gas happened in vessel, the vessel could stand the pressure and there is no danger to ignite external explosive gas.
Usable at the danger zone 1 & 2.



DSG-01



DSG-03

Type of Explosion Proof

d 2 G4

- G4 — Ignition Temperature……Apply for the ignition temperature range over 135 °C to under 200 °C
- 2 — Class of Explosion……Spatium having flame propagation at 25 mm depth, the minimum value over 0.4 mm to under 0.6 mm.
- d — Pressure & Explosion Proof Construction

Technology Institution of Industrial Safety Certificate Number

Model Numbers	Certificate Number	
	Threaded Conduit Connection	Pressure Proof Packing Type
DSG-01	T67046	T67037
DSG-03	T67047	T67036

Specifications

Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min^{-1}	Mass kg
DSG-01-3C✻-✻X✻-70	100	35	14	300 : With DC Solenoid 120 : With R Solenoid	7.75
DSG-01-2D2-✻X✻-70					7.75
DSG-01-2B✻-✻X✻-70					4.35
DSG-03-3C✻-✻X✻-51	120	31.5 Spool Type 60 Only 25	16	240 : With DC Solenoid 120 : With R Solenoid	18.2
DSG-03-2D2-✻X✻-51					18.2
DSG-03-2B✻-✻X✻-51					10.2

★ The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.
The maximum flow differs according to the spool type and operating conditions. For details, please contact us.

Interchangeability in Installation between Current and New Design

For further improvement of reliability, Explosion Proof Type Solenoid Operated Directional Valves have been upgraded as below.
DSG-01 : 50 Design → 70 Design
DSG-03 : 50 Design → 51 Design

Cable Departure

As of threaded conduit connection type, add sealing fitting on the cable departure. With this arrangement, the certificate number also changed.

Model Numbers	Certificate Number		
	(Current)	(New)	
		Threaded Conduit Connection Type	Pressure Proof Packing Type
DSG-01	T32873	T67046	T67037
DSG-03	T43853	T67047	T67036

Specifications / Characteristics

DSG-01 models improve high pressure and high flow.

Model Numbers	Max. Flow L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min^{-1}	Mass kg	
					3C*/2D*	2B*
(New) 70 Design	100	35	14	300 : With DC Solenoid 120 : With R Solenoid	7.75	4.35
(Current) 50 Design	35	31.5 (3C60 : 25)		120	7.3	4.1

DSG-03 have no changes between current and new models.

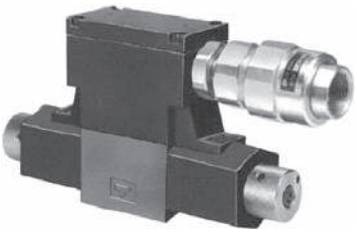
Interchangeability in Installation between Current and New Design

There are some changes in dimensions concerned sealing fitting, but there is interchangeability in installation between current and new design.

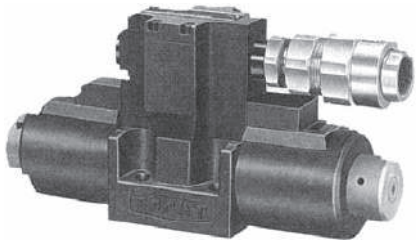
Please contact us for details about Explosion Proof (Flameproof) Type Solenoid Operated Directional Valves.

Explosion Proof (Increased Safety) Type Solenoid Operated Directional Valves

"As of electrical machinery which has no spark parts or hot section being ignition source, especially increase safety and avoid trouble - Increased Safety of Electrical Machinery with No Spark" is the point of explosion proof (increased safety) construction.
On this point of view, YUKEN's Explosion Proof (Increased Safety) Type Solenoid Operated Directional Valves increased safety about high temperature, isolation and locking mechanism.
But explosion proof in case of internal trouble is not guaranteed, so please decide propriety of use considering about surround conditions and maintenance management.
Please use at the danger zone 2 in general, not recommend to use at zone 1.



DSG-01



DSG-03

Type of Explosion Proof

e G 3

- G 3 — Ignition Temperature……Apply for the ignition temperature range over 200 °C to under 300 °C
- e — Explosion Proof (Increased Safety) Construction

Technology Institution of Industrial Safety Certificate Number

- DSG-01 …… With DC Solenoid : T48037
  With AC Solenoid : T48038
  (Rectifier Incorporated Type)
- DSG-03 …… With DC Solenoid : T47687
  With AC Solenoid : T47688
  (Rectifier Incorporated Type)

Please contact us for details about Explosion Proof (Increased Safety) Type Solenoid Operated Directional Valves.

Specifications

Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min^{-1}	Mass kg
DSG-01-3C✻-✻Y✻-51	63	31.5 〔Spool Type 60 Only 25〕	16	240 : With DC Solenoid 120 : With R Solenoid	2.8
DSG-01-2D2-✻Y✻-51					2.8
DSG-01-2B✻-✻Y✻-51					2.2
DSG-03-3C✻-✻Y✻-50	120	31.5 〔Spool Type 5 & 60 Only 25〕	16	240 : With DC Solenoid 120 : With R Solenoid	5.8
DSG-03-2D2-✻Y✻-50					5.8
DSG-03-2B✻-✻Y✻-50					4.4

★ Maximum flow indicates a ceiling flow to keep valve operation (changeover) normal.
It depends on the type of spool and operating condition, please contact us for details.

Solenoid Controlled Pilot Operated Directional Valves

● High Pressure / High Flow

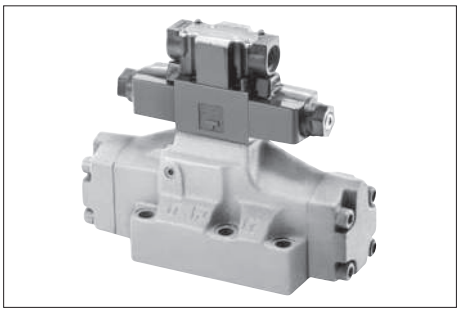
Size “04” valves can flow maximum 300 L/min, “06” valves can flow maximum 500 L/min and “10” valves can flow maximum 1100 L/min. High pressure along which high flow means compact system design.

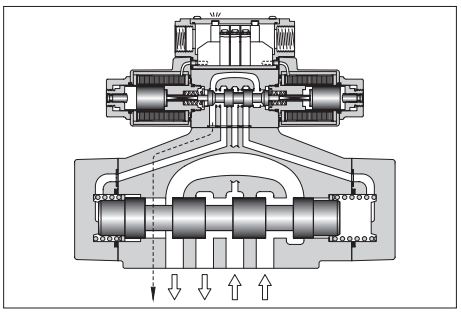
● Lower Pressure Drop

System energy saving increased as pressure drop of each valve has been greatly reduced.

● Easy Exchange Between Pilot and Drain Connection Type

It is easy to exchange between pilot and drain connection type (internal ⇔ external) by plug mounting on-off.





■ Specifications

Valve Type	Model Numbers	Max. Flow L/min	Max. Operating Pressure MPa	Max. Pilot Pressure MPa	Min.★2 Required Pilot Pres. MPa	Max. T-Line Back Pressure MPa		Max. Changeover Frequency min⁻¹			Mass kg
						Ext. Drain	Int. Drain	AC	DC	R	
Standard Type	DSHG-01-3C＊-＊-14	40	21	21	1.0	16	16	120	120	120	4.0 (3.2)★4
	DSHG-01-2B＊-＊-14										3.5 (2.7)★4
	DSHG-03-3C＊-＊-14	160	25	25	0.7	16	16	120	120	120	6.9
	DSHG-03-2N＊-＊-14										6.9
	DSHG-03-2B＊-＊-14										6.4
	(S-) DSHG-04-3C＊-＊-52	300	31.5	25	0.8	21	21	120	120	120	8.5
	(S-) DSHG-04-2N＊-＊-52										8.5
	(S-) DSHG-04-2B＊-＊-52										8.0
Shockless Type	(S-) DSHG-06-3C＊-＊-53	500	31.5	25	0.8★3	21	21	120	120	120	12.4
	(S-) DSHG-06-2N＊-＊-53										12.4
	(S-) DSHG-06-2B＊-＊-53										11.9
	(S-) DSHG-06-3H＊-＊-53			21	1.0			110	110	110	13.2
	(S-) DSHG-10-3C＊-＊-43	1100	31.5	25	1.0★3	21	21	120	120	100	45.0
	(S-) DSHG-10-2N＊-＊-43							100	100	100	45.0
	(S-) DSHG-10-2B＊-＊-43			21				60	60	50	44.5
	(S-) DSHG-10-3H＊-＊-43										52.9

★1. Maximum flow indicates a ceiling flow, refer to the List of Standard Models on pages E-74 - E-78 for details.
★2. Pilot pressure of internal pilot drain models must always exceed tank line back pressure by a minimum required pilot pressure.
★3. Min. pilot pressure of with pilot piston is 1.8 MPa.
★4. Only the mass of internal pilot and internal drain type valve is the value in parentheses.
● Please contact us about High Flow Valves (Flange Connecting Type).

■ Solenoid Ratings

Refer to relevant solenoid ratings described on the page below.

Model Numbers	Pilot Valve Model Numbers	Solenoid Ratings described on the page below
DSHG-01	DSG-01-＊＊＊-＊-70	E-23
DSHG-03		
(S-) DSHG-04		
(S-) DSHG-06		
(S-) DSHG-10		

Model Number Designation

S–	DSHG	–06	–2	B	2	A	–C2	–E	T
Type	Series Number	Valve Size	No. of Valve Positions	Spool-Spring Arrangement	Spool Type	Input Only Valves Using Neutral Position & Side Position	Models with Pilot Choke Valve	Pilot Connection	Drain Connection
None: Standard Type	DSHG : Solenoid Controlled Pilot Operated Directional Valve, Sub-plate Mounting	01	3	C : Spring Centered	2 , 3 , 4 40 , 5 , 60 7 , 9 , 10 11 , 12	———	———	None: Internal Pilot E : External Pilot	None: External Drain T : Internal Drain
			2	B : Spring Offset	2 , 3 , 4 40 , 7				
		03	3	C : Spring Centered	2 , 3 , 4 40 , 5 , 60 7 , 9 , 10 11 , 12	———	C1 : With C1 Choke C2 : With C2 Choke C1C2 : With C1 & C2 Choke		
			2	N : No-Spring	2 3 4 40 7				
				B : Spring Offset					
None: Standard Type S: Shockless Type		04	3	C : Spring Centered	2 , 4 , 40 60 , 10 , 12 (3 , 5 , 6 7 , 9 , 11) ★1	———			
			2	N : No-Spring	2 , 4 , 40 (3 , 7) ★1	A ★2			
				B : Spring Offset	2 , 4 , 40 (3 , 7) ★1	A ★2 B ★2			
		06	3	C : Spring Centered	2 , 4 , 40 60 , 10 , 12 (3 , 5 , 6 7 , 9 , 11) ★1	———			
				H : Pressure Centered ★3					
		10	2	N : No-Spring	2 , 4 , 40 (3 , 7) ★1	A ★2			
				B : Spring Offset	2 , 4 , 40 (3 , 7) ★1	A ★2 B ★2			

Note: In spool type “3”, “5”, “6”, “60”, and “7”, the combination applicable between pilot system and drain system is as described in the table below.

Pilot Connection	Drain Connection	Care in Application
Internal Pilot	External Drain	Hold back pressure in the tank line so that the difference between pilot pressure and drain pressure is always more than minimum required pilot pressure.
	Internal Drain (T)	Combination is not applicable.
External Pilot (E)	External Drain	No restrictions in the combination on us
	Internal Drain (T)	

Attention

In the table above, the symbols and numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore please confirm the time of delivery with us before ordering.

	–R2	–A100	–C	–H	–N	–53	–L
	Spool Control Modification (Omit if not required)	Coil Type	Manual Override of Pilot Valve	Built-in Orifice for Pilot Line	Type of Electrical Conduit Connection	Design Number	Models with Reverse Mtg. of Solenoid
	———	AC: A100 , A200 A120 , A240 DC: D12 , D24 D48 AC → DC : R100 , R200	None : Manual Override Pin C : Push Button & Lock Nut	———	None: Terminal Box Type N : Plug-in Connector Type N1 : Plug-in★4 Connector with Indicator Light	14	——— L : Input only for reverse mtg. of solenoid.
	R2 : With Stroke Adjustment, Both Ends RA : With Stroke Adjustment, Port "A" End RB : With Stroke Adjustment, Port "B" End			———		14	——— L : Input only for reverse mtg. of solenoid.
		AC: A100 , A200 A120 , A240 DC: D12 , D24 D48 AC → DC : R100 , R200		———		52	——— L : Input only for reverse mtg. of solenoid.
	R2 : With Stroke Adjustment, Both Ends RA : With Stroke Adjustment, Port "A" End RB : With Stroke Adjustment, Port "B" End P2 : With Pilot Piston, Both Ends PA : With Pilot Piston, Port "A" End PB : With Pilot Piston, Port "B" End			H : ★5 Input only for spool-spring arrangement "H" and with built-in orifice.		53	———
						43	L : Input only for reverse mtg. of solenoid.

★1. Shockless type (S-DSHG) are not available for spool type marked ( ).
★2. As for the details of the valve using the neutral position and the side position, please refer to page E-79. Furthermore, the spool types other than "2", "4", "40" (3, 7) are also available.
★3. In spool-spring arrangement "H" (Pressure centered models), the valves with stroke adjustment (R*) and pilot-piston (P*) are not available.
★4. N1 stands for Plug-in connector with solenoid indicator light. N1 is not available for R-type solenoids.
★5. In spool-spring arrangement "H" (pressure centered models), in case the pilot pressure is more than 10 MPa, please specify that the valve should have the built-in orifice to the pilot line.
★6. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

CSA Approved Solenoid Valve

Available to supply DSHG-06 series valve approved by the CSA (Canadian Standards Association). Consult us for details.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg	Figure for the dimensions described on the page below	Remarks
DSHG-01	DSGM-01-31	1/8	0.8	E-31	Common to those for DSG-01 Solenoid Operated Directional Valves
	DSGM-01X-31	1/4			
	DSGM-01Y-31	3/8			
DSHG-03	DSGM-03-40	3/8	3	E-47	As for Internal Pilot - Internal Drain Type, common to those for DSG-03 Solenoid Operated Directional Valves
	DSGM-03X-40	1/2			
	DSGM-03Y-40	3/4	4.7		
	DHGM-03Y-10	3/4	4.7	E-84	For External Pilot Type or External Drain Type
(S-) DSHG-04	DHGM-04-20	1/2	4.4	E-85	———
	DHGM-04X-20	3/4	4.1		
(S-) DSHG-06	DHGM-06-50	3/4	7.4	E-87	———
	DHGM-06X-50	1			
(S-) DSHG-10	DHGM-10-40	1 1/4	21.5	E-87	———
	DHGM-10X-40	1 1/2			

● Sub-plates are available. Specify the sub-plate model number from the table above.
When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

Accessories

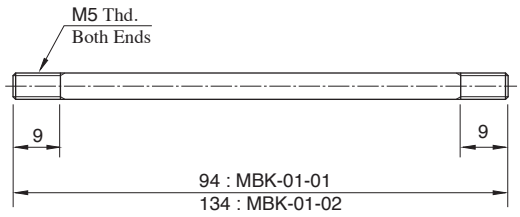
Mounting Bolt

Model Numbers	Mounting Bolt	Qty.	Tightening Torque Nm
DSHG-01	Bolt Kits : MBK-01-01-30★1 / MBK-01-02-30★2	1set	5 - 6
DSHG-03	Socket Head Cap Bolt : M6×35L	4	12 - 15
(S-) DSHG-04	Socket Head Cap Bolt : M6×45L	2	12 - 15
	Socket Head Cap Bolt : M10×50L	4	58 - 72
(S-) DSHG-06	Socket Head Cap Bolt : M12×60L	6	100 - 123
(S-) DSHG-10	Socket Head Cap Bolt : M20×75L	6	473 - 585

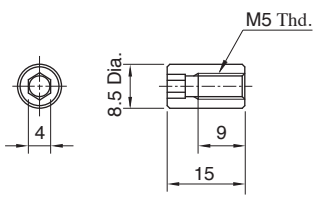
★1. For Internal Pilot-Internal Drain.
★2. For External Pilot-External Drain, External Pilot-Internal Drain and Internal Pilot-External Drain.

Bolt Kits Details

● Stud Bolt .....4 Pcs.



● Nut .....4 Pcs.



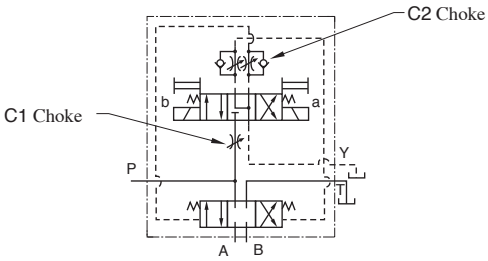
Options

Models with Pilot Choke Adjustment (C1, C2, C1C2)

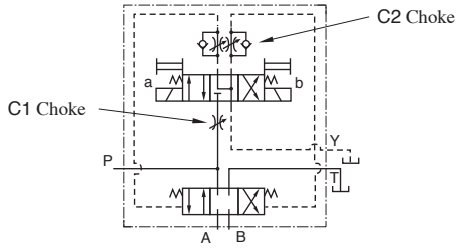
When the adjustment screw is turned clockwise, changeover speed of the main spool becomes slow. In case of the spring centered valves in particular, making slow of the returning speed of the main spool to the neutral position is possible with a C2 choke valve. These choke valves can be used in combination with the valves of spring centered, no-spring, offset, pressure centered and the valves with stroke adjustment.

Graphic Symbols (Ex.: Spring Centered)

DSHG-01, 06, 10



DSHG-03, 04

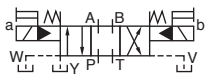


Models with Pilot Piston (P2, PA, PB)

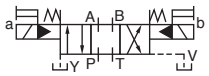
The valves with a pilot piston can be used when the high speed changeover of the main spool is required. However, in case of spring centered valves, there is no change in the returning speed of the main spool to the neutral position even with the pilot piston.

Graphic Symbols (Ex.: Spring Centered)

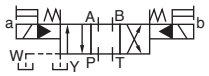
"P2" Models



"PA" Models



"PB" Models

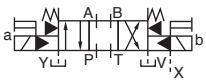


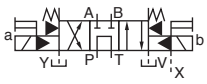
Pressure Centered Models (3H*)

The pressure centered type can be used when the returning of the main spool to the neutral position is required to be firmly.

Graphic Symbols (Ex.: External Pilot-External Drain)

(Only for 3H6, 3H60)



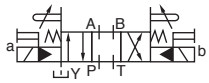


Models with Stroke Adjustment (R2, RA, RB)

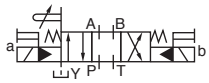
When the adjustment screw is screwed in , the main spool stroke becomes short and flow rate reduces.

Graphic Symbols (Ex.: Spring Centered)

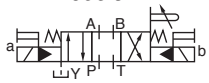
"R2" Models



"RA" Models



"RB" Models



Additional Mass of Options

Add the mass described below to the mass of standard models on page E-69, if options are required.

(kg)

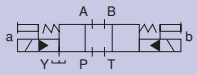
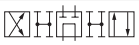
Model Numbers	Models with Pilot Choke Adj.		Models with Pilot Piston		Models with Stroke Adj.	
	C1, C2	C1C2	P2	PA PB	R2	RA RB
DSHG–03	0.65	1.3	—	—	0.6	0.3
(S–) DSHG–04	0.65	1.3	—	—	1.0	0.5
(S–) DSHG–06	0.65	1.3	1.0	0.5	1.2	0.6
(S–) DSHG–10	0.65	1.3	3.6	1.8	3.7	1.85

Options on Pilot Valve

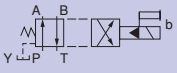
The same options to DSG-01 series valves are available.
Please refer to page E-23 for the details.

List of Standard Models (DSHG-01)

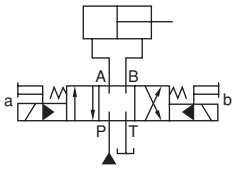
Three Positions

Spool Type	Spring Centered			
	Graphic Symbol 	Maximum Flow L/min		
	Model Numbers	7 MPa	14 MPa	21 MPa
"2"	DSHG-01-3C2	40	40	40
"3"	DSHG-01-3C3	40	40	40
"4"	DSHG-01-3C4	40	40	40
"40"	DSHG-01-3C40	40	40	40
"5"	DSHG-01-3C5	40	40	40
"60" 	DSHG-01-3C60	40	40	40
"7"	DSHG-01-3C7	40	40	40
"9"	DSHG-01-3C9	40	40	40
"10"	DSHG-01-3C10	40	40	40
"11"	DSHG-01-3C11	40	40	40
"12"	DSHG-01-3C12	40	40	40

Two Positions

Spool Type	Spring Offset			
	Graphic Symbol 	Maximum Flow L/min		
	Model Numbers	7 MPa	14 MPa	21 MPa
"2"	DSHG-01-2B2	40	40	40
"3"	DSHG-01-2B3	40	40	40
"4"	DSHG-01-2B4	40	40	40
"40"	DSHG-01-2B40	40	40	40
"7"	DSHG-01-2B7	40	40	40

Notes) 1. Max. flow shows value at pilot pressure more than 1 MPa.
2. Max. flow in the table above represents the value in the flow condition of P → A → B → T (or P → B → A → T) as shown in the circuit diagram below. In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.



List of Standard Models (DSHG-03)

Three Positions

Spool Type	Spring Centered			
	Graphic Symbol	Maximum Flow L/min		
		7 MPa	14 MPa	25 MPa
	Model Numbers			
"2"	DSHG-03-3C2	160	85 160	60 95
"3"	DSHG-03-3C3	160	160	160
"4"	DSHG-03-3C4	160	85 160	60 95
"40"	DSHG-03-3C40	160	85 160	60 95
"5"	DSHG-03-3C5	160	85 160	60 95
"60"	DSHG-03-3C60	160	160	125 160
"7"	DSHG-03-3C7	160	85 160	60 95
"9"	DSHG-03-3C9	160	85 160	60 95
"10"	DSHG-03-3C10	160	85 160	60 95
"11"	DSHG-03-3C11	160	85 160	60 95
"12"	DSHG-03-3C12	160	85 160	60 95

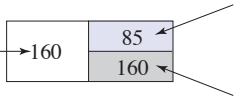
Two Positions

Spool Type	No-Spring				Spring Offset			
	Graphic Symbol	Maximum Flow L/min			Graphic Symbol	Maximum Flow L/min		
		7 MPa	14 MPa	25 MPa		7 MPa	14 MPa	25 MPa
	Model Numbers				Model Numbers			
"2"	DSHG-03-2N2	160	160	85 160	DSHG-03-2B2	160	160	85 160
"3"	DSHG-03-2N3	160	160	85 160	DSHG-03-2B3	160	160	85 160
"4"	DSHG-03-2N4	160	160	85 160	DSHG-03-2B4	160	160	85 160
"40"	DSHG-03-2N40	160	160	85 160	DSHG-03-2B40	160	160	85 160
"7"	DSHG-03-2N7	160	160	85 160	DSHG-03-2B7	160	160	85 160

Notes: 1. The relation between max. flow and pilot pressure in the table above is as shown below.

(Example)

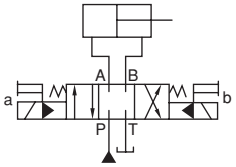
Maximum flow rate is constant regardless of pilot pressure.
Pilot Pressure more than 0.7 MPa.



Pilot Pressure at 0.7 MPa

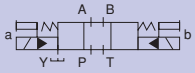
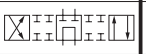
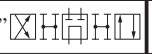
Pilot Pressure at 1 MPa

2. Max. flow in the table above represents the value in the flow condition of P → A → B → T (or P → B → A → T) as shown in the circuit diagram right.
In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.

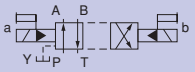
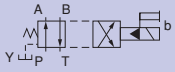


List of Standard Models (DSHG-04/S-DSHG-04)

Three Positions

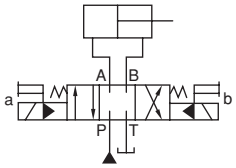
Spool Type	Spring Centered				
	Graphic Symbol 	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2"	DSHG-04-3C2	300	300	200	145
	S-DSHG-04-3C2	300	250	120	110
"3"	DSHG-04-3C3	300	300	300	300
"4"	DSHG-04-3C4	300	300	250	165
	S-DSHG-04-3C4	300	300	140	110
"40"	DSHG-04-3C40	300	300	200	145
	S-DSHG-04-3C40	300	250	120	110
"5"	DSHG-04-3C5	255	250	245	235
"6" 	DSHG-04-3C6	300	260	245	235
"60" 	DSHG-04-3C60 S-DSHG-04-3C60	300	300	300	300
"7"	DSHG-04-3C7	300	300	200	145
"9"	DSHG-04-3C9	300	300	280	250
"10"	DSHG-04-3C10	300	300	200	150
	S-DSHG-04-3C10	300	250	120	110
"11"	DSHG-04-3C11	300	260	160	140
"12"	DSHG-04-3C12	300	280	170	135
	S-DSHG-04-3C12	300	250	120	110

Two Positions

Spool Type	No-Spring					Spring Offset				
	Graphic Symbol 	Maximum Flow L/min				Graphic Symbol 	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2"	(S-) DSHG-04-2N2	300	300	300	300	(S-) DSHG-04-2B2	300	300	300	300
"3"	DSHG-04-2N3	300	300	300	300	DSHG-04-2B3	300	300	300	300
"4"	(S-) DSHG-04-2N4	300	300	300	300	(S-) DSHG-04-2B4	300	300	300	300
"40"	(S-) DSHG-04-2N40	300	300	300	300	(S-) DSHG-04-2B40	300	300	300	300
"7"	DSHG-04-2N7	300	300	300	300	DSHG-04-2B7	300	300	300	300

Notes: 1. Max. flow described above shows value at pilot pressure more than 0.8 MPa.

2. Max. flow in the table above represents the value in the flow condition of P → A → B → T (or P → B → A → T) as shown in the circuit diagram below.
In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.



List of Standard Models (DSHG-06/S-DSHG-06)

Three Positions

Spool Type	Spring Centered					Pressure Centered				
	Graphic Symbol	Maximum Flow L/min				Graphic Symbol	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2"	(S-) DSHG-06-3C2	500	500	410 500	310 410	(S-) DSHG-06-3H2	500	500	500	420 500
"3"	DSHG-06-3C3	500	500	460	370	DSHG-06-3H3	500	500	500	500
"4"	(S-) DSHG-06-3C4	500	500	410 500	310 500	(S-) DSHG-06-3H4	500	500	500	420 500
"40"	(S-) DSHG-06-3C40	500	500	410 500	310 500	(S-) DSHG-06-3H40	500	500	500	420 500
"5"	DSHG-06-3C5	500	500	425	350	DSHG-06-3H5	500	500	500	470 500
"6"	DSHG-06-3C6	475	390	300	230	DSHG-06-3H6	500	500	500	420 500
"60"	(S-) DSHG-06-3C60	475	420	340	280	(S-) DSHG-06-3H60	500	500	500	420 500
"7"	DSHG-06-3C7	500	500	450	360	DSHG-06-3H7	500	500	500	500
"9"	DSHG-06-3C9	500	500	450 500	360 500	DSHG-06-3H9	500	500	500	500
"10"	(S-) DSHG-06-3C10	500	500	410 500	310 500	(S-) DSHG-06-3H10	500	500	500	460 500
"11"	DSHG-06-3C11	500	500	410 500	310 500	DSHG-06-3H11	500	500	500	460 500
"12"	(S-) DSHG-06-3C12	500	500	410 500	310 500	(S-) DSHG-06-3H12	500	500	500	460 500

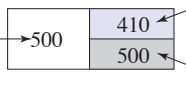
Two Positions

Spool Type	No-Spring					Spring Offset				
	Graphic Symbol	Maximum Flow L/min				Graphic Symbol	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2"	(S-) DSHG-06-2N2	500	500	500	500	(S-) DSHG-06-2B2	500	500	500	500
"3"	DSHG-06-2N3	500	500	500	500	DSHG-06-2B3	500	500	500	500
"4"	(S-) DSHG-06-2N4	500	500	500	500	(S-) DSHG-06-2B4	500	500	500	500
"40"	(S-) DSHG-06-2N40	500	500	500	500	(S-) DSHG-06-2B40	500	500	500	500
"7"	DSHG-06-2N7	500	500	500	500	DSHG-06-2B7	500	500	500	500

Notes: 1. The relation between max. flow and pilot pressure in the table above is as shown below.

(Example)

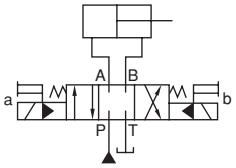
Maximum flow rate is constant regardless of pilot pressure.
(Pilot Pressure more than 0.8 MPa. In case pressure centered models, pilot pressure is more than 1 MPa.)



Pilot Pressure at 0.8 MPa.
(In case pressure centered models, pilot pressure is more than 1 MPa.)

Pilot Pressure at 1.5 MPa

2. Max. flow in the table above represents the value in the flow condition of P → A → B → T (or P → B → A → T) as shown in the circuit diagram right.
In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.



List of Standard Models (DSHG-10/S-DSHG-10)

Three Positions

Spool Type	Spring Centered					Pressure Centered				
	Graphic Symbol	Maximum Flow L/min				Graphic Symbol	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2"	(S-) DSHG-10-3C2	1100	1100	950 1100	750 1100	(S-) DSHG-10-3H2	1100	1100	1100	970 1100
"3"	DSHG-10-3C3	1100	1100	1060	895	DSHG-10-3H3	1100	1100	1100	1050 1100
"4"	(S-) DSHG-10-3C4	1100	1100	950 1100	750 1100	(S-) DSHG-10-3H4	1100	1100	1100	970 1100
"40"	(S-) DSHG-10-3C40	1100	1100	950 1100	750 1100	(S-) DSHG-10-3H40	1100	1100	1100	970 1100
"5"	DSHG-10-3C5	1100	1100	980	850	DSHG-10-3H5	1100	1100	1100	1000 1100
"6"	DSHG-10-3C6	1050	880	700	570	DSHG-10-3H6	1100	1100	1100	970 1100
"60"	(S-) DSHG-10-3C60	1050	940	785	680	(S-) DSHG-10-3H60	1100	1100	1100	970 1100
"7"	DSHG-10-3C7	1100	1100	1040 1100	870 1100	DSHG-10-3H7	1100	1100	1100	1100
"9"	DSHG-10-3C9	1100	1100	1040	870	DSHG-10-3H9	1100	1100	1100	1100
"10"	(S-) DSHG-10-3C10	1100	1100	950 1100	750 1100	(S-) DSHG-10-3H10	1100	1100	1100	1060 1100
"11"	DSHG-10-3C11	1100	1100	950 1100	750 1100	DSHG-10-3H11	1100	1100	1100	1060 1100
"12"	(S-) DSHG-10-3C12	1100	1100	950 1100	750 1100	(S-) DSHG-10-3H12	1100	1100	1100	1060 1100

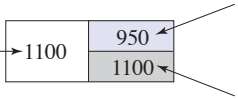
Two Positions

Spool Type	No-Spring					Spring Offset				
	Graphic Symbol	Maximum Flow L/min				Graphic Symbol	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2"	(S-) DSHG-10-2N2	1100	1100	1100	1100	(S-) DSHG-10-2B2	1100	1100	1100	1100
"3"	DSHG-10-2N3	1100	1100	1100	1100	DSHG-10-2B3	1100	1100	1100	1100
"4"	(S-) DSHG-10-2N4	1100	1100	1100	1100	(S-) DSHG-10-2B4	1100	1100	1100	1100
"40"	(S-) DSHG-10-2N40	1100	1100	1100	1100	(S-) DSHG-10-2B40	1100	1100	1100	1100
"7"	DSHG-10-2N7	1100	1100	1100	1100	DSHG-10-2B7	1100	1100	1100	1100

Notes) 1. The relation between max. flow and pilot pressure in the table above is as shown below.

(Example)

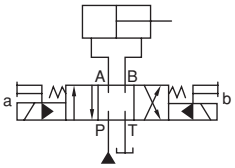
Maximum flow rate is constant regardless of pilot pressure.
Pilot Pressure more than 1 MPa.



Pilot Pressure at 1 MPa

Pilot Pressure at 1.5 MPa

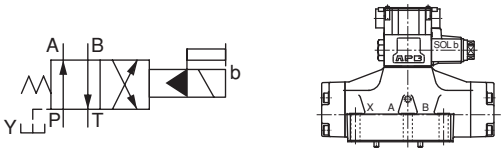
2. Max. flow in the table above represents the value in the flow condition of P → A → B → T (or P → B → A → T) as shown in the circuit diagram right.
In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.



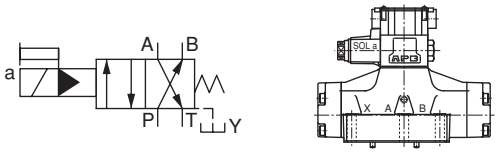
Reverse Mounting of Solenoid

In spring offset type, it is a standard configuration that the solenoid is mounted onto the valve in the SOL b position (side). However, in this particular spool-spring arrangement, the mounting of the solenoid onto the valve in the reverse position - SOL a side - is also available. The graphic symbol for this reverse mounting is as shown below.

As for the valve type 2B＊A and 2B＊B, please refer to the explanation under the heading of "Valves Using Neutral Position and Side Position" given below.



Standard Mtg. of Solenoid

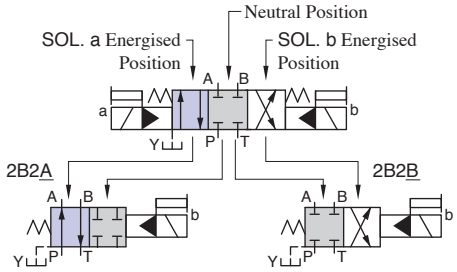


Reverse Mtg. of Solenoid

Valves Using Neutral Position and Side Position

Besides the use of the standard 2-position valves aforementioned in the "List of Standard Models", the 3-position valves also can be used as the 2-position valves using the two of their three positions. In this case, there are two kinds of the valve available. One is the valve using the neutral position and SOL a position (2B＊A) and another is the valve using the neutral position and SOL b position (2B＊B).

(Example) In case of Spool Type "2"



"A"：Use of Neutral and SOL. a Energised Position

"B"：Use of Neutral and SOL. b Energised Position

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
04 DSHG-06-2B＊A 10		
(S-) DSHG-＊-2B2A		
DSHG-＊-2B3A		
(S-) DSHG-＊-2B4A		
(S-) DSHG-＊-2B40A		
DSHG-＊-2B5A		
DSHG-＊-2B6A		
(S-) DSHG-＊-2B60A		
DSHG-＊-2B7A		
DSHG-＊-2B9A		
(S-) DSHG-＊-2B10A		
DSHG-＊-2B11A		
(S-) DSHG-＊-2B12A		

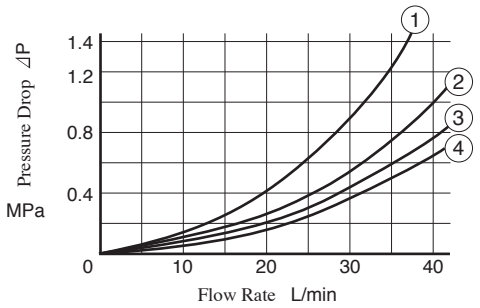
Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
04 DSHG-06-2B＊B 10		
(S-) DSHG-＊-2B2B		
DSHG-＊-2B3B		
(S-) DSHG-＊-2B4B		
(S-) DSHG-＊-2B40B		
DSHG-＊-2B5B		
DSHG-＊-2B6B		
(S-) DSHG-＊-2B60B		
DSHG-＊-2B7B		
DSHG-＊-2B9B		
(S-) DSHG-＊-2B10B		
DSHG-＊-2B11B		
(S-) DSHG-＊-2B12B		

Model Numbers	Graphic Symbols
	Standard Mtg. Type
04 DSHG-06-2N＊A 10	
(S-) DSHG-＊-2N2A	
DSHG-＊-2N3A	
(S-) DSHG-＊-2N4A	
(S-) DSHG-＊-2N40A	
DSHG-＊-2N5A	
DSHG-＊-2N6A	
(S-) DSHG-＊-2N60A	
DSHG-＊-2N7A	
DSHG-＊-2N9A	
(S-) DSHG-＊-2N10A	
DSHG-＊-2N11A	
(S-) DSHG-＊-2N12A	

Pressure Drop

Pressure drop curves based on viscosity of 35 mm²/s and specific gravity of 0.850.

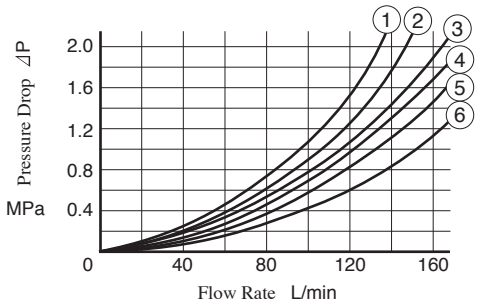
DSHG–01



DSHG–01

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	③	②	③	②	—	7	③	②	③	②	—
3	④	②	④	②	②	9	④	②	④	②	—
4	③	②	③	②	—	10	③	②	③	②	—
40	③	②	③	②	—	11	③	②	③	②	—
5	③	②	③	②	①	12	③	②	③	②	—
60	③	②	③	②	①						

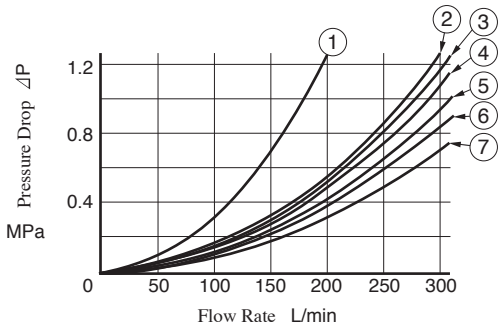
DSHG–03



DSHG–03

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	③	③	④	④	—	7	③	③	④	④	—
3	⑤	⑤	⑤	⑥	④	9	⑥	③	⑥	④	—
4	③	⑤	④	⑥	—	10	③	⑤	④	④	—
40	③	③	④	④	—	11	⑥	③	④	④	—
5	⑥	③	④	⑥	②	12	③	③	④	⑥	—
60	④	③	④	④	①						

DSHG–04、S–DSHG–04



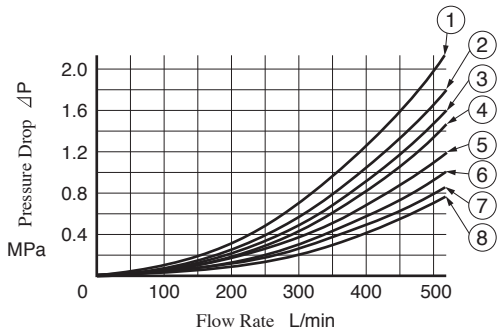
DSHG–04

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑤	④	⑤	⑥	—	60	⑦	⑤	⑦	⑦	②
3	⑤	③	⑤	⑤	⑦	7	⑤	④	⑤	⑥	—
4	⑤	③	⑤	⑤	—	9	⑤	④	⑤	⑥	—
40	⑤	④	⑤	⑥	—	10	⑤	②	⑤	⑥	—
5	⑦	④	⑤	⑤	⑤	11	⑥	④	⑤	⑥	—
6	⑤	③	⑤	⑥	①	12	⑤	④	⑤	⑤	—

S–DSHG–04

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	②	②	②	④	—	60	⑥	④	⑥	⑦	②
4	②	③	②	⑤	—	10	②	②	②	④	—
40	②	④	②	⑥	—	12	②	②	②	⑤	—

● DSHG–06、S–DSHG–06



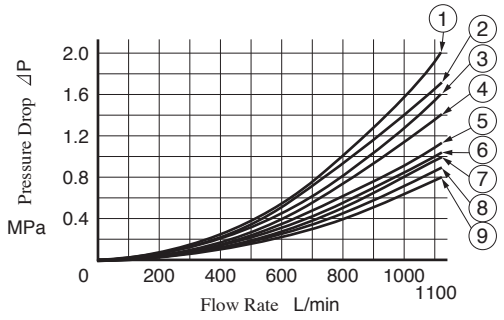
● DSHG–06

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑧	⑤	⑧	⑦	—	60	⑥	⑤	⑥	⑦	①
3	⑥	④	⑥	⑦	④	7	⑥	④	⑥	⑦	—
4	⑧	⑤	⑧	⑦	—	9	⑥	⑤	⑥	⑦	—
40	⑧	⑤	⑧	⑦	—	10	⑧	⑤	⑧	⑦	—
5	⑧	④	⑤	⑦	①	11	⑧	④	⑤	⑦	—
6	⑤	③	⑤	④	①	12	⑧	⑤	⑧	⑦	—

● S–DSHG–06

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑥	①	⑥	②	—	60	⑥	②	⑥	③	①
4	⑥	②	⑥	②	—	10	⑧	⑤	⑧	⑦	—
40	⑧	⑤	⑧	⑦	—	12	⑧	⑤	⑧	⑦	—

● DSHG–10、S–DSHG–10



● DSHG–10

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑨	⑥	⑨	⑧	—	60	⑧	⑤	⑧	⑤	③
3	⑦	⑥	⑦	⑦	⑤	7	⑦	⑥	⑦	⑦	—
4	⑨	⑥	⑨	⑥	—	9	⑦	⑥	⑦	⑧	—
40	⑨	⑥	⑨	⑧	—	10	⑨	⑤	⑨	⑧	—
5	⑨	⑥	⑧	⑥	①	11	⑨	⑥	⑧	⑦	—
6	⑤	③	⑤	④	②	12	⑨	⑦	⑨	⑥	—

● S–DSHG–10

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑧	③	⑧	④	—	60	⑧	④	⑧	④	②
4	⑧	⑤	⑧	⑥	—	10	⑨	⑤	⑨	⑧	—
40	⑨	⑥	⑨	⑧	—	12	⑨	⑦	⑨	⑥	—

● For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

● For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.
⊿P' = ⊿P(G'/0.850)

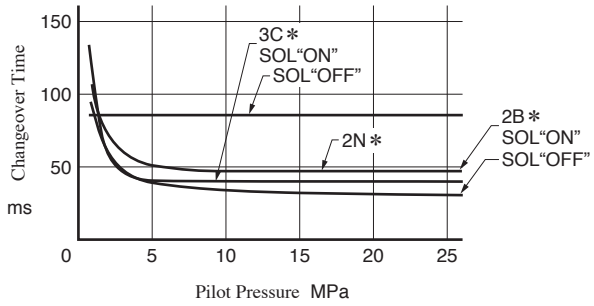
Typical Changeover Time

Changeover time varies according to oil viscosity, spool type and hydraulic circuit.

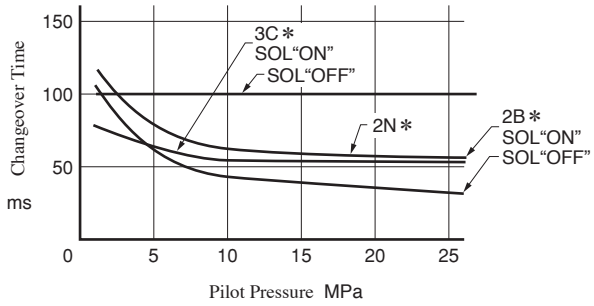
Test Conditions

Coil Type : D✻ (Models with DC solenoids)
Voltage : Rated Voltage
Oil Viscosity : 35 mm²/s

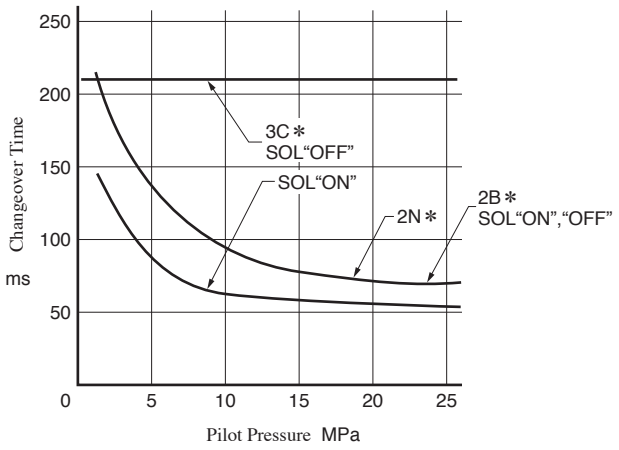
● DSHG-04



● DSHG-06



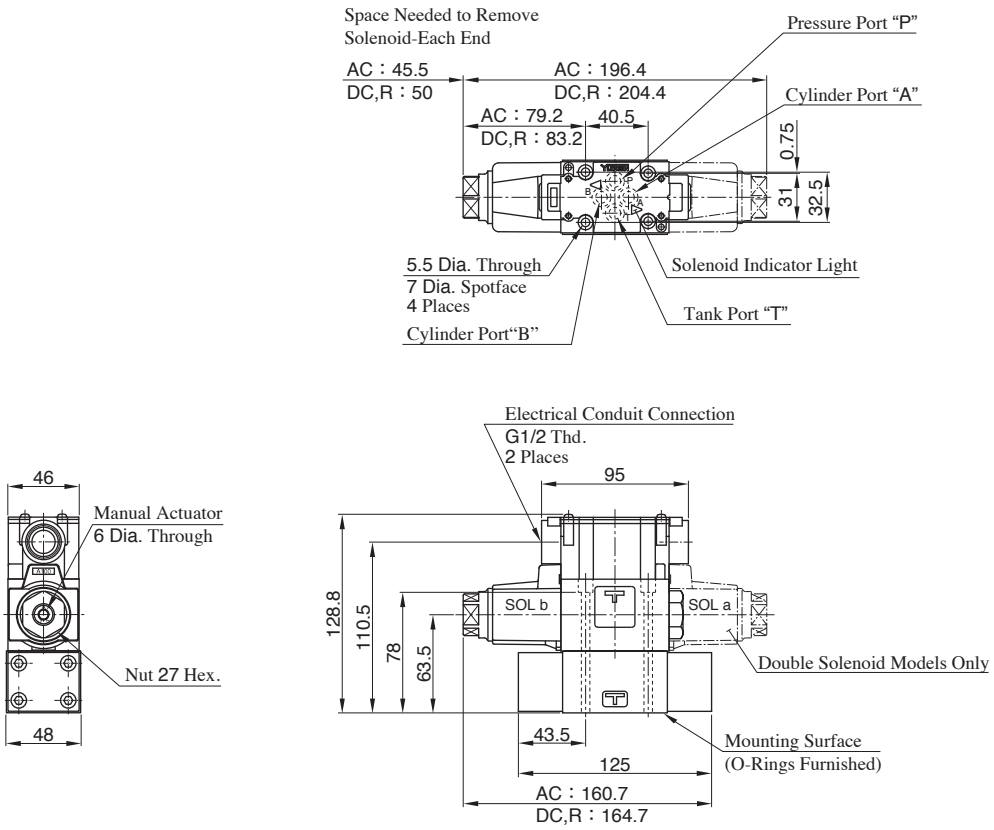
● DSHG-10



Mounting Surface: ISO 4401-03-02-0-05

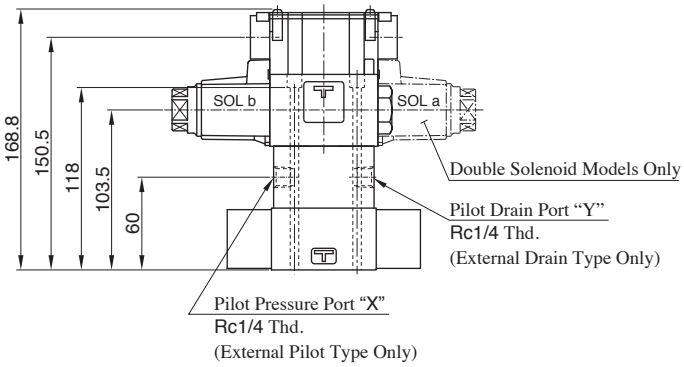
DSHG-01

● Internal Pilot - Internal Drain



Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.

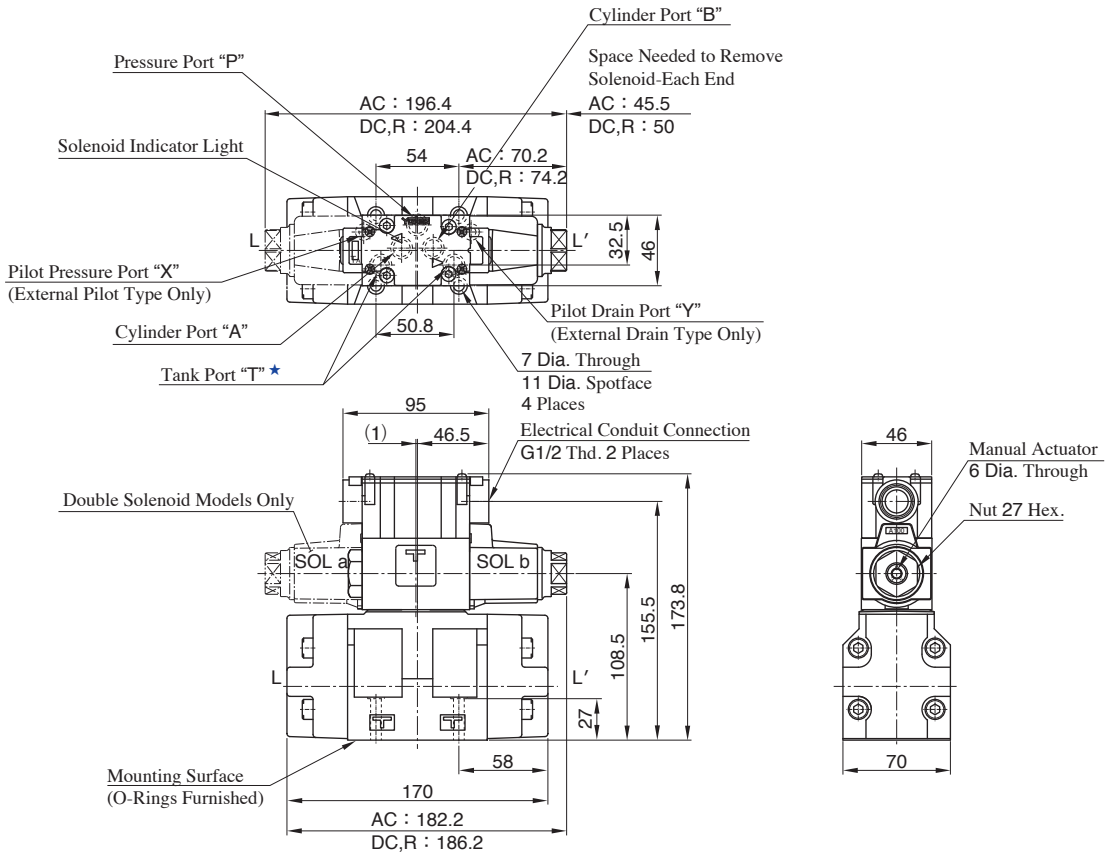
● External Pilot - External Drain
● External Pilot - Internal Drain
● Internal Pilot - External Drain



● For other dimensions, refer to "Internal Pilot / Internal Drain Type".

Mounting Surface: ISO 4401-05-05-0-05

DSHG-03

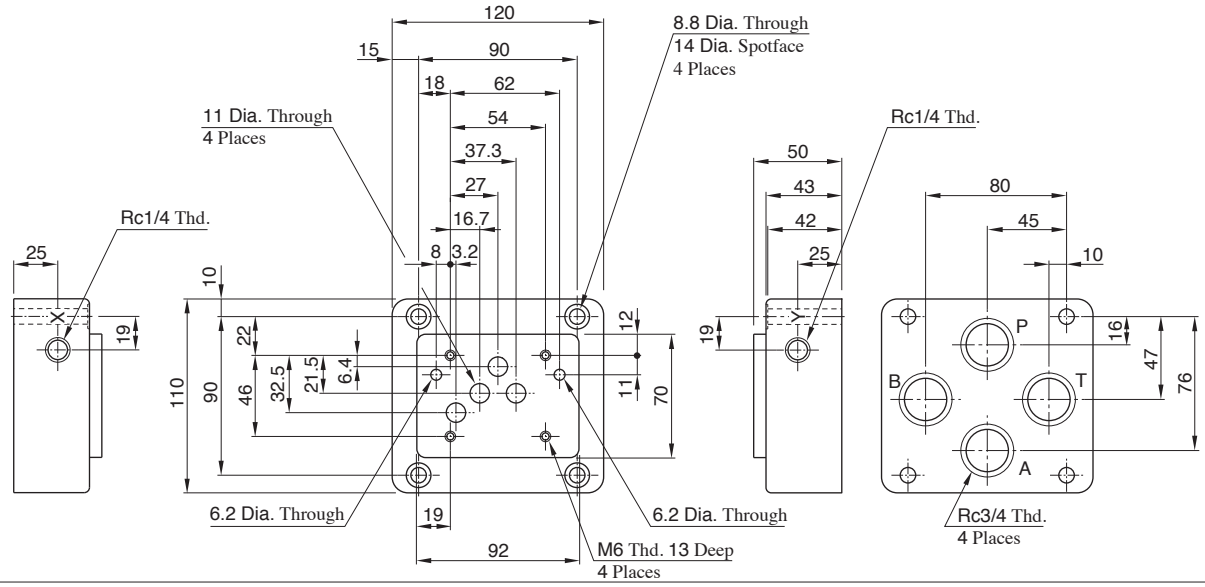


★Of the two of tank port "T", the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.

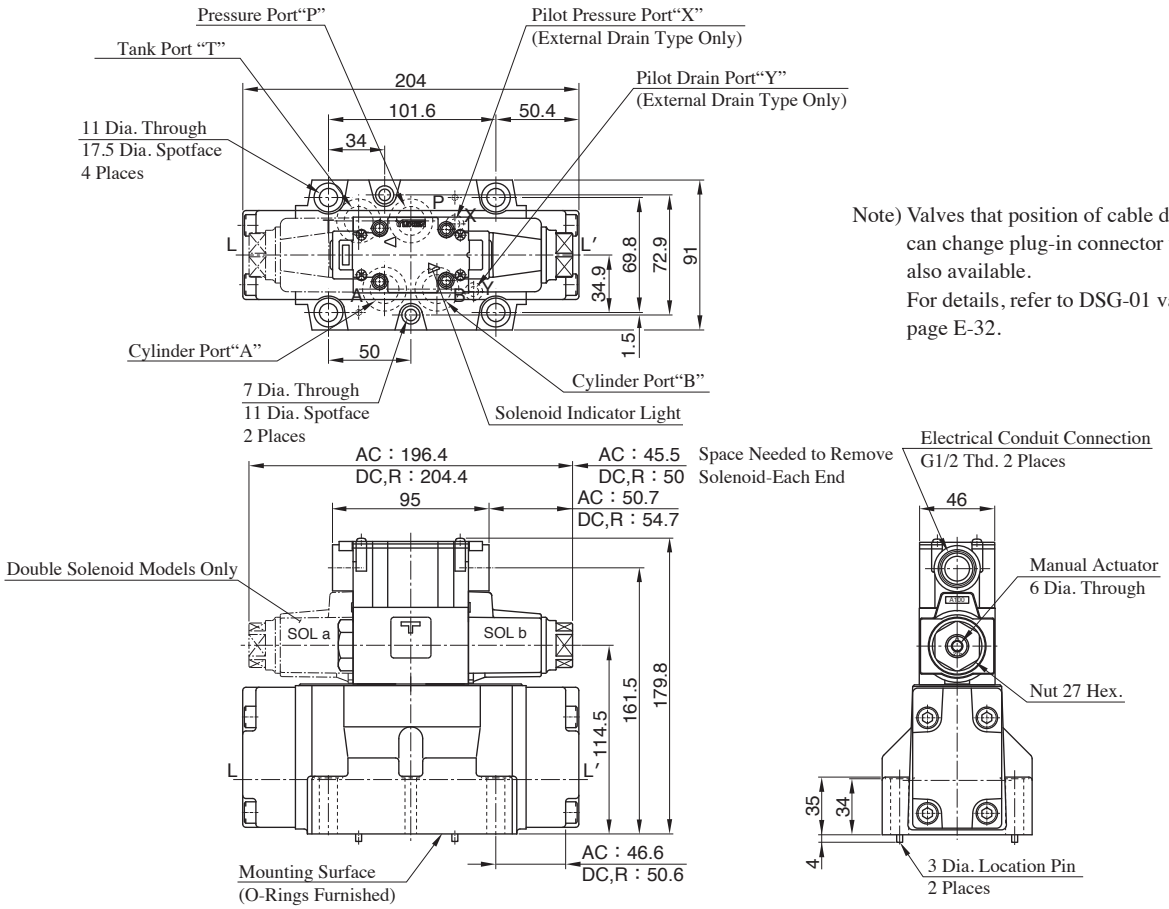
■ Sub-plate

DHGM-03Y



(S-) DSHG-04

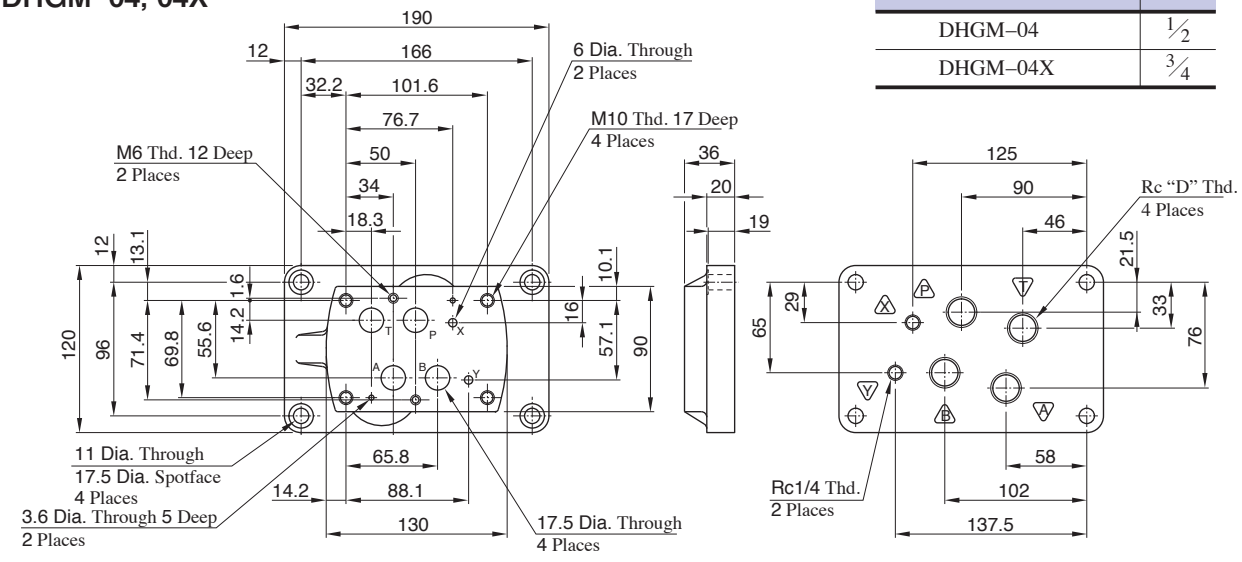
Mounting Surface: ISO 4401-07-07-0-05



Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.

■ Sub-plate
DHGM-04, 04X

Sub-plate Model Numbers	D
DHGM-04	1/2
DHGM-04X	3/4

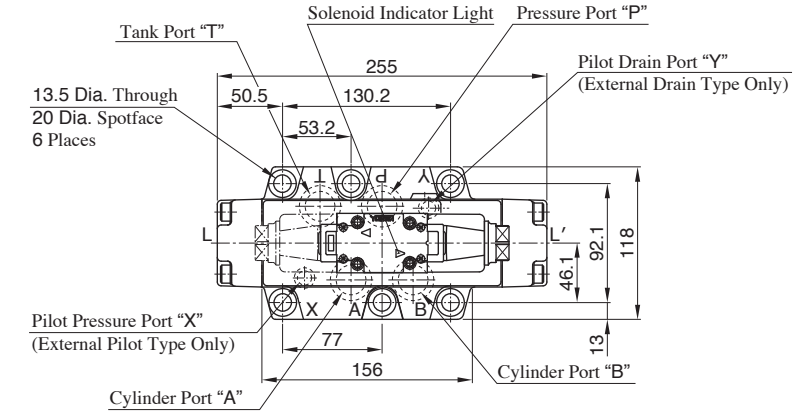


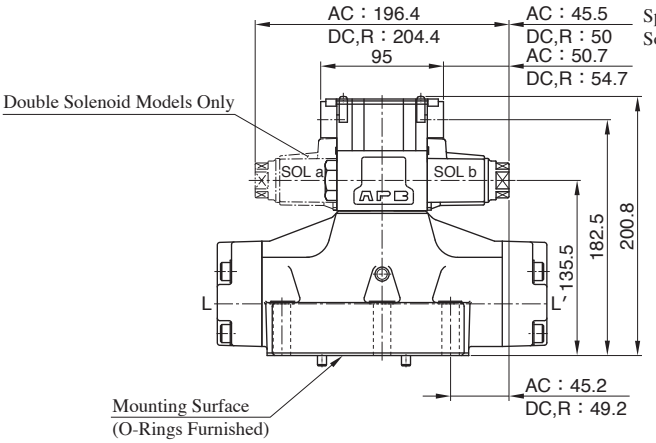
Note) Use Type of Port"X"and "Y"

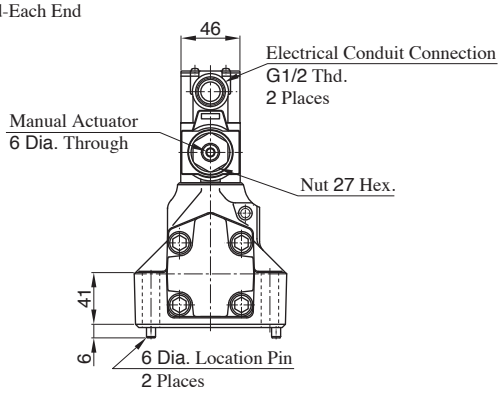
Pilot Pressure Port "X"	Drain Port "Y"
Used only on external pilot type valves. To be plugged on internal pilot type valves.	Used as drain port only on external drain type valves. To be plugged on internal drain type valves.

(S-) DSHG-06

Mounting Surface: ISO 4401-08-08-0-05



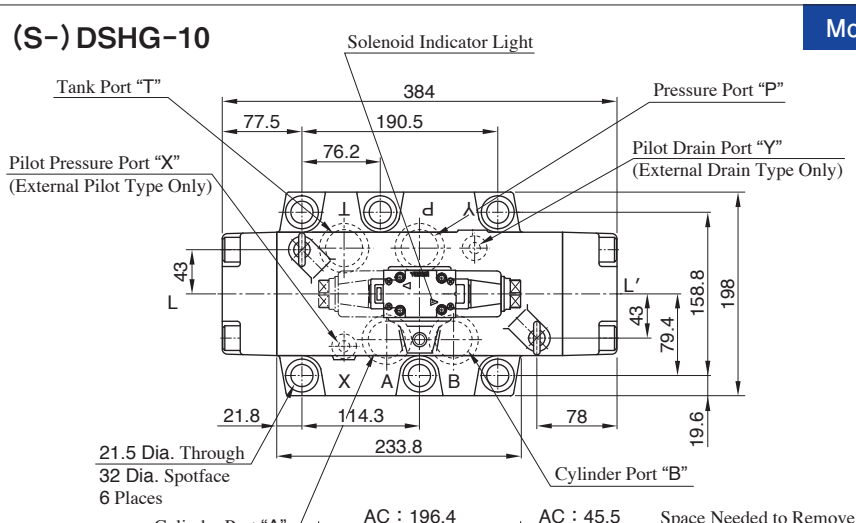


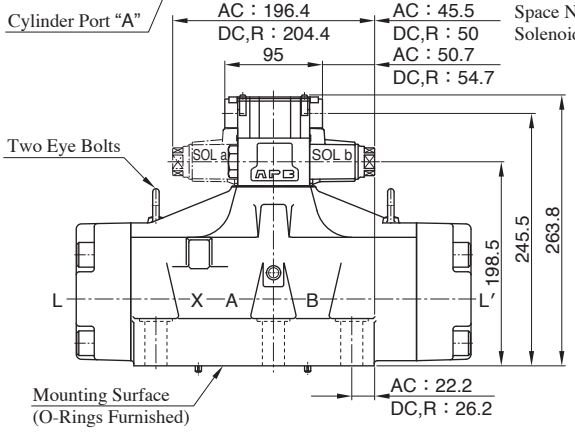


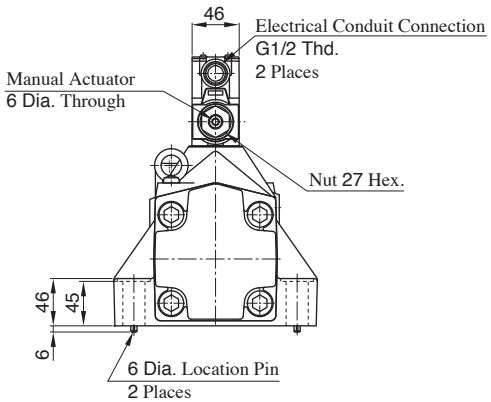
Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.

(S-) DSHG-10

Mounting Surface: ISO 4401-10-09-0-05



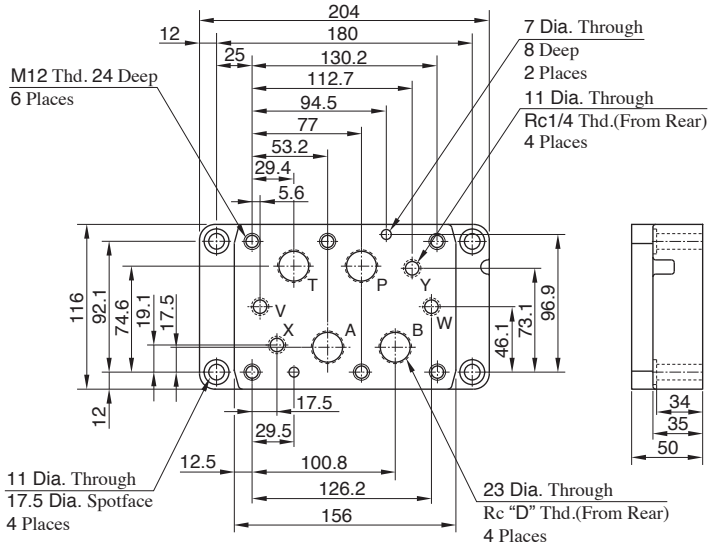




Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.

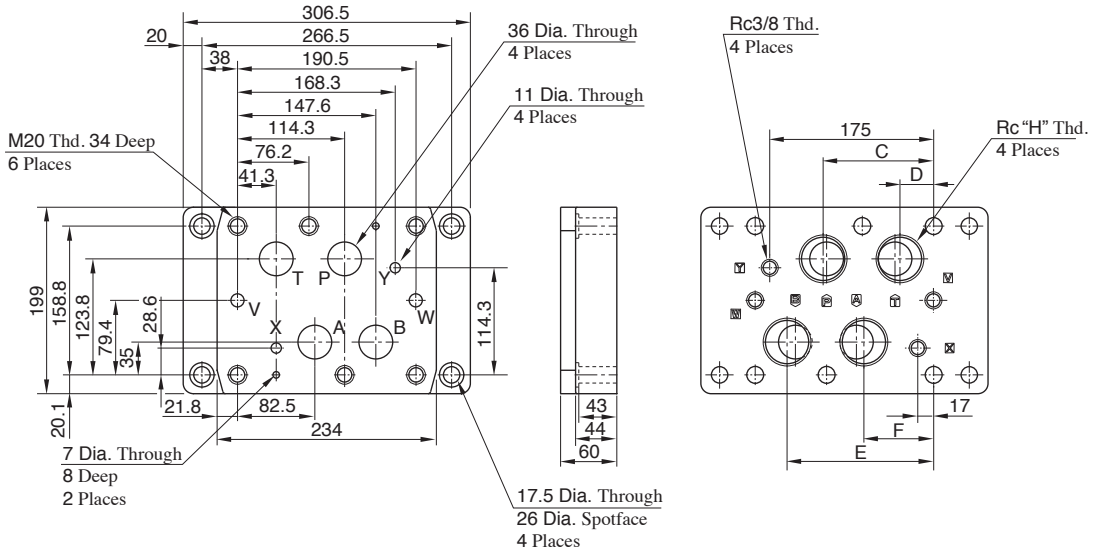
Sub-plate

DHGM-06, 06X



Sub-plate Model Numbers	"D"
DHGM-06	3/4
DHGM-06X	1

DHGM-10, 10X



Sub-plate Model Numbers	C	D	E	F	H
DHGM-10	114	41	147.5	82.5	1 1/4
DHGM-10X	118	36	156.5	74.5	1 1/2

Note) Use Type of Port "X", "Y", "V" and "W"

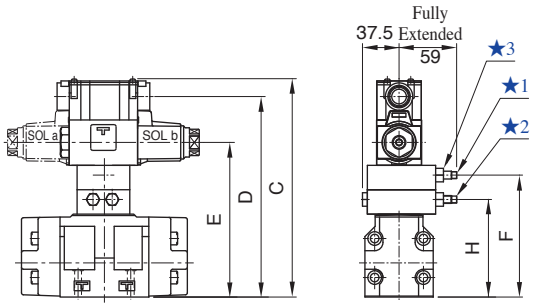
Valve Types	Pilot Pres. Port"X"	Pilot Drain Port"Y"	Drain Port"V"	Drain Port"W"
Spring Centered, No-Spring, Spring Offset	Used only on external pilot type valves. To be plugged on internal pilot type valves.	Used as drain port only on external drain type valves. To be plugged on★ internal drain type valves.	Not used (plug is not required)	
Pressure Centered			Used	Not used (plug is not required)
With Pilot Piston, Both Ends			Used	Used
With Pilot Piston, Port "A" End			Used	Not used (plug is required)
With Pilot Piston, Port "B" End			Not used (plug is required)	Used

★ As the thread is provided on the body, plug either port on the sub-plate or port on the body.

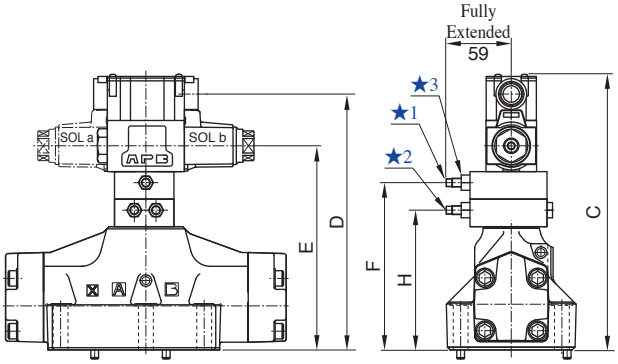
Options

Models with Pilot Choke Valve

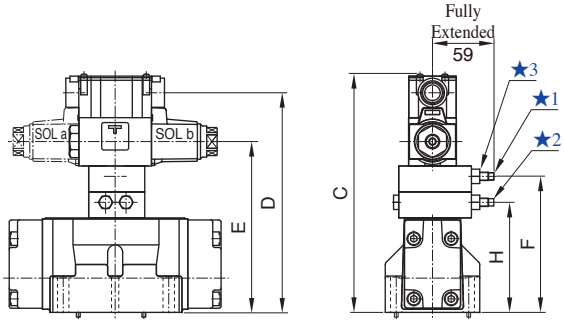
● DSHG-03-＊＊＊-C1, C2, C1C2



● (S-) DSHG-$\frac{06}{10}$-＊＊＊-C1, C2, C1C2



● (S-) DSHG-04-＊＊＊-C1, C2, C1C2



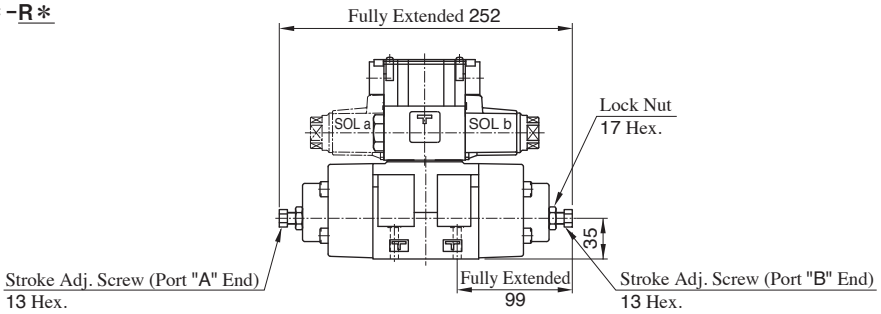
★1. "C1" Choke (Meter-in) Adj. Screw 6 Hex.
★2. "C2" Choke (Meter-out) Adj. Screw 6 Hex.
★3. Lock Nut 12 Hex.

Model Numbers	C	D	E	F	H
DSHG-03-＊＊＊-C1	198.8	180.5	133.5	100	—
DSHG-03-＊＊＊-C2				—	100
DSHG-03-＊＊＊-C1C2	223.8	205.5	158.5	125	100
(S-) DSHG-04-＊＊＊-C1	204.8	186.5	139.5	106	—
(S-) DSHG-04-＊＊＊-C2				—	106
(S-) DSHG-04-＊＊＊-C1C2	229.8	211.5	164.5	131	106
(S-) DSHG-06-＊＊＊-C1	225.8	207.5	160.5	127	—
(S-) DSHG-06-＊＊＊-C2				—	127
(S-) DSHG-06-＊＊＊-C1C2	250.8	232.5	185.5	152	127
(S-) DSHG-10-＊＊＊-C1	288.8	270.5	223.5	190	—
(S-) DSHG-10-＊＊＊-C2				—	190
(S-) DSHG-10-＊＊＊-C1C2	313.8	295.5	248.5	215	190

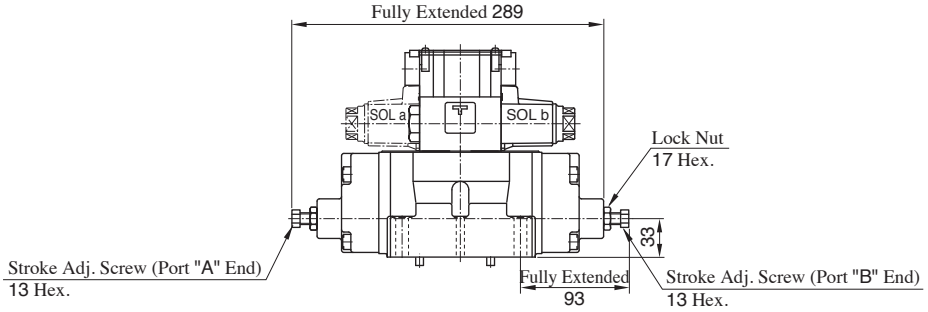
Options

Models with Stroke Adjustment

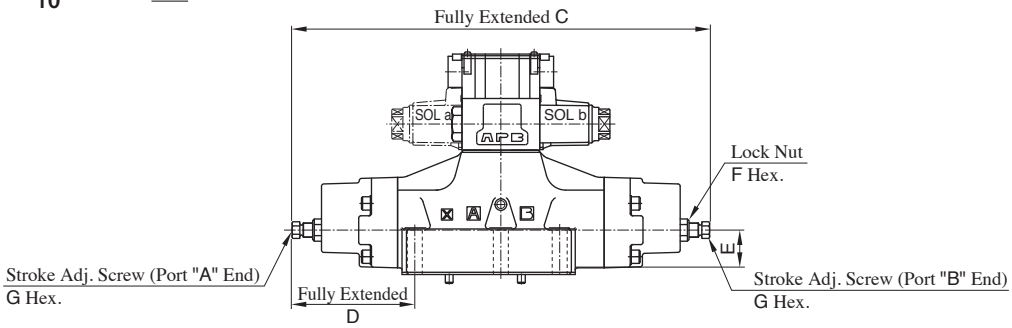
● **DSHG-03-＊＊＊-R＊**



● **(S-) DSHG-04-＊＊＊-R＊**



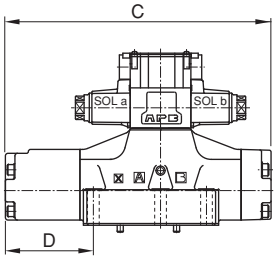
● **(S-) DSHG-$\frac{06}{10}$-＊＊＊-R＊**



Model Numbers	C	D	E	F	G
(S-) DSHG-06-＊＊＊-R2	376	111	40	19	13
(S-) DSHG-10-＊＊＊-R2	558	164.5	65	24	17

Pressure Centered Models

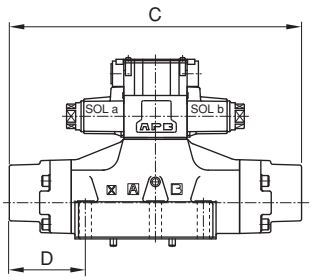
● **(S-) DSHG-$\frac{06}{10}$-3H＊**



Model Numbers	C	D
(S-) DSHG-06-3H＊	306.5	102
(S-) DSHG-10-3H＊	456	149.5

Models with Pilot Piston

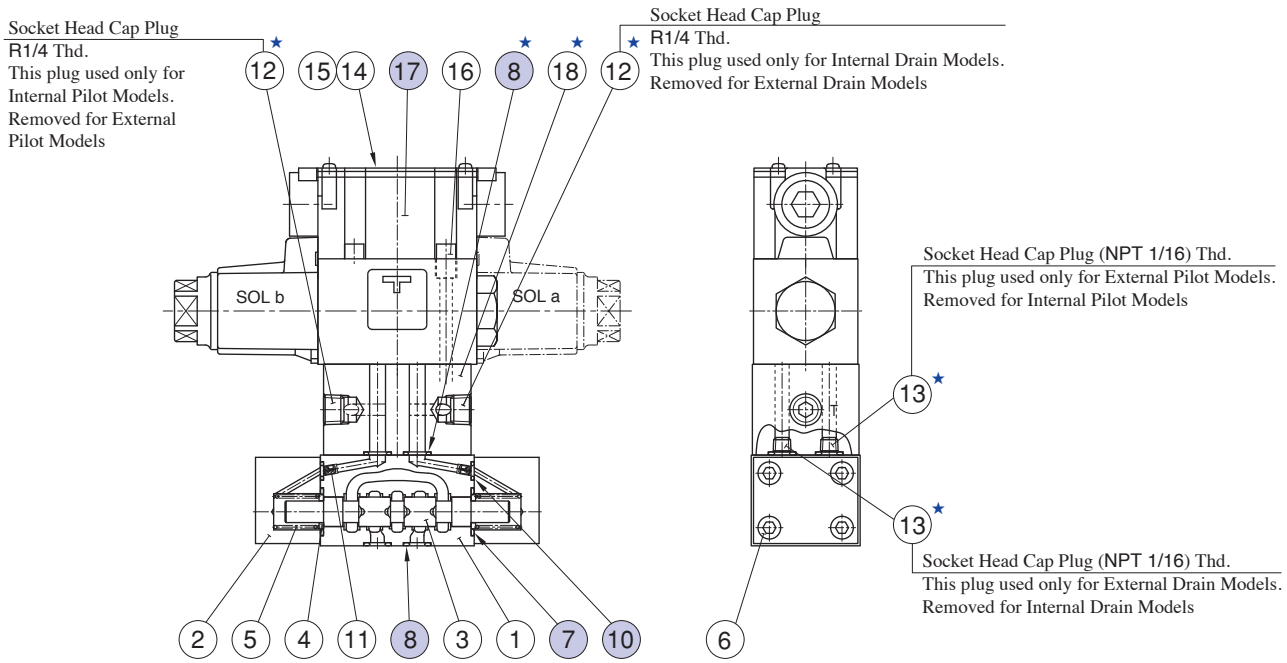
● **(S-) DSHG-$\frac{06}{10}$-＊＊＊-P＊**



Model Numbers	C	D
(S-) DSHG-06-＊＊＊-P2	323	84
(S-) DSHG-10-＊＊＊-P2	479	125

List of Seals and Pilot Valves

DSHG-01



Note: Piece parts marked ★ are not available for internal pilot-internal drain type.

List of Seals

Item	Name	Part Numbers	Qty.
7	O-Ring	JASO 1018 1A	2
8		OR NBR-90 P9-N	8 (4) ★1
10		OR NBR-90 P5-N	2

★1. Quantities in the ( ) are applicable to internal pilot-internal drain.

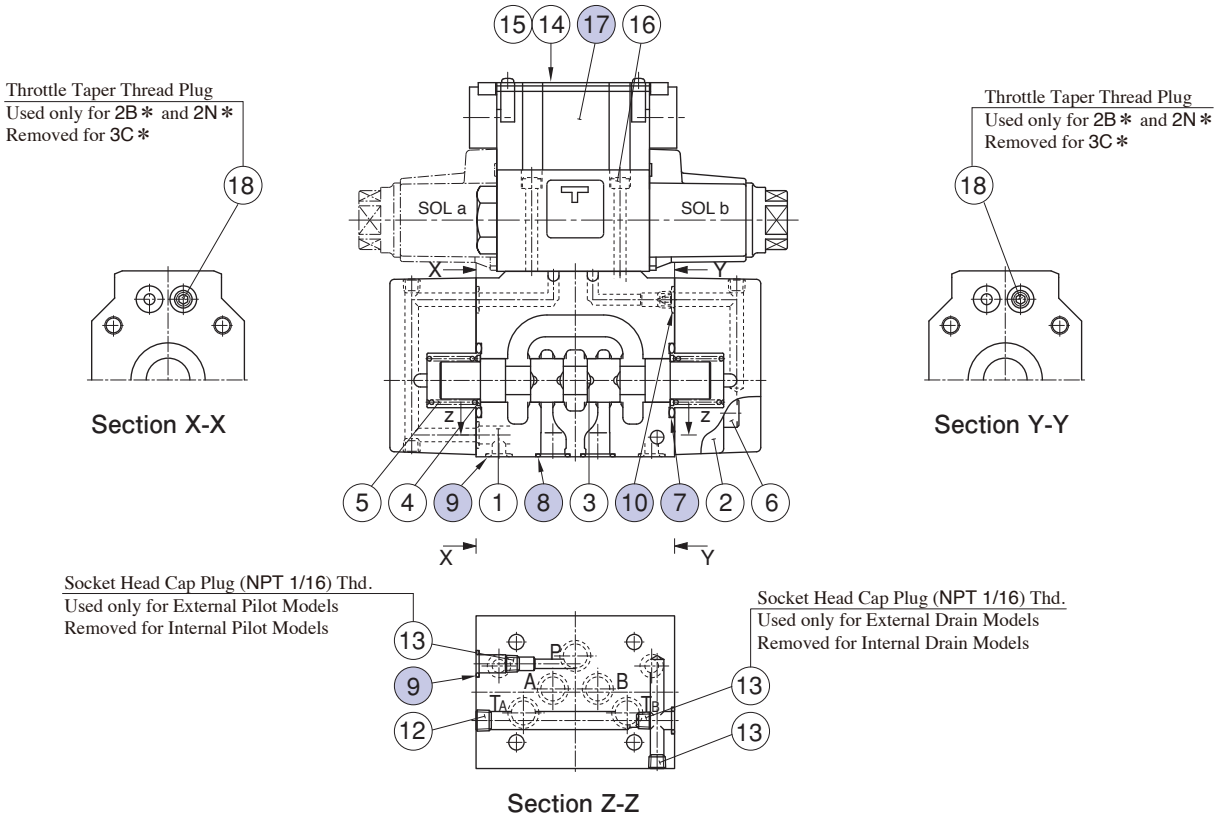
List of Item ⑰ Pilot Valves

Solenoid Controlled Pilot Operated Directional Valve Model Numbers	⑰ Pilot Valve Model Numbers
DSHG-01-3C✻-★-14	DSG-01-3C4-★-70
DSHG-01-2B✻-★-14	DSG-01-2B2-★-70-L

Note) Fill coil type (a symbol representing current/voltage) in section marked ★.
For the details of the pilot valves, refer to page E-34 for DSG-01 series.

List of Seals and Pilot Valves

DSHG-03



List of Seals

Item	Name	Part Numbers	Qty.
7	O-Ring	OR NBR-90 P28-N	2
8		AS568-014 (NBR-90)	5
9		OR NBR-90 P9-N	2
10		OR NBR-90 P9-N	6

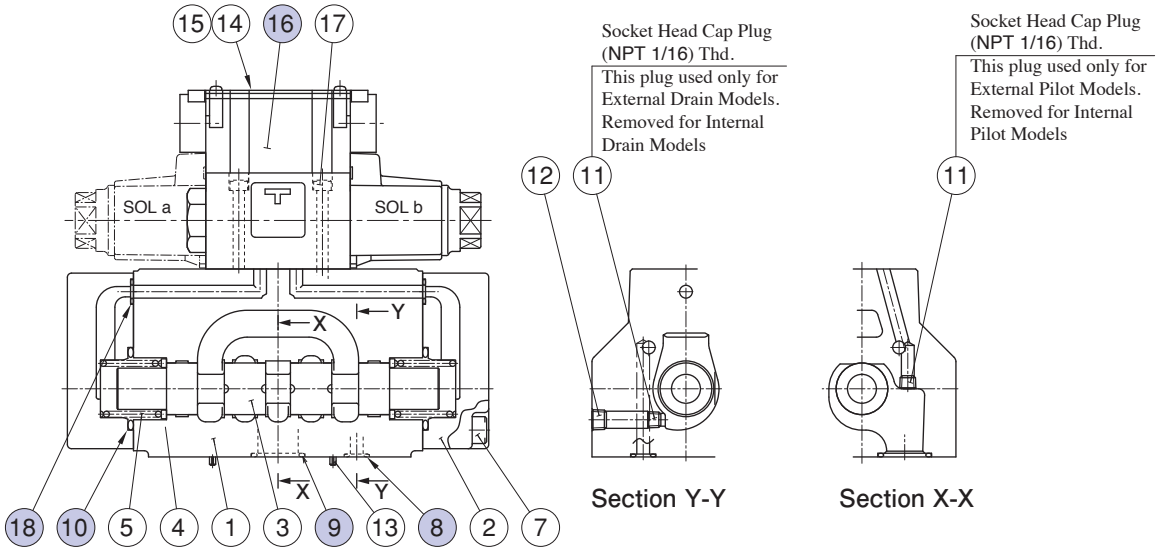
List of Item ⑰ Pilot Valves

Solenoid Controlled Pilot Operated Directional Valve Model Numbers	⑰ Pilot Valve Model Numbers
DSHG-03-3C∗-★-14	DSG-01-3C4-★-70
DSHG-03-2B∗-★-14	DSG-01-2B2-★-70
DSHG-03-2N∗-★-14	DSG-01-2D2-★-70

Note) Fill coil type (a symbol representing current/voltage) in section marked ★.
For the details of the pilot valves, refer to page E-34 for DSG-01 series.

List of Seals and Pilot Valves

(S-) DSHG-04



● List of Seals

Item	Name	Part Numbers	Qty.
8	O-Ring	OR NBR-90 P9-N	2
9		OR NBR-90 P22-N	4
10		OR NBR-90 P34-N	2
18		OR NBR-90 P9-N	2

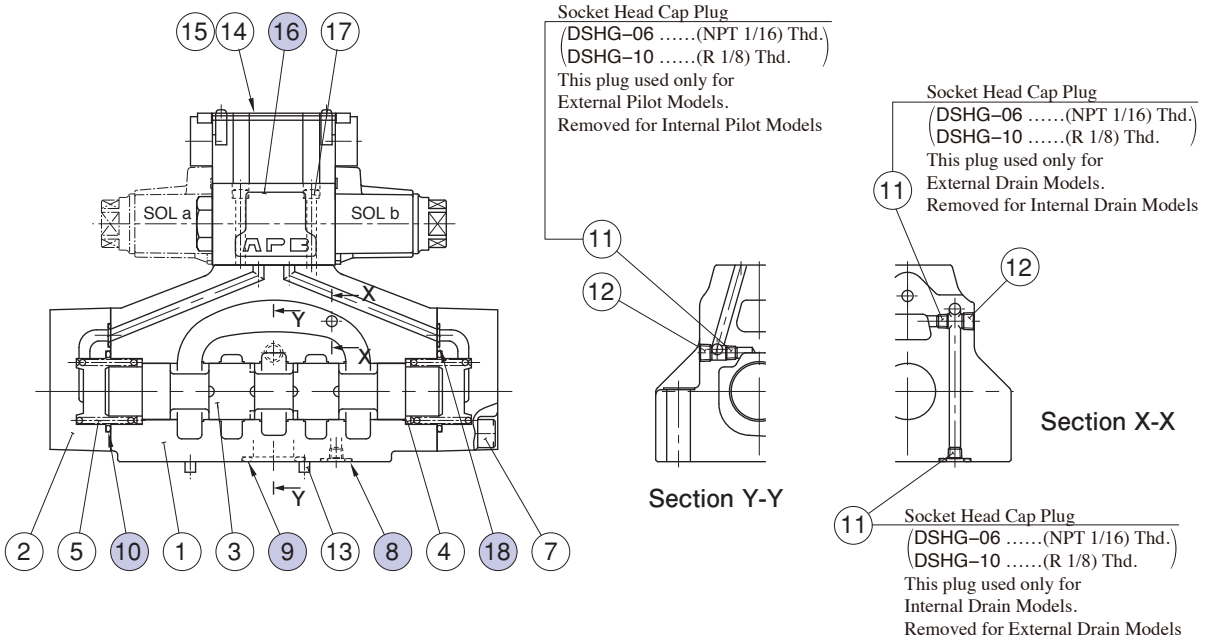
● List of Item ⑯ Pilot Valves

Solenoid Controlled Pilot Operated Directional Valve Model Numbers	⑯ Pilot Valve Model Numbers
(S-) DSHG-04-3C✻-★-52	DSG-01-3C4-★-70
(S-) DSHG-04-2N✻-★-52	DSG-01-2D2-★-70
(S-) DSHG-04-2B✻-★-52	DSG-01-2B2-★-70

Note) Fill coil type (a symbol representing current/voltage) in section marked ★.
For the details of the pilot valves, refer to page E-34 for DSG-01 series.

List of Seals and Pilot Valves

(S-) DSHG-06, 10



List of Seals

Item	Name	Part Numbers		Qty.
		(S-) DSHG-06	(S-) DSHG-10	
8	O-Ring	OR NBR-90 P14-N	OR NBR-90 P20-N	2
9		OR NBR-90 P30-N	OR NBR-90 P42-N	4
10		OR NBR-90 P40-N	OR NBR-90 G65-N	2
18		OR NBR-90 P10-N	OR NBR-90 P14-N	2

List of Item ⑯ Pilot Valves

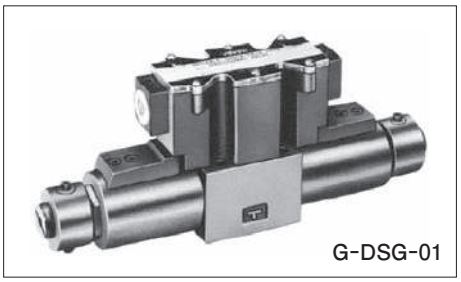
Solenoid Controlled Pilot Operated Directional Valve Model Numbers	⑯ Pilot Valve Model Numbers
(S-) DSHG-06-3C*-★-53	DSG-01-3C4-★-70
(S-) DSHG-10-3C*-★-43	
(S-) DSHG-06-2N*-★-53	DSG-01-2D2-★-70
(S-) DSHG-10-2N*-★-43	
(S-) DSHG-06-2B*-★-53	DSG-01-2B2-★-70-L
(S-) DSHG-10-2B*-★-43	
(S-) DSHG-06-3H*-★-53	DSG-01-3C9-★-70
(S-) DSHG-10-3H*-★-43	

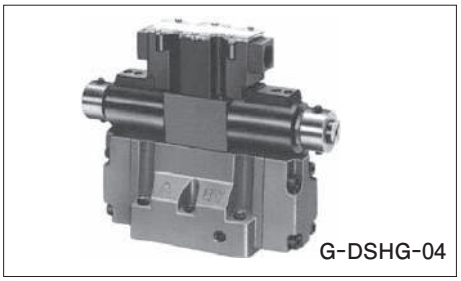
Note) Fill coil type (a symbol representing current/voltage) in section marked ★.
For the details of the pilot valves, refer to page E-34 for DSG-01 series.

"G" Series Shockless Type Solenoid Operated / Solenoid Controlled Pilot Operated Directional Valves

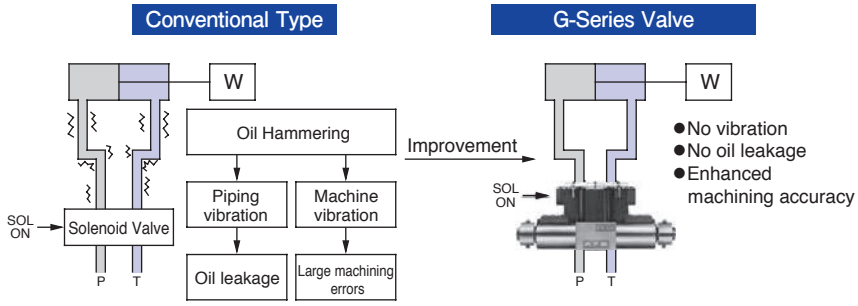
Patent Number 1775681

The shifting time of conventional Solenoid Operated, Shockless, and Directional Valves is constant and cannot be adjusted.
The G-Series Solenoid Operated Directional Valves incorporate electronic circuits enable adjustment of the spool shifting time, it can be set at an optimal level to minimise shocks to the machine.

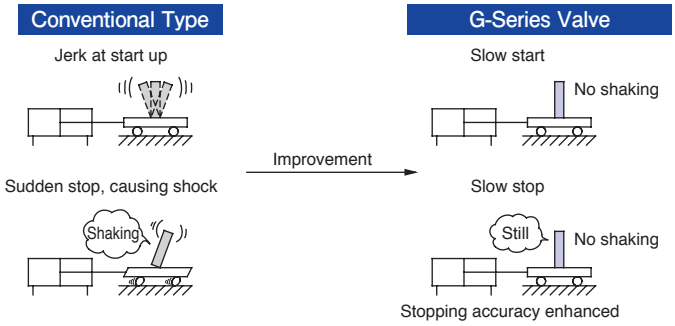

G-DSG-01


G-DSHG-04

1 Reduces oil hammering during spool changeover.

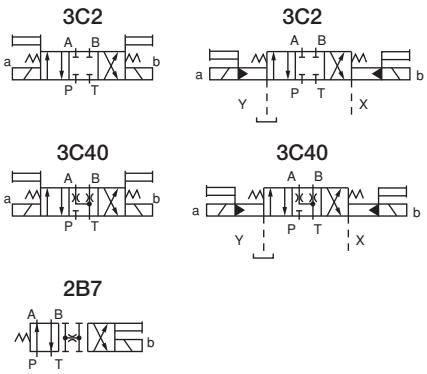


2 Reduces shock caused by acceleration and deceleration



Graphic Symbols

● G-DSG-01/03 ● G-DSHG-04/06



Specifications

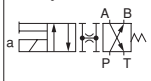
Model Numbers	Max. Flow L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Pilot Pressure MPa		Pilot Flow L/min		Shifting Time Range s		Mass kg	
				Max.	Min.	at Normal	at Transition	for ON	for OFF	3C✻	2B7
G-DSG-01-✻-✻✻✻-✻-51	10 20 30 40	25	16	—	—	—	—	0.1 - 1		3	2.1
G-DSG-03-✻-✻✻✻-✻-51	40 60 80	25	16	—	—	—	—	0.3 - 1		7.5	5.3
G-DSHG-04-3C✻-✻-✻-✻-50	160	25	16	16	1.5	1	4	0.06 - 1.5	0.1 - 2	12	—
G-DSHG-06-3C✻-✻-✻-✻-50	250					1	6	0.1 - 1	0.2 - 2	15	—

● Electrical Specifications

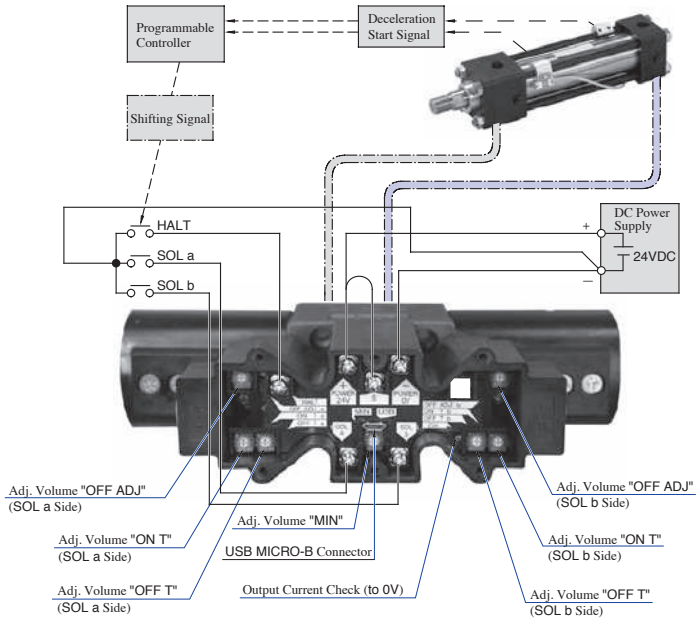
Model Numbers	Electric Power Supply		Shifting Signal, low speed operation halt signal (HALT)		
	Voltage	Input Power	Voltage	Current	Input Interface
G-DSG-01-✻-✻✻✻-✻-51 G-DSG-03-✻-✻✻✻-✻-51 G-DSHG-04-3C✻-✻-✻-✻-50 G-DSHG-06-3C✻-✻-✻-✻-50	24 V DC (21 - 28 V DC Included Ripple) Use a stable power supply	36 W	5 - 48 V DC (Can be used in common with electric power supply) Use a stable power supply	Constant at 10 mA (A constant current circuit is used)	Sink Type, Source Type

For details of "G " Series Shockless Type Solenoid Operated / Solenoid Controlled Pilot Operated Directional Valves, please contact us.

Model Number Designation

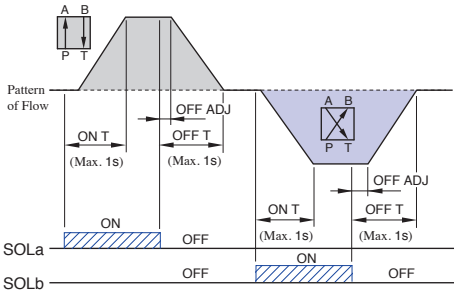
G–DSG	–01	–10	–2B7	—	—	–S	–51	–L
G–DSHG	–04	—	–3C2	–E	–R2	–S	–50	—
Series Number	Valve Size	Metered Flow Capacity	Spool Type (Refer to Graphic symbols)	Pilot Connection	Input only for options below	Input Interface	Design Number	Models with reverse mtg. of solenoid
G-DSG : "G " Series Shockless Type Solenoid Operated Directional Valves (Sub-plate Mounting Type)	01	None : 40L/min 10 : 10L/min 20 : 20L/min	3C2 3C40	——	——	None : Sink Type (Standard) S : Source Type	51	L : Input only for reverse mtg. of solenoid. (Only for 2B7) 
		None : 30L/min 10 : 10L/min 20 : 20L/min	2B7					
	03	None : 80L/min 40 : 40L/min 60 : 60L/min	3C2 3C40				51	
		None : 60L/min 40 : 40L/min	2B7					
G-DSHG : "G " Series Shockless Type Solenoid Controlled Pilot Operated Directional Valves (Sub-plate Mounting Type)	04	——	3C2 3C40	None : Internal Pilot E : External Pilot	R2 : With Stroke Adjustment, Both Ends RA : With Stroke Adjustment, Port "A" End RB : With Stroke Adjustment, Port "B" End		50	——
	06						50	

System Diagram (Example of sink type wiring)

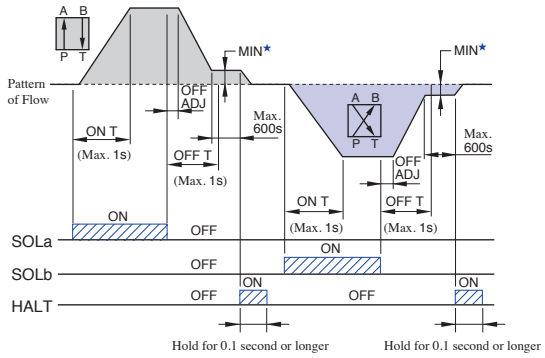


Relationships between SOL signals and flow patterns

Without HALT functions



With HALT functions



★ The minimum adjustment volume is common for SOL a and b, and it is not possible to set a different volume for each SOL a and b individually.
If the HALT functions are not used, set the minimum adjustment volume to zero.

Interchangeability between Current and New Product

"G " Series Shockless Type Solenoid Operated Directional Valves have changed models from 50 design to 51 design by installation of new amplifier.

Current Model Numbers	New Model Numbers
G-DSG-01-＊-＊＊＊-＊-50	G-DSG-01-＊-＊＊＊-＊-51
G-DSG-03-＊-＊＊＊-＊-50	G-DSG-03-＊-＊＊＊-＊-51

Major Changes

Use newly developed Digital Control Amplifier.

Interchangeability

Adjusting trimmer is inherited from the current model. Same as on the current model, trimmer adjustment allows to modify the time of spool switching in accordance with the machine.

New Functions

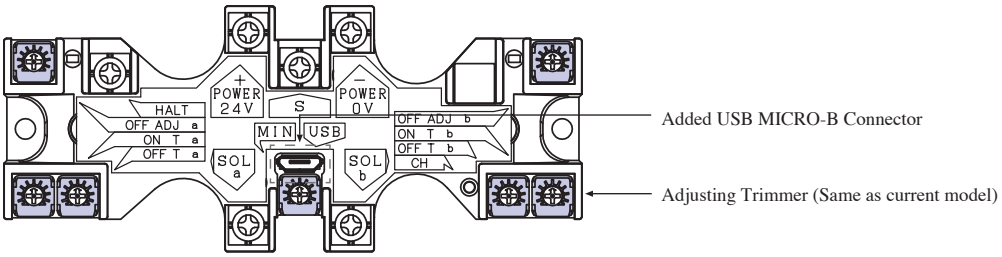
USB MICRO-B connector has been added and adjustment on PC using specialized software made available.
Making minute adjustments and readjusting has become easier compared to current model. Copying of set adjustment value made available. There is a maintenance function that allows to check working conditions of the valve such as solenoid current value and operating time on PC.

Interchangeability in Installation

Yes

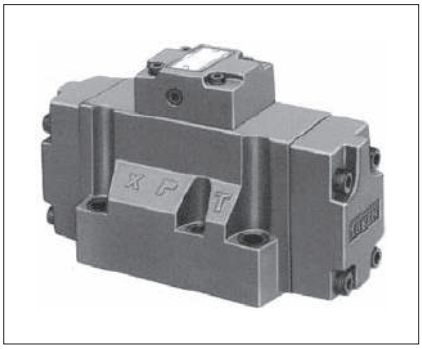
Comparison between Current and New

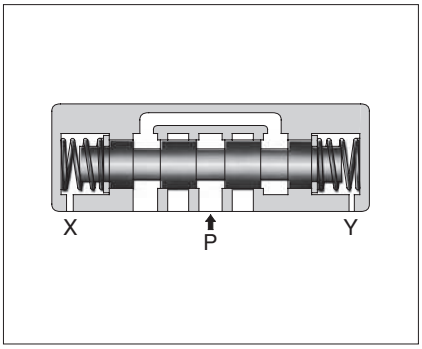
No changes in specifications, characteristics, dimensions, installations, connecting terminal and trimmer arrangement.
USB MICRO-B connector has been added to the on-board amplifier.



Pilot Operated Directional Valves

These valves perform a change over of spool by hydraulic pilot and shift the direction of oil flow.





Specifications

Model Numbers		Max. Flow★ L/min	Max. Operating Pressure MPa	Max. Pilot Pressure MPa	Min. Required Pilot Pressure MPa
Spring Centered	DHG-04-3C✻-50	300	31.5	25	0.8
No-Spring	DHG-04-2N✻-50	300			
Spring Offset	DHG-04-2B✻-50	130			
Spring Centered	DHG-06-3C✻-50	500	31.5	25	0.8
No-Spring	DHG-06-2N✻-50	500			
Spring Offset	DHG-06-2B✻-50	140			
Pressure Centered	DHG-06-3H✻-50	500		21	1.0
Spring Centered	DHG-10-3C✻-40	1100	31.5	25	1.0
No-Spring	DHG-10-2N✻-40	1100			
Spring Offset	DHG-10-2B✻-40	460			
Pressure Centered	DHG-10-3H✻-40	1100		21	

★ Maximum flow indicates a ceiling flow to keep valve operation (changeover) normal.
It depends on the type of valve and circuit, please contact us for details.

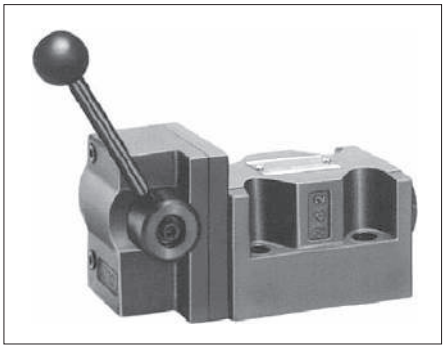
Note) Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

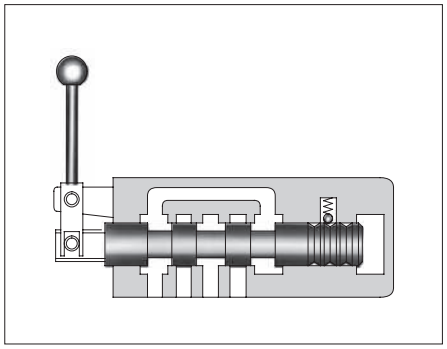
● About high flow valves (Flange Connection Type), please contact us for details.

For details of Pilot Operated Directional Valves, please contact us.

Manually Operated Directional Valves

These valves may be used to manually shift the spool position and change the direction of oil flow.





Specifications

	Model Numbers	Maximum Flow Note)1 L/min				Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Approx. Mass kg
		7 MPa	14 MPa	21 MPa	31.5 MPa			
Threaded Connections	DMT-03-3C＊-50	100★1	100★1	100★1	—	25	16	5.0
	DMT-03-3D＊-50	100	100	100	—			
	DMT-03-2D＊-50	100	100	100	—			
	DMT-03-2B＊-50	100★1	100★1	100★1	—			
	DMT-06＊-3C＊-30	300 (200)★2	300 (120)★2	300 (100)★2	—	21	At time spool shift is required: 7 At time spool shift is not required: 21	12.9
	DMT-06＊-3D＊-30	300	300	300	—			
	DMT-06＊-2D＊-30	300	300	300	—			
	DMT-06＊-2B＊-30	200	120	100	—			
	DMT-10＊-3C＊-30	500 (315)★2	500 (315)★2	500 (315)★2	—	21	At time spool shift is required: 7 At time spool shift is not required: 21	22
	DMT-10＊-3D＊-30	500	500	500	—			
	DMT-10＊-2D＊-30	500	500	500	—			
	DMT-10＊-2B＊-30	315	315	315	—			
Sub-plate Mounting	DMG-01-3C＊-10	35	35	35	—	25	14★6	1.8
	DMG-01-3D＊-10							
	DMG-01-2D＊-10							
	DMG-01-2B＊-10							
	DMG-03-3C＊-50	100★1	100★1	100★1	—	25	16	4.0
	DMG-03-3D＊-50	100	100	100	—			
	DMG-03-2D＊-50	100	100	100	—			
	DMG-03-2B＊-50	100★1	100★1	100★1	—			
	DMG-04-3C＊-21	200★3	200★3	105★3	—	21	21★7	7.4
	DMG-04-3D＊-21	200	200	200	—			
	DMG-04-2D＊-21	200	200	200	—			
	DMG-04-2B＊-21	90	60	50	—			7.9
	DMG-06-3C＊-50	500★4	500★4	500★4	500★4	31.5	21★7	11.5
	DMG-06-3D＊-50	500	500	500	500			
	DMG-06-2D＊-50	500	500	500	500			
	DMG-06-2B＊-50	420	300	250	200			12
	DMG-10-3C＊-40	1100★5	1100★5	1100★5	1100★5	31.5	21★7	48.2
	DMG-10-3D＊-40	1100	1100	1100	1100			
	DMG-10-2D＊-40	1100	1100	1100	1100			
	DMG-10-2B＊-40	670	350	260	200			50

Note) 1. The maximum flow means the limited flow of the valve. In case of pressure or flow condition, the lever operating torque of over DMG-04 size models is possible over 40 Nm.

★1. Varies depending on the spool type. For details, see the "List of Standard Models" for DSG-03 Series Solenoid Operated Directional Valves (page E-40 at 50 Hz rated voltage).

★2. The figures in parentheses indicate max. flow for 3C3,3C5, 3C6 and 3C60.

★3. Varies depending on the spool type. Please contact us for details.

★4. Varies depending on the spool type. Same as DSHG-06 (at pilot pressure of 0.8 MPa), see page E-77.

★5. Varies depending on the spool type. Same as DSHG-10 (at pilot pressure of 1.0 MPa), see page E-78.

★6. Lever operating torque varies depending on the T-line back pressure.

★7. If the T-Line back pressure exceeds 7 MPa, directly connect the drain port to the reservoir.

● About high flow valves (Flange Connection Type), please contact us for details.

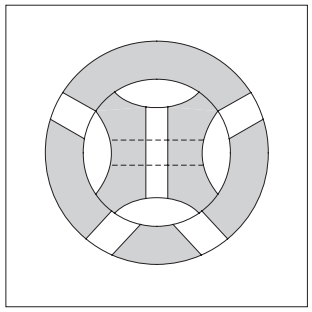
——— For details of Manually Operated Directional Valves, please contact us. ———

Mechanically Operated Directional Valves

These valves are chiefly used to shift the pilot circuit. Rotary Type Directional Valves and Cam Operated Type Directional Valves are available.

Rotary Type Directional Valves

These valves are used to rotate the spool either manually or by way of cam and shift the direction of oil flow.
The detented mechanism incorporated in these valves prevents the valve from being changed over by itself due to vibrations or any other shocks.



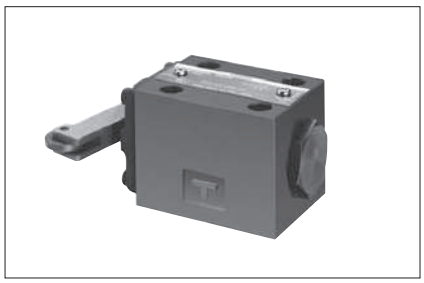
Specifications

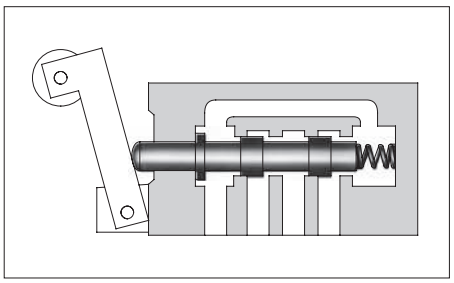
Model Numbers		Rated Flow L/min	Max. Operating Pressure MPa	Max. T-Line Pressure MPa	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting				DRT Type	DRG Type
DRT–02–＊D＊–＊＊–20	DRG–02–＊D＊–＊＊–20	16	7	7★	4.7	3.4

★ When a back pressure of more than 3 MPa is generated in the tank port, be sure to use External Drain Type.

Cam Operated Directional Valves

These valves may be used to shift the direction of oil flow by depressing the spool by way of cam.





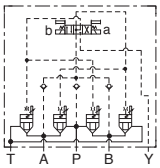
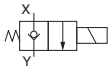
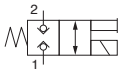
Specifications

Model Numbers		Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Pressure MPa	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting				DCT Type	DCG Type
DCT–01–2B＊–＊–40	DCG–01–2B＊–＊–40	30	21	7	1.1	1.1
DCT–03–2B＊–＊–50	DCG–03–2B＊–＊–50	100	25	10	4.5	2.9

★ Max. flow indicates the ceiling flow which does not affect the normal function (changeover) of valves.

For details of Mechanically Operated Directional Valves, please contact us.

Poppet Type Directional Valves

Valve Type	Graphic Symbols	Max. Operating Pressure MPa	Maximum Flow L/min (1 2 5 10 20 50 100 200 500 1000)	Page
Multi Purpose Control Valves		25	DSLHG-04 DSLHG-06 DSLHG-10	E-102
Solenoid Operated Poppet Type Two-Way Valves		21	CDSC-01	E-122
		14	CDSC-03 CDST-03* CDSG-03	
Shut-off Type Solenoid Operated Directional Valves		25	DSPC-01 DSPG-01 DSPC-03 DSPG-03	E-128

Mounting Surface

Mounting surface dimensions conform to ISO standard described in the below table.

Name	Model Numbers	ISO Code of Mounting Surface
Shut-off Type Solenoid Operated Directional Valves	DSPG-01	ISO 4401-03-02-0-05
	DSPG-03	ISO 4401-05-04-0-05
	DSPC-01	ISO 7789 20-01-0-07
	DSPC-03	ISO 7789 27-01-0-07
Multi Purpose Control Valves	DSLHG-04	ISO 4401-07-07-0-05
	DSLHG-06	ISO 4401-08-08-0-05
	DSLHG-10	ISO 4401-10-09-0-05

Interchangeability in Installation between Current and New Design

Model change has been made on the following products.
The difference between current and new design has been described on the paragraph of "Interchangeability in Installation between Current and New Design". Refer to relevant pages on each series.

Name	Model Numbers		Mtg. Interchangeability	Page	Major Changes
	Current	New			
1/2, 3/4, 1 1/4 Multi Purpose Control Valves	DSLHG-04-＊-＊-12 DSLHG-06-＊-＊-12 DSLHG-10-＊-＊-12	DSLHG-04-＊-＊-13 DSLHG-06-＊-＊-13 DSLHG-10-＊-＊-13	Yes	—	• Pilot valve (DSG-01) changed 60→70 design.
Solenoid Operated Poppet Type Two-Way Valves	CDS＊-03＊-C-＊-20	CDS＊-03＊-C-＊-21	Yes	E-127	• The change of solenoid ratings.
Shut-off Type Solenoid Operated Directional Valves	DSP＊-01-C-＊-20	DSP＊-01-C-＊-30	Yes	E-135	• High pressure and the change of solenoid ratings.

Solenoid

Solenoid Connector (DIN Connector)

The solenoid connector is in accordance with the international standard ISO 4400 (Fluid power systems and components-Three-pin electrical plug connectors-Characteristics and requirements).

AC Solenoid

50-60 Hz common service solenoids do not require rewiring when the applied frequency is changed.

DC Solenoid

K-series DC Solenoid which has a reputation for excellent DC control is employed.

★Three Characteristics of K-series★

1. Avoid malfunction of computers.
   (The surge voltage is low, so these valves do not give bad influences like noise to electronic devices)

2. The relays last for long time.
   (The spark between the relay contacts has been eliminated and therefore drastically decrease damages of contacts)

3. Time lag on de-energisation is reduced.

R Type Models with Current Rectifier and DC Solenoid

Specially designed DC solenoids and receptacle (or connector) containing AC-DC rectifier and transient peak suppressor are provided. Connection to be made to AC power source as with conventional AC solenoid.
Remarkably high reliability and long life and other advantages including quiet valve operation. No overheating of coil due to the spool sticking and protection against transient voltage peaks are assured.

Insulation Class of Solenoid

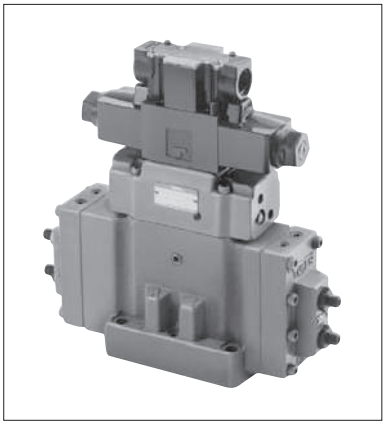
Model Numbers	Insulation Class
DSLHG-04/06/10	Class H
CDSC-01 CDS＊-03＊ DSP＊-01/03	

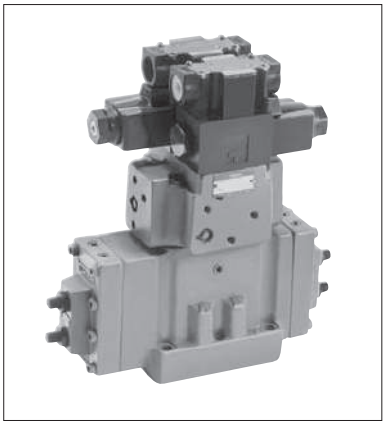
Multi Purpose Control Valves

The Yuken Multi-Purpose Control Valves Comply with The Needs of Reducing Cost and Size of Your Machine

YUKEN's Multi Purpose Control Valves are compound valves composed of the main valve having four poppets, 1/8 Solenoid Operated Directional Valves for pilot and Pilot Selector Valves. This valve is multifunctionalized by having individual poppet had functions such as directional control, flow control or pressure control according to the combination of the main valve and pilot selector valve.

Features





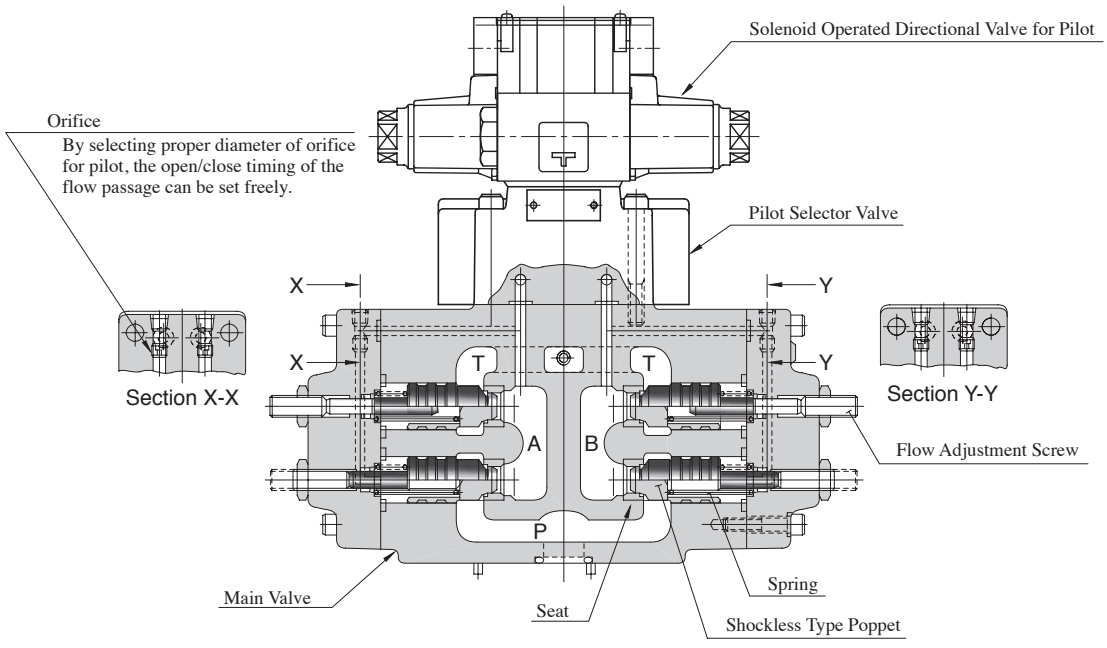
- **Multi-purpose control valves**
  The valves combine three functions of directional control, flow control and of pilot operated check valve (or counterbalance valve). The valves contribute for reducing a number of valves in applications and space for installation and then eventually leads to reduction in size and cost of your machines.

- **Quick response, High reliability**
  Changeover response time is very quick as the valves are poppet type, there is no over-lap.
  No hydraulic lock occurs as there is no leakage of pressurised oil from the seat parts.

- **Easy to reduce shock in your hydraulic system**
  By selecting proper diameter of orifice for pilot, the open/close timing of the flow passage can be set freely. Therefore, smooth starting and stopping of actuator can be done combined with using shockless type poppet. Noise of ON/OFF and vibration of piping in hydraulic system can be also reduced.

- **For regenerative circuit**
  4 position-4 way type, which is to compose regenerative circuit, is available. By adopting regenerative circuit, gaining fast feed speed by using smaller volume pump is possible. Therefore saving electric power of system is possible.

- **The mounting dimensions are conformed with ISO standard**
  The valves are interchangeable with our conventional valves in mounting.



Specifications

Model Numbers	Max. Flow L/min	Max. Operating Pressure MPa	Max. Pilot Pressure MPa	Max. T-Line Back Pres. MPa	Pressure Adj. Range of Counterbalance MPa	Ratio of Poppet Area (Seat Area: Annular Area)		Approx. Mass kg
						Direction & Flow Control	Pressure Control	
DSLHG-04-1-∗-13∗	150 (39.6)	25	25	16	—	1:1	—	15
DSLHG-04-2-∗-13∗								15
DSLHG-04-3-∗-13∗								19
DSLHG-04-4∗-∗-∗-13∗	150 {100}★				Refer to Model No. Designation	1:1	24:1	20
DSLHG-04-5∗-∗-∗-13∗								22.5
DSLHG-06-1-∗-13∗	300 (79.3)	25	25	16	—	1:1	—	26.5
DSLHG-06-2-∗-13∗								26.5
DSLHG-06-3-∗-13∗								28
DSLHG-06-4∗-∗-13∗	300 {200}★				Refer to Model No. Designation	1:1	24:1	31
DSLHG-06-5∗-∗-13∗								34.5
DSLHG-10-1-∗-13∗	500 (132)	25	25	16	—	1:1	—	59
DSLHG-10-2-∗-13∗								59
DSLHG-10-3-∗-13∗								62
DSLHG-10-4∗-∗-13∗	500 {300}★				Refer to Model No. Designation	1:1	24:1	63.5
DSLHG-10-5∗-∗-13∗								67

★In case of counterbalance function line, maximum flow is limited to the values in brackets.

Solenoid Ratings

Refer to Pilot Valve (DSG-01 Series Solenoid Operated Directional Valve) Solenoid Ratings on page E-23.

Sub-plate

Valve Model Numbers	Japanese Standard "JIS"		
	Sub-plate Model Numbers	Thread Size	Approx. Mass kg
DSLHG-04	DHGM-04-20 DHGM-04X-20	Rc 1/2 Rc 3/4	4.4 4.1
DSLHG-06	DHGM-06-50 DHGM-06X-50	Rc 3/4 Rc 1	7.4 7.4
DSLHG-10	DHGM-10-40 DHGM-10X-40	Rc 1-1/4 Rc 1-1/2	21.5 21.5

- Sub-plates are available. Specify the sub-plate model number from the table above.
  When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
- These sub-plates are sharable with those for DSHG Series Solenoid Controlled Pilot Operated Directional Valve. For dimensions, see pages E-85 and E-87.

Mounting Bolts

Socket head cap screws in the table below are included.

Model Numbers	Socket Head Cap Screw
DSLHG-04	M6 × 40 M10 × 45
DSLHG-06	M12 × 60
DSLHG-10	M20 × 75

Model Number Designation

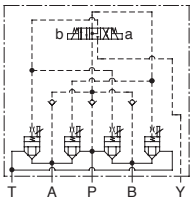
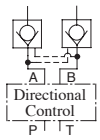
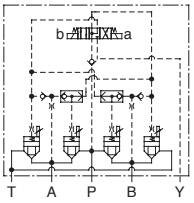
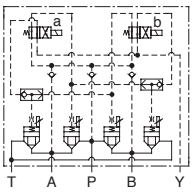
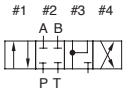
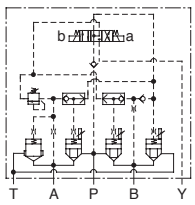
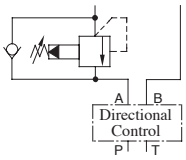
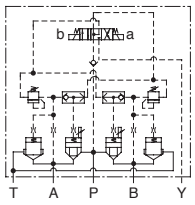
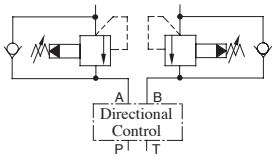
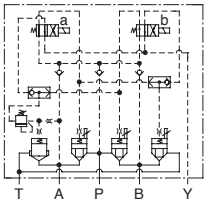
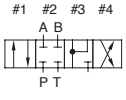
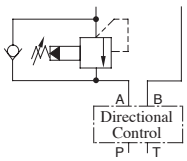
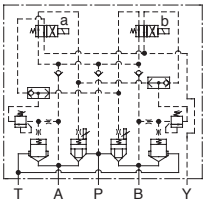
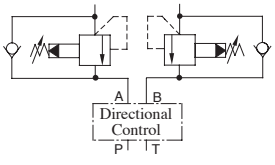
DSLH	G	-04	-4	A	-B	-E	T	-A100	-C	-N	-13
Series Number	Type of Mounting	Valve Size	Type of Pilot Control	Counterbalance Function	Pressure Adj. Range of Counterbalance MPa	Pilot Connection	Drain ★2 Connection	Coil Type	Manual Override	Electrical Conduit Connection	Design Number
DSLH: Multi-Purpose Control Vave	**G**: Sub-plate Mounting	**04**	**1** **2** **3**	—	—	**None**: Internal Pilot **E**: External Pilot	**None**: External Drain **T**: Internal Drain	AC: **A100** **A120** **A200** **A240** DC: **D12** **D24** **D48** R: (AC→DC) **R100** **R200**	**None**: Manual Override Pin **C**: Push Button & Lock Nut (Options)	**None**: Terminal Box Type **N**: Plug-in Connector Type	**13**
			4 **5**	**A** : AT Line **W**: AT & BT Lines	**B** : ∗ ★1 - 7 **H** : 6 - 25						
		06	**1** **2** **3**	—	—						**13**
			4 **5**	**A** : AT Line **W**: AT & BT Lines	**None**: ∗ ★1 - 25						
		10	**1** **2** **3**	—	—						**13**
			4 **5**	**A** : AT Line **W**: AT & BT Lines	**None**: ∗ ★1 - 25						
			See page E-105 for functions and purpose of use.								

★1. See "Min. Adjustment Pressure", page E-107, for information on minimum adjustment pressure.

★2. In case of lines with counterbalance function (-4 $\frac{A}{W}$, -5 $\frac{A}{W}$), External Drain must be selected for Drain Connection.

The coil type numbers in the shaded column are handled as optional extras. In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Function and Purpose of Use

Type of Pilot Control	Model No.	Graphic Symbols	Function: Directional Control	Function: Flow Control	Function: Pilot Operated Check Valve / Pressure Control	Purpose of Use
Type "1"	DSLHG-∗-1					● Functions as Three Position Four-Way Valve (Spring Centered Model).
Type "2"	DSLHG-∗-2					● Functions as Three Position Four-Way Valve (Spring Centered Model) as well as Two Position Valve which uses positions #1 and #3. ● Effective especially when the actuator has inertia force.
Type "3"	DSLHG-∗-3			Both Meter-in and Meter-out are possible	To get a function of pilot operated check valve, the following conditions should be fulfilled. ● Internal pilot type ("P" port pressure) ≧ ("A""B" ports pressure) ● External pilot type (Pilot pressure) ≧ ("A""B" ports pressure)	● Functions as Four Position Four-Way Valve. ● Regenerative circuit can be constructed at the Position #3.
Type "4"	DSLHG-∗-4A					● Pressure control function (counterbalance valve) has been added to Type "2" to make this type.
	DSLHG-∗-4W					● Used to control the back pressure of the actuator.
Type "5"	DSLHG-∗-5A					● Pressure control function (counterbalance valve) has been added to Type "3" to make this type.
	DSLHG-∗-5W					● Used to control the back pressure of the actuator.

Position	#1	#2	#3
SOL a	ON	OFF	OFF
SOL b	OFF	OFF	ON

Position	#1	#2	#3	#4
SOL a	ON	OFF	ON	OFF
SOL b	OFF	OFF	ON	ON

Instructions

- **Pilot Pressure**
  Pilot pressure of external pilot drain models must always exceed the pressure of the main pressure port "P".

- **Pilot Drain Port**
  Avoid connecting the pilot drain port to a line with possible surge pressure.

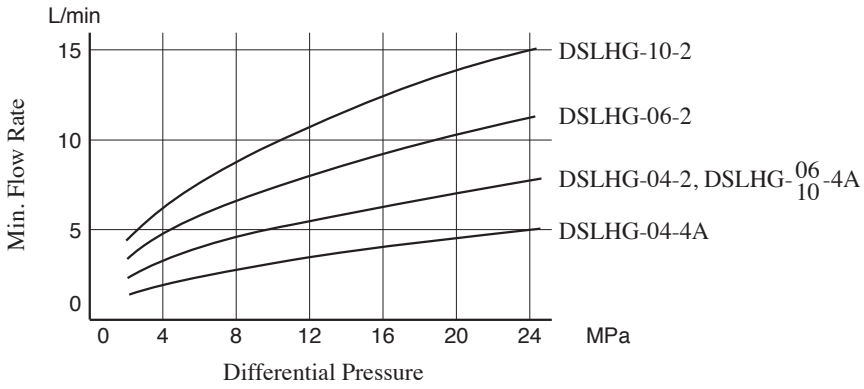
- **Drain Connection when with Counterbalance Function**
  When a valve having counterbalance function is used with internal drain type, the counterbalance pilot valve is subjected to pressure fluctuation and the pressure setting becomes unstable. For this reason, be sure to use external drain type valve.

- **Flow Adjustment**
  To perform the flow adjustment, loosen the lock nut, then turn the flow adjustment screw clockwise to decrease the flow. Be sure to re-tighten the lock nut after the adjustment.

- **Pressure Adjustment**
  To perform the pressure adjustment, loosen the lock nut, then turn the pressure adjustment screw clockwise to increase the pressure. Be sure to re-tighten the lock nut after the adjustment.

- **Min. Controlled Flow for Types "2" and "4A" at The Time of Meter-out Control**
  Minimum controlled flow at the time of meter-out control is limited (this does not happen during meter-in control) as shown in the figure below only in the case of pilot control types "2" (DSLHG-✻-2) and "4A" (DSLHG-✻-4A).

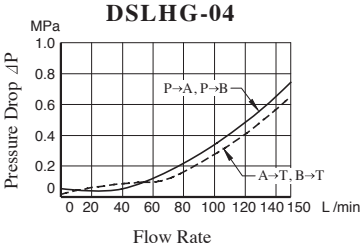
Min. Controlled Flow for Types "2" and "4A" at The Time of Meter-out Control



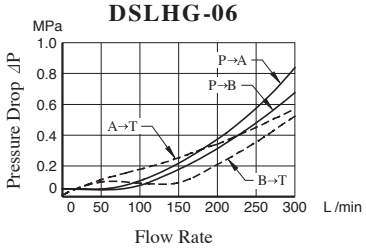
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop

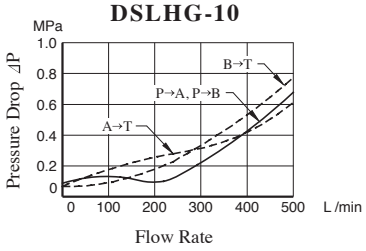
DSLHG-04



DSLHG-06



DSLHG-10



- For any other viscosity, multiply the factors in the table below.

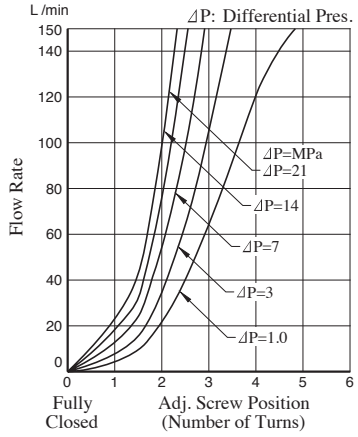
Viscosity	mm^2/s	15	20	30	40	50	60	70	80	90	100
Factor		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

- For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.

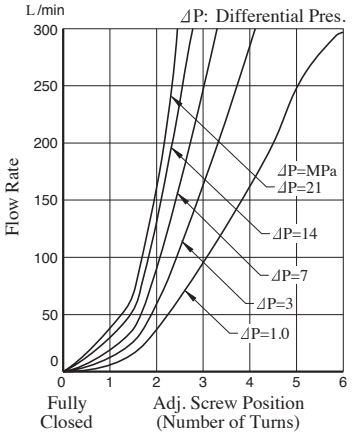
$$\Delta P' = \Delta P \, (G'/0.850)$$

Flow vs. Adjustment Revolutions

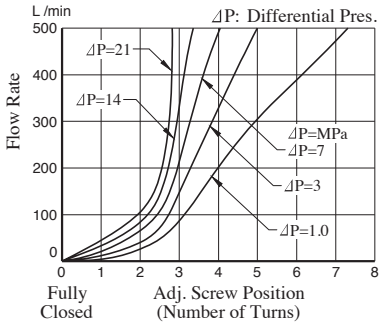
DSLHG-04



DSLHG-06



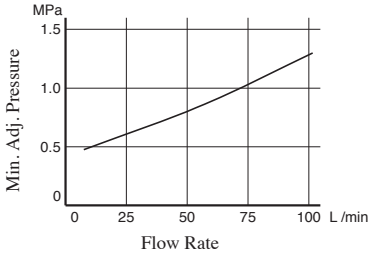
DSLHG-10



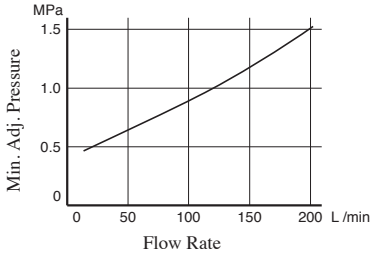
Minimum Adjustment Pressure

Because the minimum adjustment pressure varies with the tank line back pressure, add the tank line back pressure to the value on the following lines.

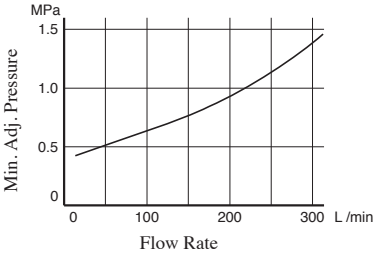
DSLHG-04-$\frac{4}{5}$*



DSLHG-06-$\frac{4}{5}$*



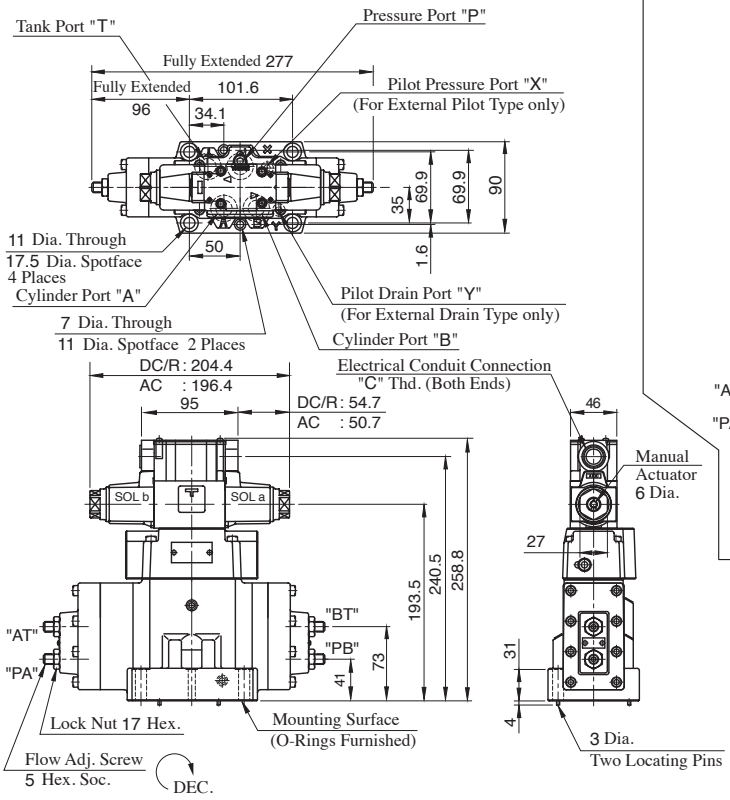
DSLHG-10-$\frac{4}{5}$*



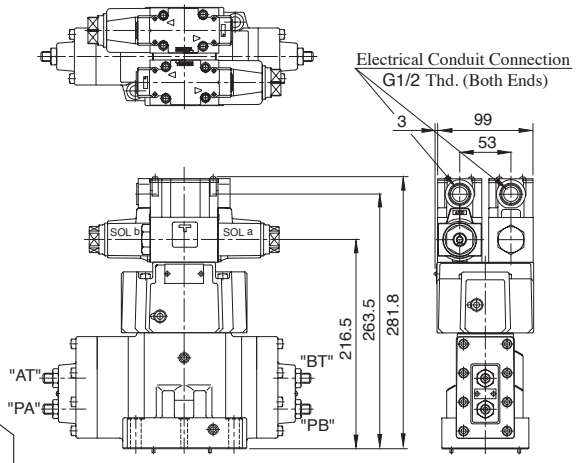
DSLHG-04-$\frac{1}{2}$-∗-13

Terminal Box Type

Mounting Surface:
ISO 4401-07-07-0-05

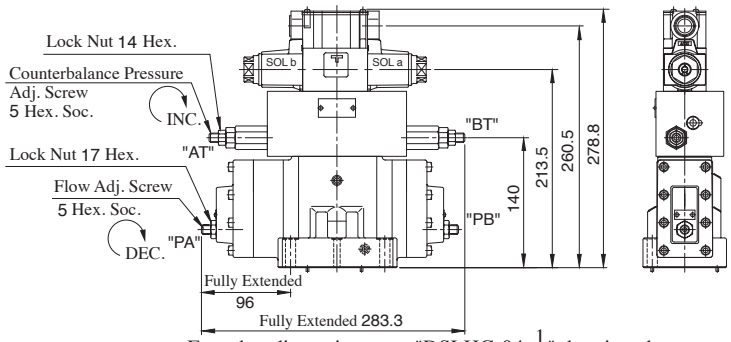


DSLHG-04-3-∗-13



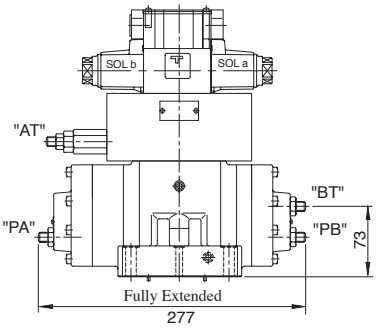
For other dimensions, see "DSLHG-04-$\frac{1}{2}$" drawing left.

DSLHG-04-4W-∗-∗-13



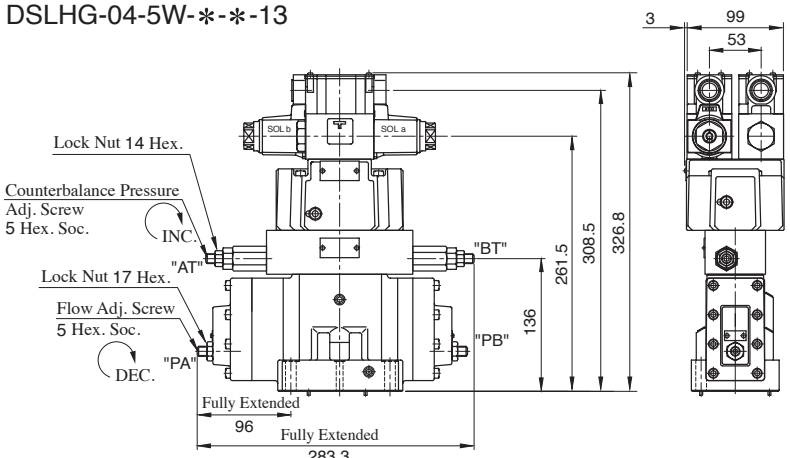
For other dimensions, see "DSLHG-04-$\frac{1}{2}$" drawing above.

DSLHG-04-4A-∗-∗-13



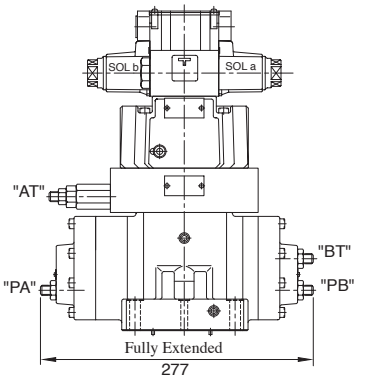
For other dimensions, see "DSLHG-04-4W" drawing left.

DSLHG-04-5W-∗-∗-13



For other dimensions, see "DSLHG-04-$\frac{1}{2}$" drawing above.

DSLHG-04-5A-∗-∗-13

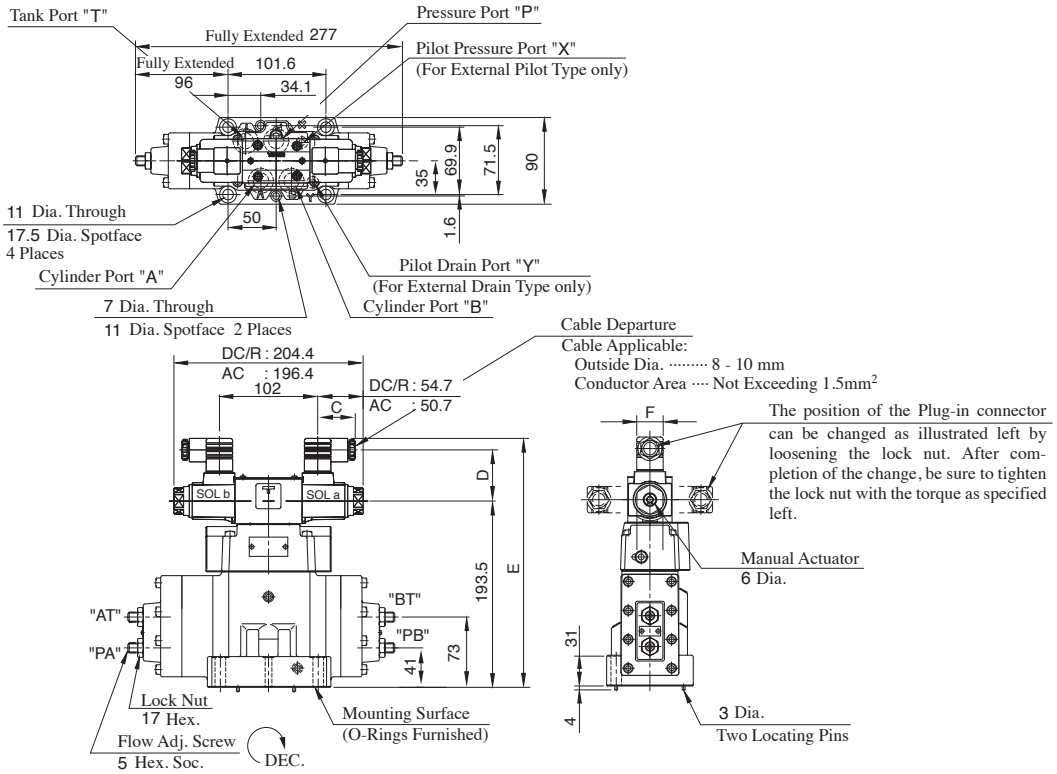


For other dimensions, see "DSLHG-04-5W" drawing left.

DSLHG-04-$\frac{1}{2}$-∗-N-13

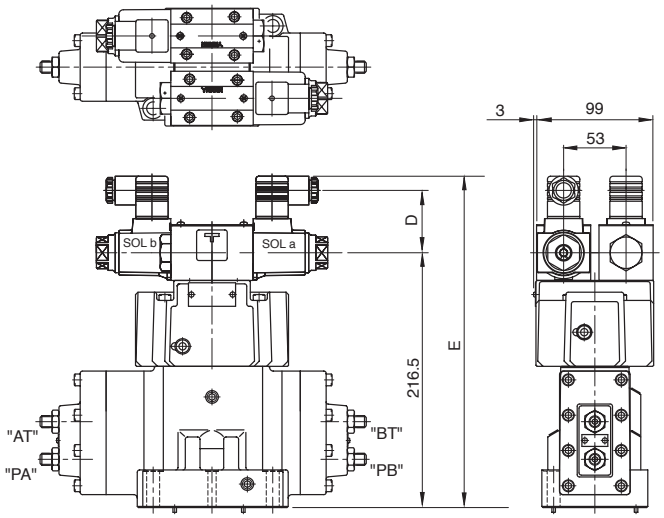
Plug-in Connector Type

Mounting Surface:
ISO 4401-07-07-0-05



Model Numbers	C	D	E	F
DSLHG-04-∗-A∗-N	39	53	258.5	27.5
DSLHG-04-∗-D∗-N	39	64	269.5	27.5
DSLHG-04-∗-R∗-N	53	57.2	272.5	34

DSLHG-04-3-∗-N-13



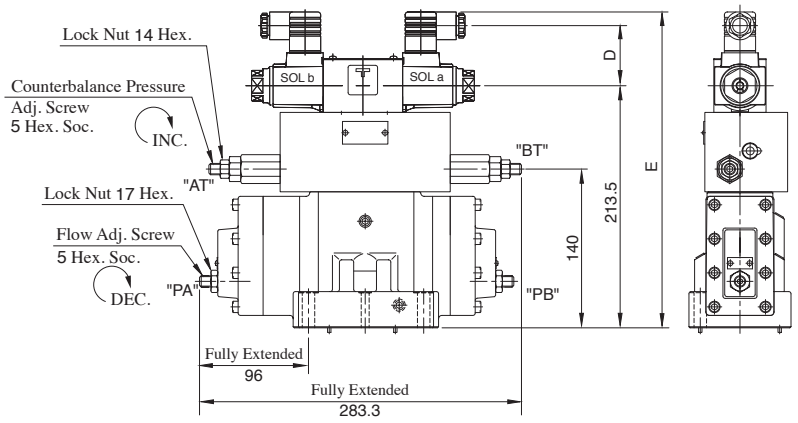
Model Numbers	D	E
DSLHG-04-3-A∗-N	53	281.5
DSLHG-04-3-D∗-N	64	292.5
DSLHG-04-3-R∗-N	57.2	299.5

For other dimensions, see "DSLHG-04-$\frac{1}{2}$-∗-N" drawing above.

Plug-in Connector Type

Mounting Surface:
ISO 4401-07-07-0-05

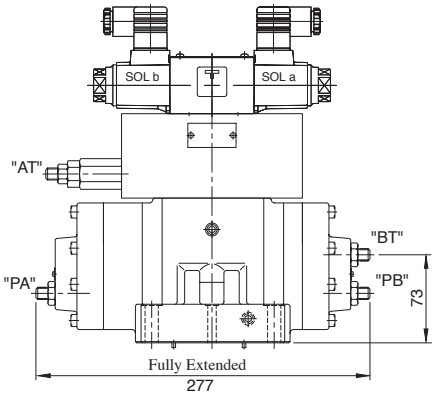
DSLHG-04-4W-∗-∗-N-13



Model Numbers	D	E
DSLHG-04-4W-∗-A∗-N	53	278.5
DSLHG-04-4W-∗-D∗-N	64	289.5
DSLHG-04-4W-∗-R∗-N	57.2	292.5

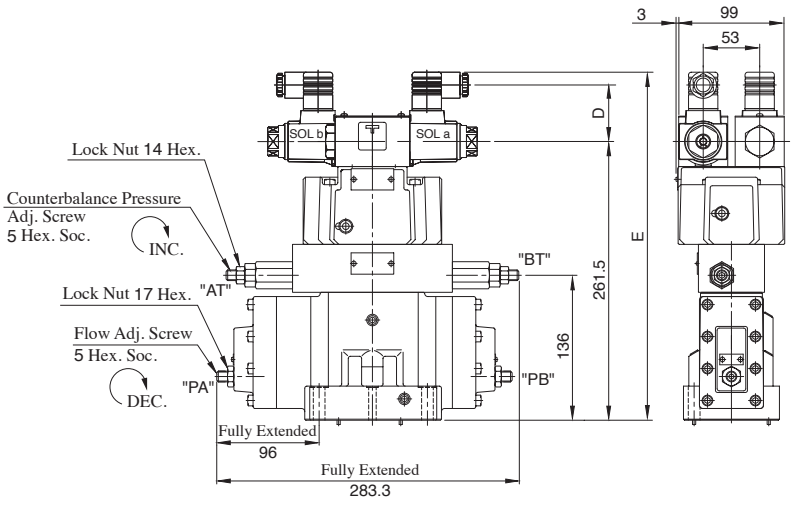
For other dimensions, see DSLHG-04-$\frac{1}{2}$-∗-N on the previous page.

DSLHG-04-4A-∗-∗-N-13



For other dimensions, see
"DSLHG-04-4W-∗-∗-N" drawing left.

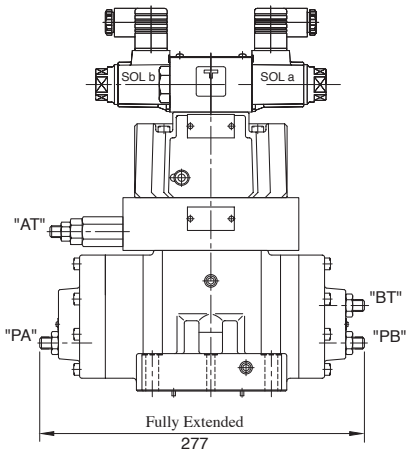
DSLHG-04-5W-∗-∗-N-13



Model Numbers	D	E
DSLHG-04-5W-∗-A∗-N	53	326.5
DSLHG-04-5W-∗-D∗-N	64	337.5
DSLHG-04-5W-∗-R∗-N	57.2	340.5

For other dimensions, see DSLHG-04-$\frac{1}{2}$-∗-N on the previous page.

DSLHG-04-5A-∗-∗-N-13

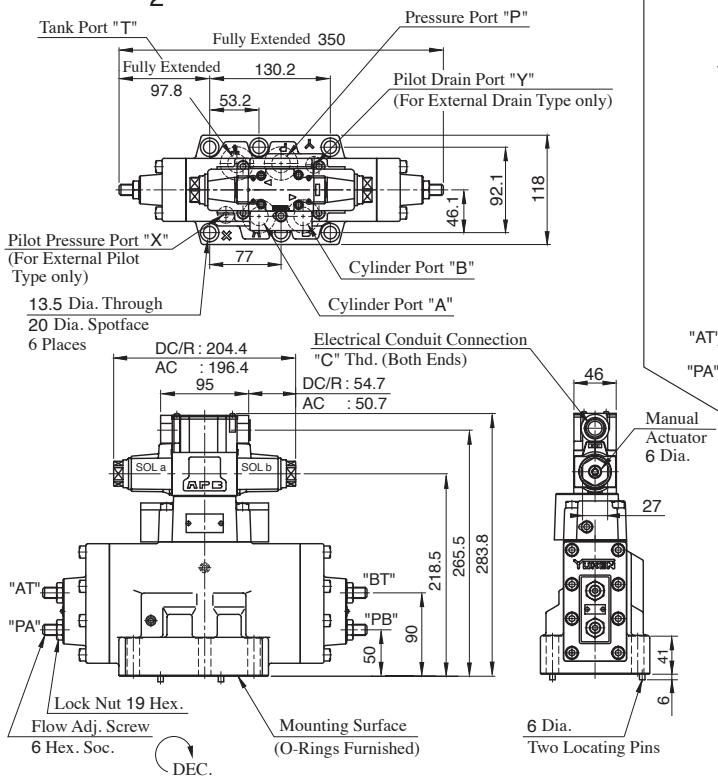


For other dimensions, see
"DSLHG-04-5W-∗-∗-N" drawing left.

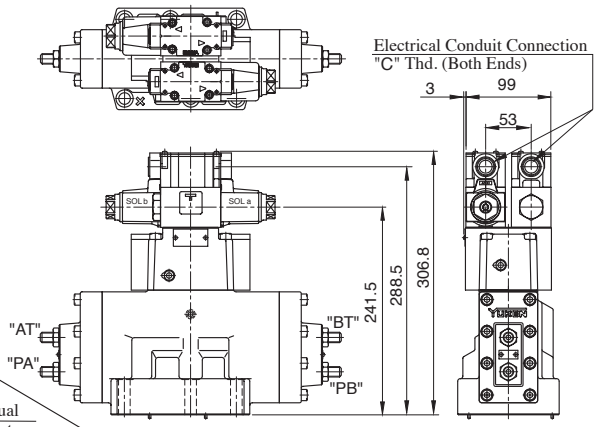
Terminal Box Type

Mounting Surface:
ISO 4401-08-08-0-05

DSLHG-06-$\frac{1}{2}$-∗-13

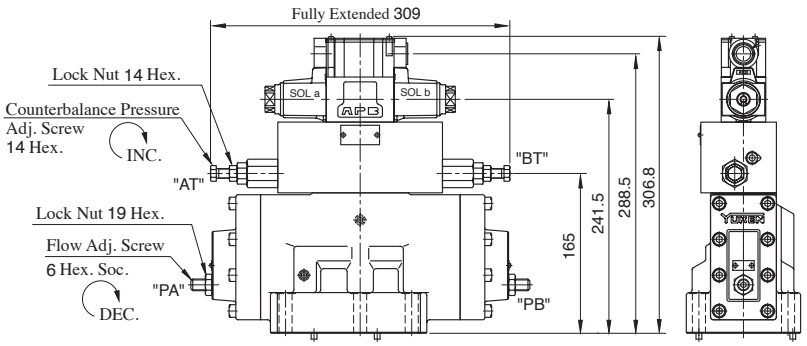


DSLHG-06-3-∗-13



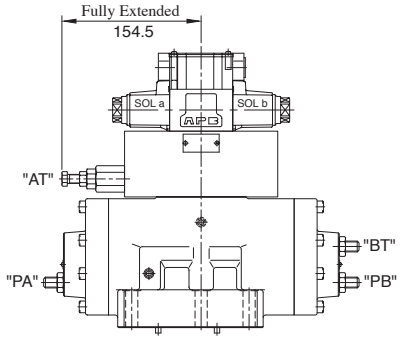
For other dimensions, see "DSLHG-06-$\frac{1}{2}$" drawing left.

DSLHG-06-4W-∗-13



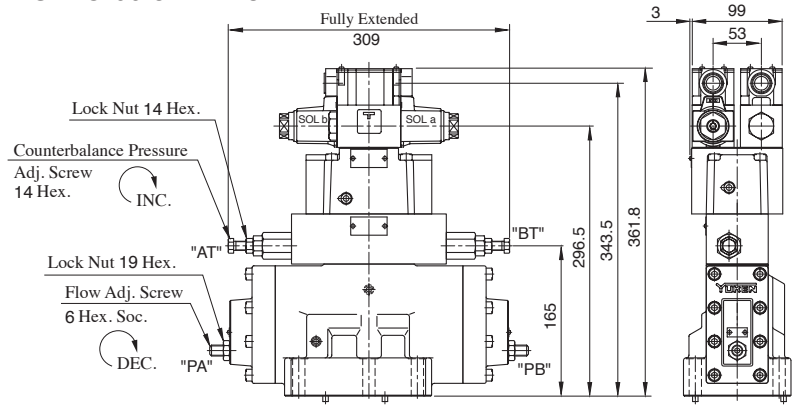
For other dimensions, see "DSLHG-06-$\frac{1}{2}$" drawing above.

DSLHG-06-4A-∗-13



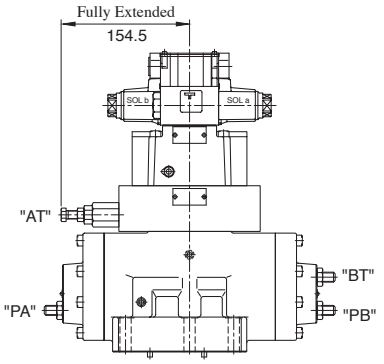
For other dimensions, see "DSLHG-06-4W" drawing left.

DSLHG-06-5W-∗-13



For other dimensions, see "DSLHG-06-$\frac{1}{2}$" drawing above.

DSLHG-06-5A-∗-13

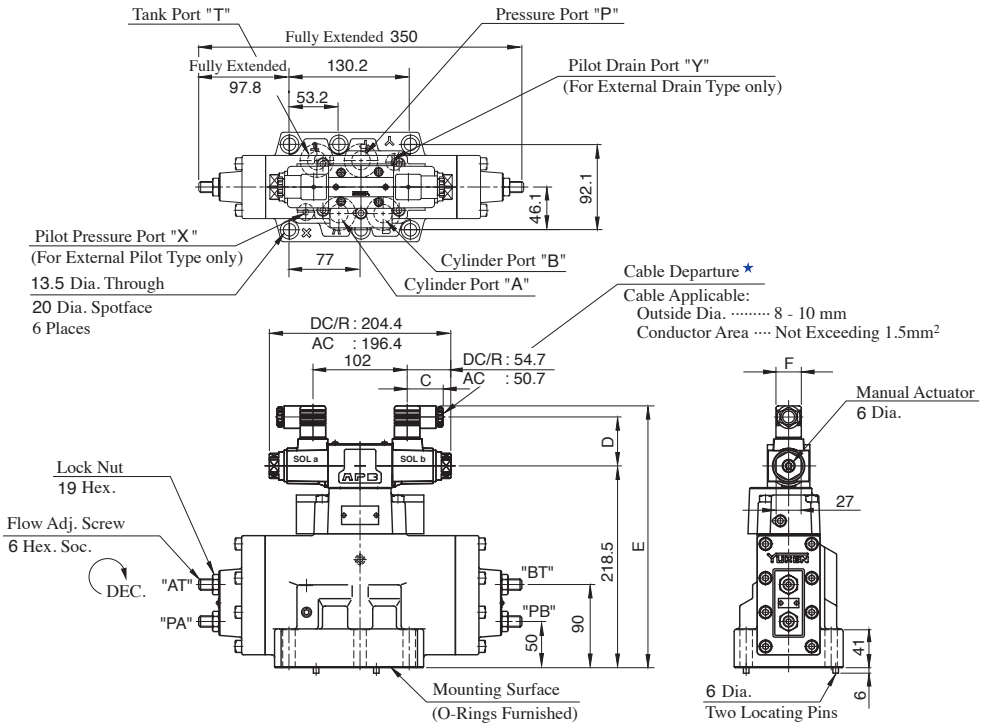


For other dimensions, see "DSLHG-06-5W" drawing left.

DSLHG-06-$\frac{1}{2}$-∗-N-13

Plug-in Connector Type

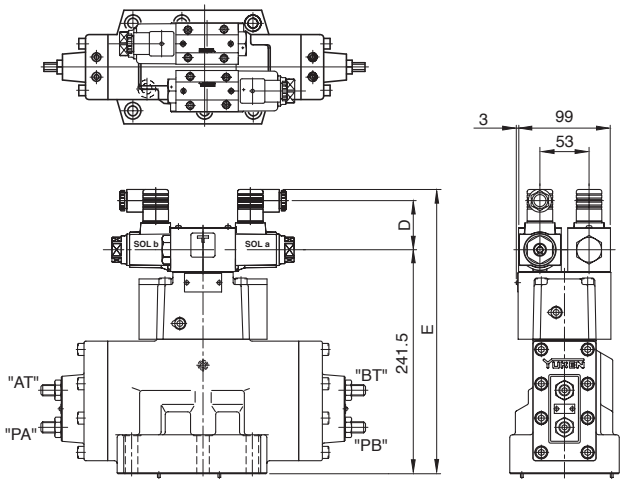
Mounting Surface:
ISO 4401-08-08-0-05



Model Numbers	C	D	E	F
DSLHG-06-∗-A∗-N	39	53	283.5	27.5
DSLHG-06-∗-D∗-N	39	64	294.5	27.5
DSLHG-06-∗-R∗-N	53	57.2	297.5	34

★ Position of cable departure can be changed. For the details, refer to DSLHG-04 valve on page E-109.

DSLHG-06-3-∗-N-13



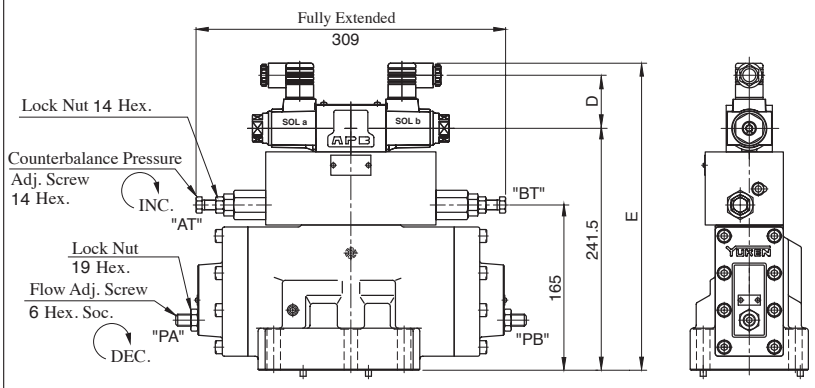
Model Numbers	D	E
DSLHG-06-3-A∗-N	53	306.5
DSLHG-06-3-D∗-N	64	317.5
DSLHG-06-3-R∗-N	57.2	320.5

For other dimensions, see "DSLHG-06-$\frac{1}{2}$-∗-N" drawing above.

Plug-in Connector Type

Mounting Surface:
ISO 4401-08-08-0-05

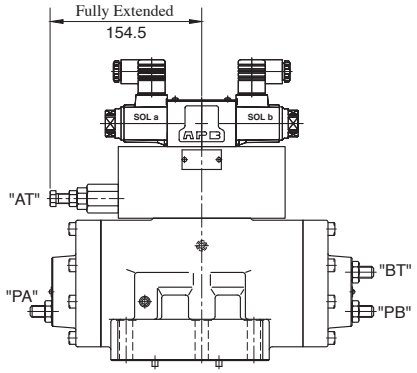
DSLHG-06-4W-∗-N-13



Model Numbers	D	E
DSLHG-06-4W-A∗-N	53	306.5
DSLHG-06-4W-D∗-N	64	317.5
DSLHG-06-4W-R∗-N	57.2	320.5

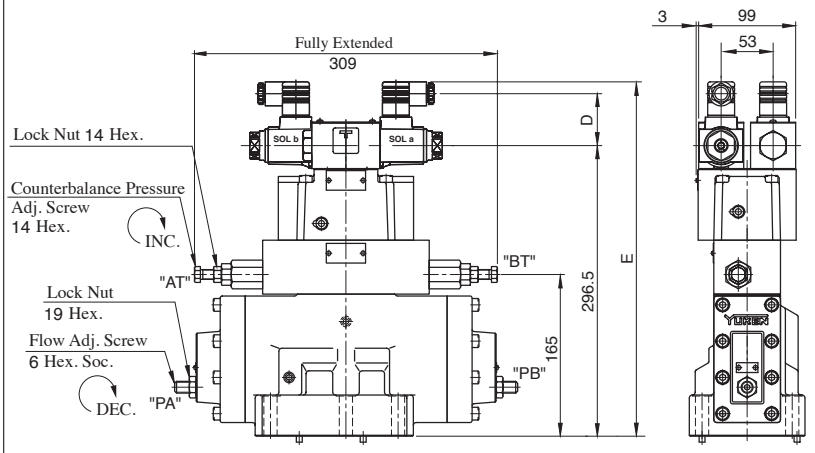
For other dimensions, see DSLHG-06-$\frac{1}{2}$-∗-N on the previous page.

DSLHG-06-4A-∗-N-13



For other dimensions, see "DSLHG-06-4W-∗-N" drawing left.

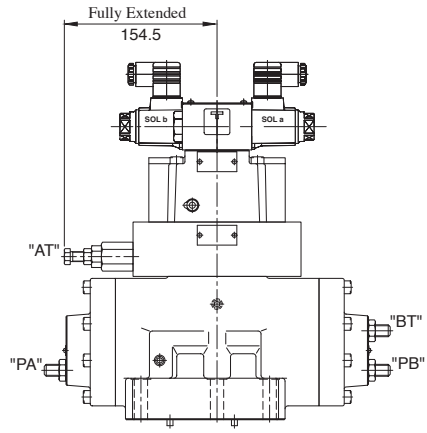
DSLHG-06-5W-∗-N-13



Model Numbers	D	E
DSLHG-06-5W-A∗-N	53	361.5
DSLHG-06-5W-D∗-N	64	372.5
DSLHG-06-5W-R∗-N	57.2	375.5

For other dimensions, see DSLHG-06-$\frac{1}{2}$-∗-N on the previous page.

DSLHG-06-5A-∗-N-13

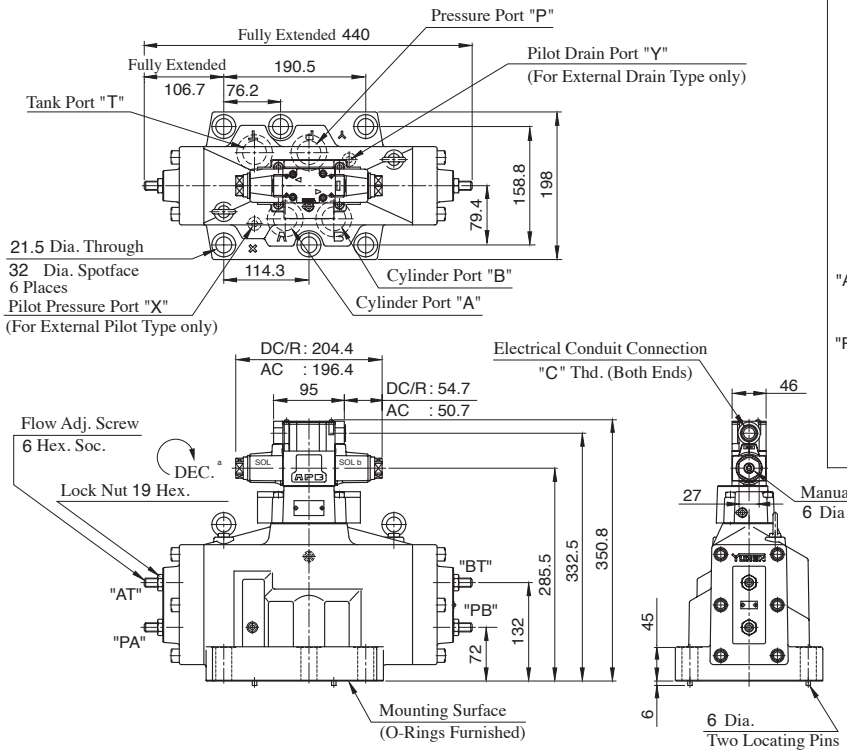


For other dimensions, see "DSLHG-06-5W-∗-N" drawing left.

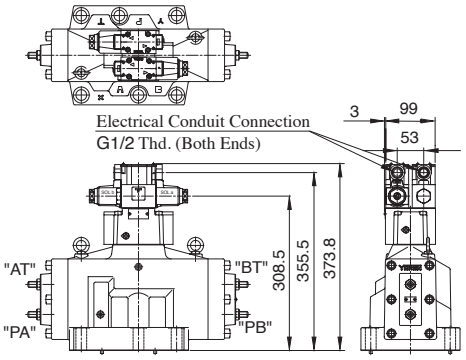
Terminal Box Type

Mounting Surface:
ISO 4401-10-09-0-05

DSLHG-10-$\frac{1}{2}$-∗-13

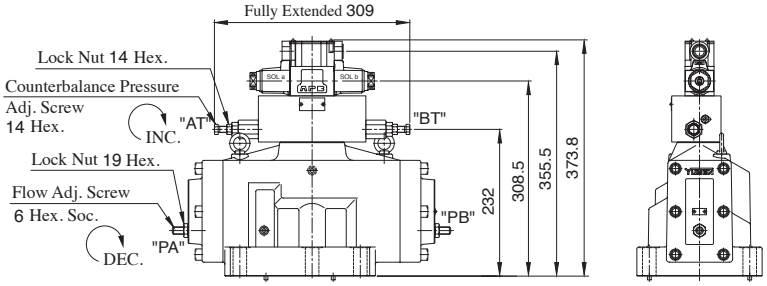


DSLHG-10-3-∗-13



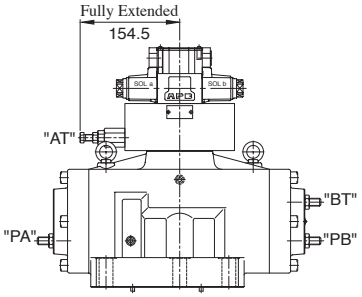
For other dimensions, see "DSLHG-10-$\frac{1}{2}$" drawing left.

DSLHG-10-4W-∗-13



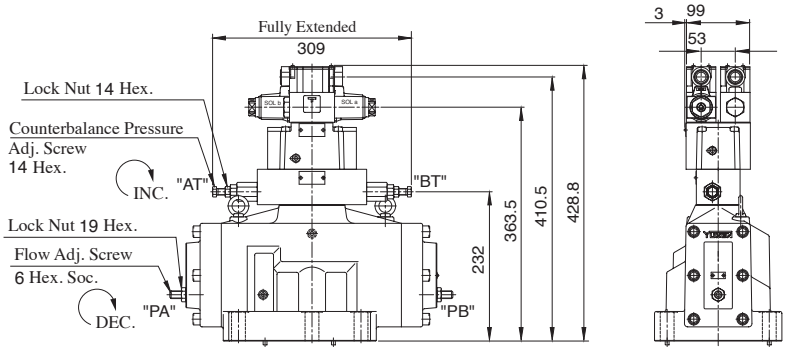
For other dimensions, see "DSLHG-10-$\frac{1}{2}$" drawing above.

DSLHG-10-4A-∗-13



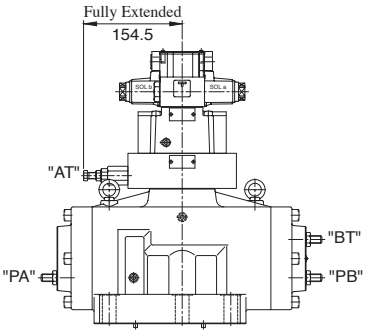
For other dimensions, see "DSLHG-10-4W" drawing left.

DSLHG-10-5W-∗-13



For other dimensions, see "DSLHG-10-$\frac{1}{2}$" drawing above.

DSLHG-10-5A-∗-13

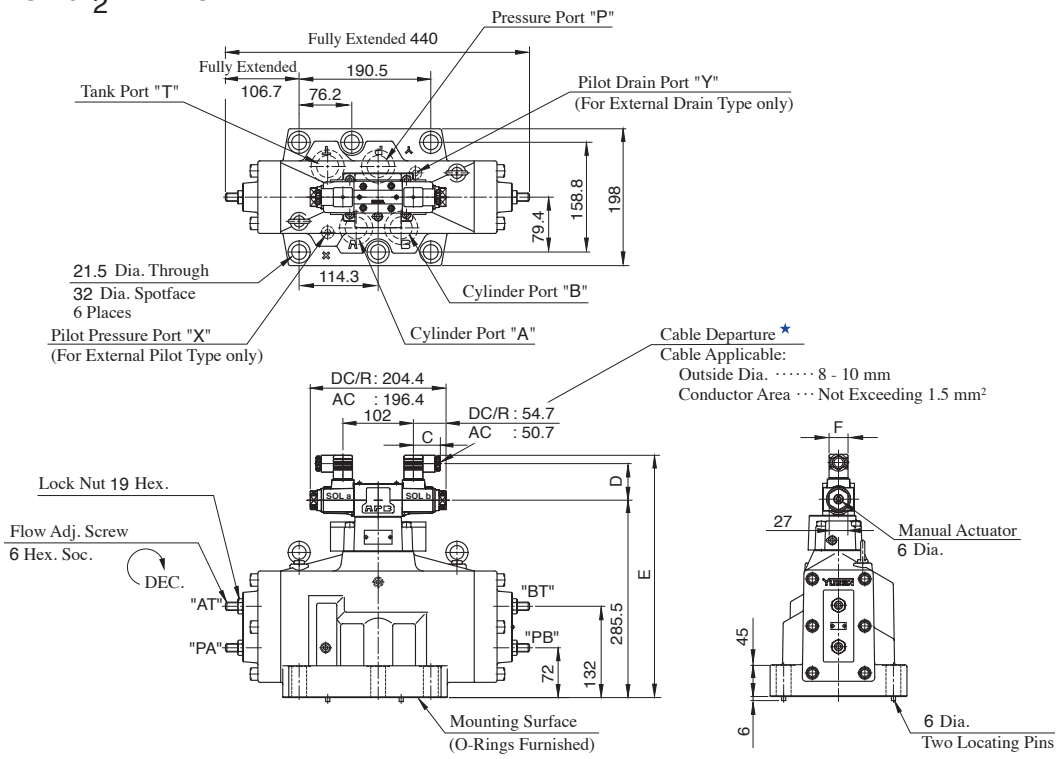


For other dimensions, see "DSLHG-10-5W" drawing left.

Plug-in Connector Type

Mounting Surface:
ISO 4401-10-09-0-05

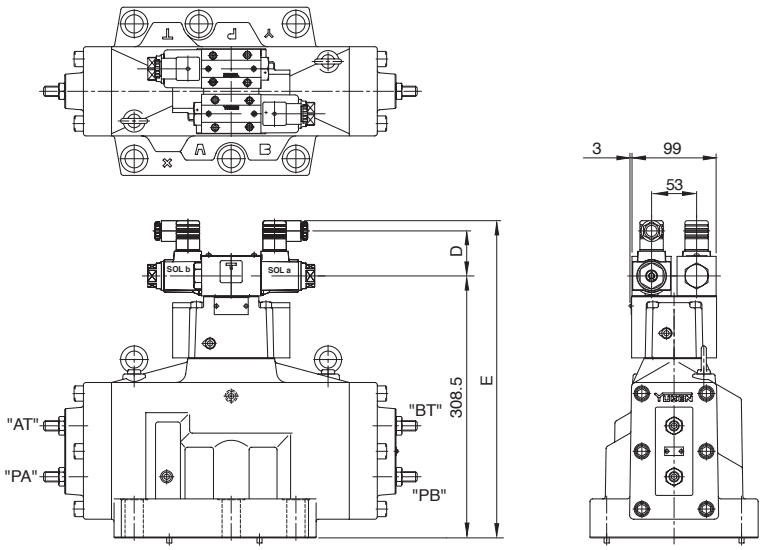
DSLHG-10-$\frac{1}{2}$-∗-N-13



Model Numbers	C	D	E	F
DSLHG-10-∗-A∗-N	39	53	350.5	27.5
DSLHG-10-∗-D∗-N	39	64	361.5	27.5
DSLHG-10-∗-R∗-N	53	57.2	364.5	34

★ Position of cable departure can be changed. For the details, refer to DSLHG-04 valve on page E-109.

DSLHG-10-3∗ -N-13



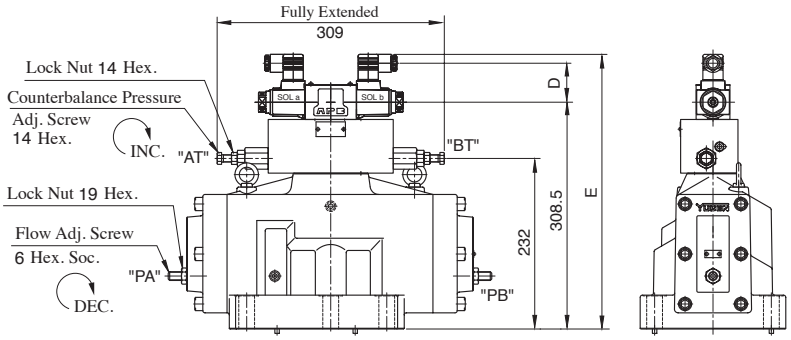
Model Numbers	D	E
DSLHG-10-3-A∗-N	53	373.5
DSLHG-10-3-D∗-N	64	384.5
DSLHG-10-3-R∗-N	57.2	387.5

For other dimensions, see "DSLHG-10-$\frac{1}{2}$-∗-N" drawing above.

Plug-in Connector Type

Mounting Surface:
ISO 4401-10-09-0-05

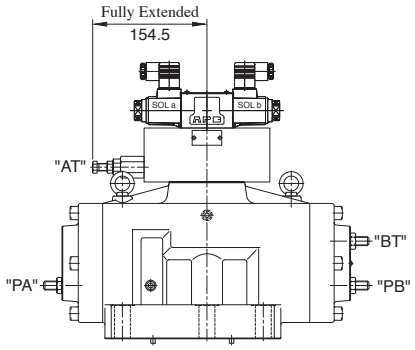
DSLHG-10-4W-∗-N-13



Model Numbers	D	E
DSLHG-10-4W-A∗-N	53	373.5
DSLHG-10-4W-D∗-N	64	384.5
DSLHG-10-4W-R∗-N	57.2	387.5

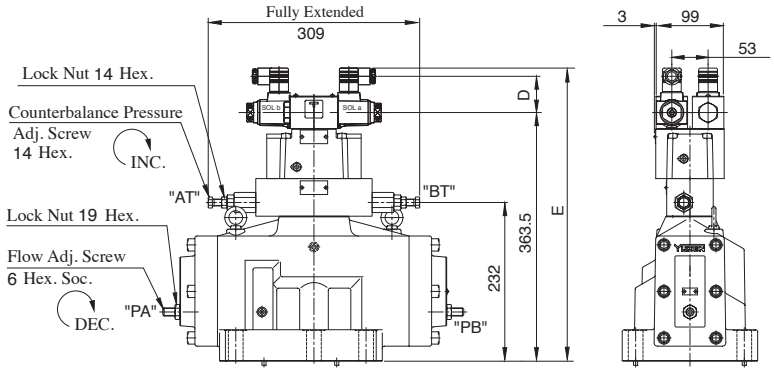
For other dimensions, see DSLHG-10-$\frac{1}{2}$-∗-N on the previous page.

DSLHG-10-4A-∗-N-13



For other dimensions, see
"DSLHG-10-4W-∗-N" drawing left.

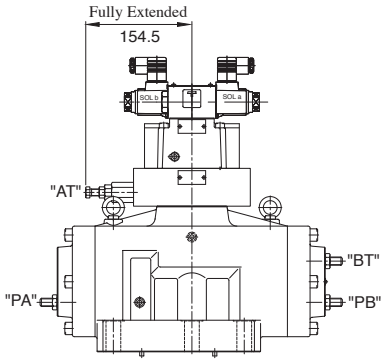
DSLHG-10-5W-∗-N-13



Model Numbers	D	E
DSLHG-10-5W-A∗-N	53	428.5
DSLHG-10-5W-D∗-N	64	439.5
DSLHG-10-5W-R∗-N	57.2	442.5

For other dimensions, see DSLHG-10-$\frac{1}{2}$-∗-N on the previous page.

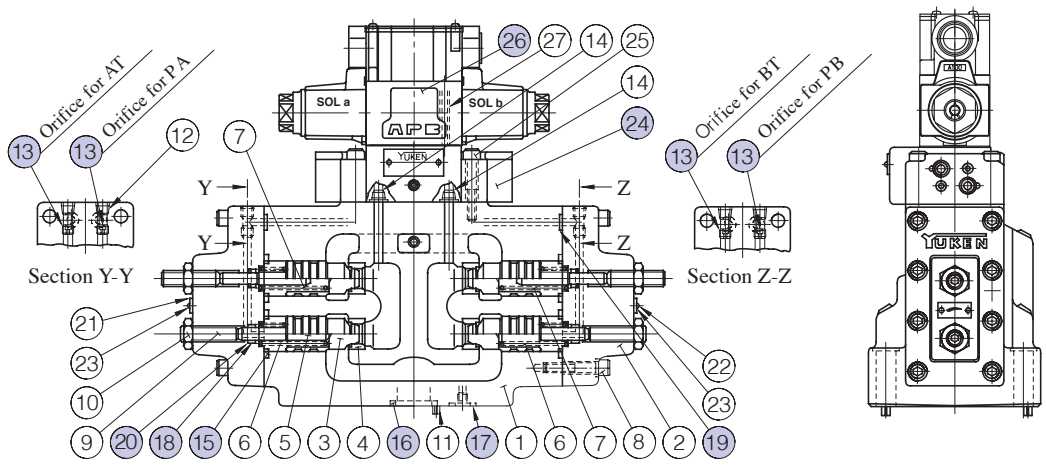
DSLHG-10-5A-∗-N-13



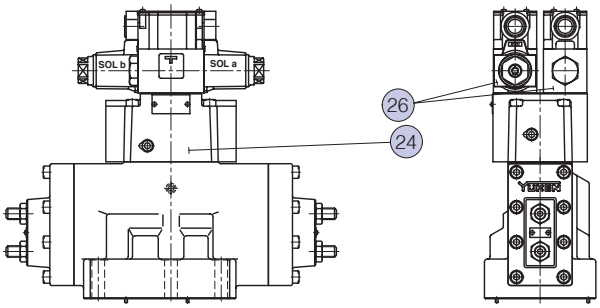
For other dimensions, see
"DSLHG-10-5W-∗-N" drawing left.

List of Seals for Main Valve, Pilot Selector Valve and Orifice

DSLHG-04/06/10-$\frac{1}{2}$-∗-13



DSLHG-04/06/10-3-∗-13



Note) Main valve is same as above drawings.

List of Seals for Main Valves

Item	Name of Parts	Part Numbers			Qty.
		DSLHG-04	DSLHG-06	DSLHG-10	
15	O-Ring	OR NBR-90 P22-N	OR NBR-90 G30-N	OR NBR-90 G40-N	4
16	O-Ring	OR NBR-90 P22-N	OR NBR-90 P30-N	OR NBR-90 P42-N	4
17	O-Ring	OR NBR-90 P9-N	OR NBR-90 P14-N	OR NBR-90 P14-N	2
18	O-Ring	OR NBR-70 P8-N	OR NBR-70 P10-N	OR NBR-70 P16-N	4
19	O-Ring	OR NBR-90 P8-N	OR NBR-90 P9-N	OR NBR-90 P11-N	4
20	Back Up Ring	BR JIS B 2401-4-T2-P8	BR JIS B 2401-4-T2-P10	BR JIS B 2401-4-T2-P16	4

Item (13) Orifice

The timing of flow path opening/closing can be adjusted as required by selecting the appropriate pilot orifice diameter. When the diameter of the orifice is to be changed, another orifice should be ordered. Standard built-in orifice diameters and selectable orifice diameters are listed in the table below.

Orifice Type	TP-OPT-1/16 x d		
Model Numbers	Orifice Diameter "d" mm		
	Standard Built-in	Selectable	Max. Dia. at Pressure over 20 MPa
DSLHG-04	1.0	0.5, 0.6, 0.8, 1.0	1.2
DSLHG-06	1.2	1.2, 1.4, 1.6, 1.8	
DSLHG-10	1.4	2.0, 2.5	1.4

Item (24) Pilot Selector Valve List

Multi-Purpose Control Valve Model Numbers	(24) Pilot Selector Valve Model Numbers
DSLHG-04-1	CG-04-1-10
DSLHG-04-2	CG-04-2-10
DSLHG-04-3	CG-04-3-10
DSLHG-06-1	CG-06-1-10
DSLHG-06-2	CG-06-2-10
DSLHG-06-3	CG-06-3-10
DSLHG-10-1	CG-06-1-10
DSLHG-10-2	CG-06-2-10
DSLHG-10-3	CG-06-3-10

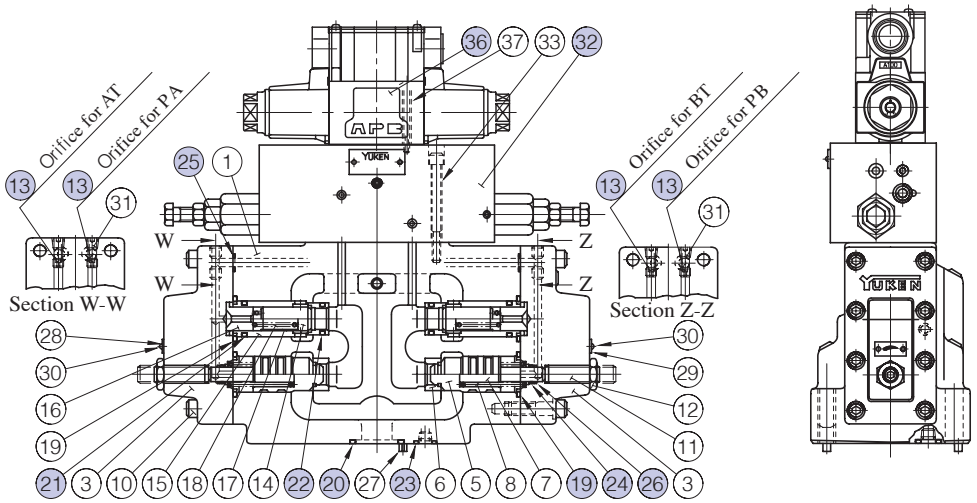
Note For details of Pilot Selector Valve, see page E-119.

Pilot Valve

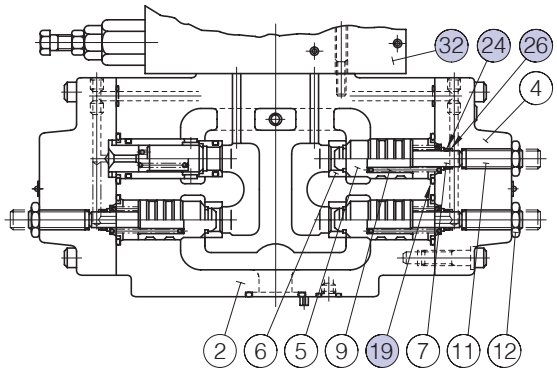
Refer to page E-121 for Pilot Valve Model Numbers.

■ List of Seals for Main Valves and Pilot Selector Valve

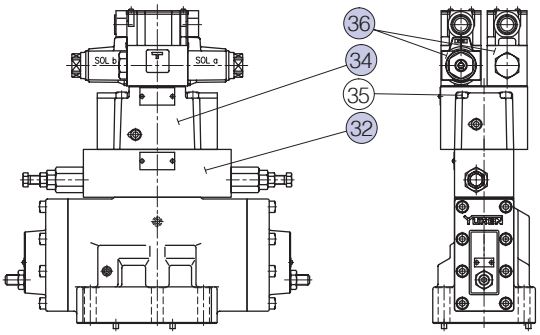
DSLHG-04/06/10-4W-∗-12



DSLHG-04/06/10-$^{4A}_{5A}$-∗-12



DSLHG-04/06/10-5W-∗-12



Note) Main valve is the same as above drawings.

● List of Seals for Main Valves

Item	Name of Parts	Part Numbers			Qty.
		DSLHG-04	DSLHG-06	DSLHG-10	
19	O-Ring	OR NBR-90 P22-N	OR NBR-90 G30-N	OR NBR-90 G40-N	4
20	O-Ring	OR NBR-90 P22-N	OR NBR-90 P30-N	OR NBR-90 P42-N	4
21	O-Ring	OR NBR-90 P16-N	OR NBR-90 P22-N	OR NBR-90 P30-N	2(1)
22	O-Ring	OR NBR-90 P14-N	OR NBR-90 P20-N	AS568-A122(NBR-90)	2(1)
23	O-Ring	OR NBR-90 P9-N	OR NBR-90 P14-N	OR NBR-90 P14-N	2
24	O-Ring	OR NBR-70 P8-N	OR NBR-70 P10-N	OR NBR-70 P16-N	2(3)
25	O-Ring	OR NBR-90 P8-N	OR NBR-90 P9-N	OR NBR-90 P11-N	4
26	Back Up Ring	BR JIS B 2401-4-T2-P8	BR JIS B 2401-4-T2-P10	BR JIS B 2401-4-T2-P16	2(3)

Note 1: The figures in ( ) indicate the quantity of seals used for 4A and 5A.

● Pilot Valve

Refer to page E-121 for Pilot Valve Model Numbers.

● Pilot Selector Valve List

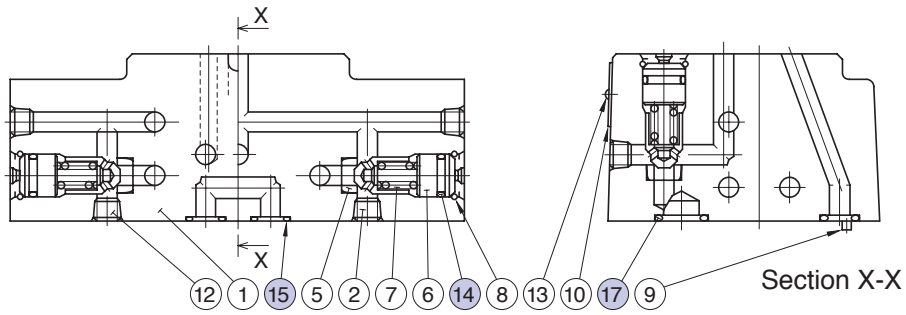
Multi-Purpose Control Valve Model Numbers	Pilot Selector Valve Model Numbers	
	Item ㉜	Item ㉞
DSLHG-04-4A-■	CG-04-4A-■-10	—
DSLHG-04-4W-■	CG-04-4W-■-10	—
DSLHG-04-5A-■	CG-04-5A-■-10	CG-04-3-10
DSLHG-04-5W-■	CG-04-5W-■-10	
DSLHG-06-4A	CG-06-4A-10	—
DSLHG-06-4W	CG-06-4W-10	—
DSLHG-06-5A	CG-06-5A-10	CG-06-3-10
DSLHG-06-5W	CG-06-5W-10	
DSLHG-10-4A	CG-06-4A-10	—
DSLHG-10-4W	CG-06-4W-10	—
DSLHG-10-5A	CG-06-5A-10	CG-06-3-10
DSLHG-10-5W	CG-06-5W-10	

Note: Fill "B" or "H" representing the pressure adjustment range in section marked with ■.
See page E-120 for the details of the pilot selector valves.

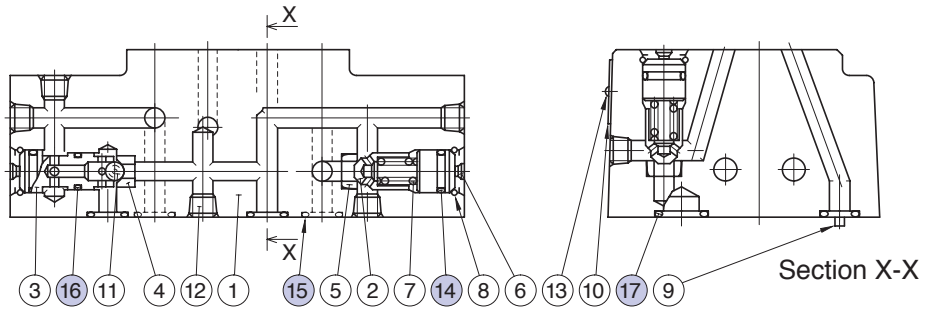
● See the previous page for Item ⑬ Orifice.

■ List of Seals (Pilot Selector Valves)

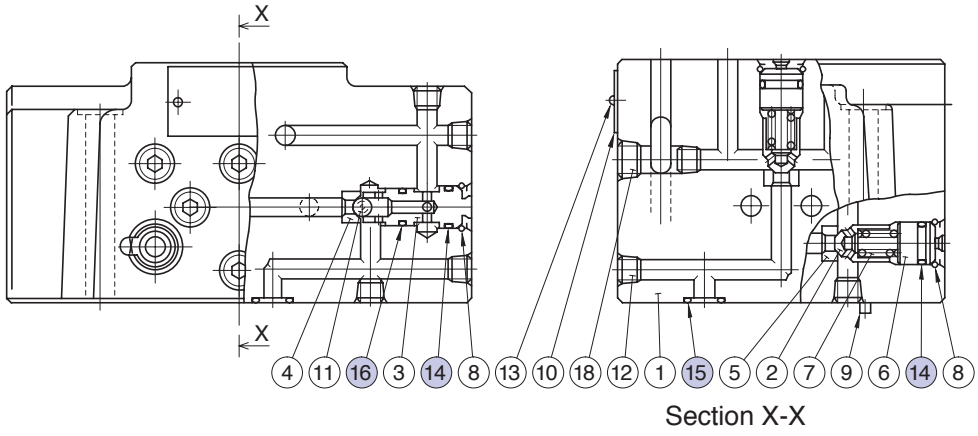
CG-04/06-1-10



CG-04/06-2-10



CG-04/06-3-10

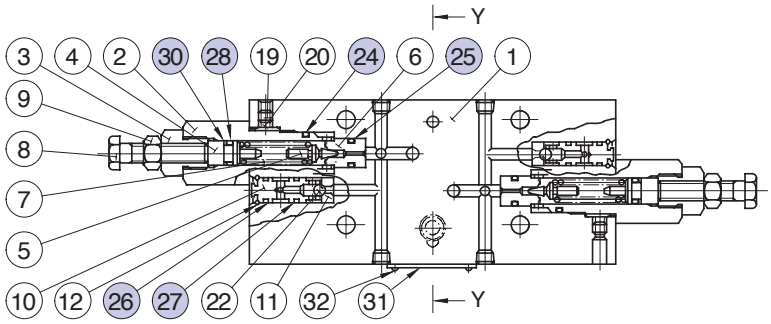


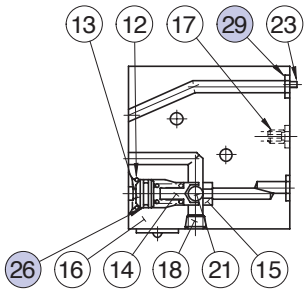
● List of Seals

Item	Name of Parts	CG-04				CG-06			
		Part Numbers	Quantity			Part Nmbers	Quantity		
			CG-04-1	CG-04-2	CG-04-3		CG-06-1	CG-06-2	CG-06-3
14	O-Ring	OR NBR-90 P10-N	3	5	5	OR NBR-90 P10-N	3	5	5
15	O-Ring	OR NBR-90 P8-N	7	7	8	OR NBR-90 P9-N	7	7	8
16	O-Ring	OR NBR-90 P8-N	—	2	2	OR NBR-90 P8-N	—	2	2
17	O-Ring	OR NBR-90 P8-N	1	1	—	AS568-A014(NBR-90)	1	1	—

■ List of Seals (Pilot Selector Valves)

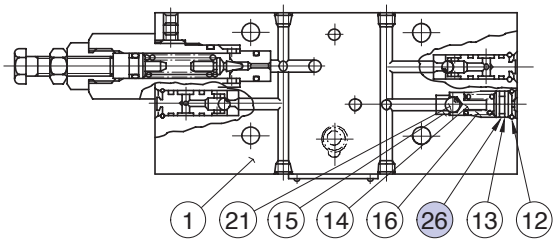
CG-04/06-4W-10



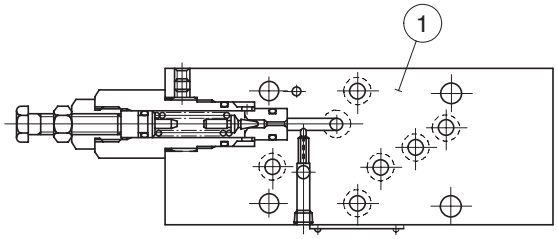


Section Y-Y

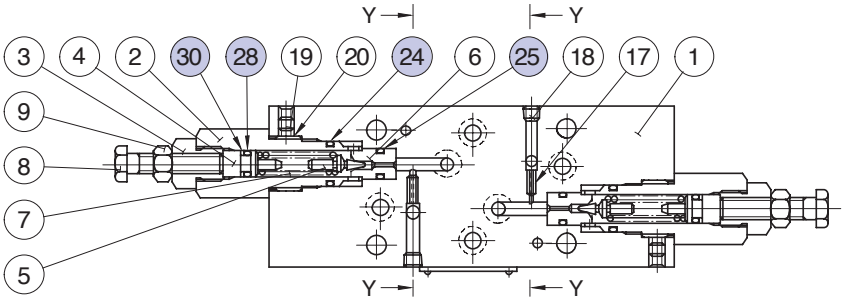
CG-04/06-4A-10

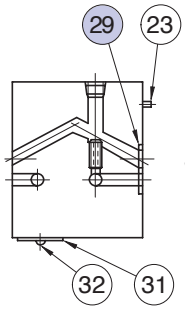


CG-04/06-5A-10



CG-04/06-5W-10





Section Y-Y

● List of Seals

Item	Name of Parts	CG-04					CG-06				
		Part Numbers	Quantity				Part Nmbers	Quantity			
			-4W-	-4A-	-5W-	-5A-		-4W-	-4A-	-5W-	-5A-
24	O-Ring	OR NBR-90 P12-N	2	1	2	1	OR NBR-90 P16-N	2	1	2	1
25	O-Ring	OR NBR-90 P9-N	2	1	2	1	OR NBR-90 P11-N	2	1	2	1
26	O-Ring	OR NBR-90 P10-N	3	4	—	—	OR NBR-90 P10-N	3	4	—	—
27	O-Ring	OR NBR-90 P8-N	2	2	—	—	OR NBR-90 P8-N	2	2	—	—
28	O-Ring	OR NBR-70 P6-N	2	1	2	1	OR NBR-70 P9-N	2	1	2	1
29	O-Ring	OR NBR-90 P8-N	8	8	8	8	OR NBR-90 P9-N	8	8	8	8
30	Back Up Ring	BR JIS B 2401-4-T2-P6	2	1	2	1	BR JIS B 2401-4-T2-P9	2	1	2	1

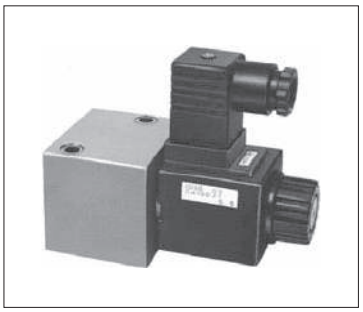
List of Pilot Valves

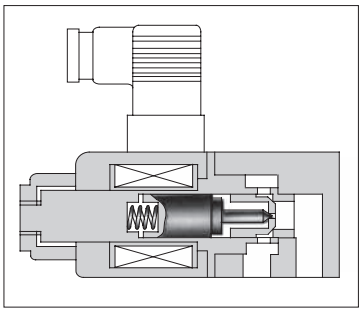
Model Numbers	Pilot Valve Model Numbers
DSLHG-04-1-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-04-2-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-04-3-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-04-4A-✻-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-04-4W-✻-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-04-5A-✻-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-04-5W-✻-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-06-1-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-06-2-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-06-3-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-06-4A-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-06-4W-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-06-5A-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-06-5W-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-10-1-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-10-2-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-10-3-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-10-4A-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-10-4W-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-10-5A-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-10-5W-★-▲-13	DSG-01-2B2-★-▲-70

Note 1: Fill coil type (a symbol representing current/voltage) in section marked ★. Likewise, in section marked ▲, fill a symbol representing the type of electrical conduit connection (None: Terminal Box Type, N: Plug-in Connector Type).
2: See page E-22 for the detailed information on the pilot valves.

Solenoid Operated Poppet Type Two-Way Valves

These valves are used for opening/closing the oil path by having the poppet valve operated with an electric signal via solenoid. Because these are poppet type valves, the internal leakage is quite small and there is no worry about hydraulic lock.





Specifications

Model Numbers	Max. Flow★1 L/min	Max. Operating Pressure MPa	Internal leakage cm^3/min	Max. Changeover Frequency min^{-1}	Approx. Mass kg
CDSC-01-C-D24-10	15	21★2	0.25 or less	240	0.35
CDSC-03-C-＊-21	50	14	0.25 or less	AC：300 DC：240 R ：120	0.5
CDST-$^{03W}_{03}$-C-＊-21					0.85
CDSG-03-C-＊-21					0.85

★1. The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.

★2. When the valve is operated at 18.5 MPa or higher pressure, continuous energies time is restricted with max. 30 min., and also the energies ratio less than 90 %.

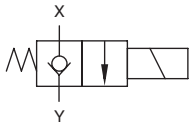
Solenoid Ratings

Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
			Source Rating	Serviceable Range	Inrush (A)	Holding (A)	Power (W)
AC	A 100	50	100	80 - 100	1.12	0.55	—
		60	100	90 - 120	0.95	0.40	
			110		0.86	0.36	
	A 120	50	120	96 - 132	0.93	0.46	
		60		108 - 144	0.79	0.33	
	A 200	50	200	160 - 220	0.56	0.28	
		60	200	180 - 240	0.48	0.20	
			220		0.43	0.18	
	A 240	50	240	192 - 264	0.47	0.23	
		60		216 - 288	0.40	0.17	
DC (K Series)	D 12	—	12	10.8 - 13.2	—	2.20	26
	D 24★		24	21.6 - 26.4		1.10	
	D 100		100	90 - 110		0.27	
AC → DC Rectified	R 100	50/60	100	90 - 110	—	0.30	26
	R 200		200	180 - 220		0.15	

★CDSC-01 is available with coil type “D24” only.

- Because both AC and DC solenoids employ the plug-in type electrical wiring, the valve can be removed without removing the wiring. (Coil type of CDSC-01 is flying lead wire only.)
- Being 50-60 Hz common service AC solenoids, do not require rewiring when the applied frequency is changed.
- K-Series DC Solenoid which has a reputation for excellent DC control is employed. (Coil type of CDSC-01 is with Surge Suppressor.)

Graphic Symbol



Instructions

Direction of flow when the solenoid is energised

These valves do not allow flow from Y to X when the solenoid is energised.

Mounting

There are no mounting restrictions for any models.

At the time of test run

At the time of test run, there is a possibility that the oil may not flow even after the solenoid is energised because of the residual air in the valve, so please release the air by few times solenoid energising at on-load condition.

Accessories

Mounting bolt below is attached only for Gasket mounting type valve (CDSG-03).

Socket Head Cap Screws：
M6×60L ...2pcs.

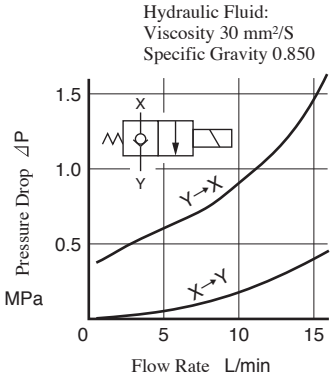
Model Number Designation

CDS	T	–03	–C	–D12	–21
Series Number	Type of Connection	Valve Size	Valve Type	Coil Type	Design Number
CDS：Solenoid Operated Poppet Type Two-Way Valves	C：Cartridge Type	01	C：Normally Closed	DC D24	10
		03		AC A100 A120 A200 A240	21
	T：Threaded Connection	03W (Rc 1/4)		DC D12 D24 D100	21
		03 (Rc 3/8)			
	G：Gasket Mounting	03		AC DC Rectified R100 R200	21

★ Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix “F-” to the model number because the special seals (fluororubber) are required to be used.

Pressure Drop

CDSC–01



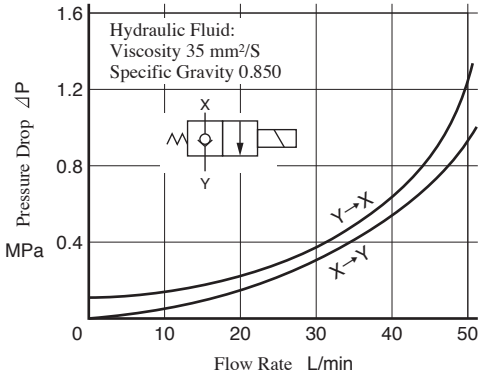
For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.84	0.91	1.00	1.07	1.14	1.19	1.24	1.28	1.32	1.35

For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.

⊿P' = ⊿P(G'/0.850)

CDSC–03
CDST–03
CDSG–03



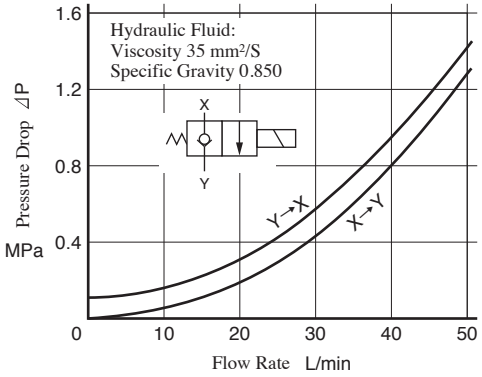
For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.

⊿P' = ⊿P(G'/0.850)

CDST–03W

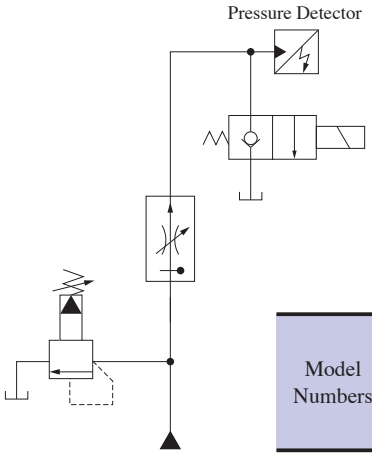


Note: Measuring has been made for the CDSC-03 (Cartridge type) when it is equipped with the same body as the threaded connections and the gasket mounting type.

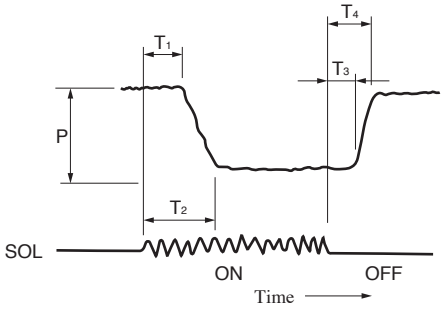
Changeover Time

Changeover time, T_2 and T_4, in particular, varies according to the hydraulic circuit and operating conditions. As an example, the following figures show how the measurement is made.

Test Circuit



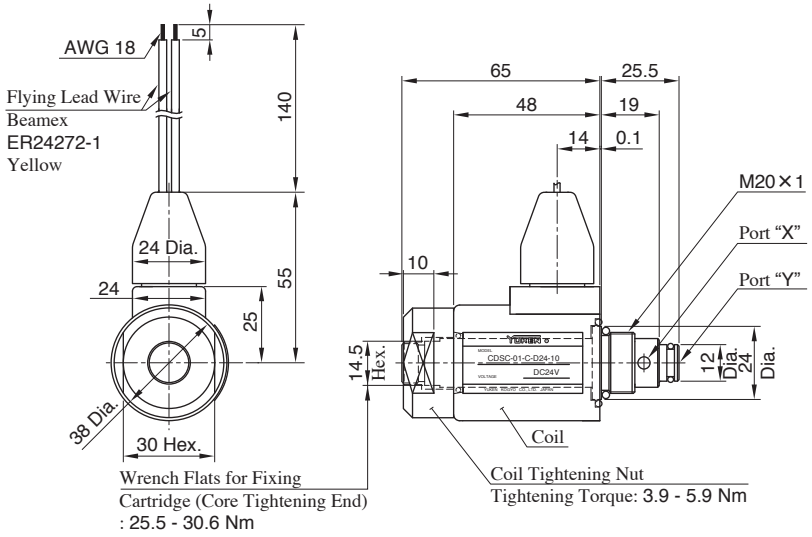
Result of measurement



Model Numbers	Solenoid Types	Condition		Time ms			
		Pressure "P" MPa	Flow Rate L/min	SOL"ON"(Open→Close)		SOL"OFF"(Open→Close)	
				T_1	T_2 (ex.)	T_3	T_4 (ex.)
CDSC-01	DC	10	15	21.4	44.0	29.0	38.4
		21	15	30.6	47.0	27.0	44.0
CDS＊-03	AC	7	50	10.0	86.0	20.0	44.0
		14	50	11.0	43.0	12.0	54.0
	DC	7	50	22.0	104.0	44.0	66.0
		14	50	24.0	60.0	41.0	73.0
	AC→DC Rectified	7	50	27.0	100.0	114.0	146.0
		14	50	32.0	66.0	108.0	142.0

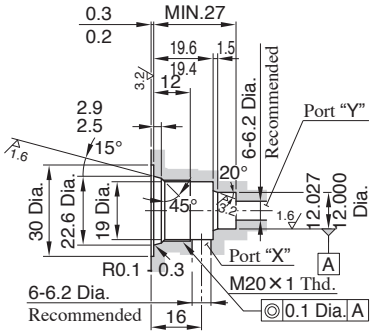
Note: Shifting time above is the value at rated voltage.

CDSC-01



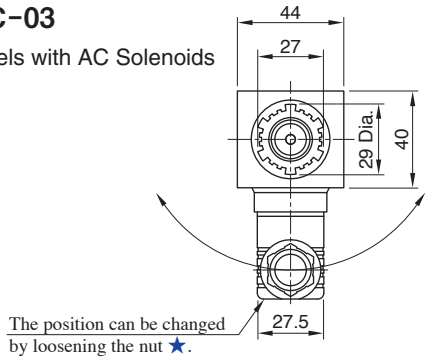
Details of Mounting Holes

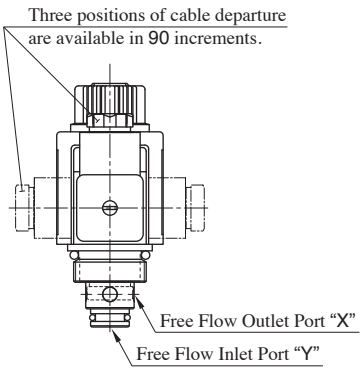
How to mount, see CDSC-03 below.

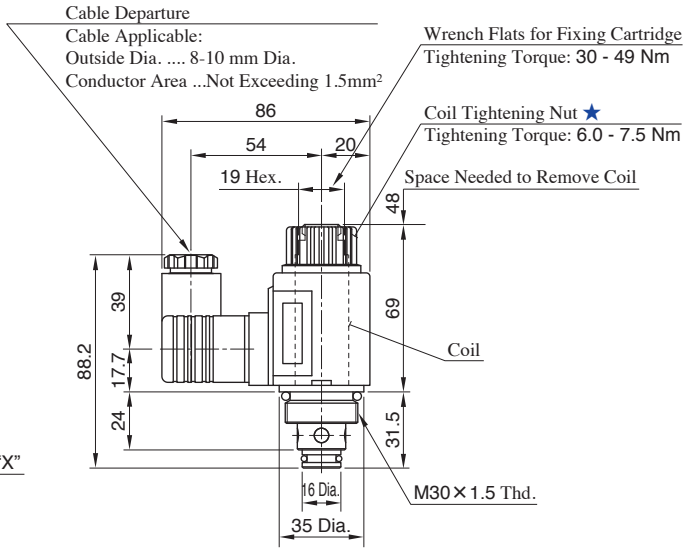


CDSC-03

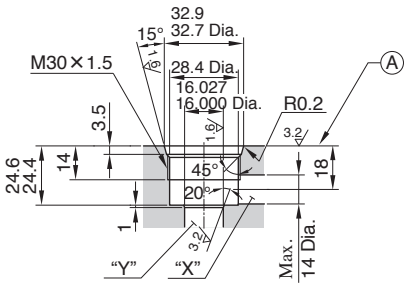
Models with AC Solenoids







Details of Mounting Holes



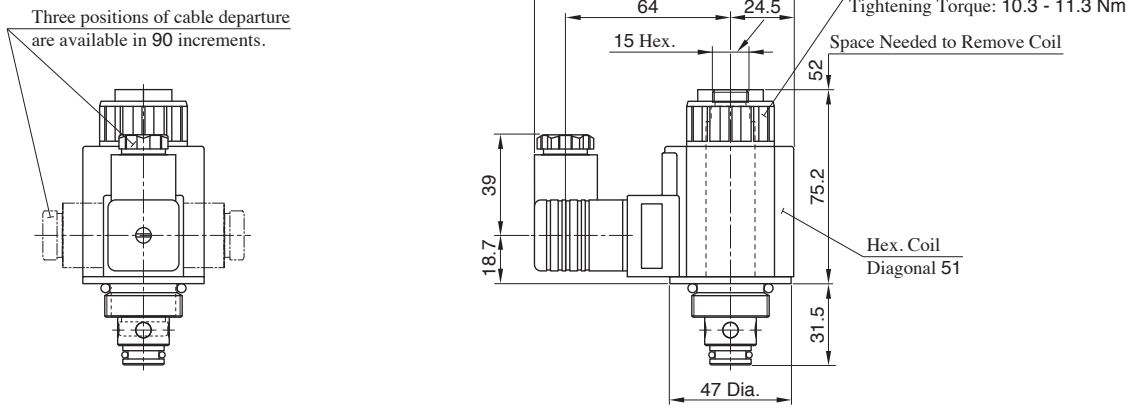
How to Mount

When mounting, the following steps must be followed:

1. Loosen the nut★, then remove the coil.
2. Thread the cartridge, making sure that the collar (AC:35 Dia.,DC/R:47 Dia.) of the cartridge is well fitted to the component surface (Ⓐ surface in the left drawing).
3. Attach the coil and secure it with a nut.

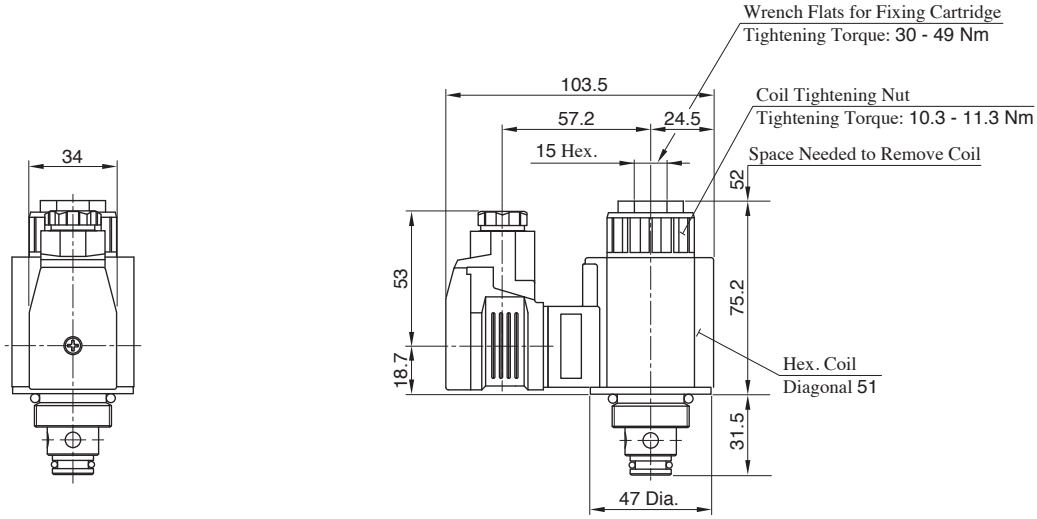
CDSC-03

● Models with DC Solenoids



● For other dimensions, refer to the "Models with AC Solenoids".
● How to mount, refer to the previous page.

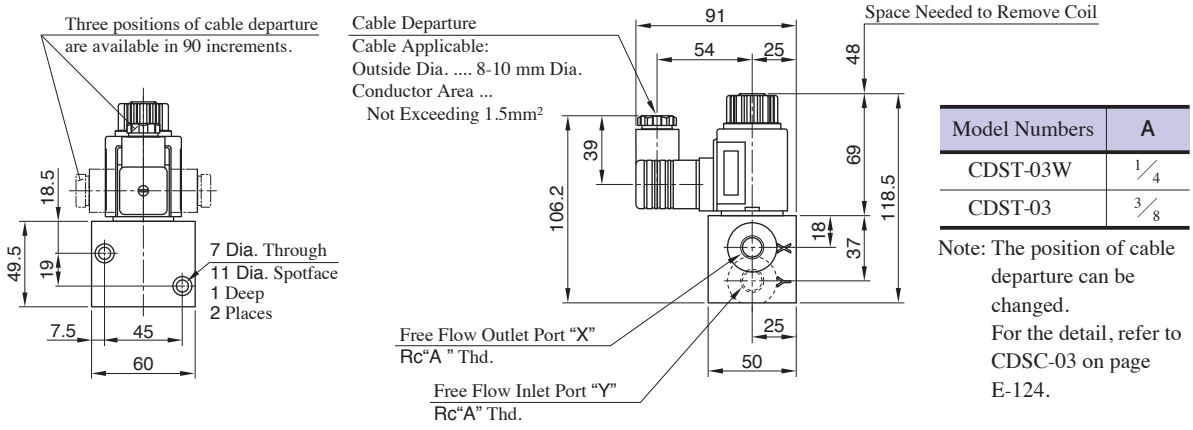
● Models with R Type Solenoids



● For other dimensions, refer to the "Models with AC Solenoids".
● How to mount, refer to the previous page.

CDST-03, 03W

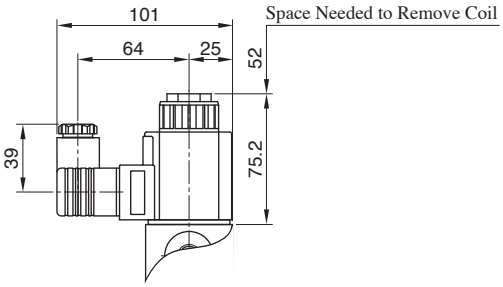
Models with AC Solenoids



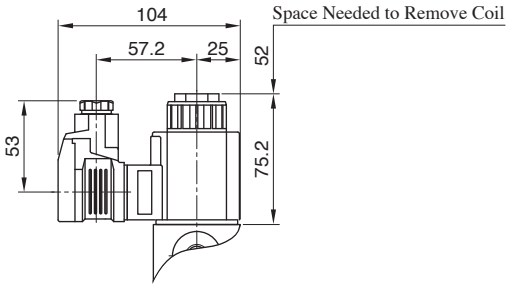
Model Numbers	A
CDST-03W	1/4
CDST-03	3/8

Note: The position of cable departure can be changed.
For the detail, refer to CDSC-03 on page E-124.

Models with DC Solenoids



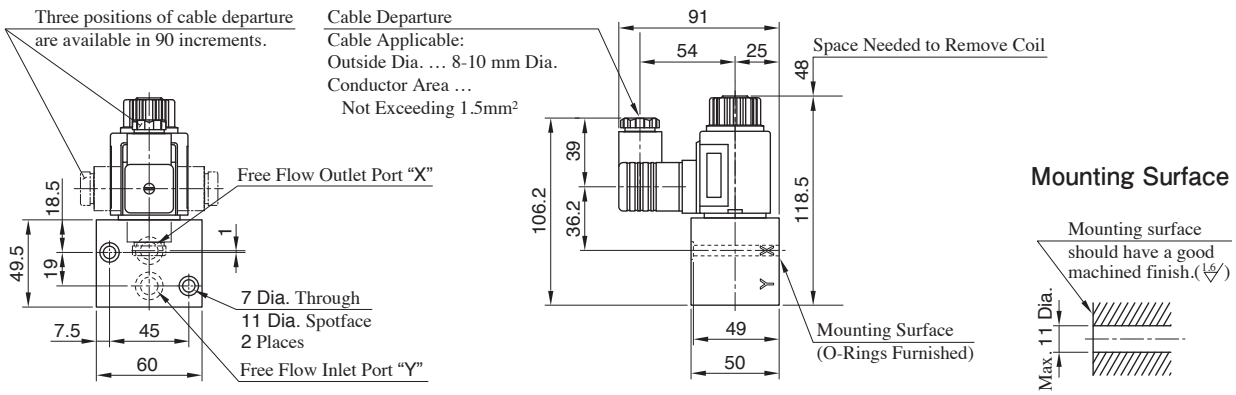
Models with R Type Solenoids



● For other dimensions, refer to the "Models with AC Solenoids".

CDSG-03

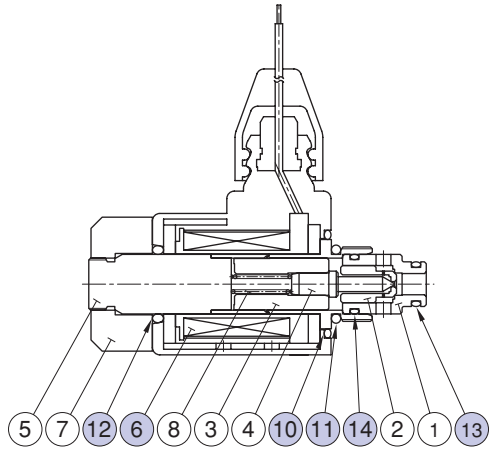
Models with AC Solenoids



Note) 1. For models with DC solenoids and models with R type solenoids, refer to CDST-03, 03W.
2. The position of cable departure can be changed. For the detail, refer to CDSC-03 on page E-124.

List of Seals, Solenoid Ass'y, Coil Ass'y

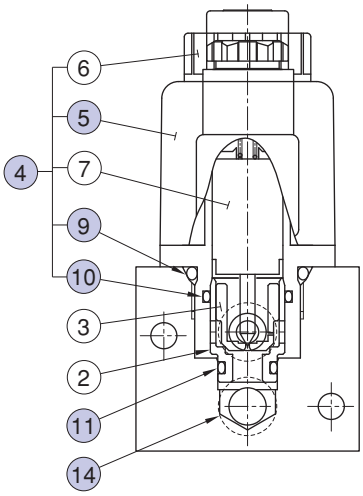
CDSC-01



List of Seals and Coil Ass'y

Item	Name of Parts	Part Numbers	Qty.
6	Coil Ass'y	2697-VK317470-3	1
10	O-Ring	JASO 2025 4 D	1
11	O-Ring	OR NBR-90 P18-N	1
12	O-Ring	OR NBR-90 P16-N	1
13	O-Ring	OR NBR-90 P9-N	1
14	O-Ring	AS 568-014 (NBR-90)	1

CDSC/CDST/CDSG-03∗



List of Seals

Item	Name of Parts	Part Numbers	Qty.	Remarks
9	O-Ring	OR NBR-90 P26-N	1	Included in Solenoid Ass'y
10	O-Ring	OR NBR-90 P20-N	1	
11	O-Ring	OR NBR-90 P12-N	1	
14	O-Ring	AS 568-014 (NBR-90)	2	only for CDSG

Solenoid Ass'y, Coil Ass'y

Valve Model No.	④ Solenoid Ass'y No.	⑤ Coil Ass'y No.
CDS∗-03∗-C-A100	CSA1-100-20	C-CSA1-100-20
CDS∗-03∗-C-A120	CSA1-120-20	C-CSA1-120-20
CDS∗-03∗-C-A200	CSA1-200-20	C-CSA1-200-20
CDS∗-03∗-C-A240	CSA1-240-20	C-CSA1-240-20
CDS∗-03∗-C-D 12	CSD1-12-20	C-SD1-12-N-50
CDS∗-03∗-C-D 24	CSD1-24-20	C-SD1-24-N-50
CDS∗-03∗-C-D100	CSD1-100-20	C-SD1-100-N-50
CDS∗-03∗-C-R100	CSR1-100-20	C-SR1-100-N-50
CDS∗-03∗-C-R200	CSR1-200-20	C-SR1-200-N-50

Interchangeability between Current and New Design

Because of solenoid assembly improvements, CDS -03 has been model-changed (design 20 to design 21).

Specifications and Characteristics

There are no changes in the specifications and characteristics of the valves themselves.

Solenoid Ratings

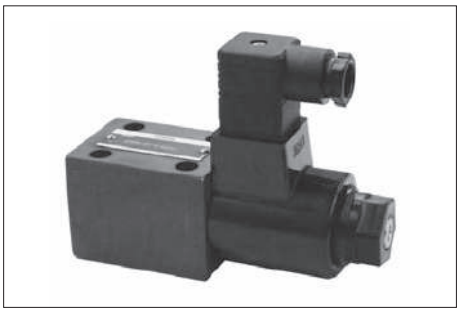
There are changes in the inrush current, holding current and power, but there are no technical problem.

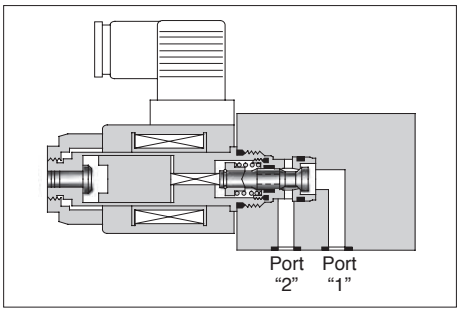
Interchangeability in Installation

There are some changes in dimensions about solenoids, but interchangeability in installation is no problem.

Shut-off Type Solenoid Operated Directional Valves

The shut-off type solenoid operated directional valves are poppet type solenoid operated two-way directional valves developed to meet the needs of this age such as energy and resources saving.





● High-response

High response is provided by the poppet design.

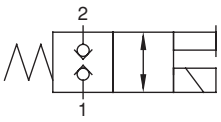
● Smallest internal leakage

Internal leakage are very small, less than 5 drips per min., which is achieved by the poppet design.

● Two mounting types: cartridge and sub-plate

Mounting dimensions for both types conform to ISO standard.

Graphic Symbol



■ Specifications

Model Numbers	Max. Flow★1 L/min	Max. Operating Pressure MPa			Max. Changeover Frequency min^{-1}	Internal leakage cm^3/min	Approx. Mass kg
		Port"1"		Port "2"			
		"1"→"2"Flow	"2"→"1"Flow				
DSPC-01-C-D24-30★2	40	10	21	25	300	0.25 or Less	0.6
DSPG-01-C-D24-30★2							1.6
DSPC-03-C-D24-10★2	80		16		240	0.25 or Less	1.0
DSPG-03-C-D24-10★2							3.9

★1. Maximum flow rates depend on operating conditions. For details, see page E-130.
★2. Protections against dust and water conform to the international electric standard below.
DSPC-01, DSPG-01 : (I.E.C) PUBL.529 IP65
DSPC-03, DSPG-03 : (I.E.C) PUBL.529 IP64

■ Instructions

- Do not connect port "1" to a line subjected to surge pressures. In addition, if you use port "1" for tank line, be sure to keep the end of the line in the oil.
- In the case of "DSPC", use iron material for installation body.

Model Number Designation

DSP	G	–01	–C	–D24	–30
Series Number	Type of Connection	Valve Size	Valve Type	Coil Type	Design Number
DSP : Shut-off Type Solenoid Operated Directional Valves	C : Cartridge Type G : Sub-plate Mounting	01	C : Normally Closed	DC D24	30
		03		DC D12 D24	10

★ Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Solenoid Ratings

Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage					
			Source Rating	Serviceable Range	Inrush★1 (A)		Holding (A)		Power (W)	
					01	03	01	03	01	03
DC★2	D12	—	12	10.8 - 13.2	—	—	—	3.16	—	38
	D24		24	21.6 - 26.4			1.22	1.57	29	

★ 1. Inrush current in the above table shows rms values at maximum stroke.
★ 2. K-Series DC Solenoid which has a reputation for excellent DC control is employed.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSPG-01	DSGM-01-31	1/8	0.8
	DSGM-01X-31	1/4	
	DSGM-01Y-31	3/8	
DSPG-03	DSGM-03-40	3/8	3
	DSGM-03X-40	1/2	
	DSGM-03Y-40	3/4	4.7

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽6.3)
- These sub-plates are sharable with those for DSG-01/03 Series Solenoid Operated Directional Valve. For dimensions, see pages E-31 and E-47.

Accessories

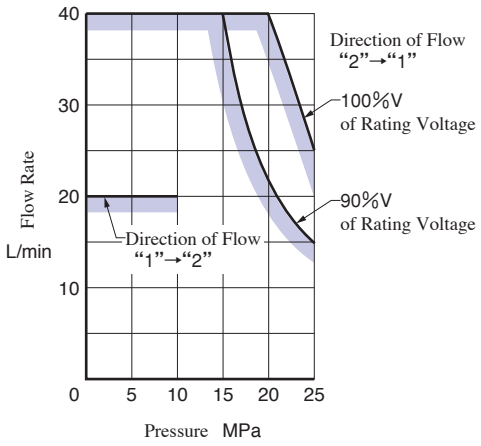
Valve Model Numbers	Mounting Bolts (Soc. Hd. Cap Screw)	
	Size	Tightening Torque
DSPG-01	M5×50L ……4 pcs.	5 - 7 Nm
DSPG-03	M6×80L ……4 pcs.	12 - 15 Nm

Characteristics Typical Performance Characteristics at Viscosity 30 mm²/s (ISO VG 46 oils, 50°C)

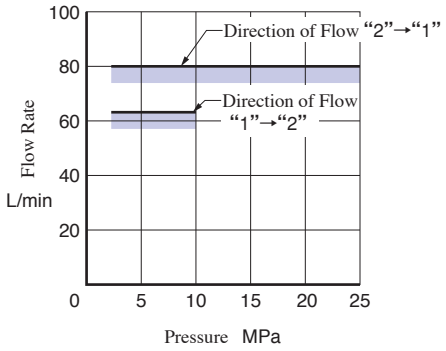
Maximum Flow Rate

The zone under each shaded line denotes the flow rate ranges being free of trouble in changeover.

DSPC/DSPG-01



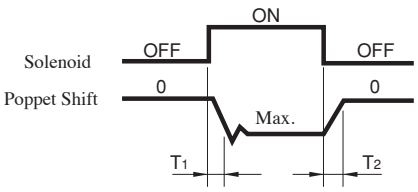
DSPC/DSPG-03



Typical Changeover Time

[Test Conditions]

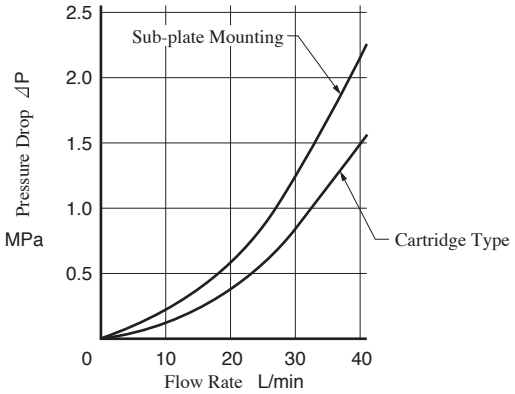
- Pressure : 15 MPa
- Flow Rate : (01) 30 L/min
  (03) 63 L/min
- Voltage : 100%Vof Rating Voltage
- Direction of Flow : "2"→"1"



Model Numbers	Time ms	
	T_1	T_2
DSP∗-01-C-D∗	69	14
DSP∗-03-C-D∗	60	80

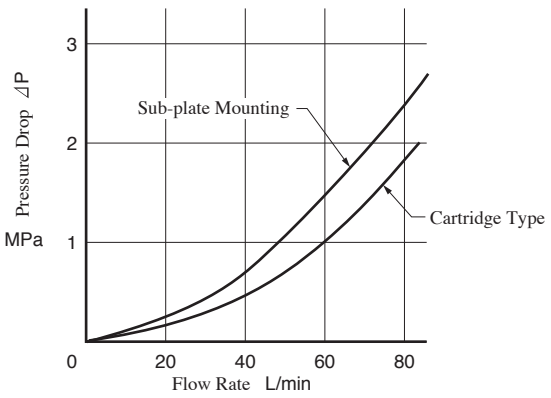
Pressure Drop

DSPC/DSPG-01



- For any other viscosity, multiply the factors in the table right.
- For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.
  ⊿P' = ⊿P(G'/0.850)

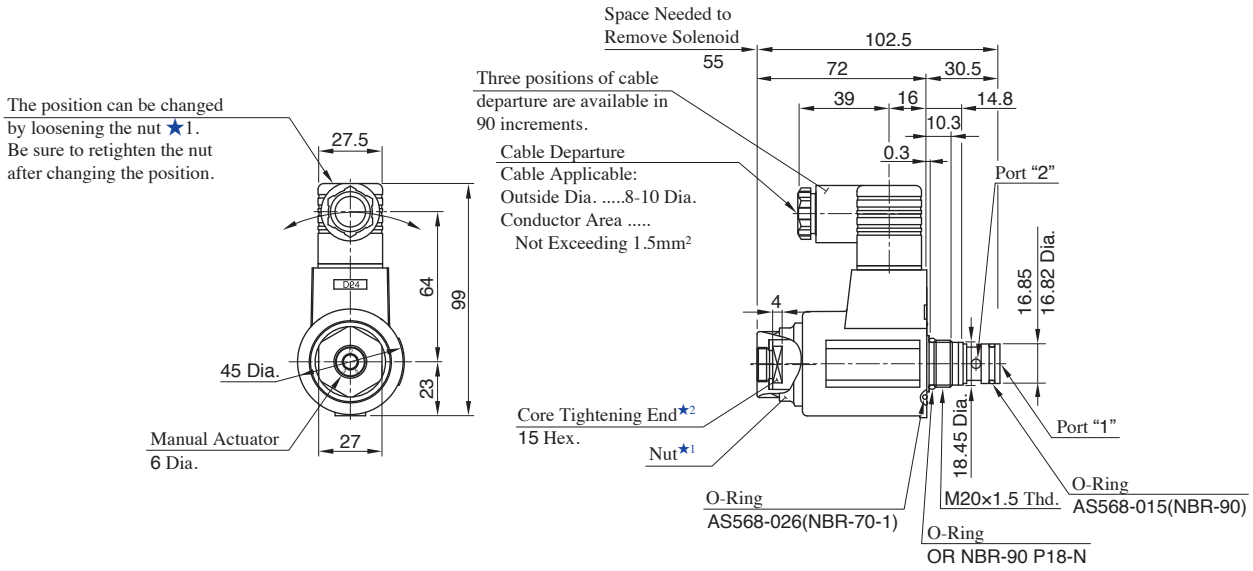
DSPC/DSPG-03



Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.84	0.91	1.00	1.07	1.14	1.19	1.24	1.28	1.32	1.35

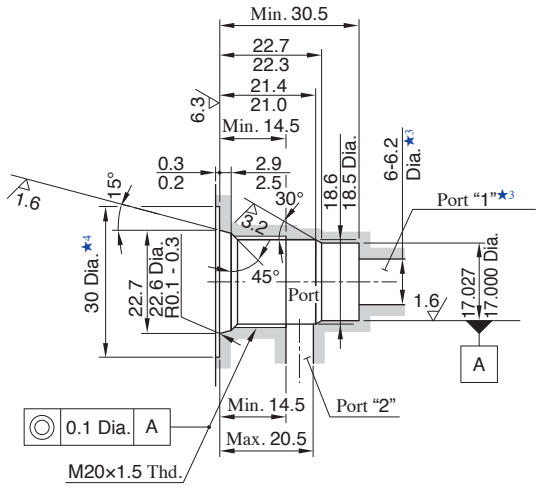
DSPC-01

Mounting Surface: ISO 7789 20-01-0-07



★1. Tightening Torque for Nuts : 10.3 - 11.3 Nm
★2. Tightening Torque for Iron Core Assembly : 20.5 - 25.5 Nm

Details of Mounting Holes



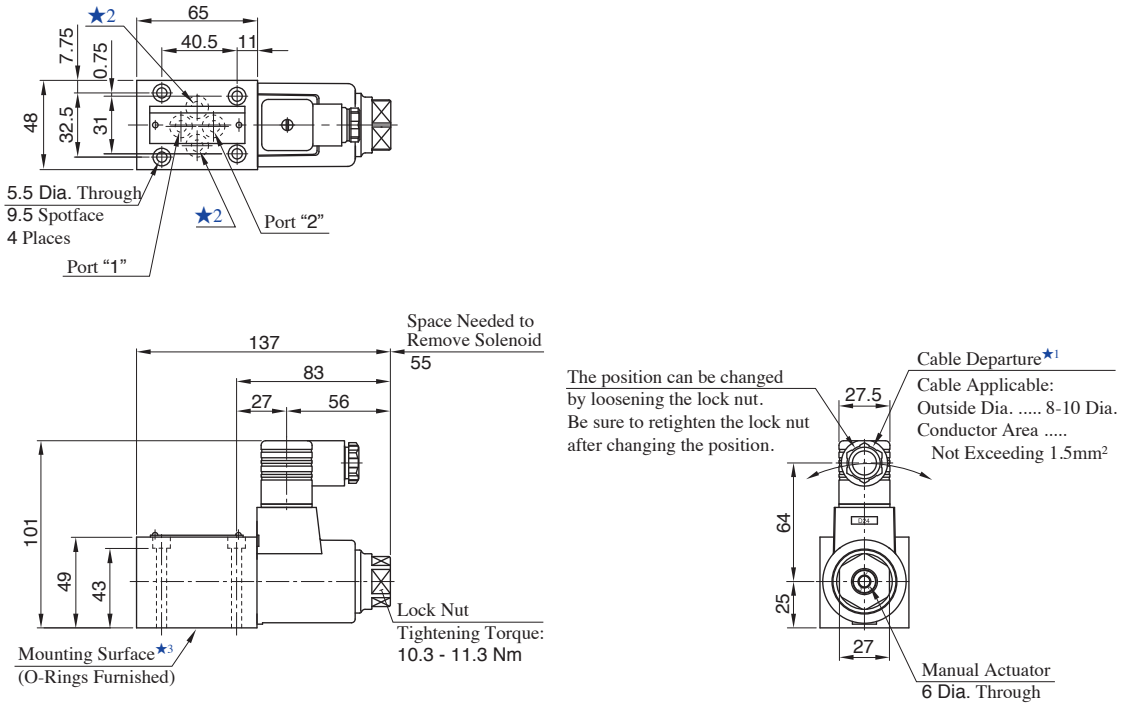
How to Mount

When mounting, the following steps must be followed.
1. Loosen the coil fastening the nut ★2 and remove the coil.
2. Making use of the core tightening end ★1, screw the cartridge in.
3. Attach the coil and fix it with the nut.

Note 1) ★3 Port diameter of 6.2 Dia. recommended.
Note 2) Mounting hole dimensions conform to ISO 7789 20-01-0-07, only ★4 dimension is different.
So in case that 30 design products mount on 33 Dia. hole of current design (10,20 design), those of water-proof function decrease to about IP 64 level.
Note 3) Use iron materials for the mounting section.

DSPG-01

Mounting Surface: ISO 4401-03-02-0-05

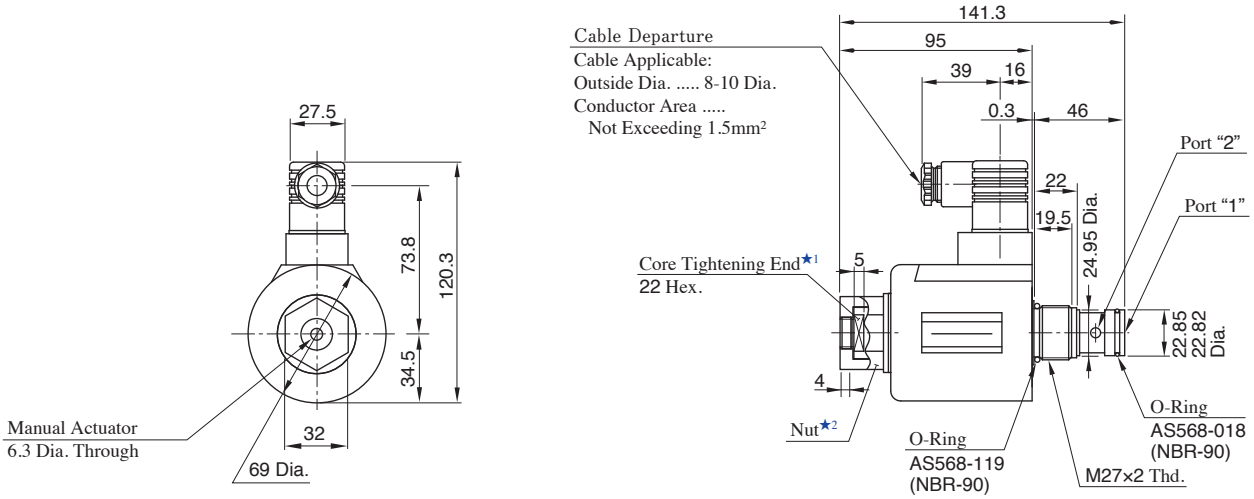


★1. The location and the position of the cable departure can be changed. For details, see the cartridge type.
★2. These ports (2 places) are not used. In addition, the body has the O-ring grooves and O-rings are included in the body.
★3. Ports A and B are used as ports "2" and "1" respectively.
★4. O-rings for Ports: OR NBR-90 P9-N

Note) Dimensions of valve mounting surface are shared with those of sub-plates, refer to page E-31.

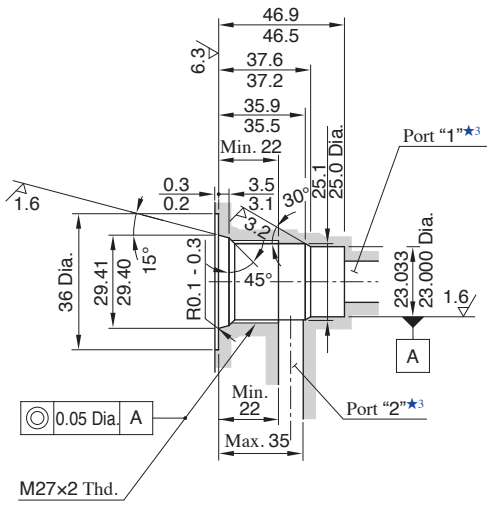
DSPC-03

Mounting Surface: ISO 7789 27-01-0-07



★1. Tightening Torque for Iron Core Assembly：110 - 140 Nm
★2. Tightening Torque for Nuts：8.5 - 10.5 Nm

Details of Mounting Holes



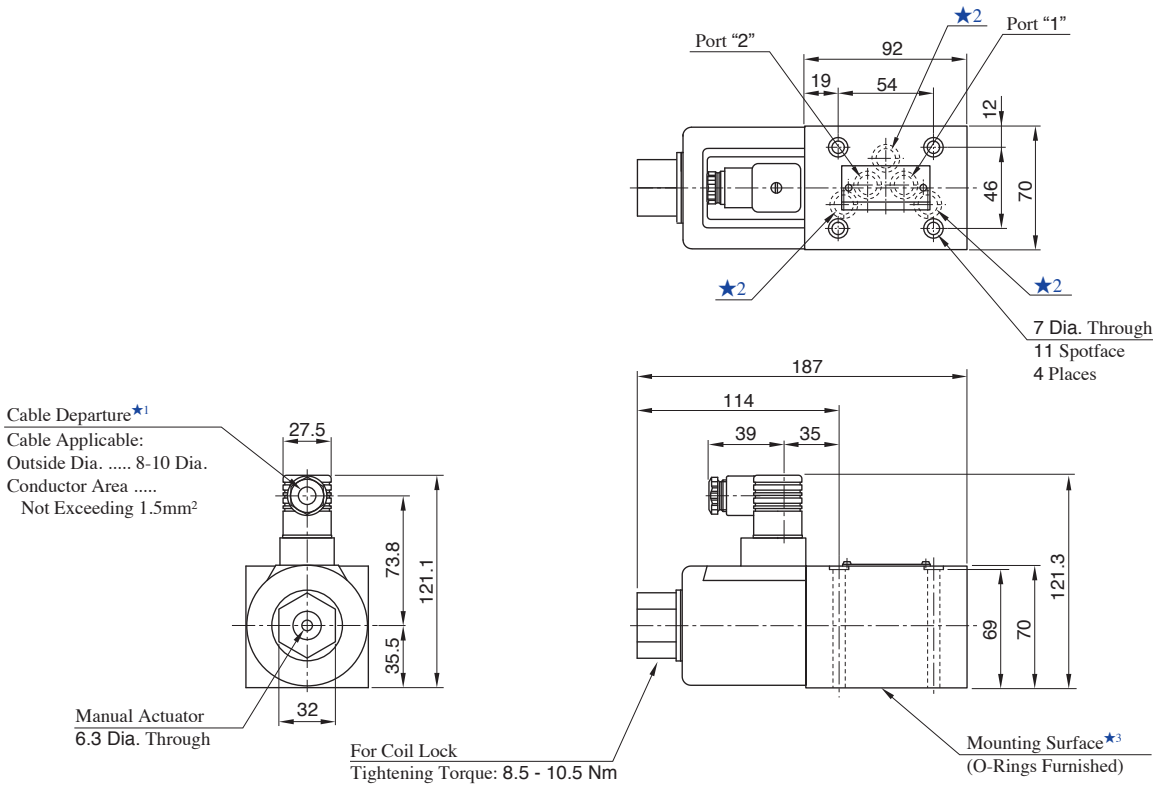
How to Mount

When mounting, the following steps must be followed.
1. Loosen the coil fastening the nut ★2 and remove the coil.
2. Making use of the core tightening end ★1, screw the cartridge in.
3. Attach the coil and fix it with the nut.

Note 1) ★3 Port diameter of 11 Dia. recommended.
Note 2) Use iron materials for the mounting section.

DSPG-03

Mounting Surface: ISO 4401-05-04-0-05

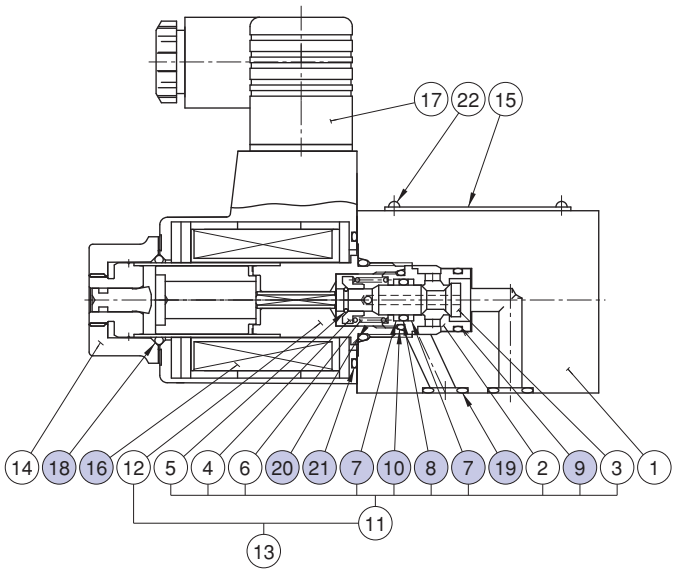


★1. The location and the position of the cable departure can be changed. For details, see the DSG-03 Series Solenoid Operated Valves on page E-48.
★2. These ports (3 places) are not used. In addition, the body has the O-ring grooves and O-rings are included in the body.
★3. Ports A and B are used as ports "2" and "1" respectively.
★4. O-rings for ports: AS 568-014 (NBR-90)

Note) Dimensions of valve mounting surface are shared with those of sub-plates, refer to page E-47.

List of Seals, Solenoid Ass'y, Coil Ass'y

DSPC/DSPG-01
DSPC/DSPG-03



List of Seals

Item	Name of Parts	DSP✻–01		DSP✻–03	
		Part Numbers	Qty.	Part Numbers	Qty.
7	Back Up Ring	SD 1286-VK420107-5	2	2691-VK418550-0	2
8	O-Ring	OR NBR-70-1 P8-N	1	OR NBR-70-1 P12-N	1
9	O-Ring	AS 568-015 (NBR-90)	1	AS 568-018 (NBR-90)	1
10	O-Ring	AS 568-014 (NBR-90)	1	AS 568-017 (NBR-90)	1
18	O-Ring	OR NBR-70-1 P20-N	1	—	—
19★	O-Ring	OR NBR-90 P9-N	4	AS 568-014 (NBR-90)	5
20	O-Ring	OR NBR-90 P18-N	1	AS 568-119 (NBR-90)	1
21	O-Ring	AS 568-026 (NBR-70-1)	1	—	—

★ O-ring item ⑲, use only for sub-plates mounting type (DSPG-01/03).

List of Solenoid Ass'y, Coil Ass'y

Valve Model No.	Solenoid Ass'y No.	⑯Coil Ass'y No.
DSPC/DSPG-01-C-D24	—★	C-SD1H-24-N-70
DSPC/DSPG-03-C-D12	SD3-12-N-5130	C-SD3-12-N-51
DSPC/DSPG-03-C-D24	SD3-24-N-5130	C-SD3-24-N-51

★About replacement of DSPC/DSPG-01 solenoid ass'y, please contact us.

Interchangeability between Current and New Design

Because of solenoid assembly improvements, DSP*-03 has been model-changed (design 20 to design 30).

Specifications and Characteristics

Max. operating pressure at port "1" flow "2"→"1", pressure changed 16MPa → 21 MPa.

Solenoid Ratings

There are changes in the holding current, but there are no technical problem.

But the coil type is limited only for D24, about replacement of solenoid ass'y, please contact us.

Dust and Water Proof Specifications

Water-proof protection level is upgraded. (IEC) PUBL.529 IP64 → (IEC) PUBL.529 IP65

In case that DSPC-01 mount on 33 Dia. hole of current design, those of water-proof function decrease to IP 64 level.

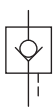
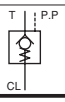
Interchangeability in Installation

There are some changes in dimensions about solenoids, but interchangeability in installation is no problem.

Models with AC Solenoids

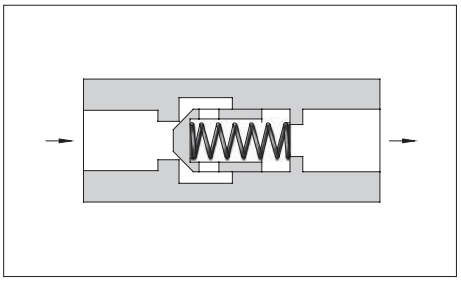
Because of the component parts stock shortage, stop selling.

Check/Pilot Controlled Check Valves

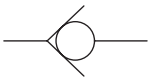
Valve Type	Graphic Symbols	Max. Operating Pressure MPa	Maximum Flow L/min 1 2 5 10 20 50 100 200 500 1000 2000 5000	Page
Check Valves		25	In-Line (CIT) 02 03 06 10 Right Angle (CRT/CRG) 03 06 10 Right Angle, Flanged Connection (CRF) 10 16 24	E-137
Pilot Operated Check Valves		25	Threaded Connection (CP＊T) Sub-plate Mounting (CP＊G) 03 06 10 Flanged Connection (CP＊F) 10 16	E-143
In-Line Prefill Valves		25	PI＊F-40 50 63 80 100	E-148

In-Line Check Valves

These valves allow free flow in one direction and prevent flow in the reverse direction. Cracking pressure specified is the pressure required to open the valve and allow free flow.



Graphic Symbol



Specifications

Model Numbers	Rated Flow★ L/min	Max. Operating Pres. MPa	Cracking Pres. MPa	Approx. Mass kg
CIT-02-∗-50	16	25	0.04 0.35 0.5	0.1
CIT-03-∗-50	30			0.3
CIT-06-∗-50	85			0.8
CIT-10-∗-50	230			2.3

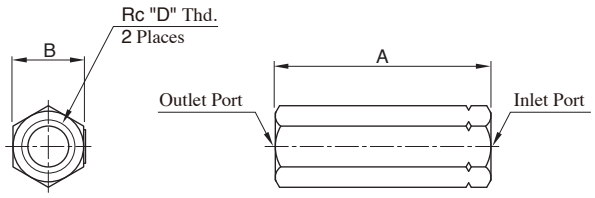
★Rated flow is the approximate flow rate, when there is a free flow pressure drop of maximum 0.3 MPa, the fluid has a specific gravity of 0.85 and a kinematic viscosity of 20 mm²/s, and the cracking pressure is 0.04 MPa.

Model Number Designation

CI	T	–03	–04	–50
Series Number	Type of Connection	Valve Size	Cracking Pressure MPa	Design Number
CI : In-Line Check Valve	T : Threaded Connection	02	04 : 0.04 35 : 0.35 50 : 0.5	50
		03		50
		06		50
		10		50

● For In-Line Check Valves, standard type (for petroleum base oils) can be used phosphate ester type fluid.

CIT–02, 03, 06, 10

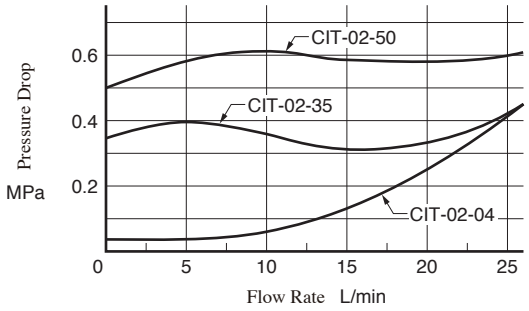


Model Numbers	A	B	D
CIT-02-∗-50	58	19	1/4
CIT-03-∗-50	76	27	3/8
CIT-06-∗-50	95	41	3/4
CIT-10-∗-50	133	60	1 1/4

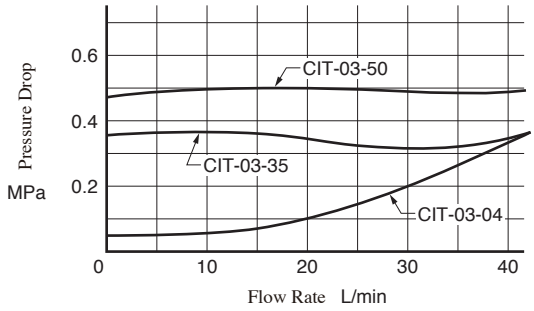
Pressure Drop

Hydraulic Fluid: Viscosity 30 mm²/s

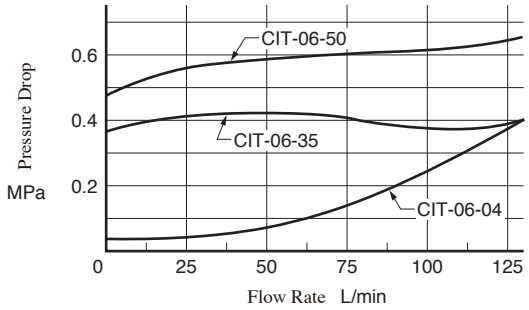
CIT-02



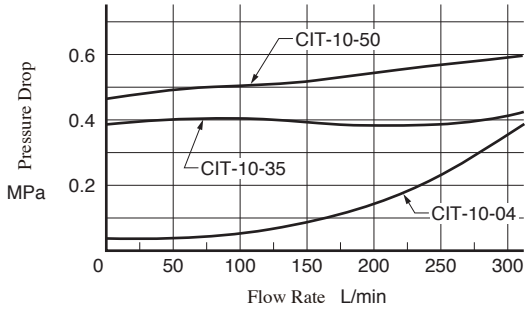
CIT-03



CIT-06

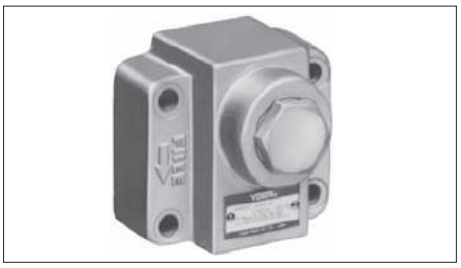


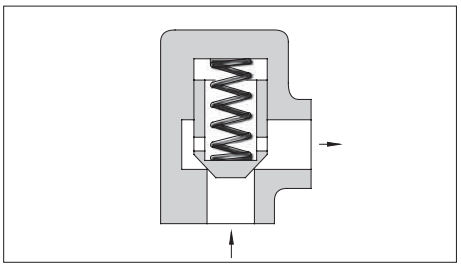
CIT-10



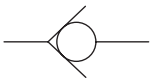
Right Angle Check Valves

These valves allow free flow in one direction and prevent flow in the reverse direction. Cracking pressure specified is the pressure required to open the valve and allow free flow.





Graphic Symbol



Specifications

Model Numbers		Rated Flow★ L/min	Max. Operating Pres. MPa	Cracking Pres. MPa	Approx. Mass kg
Threaded Connection	CRT-03-＊-50	40	25	0.04	0.9
	CRT-06-＊-50	125		0.35	1.7
	CRT-10-＊-50	250		0.5	5.6
Sub-plate Mounting	CRG-03-＊-50	40	25	0.04	1.7
	CRG-06-＊-50	125		0.35	2.9
	CRG-10-＊-50	250		0.5	5.5

★ Rated flow is the approximate flow rate, when there is a free flow pressure drop of maximum 0.3 MPa, the fluid has a specific gravity of 0.85 and a kinematic viscosity of 20 mm²/s, and the cracking pressure is 0.04 MPa.

Model Number Designation

CR	T	–03	–04	–50
Series Number	Type of Connection	Valve Size	Cracking Pressure MPa	Design Number
CR : Right Angle Check Valve	T : Threaded Connection	03	04 : 0.04 35 : 0.35 50 : 0.5	50
		06		50
		10		50
	G : Sub-plate Mounting	03		50
		06		50
		10		50

Note) Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Yuken can offer flanged connection valves described below.
For details, contact us.

Model No.	Rated Flow L/min	Max. Operating Pres. MPa
CRF-10-＊-50	300	25
CRF-16-＊-50	600	
CRF-24-＊-50	1300	

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
CRG-03	CRGM-03-50	3/8	1.6
	CRGM-03X-50	1/2	1.6
CRG-06	CRGM-06-50	3/4	2.4
	CRGM-06X-50	1	3.0
CRG-10	CRGM-10-50	1 1/4	4.8
	CRGM-10X-50	1 1/2	5.7

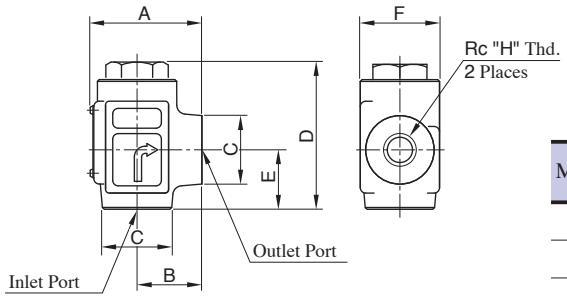
● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6S)

Accessories

Mounting Bolts

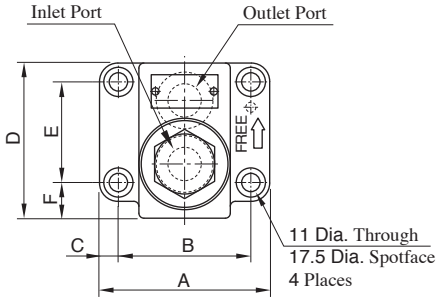
Valve Model Numbers	Socket Head Cap Screw	Qty.
CRG-03	M10 × 45L	4
CRG-06	M10 × 50L	4
CRG-10	M10 × 55L	6

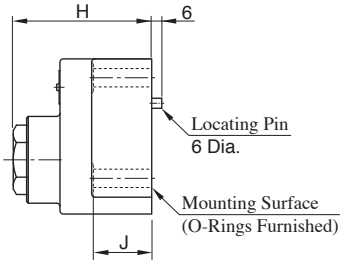
CRT-03, 06, 10



Model Numbers	A	B	C	D	E	F	H
CRT-03	62	36	38 Dia.	80.5	33	44	3/8
CRT-06	74	45	54 Dia.	104.5	49	54	3/4
CRT-10	107	65	80 SQ.	130	65	80	1 1/4

CRG-03, 06

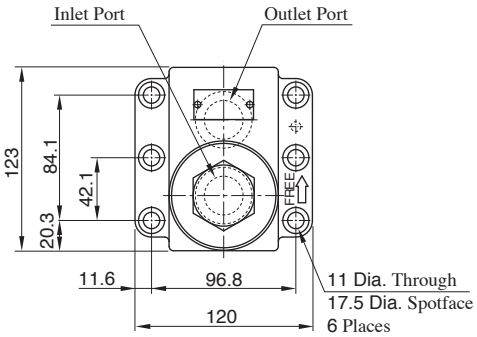


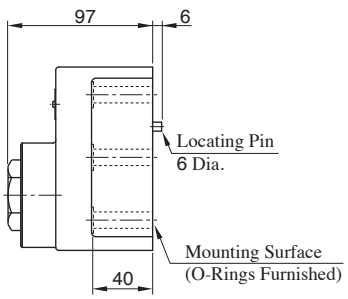


Model Numbers	A	B	C	D	E	F	H	J	Mounting surface conform to ISO standard below
CRG-03	90	66.7	11.7	72	42.9	17.5	72.5	30	ISO 5781-06-07-0-00
CRG-06	102	79.4	11.3	93	60.3	21.4	84.5	35	ISO 5781-08-10-0-00

CRG-10

Mounting Surface: ISO 5781-10-13-0-00

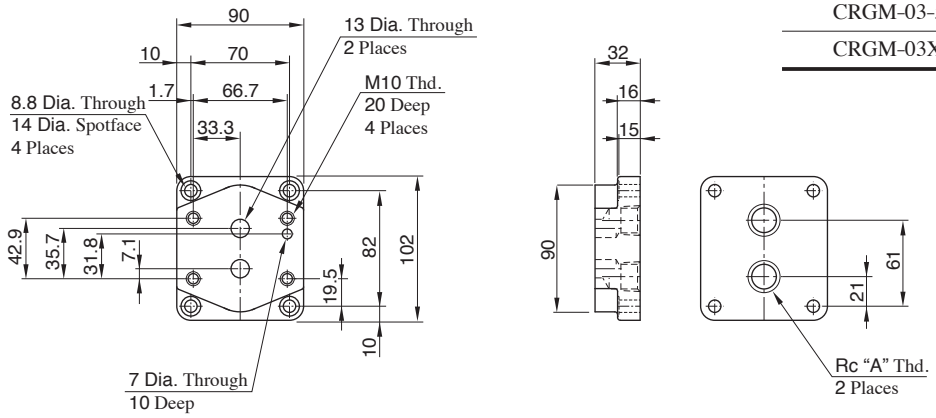




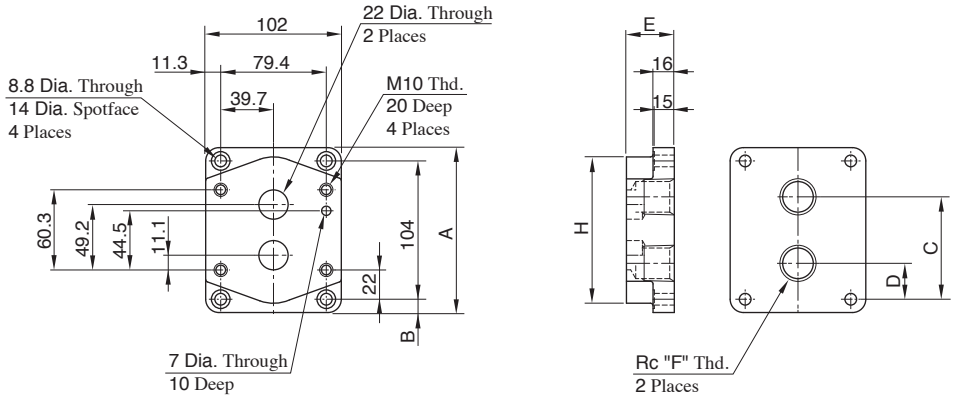
Sub-plate

CRGM−03, 03X

Sub-plate Model Numbers	A
CRGM-03-50	3/8
CRGM-03X-50	1/2

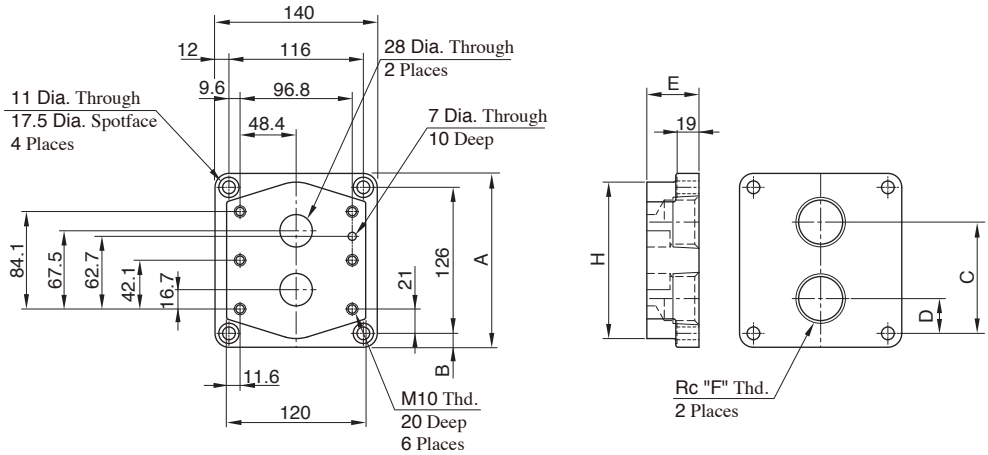


CRGM−06, 06X



Sub-plate Model Numbers	A	B	C	D	E	F	H
CRGM-06-50	124	10	77	27	36	3/4	110
CRGM-06X-50	136	16	82.3	22	45	1	130

CRGM−10, 10X

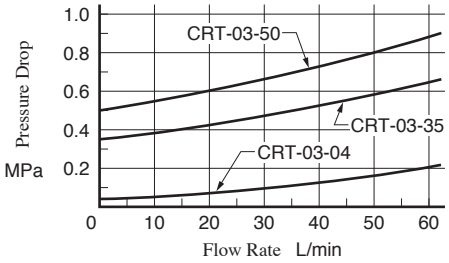


Sub-plate Model Numbers	A	B	C	D	E	F	H
CRGM-10-50	150	12	96	30	45	1 1/4	135
CRGM-10X-50	177	25.5	104	22	50	1 1/2	167

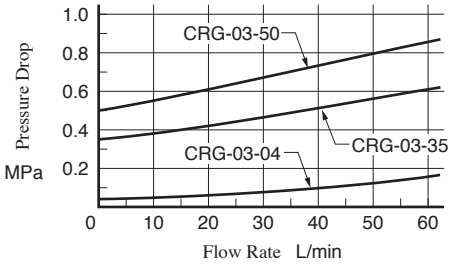
Pressure Drop

Hydraulic Fluid: Viscosity 30mm²/s

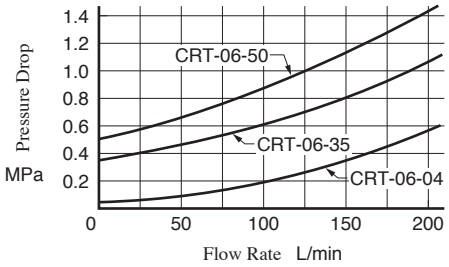
CRT-03



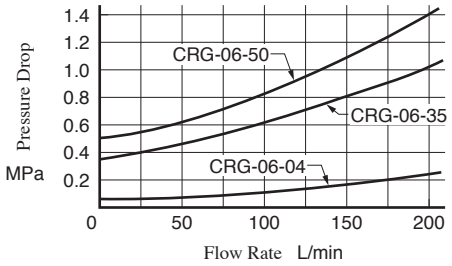
CRG-03



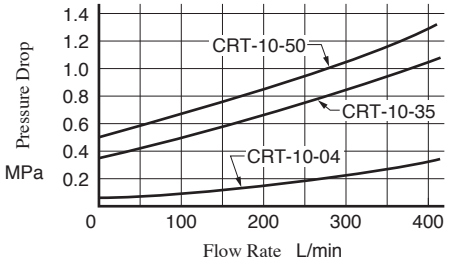
CRT-06



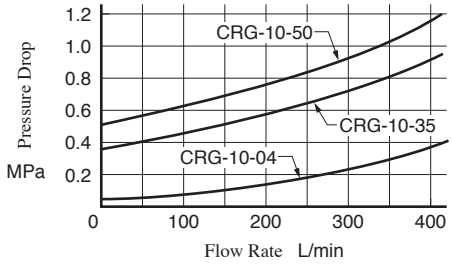
CRG-06



CRT-10

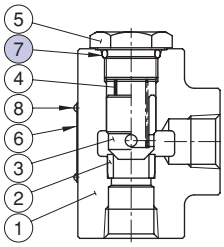


CRG-10



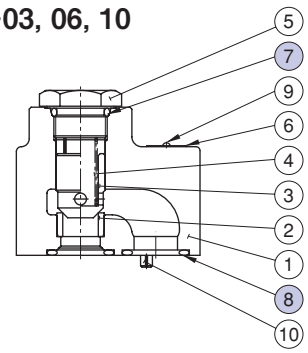
List of Seals

CRT-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.
		CRT-03	CRT-06	CRT-10	
7	O-Ring	OR NBR-90 P21-N	OR NBR-90 P24-N	OR NBR-90 P32-N	1

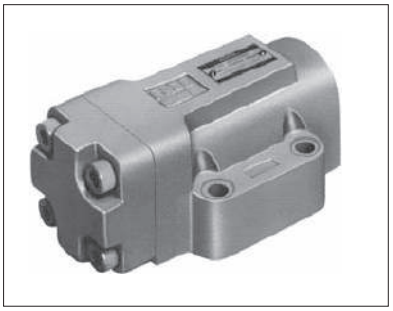
CRG-03, 06, 10

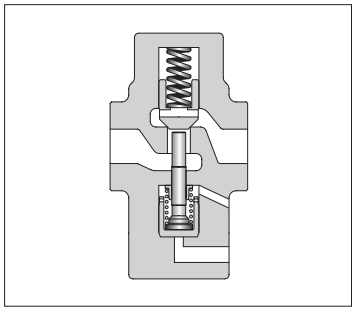


Item	Name of Parts	Part Numbers			Qty.
		CRG–03	CRG–06	CRG–10	
7	O-Ring	OR NBR-90 P21-N	OR NBR-90 P24-N	OR NBR-90 P32-N	1
8	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2

Pilot Controlled Check Valves

These check valves allow flow in one direction and prevent flow in the reverse direction, until operated by pilot pressure to allow free reverse flow.





Graphic Symbols

External Drain Type　　Internal Drain Type

Specifications

Model Numbers		Rated Flow★ L/min	Max. Operating Pres. MPa	Cracking Pres. MPa	Approx. Mass kg
Threaded Connection	CP＊T-03-＊-＊-50	40	25	0.04 0.2 0.35 0.5	3.0
	CP＊T-06-＊-＊-50	125			5.5
	CP＊T-10-＊-＊-50	250			9.6
Sub-plate Mounting	CP＊G-03-＊-＊-50	40	25	0.04 0.2 0.35 0.5	3.3
	CP＊G-06-＊-＊-50	125			5.4
	CP＊G-10-＊-＊-50	250			8.5

★ Rated flow is the approximate flow rate, when there is a free flow pressure drop of maximum 0.3 MPa, the fluid has a specific gravity of 0.85 and a kinematic viscosity of 20 mm²/s, and the cracking pressure is 0.04 MPa.

Model Number Designatioin

CP	T	–03	–E	–04	–50
Series Number	Type of Connection	Valve Size	Drain Connection	Cracking Pres. MPa	Design Number
CP：Pilot Operated Check Valve CPD：Decompression Type Pilot Operated Check Valve	T：Threaded Connection	03	None：Internal Drain E：External Drain	04：0.04 20：0.2 35：0.35 50：0.5	50
		06			50
		10			50
	G：Sub-plate Mounting	03			50
		06			50
		10			50

Note) Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
CP＊G-03	M10 × 45L	4
CP＊G-06	M10 × 50L	4
CP＊G-10	M10 × 55L	6

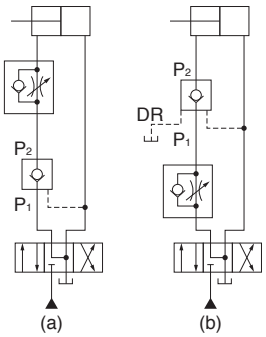
Yuken can offer flanged connection valves described below.
For details, contact us

Model Numbers	Rated Flow L/min	Max. Operating Pres. MPa
CP＊F-10-＊-＊-50	250	25
CP＊F-16-＊-＊-50	600	25

Instructions

Operation of internal and external drain types

When the outlet side P_1 is directly connected to the tank in reversed free flow (Fig. a), the internal drain type is normally used. When the back pressure is applied to the outlet side P_1 (Fig. b), be sure to use the external drain type.



Minimum pilot pressure characteristics

That depends on the pressure of the inlet side P_2 in the reversed free flow.

This value can be determined from the characteristics chart on page E-146.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
CP∗G-03	HGM-03-20	3/8	1.6
	HGM-03X-20	1/2	
CP∗G-06	HGM-06-20	3/4	2.4
	HGM-06X-20	1	3.0
CP∗G-10	HGM-10-20	1 1/4	4.8
	HGM-10X-20	1 1/2	5.7

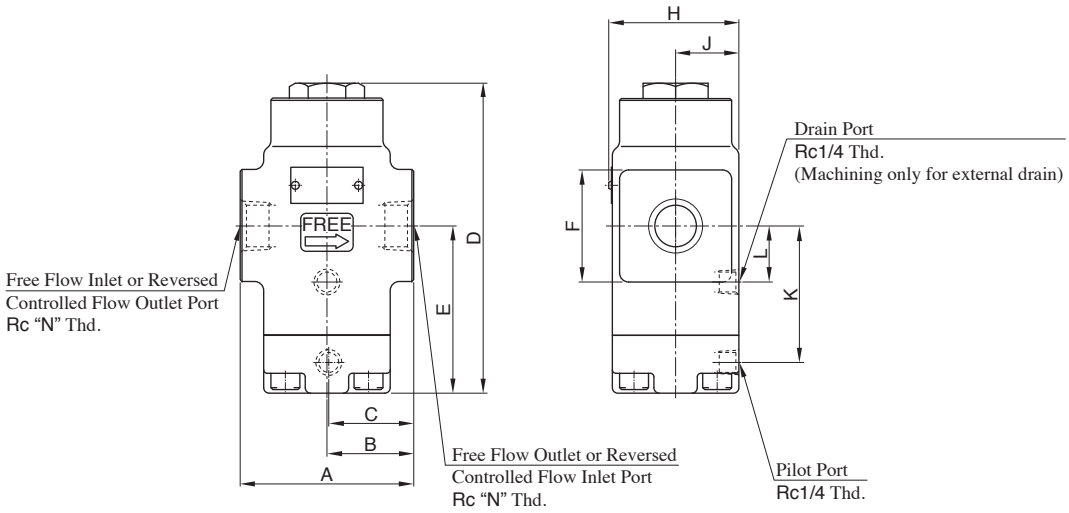
- Sub-plates are available, specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
- Sub-plates are shared with those for H Type Pressure Control Valves. Refer to pages E-149 for dimensions.

Cautions on replacement of 20 design low cracking pressure type valves with 50 design valves.

In 20 design valve with cracking pressure of 0.035 MPa (Code "5"), for closing the valve completely and certainly, it was necessary to introduce the pressurized oil into the drain port to push down the piston compulsory.

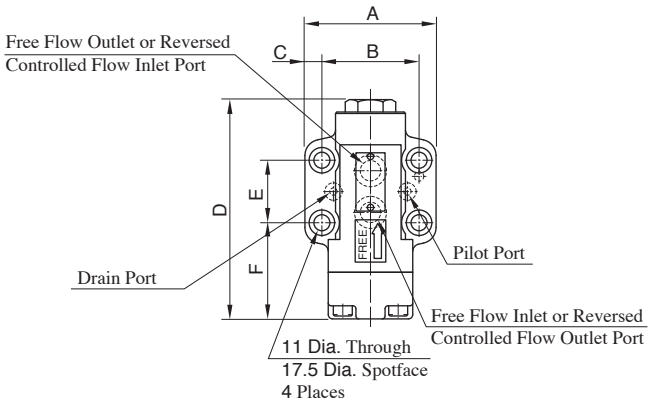
While in 50 design valve with cracking pressure of 0.04 MPa (Code "6"), it has such structure that the valve can be closed completely and certainly without introducing the pressurized oil into the drain port. On the contrary , what is worse is that if the pressurized oil is introduced into the drain port, the oil acts towards the direction of opening the valve, which is very dangerous and has to be absolutely avoided. Therefore, please do not supply any pressurized oil into the drain port in case of using 50 design valve.

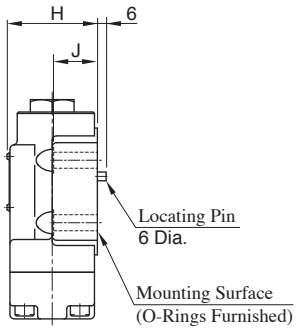
CPT CPDT -03, 06, 10



Model Numbers	A	B	C	D	E	F	H	J	K	L	N
CP∗T-03	80	40	39	150.5	84.5	38 Dia.	60	29	67.5	26.5	3/8
CP∗T-06	96	48	47	171.5	92.5	62 SQ.	72	35	75.5	31	3/4
CP∗T-10	140	70	64	203.5	113	80 SQ.	82	40	96	43	1 1/4

CPG CPDG -03, 06

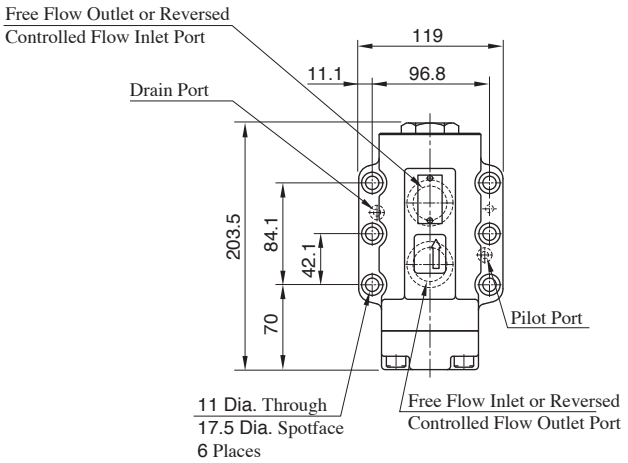


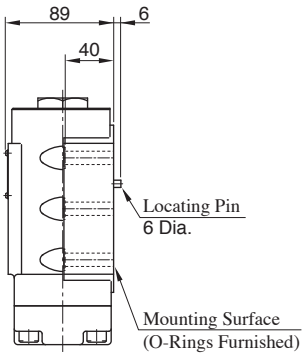


Model Numbers	A	B	C	D	E	F	H	J	Mounting Surface
CP*G-03	90	66.7	11.7	150.5	42.9	66	62	30	ISO 5781-06-07-0-00
CP*G-06	102	79.4	11.3	171.5	60.3	67.5	74	35	ISO 5781-08-10-0-00

CPG CPDG -10

Mounting Surface: ISO 5781-10-13-0-00

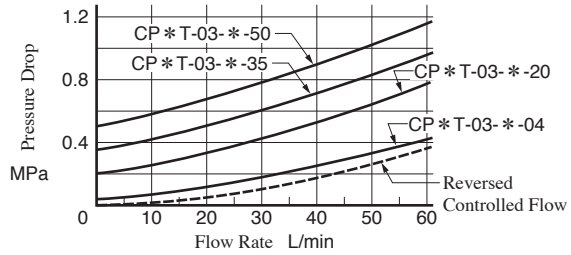




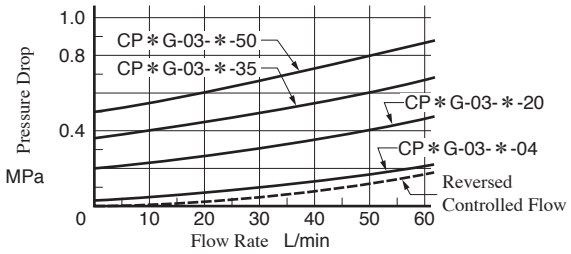
Pressure Drop

Hydraulic Fluid: Viscosity 30 mm²/s

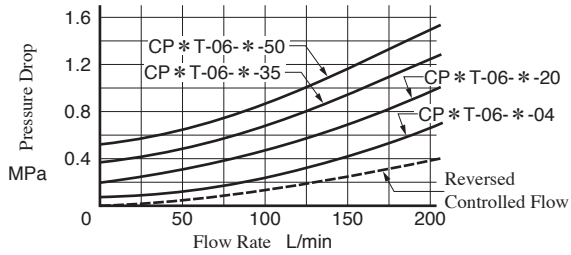
CPT-03, CPDT-03



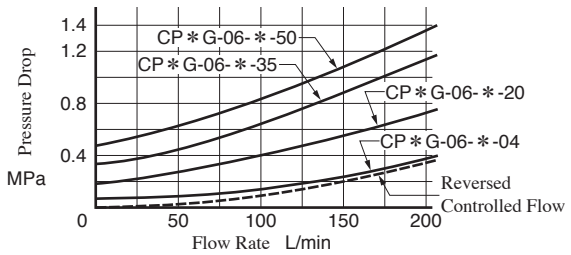
CPG-03, CPDG-03



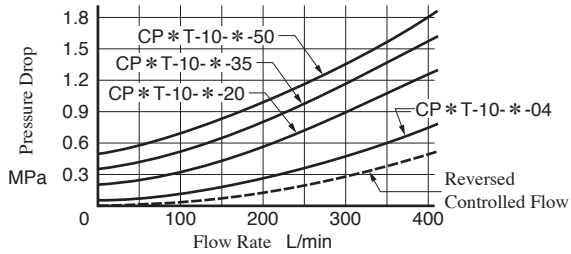
CPT-06, CPDT-06



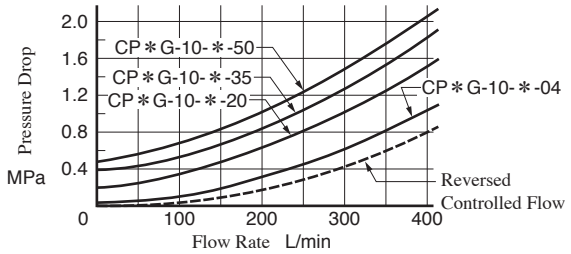
CPG-06, CPDG-06



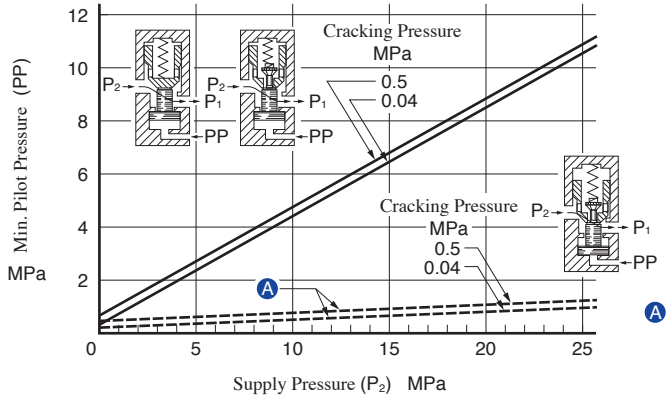
CPT-10, CPDT-10



CPG-10, CPDG-10



Min. Pilot Pressure Chart

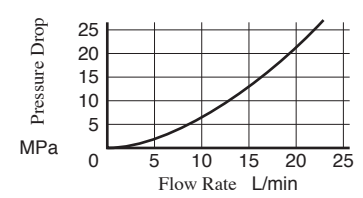


A : Min. Pilot Pressure to open the Decompression Valve (CPD : Decompression Type)

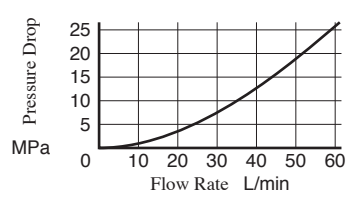
Pressure Drop for Reversed Controlled Flow Only when Decompression Valve is Opened

Hydraulic Fluid: Viscosity 30 mm²/s

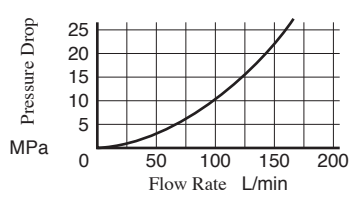
CPDT-03, CPDG-03



CPDT-06, CPDG-06

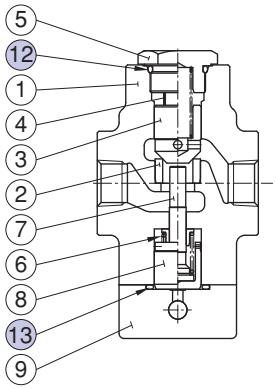


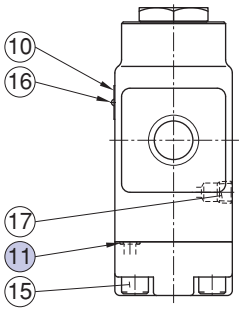
CPDT-10, CPDG-10



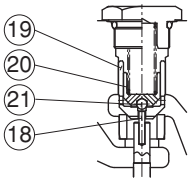
List of Seals

CPT-03, 06, 10



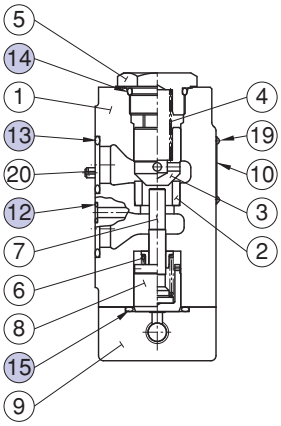


CPDT-03, 06, 10

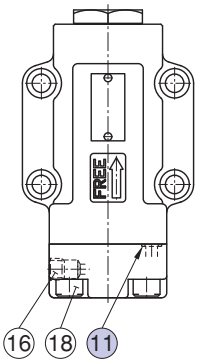


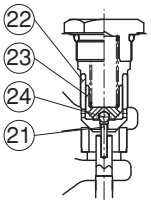
Item	Name of Parts	Part Numbers			Qty.
		CP＊T-03	CP＊T-06	CP＊T-10	
11	O-Ring	OR NBR-90 P7-N	OR NBR-90 P9-N	OR NBR-90 P9-N	1
12	O-Ring	OR NBR-90 P21-N	OR NBR-90 P29-N	OR NBR-90 P36-N	1
13	O-Ring	OR NBR-90 G25-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1

CPG-03, 06, 10



CPDG-03, 06, 10



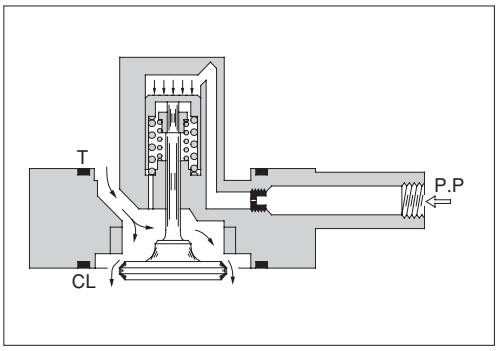


Item	Name of Parts	Part Numbers			Qty.
		CP＊G-03	CP＊G-06	CP＊G-10	
11	O-Ring	OR NBR-90 P7-N	OR NBR-90 P9-N	OR NBR-90 P9-N	1
12	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	2
13	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2
14	O-Ring	OR NBR-90 P21-N	OR NBR-90 P29-N	OR NBR-90 P36-N	1
15	O-Ring	OR NBR-90 G25-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1

In-Line Prefill Valves

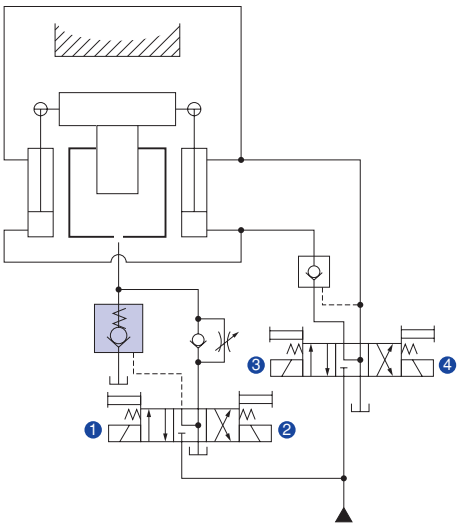
Prefill valves can be used by putting them between cylinder and reservoir in such a hydraulic system for large presses and injection molding machines where a high-speed operation is required with a small capacity pump.
In a high-speed forward stroke of the cylinder, the prefill valve sucks large amount of oil from the reservoir and feeds it into the cylinder.
In pressurizing process, the valves prevent a reserve flow from the reservoir to the cylinder, and in return stroke of the cylinder, the valve has a function of discharging the oil into the reservoir by opening the valve with a pilot pressure.

- Simple structure and high durability
- Low pressure drop and large flow
- Direct and decompression types are available for all sizes.
- Slow return valves are optionally available for pilot ports.



(Example Diagram)

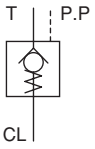
● Ram Cylinder System (with auxiliary cylinder)



〔Solenoid Shifting and Operation〕

Solenoid	Rapid Increase	Pressure	Rapid Decrease
❶	ON	OFF	ON
❷	OFF	ON	OFF
❸	ON	ON	OFF
❹	OFF	OFF	ON

Graphic Symbol



Specifications

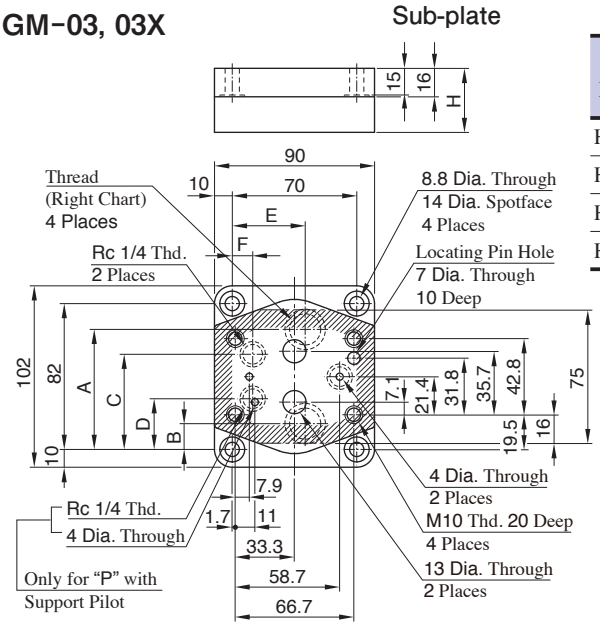
Model Numbers	Piping Size	Max. Flow★1 L/min	Max. Operating Pressure MPa	Cracking Pressure MPa	Min. Pilot Pressure Ratio★2 (Direct Type)		Pilot Volume cm^3
					P-Line Pressure	C-Line Pressure	
PI＊F- 40-10	65A	200	25	0.011	3.4 : 1		2.5
PI＊F- 50-10	80A	400		0.012	4.0 : 1		4.9
PI＊F- 63-10	90A	630			4.0 : 1		8.5
PI＊F- 80-10	100A	1000			4.3 : 1		16.3
PI＊F-100-10	125A	1600			4.3 : 1		31.8

★1. Each maximum flow rate is an approximate value when the pressure drop at free flow is ⊿P≒0.03 MPa.
★2. The minimum pilot pressure ratio is determined by the area ratio between the seat and pressured part of the pilot. The decompression type is also available.

——— For details about In-Line Prefill Valves, refer to the model catalogues. ———

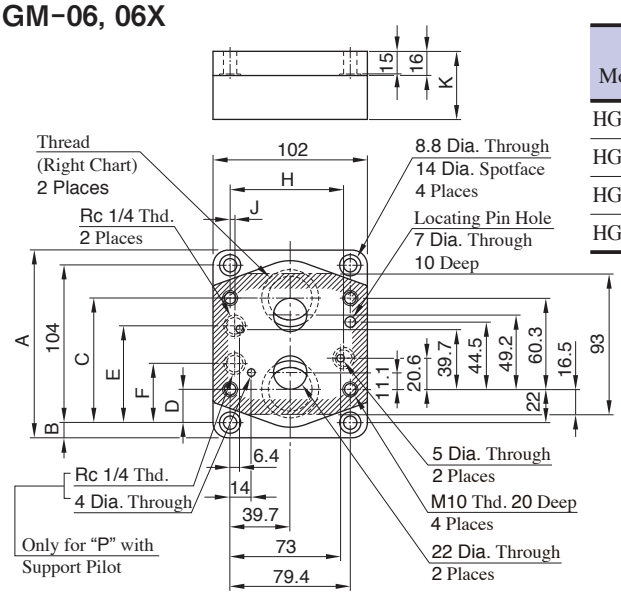
HGM-03, 03X

Sub-plate



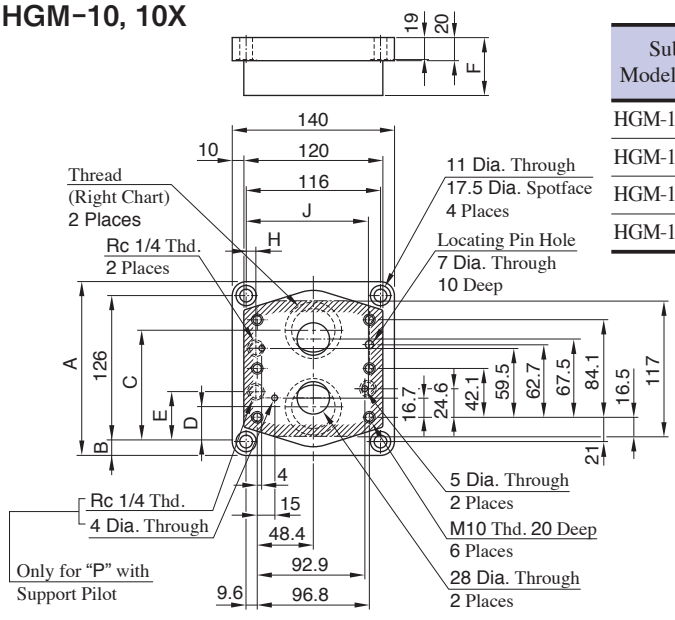
Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H
HGM-03-20	3/8	61	21	40.9	—	35	9.6	32
HGM-03X-20	1/2							
HGM-03-P-20	3/8	69.5	12.5	53.5	28.5	35	11.5	36
HGM-03X-P-20	1/2	67.5	14.5			41		

HGM-06, 06X



Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H	J	K
HGM-06-20	3/4	124	10	77	27	61.7	—	73	6.4	36
HGM-06X-20	1	136	16	82.3	22	61.7	—	75	6.4	45
HGM-06-P-20	3/4	124	10	77	27	64	39	73	3	36
HGM-06X-P-20	1	136	16	82.3	22	64	39	75	3	45

HGM-10, 10X



Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H	J
HGM-10-20	1 1/4	150	12	96	30	—	45	13.6	102.5
HGM-10X-20	1 1/2	177	25.5	104	22	—	50	13.6	102.5
HGM-10-P-20	1 1/4	150	12	96	30	43	45	9.6	102.5
HGM-10X-P-20	1 1/2	177	25.5	104	22	43	50	9.6	106

F

MODULES

YUKEN's Modular Valves are stack type valves, and require no piping. They not only rationalise system build, but they also meet the technical requirements for a variety of hydraulic systems. Stacking systems is a new era in hydraulics.
The valves have standardized mounting surface conforming to ISO 4401 and optimum thickness for each size. Any hydraulic circuits can be easily composed by stacking the valves with mounting bolts. The valves can be used widely for hydraulic systems for various industries such as machine tools, special purpose machines, ships and steel mill equipment.

Valve Type	Max. Operating Pressure MPa	Maximum Flow L/min (1 2 3 5 7 10 20 30 50 70 100 200 300 500 700 1000)	Page
005 Series Modular Valves	25	005	F-7
007 Series Modular Valves	25	007	F-9
01 Series Modular Valves	35	01 ★1 01	F-11
03 Series Modular Valves	35	03 ★2 ★1 03	F-47
04 Series Modular Valves	35	04	F-78
06 Series Modular Valves	35	06	F-88
10 Series Modular Valves	25	10	F-98

★1. Maximum Flow for Throttle and Check Modular Valves. (MSA/MSB/MSW)
★2. Maximum Flow for Reducing Modular Valves with Pressure Adjustment Range "A" is limited to 80 L/min.

Hydraulic Fluids

Fluid Types

Any type of hydraulic fluid listed in the table below can be used.

Petroleum Base Oils	Use fluids equivalent to ISO VG 32 or VG 46.
Synthetic Fluids	Use phosphate ester or polyol ester fluids. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
Water-containing Fluids	Use water-glycol fluid.

Note: For use with hydraulic fluids other than those listed above(ex. W/O type Emulsion), please consult your Yuken representative in advance.

Recommended Fluid Viscosity and Temperature

Use hydraulic fluids which satisfy the both recommended viscosity and oil temperature given in the table below.

Name	Viscosity	Temperature
005 Series Modular Valves 007 Series Modular Valves	15 – 200 mm^2/s	–15 – +60°C
01 Series Modular Valves 03 Series Modular Valves 04 Series Modular Valves 06 Series Modular Valves 10 Series Modular Valves	15 – 400 mm^2/s	–15 – +70°C

Control of Contamination

Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valve.

Name	Contamination	Nominal Filtration
005 Series Modular Valves 007 Series Modular Valves	Within NAS1638 – Grade 11	20μm or less
01 Series Modular Valves 03 Series Modular Valves 04 Series Modular Valves 06 Series Modular Valves 10 Series Modular Valves	Within NAS1638 – Grade 12	20μm or less

High Pressure, High Flow Rate Modular Valves

Features

1. Installation and mounting space can be minimized.
2. No special skill is required for assembly and any addition or alteration of the hydraulic circuit can be made quickly and easily.
3. Problems such as oil-leaks, vibration and noise which may be caused by piping are minimized, increasing the reliability of the hydraulic system.
4. Maintenance and system check-ups can be easily carried out as they are normally installed in stackable units.

Specifications

Name	Valve Size	Max. Operating Pressure MPa	Max. Flow L/min	Number of Stack ★3
005 Series Modular Valves	——	25	15	1 to 4 stacks
007 Series Modular Valves				
01 Series Modular Valves	1/8	35	60 (80) ★1	1 to 5 stacks ★4
03 Series Modular Valves	3/8	35	120 (160) ★1,2	1 to 5 stacks ★4
04 Series Modular Valves	1/2	35	300	1 to 5 stacks
06 Series Modular Valves	3/4	35	500	
10 Series Modular Valves	1 1/4	25	800	

★1. The values in parentheses represent the max. flow rates for throttle modular valves (MSP) and throttle check modular valves (MSA/MSB/MSW).
★2. Maximum flow for reducing modular valves with pressure adjustment range "A" is limited to 80 L/min.
★3. Solenoid operated directional valve is included in the number of stack.
★4. If the working pressure is above 25 MPa, the maximum number of layers in a stack is 4 including the solenoid operated directional valve.

Mounting Surface

007 – 10 Series

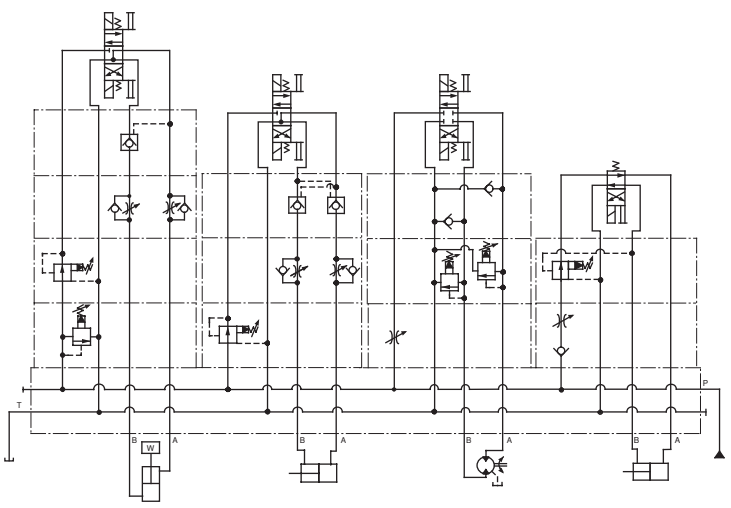
Mounting surface dimensions conform to ISO 4401 (Hydraulic fluid power four port directional control valves mounting surface) as listed in the table below.

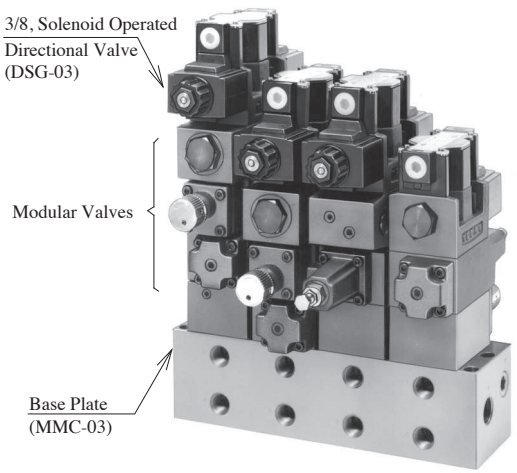
Name	ISO Mtg. Surface Code No.
007 Series Modular Valves	ISO 4401-02-01-0-05
01 Series Modular Valves	ISO 4401-03-02-0-05
03 Series Modular Valves	ISO 4401-05-04-0-05
04 Series Modular Valves	ISO 4401-07-07-0-05
06 Series Modular Valves	ISO 4401-08-08-0-05
10 Series Modular Valves	ISO 4401-10-09-0-05

★ Only 005 Series are YUKEN original specification

Stacking Example

03 Series





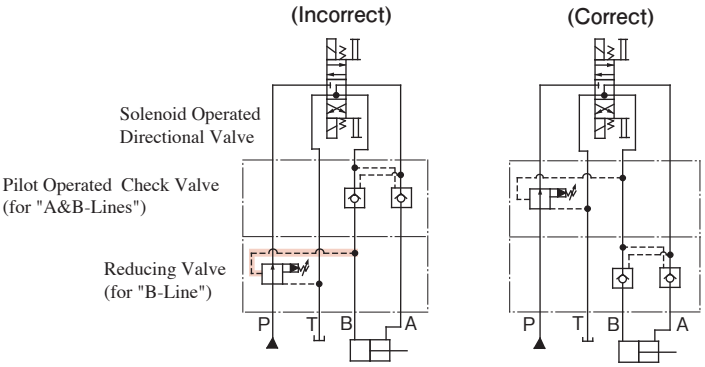
Instructions

Caution in the selection of valves and circuit designing

The selection of modular valves, to suit a particular function or hydraulic circuit, are made in exactly the same way as conventional valves, taking into account of the flow and pressure of each valve to be used. In some cases, the stacking system may be restricted, so please refer to the following instructions for stacking sequence. Please note, that when designing a system using modular stacking valves, due consideration should be given to working space for future maintenance.

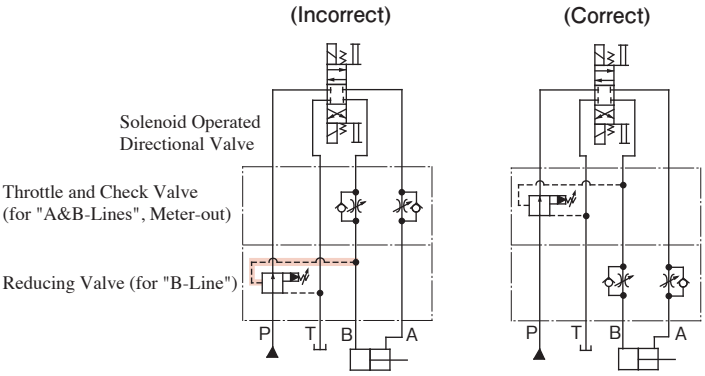
● Stacking sequence when using reducing valves (for "A" or "B" line) and pilot operated check valves.

Because reducing valves are spool type, there is an internal leakage. In the stacking sequence shown in the drawing left (incorrect), the cylinder moves due to leakage through the pilot pressure line □.
Consequently, retaining the position of the cylinder using a pilot operated check valve becomes impossible. The stacking sequence shown in the drawing right (correct) is required in order to retain the cylinder position.



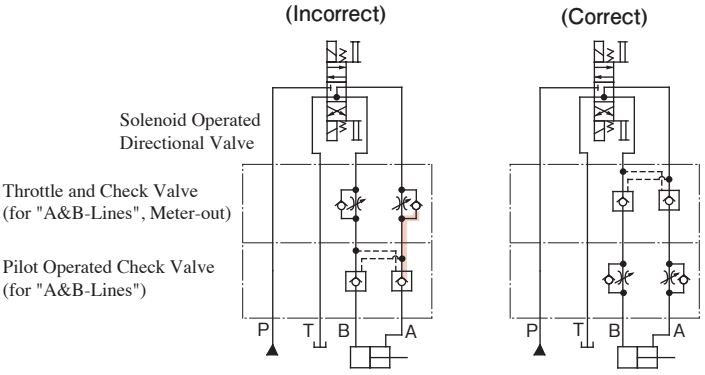
● Stacking sequence when using reducing valves (for "A" or "B" line) and throttle and check valves (for meter-out).

In B to T flow in the drawing left (incorrect), pressure is generated at □ part with a throttle effect of the throttle and check valve. Depending upon the pressure so generated, the reducing valve may perform a pressure reducing function which causes a shortage of output power of the cylinder and spoils the smooth operation of the cylinder.
Therefore, stacking sequence in the drawing right (correct) is required in this combination.



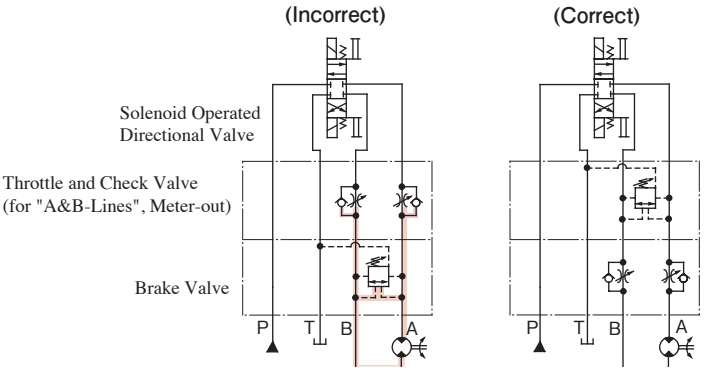
● Stacking sequence when using pilot operated check valves and throttle and check valves (for meter-out).

In A to T flow in the drawing left (incorrect), pressure is generated at □ part with a throttle effect of the throttle and check valve.
The pressure so generated acts to shut the pilot operated check valve and eventually creates an open and shut operation of the valve repeatedly which may cause the cylinder to have a knocking effect (the same effect will occur in the case of B to T flow). Therefore, the stacking sequence in the drawing right (correct) is required in this combination.



● Stacking sequence when using brake valves and throttle and check valves

In the drawing left (incorrect), pressure is generated at □ part (a load pressure and a back pressure from throttle effect). For structual reasons of the brake valve, the load pressure and back pressure act to open the valve, therefore, the setting pressure should be more than the pressure equal to the load pressure plus back pressure (Pa + Pb). If the setting pressure is less than Pa + Pb, the brake valve acts and brakes the movement of the actuator in operation, this eventually reduces the speed of the actuator. On the contrary, if the setting pressure is more than Pa + Pb, shock may occur when braking the actuator since the setting pressure is too high against the load pressure. Therefore, the stacking sequence in the drawing right (correct) is required in this combination.



Base Plates and Sub-Plates

When mounting the modular valves, use base plates and sub-plates specified below. If these base plates and the sub-plates are not used, ensure that the mounting surface has a good machined finish. (▽6)

Series	Base Plates		Sub-Plates	
	Model Numbers	Page	Model Numbers	Page
005 Series	Consult your Yuken representative in advance.	—	Consult your Yuken representative in advance.	—
007 Series		—		—
01 Series	MMC-01-∗-40	F-39	DSGM-01∗-31	F-108
03 Series	MMC-03-T-∗-21	F-71	DSGM-03∗-40	F-108
04 Series	Consult your Yuken representative in advance.	—	DHGM-04∗-20	F-108
06 Series		—	DHGM-06∗-50	F-109
10 Series		—	DHGM-10∗-40	F-109

Mounting Bolts

Modular valves are mounted using stud bolts which are supplied in a kit form. When mounting, see the following table for tightening torque. After the test run, be sure to tighten again firmly within the specified torque.

Series	Bolt Kit Model Numbers	Tightening Torque Nm
005 Series	MBK-005-∗-20	2.5-3.5
007 Series	MBK-007-∗-10	
01 Series	MBK-01-∗-70	5-7(6-7)★
03 Series	MBK-03-∗-10	12-15
04 Series	MBK-04-∗-10	12-15(M6) 45-55(M10)
06 Series	MBK-06-∗-70	70-100(90-100)★
10 Series	MBK-10-∗-10	150-170

★ The value range in parentheses represents the tightening torque requirements if the operating pressure is above 25 MPa.

Assembly

Assembly should be carried out in clean conditions and in accordance with the following procedure. Cautious attention should be paid to ensure that the interface of the valves are clean and free from dirt or other foreign materials.

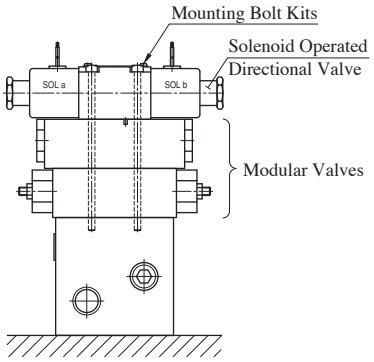
Assembly Procedure:

005/007 Series

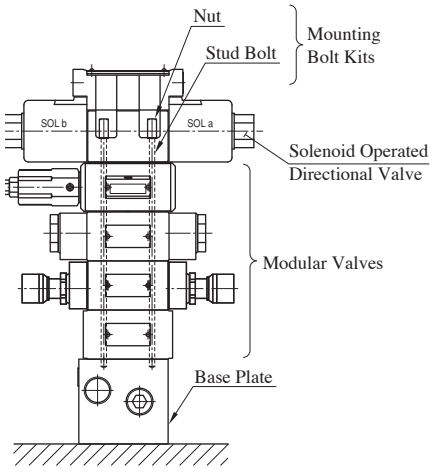
1) To stack modular valves and solenoid operated directional valves according to circuit requirements, match the O-ring surfaces to the mounting surface and check the alignment of the locating pins. (007 Series check the port arrangement)
2) Align the right and left sides of the stacked valves.
3) Tighten the four mounting bolts to the specified tightening torque. After the test run, be sure to tighten again firmly within the specified torque.

01-10 Series

1) Screw-in the four stud bolts(04, 06 and 10 series: six stud bolts), fully into the tapped holes on the mounting surface of the specified base plate, sub-plate or manifold. 01,04 and 06 series stud bolts, screw short-side into the mounting surface of the specified base plate, sub-plate or manifold.
2) Stack the modular valves and solenoid operated directional valves in accordance with the hydraulic circuit, place the O-ring inserted surface face onto the base plate and make sure that the port arrangement of the modular valves are in the correct position before stacking the valves onto the stud bolts.
3) Align both the end of the valves stacked.
4) Screw-in the four nuts(04, 06 and 10 series: six nuts) onto the stud bolts and tighten with the specified torque. After the test run, be sure to retighten the nuts firmly within the specified torque.



005 Series Modular Valves



03 Series Modular Valves

Pressure Drop

Pressure Drop

Pressure drop curves of the modular valves are those based on viscosity of 35 mm²/s and specific gravity of 0.850. When using the modular valves in conditions other than the above mentioned, find the appropriate values referring to the following table and formula.

● For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

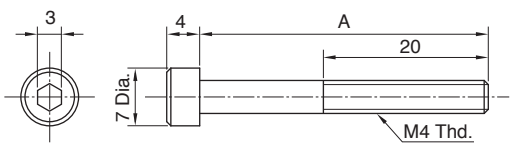
● For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the following formula. ⊿P'= ⊿P (G'/0.850)

Interchangeability in Installation between Current and New Design

The model changed for the following models have been made.

Name		Model Numbers		Mtg. Interchangeability	Page	Major changes
		Current	New			
01 Series	Relief Modular Valves	MB＊-01-＊-30	MB＊-01-＊-＊-70	Yes	F-42-F-46	Higher Operating Pressure. Modification for large flow use.
	Reducing Modular Valves	MR＊-01-＊-30	MR＊-01-＊-＊-70	Yes		
	Sequence Modular Valves	MHP-01-＊-30	MHP-01-＊-＊-70	Yes		
	Counterbalance Modular Valves	MHA-01-＊-30	MHA/MHB-01-＊-70	Yes		
	Throttle and Check Modular Valves	MS＊-01-＊＊-50	MS＊-01-＊＊-70	Yes		
	Check Modular Valves	MC＊-01-＊-30	MC＊-01-＊-70	Yes		
	Pilot Operated Check Modular Valves	MP＊-01-＊-40	MP＊-01-＊-70	Yes		
		MP＊-01-＊-4001	MP＊-01-＊-L-70			
	Bolt Kits	MBK-01-＊-30	MBK-01-＊-70	Yes		
03 Series	Relief Modular Valves	MB＊-03-＊-30	MB＊-03-＊-70	Yes	F-74-F-77	Higher Operating Pressure. Modification for large flow use.
	Reducing Modular Valves	MR＊-03-＊-30	MR＊-03-＊-70	Yes		
	Throttle and Check Modular Valves	MS＊-03-＊-40	MS＊-03-＊-70	Yes		
	Check Modular Valves	MCP/MCT-03-＊-10 MCA/B/W-03-＊-20	MC＊-03-＊-70	Yes		
	Pilot Operated Check Modular Valves	MP＊-03-＊-20	MP＊-03-＊-70	Yes		
		MP＊-03-＊-2001	MP＊-03-＊-L-70			

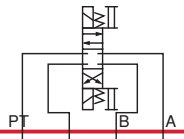
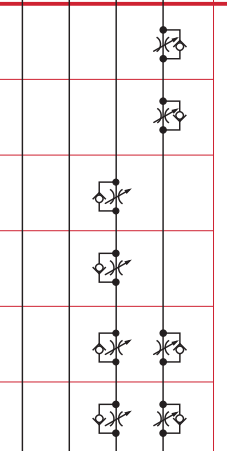
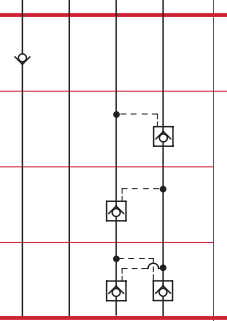
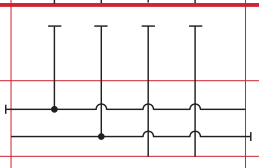
Comparison of MBK-005 bolt kit model numbers



Bolt Kit Model Numbers		Dimensions A mm	The number of the laminating steps quantity of valves to be stacked including solenoid operated directional valve
(New) 20 Design	(Current) 10 Design		
MBK-005-01-20	MBK-005-02-10	65	2
MBK-005-02-20	MBK-005-03-10	95	3
MBK-005-03-20	————	125	4
MBK-005-05-20	MBK-005-01-10	35	1

005 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page
	Solenoid Operated Directional Valve DSG-005-＊＊＊-＊-40		★
Pressure Control Valves	Releif Valves (for "P-Line") MBP-005-＊-20		F-8
	Reducing Valves (for "P-Line") MRP-005-＊-20		F-8
Flow Control Valves	Throttle and Check Valves (for "A-Line", Meter-out) MSA-005-X-20		F-8
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-005-Y-20		
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-005-X-20		
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-005-Y-20		
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-005-X-20		
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-005-Y-20		
Directional Control Valves	Check Valves (for "P-Line") MCP-005-0-20		F-8
	Pilot Operated Check Valves (for "A-Line") MPA-005-2-20		F-8
	Pilot Operated Check Valves (for "B-Line") MPB-005-2-20		
	Pilot Operated Check Valves (for "A&B-Lines") MPW-005-2-20		
Modular Plates and Mounting Bolts	End Plates (Blocking Plates) MDC-005-A-20		F-8
	Base Plates MMC-005-＊-20		F-8
	Bolts Kits MBK-005-＊-20		F-8

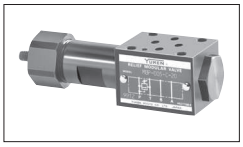
★Please refer to the catalog page of "E: Directional Control Valves".

●Further information about 005 series modular valves, please consult your Yuken representative.

Relief Modular Valves

Specifications

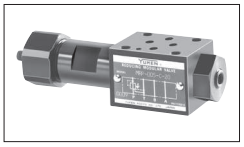
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MBP-005-＊-20	25	15



Reducing Modular Valves

Specifications

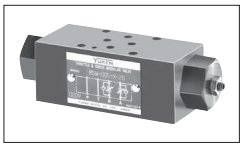
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MRP-005-＊-20	25	15



Throttle and Check Modular Valves

Specifications

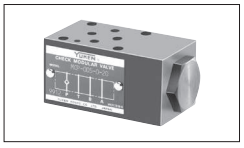
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS＊-005-＊-20	25	15



Check Modular Valves

Specifications

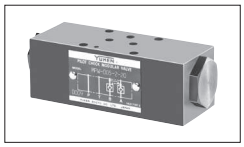
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MCP-005-0-20	25	15



Pilot Operated Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP＊-005-2-20	25	15



End Plates

Blocking plates are used for auxiliary mounting surface or for closing unnecessary circuits.

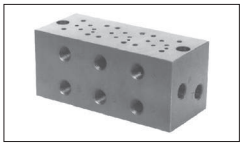
Specifications

Model Numbers	Max. Operating Pressure MPa
MDC-005-A-20	25

Base Plates For Modular Valves

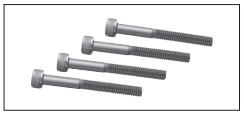
Specifications

Model Numbers	Max. Operating Pressure MPa
MMC-005-＊-20	25



Mounting Bolt Kits For Modular Valves

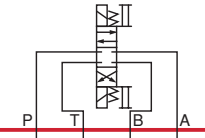
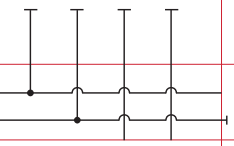
To mount the valves, four M4 bolts are used. The combination of valves varies with circuits. So, we have several mounting bolt kits suitable for different valve combinations.



Model Numbers
MBK-005-＊-10

007 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page
	Solenoid Operated Directional Valve DSG-007-＊＊＊-＊-＊10		★
Pressure Control Valves	Reducing Valves (for "P-Line") MRP-007-＊-10		F-10
Flow Control Valves	Throttle and Check Valves (for "A-Line", Meter-out) MSA-007-X-10		F-10
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-007-Y-10		
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-007-X-10		
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-007-Y-10		
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-007-X-10		
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-007-Y-10		
Directional Control Valves	Pilot Operated Check Valves (for "A-Line") MPA-007-2-10		F-10
	Pilot Operated Check Valves (for "B-Line") MPB-007-2-10		
	Pilot Operated Check Valves (for "A&B-Lines") MPW-007-2-10		
Modular Plates and Mounting Bolts	End Plates (Blocking Plates) MDC-007-A-10		F-10
	Base Plates MMC-007-＊-10		F-10
	Bolts Kits MBK-007-＊-10		F-10

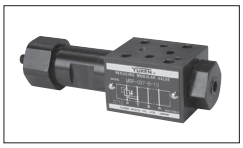
★Please refer to the catalog page of "E: Directional Control Valves".

●Further information about 007 series modular valves, please consult your Yuken representative.

Reducing Modular Valves

Specifications

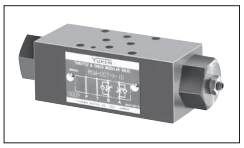
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MRP-007-＊-10	25	15



Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS＊-007-＊-10	25	15



Pilot Operated Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP＊-007-2-10	25	15

End Plates

Blocking plates are used for auxiliary mounting surface or for closing unnecessary circuits.

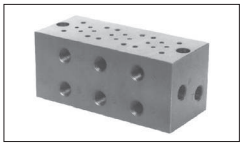
Specifications

Model Numbers	Max. Operating Pressure MPa
MDC-007-A-10	25

Base Plates For Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa
MMC-007-＊-10	25



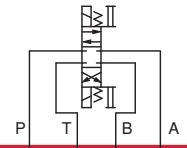
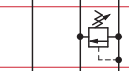
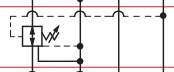
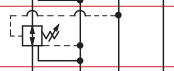
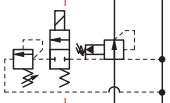
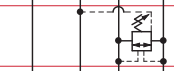
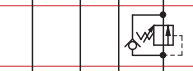
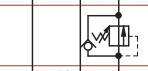
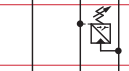
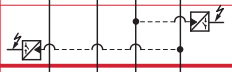
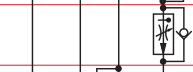
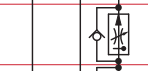
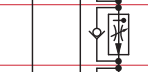
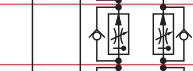
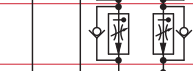
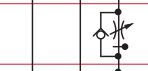
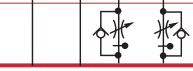
Mounting Bolt Kits For Modular Valves

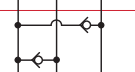
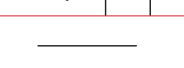
To mount the valves, four M4 bolts are used. The combination of valves varies with circuits. So, we have several mounting bolt kits suitable for different valve combinations.

Model Numbers
MBK-007-＊-10

01 Series Modular Valves

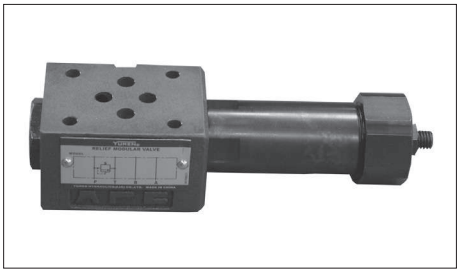
Type of Modular Valve

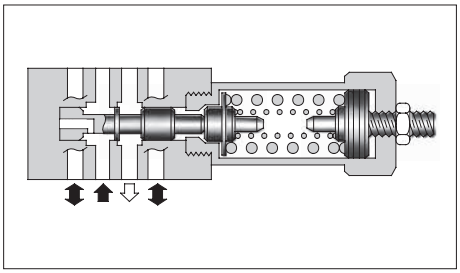
Class	Name and Model Numbers	Graphic Symbols	Page
	Solenoid Operated Directional Valve (S-) DSG-01-＊＊＊-70 E-DSG-01-＊＊＊-D＊-70 T-DSG-01-＊＊＊-D24＊-70 G-DSG-01-＊＊＊-＊-51		★
Pressure Control Valves	Releif Valves (for "P-Line") MBP-01-＊-70		F-12
	Releif Valves (for "A-Line") MBA—01—＊—70		F-12
	Releif Valves (for "B-Line") MBB—01—＊—70		F-12
	Reducing Valves (for "P-Line") MRP—01—＊—70		F-14
	Reducing Valves (for "A-Line") MRA—01—＊—70		F-14
	Reducing Valves (for "B-Line") MRB—01—＊—70		F-14
	Two Pressure Reducing Valves (for "P-Line") MRDP-01-＊-＊-＊-10		F-16
	Brake Valves MBR-01-＊-30		F-18
	Sequence Valves (for "P-Line") MHP-01-＊-70		F-19
	Counterbalance Valves (for "A-Line") MHA-01-＊-70		F-19
	Counterbalance Valves (for "B-Line") MHB-01-＊-70		F-19
	Pressure Switch Valves (for "P-Line") MJP-01-＊-＊-10		F-22
	Pressure Switch Valves (for "A-Line") MJA-01-＊-＊-10		F-22
	Pressure Switch Valves (for "B-Line") MJB-01-＊-＊-10		F-22
	Pressure Switch Valves (for "A&B-Line") MJW-01-J-＊-10		F-22
Flow Control Valves	Flow Control Valves (for "P-Line") MFP-01-10		F-25
	Flow Control and Check Valves (for "A-Line", Meter-out) MFA-01-X-10		F-25
	Flow Control and Check Valves (for "A-Line", Meter-in) MFA-01-Y-10		F-25
	Flow Control and Check Valves (for "B-Line", Meter-out) MFB-01-X-10		F-25
	Flow Control and Check Valves (for "B-Line", Meter-in) MFB-01-Y-10		F-25
	Flow Control and Check Valves (for "A&B-Lines", Meter-out) MFW-01-X-10		F-25
	Flow Control and Check Valves (for "A&B-Lines", Meter-in) MFW-01-Y-10		F-25
	Temperature Compensated Throttle and Check Valves (for "A-Line", Meter-out) MSTA-01-X-10		F-27
	Temperature Compensated Throttle and Check Valves (for "B-Line", Meter-out) MSTB-01-X-10		F-27
	Temperature Compensated Throttle and Check Valves (for "A&B-Lines", Meter-out) MSTW-01-X-10		F-27

Class	Name and Model Numbers	Graphic Symbols (P T B A)	Page
Flow Control Valves	Throttle Valves (for "P-Line") MSP-01-50		F-29
	Throttle Valves (for "T-Line") MST-01-50		F-29
	Check and Throttle Valves (for "P-Line") MSCP-01-30		F-30
	Throttle and Check Valves (for "A-Line", Meter-out) MSA-01-X-70		F-31
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-01-Y-70		F-31
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-01-X-70		F-31
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-01-Y-70		F-31
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-01-X-70		F-31
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-01-Y-70		F-31
	Throttle and Check Valves (for "A&B-Lines", Meter-out, Meter-in) MSW-01-XY-70		F-31
	Throttle and Check Valves (for "A&B-Lines", Meter-in, Meter-out) MSW-01-YX-70		F-31
Directional Control Valves	Check Valves (for "P-Line") MCP-01-＊-70		F-33
	Check Valves (for "A-Line") MCA-01-＊-70		F-33
	Check Valves (for "B-Line") MCB-01-＊-70		F-33
	Check Valves (for "T-Line") MCT-01-＊-70		F-33
	Check Valves (for "A&B-Line") MCW-01-＊-70		F-33
	Anti-Cavitation Valves MAC-01-30		F-35
	Pilot Operated Check Valves (for "A-Line") MPA-01-＊-＊-70		F-36
	Pilot Operated Check Valves (for "B-Line") MPB-01-＊-＊-70		F-36
	Pilot Operated Check Valves (for "A&B-Lines") MPW-01-＊-＊-70		F-36
Modular Plates and Mounting Bolts	End Plates (Blocking Plates)) MDC-01-A-30		F-38
	End Plates (Bypass plates) MDC-01-B-30		F-38
	Connecting Plates (for "P&A-Lines") MDS-01-PA-30		F-38
	Connecting Plates (for "P&B-Lines") MDS-01-PB-30		F-38
	Connecting Plates (for "A&T-Lines") MDS-01-AT-30		F-38
	Base Plates MMC-01-＊-40		F-39
	Bolt Kits MBK-01-＊-70		F-41

★Please refer to the catalog page of "E: Directional Control Valves".

Relief Modular Valves





Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MB＊-01-＊-＊-70	35	60

Model Number Designation

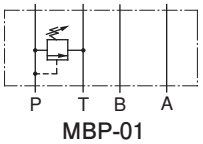
MBP	–01	–B	–B	–70
Series Number	Valve Size	Pres. Adj. Range MPa	Pres. Adj. Screw Position	Design Number
MBP: Relief Valve for P-Line	**01**	**B:** ★-7 **C:** 3.5-14 **H:** 7-21 **K:** 14-35	**None:** A Port Side **B:** B Port Side	**70**
MBA: Relief Valve for A-Line **MBB:** Relief Valve for B-Line			—	

★See the "Min. Adjustment Pressure" of this page.

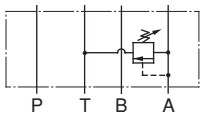
Instructions

- The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of this page. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.
- In case of a small flow, the setting pressure may become unstable. To avoid this, refer to the minimum flow characteristic curve of the next page and use the valve within a range as shown with .

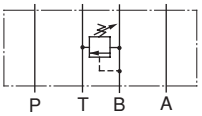
Graphic Symbols



MBP-01



MBA-01

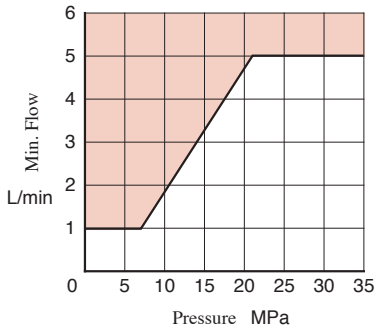


MBB-01

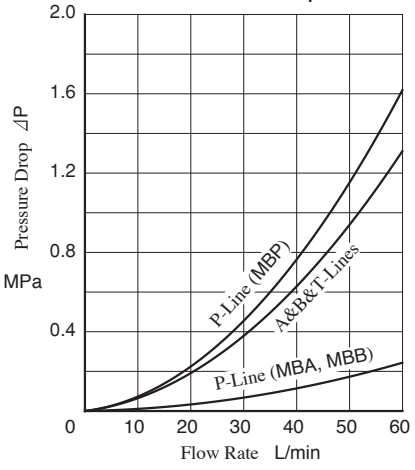
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

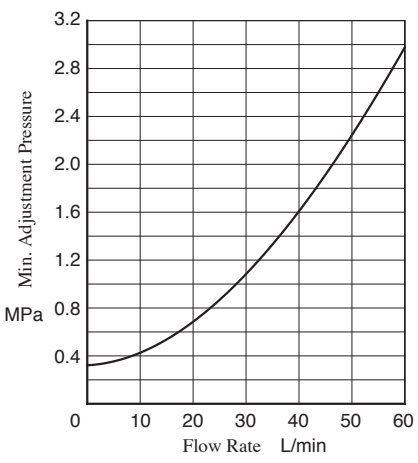
Minimum Flow



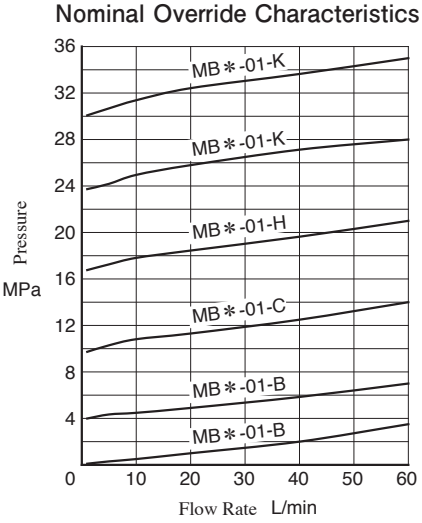
Pressure Drop



Min. Adjustment Pressure

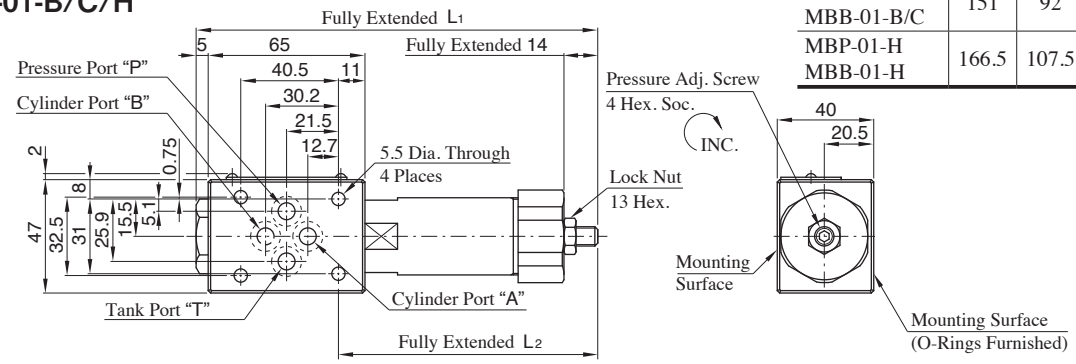


Nominal Override Characteristics

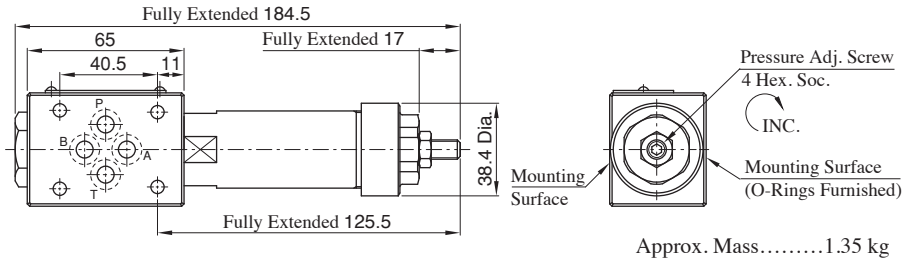


MBP-01-B/C/H
MBB-01-B/C/H

Model Numbers	L_1	L_2	Mass kg
MBP-01-B/C MBB-01-B/C	151	92	1.15
MBP-01-H MBB-01-H	166.5	107.5	1.25



MBP-01-K
MBB-01-K

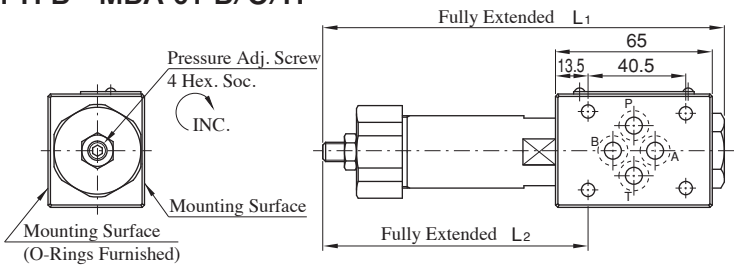


Approx. Mass.....1.35 kg

●For other dimensions, refer to the drawing above (MBP-01-B/C/H).

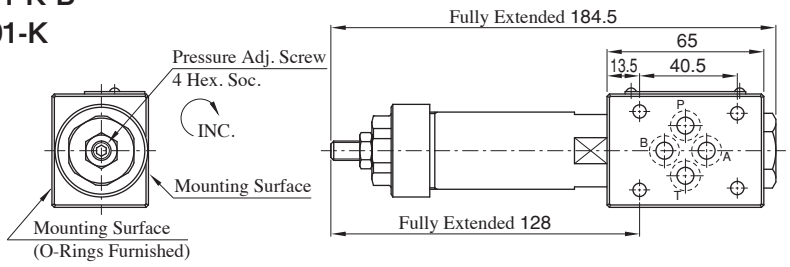
MBP-01-B-B • MBP-01-C-B
MBP-01-H-B • MBA-01-B/C/H

Model Numbers	L_1	L_2	Mass kg
MBP-01-B-B MBP-01-C-B MBA-01-B/C	151	94.5	1.15
MBP-01-H-B MBA-01-H	166.5	110	1.25



●For other dimensions, refer to the drawing above (MBP-01-B/C/H).

MBP-01-K-B
MBA-01-K

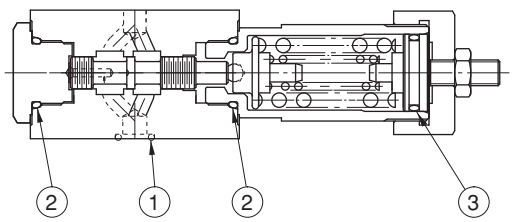


Approx. Mass.....1.35 kg

●For other dimensions, refer to the drawing above (MBP-01-B/C/H).

List of Seals

MBP-01
MBA-01
MBB-01



Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2
3	O-Ring	OR NBR-70-1 P20-N (MB＊-01-B/C/H(-B)) OR NBR-70-1 P22-N (MB＊-01-K(-B))	1

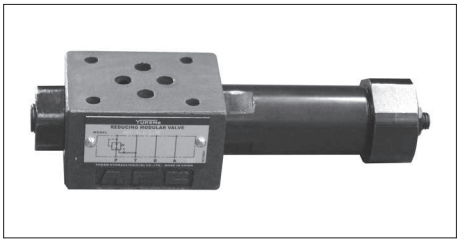
●MBP/MBB-01-＊-B, MBA-01
The pressure adjustment part is assembled on the left side.

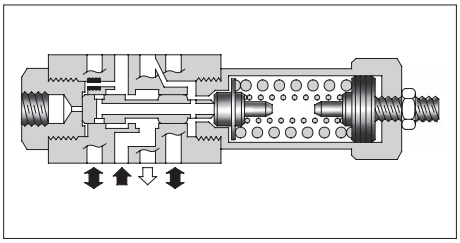
Reducing Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MR＊-01-＊-＊-70	35	60 ★

★If the pressure is set below 0.5 MPa, the maximum flow is limited. See the "Min. Adjustment Pressure vs. Max. Flow"of this page and during use, stay within the shaded zone on the graph.



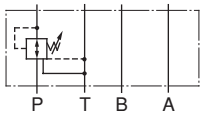


Model Number Designation

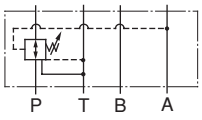
MRP	–01	–A	–B	–70
Series Number	Valve Size	Pres.Adj. Range MPa	Pres.Adj. Screw Position	Design Number
MRP: Reducing Valve for P-Line	**01**	**A:** ★-3.5 **B:** 0.8-7 **C:** 3.5-14 **H:** 7-21	**None:** A Port Side **B:** B Port Side	**70**
MRA: Reducing Valve for A-Line **MRB:** Reducing Valve for B-Line				

★See the "Min. Adjustment Pressure vs. Max. Flow" of this page.

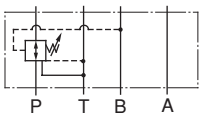
Graphic Symbols



MRP-01



MRA-01

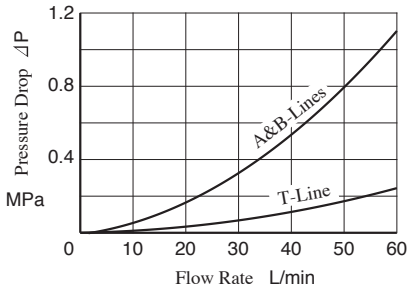


MRB-01

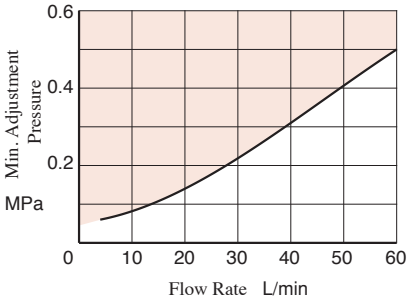
Typical Performance Characteristics

Hydraulic Fluid:Viscosity 35 mm²/s, Specific Gravity 0.850

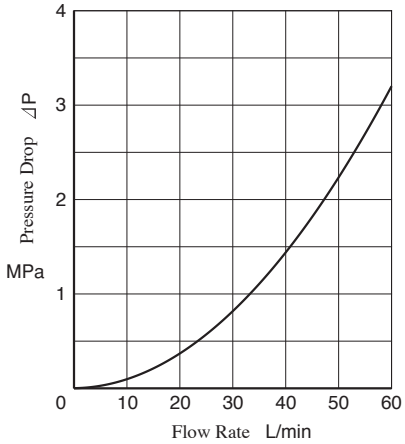
Pressure Drop



Min. Adjustment Pressure vs. Max. Flow

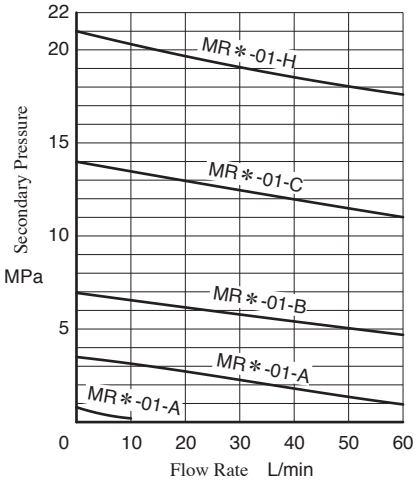


Pres. Drop at Spool Fully Open (P-Line)

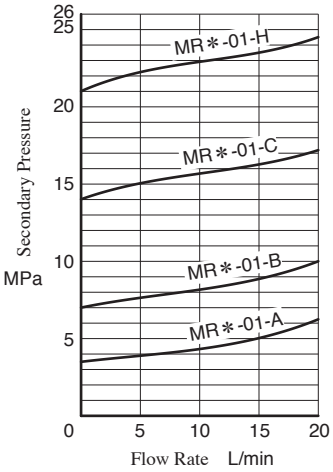


Nominal Override Characteristics Primary Pressure 35 MPa

●Primary Pres.→Secondary Pres.



●Secondary Pres.→T Line

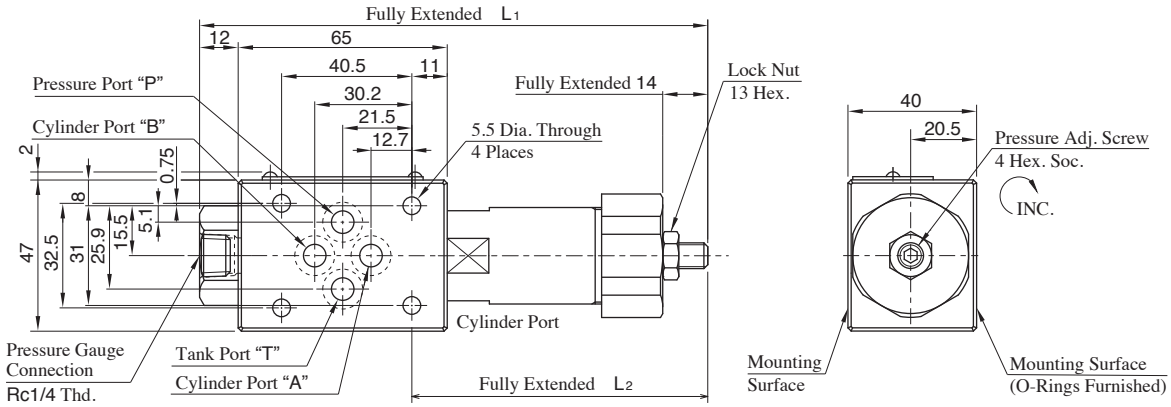


Instructions

- The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

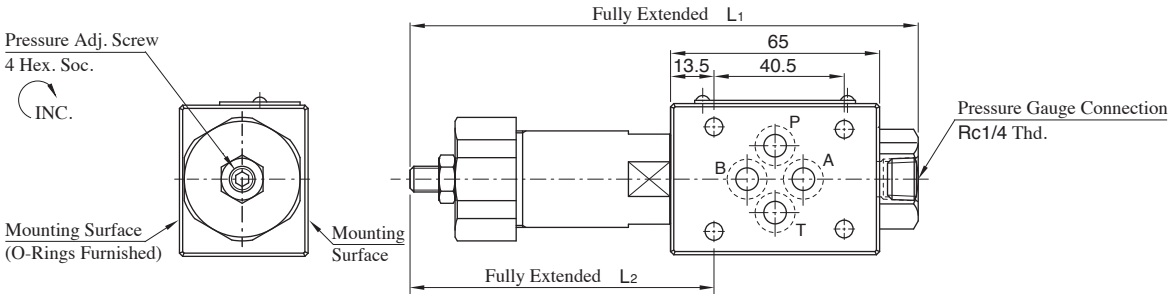
MRP-01
MRA-01
MRB-01

Model Numbers	L_1	L_2	Mass kg
MR＊-01-A	162.5	96.5	1.10
MR＊-01-B/C	158	92	1.15
MR＊-01-H	173.5	107.5	1.25



MRP-01-＊-B
MRA-01-＊-B
MRB-01-＊-B

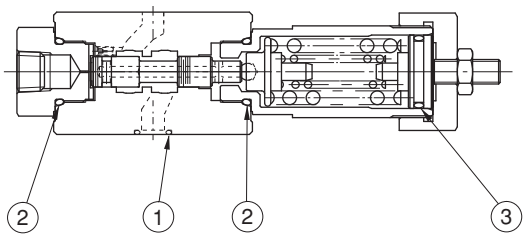
Model Numbers	L_1	L_2	Mass kg
MR＊-01-A-B	162.5	99	1.10
MR＊-01-B-B	158	94.5	1.15
MR＊-01-C-B			
MR＊-01-H-B	173.5	110	1.25



- For other dimensions, please refer to "MRP/MRA/MRB-01" in the above figure.

List of Seals

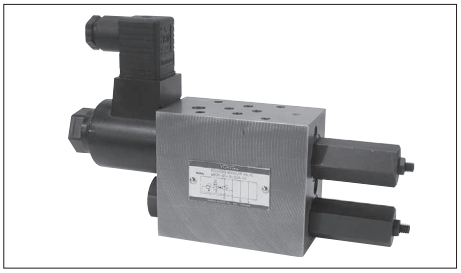
MRP-01
MRA-01
MRB-01

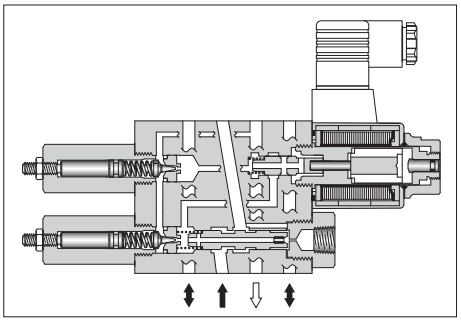


Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2
3	O-Ring	OR NBR-70-1 P20-N	1

- MR＊-01-＊-B
  The pressure adjustment part is assembled on the left side.

Two Pressure Reducing Modular Valves





Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MRDP-01-B-＊-＊-10	14	20 ★
MRDP-01-C-＊-＊-10		40 ★

★Max. Flow is limited when set pressure is low pressure.
See the "Min. Adjustment Pressure vs. Max. Flow" of this page and operate in the range above the graph curve.

Model Number Designation

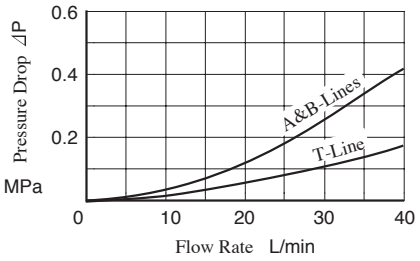
MRDP	–01	–B	–A100	–N	–10
Series Number	Valve Size	Pres. Adj. Range MPa	Coil Type	Electrical Conduit Connection	Design Number
MRDP: Two Pressure Reducing Valve for P-Line	**01**	Low Press. / High Press. **B:** 0.2-3.5 / 0.5-7 **C:** 0.5-7 / 0.5-14	AC A100, A200 DC D24 AC (Rectified) R100, R200★	**N:** Plug-in Connector Type **N1:** Plug-in Connector Type with Indicator Light (Option)	**10**

★Coil Type "R200" is treated as an option.

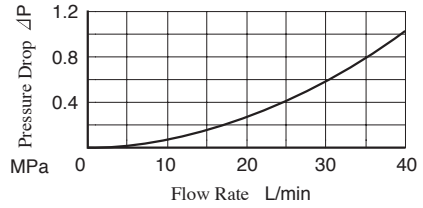
Typical Performance Characteristics

Hydraulic Fluid:Viscosity 35 mm²/s, Specific Gravity 0.850

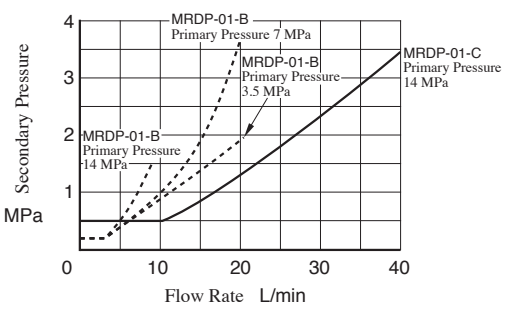
Pressure Drop



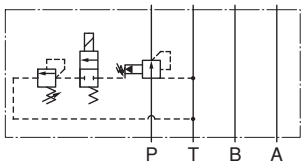
Pressure Drop at Spool Fully Open (P-Line)



Min. Adjustment Pressure vs. Max. Flow



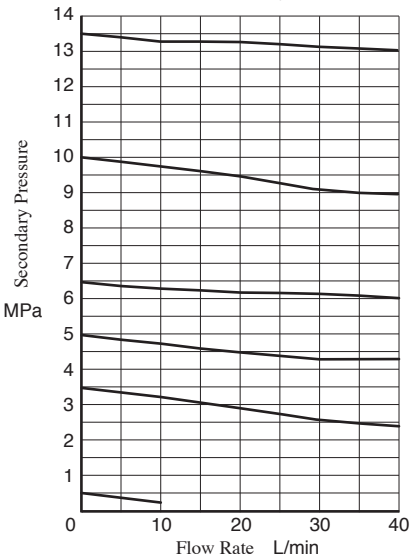
Graphic Symbol



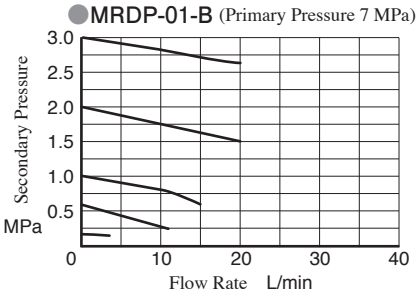
MRDP-01

Nominal Override Characteristics

●MRDP-01-C (Primary Pressure 14 MPa)



●MRDP-01-B (Primary Pressure 7 MPa)



Standard Solenoid Ratings

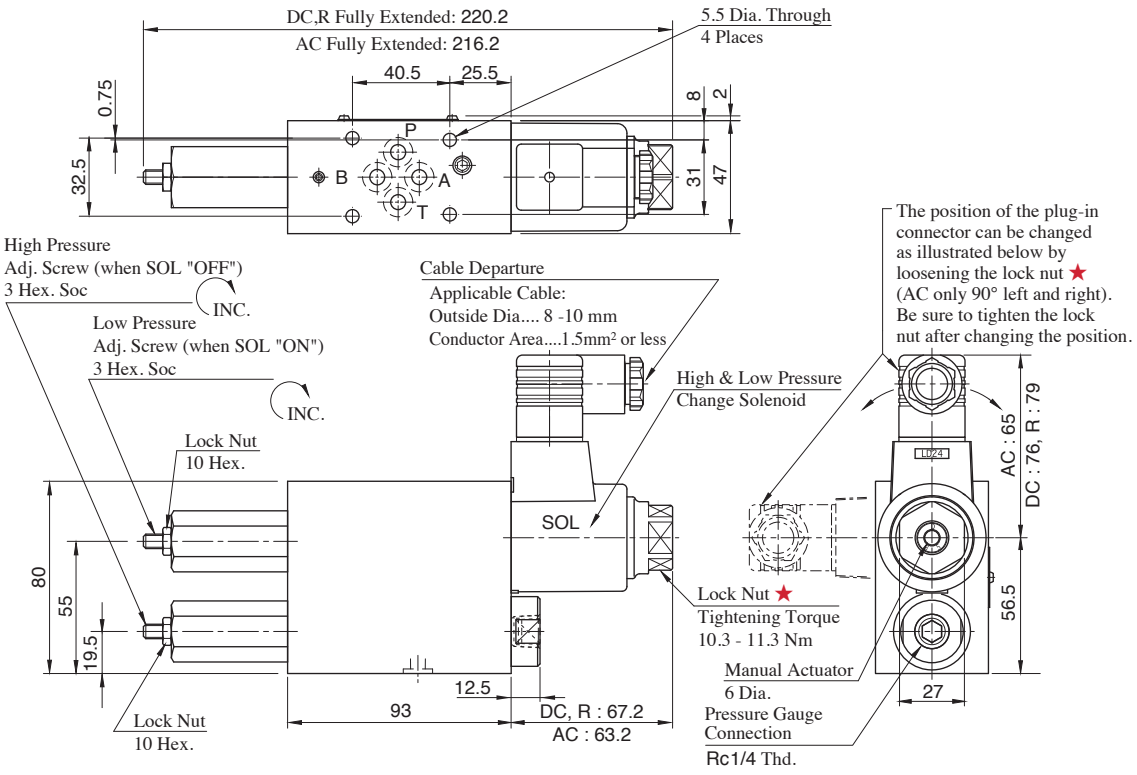
Electric Source	Coil Type	Frequency Hz	Voltage (V)		Current & Power at Rated Voltage		
			Source Rating	Serviceable Range	Inrush (A)	Holding (A)	Power (W)
AC	A100	50	100	80-110	1.65	0.30	—
		60	100	90-120	1.45	0.24	
			110		1.60	0.27	
	A200	50	200	160-220	0.83	0.15	
		60	200	180-240	0.73	0.12	
			220		0.80	0.14	
DC	D24	—	24	21.6-26.4	—	0.60	14
AC→DC (Rectified)	R100	50/60	100	90-110	—	0.168	14
	R200		200	180-220		0.084	

Instructions

- The minimum adjustment pressure equals the value of the minimum adjustment pressure on the previous page plus the tank line back pressure. This back pressure should include the value of the T-Line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
- To adjust the pressure, loosen the lock nut and turn the pressure adjustment screw slowly clockwise to increase pressure and anti-clockwise to decrease pressure. After adjustments do not forget to tighten the lock nut. Refer to the table below for the relationship between energized state of the high & low pres. change solenoid and set pressure.

High & Low Pres. Change Solenoid	Set Pres.
OFF	High
ON	Low

MRDP-01

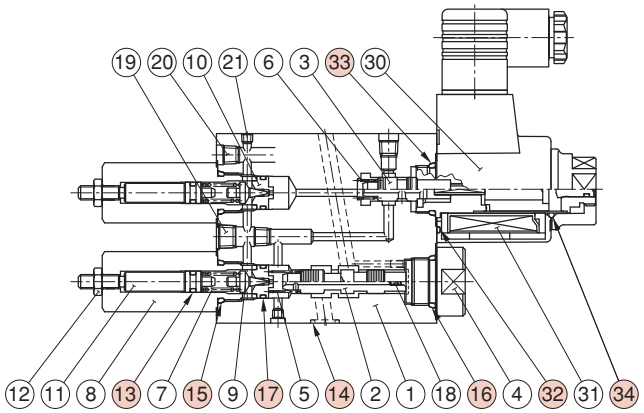


Mounting Surface Dimensions:93×47

Approx. Mass.....3 kg

List of Seals, Solenoid Ass'y, Coil Ass'y No.

MRDP-01



List of Seals

Item	Name of Parts	Part Numbers	Qty.	Notes
13	O-Ring	OR NBR-70-1 P6-N	2	
14	O-Ring	OR NBR-90 P9-N	4	
15	O-Ring	OR NBR-90 P14-N	2	
16	O-Ring	OR NBR-90 P18-N	1	
17	O-Ring	AS568-013(NBR-90)	2	
32	O-Ring	AS568-026(NBR-70-1)	1	Included in solenoid ass'y (item ㉚).
33	O-Ring	OR NBR-90 P18-N	1	
34	O-Ring	OR NBR-70-1 P20-N	1	

Solenoid Ass'y, Coil Ass'y No.

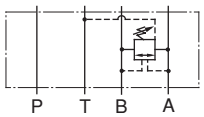
Model Numbers	㉚Solenoid Ass'y No.	㉛Coil Ass'y No.
MRDP-01-＊-A100	L-SA1-100-N-7003	C-L-SA1-100-N-70
MRDP-01-＊-A200	L-SA1-200-N-7003	C-L-SA1-200-N-70
MRDP-01-＊-D24	L-SD1-24-N-7003	C-L-SD1-24-N-70
MRDP-01-＊-R100	L-SR1-100-N-7003	C-L-SR1-100-N-70
MRDP-01-＊-R200	L-SR1-200-N-7003	C-L-SR1-200-N-70

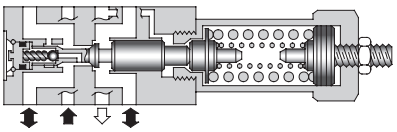
Brake Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MBR-01-∗-30	25	35

Graphic Symbol





Model Number Designation

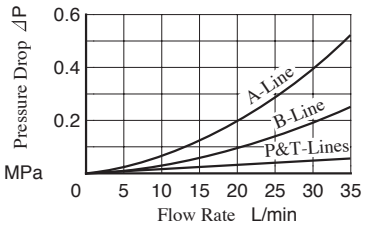
MBR	–01	–C	–30
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MBR: Brake Valve	**01**	**C:** ★-14 **H:** 7-21	**30**

★See the "Min. Adjustment Pressure" of this page.

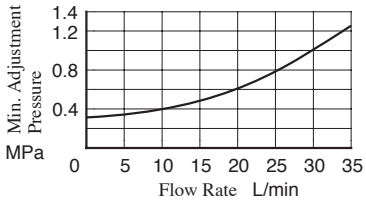
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop



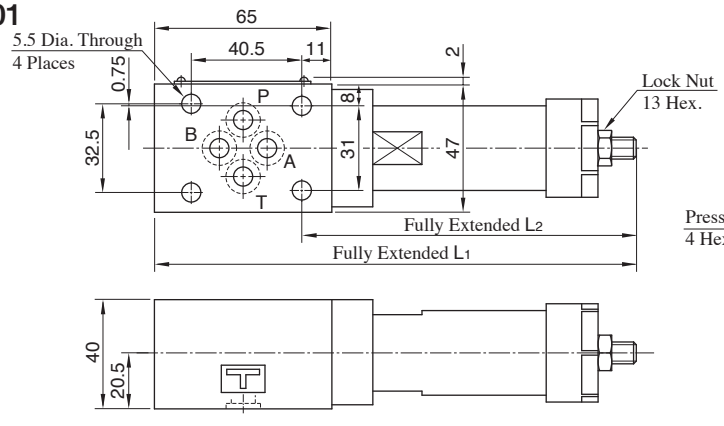
Min. Adjustment Pressure



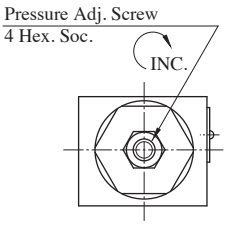
Instructions

- The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of the left. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

MBR-01



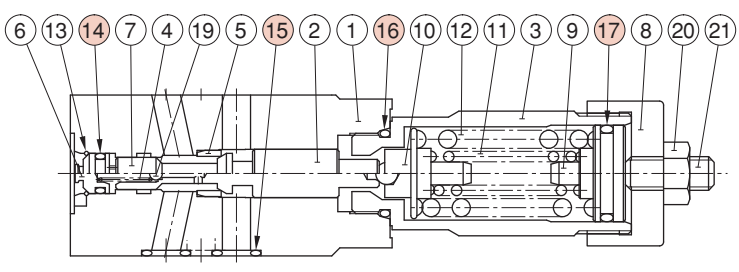
Model Numbers	L1	L2
MBR-01-C	161	107
MBR-01-H	176.5	122.5



Approx. Mass.....1.3 kg

List of Seals

MBR-01

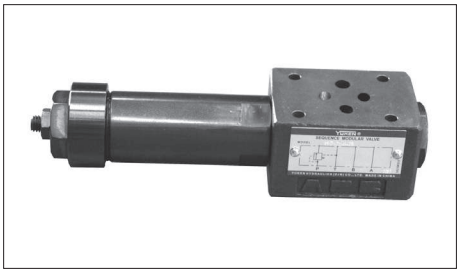


Item	Name of Parts	Part Numbers	Qty.
14	O-Ring	OR NBR-90 P7-N	1
15	O-Ring	OR NBR-90 P9-N	4
16	O-Ring	OR NBR-90 P18-N	1
17	O-Ring	OR NBR-70-1 P20-N	1

Sequence Modular Valves/Counterbalance Modular Valves

Specifications

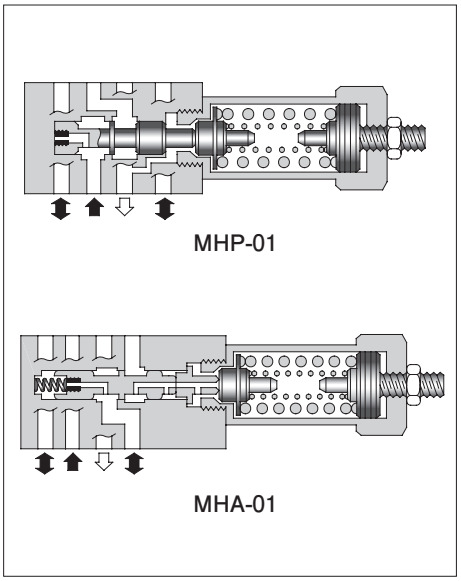
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MHP-01-∗-∗-70	35	60
MHA/MHB-01-∗-70		



Model Number Designation

MHP	–01	–B	–B	–70
Series Number	Valve Size	Pres. Adj. Range MPa	Pres. Adj. Screw Position	Design Number
MHP: Sequence Valve for P-Line	**01**	**B:** ★-7 **C:** 3.5-14 **H:** 7-21 **K:** 14-35	**None:** A Port Side **B:** B Port Side	**70**
MHA: Counterbalance Valve for A-Line **MHB:** Counterbalance Valve for B-Line			—	

★See the "Min. Adjustment Pressure" on this page.



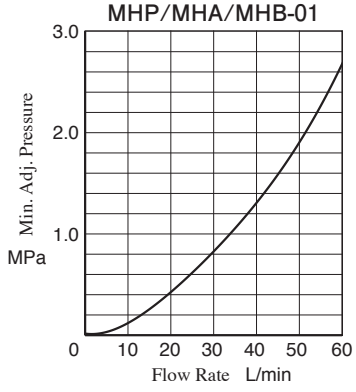
Instructions

- The minimum adjustment pressure for MHP-01 equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure. This back pressure should include the value of the T-Line pressure drop characteristics of the valves stacked.
- The minimum adjustment pressure for MHA-01 and MHP-01 equals the value obtained from the minimum adjustment pressure characteristics plus the outlet-side back pressure of the valve.
  The outlet-side back pressure should include the values of the A(B)-Line pressure drop.
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For increasing pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

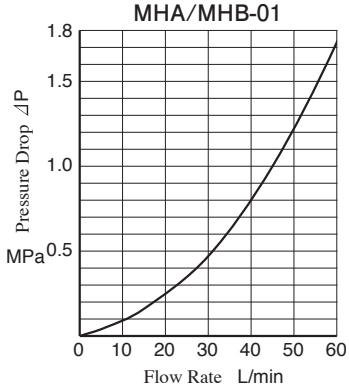
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity: 0.850

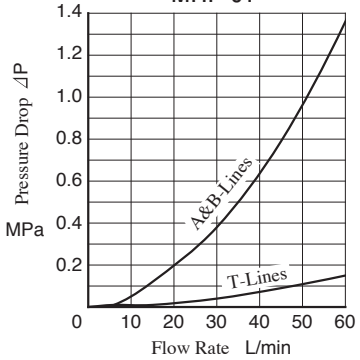
Min. Adjustment Pressure
MHP/MHA/MHB-01



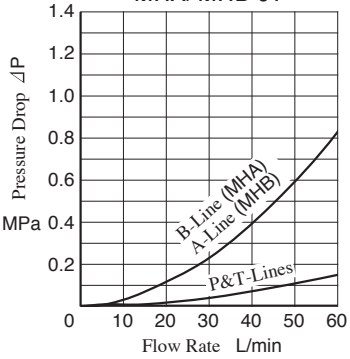
Pressure Drop for Free Flow
MHA/MHB-01



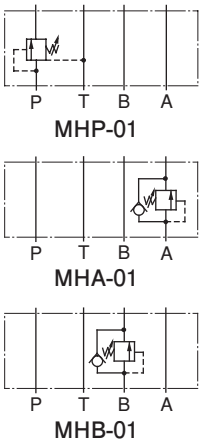
Pressure Drop
MHP-01



Pressure Drop
MHA/MHB-01

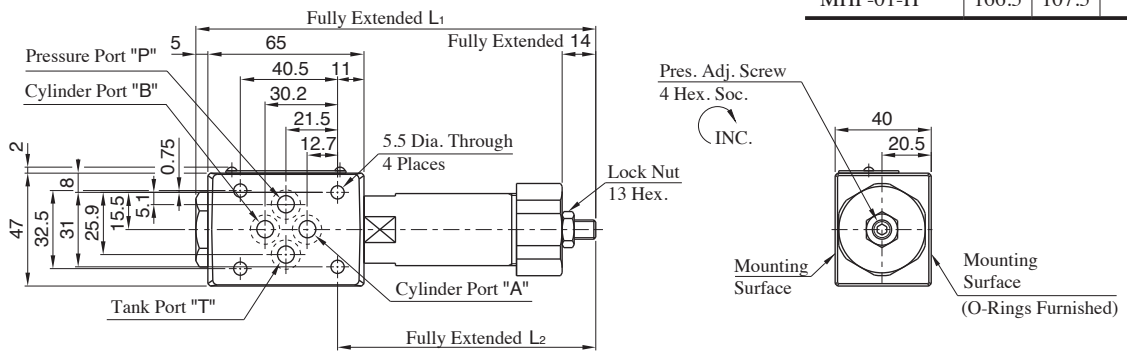


Graphic Symbols

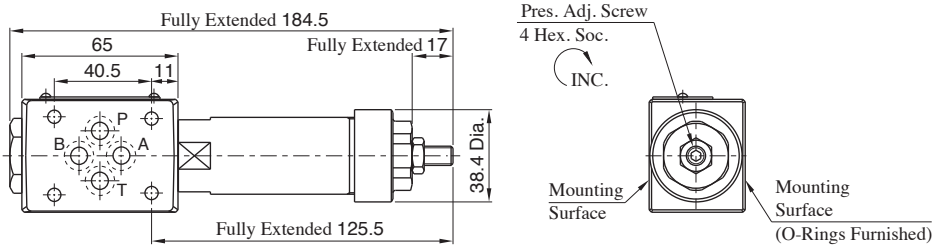


MHP-01-B/C/H

Model Numbers	L1	L2	Mass kg
MHP-01-B/C	151	92	1.45
MHP-01-H	166.5	107.5	1.55



MHP-01-K

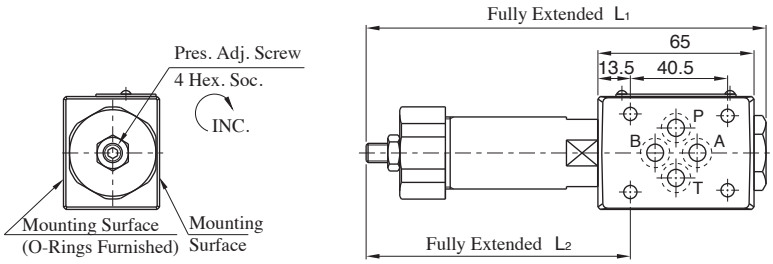


●For other dimensions, refer to "MHP-01-B/C/H" in the above figure.

Approx. Mass.....1.65 kg

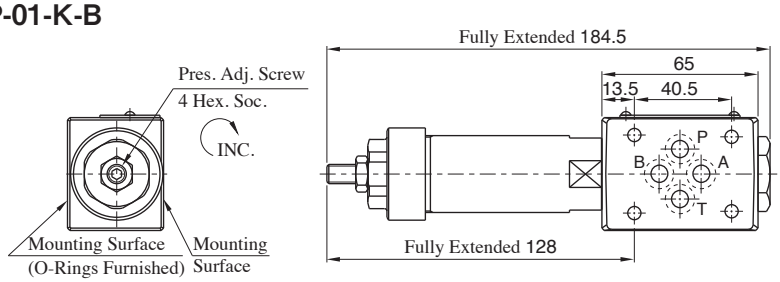
MHP-01-B-B
MHP-01-C-B
MHP-01-H-B

Model Numbers	L1	L2	Mass kg
MHP-01-B-B MHP-01-C-B	151	94.5	1.45
MHP-01-H-B	166.5	110	1.55



●For other dimensions, refer to "MHP-01-B/C/H" drawing above.

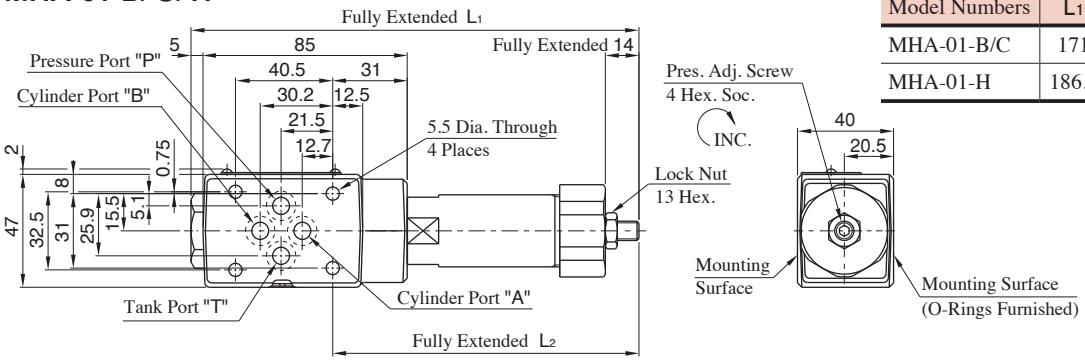
MHP-01-K-B



Approx. Mass.....1.65 kg

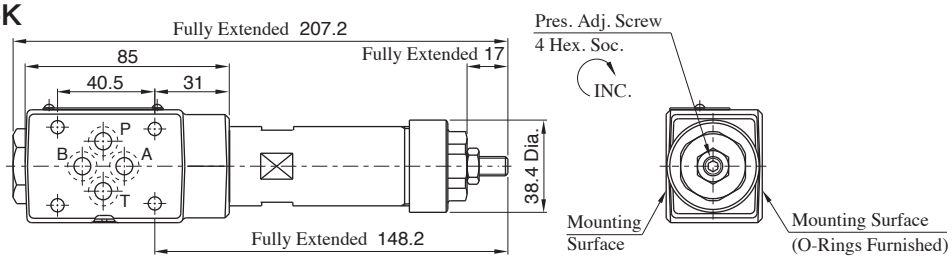
●For other dimensions, refer to "MHP-01-K" in the above figure.

MHA-01-B/C/H



Model Numbers	L1	L2	Mass kg
MHA-01-B/C	171	112	1.65
MHA-01-H	186.5	127.5	1.75

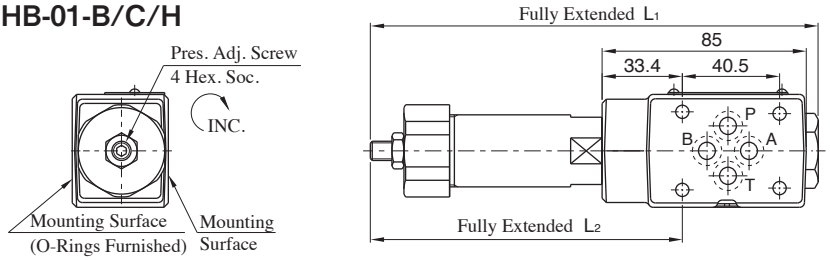
MHA-01-K



●For other dimensions, refer to "MHA-01-B/C/H" in the above figure.

Approx. Mass.....1.85 kg

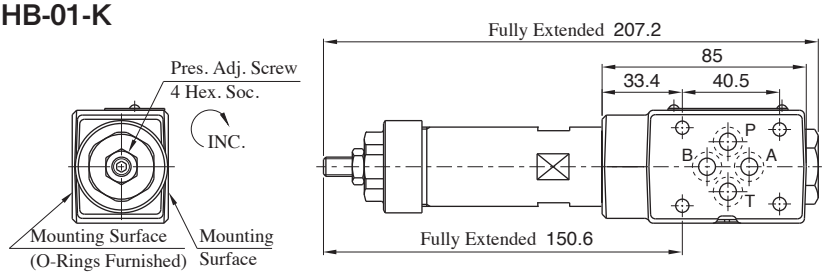
MHB-01-B/C/H



Model Numbers	L1	L2	Mass kg
MHB-01-B/C	171	114.4	1.65
MHB-01-H	186.5	129.9	1.75

●For other dimensions, refer to "MHA-01-B/C/H" in the above figure.

MHB-01-K

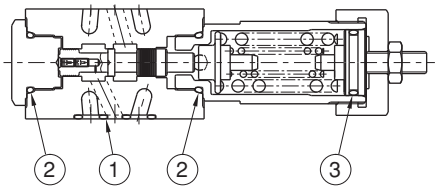


Approx. Mass.....1.85 kg

●For other dimensions, refer to "MHA-01-K" in the above figure.

List of Seals

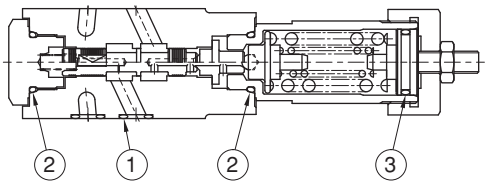
MHP-01



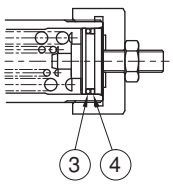
●MHP-01-＊-B has the pressure adjustment part on the left side.

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2
3	O-Ring	OR NBR-70-1 P20-N [MHP-01-B/C/H] OR NBR-70-1 P22-N [MHP-01-K]	1

MHA-01



MHA-01-K



●MHB-01 has the pressure adjustment part on the left side.

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2
3	O-Ring	OR NBR-90 P20-N [MHA-01-B/C/H] [MHB-01-B/C/H] OR NBR-90 P22-N [MHA-01-K] [MHB-01-K]	1
4	Back-up Ring	BR JIS B 2401-4-T2-P22 [MHA-01-K] [MHB-01-K]	1

Pressure Switch Modular Valves

Specifications

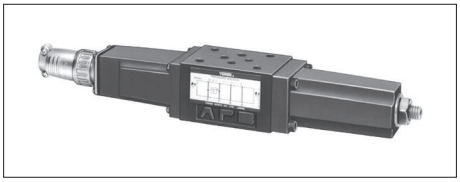
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MJ∗-01-M-∗-∗-10	31.5	35
MJ∗-01-J-35-10	10	
MJ∗-01-J-100-10	10	
MJ∗-01-J-200-10	20	
MJ∗-01-J-350-10	35	

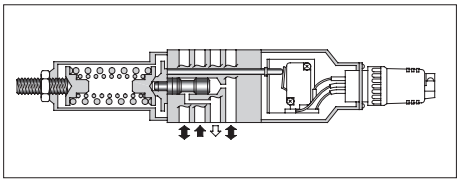
Sensitive Switch Ratings

Electric Source	AC	DC	
Voltage (V)	125・250	125	250
Current (A)	11A–1/3 HP	0.5	0.25

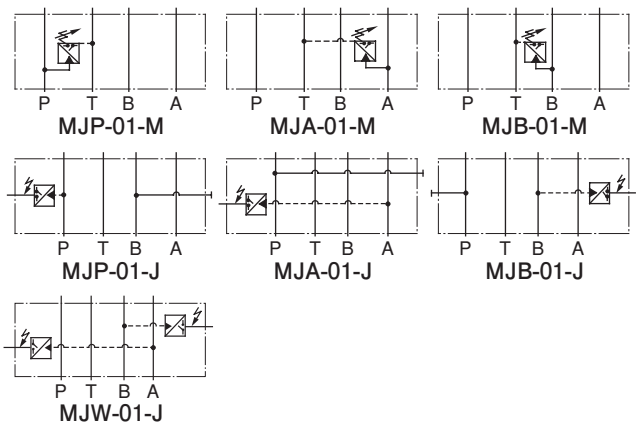
Specifications of semiconductor type pressure switch

JT-02 series is installed for semiconductor type pressure switch, refer to "C Pressure Control Valves" catalog page for details.





Graphic Symbols



Model Number Designation

MJP	–01	–M	–B	–N	–10
Series Number	Valve Size	Type of Switch	Pres. Adj. Range MPa	Type of Electrical Connection	Design Number
MJP: for P-Line **MJA:** for A-Line **MJB:** for B-Line Pressure Switch Modular Valves	**01**	**M:** Sensitive Switch	**B:** 1-7 **C:** 3.5-14 **H:** 7-21	**None:** Cable Connector Type **N:** With Plug-in Connector (DIN)	**10**
MJP: for P-Line **MJA:** for A-Line **MJB:** for B-Line **MJW:** for A&B-Line Pressure Switch Modular Valves		**J:** Semiconductor Type Pressure Switch	**35:** 0.1-3.5 **100:** 1-10 **200:** 2-20 **350:** 3.5-35	**None:** Lead Wire Type	

Instructions

Wiring of a sensitive switch should be made correctly referring to the table right. Numbers in the switch status column indicate wiring numbers in receptacles or contact numbers of connectors.

(Pressure with Sensitive Switch and The Switch Status)

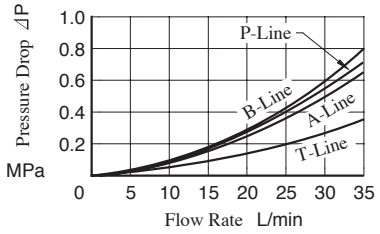
Operating Pressure	Switch Status
Less than Pressure setting	
More than Pressure setting	

To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise.
For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

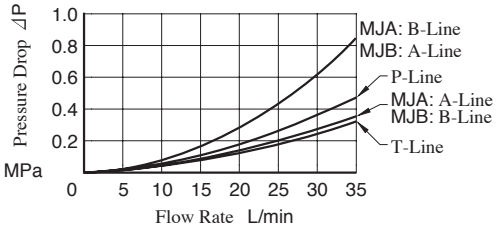
Pressure Drop

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

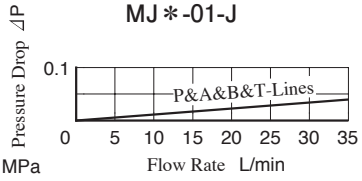
MJP-01-M



MJA_-01-M
MJB



MJ∗-01-J

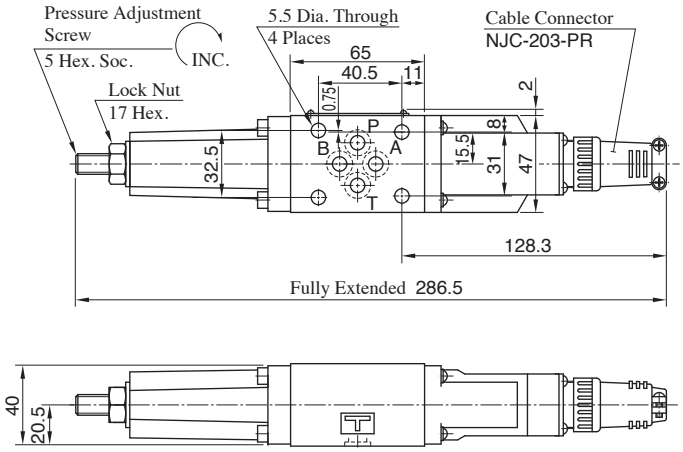


Accessories

Valve Model Numbers	Accessories
MJ＊-01-M-＊-10	Cable connector : NJC-203-PR.....1 Pc.
MJ＊-01-M-＊-N-10	DIN connector : GDM311-B-11.....1 Pc.

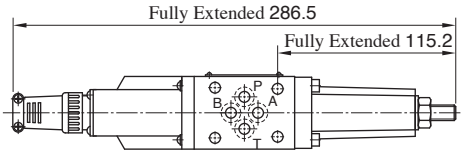
●Cable Connector Type

MJP-01-M-＊-10
MJA-01-M-＊-10



Approx. Mass.....1.3 kg

MJB-01-M-＊-10

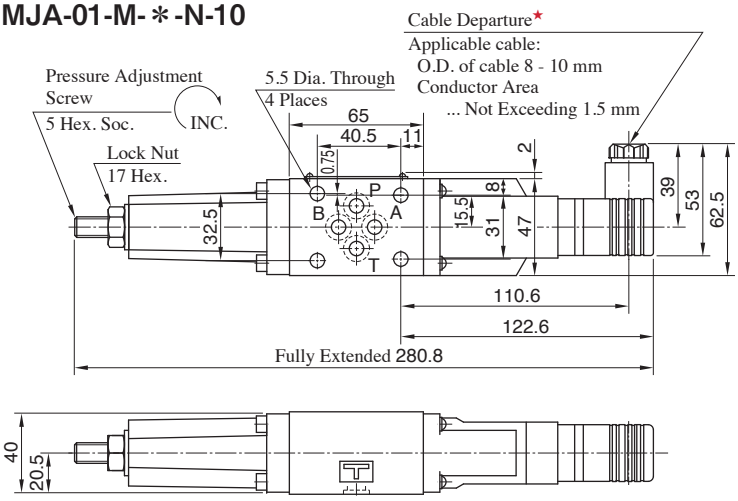


Approx. Mass.....1.3 kg

For other dimensions, refer to "MJP-01" in the drawing left.

●Plug-in Connector Type

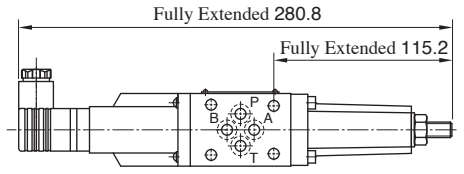
MJP-01-M-＊-N-10
MJA-01-M-＊-N-10



Approx. Mass.....1.3 kg

★As shown by the dot-and-dash line, the cable departure can also be faced opposite.

MJB-01-M-＊-N-10

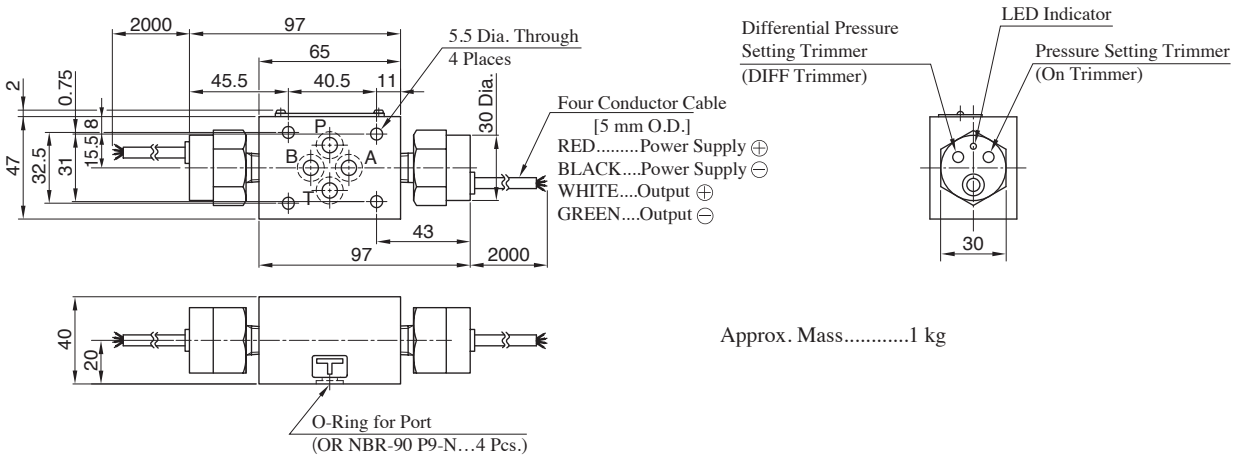


Approx. Mass.....1.3 kg

For other dimensions, refer to "MJP-01" in the drawing left.

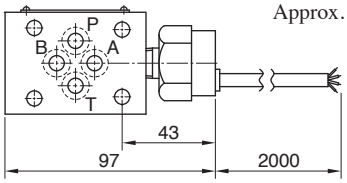
●Semiconductor Type Pressure Switch

MJW-01-J-＊-10



Approx. Mass.....1 kg

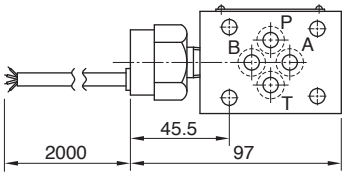
MJP-01-J-＊-10
MJA-01-J-＊-10



Approx. Mass.....1 kg

For other dimensions, refer to "MJW-01" in the drawing above.

MJB-01-J-＊-10

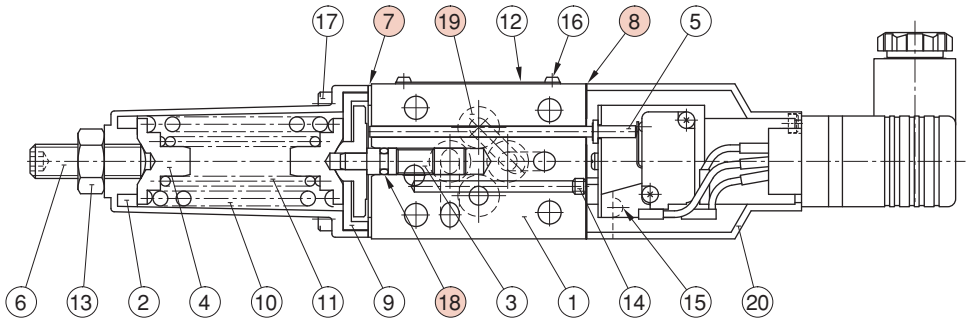


Approx. Mass.....1 kg

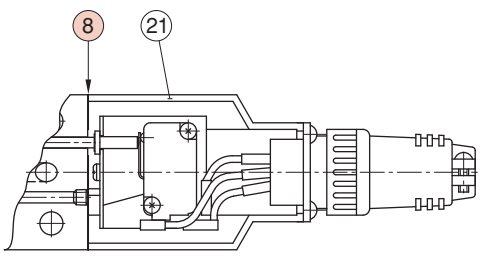
For other dimensions, refer to "MJW-01" in the drawing above.

■ List of Seals

MJP-01-M-＊-N-10
Plug-in Connector Type



MJ＊-01-M-＊-10
Cable Connector Type



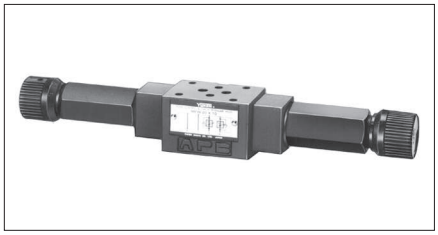
Item	Name of Parts	Part Numbers	Qty.
7	Packing	3116-VK414239-4	1
8	Packing	3116-VK414240-2	1
18	O-Ring	OR NBR-70-1 P5-N	1
19	O-Ring	OR NBR-90 P9-N	4

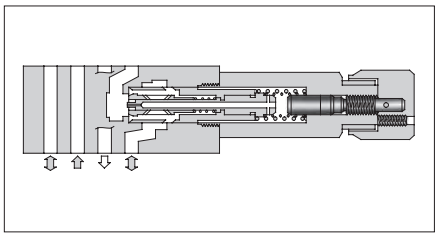
●Since MJ＊-01-J-＊-10 (Semiconductor type pressure switch) does not have any seals inside, only four(4) O-rings for the ports are required. Please refer to the drawing above.

Pressure and Temperature Compensated Flow Control (and Check) Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Metered Flow L/min	Max. Free Flow L/min
MFP-01-10	16	35	——
MF＊-01-＊-10			35

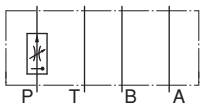




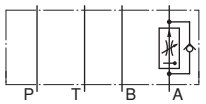
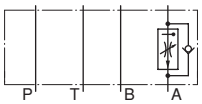
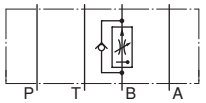
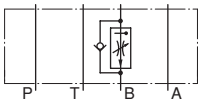
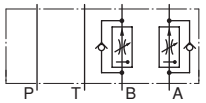
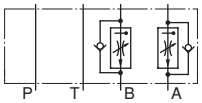
Model Number Designation

MFA	–01	–X	–10
Series Number	Valve Size	Direction of Flow	Design Number
MFP: Flow Control Valve for P-Line	**01**	——	**10**
MFA: Flow Control and Check Valve for A-Line **MFB:** Flow Control and Check Valve for B-Line **MFW:** Flow Control and Check Valve for A&B-Lines		**X:** Meter-out **Y:** Meter-in	**10**

Graphic Symbols



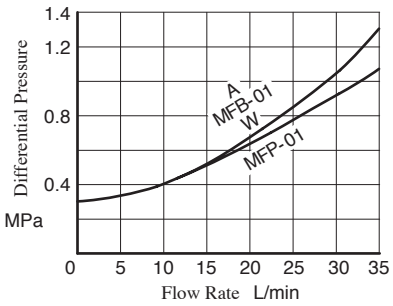
MFP-01

Meter-out	Meter-in
 MFA-01-X	 MFA-01-Y
 MFB-01-X	 MFB-01-Y
 MFW-01-X	 MFW-01-Y

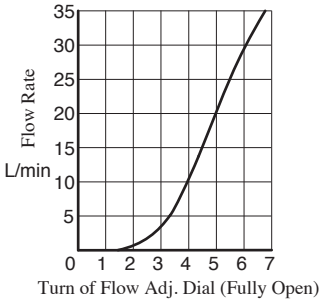
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

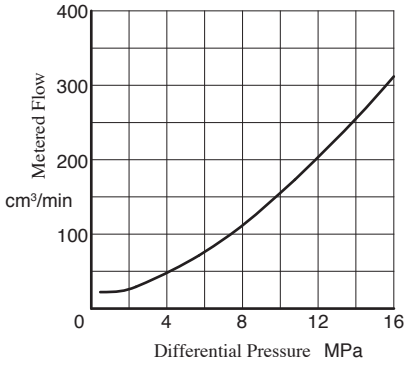
Min. Required Pressure Difference



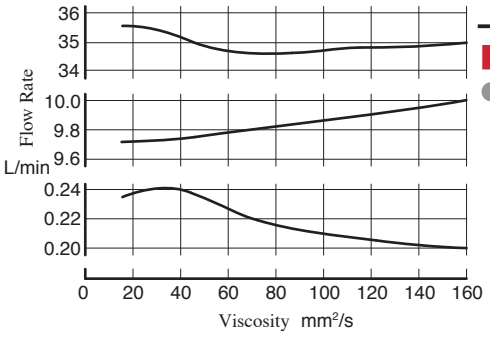
Metered Flow vs. Dial Position



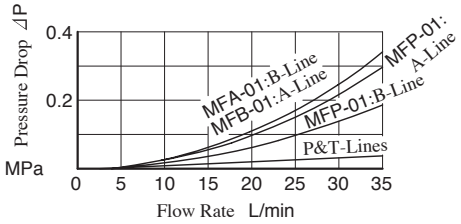
Min. Metered Flow



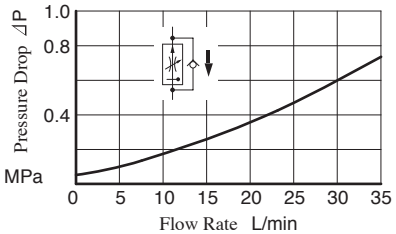
Metered Flow vs. Viscosity



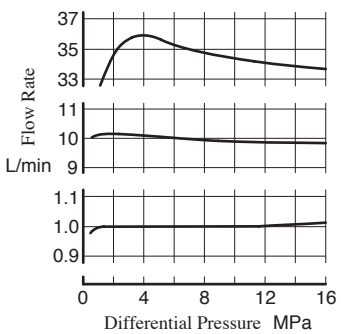
Pressure Drop



Pressure Drop for Free Flow



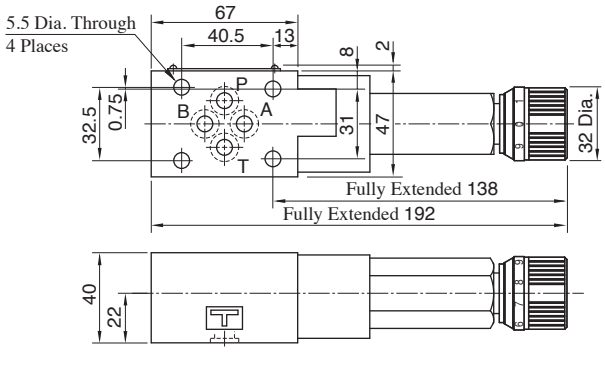
Metered Flow vs. Differential Pres.



Instructions

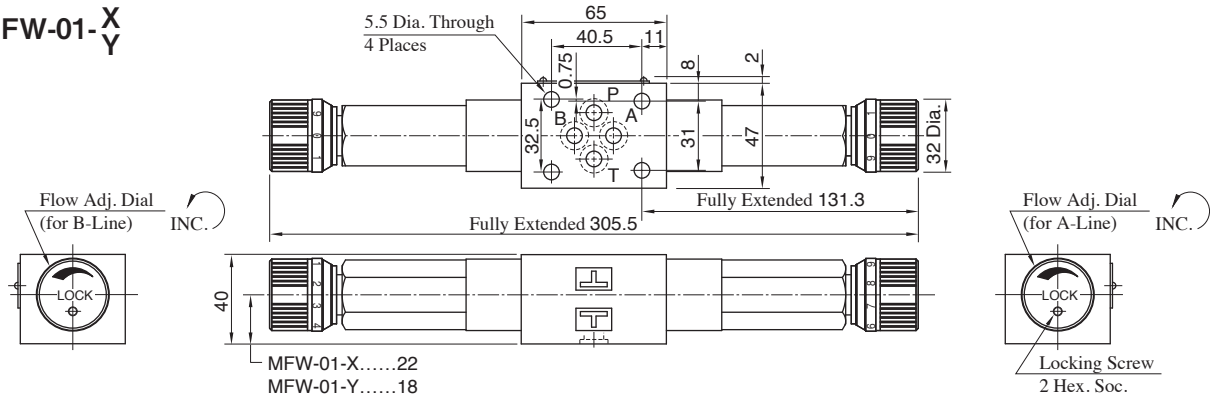
●To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

MFP-01



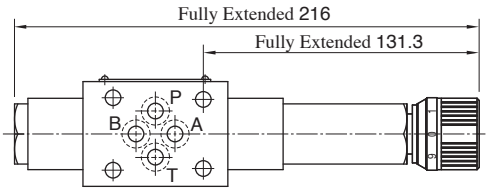
Approx. Mass.....1.7 kg

MFW-01-X/Y



Approx. Mass.....2.1 kg

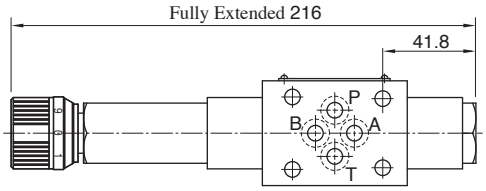
MFA-01-X/Y



Approx. Mass.....1.6 kg

For other dimensions, refer to "MFW-01" in the drawing above.

MFB-01-X/Y

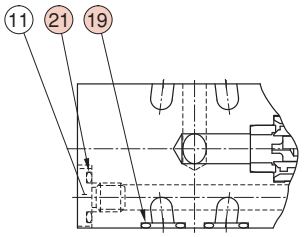


Approx. Mass.....1.6 kg

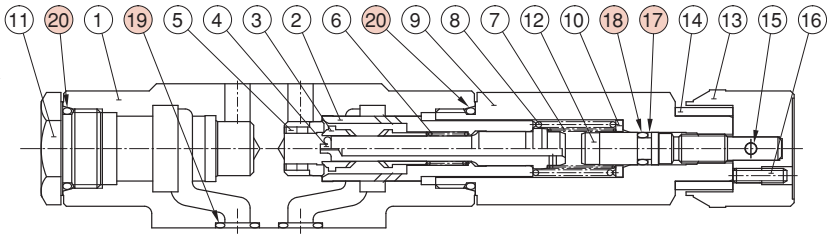
For other dimensions, refer to "MFW-01" in the drawing above.

List of Seals

MFP-01
MFA-01
MFB-01
MFW-01



MFP-01



MFA-01

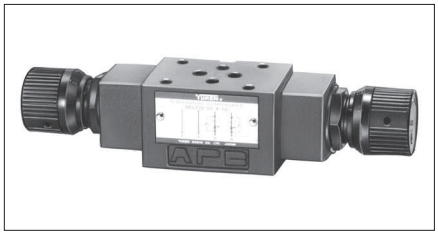
- MFB-01: Flow control part is built in the left side.
- MFW-01: Flow control part is built in the both sides.

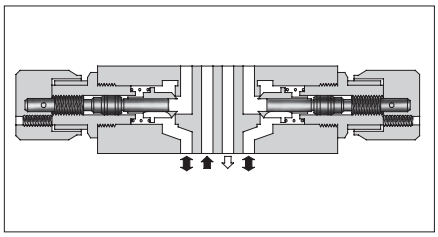
Item	Name of Parts	Part Numbers	Qty.			
			MFP–01	MFA–01	MFB–01	MFW–01
17	Back-up Ring	BR JIS B 2401-4-T2-P6	1	1	1	2
18	O-Ring	OR NBR-70-1 P6-N	1	1	1	2
19	O-Ring	OR NBR-90 P9-N	4	4	4	4
20	O-Ring	OR NBR-90 P18-N	1	2	2	2
21	O-Ring	OR NBR-90 P10-N	1	—	—	—

Temperature Compensated Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Differential Pressure MPa	Max. Metered Flow L/min	Min. Metered Flow L/min	Max. Free Flow L/min
MST∗-01-X-10	31.5	14	35	0.5	35

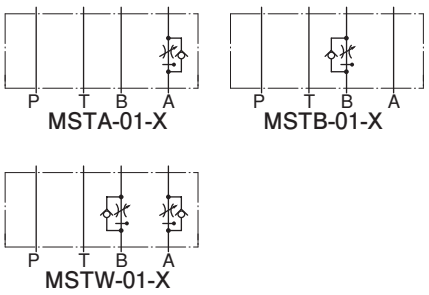




Model Number Designation

MSTA	–01	–X	–10
Series Number	Valve Size	Direction of Flow	Design Number
MSTA: for A-Line **MSTB:** for B-Line **MSTW:** for A&B-Lines } Temperature Compensated Throttle and Check Valve	**01**	**X:** Meter-out	**10**

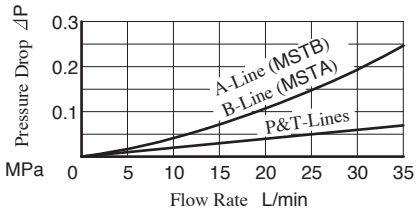
Graphic Symbols



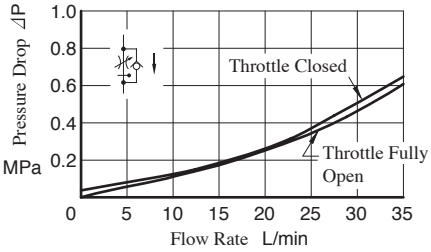
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

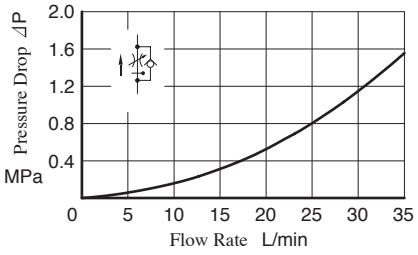
Pressure Drop



Pressure Drop for Free Flow



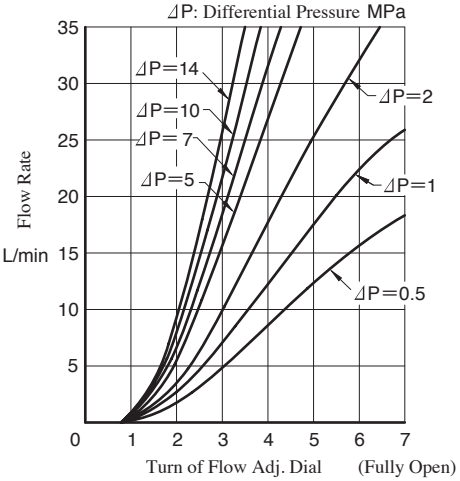
Pressure Drop at Throttle Fully Open



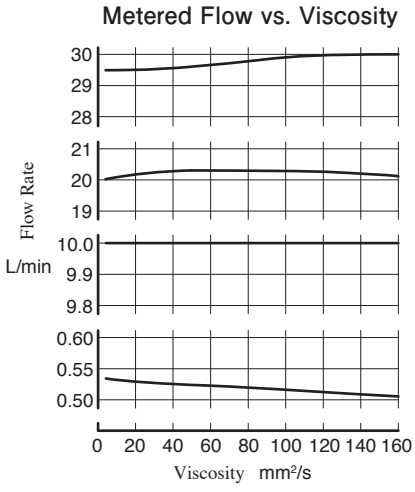
Instructions

To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

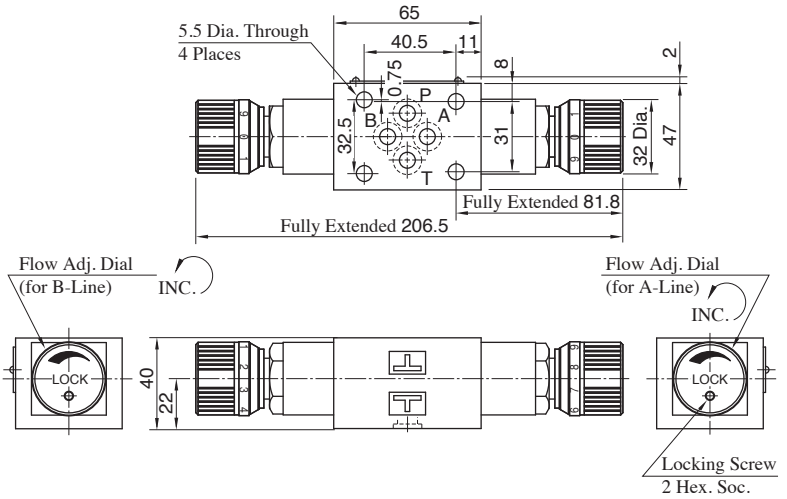
Metered Flow vs. Dial Position



Metered Flow vs. Viscosity

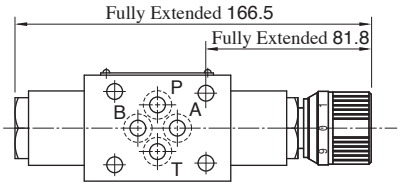


MSTW-01-X



Approx. Mass.....1.5 kg

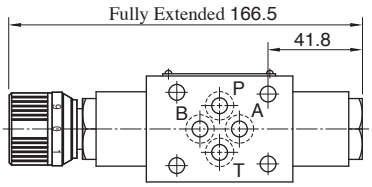
MSTA-01-X



Approx. Mass.....1.3 kg

For other dimensions, refer to "MSTW-01" in the drawing left.

MSTB-01-X

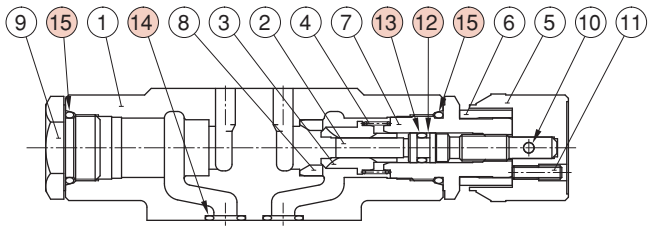


Approx. Mass.....1.3 kg

For other dimensions, refer to "MSTW-01" in the drawing left.

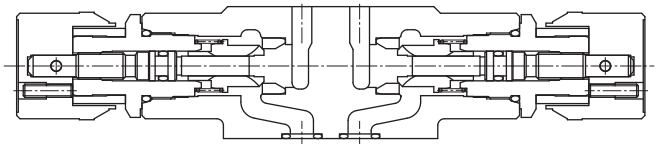
List of Seals

MSTA-01
MSTB-01
MSTW-01



MSTA-01-X

●MSTB-01-X: Flow control part is built in the left side.



MSTW-01-X

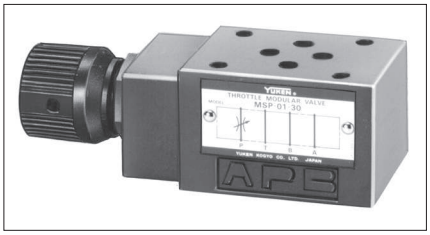
Item	Name of Parts	Part Numbers	Qty.		
			MSTA	MSTB	MSTW
12	Back-up Ring	BR JIS B 2401 -4-T2-P6	1	1	2
13	O-Ring	OR NBR-70-1 P6-N	1	1	2
14	O-Ring	OR NBR-90 P9-N	4	4	4
15	O-Ring	OR NBR-90 P18-N	2	2	2

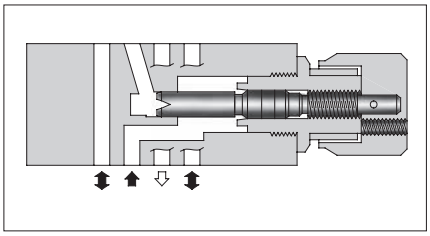
Throttle Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS ✻ -01-50	31.5	60 ★

★At the low differential pressure, maximum flow is limited. See "Pressure Drop at Throttle Fully Open".





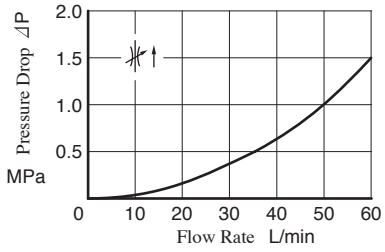
Model Number Designation

MSP	–01	–50
Series Number	Valve Size	Design Number
MSP: for P-Line **MST:** for T-Line } Throttle Valve	**01**	**50**

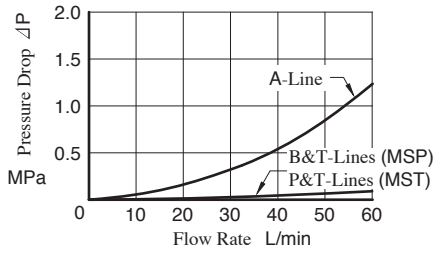
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

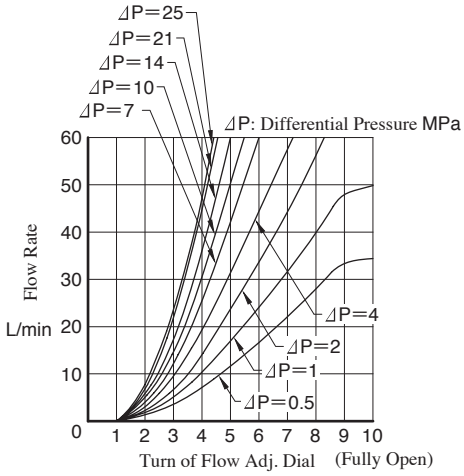
Pressure Drop at Throttle Fully Open



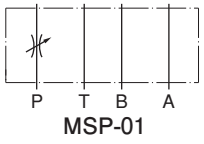
Pressure Drop



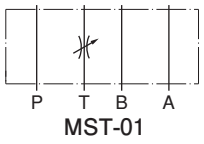
Metered Flow vs. Dial Position



Graphic Symbols



MSP-01

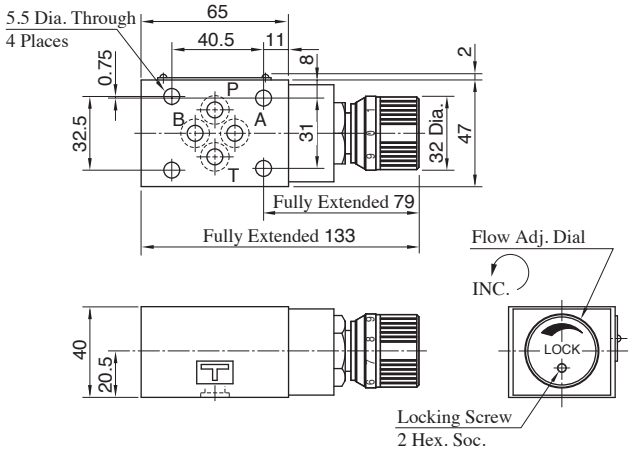


MST-01

Instructions

●To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

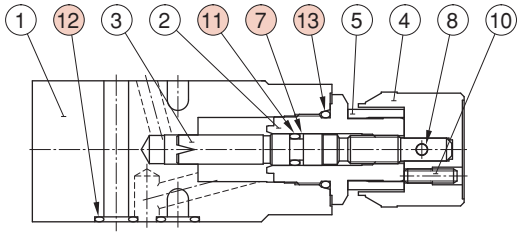
MSP-01
MST-01



Approx. Mass.....1.2 kg

List of Seals

MSP-01
MST-01



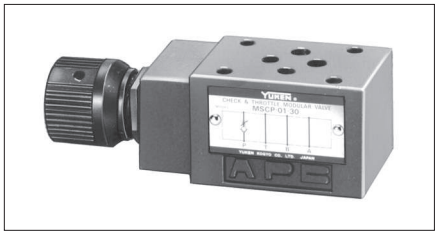
Item	Name of Parts	Part Numbers	Qty.
7	Back-up Ring	BR JIS B 2401-4-T2-P6	1
11	O-Ring	OR NBR-70-1 P6-N	1
12	O-Ring	OR NBR-90 P9-N	4
13	O-Ring	OR NBR-90 P18-N	1

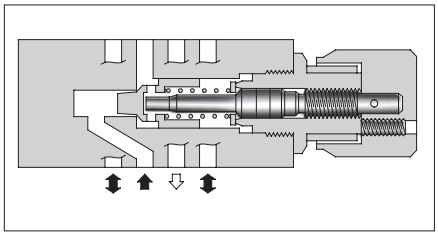
Check and Throttle Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MSCP-01-30	31.5	35 ★

★At the low differential pressure, maximum flow is limited. See "Pressure Drop at Throttle Fully Open".

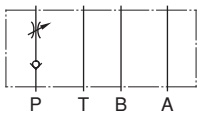




Model Number Designation

MSCP	–01	–30
Series Number	Valve Size	Design Number
MSCP: Check and Throttle **MSCP:** Valve for P-Line	**01**	**30**

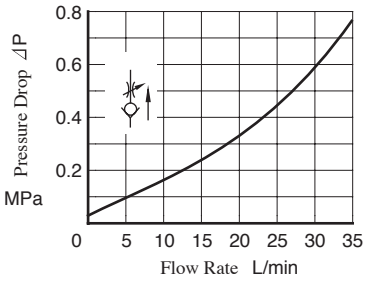
Graphic Symbol



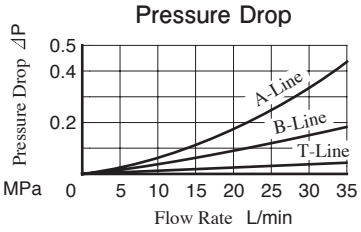
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

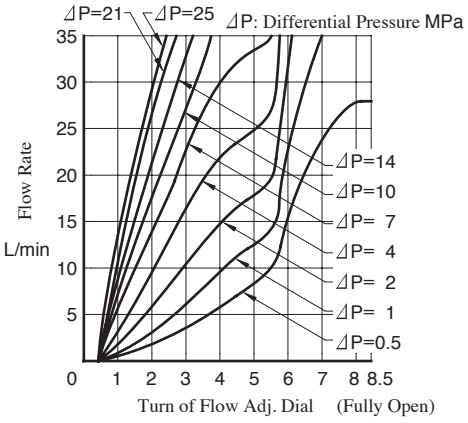
Pressure Drop at Throttle Fully Open



Pressure Drop



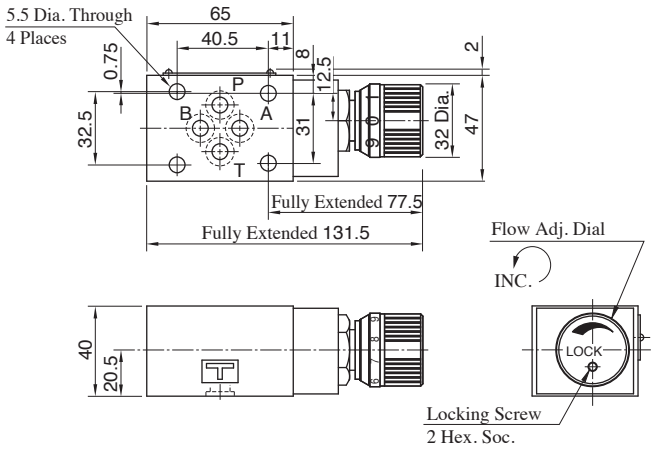
Metered Flow vs. Dial Position



Instructions

●To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

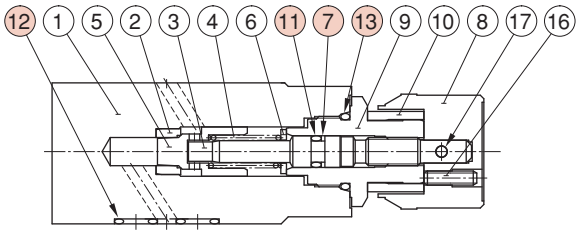
MSCP-01



Approx. Mass.....1.2 kg

List of Seals

MSCP-01

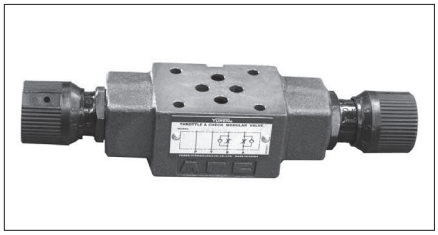


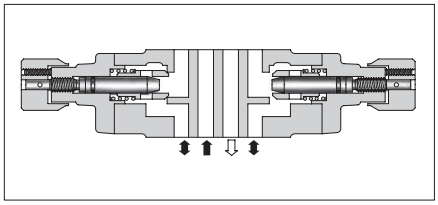
Item	Name of Parts	Part Numbers	Qty.
7	Back-up Ring	BR JIS B 2401-4-T2-P6	1
11	O-Ring	OR NBR-70-1 P6-N	1
12	O-Ring	OR NBR-90 P9-N	4
13	O-Ring	OR NBR-90 P18-N	1

Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS＊-01-＊＊-70	35	80

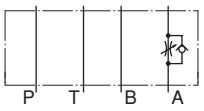
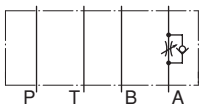
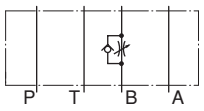
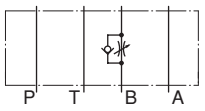
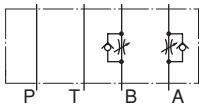
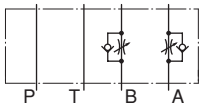
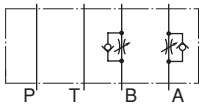
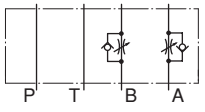




Model Number Designation

MSW	–01	–X	Y	–70
Series Number	Valve Size	Direction of Flow ("A" Line)	Direction of Flow ("B" Line)	Design Number
MSA: Throttle and Check Valve for A-Line	01	**X:** Meter-out **Y:** Meter-in	—	70
MSB: Throttle and Check Valve for B-Line		—	**X:** Meter-out **Y:** Meter-in	
MSW: Throttle and Check Valve for A&B-Lines		**X:** Meter-out **Y:** Meter-in		
		X: Meter-out	**Y:** Meter-in	
		Y: Meter-in	**X:** Meter-out	

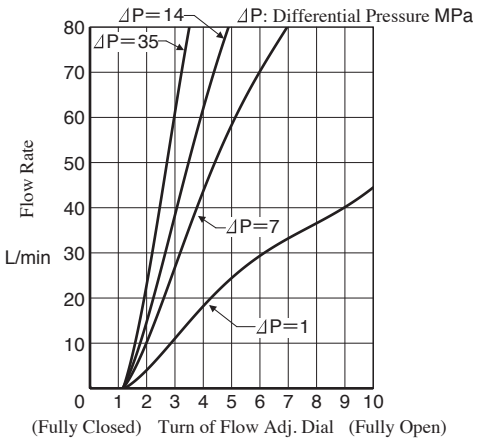
Graphic Symbols

Meter-out	Meter-in
 MSA-01-X	 MSA-01-Y
 MSB-01-X	 MSB-01-Y
 MSW-01-X	 MSW-01-Y
Meter-out・Meter-in	**Meter-in・Meter-out**
 MSW-01-XY	 MSW-01-YX

Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

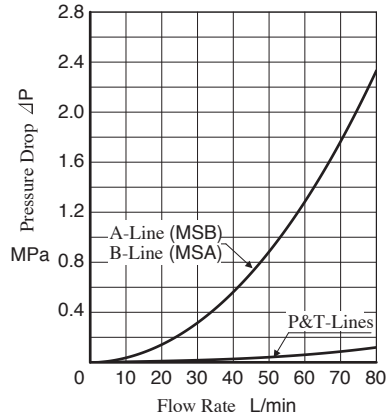
Metered Flow vs. Dial Position



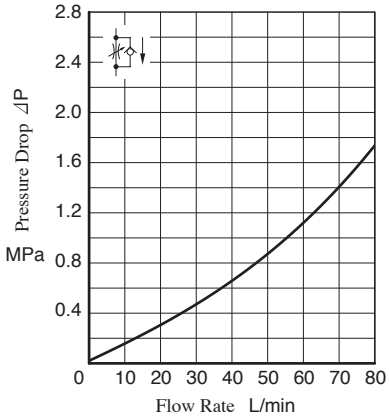
Instructions

To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial cloackwise. For a decrease of flow turn the dial clockwise. Be sure to re-tighten the locking screw frimly after the adjustment of the flow rate.

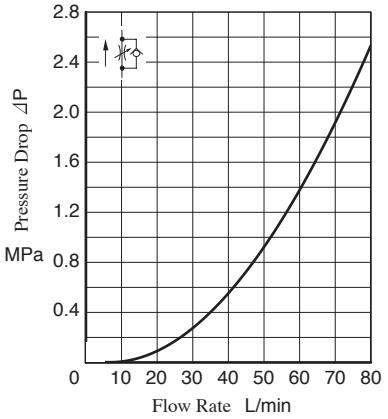
Pressure Drop



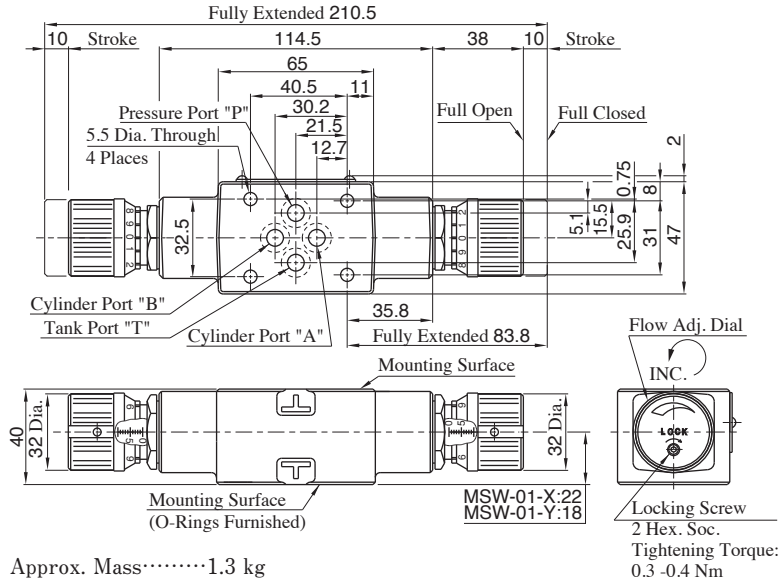
Pressure Drop for Free Flow



Pressure Drop at Throttle Fully Open

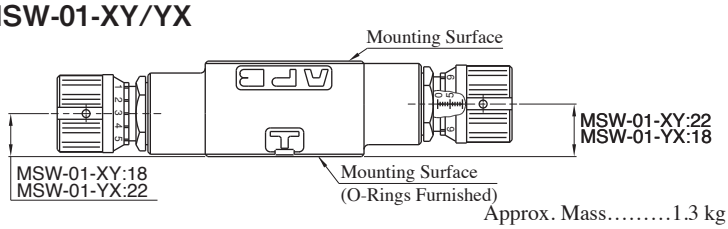


MSW-01-X/Y



Approx. Mass·····1.3 kg

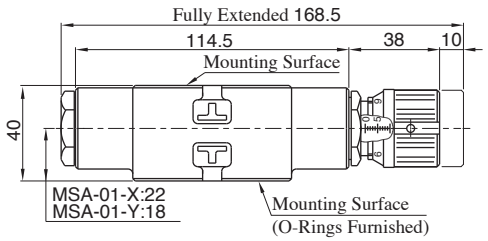
MSW-01-XY/YX



Approx. Mass.....1.3 kg

For other dimensions, refer to "MSW-01-X/Y" in the drawing above.

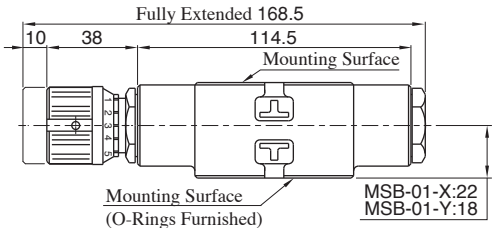
MSA-01-X/Y



Approx. Mass.....1.15 kg

For other dimensions, refer to "MSW-01" in the drawing left.

MSB-01-X/Y

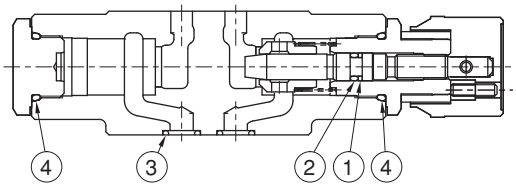


Approx. Mass.....1.15 kg

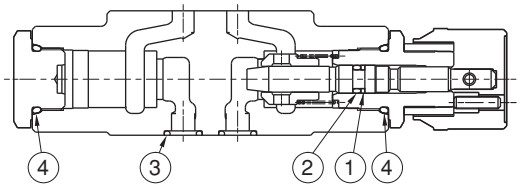
For other dimensions, refer to "MSW-01" in the drawing left.

List of Seals

MSA-01, MSB-01, MSW-01



MSA-01-X



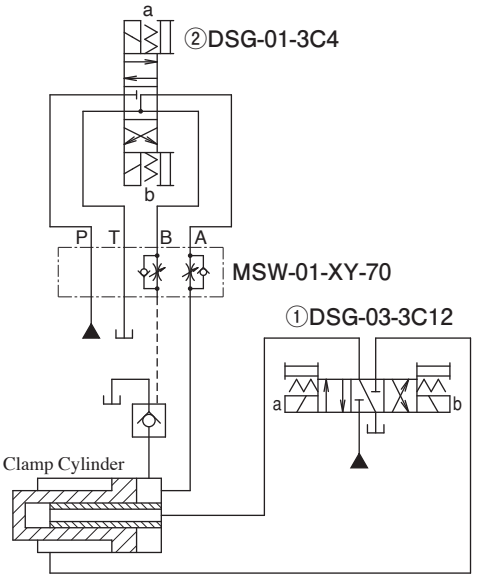
MSA-01-Y

- MSB-01: Flow control part is built in the left side.
- MSW-01: Flow control part is built in the both left and right sides.

Item	Name of Parts	Part Numbers	Qty.	
			MSA,MSB	MSW
1	Back-up Ring	BR JIS B 2401-4-T2-P6	1	2
2	O-Ring	OR NBR-70-1 P6-N	1	2
3	O-Ring	OR NBR-90 P9-N	4	4
4	O-Ring	OR NBR-90 P18-N	2	2

Application

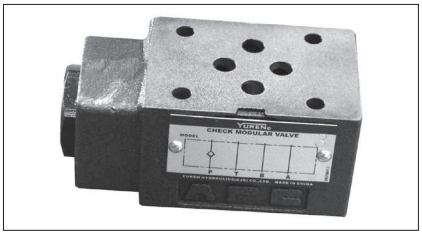
- Circuit of Clamp Cylinder for Injection Molding Machine

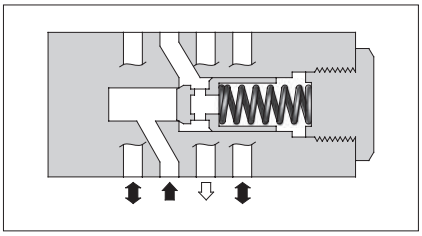


Operation Sequence

Clamp Cylinder	Advance	End Point Pressurization	Decompression	Retreat
Solenoid Operated Directional Valve ①	Sol.a ON	→	Center Position	Sol.b ON
Solenoid Operated Directional Valve ②	Sol.b ON	Sol.a ON	Sol.b ON	→

Check Modular Valves





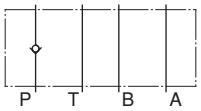
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MC＊-01-＊-70	35	60

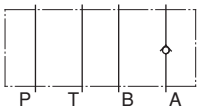
Model Number Designation

MCP	–01	–0	–70
Series Number	Valve Size	Cracking Pressure MPa	Design Number
MCP: Check Valve for P-Line **MCA:** Check Valve for A-Line **MCB:** Check Valve for B-Line **MCT:** Check Valve for T-Line **MCW:** Check Valve for A-Line & B-Line	**01**	**0:** 0.035 **2:** 0.2 **4:** 0.4	**70**

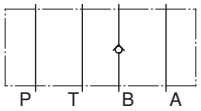
Graphic Symbols



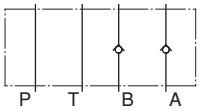
MCP-01



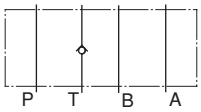
MCA-01



MCB-01



MCW-01



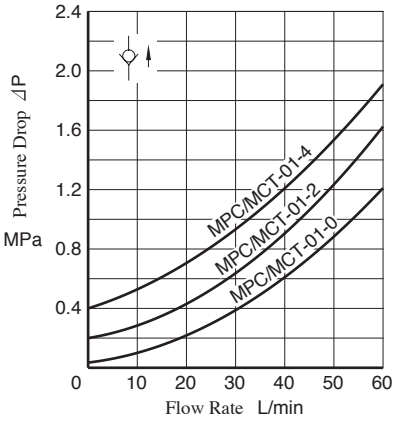
MCT-01

Typical Performance Characteristics

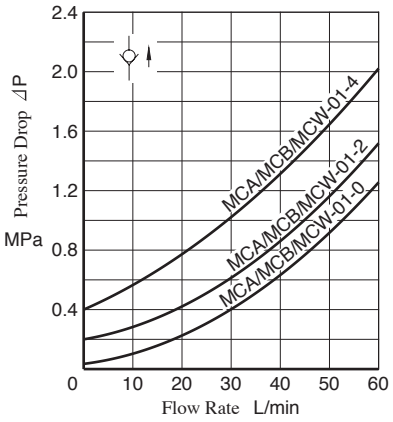
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop for Free Flow

MCP/MCT-01

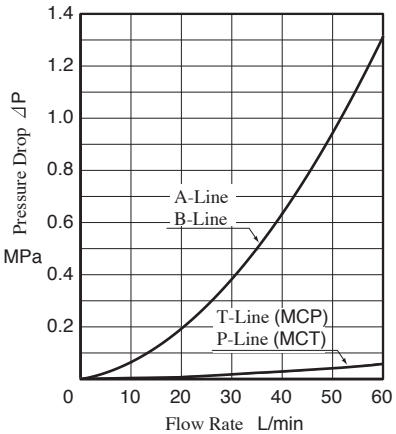


MCA/MCB/MCW-01

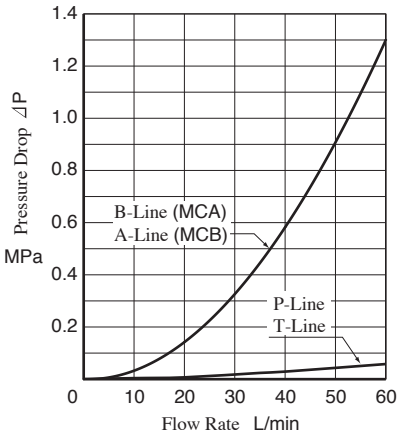


Pressure Drop of each line

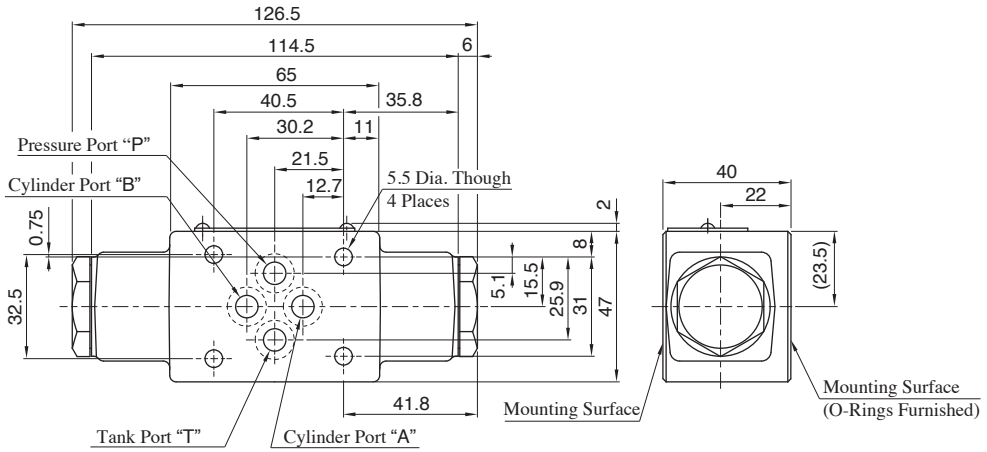
MCP/MCT-01



MCA/MCB/MCW-01

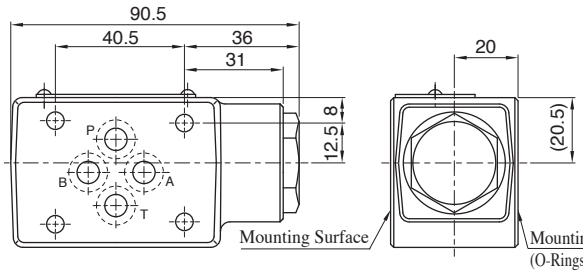


MCA-01
MCB-01
MCW-01

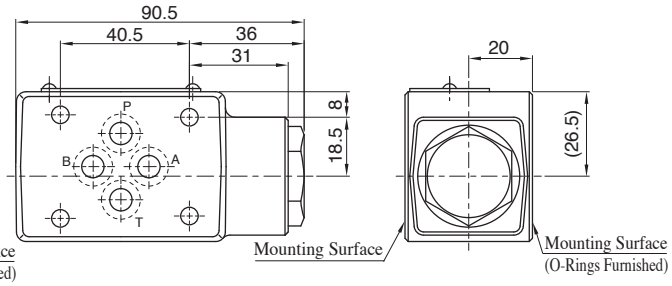


Approx. Mass.....1.2 kg

MCP-01



MCT-01

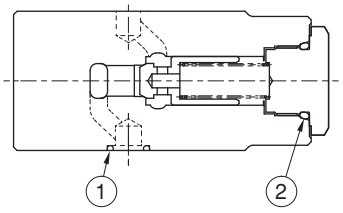


●Please refer to the drawing above (MCA-01/MCB-01/MCW-01) for other dimensions.

Approx. Mass.....1.0 kg

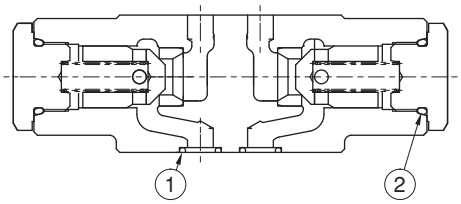
List of Seals

MCP-01
MCT-01



Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	1

MCA-01
MCB-01
MCW-01



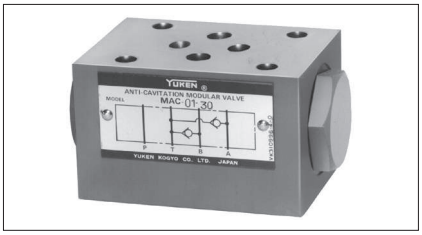
Please refer to the drawing above for MCW-01.

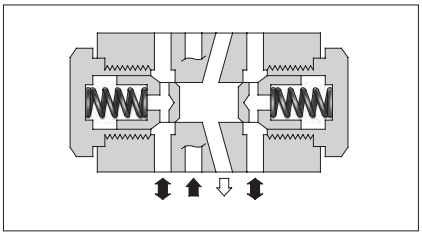
●MCA-01 does not have poppet, spring or seat built in the left side.

●MCB-01 does not have poppet, spring or seat built in the right side.

Item	Name of Parts	Model of Parts	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2

Anti-Cavitation Modular Valves





Specifications

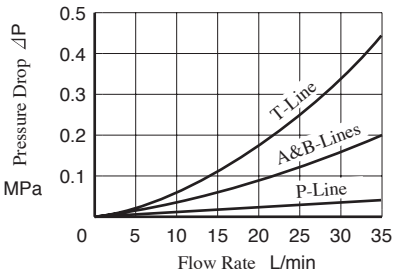
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MAC-01-30	31.5	35

Model Number Designation

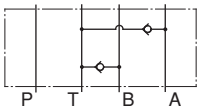
MAC	–01	–30
Series Number	Valve Size	Design Number
MAC: Anti-Cavitation Valve	**01**	**30**

Pressure Drop

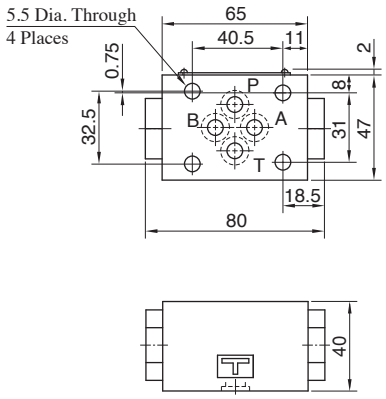
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Graphic Symbol

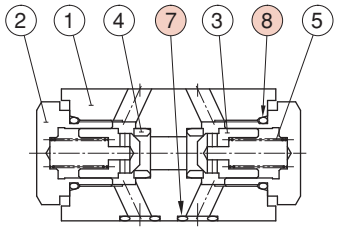


MAC-01



Approx. Mass.....0.8 kg

List of Seals
MAC-01

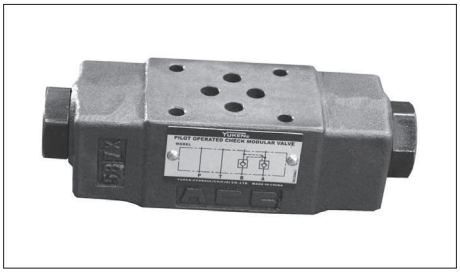


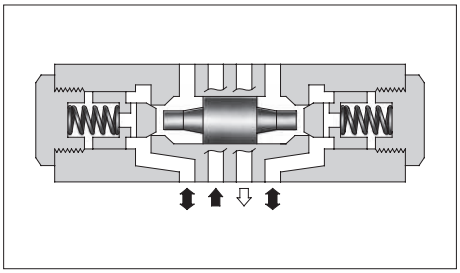
Item	Name of Parts	Part Numbers	Qty.
7	O-Ring	OR NBR-90 P9-N	4
8	O-Ring	OR NBR-90 P18-N	2

Pilot Operated Check Modular Valves

Specifications

Model Numbers		Max. Operating Pressure MPa	Max. Flow L/min
Standard	MP∗-01-∗-70	35	60
Low Pilot Pressure Control Type	MP∗-01-∗-L-70		

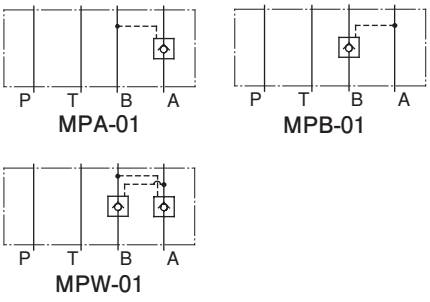




Model Number Designation

MPA	–01	–2	–L	–70
Series Number	Valve Size	Cracking Pressure MPa	Pilot Operation Format	Design Number
MPA: Pilot Operated Check Valve for A-Line **MPB:** Pilot Operated Check Valve for B-Line **MPW:** Pilot Operated Check Valve for A&B-Line	**01**	**0:** 0.035 **2:** 0.2 **4:** 0.4	**None:** Standard **L:** Low Pilot Pressure Type	**70**

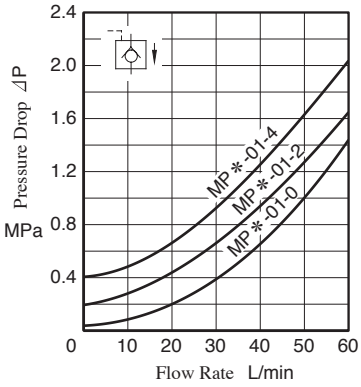
Graphic Symbols



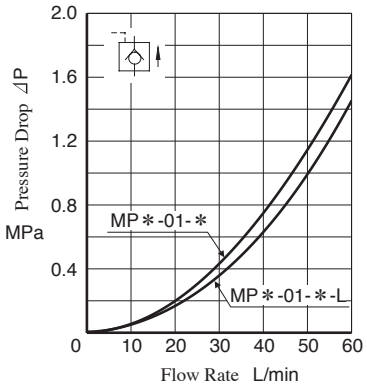
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

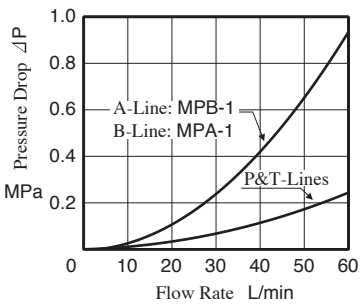
Pressure Drop for Free Flow



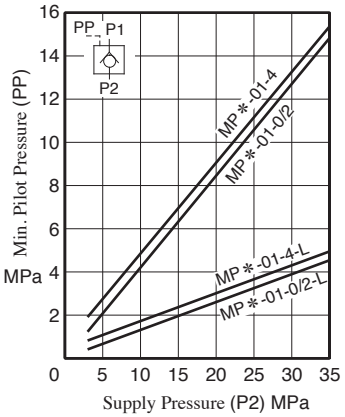
Pressure Drop for Reversed Controlled Flow



Pressure Drop

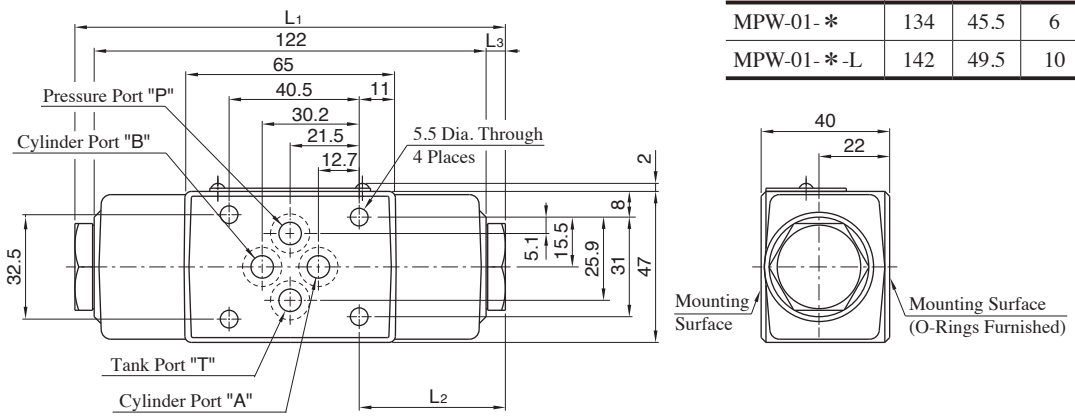


Min. Pilot Pressure



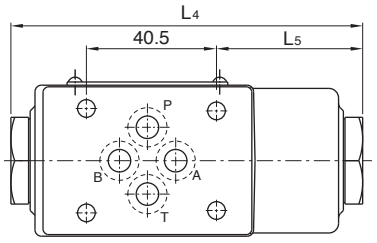
MPW-01

Model Numbers	L_1	L_2	L_3	Approx. Mass kg
MPW-01-＊	134	45.5	6	1.4
MPW-01-＊-L	142	49.5	10	1.45



MPA-01

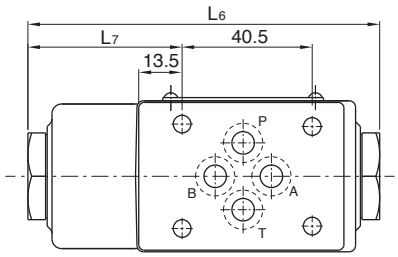
Model Numbers	L_4	L_5	Approx. Mass kg
MPA-01-＊	109.5	45.5	1.15
MPA-01-＊-L	113.5	49.5	1.2



●Please refer to the drawing above (MPW-01) for other dimensions.

MPB-01

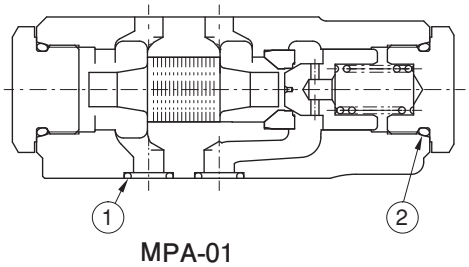
Model Numbers	L_6	L_7	Approx. Mass kg
MPB-01-＊	109.5	48	1.15
MPB-01-＊-L	113.5	52	1.2



●Please refer to the drawing above (MPW-01) for other dimensions.

List of Seals

MPA-01
MPB-01
MPW-01



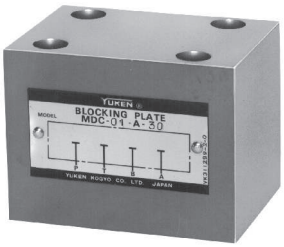
MPA-01

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2

●MPW-01 has a check valve built in the left side.
●MPW-01 has check valves built in the both left and right sides.

End Plates

Blocking plates are used for auxiliary mounting surface or for closing unnecessary circuits.
Bypass plates are used for unidirectional circuits that require no solenoid operated directional valves.

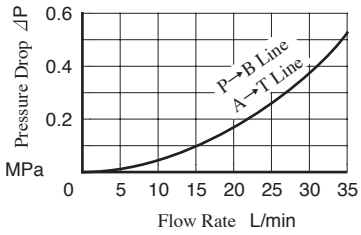


Model Number Designation

MDC	–01	–A	–30
Series Number	Plate Size	Type of Plate	Design Number
MDC: End Plate	**01**	**A:** Blocking Plate **B:** Bypass Plate	**30**

Typical Performance Characteristics

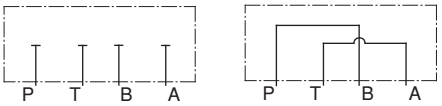
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Specifications

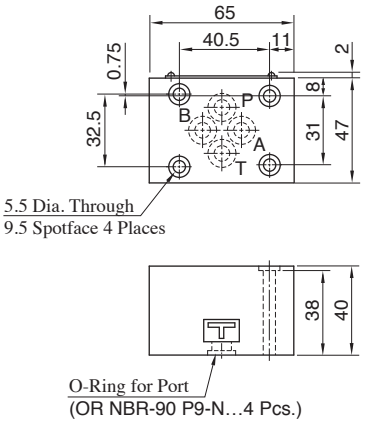
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MDC-01-∗-30	31.5	35

Graphic Symbols



MDC-01-A　　MDC-01-B

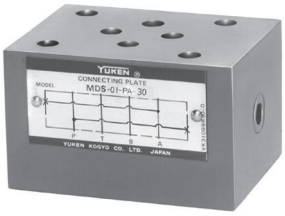
MDC-01



Approx. Mass.....1 kg

Connecting Plates

These plates are used for detecting pressure of each line.



Model Number Designation

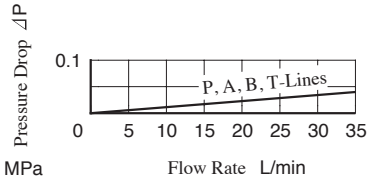
MDS	–01	–PA	–30
Series Number	Plate Size	Type of Detecting Line	Design Number
MDS: Connecting Plate	**01**	**PA:** P&A-Lines **PB:** P&B-Lines **AT:** A&T-Lines	**30**

Specifications

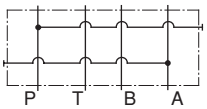
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MDS-01-∗-30	31.5	35

Pressure Drop

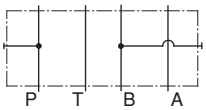
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



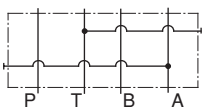
Graphic Symbols



MDS-01-PA

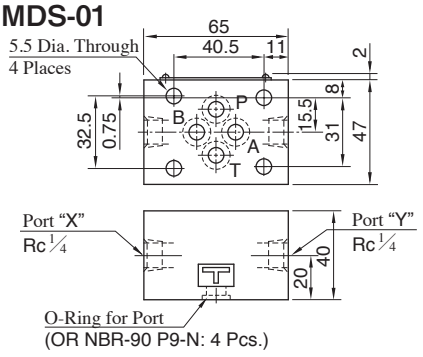


MDS-01-PB



MDS-01-AT

MDS-01



Approx. Mass.....0.8 kg

Model Numbers	Pressure Detecting Line	
	Port "X"	Port "Y"
MDS-01-PA	P-Line	A-Line
MDS-01-PB	B-Line	P-Line
MDS-01-AT	T-Line	A-Line

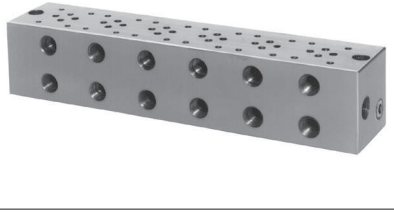
Base Plates For Modular Valves

Specifications

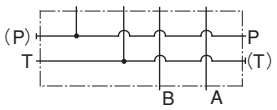
Max. Operating Pressure……25 MPa

Model Number Designation

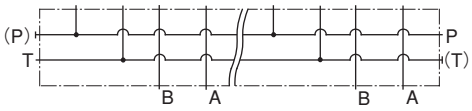
MMC	–01	–6	–40
Series Number	Plate Size	Number of Stations	Design Number
MMC: Base Plate	**01**	**1:** 1 Station **6:** 6 Stations **2:** 2 Stations **7:** 7 Stations **3:** 3 Stations **8:** 8 Stations **4:** 4 Stations **9:** 9 Stations **5:** 5 Stations **10:** 10 Stations	**40**



Graphic Symbols

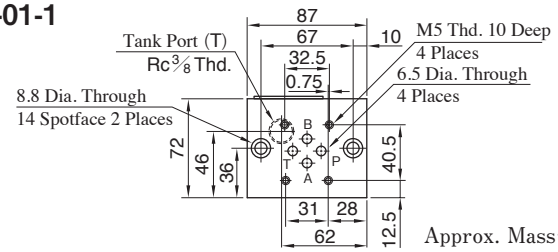


MMC-01-1

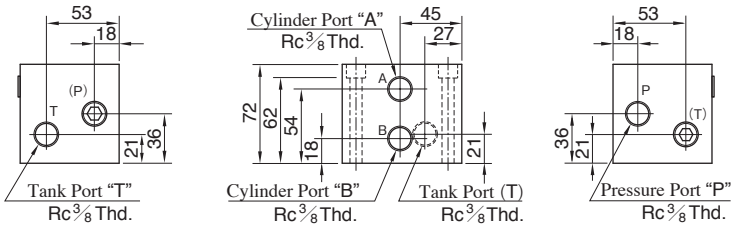


MMC-01-2～10

MMC-01-1

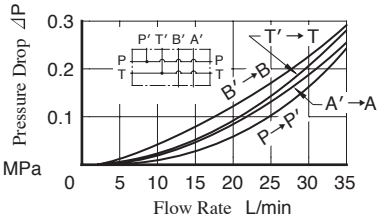


Approx. Mass·····3.5 kg

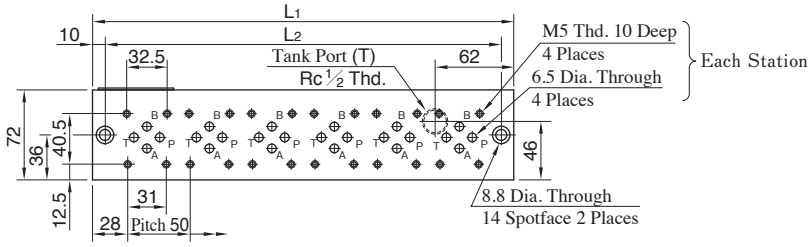


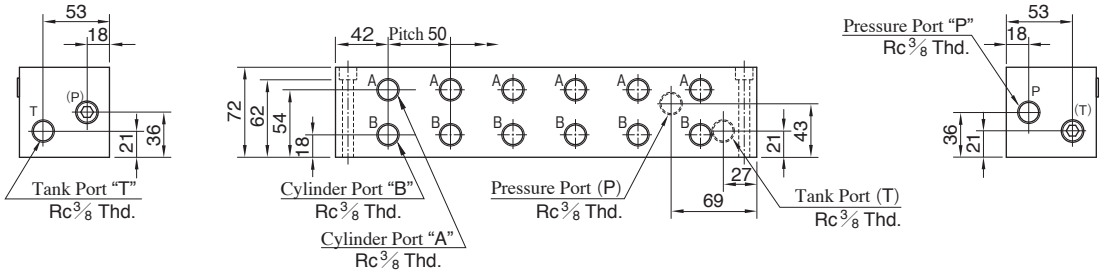
Pressure Drop

Hydraulic Fluid: Viscosity 35 mm²/s,
Specific Gravity 0.850



MMC-01-2 – 10





Model Numbers	L1	L2	Mass kg
MMC-01-2	137	117	5.5
MMC-01-3	187	167	7.0
MMC-01-4	237	217	8.5
MMC-01-5	287	267	10.0
MMC-01-6	337	317	11.5

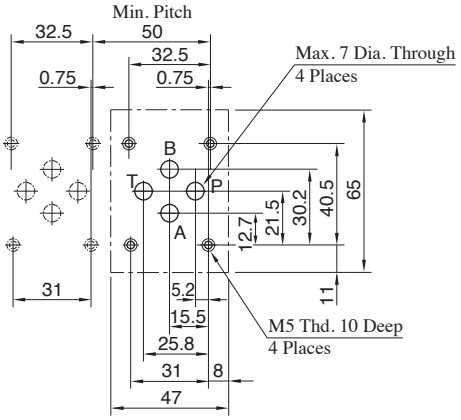
Model Numbers	L1	L2	Mass kg
MMC-01- 7	387	367	13.0
MMC-01- 8	437	417	14.5
MMC-01- 9	487	467	16.0
MMC-01-10	537	517	17.5

Instructions

- Port Used: Base plate has three (two, in case of 1 station type) pressure port "P"s and four tank port "T"s. Any one of these ports or two or more ports may be used. However, please note that the ports marked with (P) or (T) in the drawing are normally plugged. Remove the plugs when using such ports. Make sure that ports that are not currently used are properly plugged.

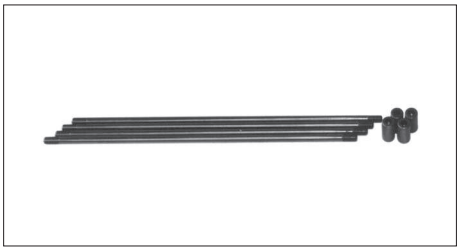
Interface Mounting Surface Dimensions for 01 Series Modular Valve

When standard base plates (MMC-01) are not used, the mounting surface described below must be prepared. The mounting surface should have a good machined finish. ($\sqrt{6}$)



Mounting Bolt Kits For Modular Valves

Valves are mounted with four stud bolts. Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis.
When ordering the bolt kit, be sure to give the bolt kit model number from the table below.



Model Number Designation

MBK	–01	–02	–70
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK：Bolt Kits for Modular Valves	01	01, 02, 03, 04, 05 (Refer to the following chart)	70

Bolt Kits Selection Chart

Model Numbers	Quantity of valves to be stacked			Approx. Mass g	Max. Operating Pressure MPa
	Solenoid Operated Directional Valve (∗-DSG-01)	End Plate (MDC-01)	Modular Valve & Connecting Plate (M∗∗-01) ★2		
MBK–01–01–70	1	0	1	85	35
	0	1			
MBK–01–02–70	1	0	2	110	35
	0	1			
MBK–01–03–70	1	0	3	135	35
	0	1			
MBK–01–04–70 ★1	1	0	4	160	25
	0	1			
MBK–01–05–70	1	0	0	32	35
	0	1			

★1. In case of MBK-01-04-70, operating pressure is restricted at 25 MPa or less.
★2. Two Pressure Reducing Valve(MRDP-01), that height of tightening position is equal to 2 pieces of other modular valves, so that if use Two Pressure Reducing Valves, add 1 piece to the actual using quantity.

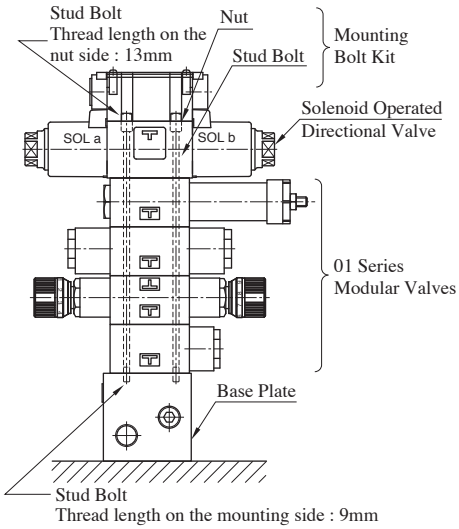
Bolt Kit Composition

Stud Bolt..... 4 Pcs.
Nut ..... 4 Pcs. } 1 Set

Note: In case of bolt kit model number having "05", four hexagon socket head cap screws only.

Tightening Torque:

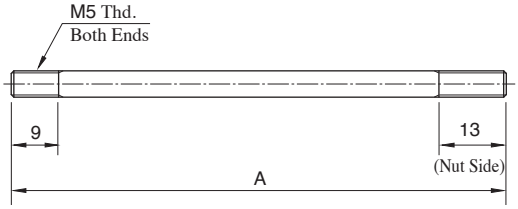
Operating Pressure MPa	Tightening Torque Nm
25 or less	5-7
More than 25	6-7



Stacking Example

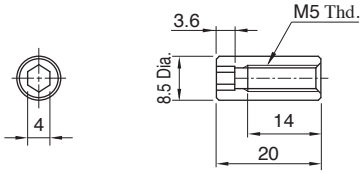
MBK-01

Stud Bolt



Bolt Numbers	A mm
01	98
02	138
03	178
04	218
05	Socket Head Cap Screw M5×45 L

Nut



Interchangeability in Installation between Current and New Design

The following models of 01 Series Modular Valves have changed to 70 design numbers model to operate higher pressure and modification for large flow use.

Name	Model Numbers
Relief Modular Valves	MB＊-01-＊-＊-70
Reducing Modular Valves	MR＊-01-＊-＊-70
Sequence Modular Valves	MHP-01-＊-＊-70
Counterbalance Modular Valves	MHA/MHB-01-＊-70
Throttle and Check Modular Valves	MS＊-01-＊＊-70
Check Modular Valves	MC＊-01-＊-70
Pilot Operated Check Modular Valves	MP＊-01-＊-＊-70
Bolt Kits	MBK-01-＊-70

Major Changes

(1) Max.Operating Pressure (35MPa) & Max. Flow have substancially increased respectively.

(2) Possible to select "B" port side of the pressure adjustment screw direction about 3 models below.

①Relief Modular Valves (only for P-Line)

②Reducing Modular Valves (for all P&A&B-Line)

③Sequence Modular Valves

(3) Add B-Line for Counterbalance Modular Valves.

(4) Selectable low pilot operation type as standard model for Pilot Operated Check Modular Valves.

Mounting Interchangeability

Interchangeability	Details
Yes	・Mounting surface is not changed from current models. ・If use the adjustment pressure as more than 25 MPa, have to select 70 design bolt kits (MBK-01). Mounting bolt kits of 70 design, the length of both sides screw is different, so refer to the assembly example about 01 series modular valves on page F-41.

Specifications

Max. Operating Pressure

Name	Current		New	
	Model Numbers	Max. Operating Pressure MPa	Model Numbers	Max. Operating Pressure MPa
Relief Modular Valves	MB＊-01-＊-30	21	MB＊-01-＊-＊-70	35
Reducing Modular Valves	MR＊-01-＊-30	31.5	MR＊-01-＊-＊-70	
Sequence Modular Valves	MHP-01-＊-30	25	MHP-01-＊-＊-70	
Counterbalance Modular Valves	MHA-01-＊-30	25	MHA/MHB-01-＊-70	
Throttle and Check Modular Valves	MS＊-01-＊＊-50	31.5	MS＊-01-＊＊-70	
Check Modular Valves	MC＊-01-＊-30	31.5	MC＊-01-＊-70	
Pilot Operated Check Modular Valves	MP＊-01-＊-40	31.5	MP＊-01-＊-70	
	MP＊-01-＊-4001	31.5	MP＊-01-＊-L-70	

Max. Flow

Name	Current		New	
	Model Numbers	Max. Flow L/min	Model Numbers	Max. Flow L/min
Relief Modular Valves	MB＊-01-＊-30	35	MB＊-01-＊-＊-70	60
Reducing Modular Valves	MR＊-01-＊-30	35	MR＊-01-＊-＊-70	60
Sequence Modular Valves	MHP-01-＊-30	35	MHP-01-＊-＊-70	60
Counterbalance Modular Valves	MHA-01-＊-30	35	MHA/MHB-01-＊-70	60
Throttle and Check Modular Valves	MS＊-01-＊＊-50	60	MS＊-01-＊＊-70	80
Check Modular Valves	MC＊-01-＊-30	35	MC＊-01-＊-70	60
Pilot Operated Check Modular Valves	MP＊-01-＊-40	35	MP＊-01-＊-70	60
	MP＊-01-＊-4001	35	MP＊-01-＊-L-70	60

●Model Number Designation

Function Addition

Name	Model Numbers	Additional Functions
Relief Modular Valves	MBP-01-＊-B-70	Direction of the pressure adjustment screw, selectable B port side
Reducing Modular Valves	MR＊-01-＊-B-70	Direction of the pressure adjustment screw, selectable B port side
Sequence Modular Valves	MHP-01-＊-B-70	Direction of the pressure adjustment screw, selectable B port side
Counterbalance Modular Valves	MHB-01-＊-70	Add the Counterbalance Modular Valves for B-Line
Pilot Operated Check Modular Valves	MP＊-01-＊-L-70	Low pilot operation type, selectable as standard product

Pressure Adjustment Range

Name	Current		New	
	Model Numbers	Pres. Adj. Range MPa	Model Numbers	Pres. Adj. Range MPa
Relief Modular Valves	MB＊-01-＊-30	**C:** ★-14 **H:** 7-21	MB＊-01-＊-＊-70	**B:** ★-7 **C:** 3.5-14 **H:** 7-21 **K:** 14-35
Reducing Modular Valves	MR＊-01-＊-30	**B:** ★-7 **C:** 3.5-14 **H:** 7-21	MR＊-01-＊-＊-70	**A:** ★-3.5 **B:** 0.8-7 **C:** 3.5-14 **H:** 7-21
Sequence Modular Valves	MHP-01-＊-30	**C:** ★-14 **H:** 7-21	MHP-01-＊-＊-70	**B:** ★-7 **C:** 3.5-14 **H:** 7-21 **K:** 14-35
Counterbalance Modular Valves	MHA-01-＊-30		MHA/MHB-01-＊-70	

Cracking Pressure

Name	Current		New	
	Model Numbers	Cracking Pressure MPa	Model Numbers	Cracking Pressure MPa
Pilot Operated Check Modular Valves	MP＊-01-＊-40	**2:** 0.2 **4:** 0.4	MP＊-01-＊-70	**0:** 0.035 **2:** 0.2 **4:** 0.4
	MP＊-01-＊-4001		MP＊-01-＊-L-70	

●Typical Performance Characteristics

Characteristics of all models have been changed.

●Approx. Mass

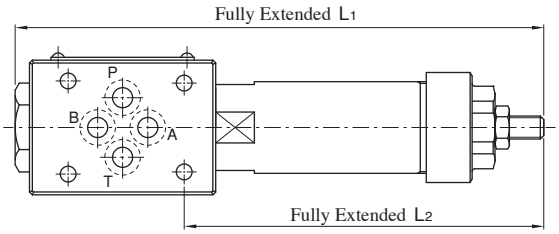
Name	Current		New	
	Model Numbers	Approx. Mass kg	Model Numbers	Approx. Mass kg
Relief Modular Valves	MB＊-01-＊-30	1.1	MBP-01-B/C-70 MBP-01-B/C-B-70 MBA-01-B/C-70 MBB-01-B/C-70	1.15
			MBP-01-H-70 MBP-01-H-B-70 MBA-01-H-70 MBB-01-H-70	1.25
Reducing Modular Valves	MR＊-01-B/C-30	1.1	MR＊-01-B/C-70	1.15
	MR＊-01-H-30		MR＊-01-H-70	1.25
Sequence Modular Valves	MHP-01-＊-30	1.1	MHP-01-B/C-＊-70	1.45
			MHP-01-H-＊-70	1.55
Counterbalance Modular Valves	MHA-01-＊-30	1.3	MHA-01-B/C-＊-70	1.65
			MHB-01-B/C-＊-70	1.65
			MHA/MHB-01-H-＊-70	1.75
Throttle and Check Modular Valves	MSA/MSB-01-＊＊-50	1.3	MSA/MSB-01-＊＊-70	1.15
	MSW-01-＊＊-50	1.5	MSW-01-＊＊-70	1.3
Check Modular Valves	MCP/MCT-01-＊-30	1.1	MCP/MCT-01-＊-70	1.0
	MCA/MCB/MCW-01-＊-30	1.3	MCA/MCB/MCW-01-＊-70	1.2
Pilot Operated Check Modular Valves	MP＊-01-＊-40/4001	1.2	MPA/MPB-01-＊-70	1.15
			MPW-01-＊-70	1.4
			MPA/MPB-01-＊-L-70	1.2
			MPW-01-＊-L-70	1.45
Mounting Bolt Kits	MBK-01-01-30	0.060	MBK-01-01-70	0.085
	MBK-01-02-30	0.100	MBK-01-02-70	0.110
	MBK-01-03-30	0.130	MBK-01-03-70	0.135
	MBK-01-05-30	0.040	MBK-01-05-70	0.032

Dimensions

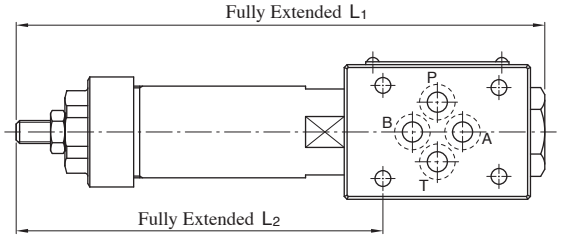
As of fully extended dimensions, height (40mm) and depth (47mm) are same between current and new models. Width is same except for the models below.

(1) Relief Modular Valves

MBP-01
MBB-01



MBP-01-＊-B
MBA-01

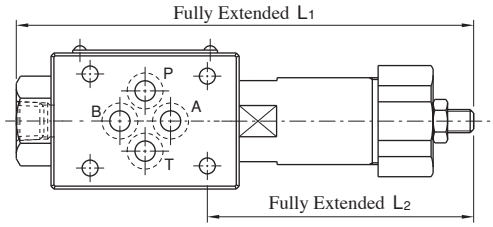


	Model Numbers	L1	L2
New	MBP-01-B-70	151	92
	MBB-01-B-70		
	MBP-01-K-70	184.5	125.5
	MBB-01-K-70		
	MBP-01-B-B-70	151	94.5
	MBP-01-C-B-70		
	MBP-01-H-B-70	166.5	110
	MBA-01-B-70	151	94.5
	MBP-01-K-B-70	184.5	128
	MBA-01-K-B-70		

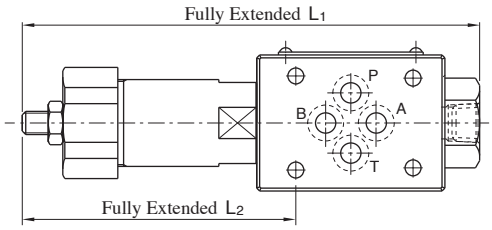
★1. Pressure adjustment range “B”, “K” newly added.
★2. Pressure adjustment screw direction B port side, newly added for P-Line.

(2) Reducing Modular Valves

MR＊-01



MR＊-01-＊-B

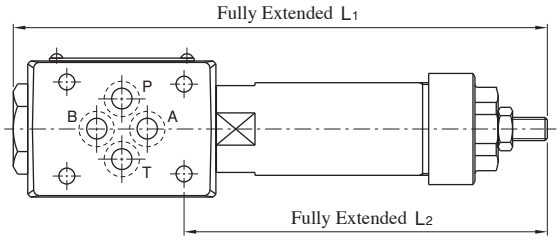


	Model Numbers	L1	L2
New	MRA-01-A-70	162.5	96.5
	MR＊-01-A-B-70	162.5	99
	MR＊-01-B-B-70	158	94.5
	MR＊-01-C-B-70		
	MR＊-01-H-B-70	173.5	110

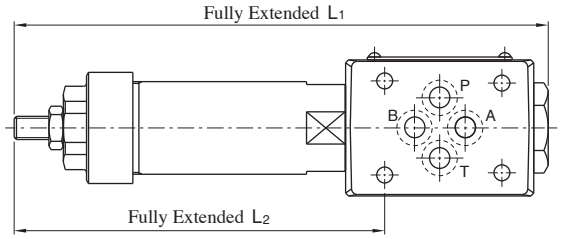
★1. Pressure adjustment range “A” newly added.
★2. Pressure adjustment screw direction B port side, newly added.

(3) Sequence Modular Valves

MHP-01



MHP-01-＊-B

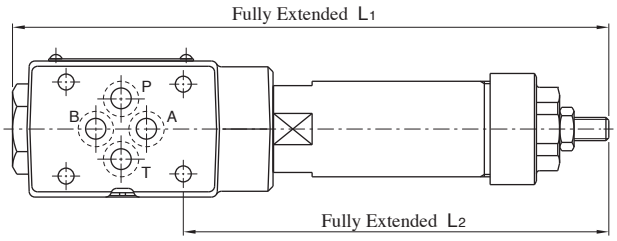


	Model Numbers	L1	L2
New	MHP-01-B-70	151	92
	MHP-01-K-70	184.5	125.5
	MHP-01-B-B-70	151	94.5
	MHP-01-C-B-70		
	MHP-01-H-B-70	166.5	110
	MBP-01-K-B-70	184.5	128

★1. Pressure adjustment range “B”, “K” newly added.
★2. Pressure adjustment screw direction B port side, newly added.

(4) Counterbalance Modular Valves

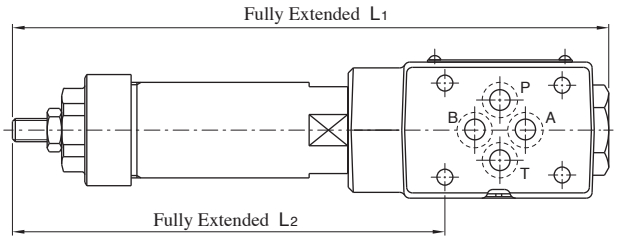
MHA-01



Model Numbers		L1	L2
New	MHA-01-B-70	171	112
	MHA-01-K-70	207.2	148.2

★Pressure adjustment range “B”, “K” newly added.

MHB-01

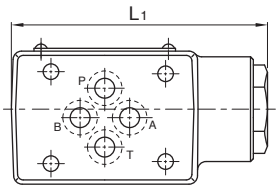


Model Numbers		L1	L2
New	MHB-01-B-70	171	114.4
	MHB-01-C-70		
	MHB-01-H-70	186.5	129.9
	MHB-01-K-70	207.2	150.6

★Newly added for B-Line.

(5) Check Modular Valves

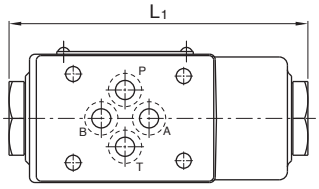
MCP/MCT-01



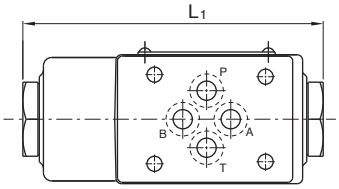
Model Numbers		L1
Current	MCP/MCT-01-＊-30	90
New	MCP/MCT-01-＊-70	90.5

(6) Pilot Operated Check Modular Valves

MPA-01



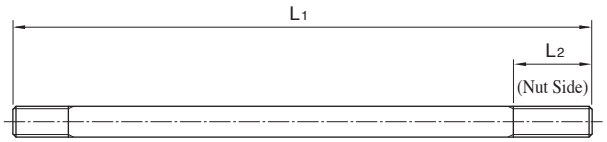
MPB-01



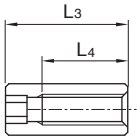
Model Numbers		L1
Current	MPA/MPB-01-＊-40	134
	MPA/MPB-01-＊-4001	138
New	MPA/MPB-01-＊-70	109.5
	MPA/MPB-01-＊-L-70	113.5

(7) Mounting Bolt Kits

●Stud Bolt



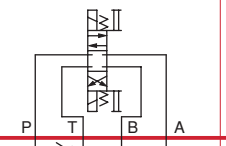
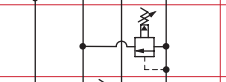
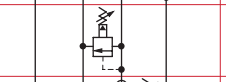
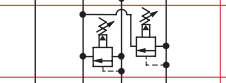
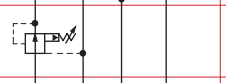
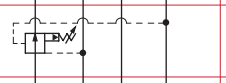
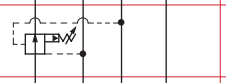
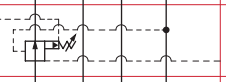
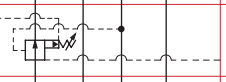
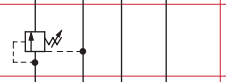
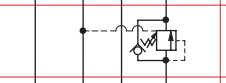
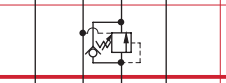
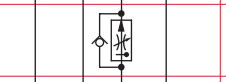
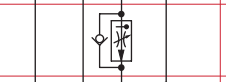
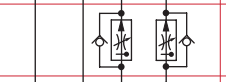
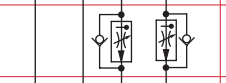
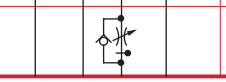
●Nut

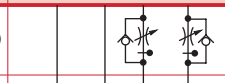
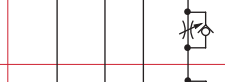
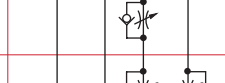
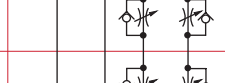
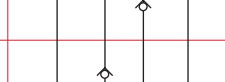
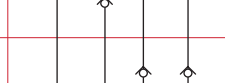
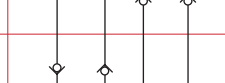
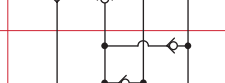
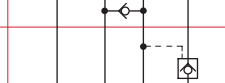
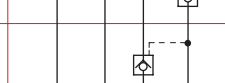
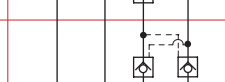
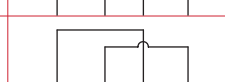
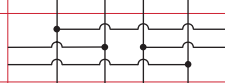
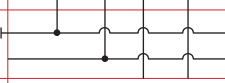
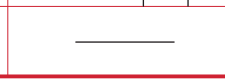
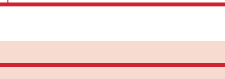


Model Numbers		L1	L2	L3	L4
Current	MBK-01-01-30	94	9	15	9
	MBK-01-02-30	134			
	MBK-01-03-30	174			
	MBK-01-04-30	214			
New	MBK-01-01-70	98	13	20	14
	MBK-01-02-70	138			
	MBK-01-03-70	178			
	MBK-01-04-70	218			

03 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page
	Solenoid Operated Directional Valves (S-) DSG-03-＊＊＊-＊-50 E-DSG-03-＊＊＊-D＊-50 T-DSG-03-＊＊＊-D24＊-50 G-DSG-03-＊＊＊-＊-51		★
Pressure Control Valves	Relief Valves (for "P-Line") MBP-03-＊-70		F-48
	Relief Valves (for "A-Line") MBA-03-＊-70		F-48
	Relief Valves (for "B-Line") MBB-03-＊-70		F-48
	Relief Valves (for "A&B-Lines") MBW-03-＊-70		F-48
	Reducing Valves (for "P-Line") MRP-03-＊-70		F-50
	Reducing Valves (for "A-Line") MRA-03-＊-70		F-50
	Reducing Valves (for "B-Line") MRB-03-＊-70		F-50
	Reducing Valves for Low Pressure Setting (for "P-Line") MRLP-03-10		F-52
	Reducing Valves for Low Pressure Setting (for "A-Line") MRLA-03-10		F-52
	Reducing Valves for Low Pressure Setting (for "B-Line") MRLB-03-10		F-52
	Sequence Valves (for "P-Line") MHP-03-＊-20		F-54
	Counterbalance Valves (for "A-Line") MHA-03-＊-20		F-54
	Counterbalance Valves (for "B-Line") MHB-03-＊-20		F-54
Flow Control Valves	Flow Control Valves (for "P-Line") MFP-03-11		F-56
	Flow Control and Check Valves (for "A-Line", Meter-in) MFA-03-X-11		F-56
	Flow Control and Check Valves (for "A-Line", Meter-in) MFA-03-Y-11		F-56
	Flow Control and Check Valves (for "B-Line", Meter-out) MFB-03-X-11		F-56
	Flow Control and Check Valves (for "B-Line", Meter-in) MFB-03-Y-11		F-56
	Flow Control and Check Valves (for "A&B-Lines", Meter-out) MFW-03-X-11		F-56
	Flow Control and Check Valves (for "A&B-Lines", Meter-in) MFW-03-Y-11		F-56
	Temperature Compensated Throttle and Check Valves (for "A-Line", Meter-out) MSTA-03-X-20		F-58
	Temperature Compensated Throttle and Check Valves (for "B-Line", Meter-out) MSTB-03-X-20		F-58

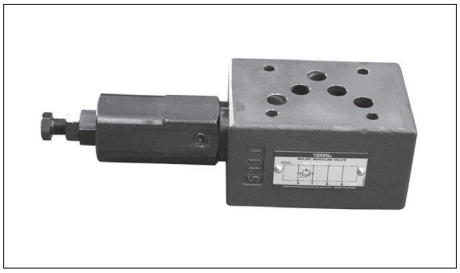
Class	Name and Model Numbers	Graphic Symbols	Page
		P T B A	
Flow Control Valves	Temperature Compensated Throttle and Check Valves (for "A&B-Lines", Meter-out) MSTW-03-X-20		F-58
	Throttle Valves (for "P-Line") MSP-03-30		F-60
	Check and Throttle Valves (for "P-Line") MSCP-03-20		F-61
	Throttle and Check Valves (for "A-Line", Meter-out) MSA-03-X-70		F-62
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-03-Y-70		F-62
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-03-X-70		F-62
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-03-Y-70		F-62
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-03-X-70		F-62
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-03-Y-70		F-62
Directional Control Valves	Check Valves (for "P-Line") MCP-03-＊-70		F-64
	Check Valves (for "A-Line") MCA-03-＊-70		F-64
	Check Valves (for "B-Line") MCB-03-＊-70		F-64
	Check Valves (for "T-Line") MCT-03-＊-70		F-64
	Check Valves (for "A&B-Lines") MCW-03-＊-70		F-64
	Check Valves (for "P&T-Lines") MCPT-03-P＊-T＊-10		F-66
	Anti-Cavitation Valves MAC-03-10		F-67
	Pilot Operated Check Valves (for "A-Line") MPA-03-＊-＊-70		F-68
	Pilot Operated Check Valves (for "B-Line") MPB-03-＊-＊-70		F-68
	Pilot Operated Check Valves (for "A&B-Lines") MPW-03-＊-＊-70		F-68
Modular Plates and Mounting Bolts	End Plates (Blocking Plates) MDC-03-A-10		F-70
	End Plates (Bypass Plates) MDC-03-B-10		F-70
	Connecting Plates MDS-03-10		F-70
	Base Plates MMC-03-T-＊-21		F-71
	Bolt Kits MBK-03-＊-10		F-73

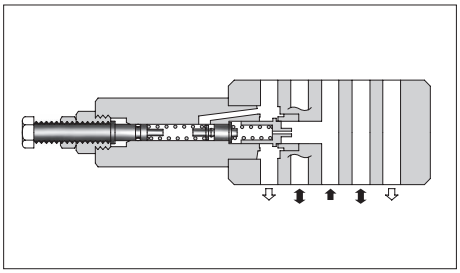
★Refer to the relevant pages of catalog "E: DIRECTIONAL CONTROLS"

Relief Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MB＊-03-＊-70	35	120





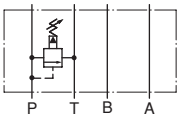
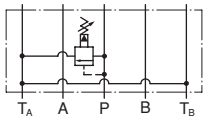
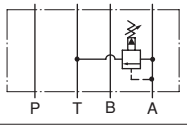
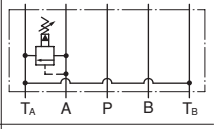
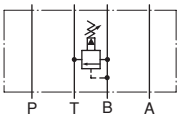
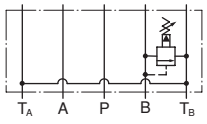
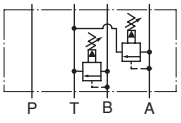
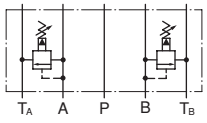
Model Number Designation

MBA	–03	–B	–70
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MBP: Relief Valve for P-Line **MBA:** Relief Valve for A-Line **MBB:** Relief Valve for B-Line **MBW:** Relief Valve for A&B-Lines	**03**	**B:** ★-7 **C:** 3.5-14 **K:** 7-35	**70**

★See the "Min. Adjustment Pressure" of this page.

Instructions

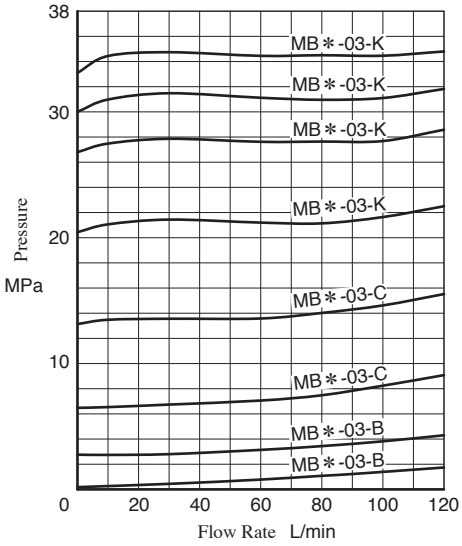
The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of this page. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.
In case of a small flow, the setting pressure may become unstable. To avoid this, refer to the minimum flow characteristic curve of the this page and use the valve within a range as shown with .

Model Numbers	Graphic Symbols	Graphic Symbols
MBP-03		
MBA-03		
MBB-03		
MBW-03		

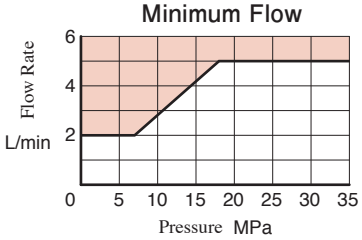
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

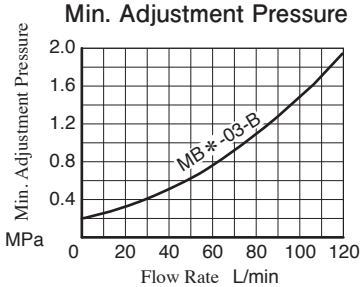
Nominal Override Characteristics



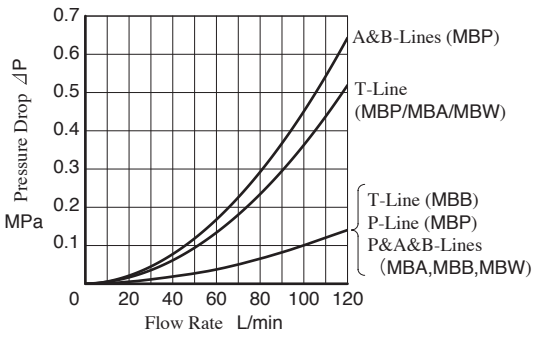
Minimum Flow



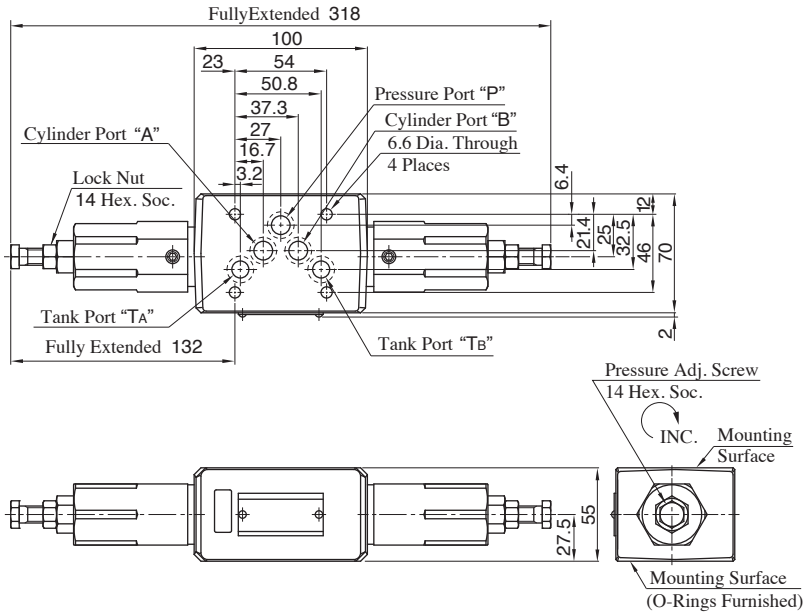
Min. Adjustment Pressure



Pressure Drop

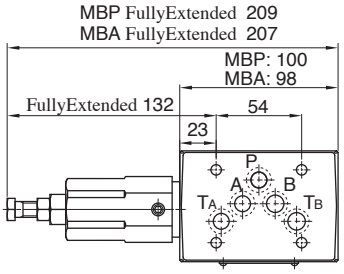


MBW-03



Approx. Mass.....4.0kg

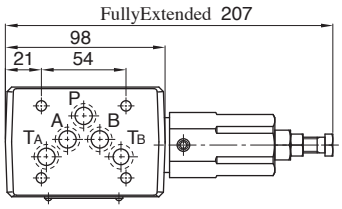
MBP-03, MBA-03



Approx. Mass.....3.4 kg

For other dimensions, refer to (MBW-03) in the drawing left.

MBB-03

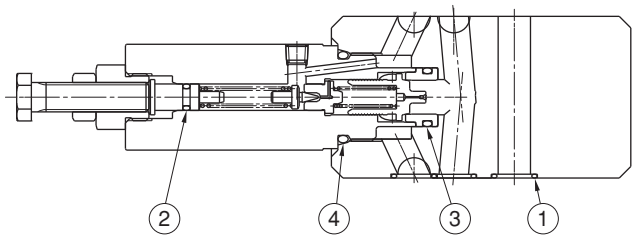


Approx. Mass.....3.4 kg

For other dimensions, refer to (MBW-03) in the drawing left.

List of Seals

MBP-03
MBA-03
MBB-03
MBW-03

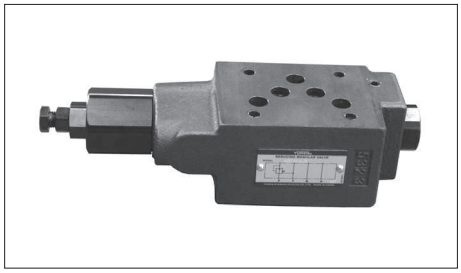


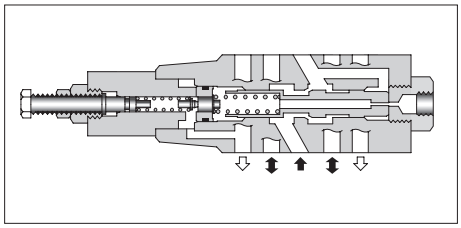
MBP-03
MBA-03

- MBB-03:The pressure adjustment part is assembled on the right side.
- MBW-03:The pressure adjustment part is assembled on the both sides.

Item	Name of Parts	Part Numbers	Qty.			
			MBP-03	MBA-03	MBB-03	MBW-03
1	O-Ring	AS568-014 (NBR-90)	5	5	5	5
2	O-Ring	OR NBR-70-1 P6-N	1	1	1	2
3	O-Ring	OR NBR-90 P16-N	1	1	1	2
4	O-Ring	OR NBR-90 P26-N	1	1	1	2

Reducing Modular Valves





Specifications

Model Numbers	Max. Operating Pressure MPa	Max.Flow L/min
MR ✻ -03-A-70★	35	80
MR ✻ -03-B/C/H-70		120

★If the pressure is set below 1.2 MPa, the maximum flow is limited. See the "Min. Adjustment Pressure vs. Max. Flow" of this page.

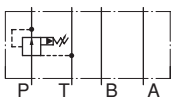
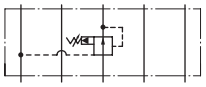
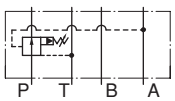
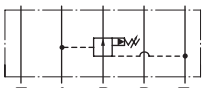
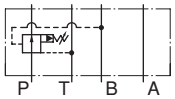
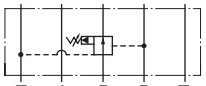
Model Number Designation

MRP	–03	–B	–70
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MRP: Reducing Valve for P-Line **MRA:** Reducing Valve for A-Line **MRB:** Reducing Valve for B-Line	**03**	**A:** ★-3.5 **B:** 1-7 **C:** 3.5-14 **H:** 7-31.5	**70**

★See the "Min. Adjustment Pressure vs. Max. Flow" of this page.

Instructions

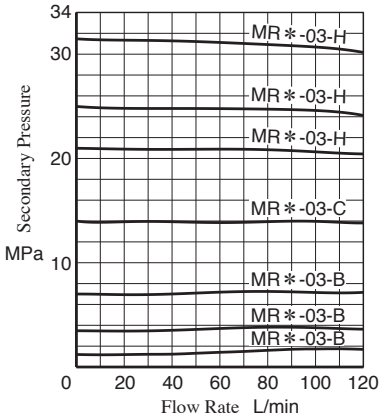
The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of this page. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve. To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anticlockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

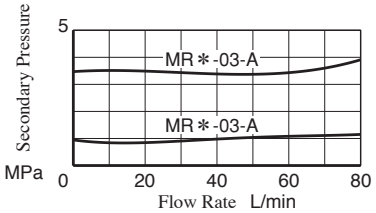
Model Numbers	Graphic Symbols	Graphic Symbols
MRP-03		
MRA-03		
MRB-03		

Typical Performance Characteristics

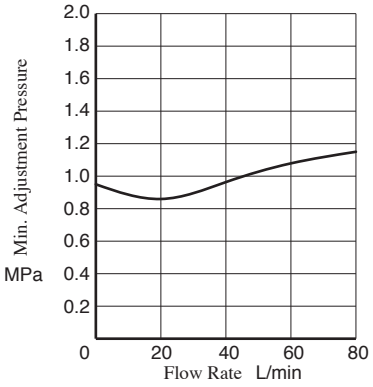
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Nominal Override Characteristics Primary Pressure 35 MPa

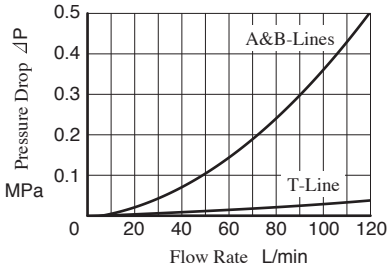




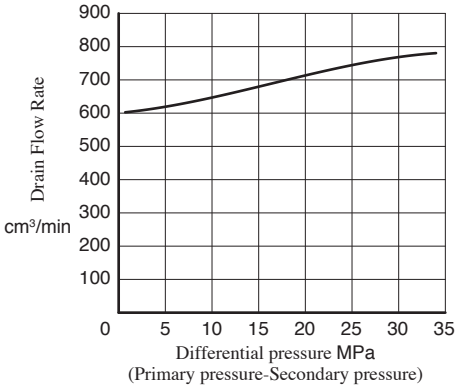
Min. Adjustment Pressure vs. Max. Flow



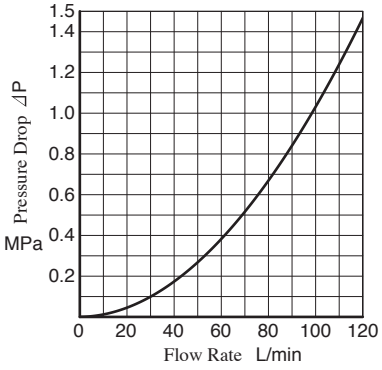
Pressure Drop



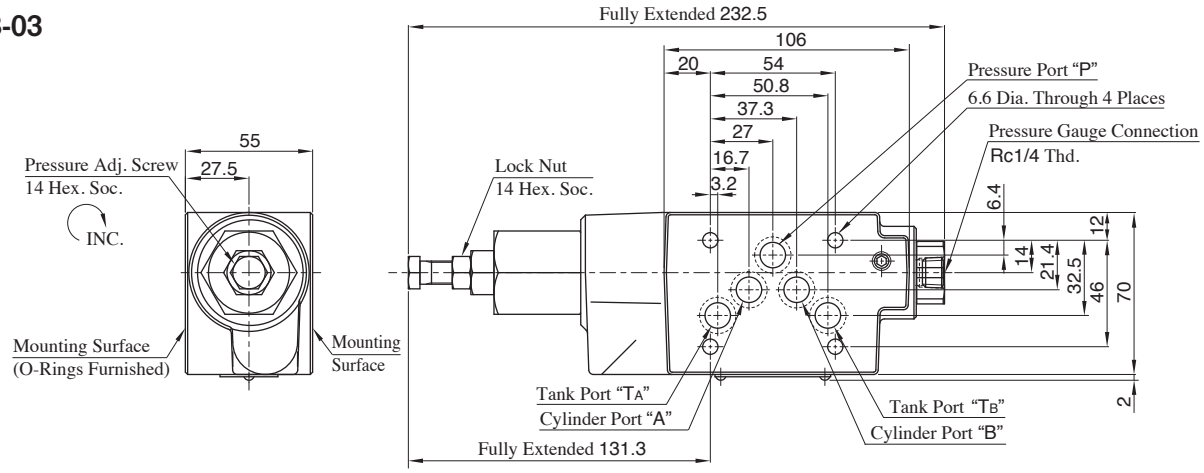
Drain Flow Rate



Pres. Drop at Spool Fully Open (P-Line)

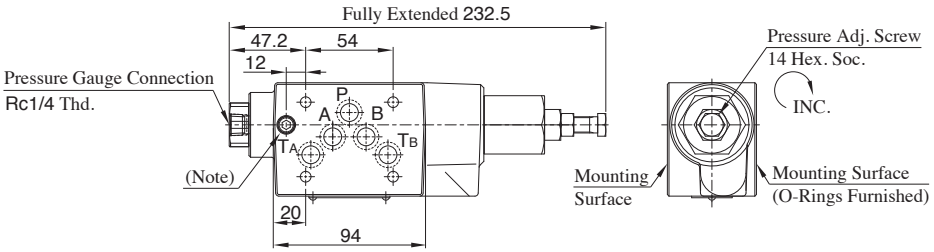


MRP-03
MRB-03



Approx. Mass.....3.8 kg

MRA-03

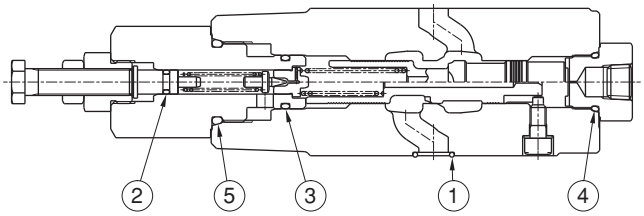


For other dimensions, refer to "MRP-03" in the drawing abobe. Approx. Mass.....3.8 kg

Note: If mounting surface dimension equipped with the valves based on ISO 4401-05-05-0-05, pilot port of stacking valves will interfere with bolt hole of MRA-03, so check gasket surface of the stacking valves.

List of Seals

MRP-03
MRA-03
MRB-03

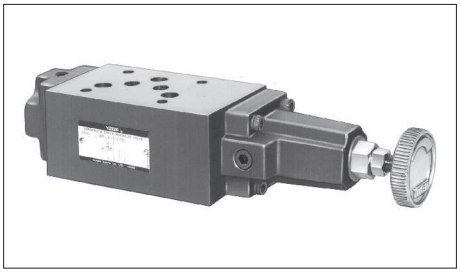


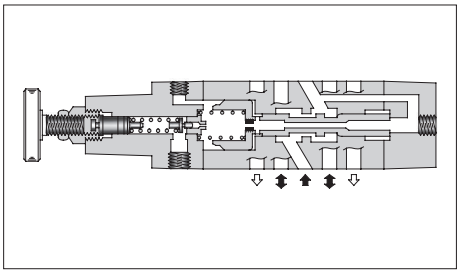
MRP-03

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-70-1 P6-N	1
3	O-Ring	OR NBR-90 P16-N	1
4	O-Ring	OR NBR-90 P18-N	1
5	O-Ring	OR NBR-90 P26-N	1

- MRA-03:The pressure adjustment part is assembled on the right side.
- MRB-03:The pressure adjustment part is assembled on the left side.

Reducing Modular Valves for Low Pressure Setting





Specifications

Model Numbers	Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max.Flow L/min
MRL＊–03–10	7	0.2-6.5	50 ★

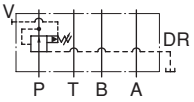
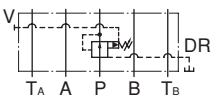
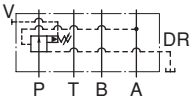
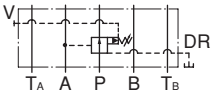
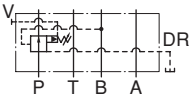
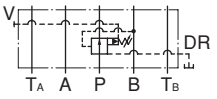
★ If the pressure is set below 0.8 MPa, the maximum flow is limited.
See the "Min. Adjustment Pressure vs. Max. Flow" of this page and during use, stay within the shaded zone on the graph.

Model Number Designation

MRLP	–03	–10
Series Number	Valve Size	Design Number
MRLP:Low Pressure Setting Type Reducing Valve for P-Line MRLA:Low Pressure Setting Type Reducing Valve for A-Line MRLB:Low Pressure Setting Type Reducing Valve for B-Line	03	10

Instructions

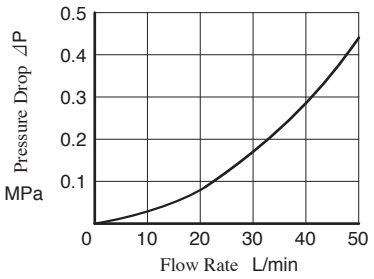
If there is a pressure in drain line, it is added to the secondary setting pressure. Hence, drain line must be connected to tank directly with a low back pressure close to atmospheric pressure.

Model Numbers	Graphic Symbols	Graphic Symbols
MRLP-03		
MRLA-03		
MRLB-03		

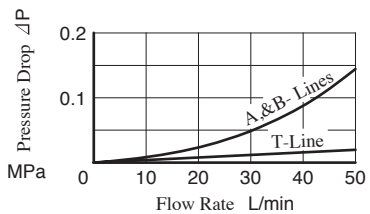
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

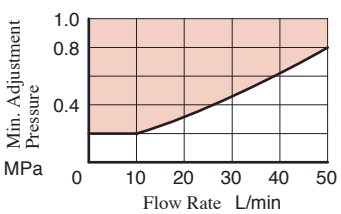
Pres. Drop at Spool Fully Open (P-Line)



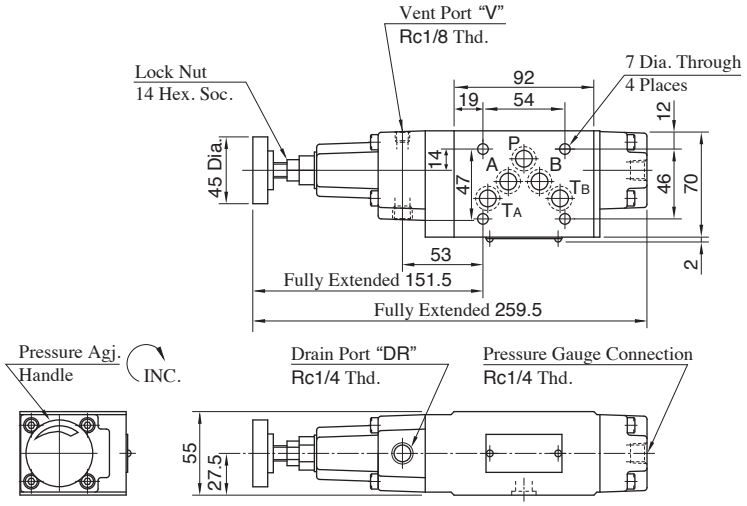
Pressure Drop



Min. Adjustment Pressure vs. Max. Flow

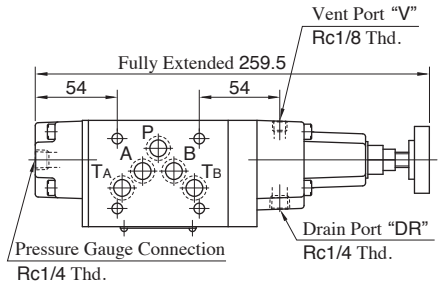


MRLP-03
MRLB-03



Approx. Mass.....4.5 kg

MRLA-03

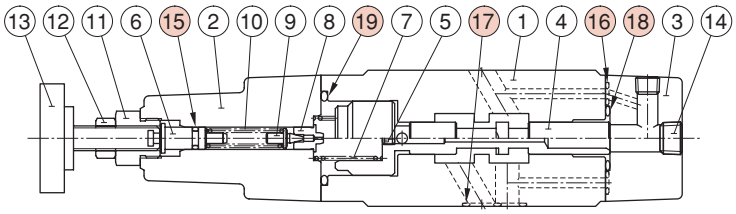


Approx. Mass.....4.5 kg

For other dimensions, refer to "MRLP-03/MRLB-03" in the drawing left.

List of Seals

MRLP-03
MRLA-03
MRLB-03



MRLP-03

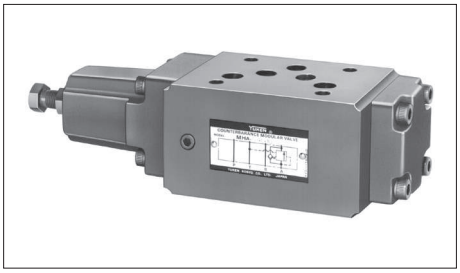
Item	Name of Parts	Part Numbers	Qty.
15	O-Ring	OR NBR-70-1 P6-N	1
16	O-Ring	OR NBR-90 P6-N	2
17	O-Ring	AS568-014 (NBR-90)	5
18	O-Ring	OR NBR-90 P22-N	1
19	O-Ring	OR NBR-90 P32-N	1

- MRLA-03: The pressure adjustment part is assembled on the right side.
- MRLB-03: The cover will be rotated 180 degrees with respect to MRLP.

Sequence Modular Valves / Counterbalance Modular

Specifications

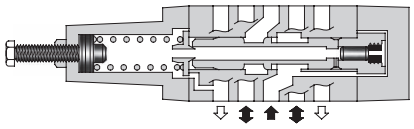
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min	Free Flow L/min
MHP–03–＊–20	25	50	———
MH＊–03–＊–20			70



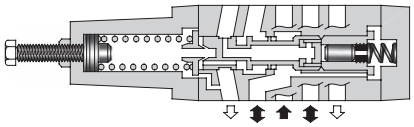
Model Number Designation

MHP	–03	–C	–20
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MHP: Sequence Valve for P-Line	03	**N:** ★-1.8 **A:** 1.8-3.5 **B:** 3.5-7 **C:** 7-14	**20**
MHA: Counterbalance Valve for A-Line MHB: Counterbalance Valve for B-Line			**20**

★See the "Min. Adjustment Pressure vs. Max. Flow" of this page.



MHP-03



MHA/MHB-03

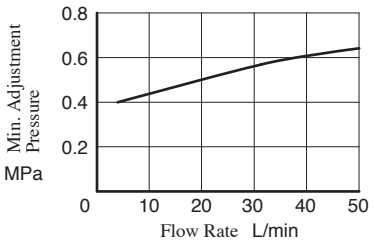
Instructions

The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of this page. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

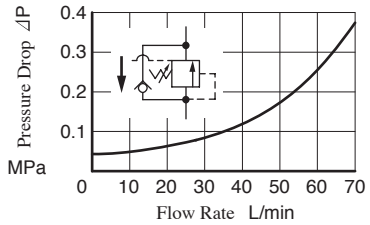
Typical Performance Characteristics

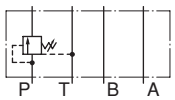
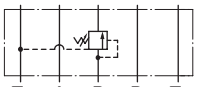
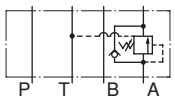
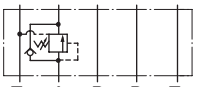
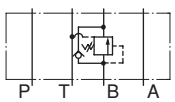
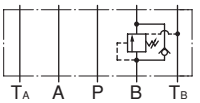
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Min. Adjustment Pressure
MHP/MHA/MHB-03



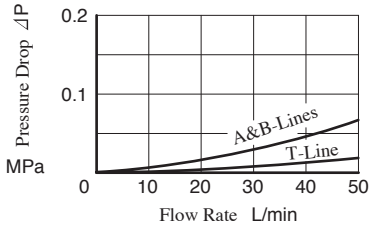
Pressure Drop for Free Flow
MHA/MHB-03



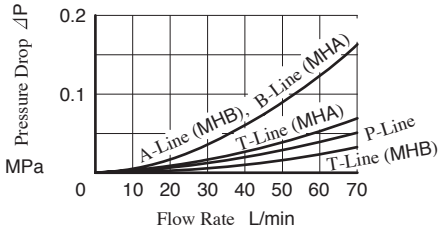
Model Numbers	Graphic Symbols	Graphic Symbols
MHP-03		
MHA-03		
MHB-03		

Pressure Drop

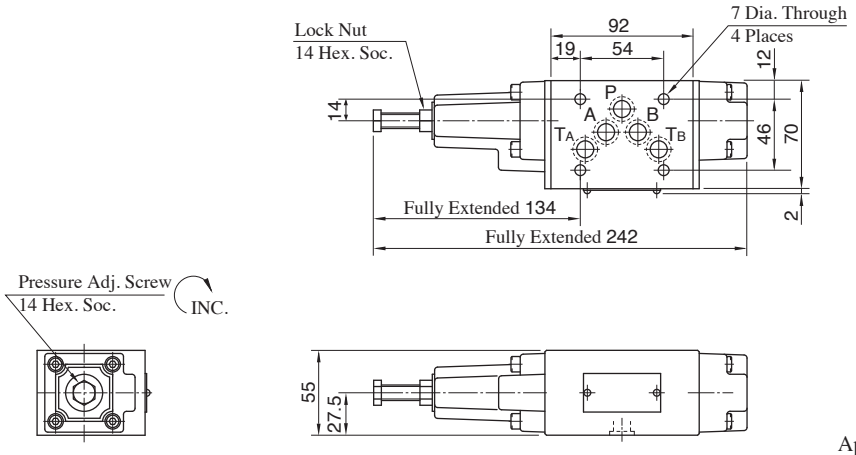
MHP-03



MHA/MHB-03

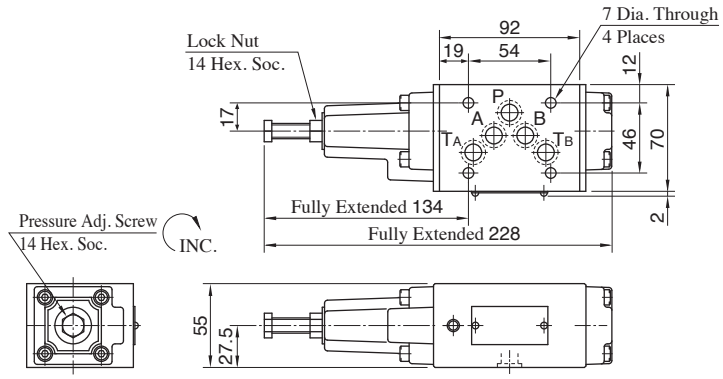


MHP-03



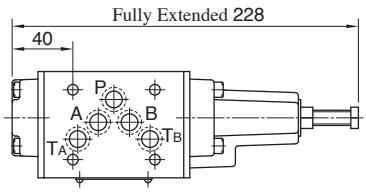
Approx. Mass.....3.5 kg

MHA-03



Approx. Mass.....3.5 kg

MHB-03

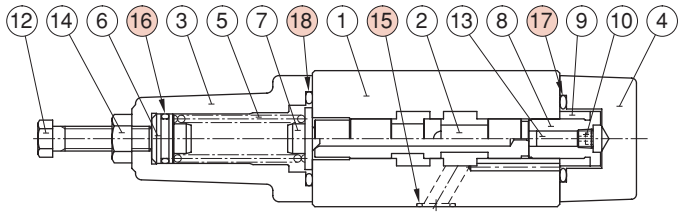


Approx. Mass.....3.5 kg

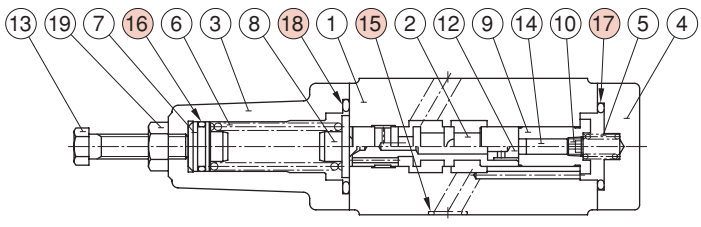
For other dimensions, refer to “MHA-03”in the drawing left..

List of Seals

MHP-03, MHA-03, MHB-03



MHP-03



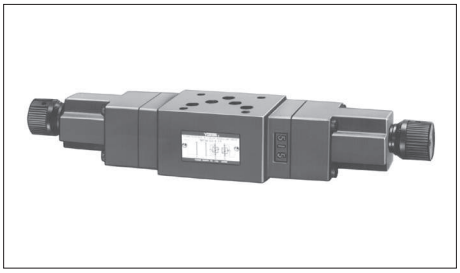
MHA-03

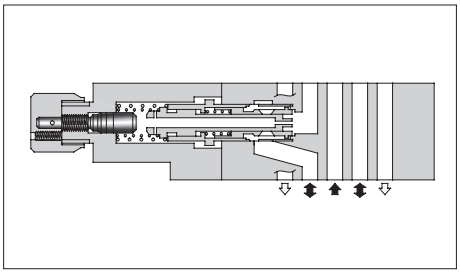
Item	Name of Parts	Part Numbers	Qty.
15	O-Ring	AS568-014 (NBR-90)	5
16	O-Ring	OR NBR-90 P16-N (OR NBR-70-1 P16-N)★	1
17	O-Ring	OR NBR-90 P29-N	1
18	O-Ring	OR NBR-90 P32-N	1

★ If use MHP-03, the O-Ring of item 16 use the one within brackets.

●MHB-03: The pressure adjustment part is assembled on the right side.

Pressure and Temperature Compensated Flow Control (and Check) Modular Valves





Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min	Free Flow L/min
MFP-03-11	16	50	———
MF∗-03-∗-11			70

Model Number Designation

MFA	–03	–X	–11
Series Number	Valve Size	Directoin of Flow	Design Number
MFP:Pressure & Temperature Compensated Flow Control Valve for P-Line	03	———	11
MFA:Pressure & Temperature Compensated Flow Control & Check Valve for A-Line MFB:Pressure & Temperature Compensated Flow Control & Check Valve for B-Line MFW:Pressure & Temperature Compensated Flow Control & Check Valve for A&B-Lines		**X:** Meter-out **Y:** Meter-in	11

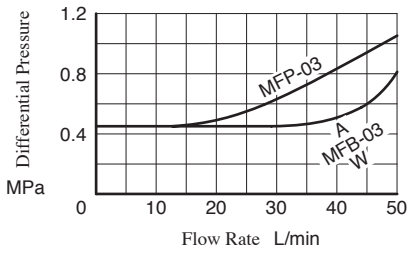
Instructions

●To make flow adjustment,loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

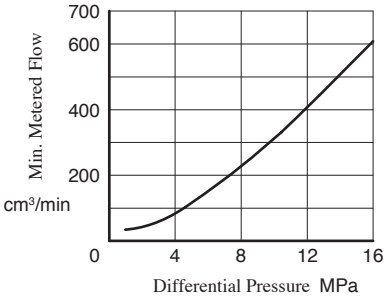
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

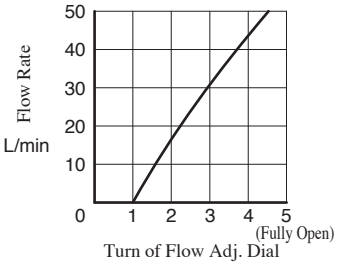
Min. Required Pressure Difference



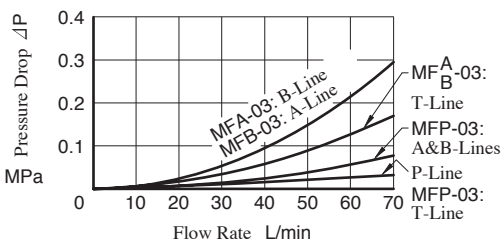
Min. Metered Flow



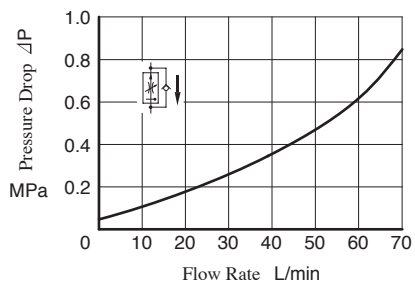
Metered Flow vs. Dial Position



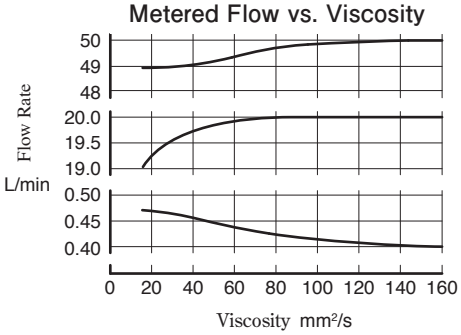
Pressure Drop



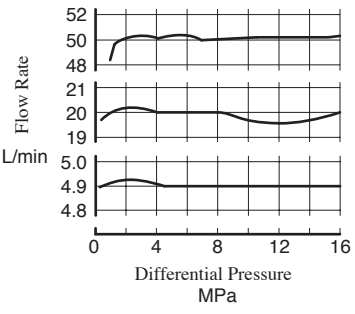
Pressure Drop for Free Flow

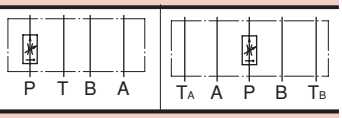


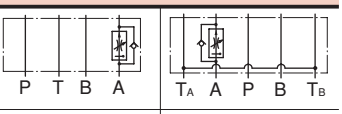
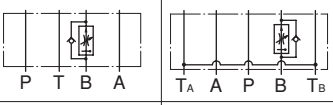
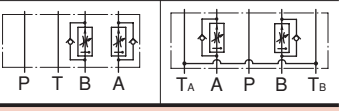
Metered Flow vs. Viscosity

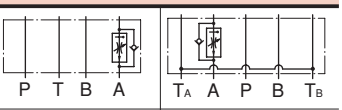
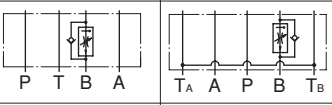
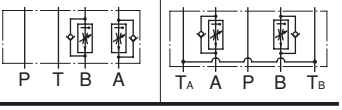


Metered Flow vs. Differential Pressure

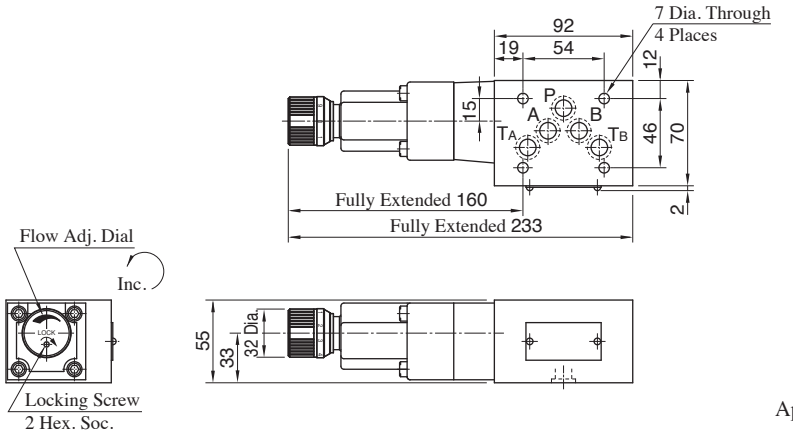


Model Numbers	Graphic Symbols
MFP-03	

Model Numbers	Graphic Symbols
MFA-03 -X	
MFB-03 -X	
MFW-03 -X	

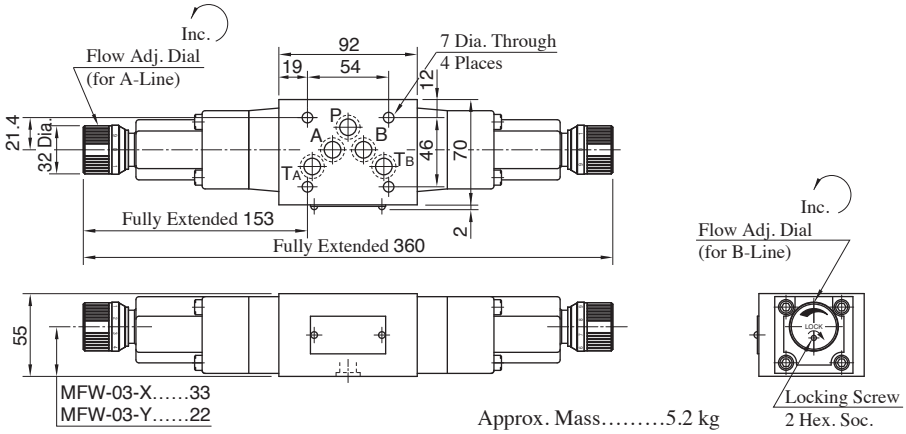
Model Numbers	Graphic Symbols
MFA-03 -Y	
MFB-03 -Y	
MFW-03 -Y	

MFP-03



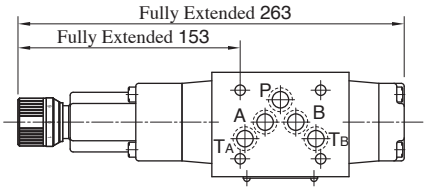
Approx. Mass.....4.2 kg

MFW-03-X/Y



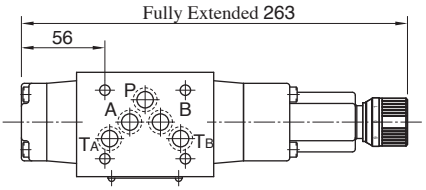
Approx. Mass.....5.2 kg

MFA-03-X/Y



Approx. Mass.....4.1 kg

MFB-03-X/Y

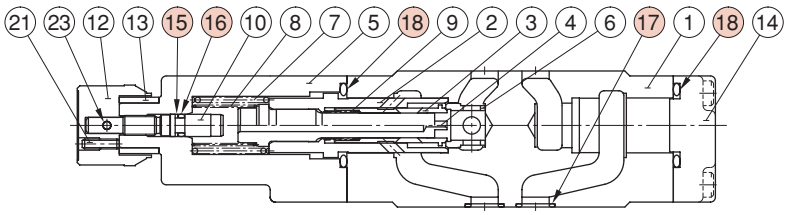


Approx. Mass.....4.1 kg

For other dimensions, refer to "MFW-03" in the drawing above.

List of Seals

MFP-03
MFA-03
MFB-03
MFW-03

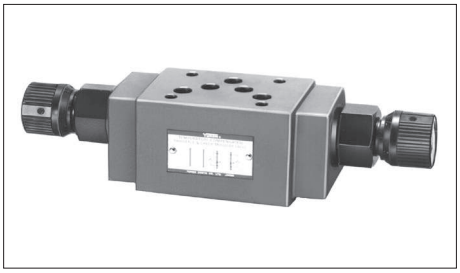


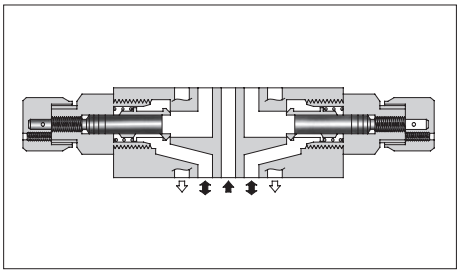
MFA-03

- MFP-03: The body ① is different.
- MFB-03: The flow adjustment part is built in the right side.
- MFW-03:The flow adjustment part is built in the both left and right sides.

Item	Name of Parts	Part Numbers	Qty.			
			MFP–03	MFA–03	MFB–03	MFW–03
15	Back-up Ring	BR JIS B 2401-4-T2-P6	1	1	1	2
16	O-Ring	OR NBR-70-1 P6-N	1	1	1	2
17	O-Ring	AS568-014 (NBR-90)	5	5	5	5
18	O-Ring	OR NBR-90 P28-N	1	2	2	2

Temperature Compensated Throttle and Check Modular Valves





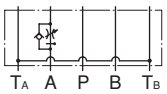
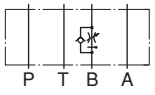
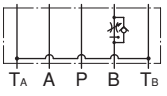
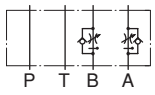
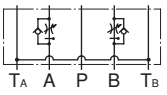
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Differential Pressure MPa	Max. Metered Flow L/min	Min. Metered Flow L/min	Max. Free Flow L/min
MST✻-03-X-20	25	25	70	2 (1)★	70

★The figures in parentheses are the values when the differential pressure is less than 3.5 MPa.

Model Number Designation

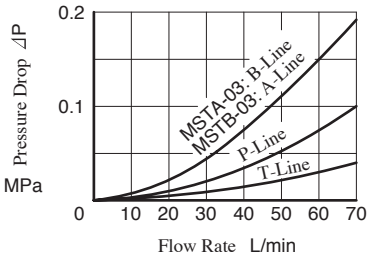
MSTA	–03	–X	–20
Series Number	Valve Size	Direction of Flow	Design Number
MSTA: for A-Line MSTB: for B-Line MSTW: for A&B-Lines } Temperature Compensated Throttle and Check Valve	**03**	**X:** Meter-out	**20**

Model Numbers	Graphic Symbols	Detailed Graphic Symbols
	Meter-out	
MSTA -03-X		
MSTB -03-X		
MSTW -03-X		

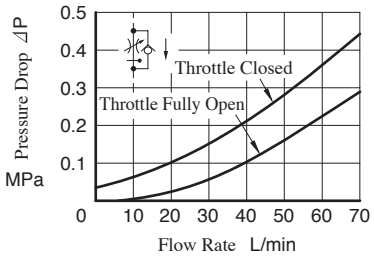
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

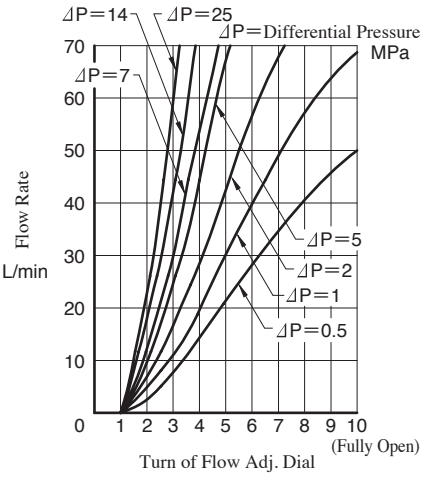
Pressure Drop



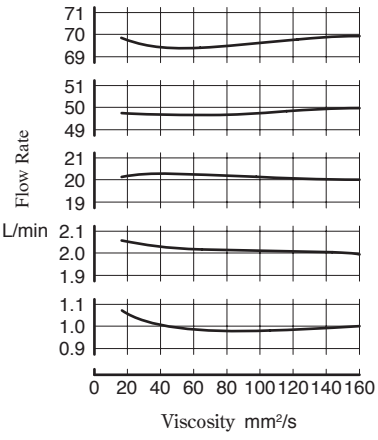
Pressure Drop for Free Flow



Metered Flow vs. Dial Position



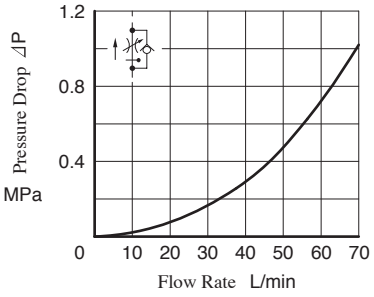
Metered Flow vs. Viscosity



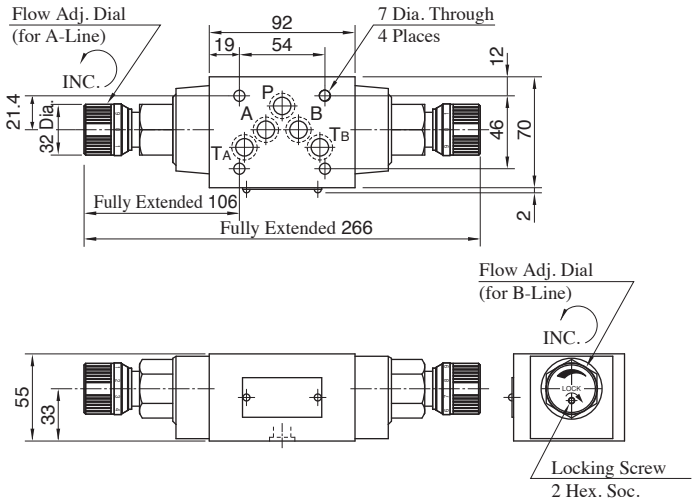
Instructions

●To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

Pressure Drop at Throttle Fully Open

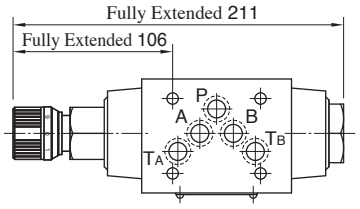


MSTW-03-X



Approx. Mass.....3.7 kg

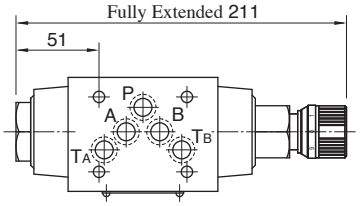
MSTA-03-X



Approx. Mass.....3.5 kg

For other dimensions, refer to "MSTW-03" in the drawing left.

MSTB-03-X

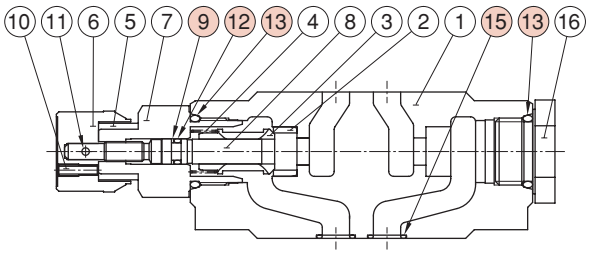


Approx. Mass.....3.5 kg

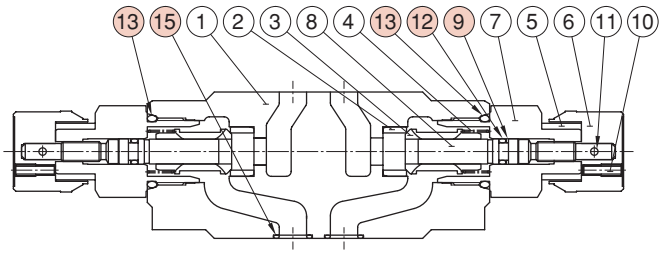
For other dimensions, refer to "MSTW-03" in the drawing left.

List of Seals

MSTA-03-X
MSTB-03-X
MSTW-03-X



MSTA-03-X

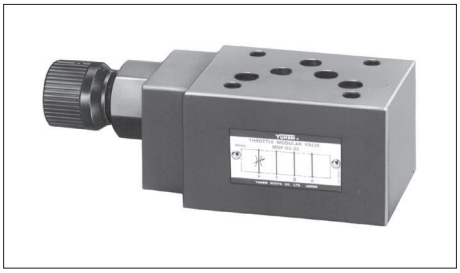


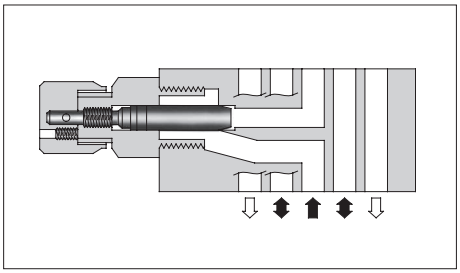
MSTW-03-X

●MSTB-03-X : The pressure adjustment part is built in the right side.

Item	Name of Parts	Part Numbers	Qty.		
			MSTA–03	MSTB–03	MSTW–03
9	Back-up Ring	900-VK411915-2	1	1	2
12	O-Ring	OR NBR-70-1 P7-N	1	1	2
13	O-Ring	OR NBR-90 P24-N	2	2	2
15	O-Ring	AS568-014 (NBR-90)	5	5	5

Throttle Modular Valves





Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MSP-03-30	25	70 ★

★Maximum flow decreases when the differential pressure is less than 1 MPa. See the "Pressure Drop at Throttle Fully Open" of this page.

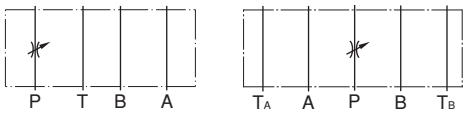
Model Number Designation

MSP	–03	–30
Series Number	Valve Size	Design Number
MSP: Throttle Valve for P-Line	**03**	**30**

Instructions

●To make flow adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

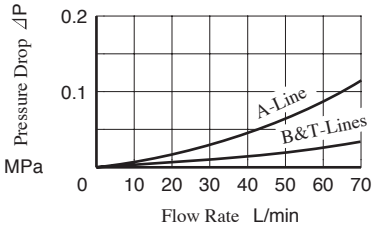
Graphic Symbols



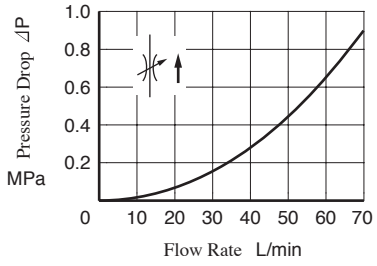
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

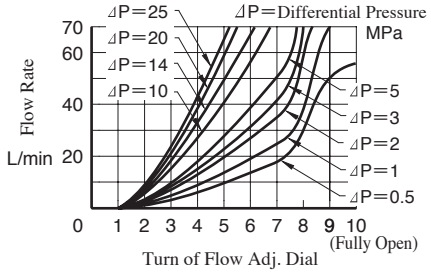
Pressure Drop



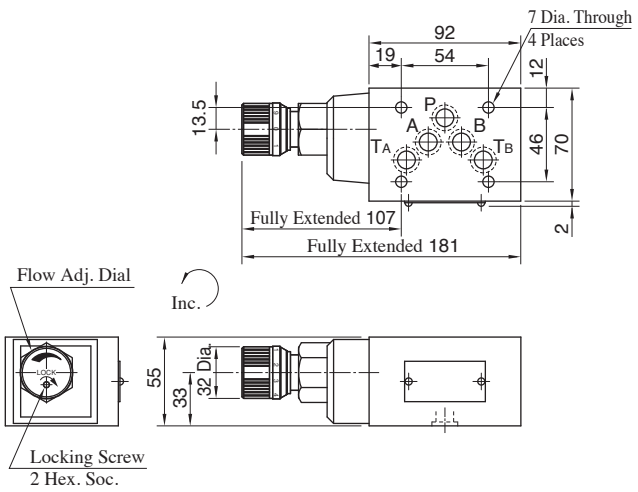
Pressure Drop at Throttle Fully Open



Metered Flow vs. Dial Position



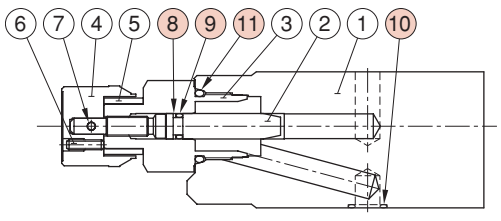
MSP-03



Approx. Mass.....3.0 kg

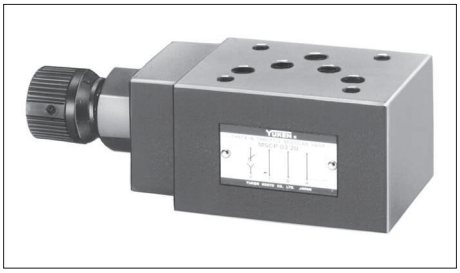
List of Seals

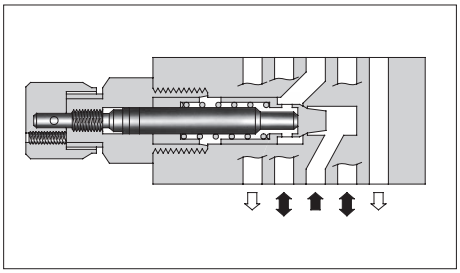
MSP-03



Item	Name of Parts	Part Numbers	Qty.
8	Back-up Ring	900-VK411915-2	1
9	O-Ring	OR NBR-70-1 P7-N	1
10	O-Ring	AS568-014 (NBR-90)	5
11	O-Ring	OR NBR-90 P24-N	1

Check and Throttle Modular Valves





Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MSCP–03–20	25	70 ★

★Maximum flow decreases when the differential pressure is less than 0.8 MPa. See the "Pressure Drop at Throttle Fully Open" of this page.

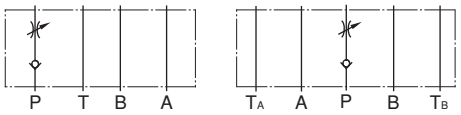
Model Number Designation

MSCP	–03	–20
Series Number	Valve Size	Design Number
MSCP: Check & Throttle Valve for P-Line	03	20

Instructions

●To make flow adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

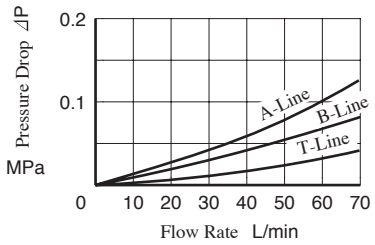
Graphic Symbols



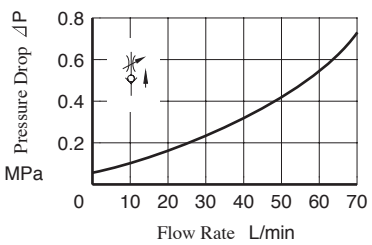
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

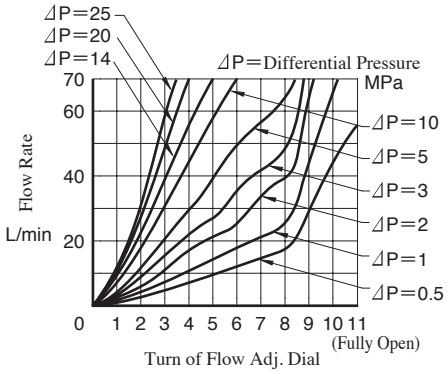
Pressure Drop



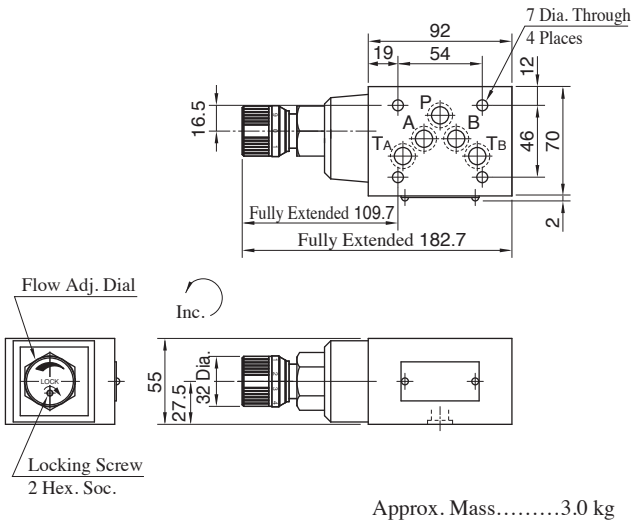
Pressure Drop at Throttle Fully Open



Metered Flow vs. Dial Position



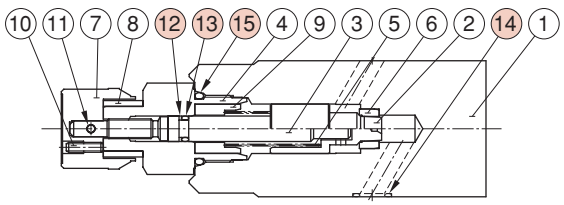
MSCP-03



Approx. Mass.....3.0 kg

List of Seals

MSCP-03



Item	Name of Parts	Part Numbers	Qty.
12	Back-up Ring	900-VK411915-2	1
13	O-Ring	OR NBR-70-1 P7-N	1
14	O-Ring	AS568-014 (NBR-90)	5
15	O-Ring	OR NBR-90 P24-N	1

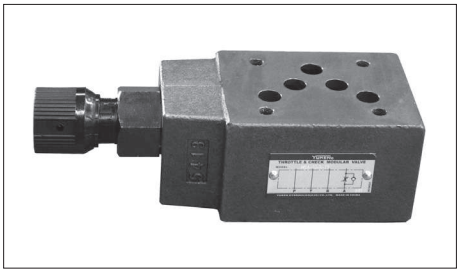
Throttle and Check Modular Valves

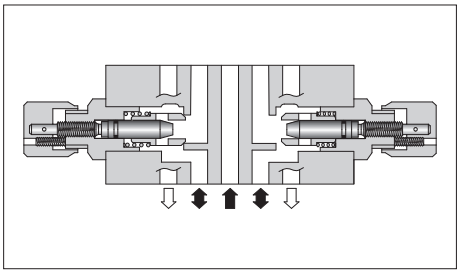
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS∗–03–∗–70	35	160

Model Number Designation

MSA	–03	–X	–70
Series Number	Valve Size	Directoin of Flow	Design Number
MSA:Throttle & Check Valve for A-Line MSB:Throttle & Check Valve for B-Line MSW:Throttle & Check Valve for A&B-Lines	**03**	**X:** Meter-out **Y:** Meter-in	**70**

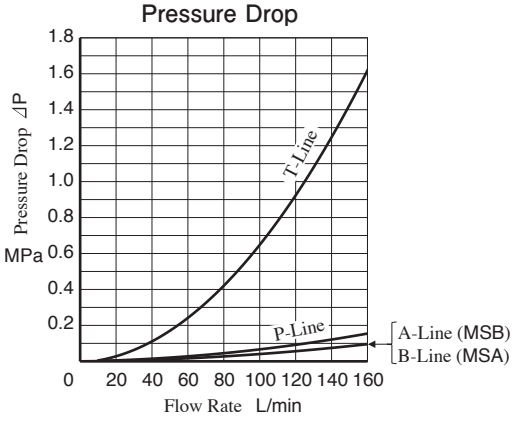




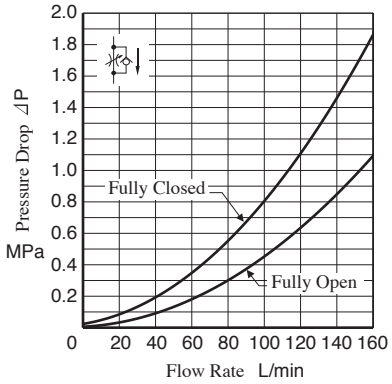
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

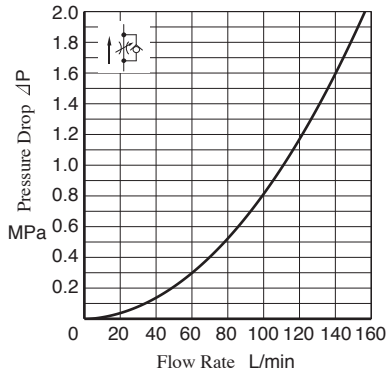
Pressure Drop

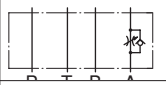
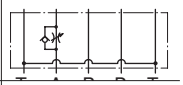
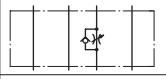
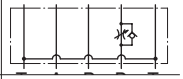
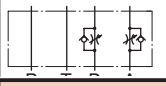
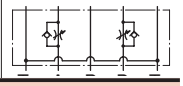


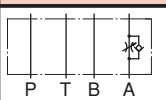
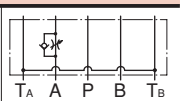
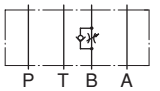
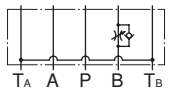
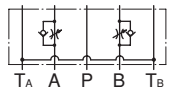
Pressure Drop for Free Drop



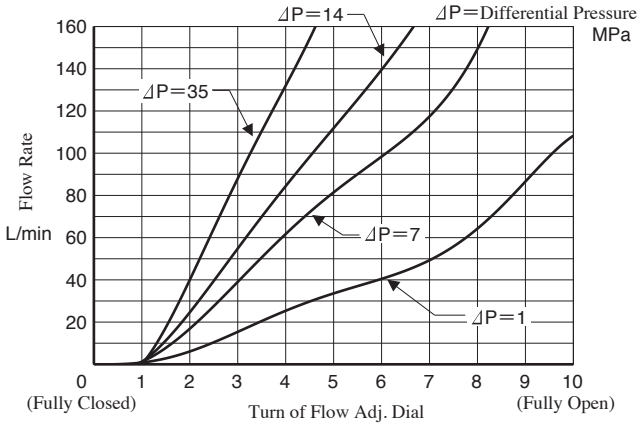
Pressure Drop at Throttle Fully Open



Model Numbers	Graphic Symbols	
MSA-03 -X		
MSB-03 -X		
MSW-03 -X		

Model Numbers	Graphic Symbols	
MSA-03 -Y		
MSB-03 -Y		
MSW-03 -Y		

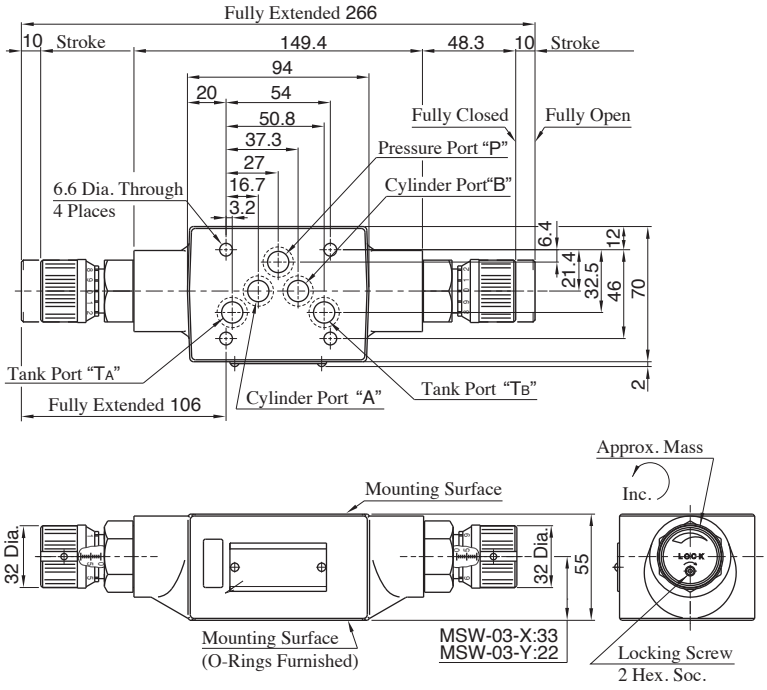
Metered Flow vs. Dial Position



Instructions

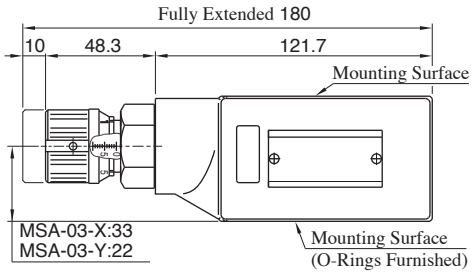
●To make flow adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

MSW-03-X/Y



Approx. Mass.....3.5 kg

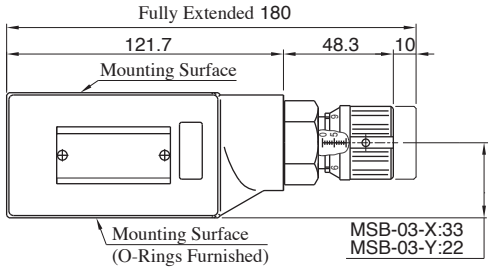
MSA-03-X/Y



Approx. Mass.....2.8 kg

For other dimensions, refer to "MSW-03"in the drawing left.

MSB-03-X/Y

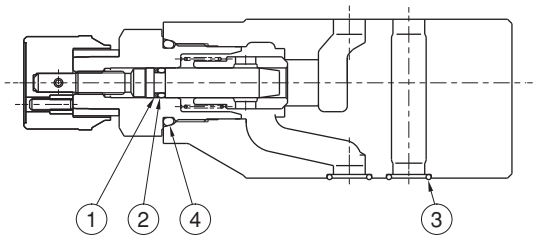


Approx. Mass.....2.8 kg

For other dimensions, refer to "MSW-03"in the drawing left.

List of Seals

MSA-03
MSB-03
MSW-03



MSA-03

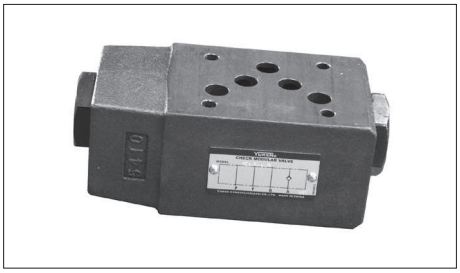
●MSB-03 : The flow adjustment part is built in the right side.
●MSW-03 : The flow adjustment part is built in the both left and right sides.

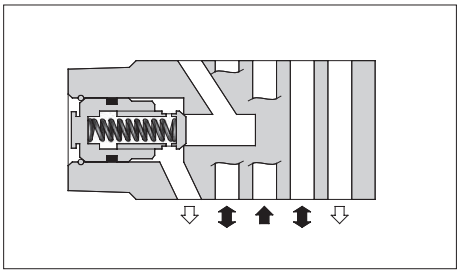
Item	Name of Parts	Part Numbers	Qty.		
			MSA-03	MSB-03	MSW-03
1	Back-up Ring	900-VK411915-2 (P7)	1	1	2
2	O-Ring	OR NBR-70-1 P7-N	1	1	2
3	O-Ring	AS568-014 (NBR-90)	5	5	5
4	O-Ring	OR NBR-90 P24-N	1	1	2

Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MCP–03–＊–70	35	120
MCA–03–＊–70		
MCB–03–＊–70		
MCW–03–＊–70		
MCT–03–＊–70		





Model Number Designation

MCP	–03	–0	–70
Series Number	Valve Size	Cracking Pressure MPa	Design Number
MCP:Check Valve for P-Line MCA:Check Valve for A-Line MCB:Check Valve for B-Line MCW:Check Valve for A&B-Lines MCT:Check Valve for T-Line	**03**	**0:** 0.035 **2:** 0.2 **4:** 0.4	**70**

Model Numbers	Graphic Symbols	
MCP-03	P T B A	T_A A P B T_B
MCA-03	P T B A	T_A A P B T_B
MCB-03	P T B A	T_A A P B T_B
MCW-03	P T B A	T_A A P B T_B
MCT-03	P T B A	T_A A P B T_B

Instructions

●Tank Line Used

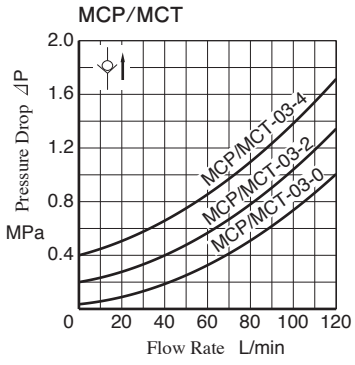
Check Valve function of MCT-03 is included in T_A-Line.
Therefore, the tank line for a circuit that used this valve must be T_A-Line.

Typical Performance Characteristics

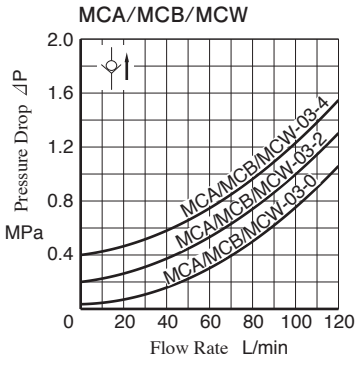
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop for Free Flow

MCP/MCT

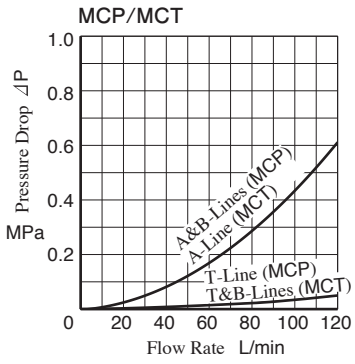


MCA/MCB/MCW

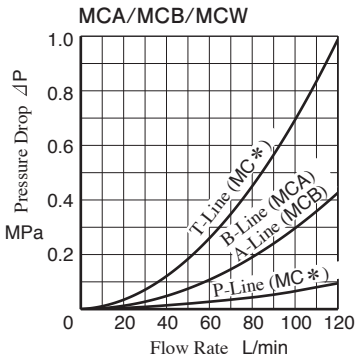


Pressure Drop

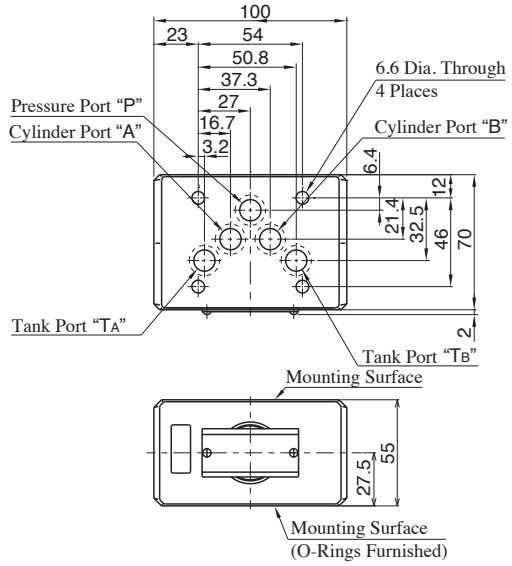
MCP/MCT



MCA/MCB/MCW

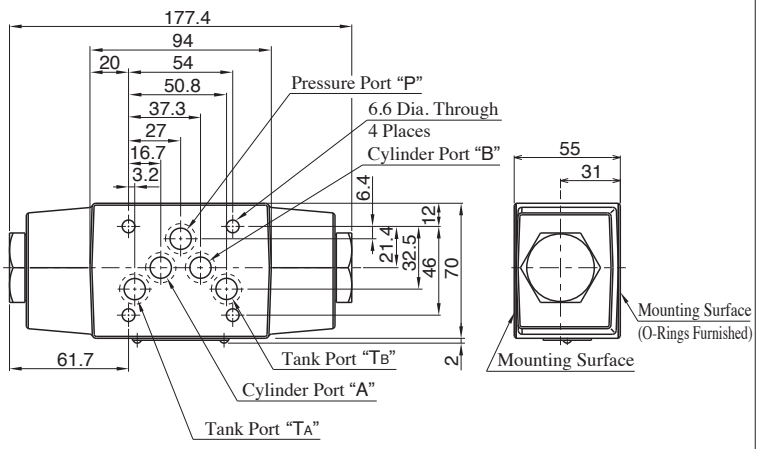


MCP-03



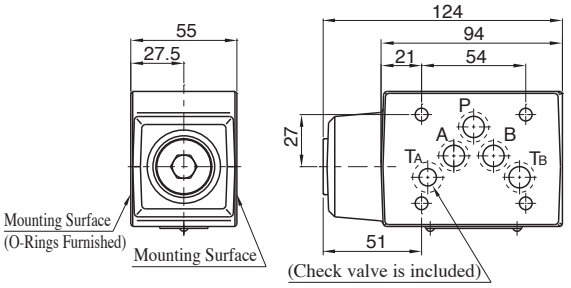
Approx. Mass.....2.6 kg

MCW-03



Approx. Mass.....3.7 kg

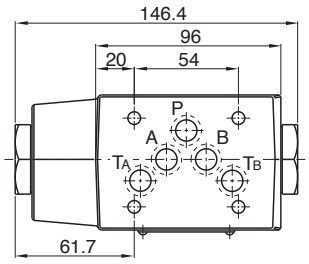
MCT-03



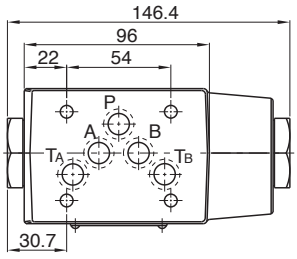
Approx. Mass.....3.0 kg

For other dimensions, refer to "MCW-03" in the drawing above.

MCA-03



MCB-03

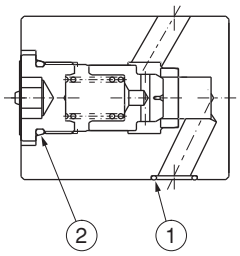


Approx. Mass.....3.0 kg

For other dimensions, refer to "MCW-03" in the drawing above.

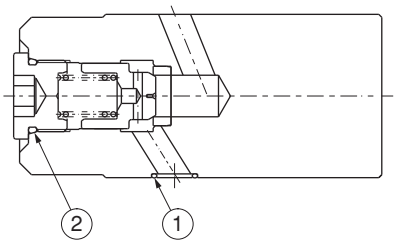
List of Seals

MCP-03



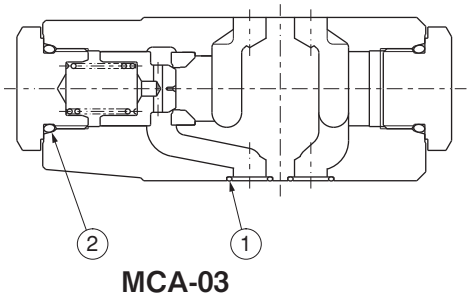
Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-90 P21-N	1

MCT-03



Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-90 P21-N	1

MCA-03 MCB-03 MCW-03

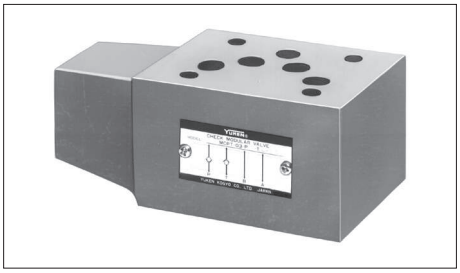


MCA-03

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-90 P24-N	2

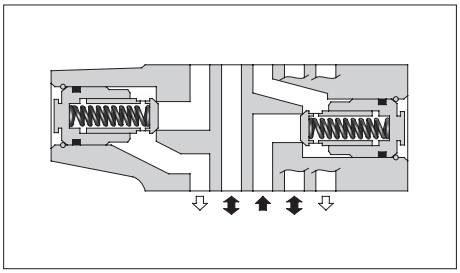
- MCB-03: Check valve is assembled on the right side.
- MCW-03: Check valve is assembled on the both sides.

Check Modular Valves For "P&T" Lines



Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MCPT–03–P∗–T∗–10	25	70



Model Number Designation

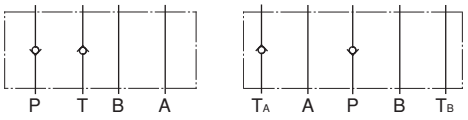
MCPT	–03	–P0	–T0	–10
Series Number	Valve Size	Cracking Pressure of P-Line MPa	Cracking Pressure of T-Line MPa	Design Number
MCPT: Check Valve for P&T-Lines	**03**	**P0:** 0.035 **P2:** 0.2	**P0:** 0.035 **P2:** 0.2	**10**

Instructions

●Tank Line Used

Check Valve function of Tank Line is included in TA-Line.
Therefore, the tank line for a circuit that used this valve must be TA-Line.

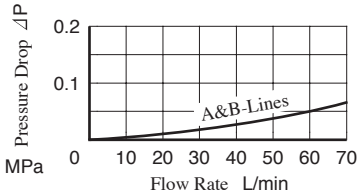
Graphic Symbols



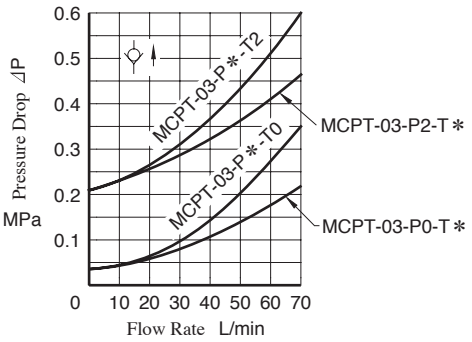
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

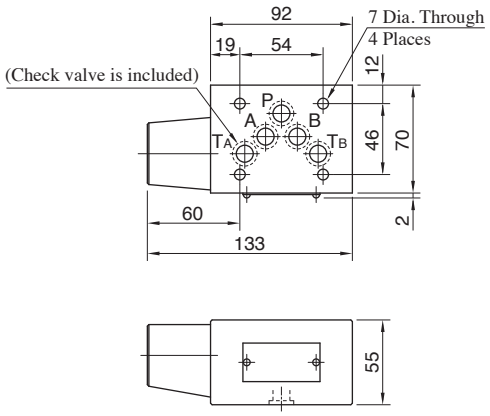
Pressure Drop



Pressure Drop for Free Flow



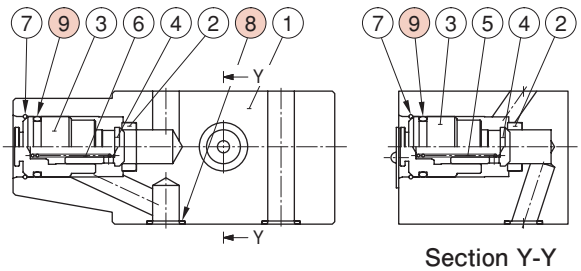
MCPT-03



Approx. Mass.....2.7 kg

List of Seals

MCPT-03



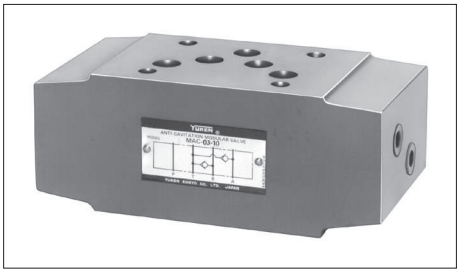
Section Y-Y

Item	Name of Parts	Part Numbers	Qty.
8	O-Ring	AS568-014 (NBR-90)	5
9	O-Ring	OR NBR-90 P21-N	2

Anti-Cavitation Modular Valves

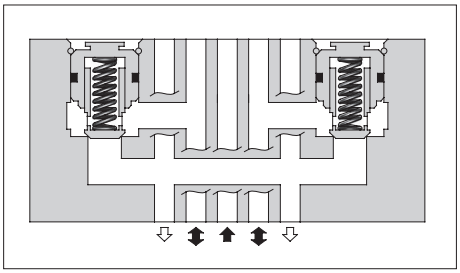
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MAC–03–10	25	70



Model Number Designation

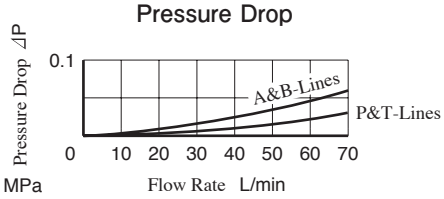
MAC	–03	–10
Series Number	Valve Size	Design Number
MAC: Anti-Cavitation Valve	**03**	**10**



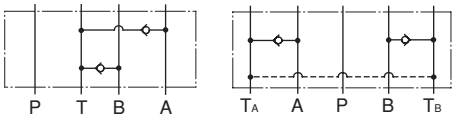
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

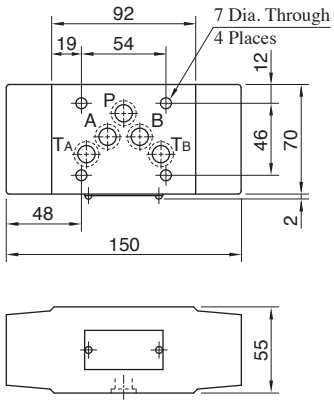
Pressure Drop



Graphic Symbols



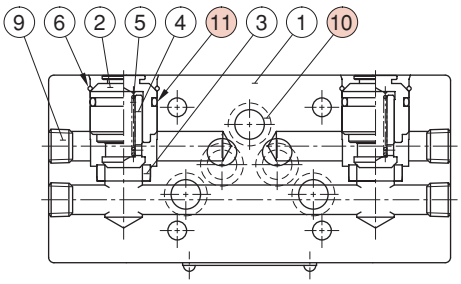
MAC-03



Approx. Mass.....3.8 kg

List of Seals

MAC-03

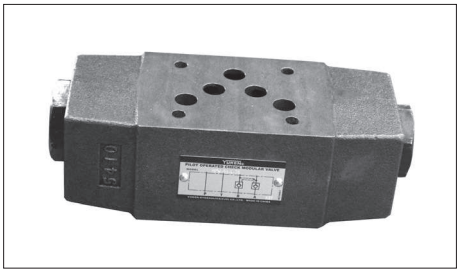


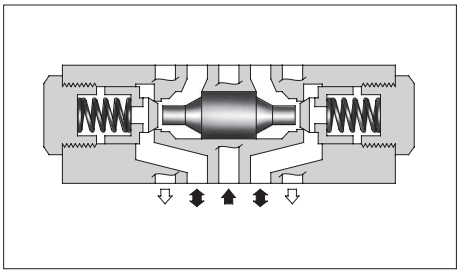
Item	Name of Parts	Part Numbers	Qty.
10	O-Ring	AS568-014 (NBR-90)	5
11	O-Ring	OR NBR-90 P21-N	2

Pilot Operated Check Modular Valves

Specifications

Model Numbers		Max. Operating Pressure MPa	Max. Flow L/min
Standard	MP∗-03-∗-70	35	120
Low Pilot Pressure Control Type	MP∗-03-∗-L-70		





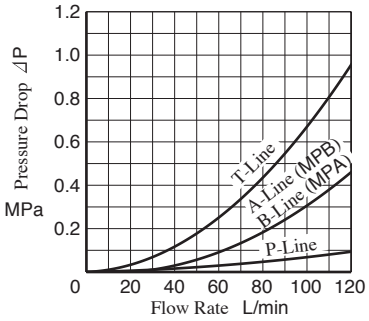
Model Number Designation

MPA	–03	–2	–L	–70
Series Number	Valve Size	Cracking Pressure MPa	Pilot Pressure Control Type	Design Number
MPA: Pilot Operated Check Valve for A-Line MPB: Pilot Operated Check Valve for B-Line MPW: Pilot Operated Check Valve for A&B-Lines	**03**	**0:** 0.035 **2:** 0.2 **4:** 0.4	None: Standard L: Low Pilot Pressure Control Type	**70**

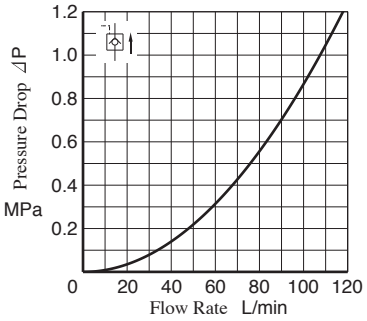
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

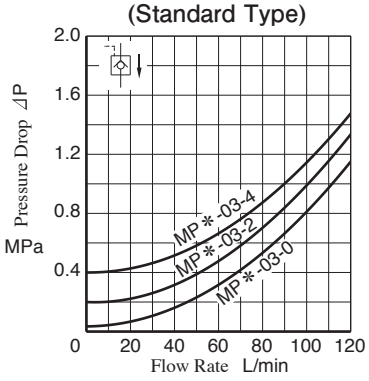
Pressure Drop



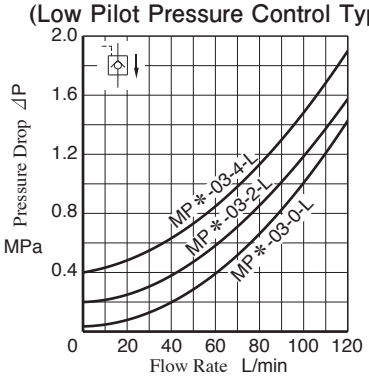
Pressure Drop for Reversed Controlled Flow



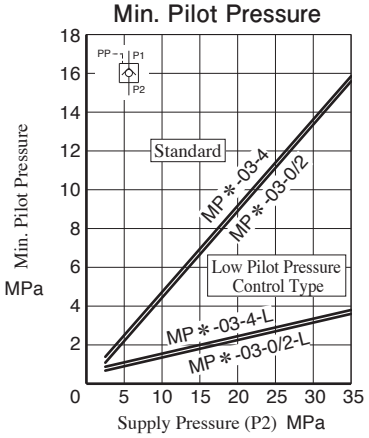
Pressure Drop for Free Flow (Standard Type)

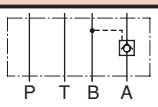
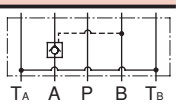
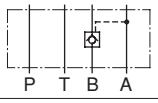
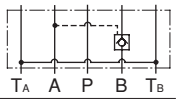
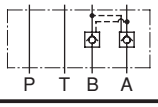
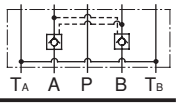


Pressure Drop for Free Flow (Low Pilot Pressure Control Type)

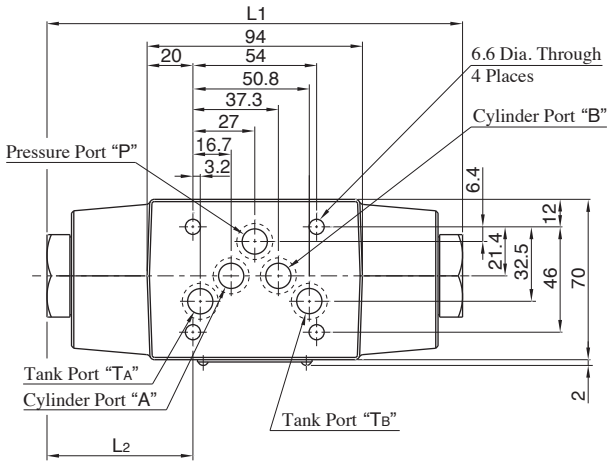


Min. Pilot Pressure

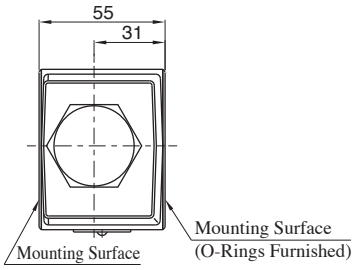


Model Numbers	Graphic Symbols	
MPA-03		
MPB-03		
MPW-03		

MPW-03

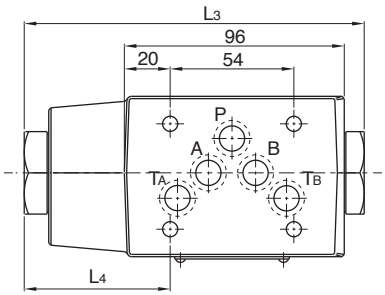


Model Numbers	L1	L2
MPW-03-*	177.4	61.7
MPW-03-*-L	181.4	63.7



Approx. Mass.....3.7 kg

MPA-03

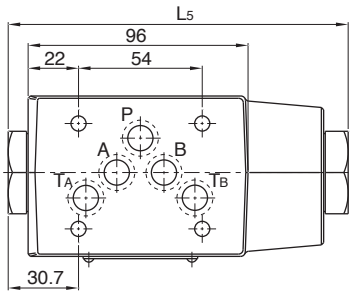


Model Numbers	L3	L4
MPA-03-*	146.4	61.7
MPA-03-*-L	148.4	63.7

Approx. Mass.....3.0 kg

For other dimensions, refer to "MPW-03" in the drawing above.

MPB-03



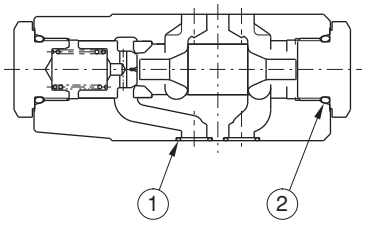
Model Numbers	L5
MPB-03-*	146.4
MPB-03-*-L	148.4

Approx. Mass.....3.0 kg

For other dimensions, refer to "MPW-03" in the drawing above.

List of Seals

MPA-03
MPB-03
MPW-03



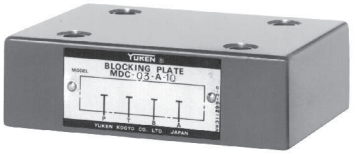
MPA-03

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-90 P24-N	2

- MPB-03: Check valve is assembled on the right side.
- MPW-03: Check valve is assembled on the both left and right side.

End Plates

Blocking plates are used for auxiliary mounting surface or for closing unnecessary circuits. Bypass plates are used for unidirectional circuits that require no solenoid operated directional valves.



Specifications

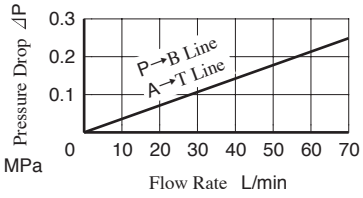
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MDC–03–∗–10	25	70

Model Number Designation

MDC	–03	–A	–10
Series Number	Valve Size	Type of Plate	Design Number
MDC: End Pate	03	A: Blocking Plate B: Bypass Plate	10

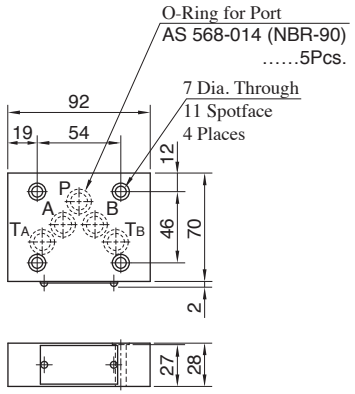
Pressure Drop

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Model Numbers	Graphic Symbols	
MDC-03 -A	P T B A	T_A A P B T_B
MDC-03 -B	P T B A	T_A A P B T_B

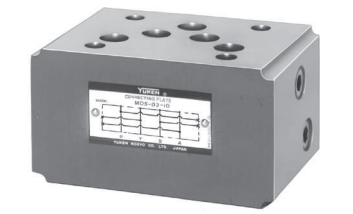
MDC-03



Approx. Mass.....1.2 kg

Connecting Plates

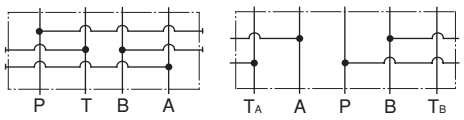
These plates are used for detecting pressure of each line.



Model Number Designation

MDS	–03	–10
Series Number	Valve Size	Design Number
MDS: Connecting Plate	03	10

Graphic Symbols

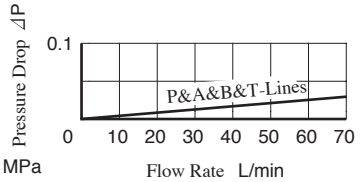


Specifications

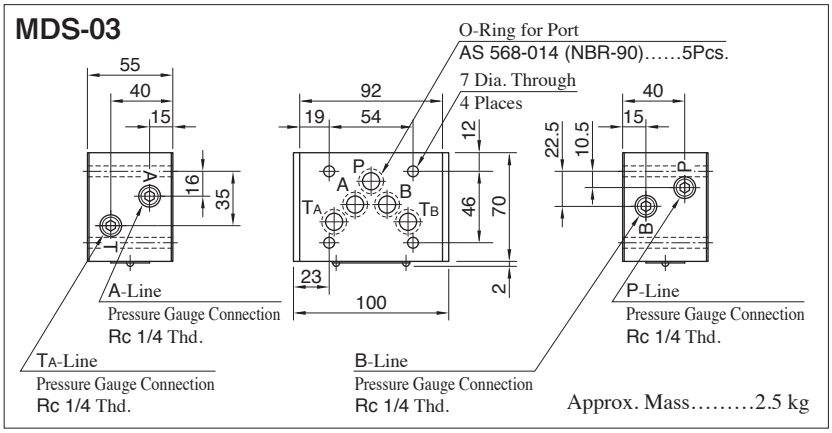
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MDS–03–10	25	70

Pressure Drop

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



MDS-03

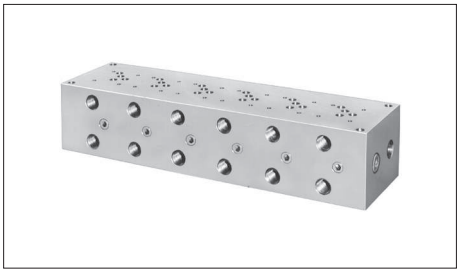


Approx. Mass.....2.5 kg

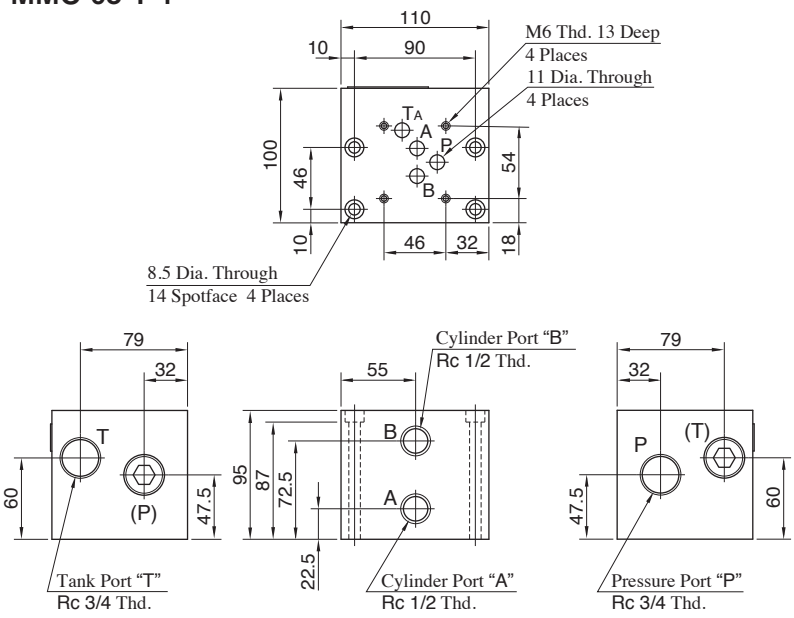
Base Plates For Modular Valves

Model Number Designation

MMC	–03	–T	–6	–21
Series Number	Plate Size	Type of Connection	Number of Stations	Design Number
MMC: Base Plate	**03**	**T:** Threaded Connection	**1:** 1 Station **5:** 5 Stations **2:** 2 Stations **6:** 6 Stations **3:** 3 Stations **7:** 7 Stations **4:** 4 Stations	**21**



MMC-03-T-1

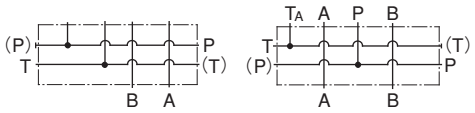


Approx. Mass.....8.5 kg

Specifications

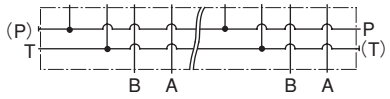
Max. Operating Pressure.....25 MPa

Graphic Symbol Detailed Graphic Symbol



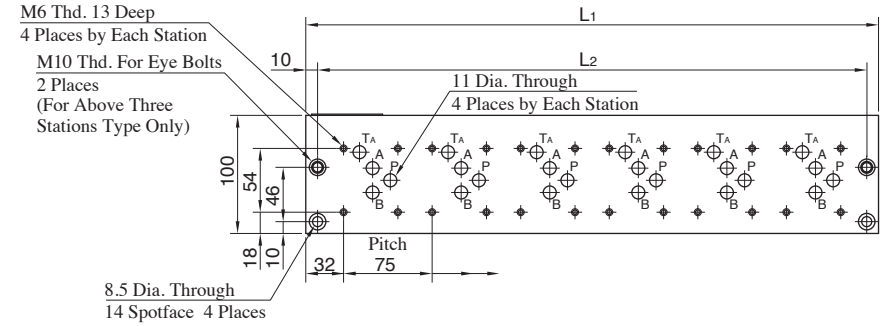
MMC-03-T-1

Graphic Symbol

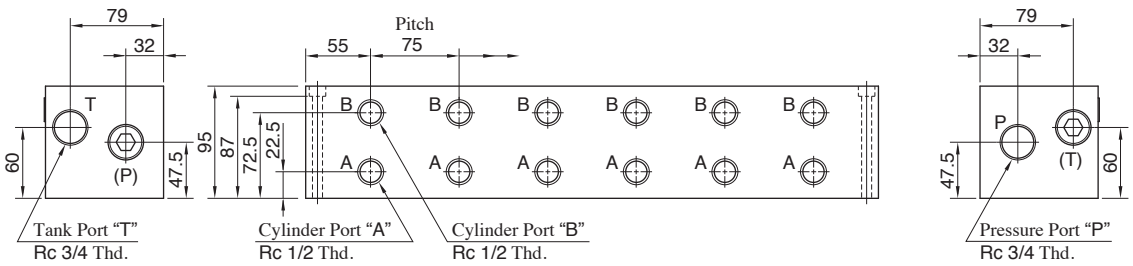


MMC-03-T-2–7

MMC-03-T-2–7

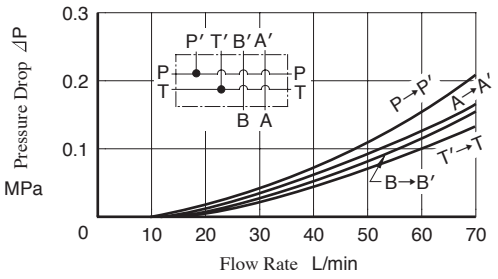


Model Numbers	L1	L2	Mass kg
MMC–03–T–2	185	165	14
MMC–03–T–3	260	240	19.5
MMC–03–T–4	335	315	25
MMC–03–T–5	410	390	30.5
MMC–03–T–6	485	465	36
MMC–03–T–7	560	540	41



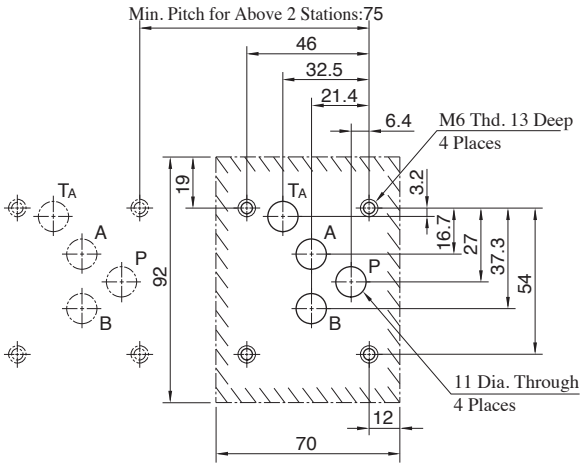
Pressure Drop

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Mounting Surface Dimensions for 03 Series Modular Valve

When the standard base plate (MMC-03) is not used, the following mounting surface must be prepared. Also, the mounting surface must have a good machined finish. (1.6)



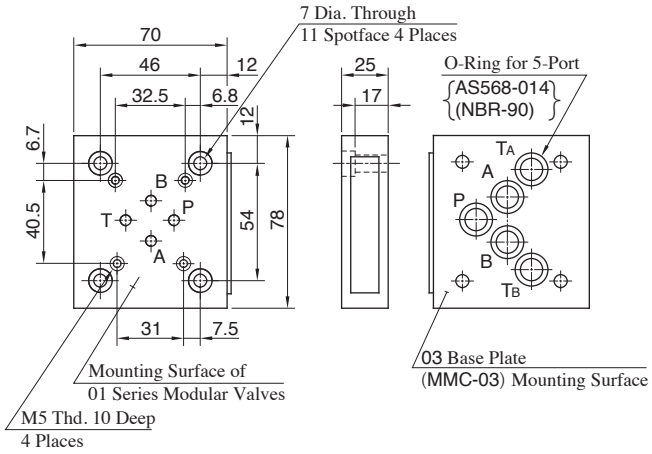
Instructions

- Although two ports are provided for both pressure port "P" and tank port "T", either may be used.
  However, the ports having (P) or (T) in the drawing are normally plugged. Remove the plugs of the ports when they are used. Make sure that the ports that are not currently used are properly plugged.

Spacer Kits

If 01 Series Modular Valves stacking on the 03 Base Plates, use this spacer.
If use, order by the model number below.
Model Numbers: DSGM-03-4010
Approx. Mass: 1kg
Accessories: Mounting Bolt 4 Pcs. : M6×25L
O-Ring 5 Pcs. : AS568-014 (NBR-90)

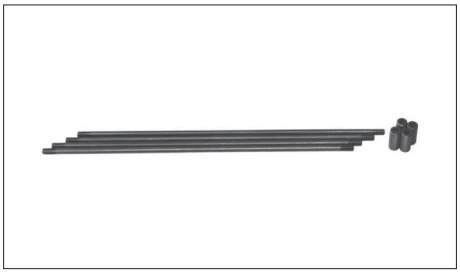
DSGM-03-4010



Note:
In the spacer above, 01 side “A” ⇔ 03 side “B”, 01 side “B” ⇔ 03 side “A” are connected.

Mounting Bolt Kits For Modular Valves

Valves are mounted with four M6 stud bolts. Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis.
When ordering the mounting bolt kit, be sure to give the bolt kit model number from the table below.



Model Number Designation

MBK	–03	–04	–10
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK: Mounting Bolt Kits for Modular Valve	**03**	**01, 02, 03, 04, 05** (Refer to the following chart)	**10**

Bolt Kit Composition

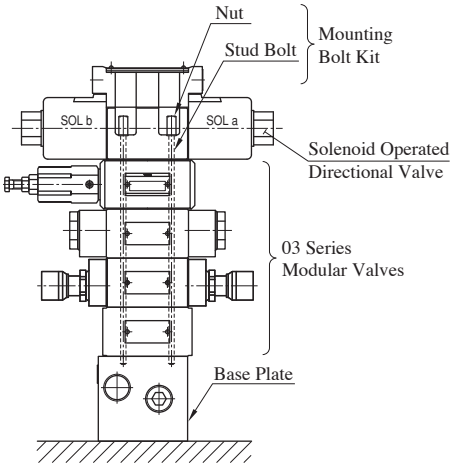
Stud Bolt ..... 4 Pcs.
Nut ..... 4 Pcs. } 1 Set

Note: In case of bolt kit model number having "05", four hexagon socket head cap screws only.

Tightening Torque..... 12-15 Nm

Bolt Kits Selection Chart

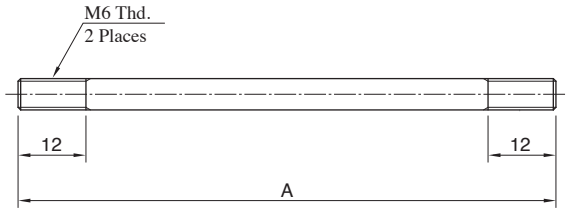
Model Numbers	Quantity of valves to be stacked			Approx. Mass (1 Set) g
	Solenoid Operated Directional Valve (＊–DSG–03)	End Plate (MDC–03)	Modular Valve or Connecting Plate (M＊＊–03)	
MBK–03–01–10	1	0	1	120
	0	1		
MBK–03–02–10	1	0	2	160
	0	1		
MBK–03–03–10	1	0	3	200
	0	1		
MBK–03–04–10	1	0	4	240
	0	1		
MBK–03–05–10	1	0	0	40
	0	1		



Stacking Example

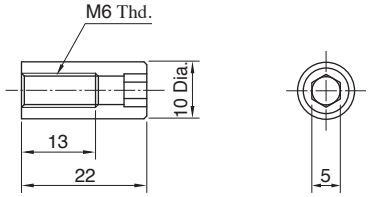
MBK-03

Stud Bolt



Bolt Number	A mm
01	103
02	158
03	213
04	268
05	Socket Head Cap Screw M6×35 L

Nut



Interchangeability in Installation between Current and New Design

The following models of 03 Series Modular Valves have changed to 70 design numbers model to operate higher pressure and modification for large flow use.

Name	Model Numbers
Relief Modular Valves	MB＊-03-＊-70
Reducing Modular Valves	MR＊-03-＊-70
Throttle and Check Modular Valves	MS＊-03-＊-70
Check Modular Valves	MC＊-03-＊-70
Pilot Operated Check Modular Valves	MP＊-03-＊-＊-70

Major Changes

(1) Max. Operating Pressure (35MPa) & Max. Flow have substantially increased respectively.
(2) Selectable low pilot operation type as standard model for Pilot Operated Check Modular Valves.

Mounting Interchangeability

Yes
Mounting surface is not changed from current models.

Specifications

Max. Operating Pressure

Name	Current		New	
	Model Numbers	Max. Operating Pressure MPa	Model Numbers	Max. Operating Pressure MPa
Relief Modular Valves	MB＊-03-＊-30	31.5	MB＊-03-＊-70	35
Reducing Modular Valves	MR＊-03-＊-30	25	MR＊-03-＊-70	
Throttle and Check Modular Valves	MS＊-03-＊-40		MS＊-03-＊-70	
Check Modular Valves	MCP/MCT-03-＊-10 MCA/MCB/MCW-03-＊-20		MC＊-03-＊-70	
Pilot Operated Check Modular Valves	MP＊-03-＊-20		MP＊-03-＊-70	
	MP＊-03-＊-2001		MP＊-03-＊-L-70	

Max. Flow

Name	Current		New	
	Model Numbers	Max. Flow L/min	Model Numbers	Max. Flow L/min
Relief Modular Valves	MB＊-03-＊-30	70	MB＊-03-＊-70	120
Reducing Modular Valves	MR＊-03-＊-30	70	MR＊-03-A-70	80
			MR＊-03-B/C/H-70	120
Throttle and Check Modular Valves	MS＊-03-＊-40	120	MS＊-03-＊-70	160
Check Modular Valves	MCP/MCT-03-＊-10 MCA/MCB/MCW-03-＊-20	70	MC＊-03-＊-70	120
Pilot Operated Check Modular Valves	MP＊-03-＊-20		MP＊-03-＊-70	
	MP＊-03-＊-2001		MP＊-03-＊-L-70	

Model Number Designation

Function Addition

Name	Model Numbers	Additional Functions
Pilot Operated Check Modular Valves	MP✻-03-✻-L-70	Low pilot operation type, selectable as standard product

Pressure Adjustment Range

Name	Current		New	
	Model Numbers	Pres. Adj. Range MPa	Model Numbers	Pres. Adj. Range MPa
Relief Modular Valves	MB✻-03-✻-30	**B:** ★-7 **H:** 3.5-31.5	MB✻-03-✻-70	**B:** ★-7 **C:** 3.5-14 **K:** 7-35
Reducing Modular Valves	MR✻-03-✻-30	**B:** 1-7 **H:** 3.5-24.5	MR✻-03-✻-70	**A:** ★-3.5 **B:** 1-7 **C:** 3.5-14 **H:** 7-31.5

Cracking Pressure

Name	Current		New	
	Model Numbers	Cracking Pressure MPa	Model Numbers	Cracking Pressure MPa
Check Modular Valves	MCP/MCT-03-✻-10 MCA/MCB/MCW-03-✻-20	**0:** 0.035 **2:** 0.2	MC✻-03-✻-70	**0:** 0.035 **2:** 0.2 **2:** 0.4
Pilot Operated Check Modular Valves	MP✻-03-✻-20	**2:** 0.2 **2:** 0.4	MP✻-03-✻-70	**0:** 0.035 **2:** 0.2 **4:** 0.4
	MP✻-03-✻-2001		MP✻-03-✻-L-70	

Typical Performance Characteristics

Characteristics of all models have been changed.

Approx. Mass

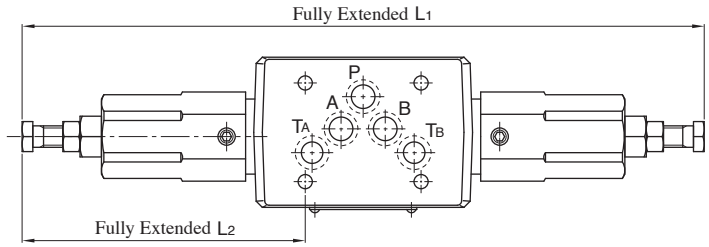
Name	Current		New	
	Model Numbers	Approx. Mass kg	Model Numbers	Approx. Mass kg
Relief Modular Valves	MBP/MBA/MBB-03-✻-30	3.1	MBP/MBA/MBB-03-✻-70	3.4
	MBW-03-✻-30	3.8	MBW-03-✻-70	4.0
Reducing Modular Valves	MR✻-03-✻-30	3.3	MR✻-03-✻-70	3.8
Throttle and Check Modular Valves	MSA/MSB-03-✻-40	3.5	MSA/MSB-03-✻-70	2.8
	MSW-03-✻-40	3.7	MSW-03-✻-70	3.5
Check Modular Valves	MCP-03-✻-10	2.5	MCP-03-✻-70	2.6
	MCA/MCB-03-✻-20	3.5	MCA/MCB-03-✻-70	3.0
	MCW-03-✻-20	3.5	MCW-03-✻-70	3.7
	MCT-03-✻-10	2.8	MCT-03-✻-70	3.0
Pilot Operated Check Modular Valves	MPA/MPB-03-✻-20	3.5	MPA/MPB-03-✻-✻-70	3.0
	MPW-03-✻-2001	3.5	MPW-03-✻-✻-70	3.7

●Dimensions

As of fully extended dimensions, height (55mm) and depth (70mm) are same between current and new models. Width is same except for the models below.

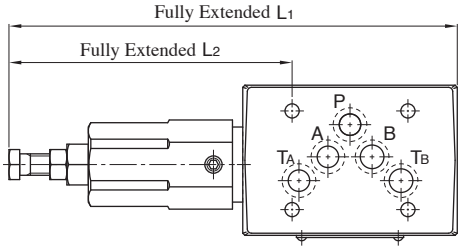
(1) Relief Modular Valves

MBW-03

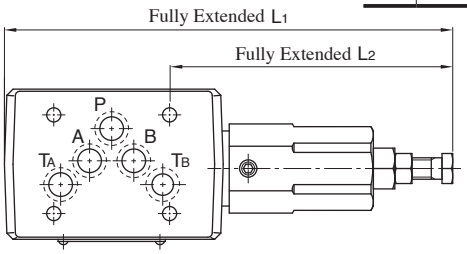


Model Numbers		L1	L2
Current	MBP-03-＊-30	214	134
	MBA-03-＊-30	214	134
	MBB-03-＊-30	214	—
	MBW-03-＊-30	320	133
New	MBP-03-＊-70	209	132
	MBA-03-＊-70	207	132
	MBB-03-＊-70	207	—
	MBW-03-＊-70	318	132

MBP/MBA-03

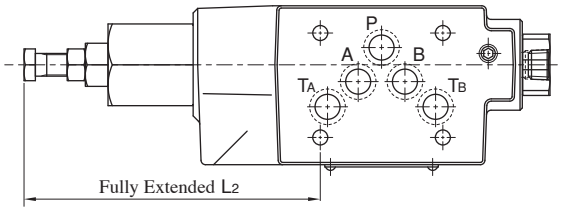


MBB-03

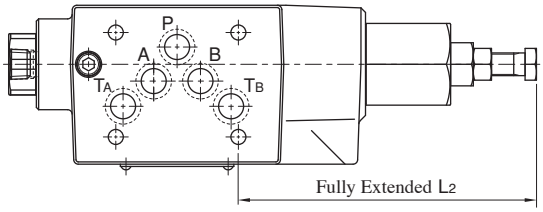


(2) Reducing Modular Valves

MRP/MRB-03



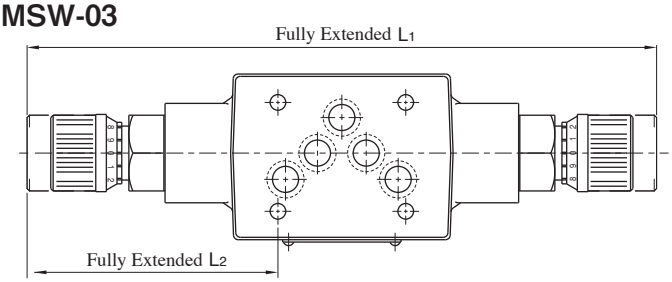
MRA-03



Model Numbers		L2
Current	MR＊-03-＊-30	131
New	MR＊-03-＊-70	131.3

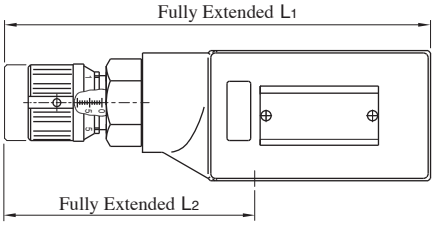
(3) Throttle and Check Modular Valves

MSW-03

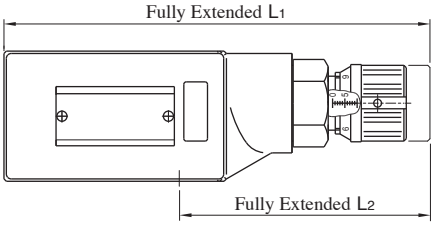


Model Numbers		L1	L2
Current	MSA-03-＊-40	193.5	91.5
	MSB-03-＊-40	193.5	
	MSW-03-＊-40	237	
New	MSA-03-＊-70	180	106
	MSB-03-＊-70	180	
	MSW-03-＊-70	266	

MSA-03

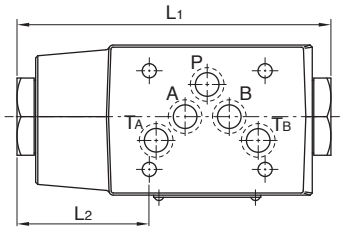


MSB-03

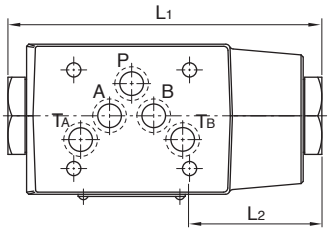


(4) Check Modular Valves

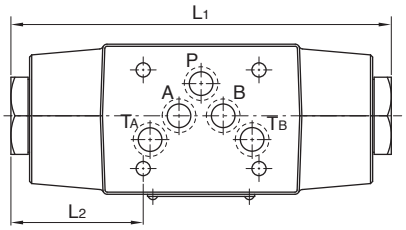
MCA-03



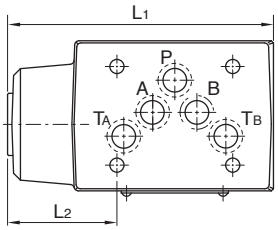
MCB-03



MCW-03



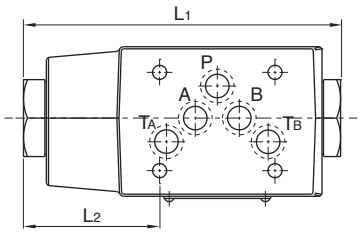
MCT-03



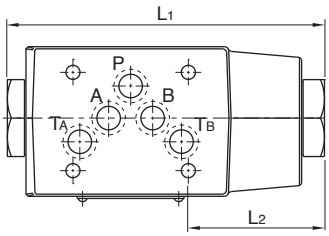
	Model Numbers	L1	L2
Current	MCA/MCB-03-＊-20	174	60
	MCW-03-＊-20	174	60
	MCT-03-＊-10	117	44
New	MCA/MCB-03-＊-70	146.4	61.7
	MCW-03-＊-70	177.4	61.7
	MCT-03-＊-70	124	51

(5) Pilot Operated Check Modular Valves

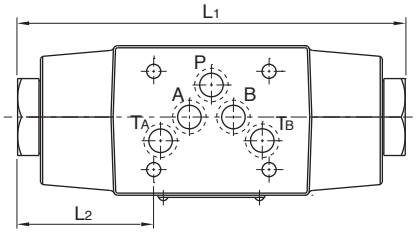
MPA-03-＊
MPA-03-＊-L



MPB-03-＊
MPB-03-＊-L



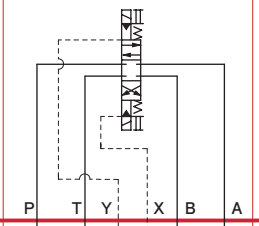
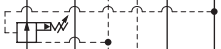
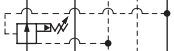
MPW-03-＊
MPW-03-＊-L

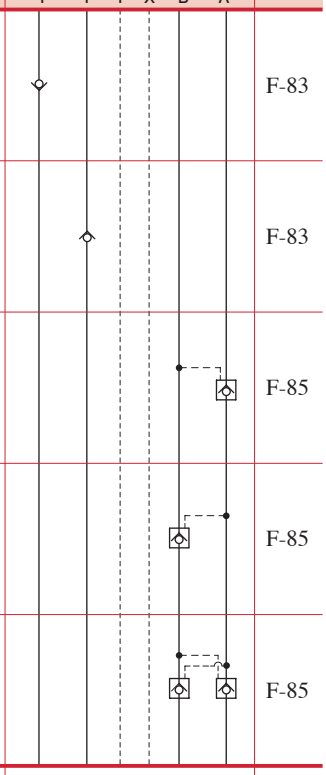


	Model Numbers	L1	L2
Current	MPA/MPB-03-＊-20	174	60
	MPW-03-＊-20	174	60
	MPA/MPB-03-＊-2001	178	62
	MPW-03-＊-2001	178	62
New	MPA/MPB-03-＊-70	146.4	61.7
	MPW-03-＊-70	177.4	61.7
	MPA/MPB-03-＊-L-70	148.4	63.7
	MPW-03-＊-L-70	181.4	63.7

04 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page
	Solenoid Operated Directional Valve (S-) DSHG-04-＊＊＊-＊-52		★
Pressure Control Valves	Reducing Valves (for "P-Line") MRP-04-＊-10		F-79
	Reducing Valves (for "A-Line") MRA-04-＊-10		F-79
	Reducing Valves (for "B-Line") MRB-04-＊-10		F-79
Flow Control Valves	Throttle and Check Valves (for "A-Line", Meter-out) MSA-04-X-10		F-81
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-04-Y-10		F-81
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-04-X-10		F-81
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-04-Y-10		F-81
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-04-X-10		F-81
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-04-Y-10		F-81

Class	Name and Model Numbers	Graphic Symbols	Page
Directional Control Valves	Check Valves (for "P-Line") MCP-04-＊-10		F-83
	Check Valves (for "T-Line") MCT-04-＊-10		F-83
	Pilot Operated Check Valves (for "A-Line") MPA-04-＊-10		F-85
	Pilot Operated Check Valves (for "B-Line") MPB-04-＊-10		F-85
	Pilot Operated Check Valves (for "A&B-Lines") MPW-04-＊-10		F-85
Mounting Bolts	Bolt Kits MBK-04-＊-10		F-86

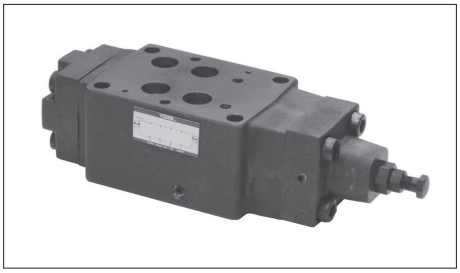
★Refer to the relevant pages of catalog “E: DIRECTIONAL CONTROLS”

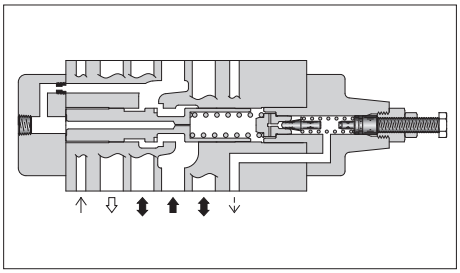
Reducing Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow ★ L/min
MR＊-04-A-10	35	100
MR＊-04-C-10 B H		300

★In case of pressure adjustment range "A" "B", the maximum flow is limited by the pressure in the secondary side.
Use in the range of refer to "Secondary Side Pressure - Max. Flow Characteristics " below.

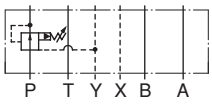




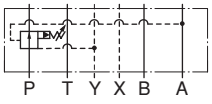
Model Number Designation

MRP	–04	–A	–10
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MRP: for P-Line MRA: for A-Line MRB: for B-Line } Reducing Modular Valves	**04**	**A:** 0.7-7 **B:** 1.5-7 **C:** 3.5-14 **H:** 7-25	**10**

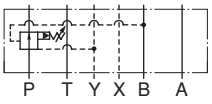
Graphic Symbols



MRP-04



MRA-04



MRB-04

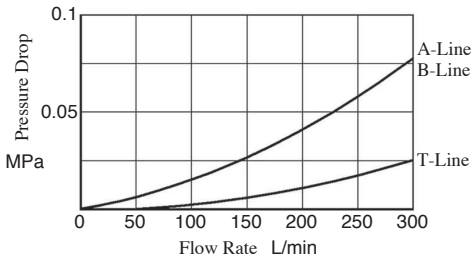
Instructions

- The drain line (Y-port) must be connected to tank directly to keep setting pressure stable. If use solenoid controlled pilot operated directional valves with these modular valves, please select the internal drain type (T-line).
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

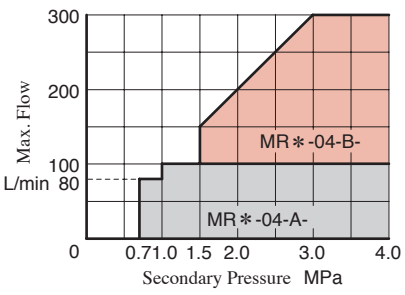
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop

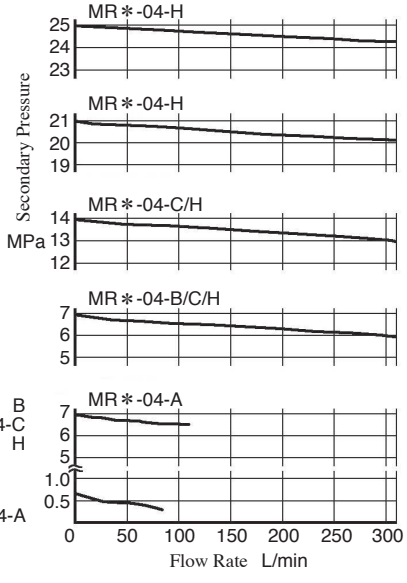


Secondary Pressure vs. Max. Flow

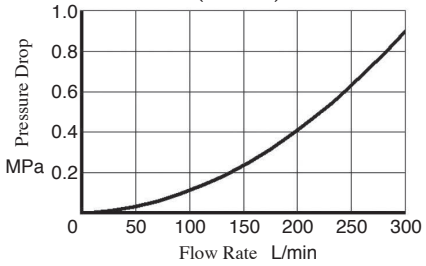


Nominal Override Characteristics

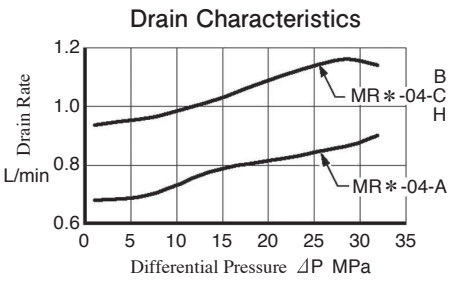
Primary Pressure 35 MPa



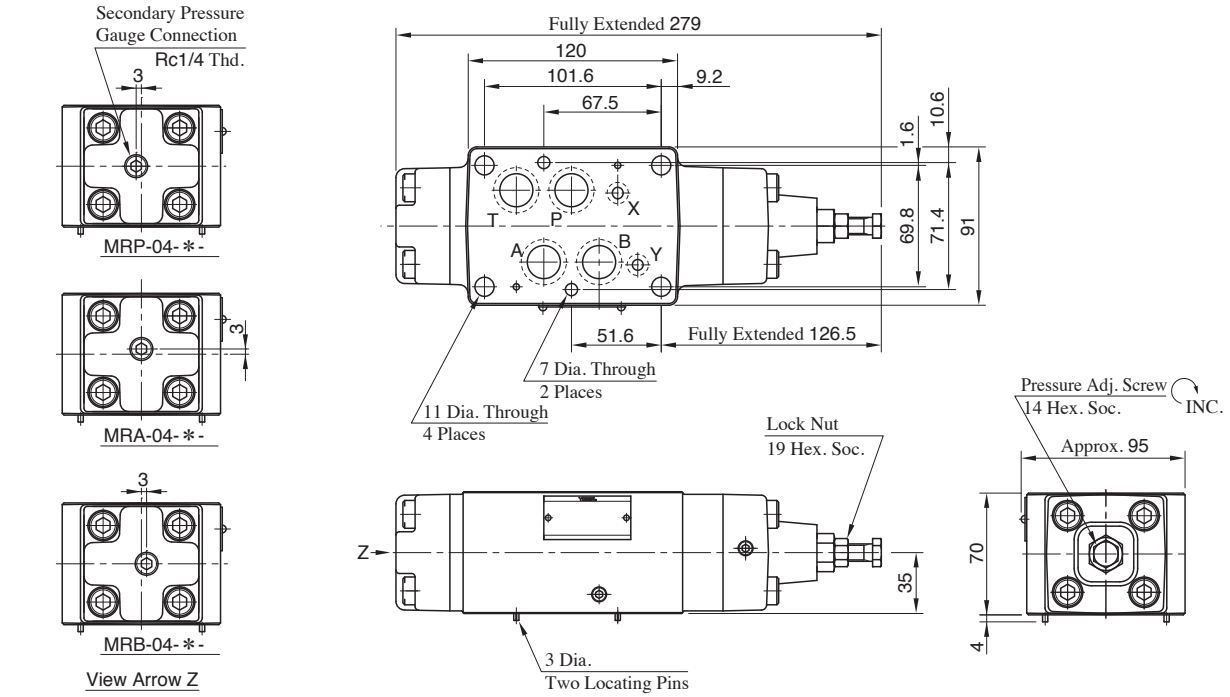
Pres. Drop at Spool Fully Open (P-Line)



Drain Characteristics



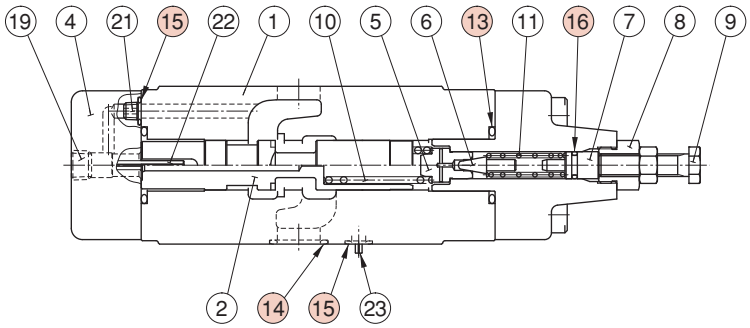
MRP-04
MRA-04
MRB-04



Approx. Mass·····7.4 kg

List of Seals

MRP-04
MRA-04
MRB-04

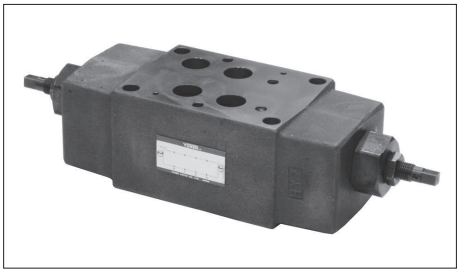


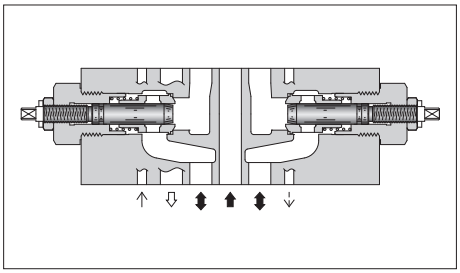
Item	Name of Parts	Part Numbers	Qty.
13	O-Ring	OR NBR-90 P28-N	2
14	O-Ring	OR NBR-90 P22-N	4
15	O-Ring	OR NBR-90 P9-N	7
16	O-Ring	OR NBR-70-1 P9-N	1

Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS＊-04-＊-10	35	300





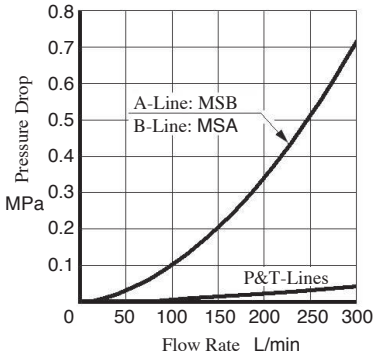
Model Number Designation

MSA	–04	–X	–10
Series Number	Valve Size	Direction of Flow	Design Number
MSA: For A-Line MSB: For B-Line MSW: For A&B-Lines } Throttle and Check Valve	**04**	**X:** Meter-out **Y:** Meter-in	**10**

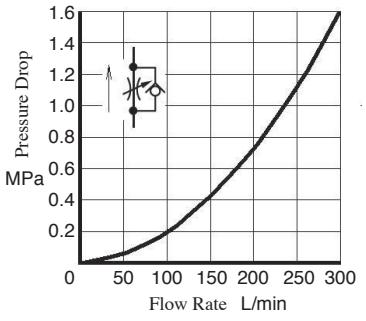
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

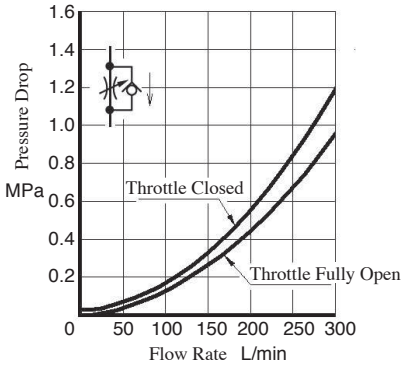
Pressure Drop



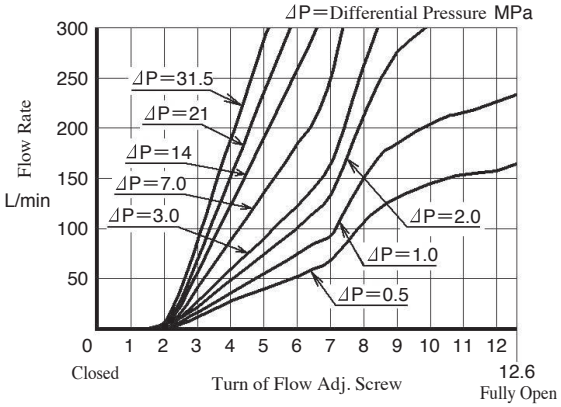
Pressure Drop at Throttle Fully Open



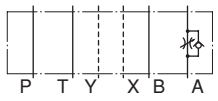
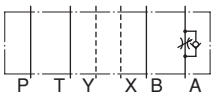
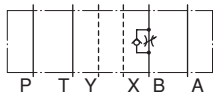
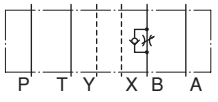
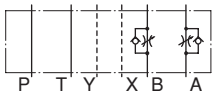
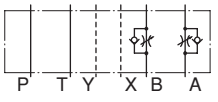
Pressure Drop for Free Flow



Metered Flow vs. Screw Position



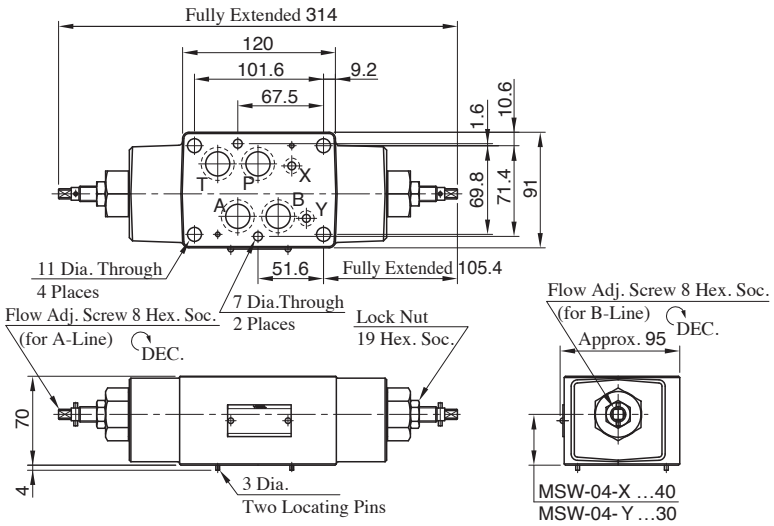
Graphic Symbols

Meter-out	Meter-in
 MSA-04-X	 MSA-04-Y
 MSB-04-X	 MSB-04-Y
 MSW-04-X	 MSW-04-Y

Instructions

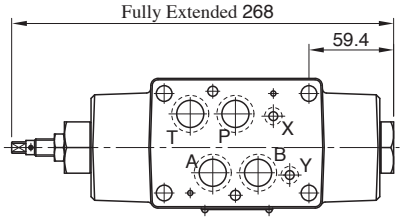
- To make flow rate adjustment, loosen lock nut and turn the flow adjustment screw clockwise or anti-clockwise. Turn the screw anti-clockwise, the flow rate increase. Be sure to re-tighten the lock nut firmly after the adjustment of the flow rate is completed.

MSW-04-X Y



Approx. Mass.....7.6 kg

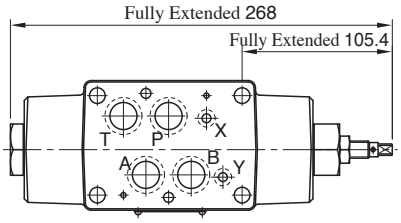
MSA-04-X Y



Approx. Mass.....7.4 kg

For other dimensions, refer to "MSW-04" in the drawing left.

MSB-04-X Y

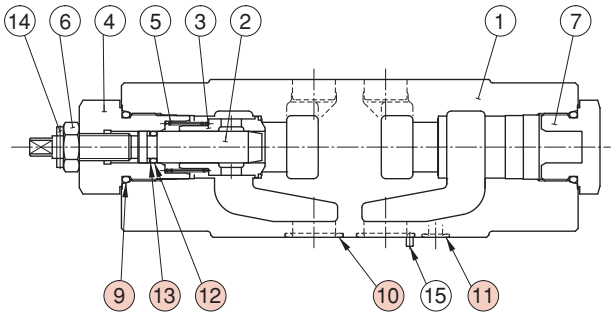


Approx. Mass.....7.4 kg

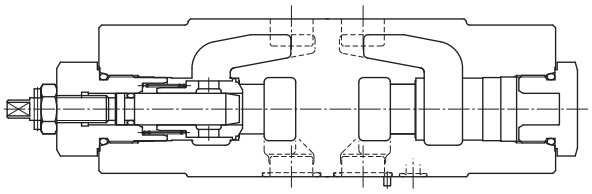
For other dimensions, refer to "MSW-04" in the drawing left.

List of Seals

MSA-04
MSB-04
MSW-04



MSA-04-X



MSA-04-Y

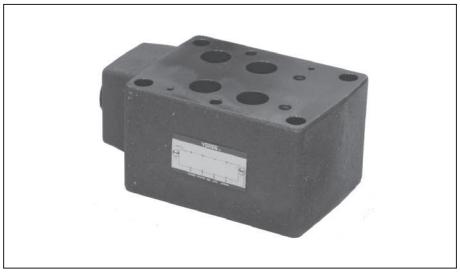
●MSB-04 : The flow adjustment parts is assembled on the right side.
●MSW-04 : The flow adjustment parts is assembled on the both sides.

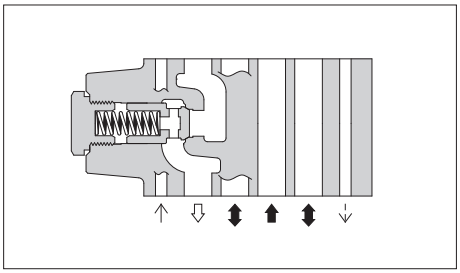
Item	Name of Parts	Part Numbers	Qty.		
			MSA–04	MSB–04	MSW–04
9	O-Ring	OR NBR-90 P26-N	2	2	2
10	O-Ring	OR NBR-90 P22-N	4	4	4
11	O-Ring	OR NBR-90 P9-N	2	2	2
12	O-Ring	OR NBR-70-1 P10A-N	1	1	2
13	Back-up Ring	BR JIS B 2401-4-T2-P10A	1	1	2

Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MCP-04-∗-10	35	300
MCT-04-∗-10		

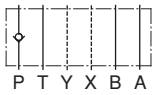




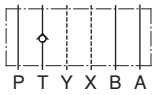
Model Number Designation

MCP	–04	–0	–10
Series Number	Valve Size	Cracking Pressure MPa	Design Number
MCP: Check Valve for P-Line	04	**0:** 0.035 **2:** 0.2 **4:** 0.4	**10**
MCT: Check Valve for T-Line			**10**

Graphic Symbols



MCP-04

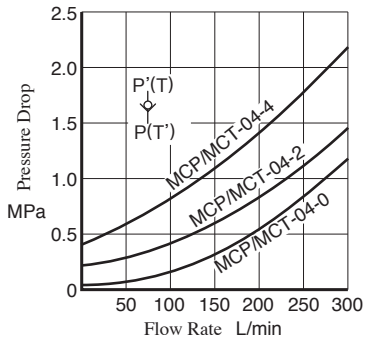


MCT-04

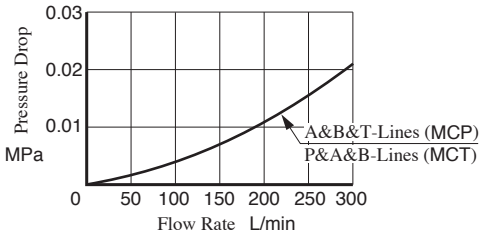
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

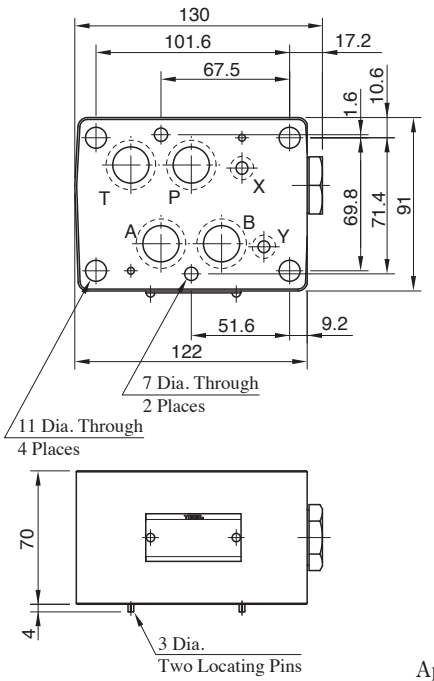
Pressure Drop for Free Flow

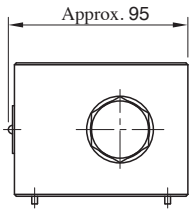


Pressure Drop



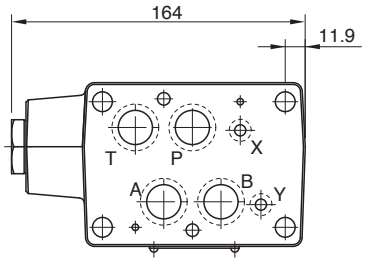
MCP-04

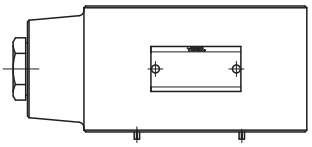




Approx. Mass·····4.6 kg

MCT-04



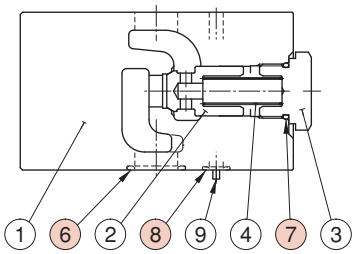


Approx. Mass.....5.4 kg

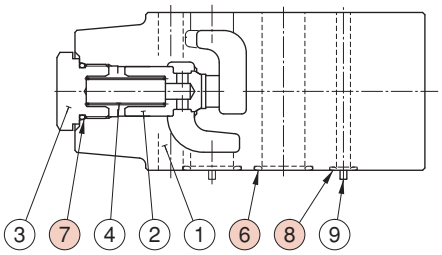
For other dimensions, refer to “MCP-04” in the drawing left.

List of Seals

MCP-04



MCT-04

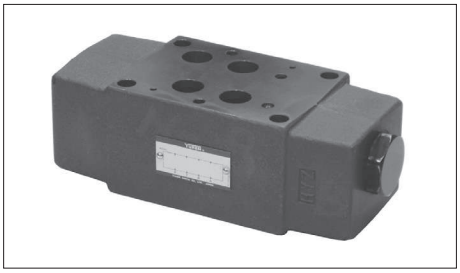


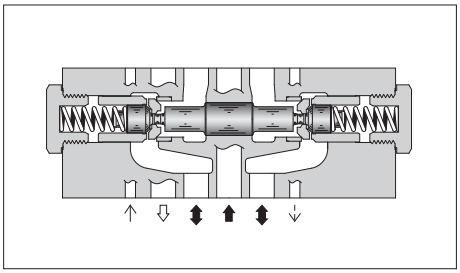
Item	Name of Parts	Part Numbers	Qty.
6	O-Ring	OR NBR-90 P22-N	4
7	O-Ring	OR NBR-90 P21-N	1
8	O-Ring	OR NBR-90 P9-N	2

Pilot Operated Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP∗–04–∗–10	35	300





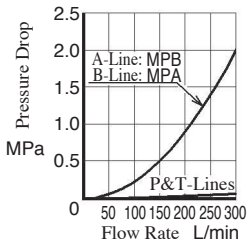
Model Number Designation

MPA	–04	–2	–10
Series Number	Valve Size	Cracking Pressure MPa	Design Number
MPA: For A-Line MPB: For B-Line MPW: For A&B-Lines } Pilot Operated Check Valve	**04**	**2:** 0.2 **4:** 0.4	**10**

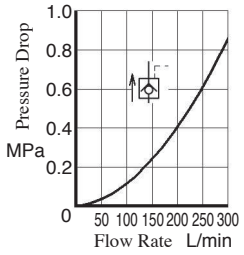
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

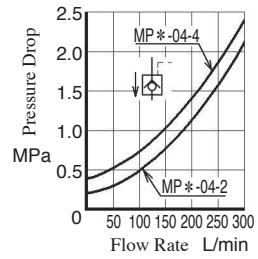
Pressure Drop



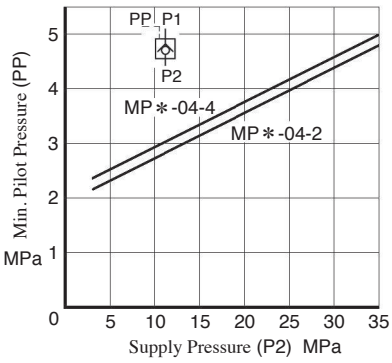
Pressure Drop for Reversed Controlled Flow



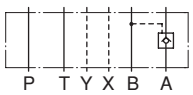
Pressure Drop for Free Flow



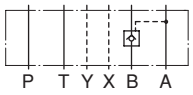
Min. Pilot Pressure



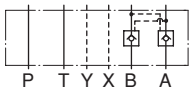
Graphic Symbols



MPA-04

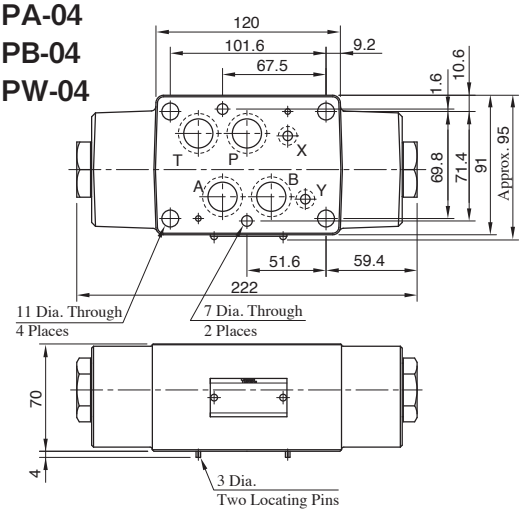


MPB-04



MPW-04

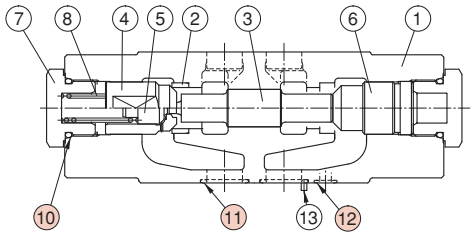
MPA-04
MPB-04
MPW-04



Approx. Mass.....7.3 kg

List of Seals

MPA-04
MPB-04
MPW-04



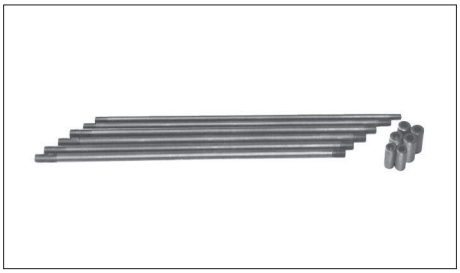
MPA-04

- MPB-04: The Check Valve is assembled on the right side.
- MPW-04: The Check Valve is assembled on the both sides.

Item	Name of Parts	Part Numbers	Qty.
10	O-Ring	OR NBR-90 P26-N	2
11	O-Ring	OR NBR-90 P22-N	4
12	O-Ring	OR NBR-90 P9-N	2

Mounting Bolt Kits For Modular Valves

Valves are mounted with six stud bolts (M6×2, M10×4). Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis. When ordering the mounting bolt kit, be sure to give the bolt kit model number from the table below.



Model Number Designation

MBK	–04	–01	–10
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK: Mounting Bolt Kits for Modular Valves	**04**	**01, 02, 03, 04** (Refer to the selection chart below)	**10**

Bolt Kits Selection Chart

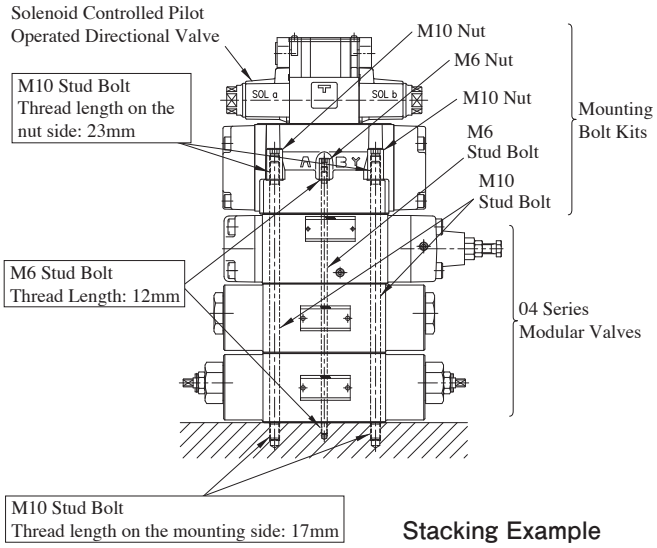
Bolt Kit Model Numbers	Quantity of Valves to be Stacked		Approx. Mass (1 set) kg
	Sol. Cont. Pilot Operated Directional Valves (DSHG-04, 52Design)	Modular Valve	
MBK–04–01–10	1	1	0.6
MBK–04–02–10	1	2	0.8
MBK–04–03–10	1	3	1.0
MBK–04–04–10	1	4	1.2

Bolt Kit Composition

M6 Stud Bolt ..... 2 Pcs.
M6 Nut ..... 2 Pcs.
M10 Stud Bolt ..... 4 Pcs.
M10 Nut ..... 4 Pcs.
} 1 Set

Tightening Torque

M6 ..... 12–15 Nm
M10 ..... 45–55 Nm

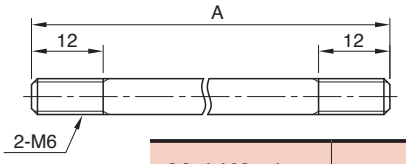


Stacking Example

MBK-04

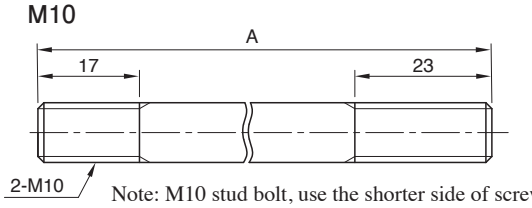
Stud Bolt

M6



Model Numbers	A	
	M6	M10
MBK-04-01-10	125	140
MBK-04-02-10	195	210
MBK-04-03-10	265	280
MBK-04-04-10	335	350

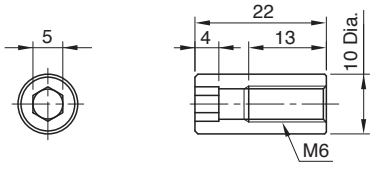
M10



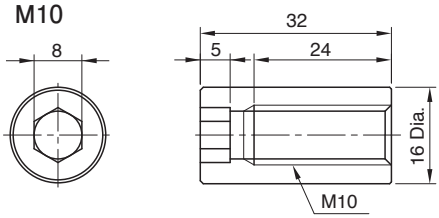
Note: M10 stud bolt, use the shorter side of screw part to the mounting surface side, the longer side to the nut side.
About more details, refer to the stacking example of the 04 series modular valves.

Nut

M6



M10

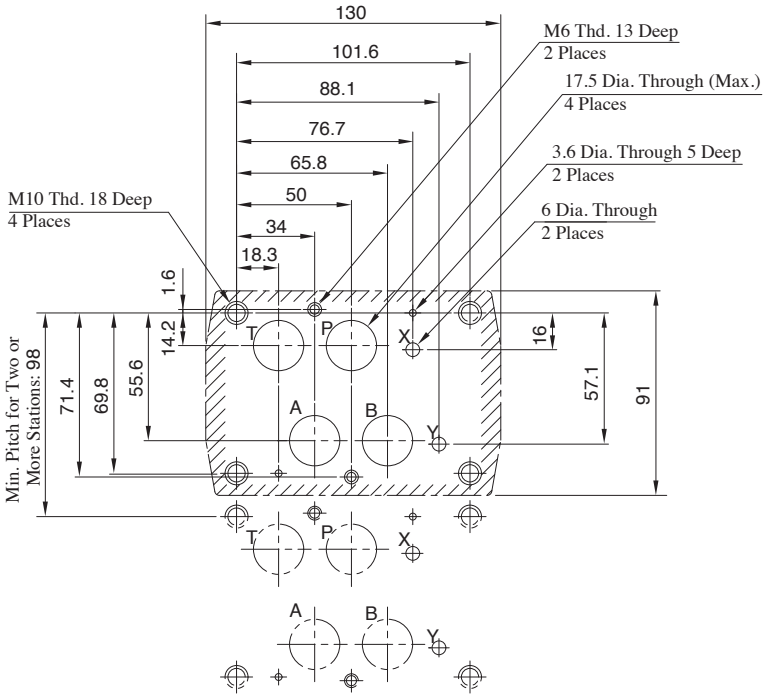


Mounting Surface Dimensions for 04 Series Modular Valve

When mounting 04 series modular valve, be sure to use a sub-plate for 1/2 solenoid controlled pilot operated directional valves

Name	Model Numbers	Page
Sub-plate for 1/2 Solenoid Controlled Pilot Operated Directional Valves	DHGM–04✻–20	F-108

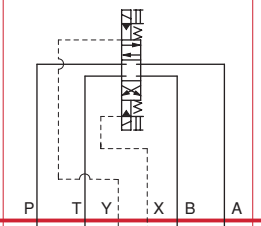
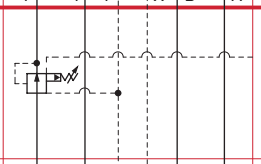
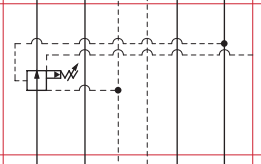
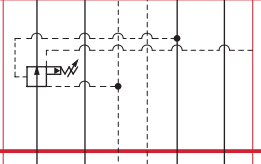
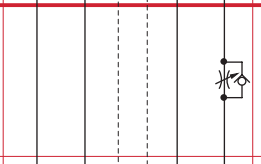
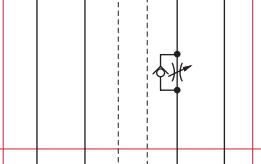
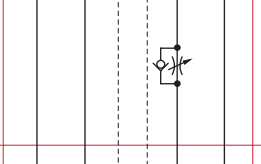
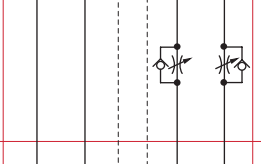
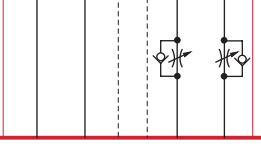
Also, when no sub-plates are used, be sure to use the following mounting surface.

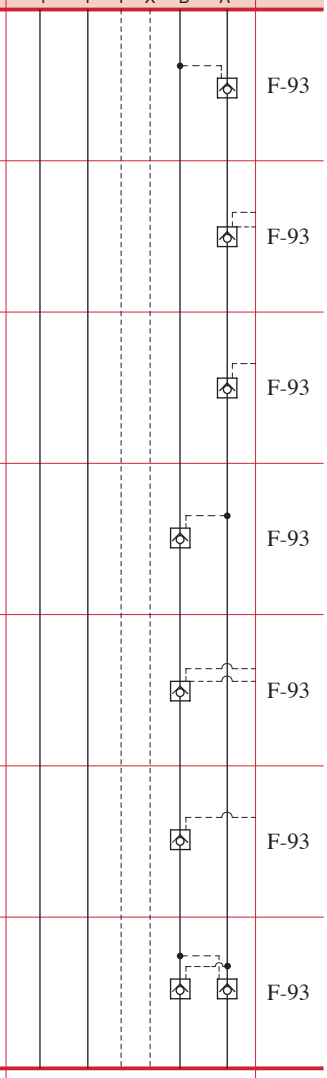


Note: The mounting surface of shaded parts above has a good machined finish. ($\sqrt{}^{1.6}$)

06 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page
	★1 Solenoid Controlled Pilot Operated Directional Valve (S-) DSHG-06-＊＊＊-＊-53		★2
Pressure Control Valves	Reducing Valves (for "P-Line") MRP-06-＊-70		F-89
	Reducing Valves (for "A-Line") MRA-06-＊-70		F-89
	Reducing Valves (for "B-Line") MRB-06-＊-70		F-89
Flow Control Valves	Throttle and Check Valves (for "A-Line", Meter-out) MSA-06-X-70		F-91
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-06-Y-70		F-91
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-06-X-70		F-91
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-06-Y-70		F-91
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-06-X-70		F-91
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-06-Y-70		F-91

Class	Name and Model Numbers	Graphic Symbols	Page
Directional Control Valves	Pilot Operated Check Valves (for "A-Line", Internal Pilot-Internal Drain Type) MPA-06-＊-70		F-93
	Pilot Operated Check Valves (for "A-Line", External Pilot-External Drain Type) MPA-06＊-＊-X-70		F-93
	Pilot Operated Check Valves (for "A-Line", External Pilot-Internal Drain Type) MPA-06＊-＊-Y-70		F-93
	Pilot Operated Check Valves (for "B-Line", Internal Pilot-Internal Drain Type) MPB-06-＊-＊-70		F-93
	Pilot Operated Check Valves (for "B-Line", External Pilot-External Drain Type) MPB-06＊-＊-X-70		F-93
	Pilot Operated Check Valves (for "B-Line", External Pilot-Internal Drain Type) MPB-06＊-＊-Y-70		F-93
	Pilot Operated Check Valves (for "A&B-Lines", Internal Pilot-Internal Drain Type) MPW-06-＊-70		F-93
Mounting Bolts	Bolt Kits MBK-06-＊-70		F-96

★1. Because drain ports "V" and "W" are not provided for solenoid controlled pilot operated directional valves of Pressure Centered Type (3H*) and models with Pilot Piston (P*), those valves cannot be used in combination with modular valves.

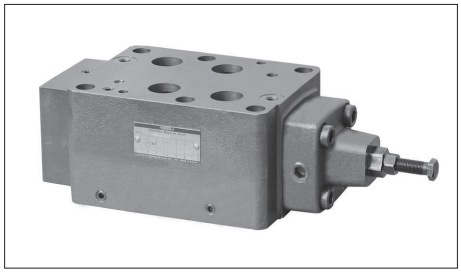
★2. Refer to the relevant pages of catalog “E: DIRECTIONAL CONTROLS”

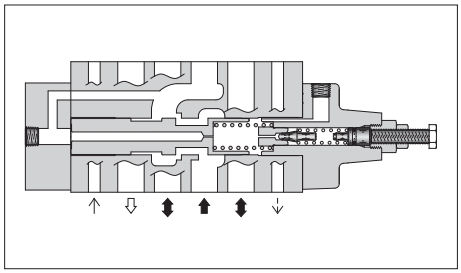
Reducing Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow ★ L/min
MR＊-06-A-70	35	125
MR＊-06-C-70 B H		500

★In the pressure adjustment ranges "A" and "B", maximum flow rates are limited by the pressure setting on the secondary side. See the "Secondary Pressure vs. Max. Flow"of this page, use the valve at the maximum flow rate within a zone highlighted with .

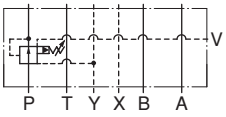




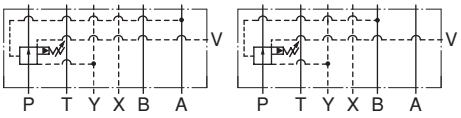
Model Number Designation

MRP	–06	–A	–70
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MRP: For P-Line MRA: For A-Line MRB: For B-Line } Reducing Valve	**06**	**A:** 0.7-7 **B:** 1.5-7 **C:** 3.5-14 **H:** 7-25	**70**

Graphic Symbols



MRP-06



MRA-06 MRB-06

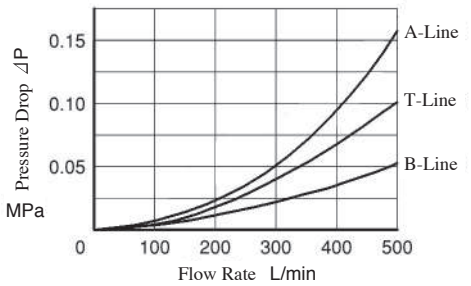
Instructions

- Connect Drain Line (Y port) to oil tank independently so as to obtain stable pressure setting. At the same time, the solenoid controlled pilot operated directional valve to be used in combination with this valve must be of internal drain type (with T).
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

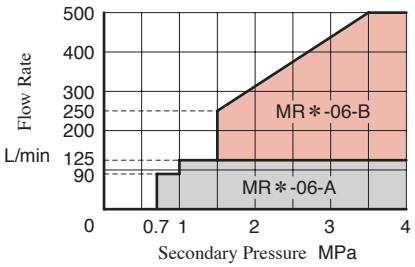
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop

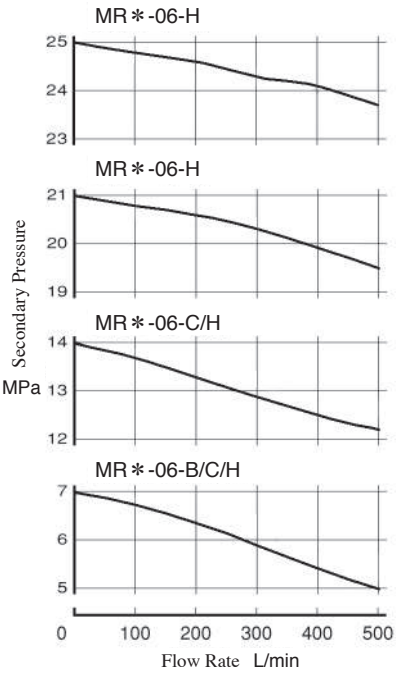


Secondary Pressure vs. Max. Flow

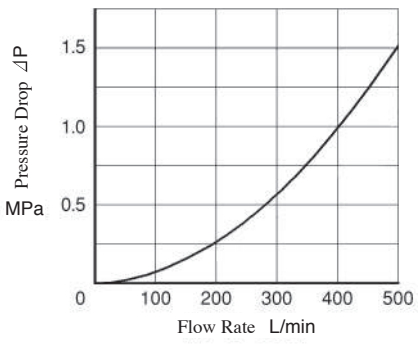


Nominal Override Characteristics

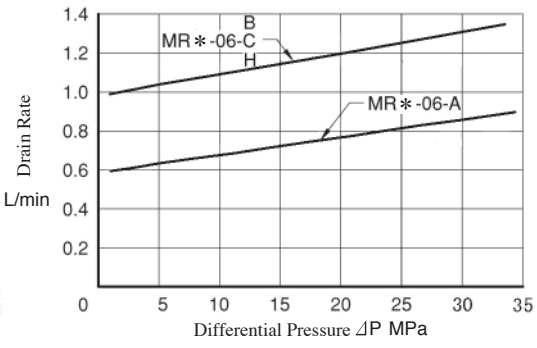
Primary Pressure 35 MPa



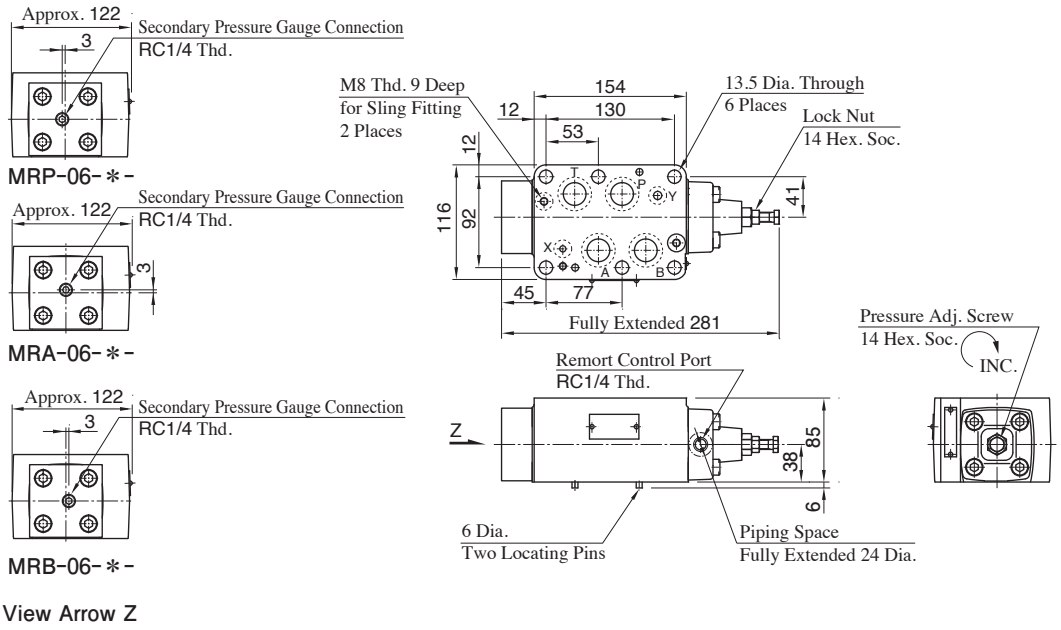
Pressure Drop at Spool Fully Open (P-Line)



Drain Characteristics



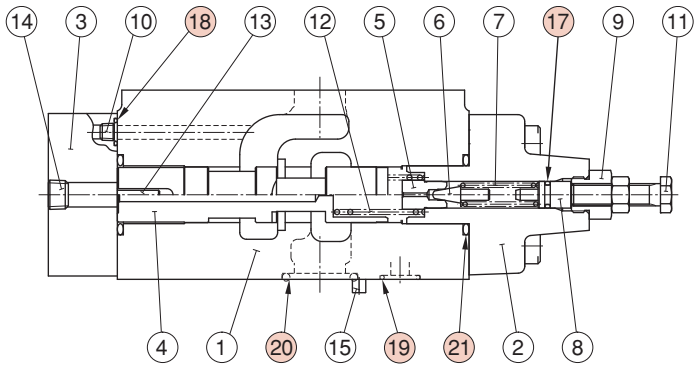
MRP-06
MRA-06
MRB-06



Approx. Mass·····11.1 kg

List of Seals

MRP-06
MRA-06
MRB-06

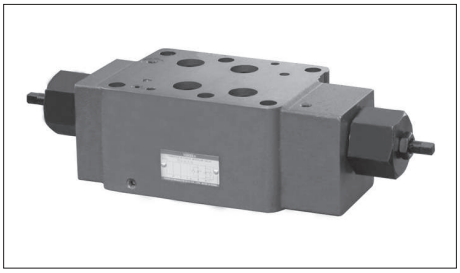


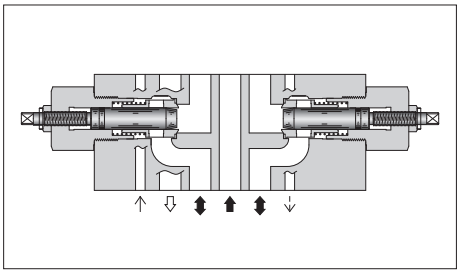
Item	Name of Parts	Part Numbers	Qty.
17	O-Ring	OR NBR-70-1 P9-N	1
18	O-Ring	OR NBR-90 P9-N	5
19	O-Ring	OR NBR-90 P14-N	2
20	O-Ring	OR NBR-90 P28-N	4
21	O-Ring	OR NBR-90 P30-N	2

Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS＊–06–＊–70	35	500





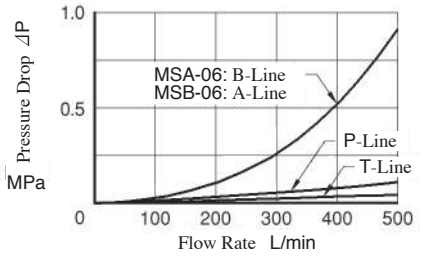
Model Number Designation

MSA		–06	–X	–70
Series Number		Valve Size	Direction of Flow	Design Number
MSA: For A-Line MSB: For B-Line MSW: For A&B-Line	Throttle and Check Valve	06	**X:** Meter-out **Y:** Meter-in	70

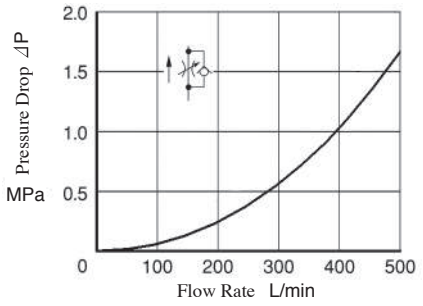
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

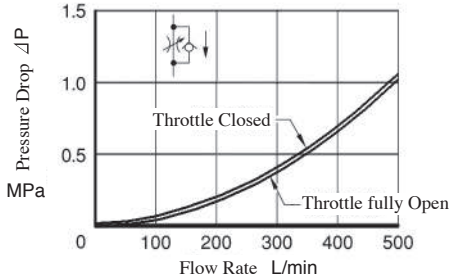
Pressure Drop



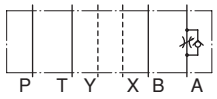
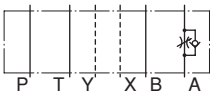
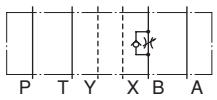
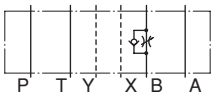
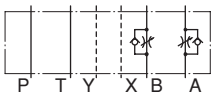
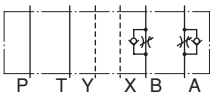
Pressure Drop at Throttle Fully Open



Pressure Drop for Free Flow



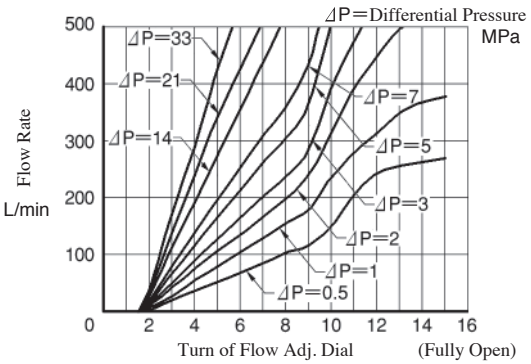
Graphic Symbols

Meter-out	Meter-in
 MSA-06-X	 MSA-06-Y
 MSB-06-X	 MSB-06-Y
 MSW-06-X	 MSW-06-Y

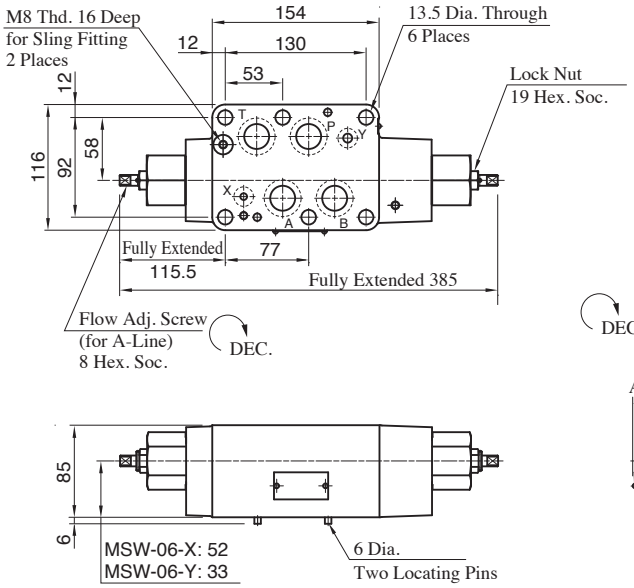
Instructions

- To make flow rate adjustment, loosen lock nut and turn the flow adjustment screw clockwise or anti-clockwise. To throttle the flow, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after the adjustment of the flow rate is completed.

Metered Flow vs. Screw Position

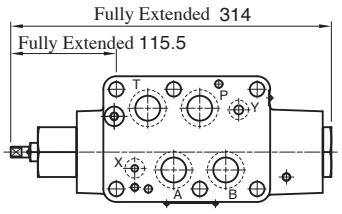


MSW-06-X Y



Approx. Mass.....12.2 kg

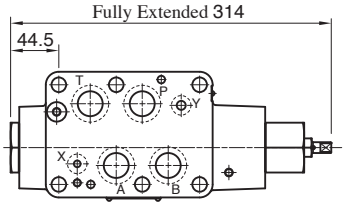
MSA-06-X Y



Approx. Mass.....12 kg

For other dimensions, refer to "MSW-06" in the drawing left.

MSB-06-X Y

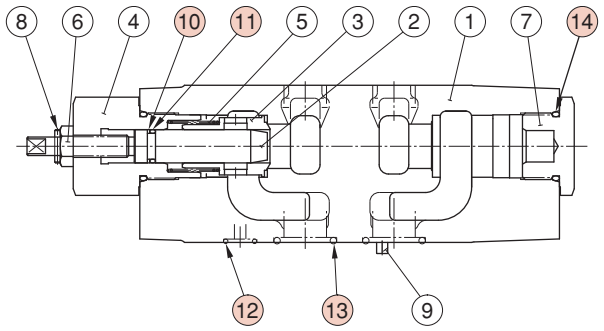


Approx. Mass.....12 kg

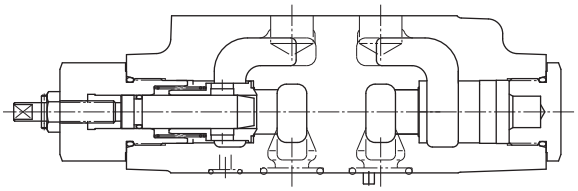
For other dimensions, refer to "MSW-06" in the drawing left.

List of Seals

MSA-06
MSB-06
MSW-06



MSA-06-X

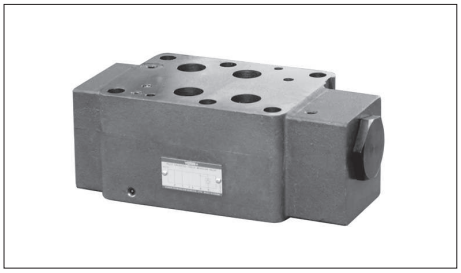


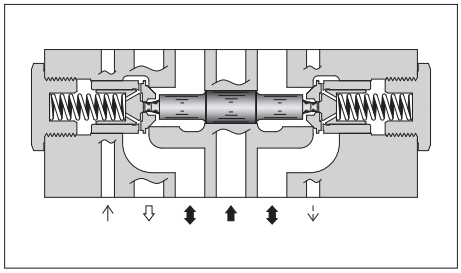
MSA-06-Y

- MSB-06 : The flow adjustment part is assembled on the right side.
- MSW-06 : The flow adjustment part is assembled on the both sides.

Item	Name of Parts	Part Numbers	Qty.		
			MSA-06	MSB-06	MSW-06
10	Back-up Ring	BR JIS B 2401-4-T2-P14	1	1	2
11	O-Ring	OR NBR-70-1 P14-N	1	1	2
12	O-Ring	OR NBR-90 P14-N	2	2	2
13	O-Ring	OR NBR-90 P28-N	4	4	4
14	O-Ring	OR NBR-90 P32-N	2	2	2

Pilot Operated Check Modular Valves





Model Number Designation

MPA	–06	S	–2	–X	–70
Series Number	Valve Size	Port Tapping Feature of Pilot-Drain Port ★1	Cracking Pressure MPa	Pilot-Drain Connection ★2	Design Number
MPA: For A-Line MPB: For B-Line MPW: For A&B-Line } Pilot Operated Check Valve	**06**	**None:** Rc 3/8 **S:** G 3/8	**2:** 0.2 **4:** 0.4	**None:** Internal Pilot-Internal Drain **X:** External Pilot-External Drain **Y:** External Pilot-Internal Drain	**70**

★1. This item applies only to External Pilot or External Drain Type.
★2. Only "None: Internal Pilot-Internal Drain Type" is available for MPW (for "A&B-Lines").

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP＊–06＊–＊–＊–70	35	500

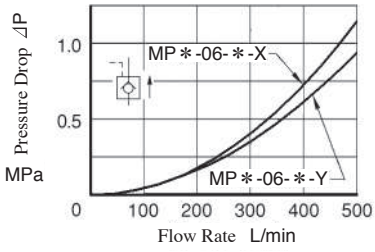
Graphic Symbols

Model Numbers \ Pilot-Drain Type	Internal Pilot-Internal Drain Type	External Pilot-External Drain Type	External Pilot-Internal Drain Type
MPA-06	P T Y X B A MPA-06-＊	P T Y X B A MPA-06＊-＊-X	P T Y X B A MPA-06＊-＊-Y
MPB-06	P T Y X B A MPB-06-＊	P T Y X B A MPB-06＊-＊-X	P T Y X B A MPB-06＊-＊-Y
MPW-06	P T Y X B A MPW-06-＊	—	—

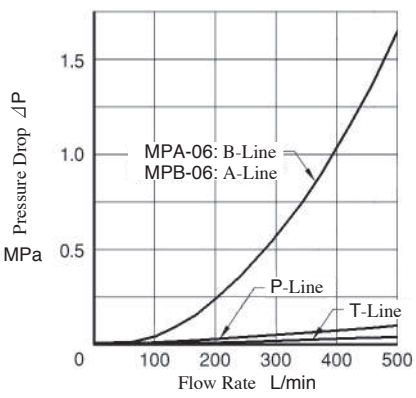
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

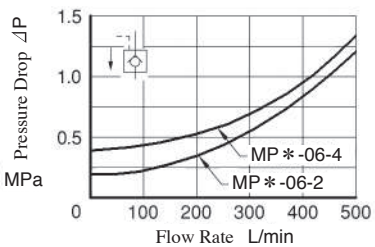
Pressure Drop for Reversed Controlled Flow



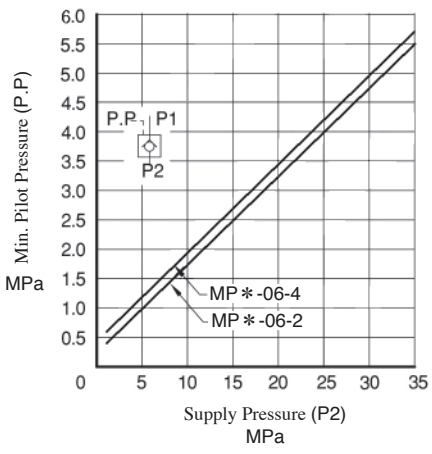
Pressure Drop



Pressure Drop for Free Flow

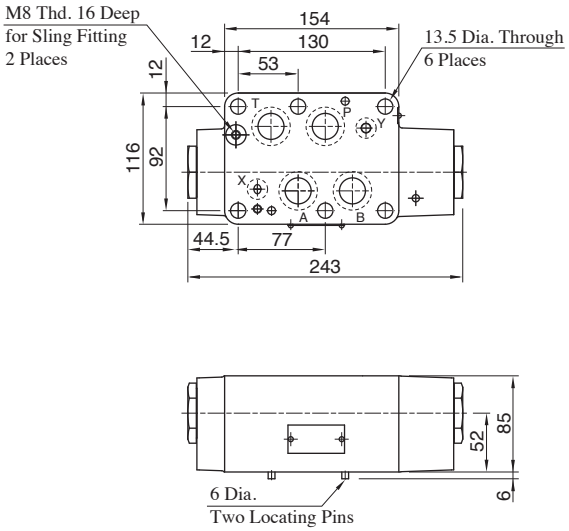


Min. Pilot Pressure



●Internal Pilot – Internal Drain Type

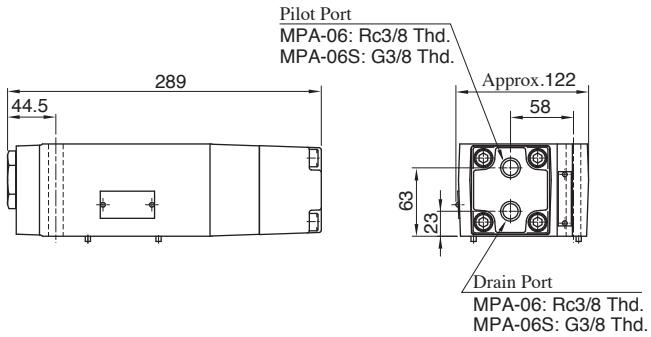
MPA-06
MPB-06
MPW-06



Approx. Mass.....11.6 kg

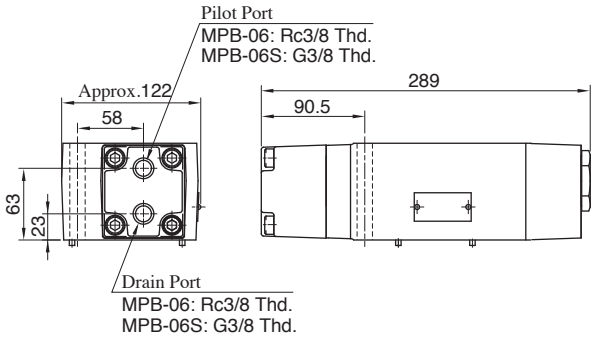
●External Pilot - External Drain Type

MPA-06∗-∗-X



Approx. Mass.....13 kg

MPB-06∗-∗-X

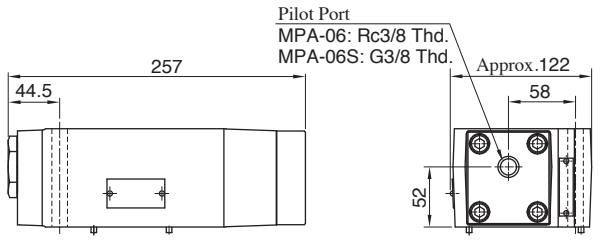


Approx. Mass.....13 kg

For other dimensions, refer to "Internal Pilot-Internal Drain Type" in the drawing above.

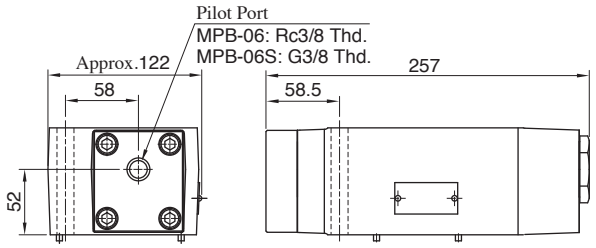
●External Pilot - Internal Drain Type

MPA-06∗-∗-Y



Approx. Mass.....11.6 kg

MPB-06∗-∗-Y



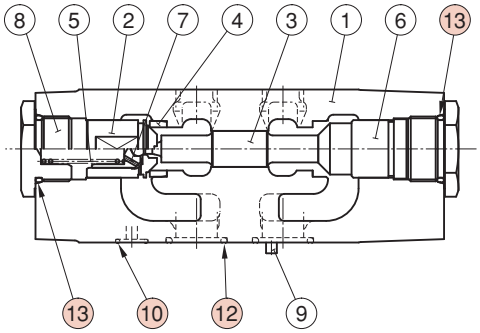
Approx. Mass.....11.6 kg

For other dimensions, refer to "Internal Pilot-Internal Drain Type" in the drawing above.

List of Seals

MPA-06
MPB-06
MPW-06

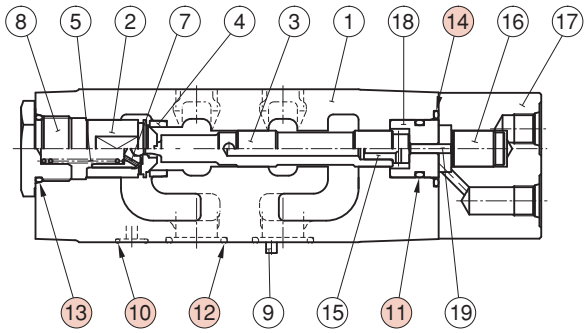
Internal Pilot - Internal Drain Type



MPA-06

- MPB-06: The Check Valve is assembled on the right side.
- MPW-06: The Check Valve is assembled on the both sides.

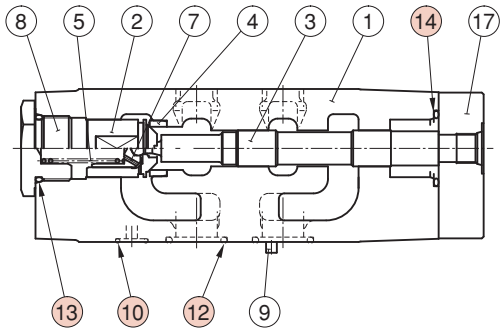
External Pilot - External Drain Type



MPA-06＊-＊-X

- MPB-06: The Check Valve is assembled on the right side.

External Pilot - Internal Drain Type



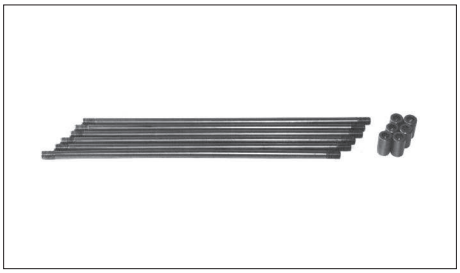
MPA-06＊-＊-Y

- MPB-06: The Check Valve is assembled on the right side.

Item	Name of Parts	Part Numbers	Qty.		
			Internal Pilot - Internal Drain Type	External Pilot - External Drain Type	External Pilot - Internal Drain Type
10	O-Ring	OR NBR-90 P14-N	2	2	2
11	O-Ring	OR NBR-70-1 P26-N	—	1	—
12	O-Ring	OR NBR-90 P28-N	4	4	4
13	O-Ring	OR NBR-90 P32-N	2	1	1
14	O-Ring	OR NBR-90 P36-N	—	1	1

Mounting Bolt Kits For Modular Valves

Valves are mounted with six stud bolts. Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis. When ordering the mounting bolt kit, be sure to give the bolt kit model number from the table below.



Model Number Designation

MBK	–06	–01	–70
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK: Mounting Bolt Kits for Modular Valves	**06**	**01, 02, 03, 04** (Refer to the chart below)	**70**

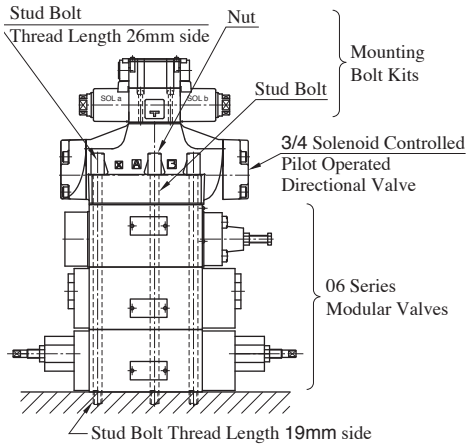
Bolt Kits Selection Chart

Bolt Kit Model Numbers	Quantity of Valves to be Stacked		Approx. Mass (1 Set) kg
	Sol. Cont. Pilot Operated Directional Valves (DSHG-06、53Design)	Modular Valve	
MBK–06–01–70	1	1	1.2
MBK–06–02–70	1	2	1.7
MBK–06–03–70	1	3	2.1
MBK–06–04–70	1	4	2.6

●**Bolt Kit Composition**

Stud Bolt····· 6 Pcs.
Nut ····· 6 Pcs.
} 1 Set

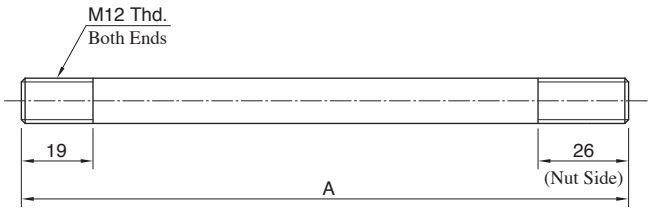
●**Tightening Torque** :····· 70–100 Nm
〔If the operating pressure is more than 25 MPa 90–100 Nm〕



Stacking Example

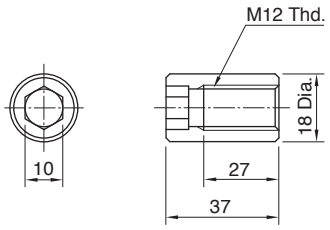
MBK-06

●**Stud Bolt**



Bolt Number	**A** mm
01	168
02	253
03	338
04	423

●**Nut**

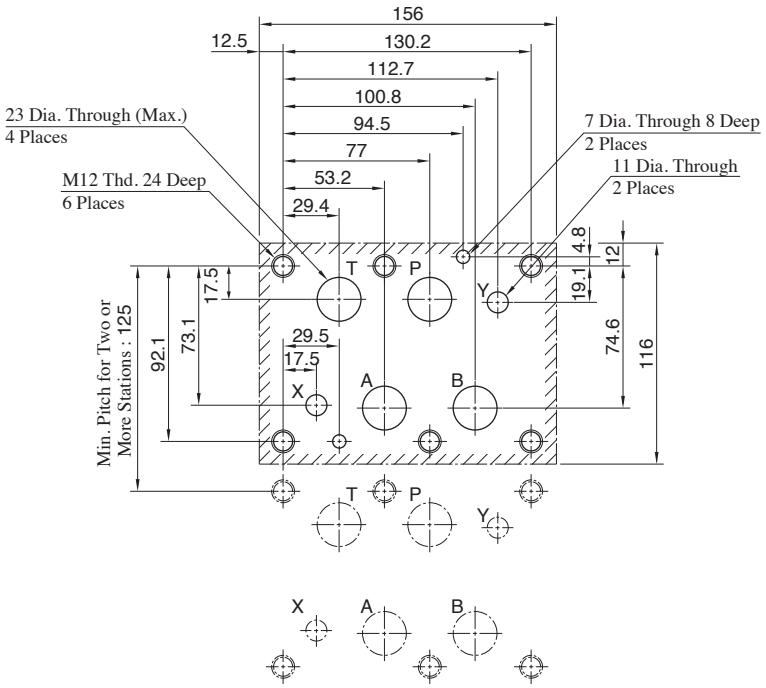


Mounting Surface Dimensions for 06 Series Modular Valve

When mounting 06 series modular valve, be sure to use a sub-plate for 3/4 solenoid controlled pilot operated directional valves.

Name	Model Numbers	Page
Sub-plate for 3/4 Solenoid Controlled Pilot Operated Directional Valves	DHGM–06✻–50	F-109

Also, when no sub-plates are used, be sure to use the following mounting surface.



Note: The mounting surface of shaded parts above has a good machined finish. (6S)

Interchangeability in Installation between Current and New Design

06 Series Modular Valves have changed from 30 to 70 design numbers model to operate higher max. pressure. The mounting surface has no changes.

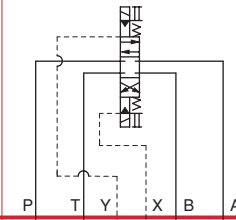
But if use the operating pressure as more than 25 MPa, have to select design No. 70 bolt kits (MBK-06).

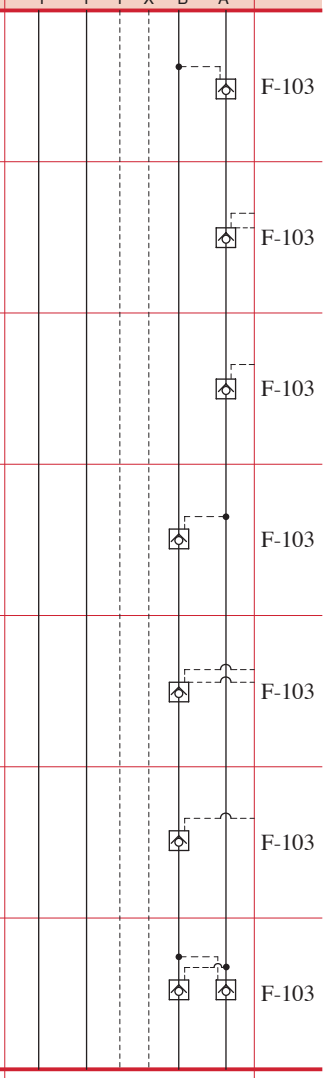
Mounting bolt kits of design No. 70, the length of both sides screw is different, so refer to the stacking example about 06 series model valves on page F-96.

If current and new designs in mixed use, the max. pressure is equal to the current design's pressure.

10 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page
	★1 Solenoid Controlled Pilot Operated Directional Valve (S-) DSHG-10-＊＊＊-＊-43		★2
Pressure Control Valves	Reducing Valves (for "P-Line") MRP-10-＊-30		F-99
	Reducing Valves (for "A-Line") MRA-10-＊-30		F-99
	Reducing Valves (for "B-Line") MRB-10-＊-30		F-99
Flow Control Valves	Throttle and Check Valves (for "A-Line", Meter-out) MSA-10-X-30		F-101
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-10-Y-30		F-101
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-10-X-30		F-101
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-10-Y-30		F-101
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-10-X-30		F-101
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-10-Y-30		F-101

Class	Name and Model Numbers	Graphic Symbols	Page
Directional Control Valves	Pilot Operated Check Valves (for "A-Line", Internal Pilot-Internal Drain Type) MPA-10-＊-30		F-103
	Pilot Operated Check Valves (for "A-Line", External Pilot-External Drain Type) MPA-10＊-＊-X-30		F-103
	Pilot Operated Check Valves (for "A-Line", External Pilot-Internal Drain Type) MPA-10＊-＊-Y-30		F-103
	Pilot Operated Check Valves (for "B-Line", Internal Pilot-Internal Drain Type) MPB-10-＊-30		F-103
	Pilot Operated Check Valves (for "B-Line", External Pilot-External Drain Type) MPB-10＊-＊-X-30		F-103
	Pilot Operated Check Valves (for "B-Line", External Pilot-Internal Drain Type) MPB-10＊-＊-Y-30		F-103
	Pilot Operated Check Valves (for "A&B-Lines", Internal Pilot-Internal Drain Type) MPW-10-＊-30		F-103
Mounting Bolts	Bolt Kits MBK-10-＊-10		F-106

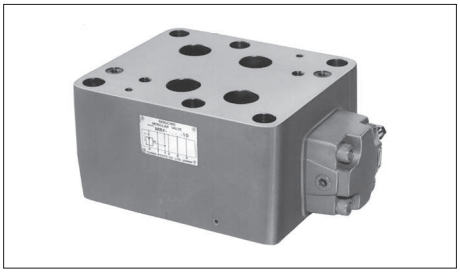
★1. Because drain ports "V" and "W" are not provided for solenoid controlled pilot operated directional valves of Pressure Centered Type (3H*) and models with Pilot Piston (P*), those valves cannot be used in combination with modular valves.
★2. Refer to the relevant pages of catalog "E: DIRECTIONAL CONTROLS"

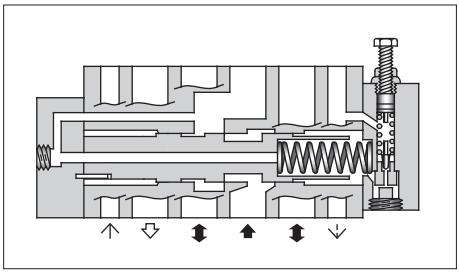
Reducing Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow ★ L/min
MR＊–10–A–30	25	250
MR＊-10–C–30 B H		800

★In the pressure adjustment ranges "A" and "B", maximum flow rates are limited by the pressure setting on the secondary side. See the "Secondary Pressure vs. Max. Flow"of this page, use the valve at the maximum flow rate within a zone highlighted with .

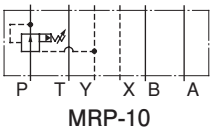




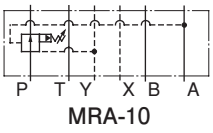
Model Number Designation

MRP	–10	–B	–30
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MRP: For P-Line MRA: For A-Line MRB: For B-Line } Reducing Valve	**10**	**A:** 0.7-7 **B:** 1.5-7 **C:** 3.5-14 **H:** 7-21	**30**

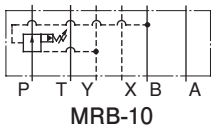
Graphic Symbols



MRP-10



MRA-10



MRB-10

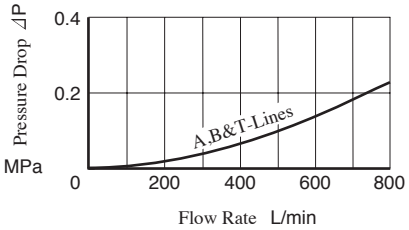
Instructions

- Connect Drain Line (Y port) to oil tank independently so as to obtain stable pressure setting. At the same time, the solenoid controlled pilot operated directional valve to be used in combination with this valve must be of internal drain type (with T).
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

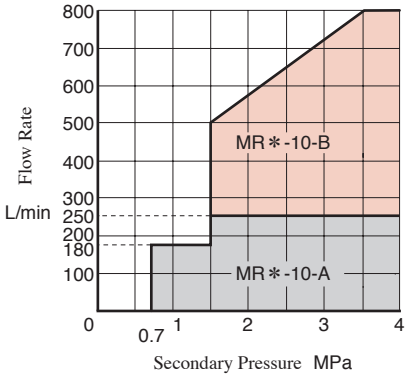
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop

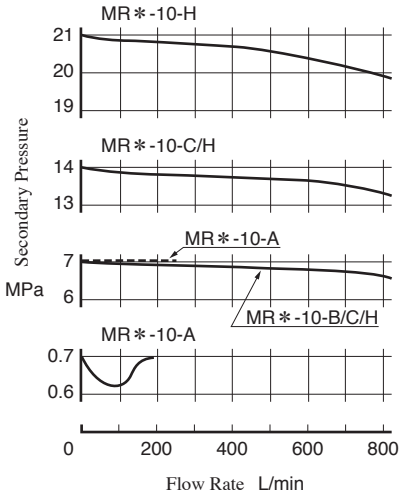


Secondary Pressure vs. Max. Flow

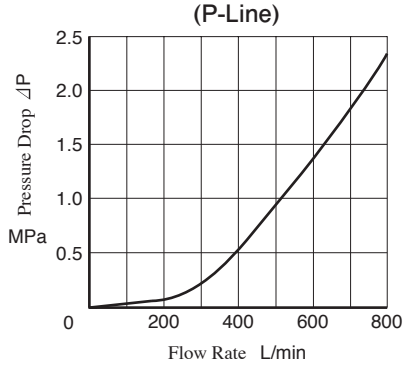


Nominal Override Characteristics

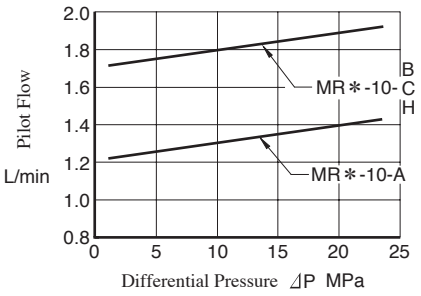
Primary Pressure 25 MPa



Pressure Drop at Spool Fully Open (P-Line)

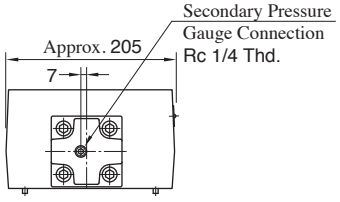


Pilot Flow

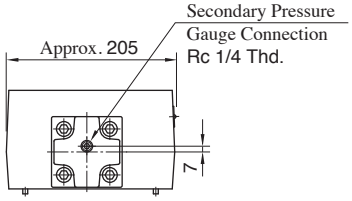


MRP-10
MRA-10
MRB-10

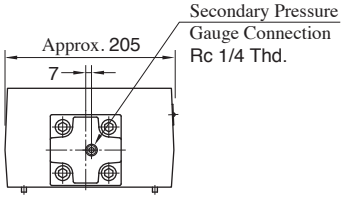
View Arrow Z



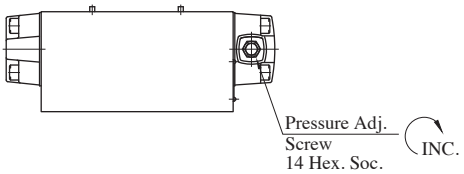
MRP-10

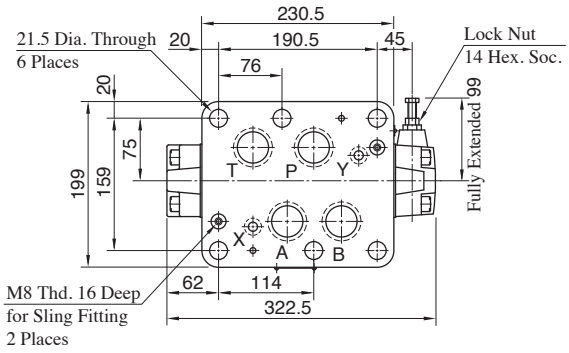


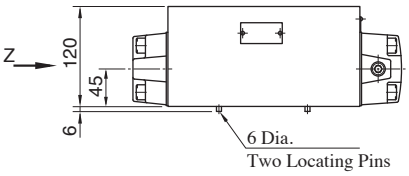
MRA-10



MRB-10



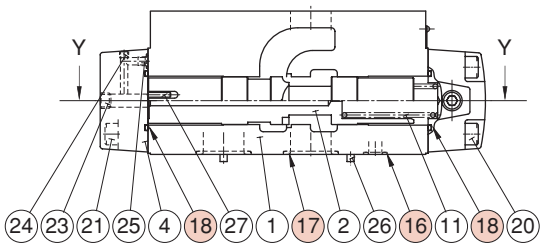


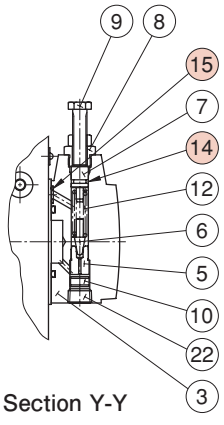


Approx. Mass.....36.6 kg

List of Seals

MRP-10
MRA-10
MRB-10

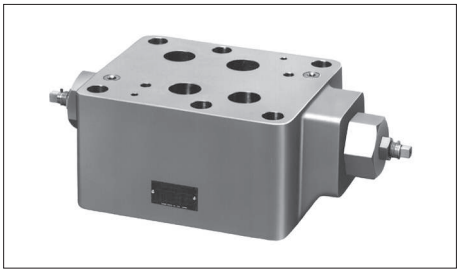


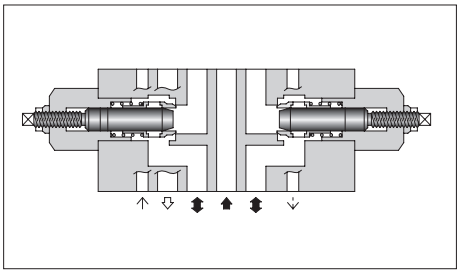


Section Y-Y

Item	Name of Parts	Part Numbers	Qty.
14	O-Ring	OR NBR-70-1 P9-N	1
15	O-Ring	OR NBR-90 P9-N	5
16	O-Ring	OR NBR-90 P16-N	2
17	O-Ring	OR NBR-90 P40-N	4
18	O-Ring	OR NBR-90 P44-N	2

Throttle and Check Modular Valves





Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS＊–10–＊–30	25	800

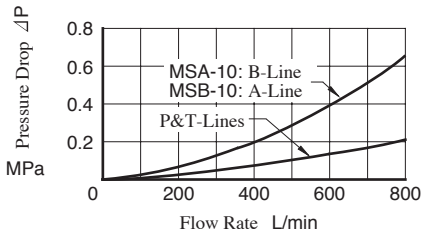
Model Number Designation

MSA	–10	–X	–30
Series Number	Valve Size	Direction of Flow	Design Number
MSA: For A-Line MSB: For B-Line MSW: For A&B-Line } Throttle and Check Valves	10	**X:** Meter-out **Y:** Meter-in	30

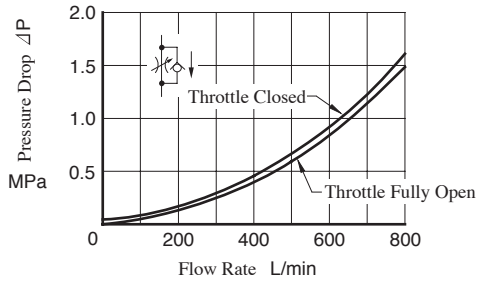
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

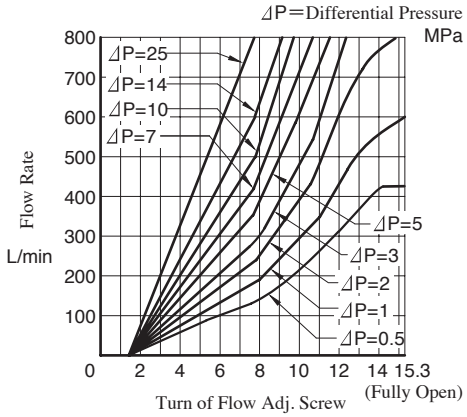
Pressure Drop



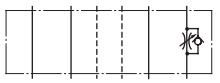
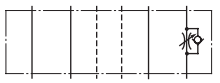
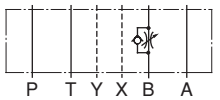
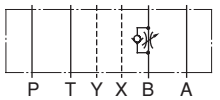
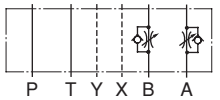
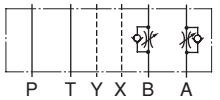
Pressure Drop for Free Flow



Metered Flow vs. Screw Position



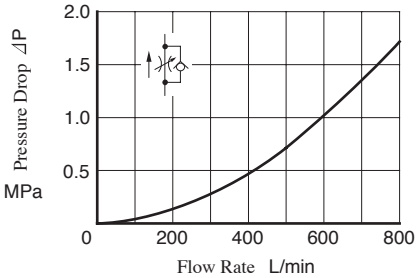
Graphic Symbols

Meter-out	Meter-in
 MSA-10-X	 MSA-10-Y
 MSB-10-X	 MSB-10-Y
 MSW-10-X	 MSW-10-Y

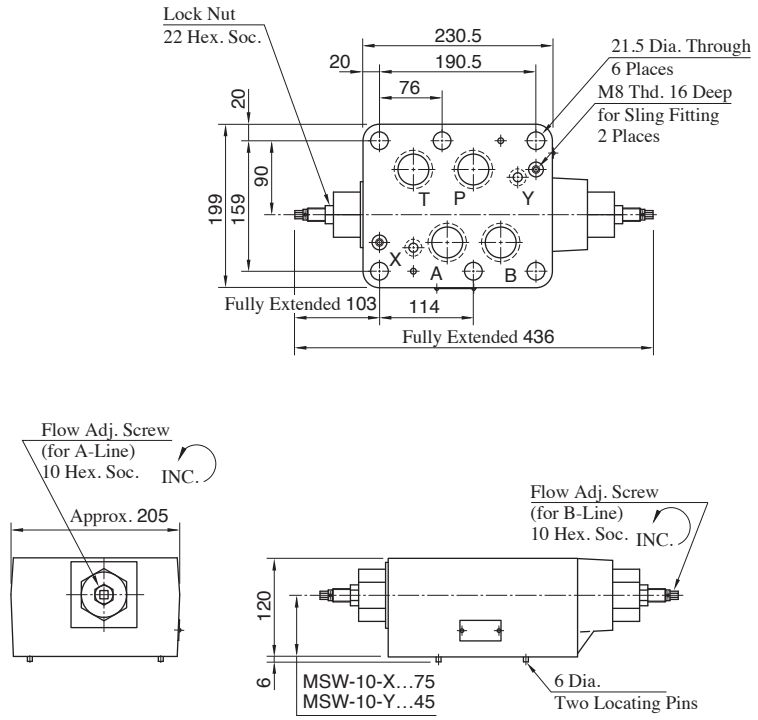
Instructions

- To make flow rate adjustment, loosen the lock nut and turn the flow adjustment screw clockwise or anti-clockwise. To throttle the flow, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after the adjustment of the flow rate is completed.

Pressure Drop at Throttle Fully Open

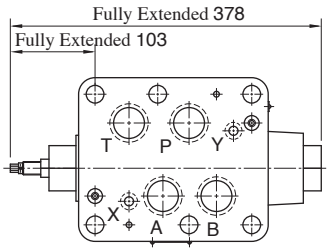


MSW-10-$\frac{X}{Y}$



Approx. Mass.....35.7 kg

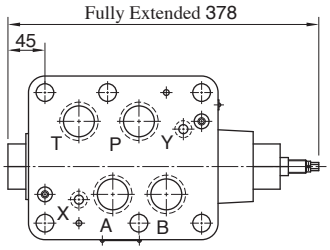
MSA-10-$\frac{X}{Y}$



Approx. Mass.....35 kg

For other dimensions, refer to "MSW-10" in the drawing left.

MSB-10-$\frac{X}{Y}$

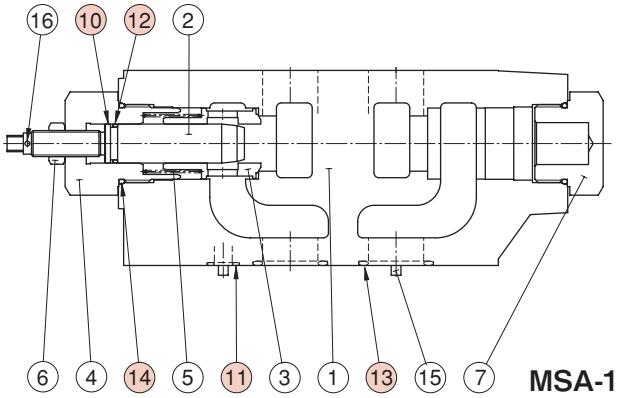


Approx. Mass.....35 kg

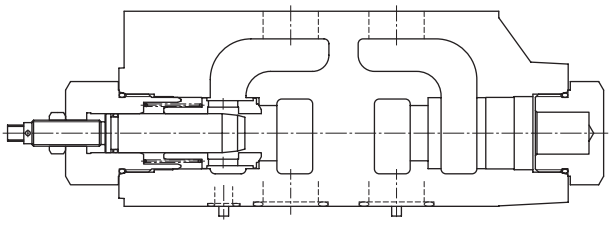
For other dimensions, refer to "MSW-10" in the drawing left.

List of Seals

MSA-10
MSB-10
MSW-10



MSA-10-X

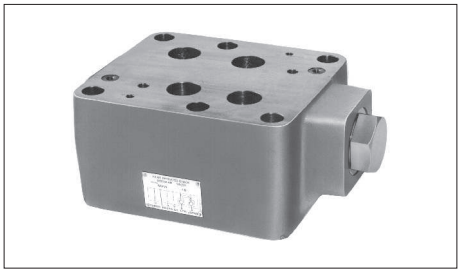


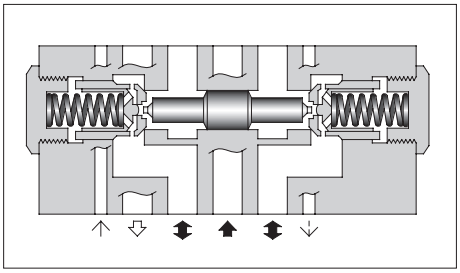
MSA-10-Y

- MSB-10 : The flow adjustment part is assembled on the right side.
- MSW-10 : The flow adjustment part is assembled on the both sides.

Item	Name of Parts	Part Numbers	Qty.		
			MSA-10	MSB-10	MSW-10
10	Back-up Ring	BR JIS B 2407-4-T2-P20	1	1	2
11	O-Ring	OR NBR-90 P16-N	2	2	2
12	O-Ring	OR NBR-70-1 P20-N	1	1	2
13	O-Ring	OR NBR-90 P40-N	4	4	4
14	O-Ring	OR NBR-90 P44-N	2	2	2

Pilot Operated Check Modular Valves





Model Number Designation

MPA	–10	S	–2	–X	–30
Series Number	Valve Size	Port Tapping Feature of Pilot-Drain Port ★1	Cracking Pressure MPa	Pilot-Drain Connection	Design Number
MPA: For A-Line / MPB: For B-Line — Pilot Operated Check Valve	**10**	**None:** Rc3／8 **S:** G3／8	**2:** 0.2 **4:** 0.4	**None:** Internal Pilot-Internal Drain **X** : External Pilot-External Drain **Y** : External Pilot-Internal Drain	**30**
MPW: For A&B-Lines — Pilot Operated Check Valve		——		**None:** Internal Pilot-Internal Drain	

★1. This item applies only to External Pilot or External Drain Type.

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP＊-10＊-＊-＊-30	25	800

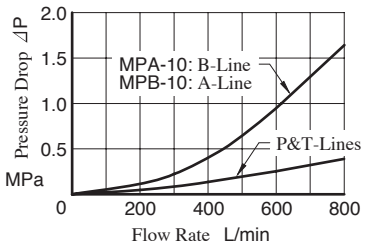
Graphic Symbols

Pilot-Drain type / Model Numbers	Internal Pilot-Internal Drain Type	External Pilot-External Drain Type	External Pilot-Internal Drain Type
MPA-10	P T Y X B A MPA-10-＊	P T Y X B A MPA-10＊-＊-X	P T Y X B A MPA-10＊-＊-Y
MPB-10	P T Y X B A MPB-10-＊	P T Y X B A MPB-10＊-＊-X	P T Y X B A MPB-10＊-＊-Y
MPW-10	P T Y X B A MPW-10-＊	——	——

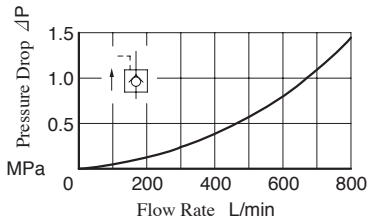
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

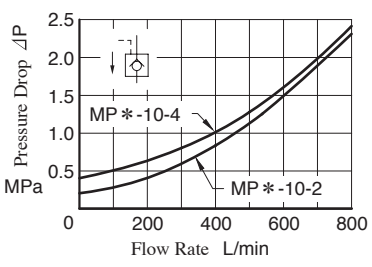
Pressure Drop



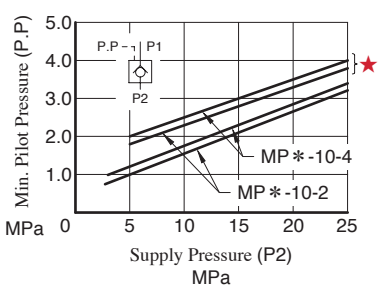
Pressure Drop for Reversed Controlled Flow



Pressure Drop for Free Flow



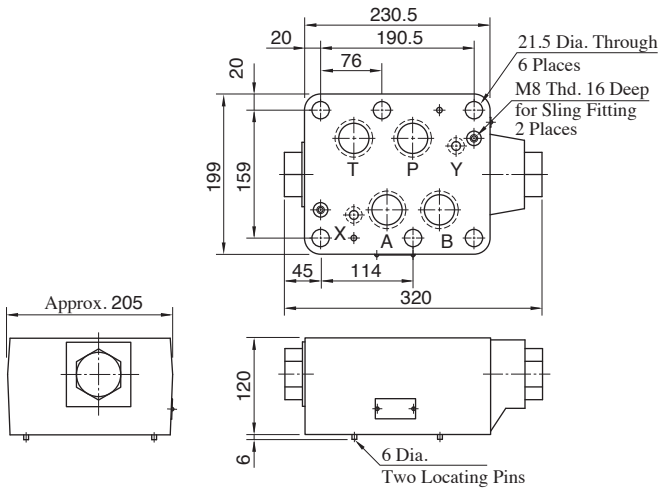
Min. Pilot Pressure



★In case of 500 L/min or more.

Internal Pilot - Internal Drain Type

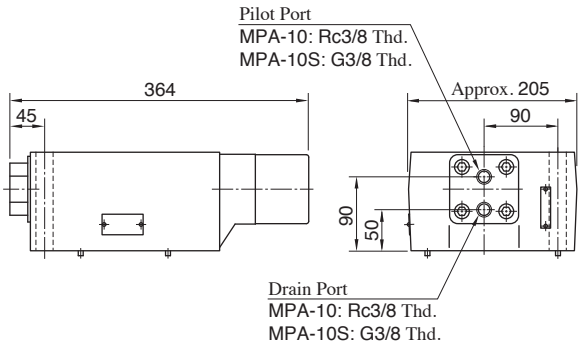
MPA-10
MPB-10
MPW-10



Approx. Mass.....36.5 kg

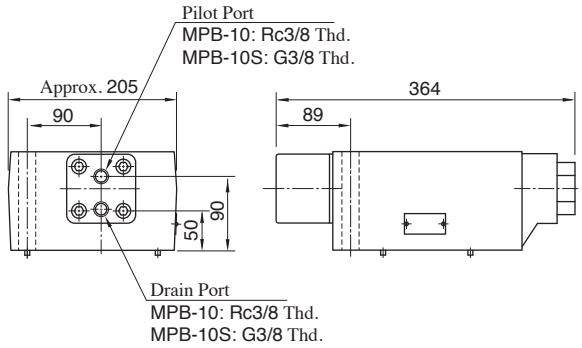
External Pilot - External Drain Type

MPA-10∗-∗-X



Approx. Mass.....38 kg

MPB-10∗-∗-X

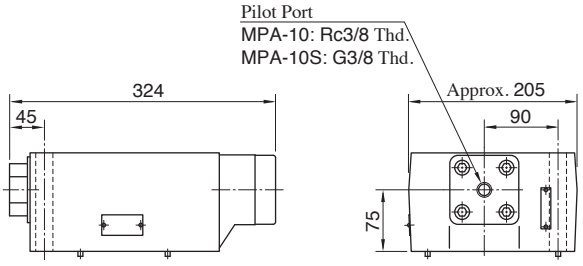


Approx. Mass.....38 kg

For other dimensions, refer to "Internal Pilot-Internal Drain Type" in the drawing above.

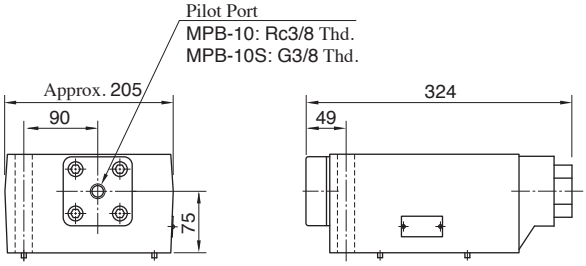
External Pilot - Internal Drain Type

MPA-10∗-∗-Y



Approx. Mass.....36.5 kg

MPB-10∗-∗-Y



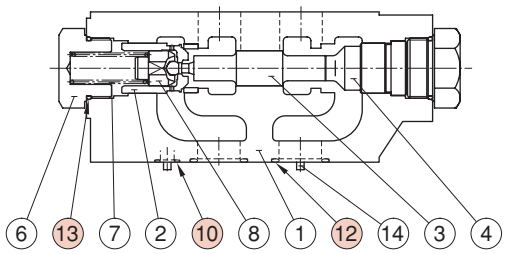
Approx. Mass.....36.5 kg

For other dimensions, refer to "Internal Pilot-Internal Drain Type" in the drawing above.

List of Seals

MPA-10
MPB-10
MPW-10

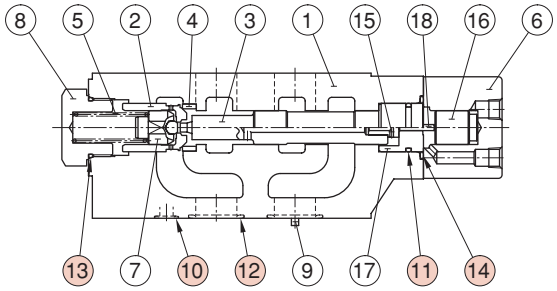
Internal Pilot - Internal Drain Type



MPA-10

●MPB-10 : The check valve is assembled on the right side.
●MPW-10 : The check valve is assembled on the both sides.

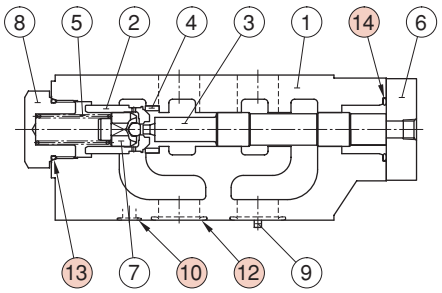
External Pilot - External Drain Type



MPA-10＊-＊-X

●MPB-10 : The check valve is assembled on the right side.

External Pilot - Internal Drain Type



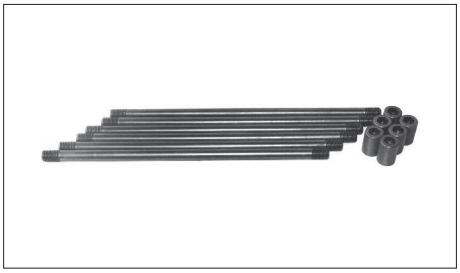
MPA-10＊-＊-Y

●MPB-10 : The check valve is assembled on the right side.

Item	Name of Parts	Part Numbers	Qty.		
			Internal Pilot-Internal Drain	External Pilot-External Drain	External Pilot-Internal Drain
10	O-Ring	OR NBR-90 P16-N	2	2	2
11	O-Ring	OR NBR-90 P34-N	—	1	—
12	O-Ring	OR NBR-90 P40-N	4	4	4
13	O-Ring	OR NBR-90 P44-N	2	1	1
14	O-Ring	OR NBR-90 P46-N	—	1	1

Mounting Bolt Kits For Modular Valves

Valves are mounted with six stud bolts. Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis. When ordering the mounting bolt kit, be sure to give the bolt kit model number from the table below.



Model Number Designation

MBK	–10	–04	–10
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK: Mounting Bolt Kits for Modular Valves	**10**	**01, 02, 03, 04** (Refer to the chart below)	**10**

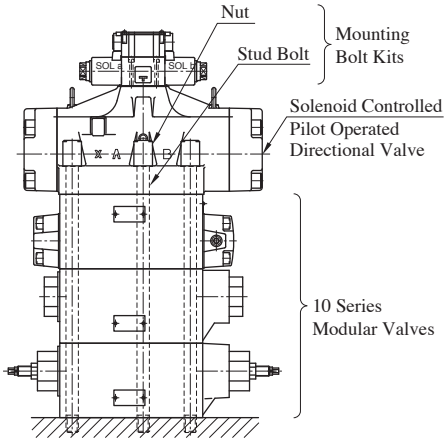
Bolt Kits Selection Chart

Model Numbers	Quantity of Valves to be Stacked		Approx. Mass (1 Set) kg
	Sol. Cont. Pilot Operated Directional Valves (DSHG–10)	Modular Valve	
MBK–10–01–10	1	1	3.9
MBK–10–02–10	1	2	5.7
MBK–10–03–10	1	3	7.4
MBK–10–04–10	1	4	9.2

● Bolt Kit Composition

Stud Bolt .....6 Pcs.
Nut .....6 Pcs.
} 1 Set

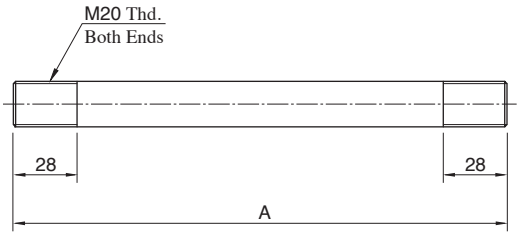
● Tightening Torque...150-170 Nm



Stacking Example

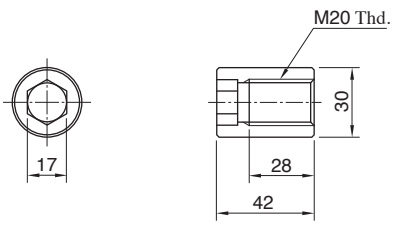
MBK-10

● Stud Bolt



Bolt Number	**A** mm
01	217
02	337
03	457
04	577

● Nut

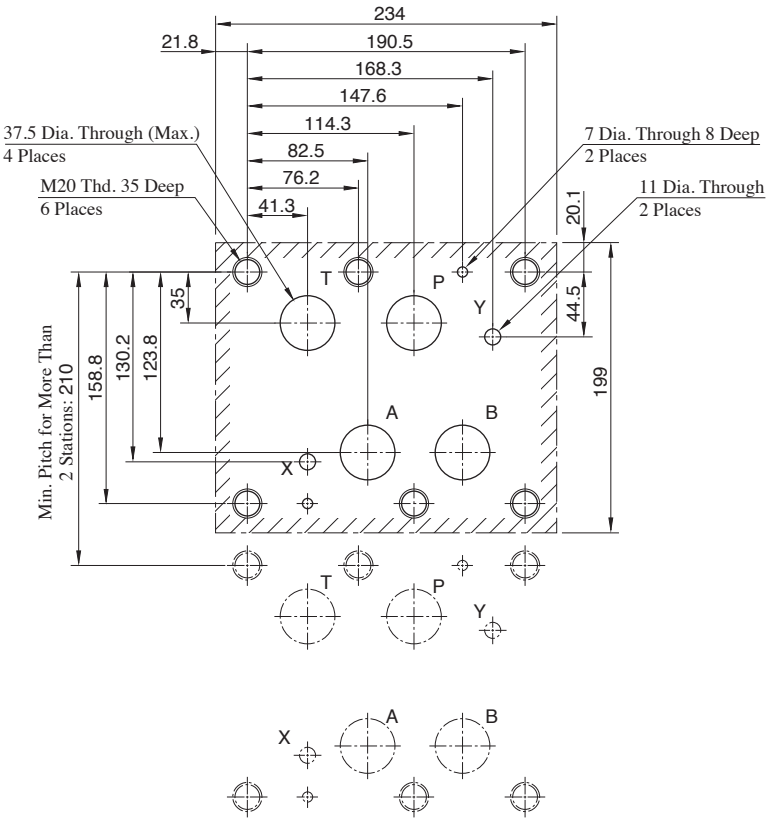


Mounting Surface Dimensions for 10 Series Modular Valve

When mounting 10 series modular valve, be sure to use a sub-plate for 1-1/4 solenoid controlled pilot operated directional valves.

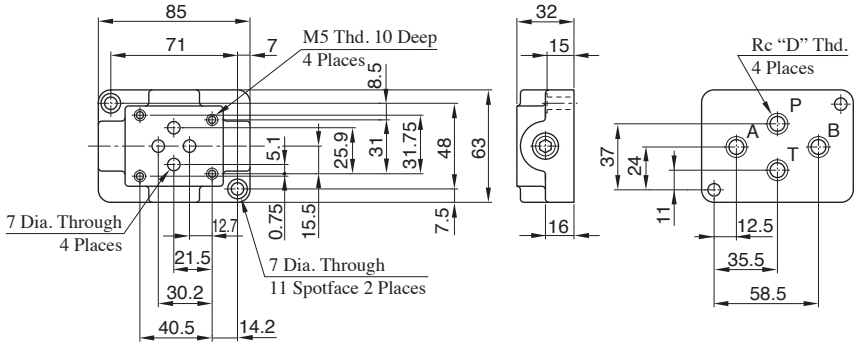
Name	Sub-plate Model Numbers	Page
Sub-plate for 1-1/4 Solenoid Controlled Pilot Operated Directional Valves	DHGM–10＊–40	F-109

When no sub-plates are used, be sure to use the following mounting surface.



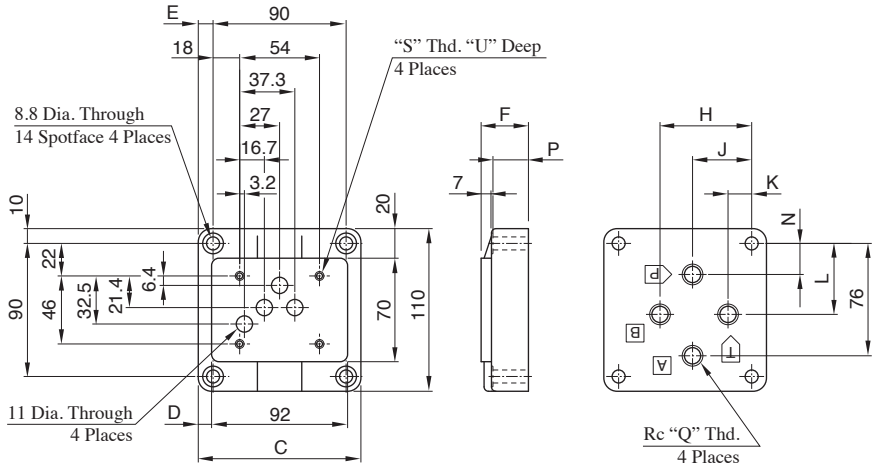
Note: The mounting surface of shaded parts above has a good machined finish. (▽6)

Sub Plate：DSGM-01、01X、01Y



Model Numbers	D
DSGM–01–31	1/8
DSGM–01X–31	1/4
DSGM–01Y–31	3/8

Sub Plate：DSGM-03／03X／03Y

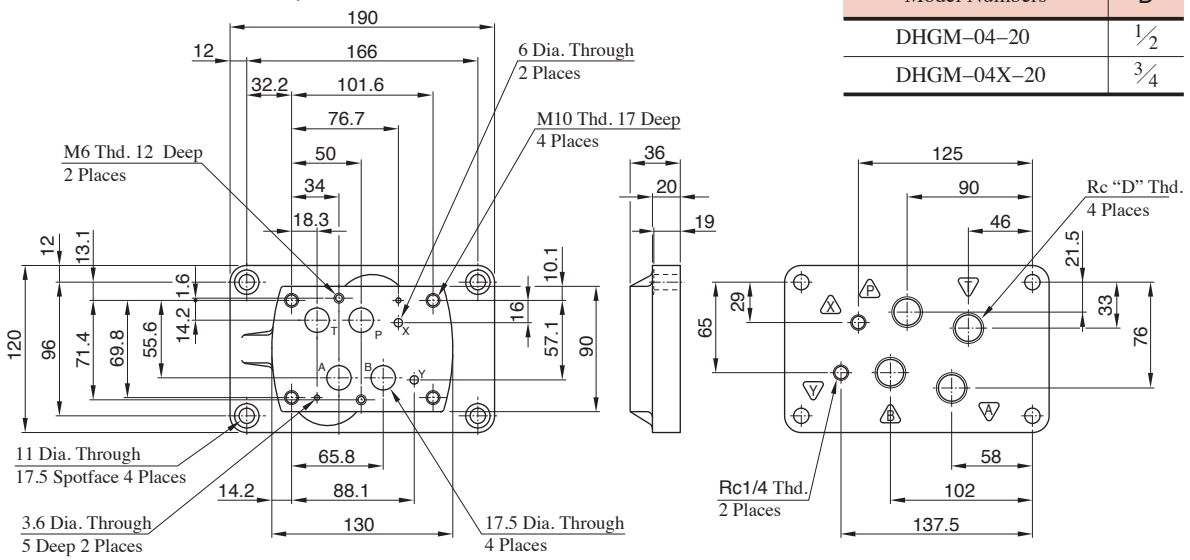


Model Numbers	C	D	E	F	H	J	K	L	N	P	Q
DSGM–03–40/4002	110	9	10	32	62	40	16	48	21	24	3/8
DSGM–03X–40/4002											1/2
DSGM–03Y–40/4002	120	14	15	50	80	45	10	47	16	42	3/4

Model Numbers	S	U	Remarks
DSGM–03＊–40	M6	13	Standard
DSGM–03＊–4002	M8	14	Option

Sub Plate：DHGM-04, 04X

Model Numbers	D
DHGM–04–20	1/2
DHGM–04X–20	3/4

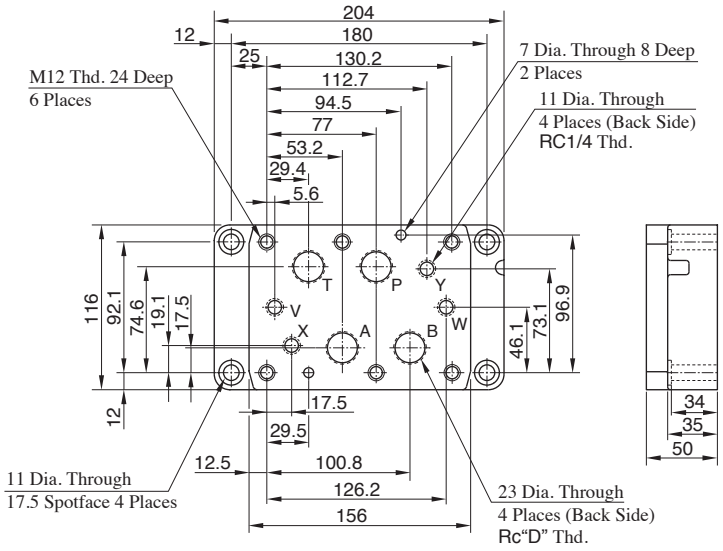


Note: Use Division of Port "X"&"Y"

Pilot Pressure Port " X "	Drain Port " Y "
Use only with external type valves. If use internal type valves, have to plug.	Use as drain port only with external type valves. If use internal type valves, have to plug.

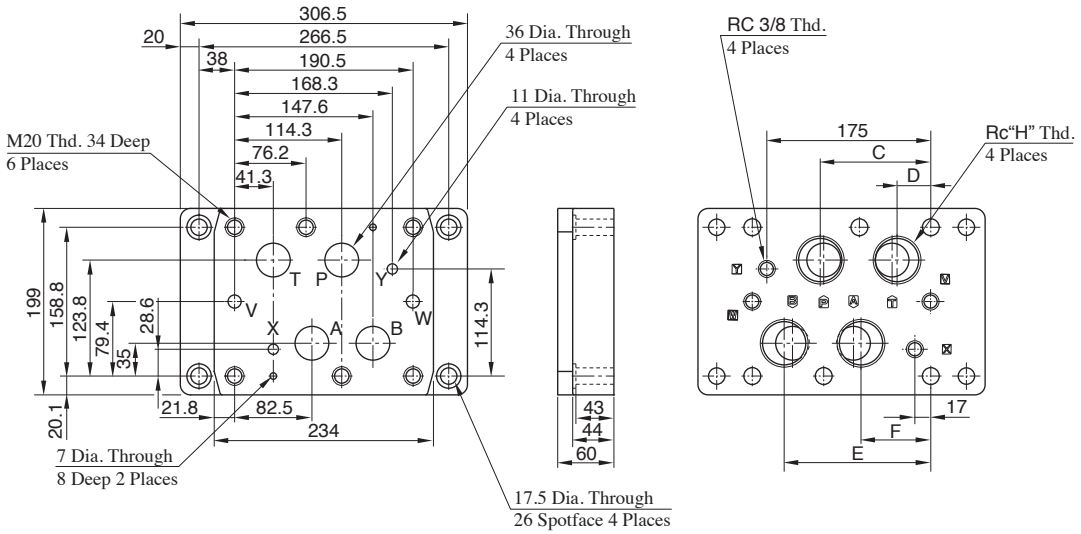
Sub Plate

DHGM-06, 06X



Model Numbers	"D"
DHGM–06–50	3/4
DHGM–06X–50	1

DHGM-10, 10X



Model Numbers	C	D	E	F	H
DHGM–10–40	114	41	147.5	82.5	1 1/4
DHGM–10X–40	118	36	156.5	74.5	1 1/2

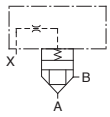
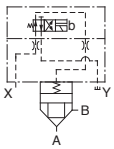
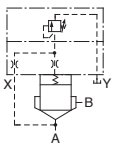
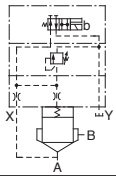
Note: Use Division of "X", "Y", "V" & "W" Port

Model and Type of Valve	Pilot Pressure Port "X"	Pilot Drain Port "Y"	Drain Port "V"	Drain Port "W"
Spring Centered, No Spring, Spring Offset	Use only with external type valves. If use with internal type valves, have to plug.	Use as drain port only with external type valves. If use internal type valves, have to plug.★	Not Use (Need Not Plug)	
Pressure Centered			Use	Not Use (Need Not Plug)
Pilot Piston with Both Ends			Use	Use
Pilot Piston with Port "A" Side			Use	Not Use (Need Not Plug)
Pilot Piston with Port "B" Side			Not Use (Need Not Plug)	Use

★ The screw is on the body side of valve, so plug either sub-plate or body.

G

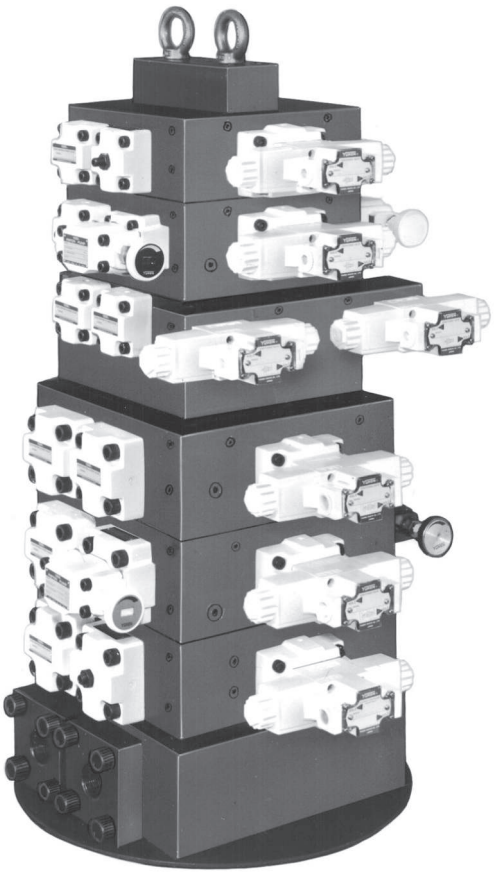
LOGIC VALVES

Valve Type	Graphic Symbols	Maximum Operating Pressure MPa	Rated Flow L/min (1 2 3 5 10 20 30 50 100 200 300 500 1000 3000 6000)	Page
Directional Control Logic Valves Directional and Flow Control Logic Valves		31.5	LD: 16 25 32 40 50 63 80 100	G-4
Solenoid Operated Directional Control Logic Valves			LDS: 25 32 40 50 63	G-5
Relief Logic Valves			LB: 16 25 32 50	G-6
Solenoid Controlled Relief Logic Valves			LBS: 16 25 32 50	G-7

Consult Yuken when detailed material such as dimensions figures is required.

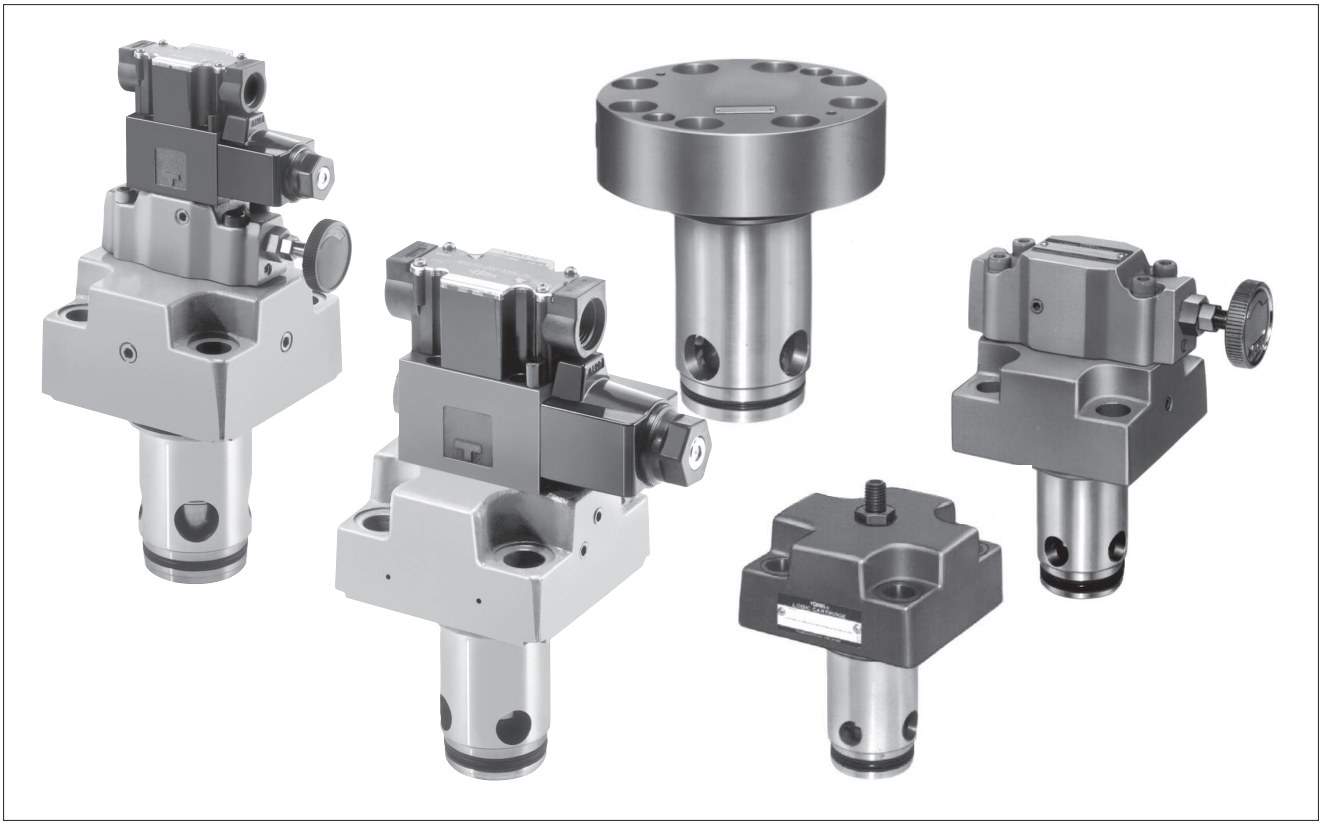
Logic Valves

Yuken Logic Valves comprise cartridge typed elements and covers with pilot passages. Various types may be combined for direction, flow rate and pressure control. Yuken Logic Valves can be incorporated in manifold blocks to form optimum integrated hydraulic circuits and compact hydraulic power units. Being a poppet type, the elements permit high-pressure, high flow rates, high speed and shockless shifting with low pressure drop. Typical applications include steel mill equipment, injection moulding machines, machine tools and so on. In addition, YUKEN's logic valves meet the cavity specifications (element insertion holes and cover mounting dimensions) of the ISO standard (ISO7368 TWO-PORT SLIP-IN CARTRIDGE VALVES CAVITIES).



Features

- Multifunction performance in terms of direction, flow and pressure can be obtained by combining elements and covers.
- Poppet-type elements virtually eliminate internal leakage and hydraulic locking. Because there are no overlaps, response times are very high, permitting high-speed shifting.
- For high pressure, large capacity systems, optimum performance is achieved with low pressure losses.
- Since the logic valves are directly incorporated in cavities provided in blocks, the system is free from problems related to piping such as oil leakage, vibration and noise, and higher reliability is achieved.
- Multifunction logic valves permit compact integrated hydraulic systems which reduce manifold dimensions and mass and achieve lower cost conventional types.

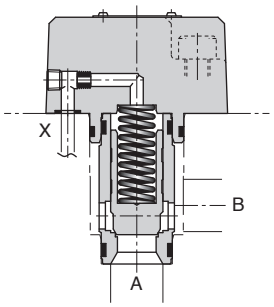


Structure and Functions

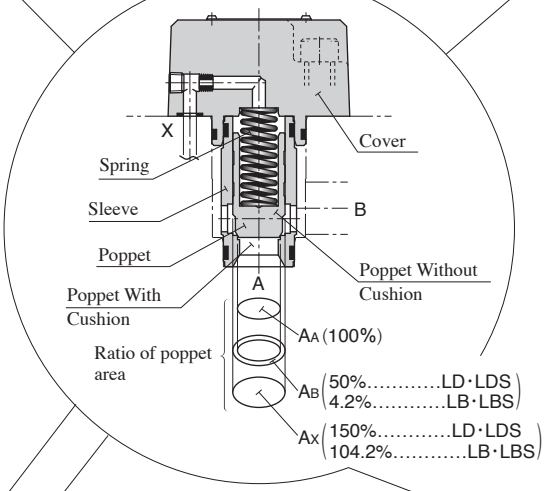
As shown below, a logic valve consists of a cover, a sleeve, a poppet and a spring incorporated in a block. Although it is a simple two-port valve designed to open and close the poppet in accordance with the pressure signals from the pilot line, it serves as a multifunctional valve for controlling the direction, flow and pressure by controlling the pressure signals. Standard covers have several pressure signal ports (pilot ports) and control valves for control purposes are available. The covers are spigot mounted. There is no risk of oil leakage.

Directional Control Logic Valve

(LD)

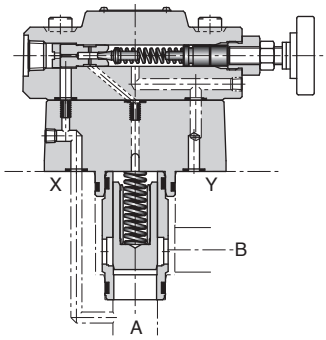


Basic Structure



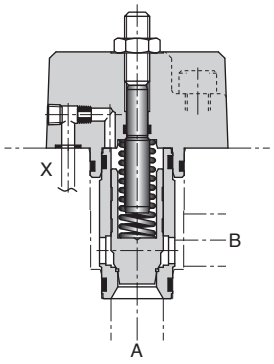
Relief Logic Valve

(LB)

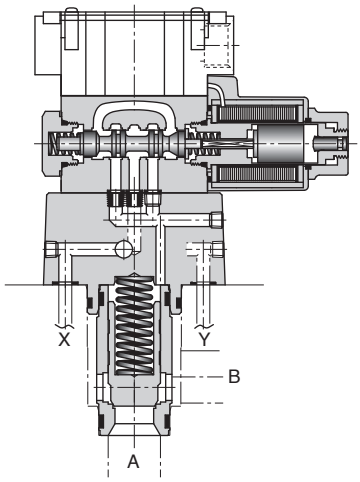


Directional & Flow Control Logic Valve

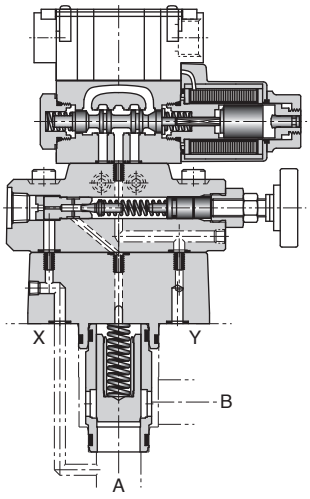
(LD-∗-∗-S-1 – 3)



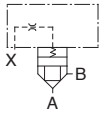
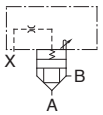
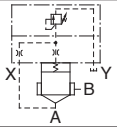
Solenoid Operated Directional Logic Valve (LDS)



Solenoid Controlled Relief Logic Valve (LBS)



● Functions, working area ratios and features

Functions	Graphic Symbols	Working area ratios (A_A : A_B)	Features
Direction		2 : 1	●Poppet Shape Without cushion ($\frac{LD}{LDS}$-∗-∗) : High-speed shift With cushion ($\frac{LD}{LDS}$-∗-∗-S) : Shockless shift ●No leakage between port A and B. ●Flow A to B and B to A are possible. ●Response time and shock can be adjusted by orifice selection.
Direction and Flow			●Poppet Shape With cushion (LD-∗-∗-S-$\frac{1}{2}$ / $\frac{1}{3}$) : Flow control ●No leakage between port A to B. ●Flow A to B only is possible. ●Response time and shock can be adjusted by orifice selection.
Relief		24 : 1	●Remote and unloading control is possible with vent circuit. (LB-∗-∗) ●Two or three pressure controls are possible in combination of solenoid operated directional valve and pilot relief valve. (LBS-∗-∗)

Directional Control/Directional & Flow Control Logic Valves

These valves are 2-way directional valves designed to open and close the circuits in accordance with pressure signals from the pilot lines. They are used as multifunctional valves for controlling flow directions or flow directions and rates. Standard covers are available so that optimum valves can be selected for control purposes.

LD-32

LD-80

Specifications

Model No.	(NOTE) Rated Flow L/min	Max. Operating Pressure MPa	Cracking Pressure MPa	Ratio of Poppet Area	Mass kg
LD-16	130	31.5	Refer to Model No. Designation	2 : 1 (Annular area 50 %)	1.6
LD-25	350				3.0
LD-32	500				5.3
LD-40	850				9.1
LD-50	1400				14.8
LD-63	2100				29.8
LD-80	3400				48
LD-100	5500				86

Note: The rated flow is values with a pressure drop of 0.3 MPa, fluid viscosity 35 mm²/s.

Model Number Designation

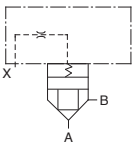
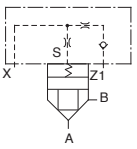
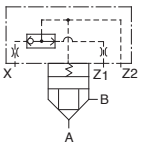
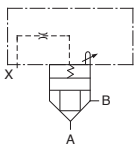
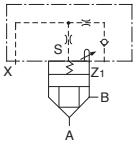
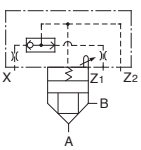
LD - 32 - 05 - S - 1 - X 05 - 12

- Design number (LD-80,100.....11)
- Designation of orifice
- Location of orifice (see the table right)
  - None : no orifice
  - X : Pilot port X
  - Z1 : Pilot port Z1
  - S : Port leading to spring
- Cover type (See the table right)
  - None, 1, 2, 3, 4, 5
- Poppet shape★
  - None : Without cushion
  - S : With cushion
- Cracking pressure (A→B)
  - None : No Spring
  - 05 : 0.05 MPa
  - 20 : 0.2 MPa
- Valve Size : 16, 25, 32, 40, 50, 63, 80, 100
- Directional control logic valves/Directional & flow control logic valves

★Poppet shapes

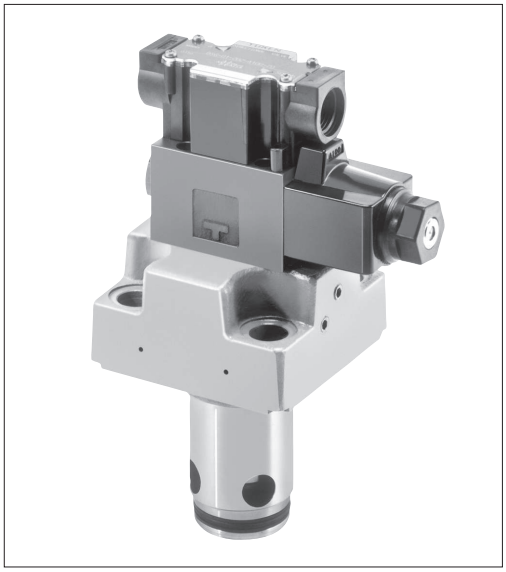
The type without a cushion and the type with a cushion are both suitable for high-speed shifting and shockless shifting respectively. For directional and flow control logic valves, be sure to specify "poppet with cushions".

List of Cover Types

	Cover Type Designation	Graphic Symbols	Valve Size 16	25	32	40	50	63	80	100
Directional Control	Standard (None)		○	○	○	○	○	○	○	○
	With Check Valve (4)		○	○	○	○	○	○	—	—
	With Shuttle Valve (5)		○	○	○	○	○	○	—	—
Directional & Flow Control	With Stroke Adjuster (1)		○	○	○	○	○	○	○	○
	With Check Valve & Stroke Adjuster (2)		○	○	○	○	○	○	—	—
	With Shuttle Valve & Stroke Adjuster (3)		○	○	○	○	○	○	—	—

Solenoid Operated Directional Control Logic Valves

These solenoid operated directional control logic valves are composed of directional control valves and solenoid operated directional valves combined together. The solenoid operated directional valves serve to switch pilot lines and the directional control valves are used to control the direction of the main circuits. Standard covers provided with various control valves are available to provide optimum control.



Specifications

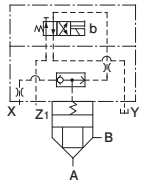
Model No.	(NOTE) Rated Flow L/min	Max. Operating Pressure MPa	Cracking Pressure MPa	Ratio of Poppet Area	Mass kg
LDS-25	350	31.5	Refer to Model No. Designation	2 : 1 (Annular area 50 %)	4.2
LDS-32	500				6.5
LDS-40	850				10.3
LDS-50	1400				18.6
LDS-63	2100				33.6

Note: The rated flow is values with a pressure drop of 0.3 MPa, fluid viscosity 35 mm²/s.

Model Number Designation

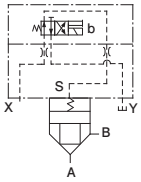
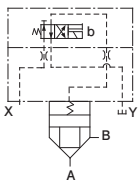
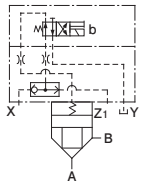
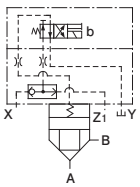
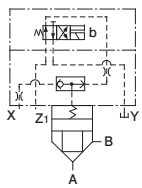
LDS-32-05-S-1-O-X 05-A100-C-N-14

- Design No. LDS-50, 63.....13
- Type of electrical conduit connection
  - None : Terminal box (standard)
  - N : Plug-in connector (option)
- Type of manual override
  - None : Manual override pin (standard)
  - C : Push button and lock nut (option)
- Coil type
  - A∗ : AC, R∗ : AC→DC rectified
  - D∗ : DC, RQ∗ : AC→DC rectified (quick return) (LDS-50, 63)
- Designation of orifice
- Location of orifice
  - None : No orifice
  - P : Pilot port P, B : Pilot port B
  - A : Pilot port A, X : Pilot port X
- Solenoid operated valve
  - None : With solenoid operated valve
  - O : Without solenoid operated valve
- Cover type (See the table right) 1, 2, 3, 4, 5, 6
- Poppet shape None : Without cushion, S : With cushion
- Cracking pressure (A→B) None : No spring, 05 : 0.05 MPa, 20 : 0.2 MPa
- Valve Size : 25, 32, 40, 50, 63
- Solenoid operated directional control logic valve

Normally Open with Shuttle Valve (6)		○	○	○	○	○

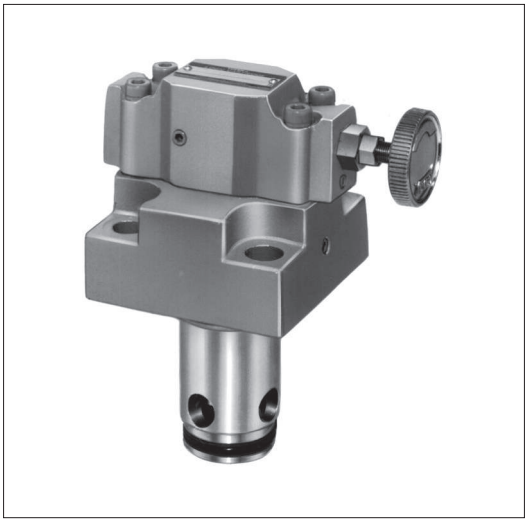
Note: In case of LDS- ∗-∗-∗-∗-O (without solenoid operated valve), the graphic symbol for the solenoid operated valve is excluded.

List of Cover Types

Cover Type Designation	Graphic Symbols	Valve Size 25	32	40	50	63
Normally Closed (1)		○	○	○	○	○
Normally Open (2)		○	○	○	○	○
Normally Closed with Shuttle Valve (3)		○	○	○	○	○
Normally Open with Shuttle Valve (4)		○	○	○	○	○
Normally Closed with Shuttle Valve (5)		○	○	○	○	○

Relief Logic Valves

These relief logic valves are used to protect pumps and control valves from excessive pressure and control the pressures of their hydraulic lines at constant levels. With the help of vent lines (Z1 or Z2 port), they are also capable of remote and unload control.



Specifications

Model No.	Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max. Flow L/min	Mass kg
LB-16-✻-✻-10	31.5	0.5 - 31.5	125	3.6
LB-25-✻-✻-10			250	4.5
LB-32-✻-✻-11			500	6.7
LB-50-✻-✻-11			1200	16.1

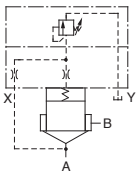
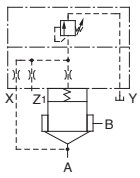
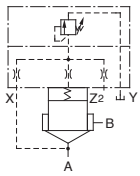
Model Number Designation

LB - 32 - V - Z1 - 11

- Design number
  - LB16, 25.....10
  - LB32, 50.....11
- Cover type (See the table right)
  - None, Z1, Z2
- Specify only for high-vent types★
- Valve size :
  - 16, 25, 32, 50
- Relief logic valve

★Use high-vent pressure types if the shifting time from unloading to on-loading is reduced.

List of Cover Types

Cover Type Designation	Graphic Symbols	Valve Size			
		16	25	32	50
Standard (None)		○	○	○	○
Vent Controlled (Z1)		○	○	○	○
Vent Controlled (Z2)		○	○	○	○

Solenoid Controlled Relief Logic Valves

These solenoid controlled relief logic valves are composite control valves having solenoid controlled directional and pilot relief valves and vent restrictors combined together. They are used to put pumps into unloading operation, with the solenoid controlled directional valves serving to select pilot lines, or to place hydraulic system two or three pressure controls, with the pilot relief valves in action.

Specifications

Model Numbers	Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max. Flow L/min	Mass kg
LBS-16-＊-＊-＊-14	31.5	0.5 - 31.5	125	3.6 - 8.5
LBS-25-＊-＊-＊-14			250	4.5 - 9.4
LBS-32-＊-＊-＊-14			500	6.7 - 11.6
LBS-50-＊-＊-＊-14			1200	16.1 - 21.0

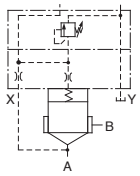
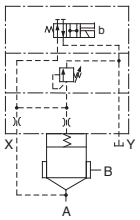
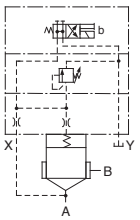
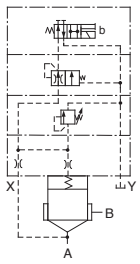
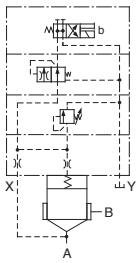
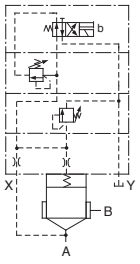
Model Number Designation

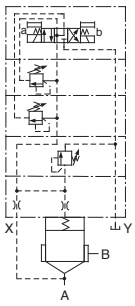
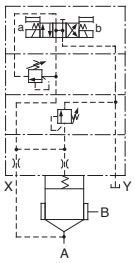
LBS - 32 - V - 1 - A100 - C - N - 14

- 14 — Design number
- N — Type of electrical conduit connection
  - None：Terminal box (standard)
  - N：Plug-in connector (option)
- C — Type of manual override
  - None：Manual override pin (standard)
  - C：Push button and lock nut (option)
- A100 — Coil type
  - A＊：AC
  - D＊：DC
  - R＊：AC→DC rectified
- 1 — Cover type (See the following page)
  - 0：No solenoid operated valve
  - 1：Normally closed, for unloading(Solenoid operated valve spool type: 2B3A)
  - 2：Normally open, for unloading(Solenoid operated valve spool type: 2B3B)
  - 3：Normally closed, with vent restrictor (Solenoid operated valve spool type: 2B3A)
  - 4：Normally open, with vent restrictor (Solenoid operated valve spool type: 2B3B)
  - 5：Two-pressure control (Solenoid operated valve spool type: 2B2)
  - 6：Three-pressure control (Solenoid operated valve spool type: 3C9)
  - 7：Two-pressure control and unloading(Solenoid operated valve spool type: 3C3)
- V — Specify only for high-vent types★
- 32 — Valve size：16, 25, 32, 50
- LBS — Solenoid controlled relief logic valve

★Use high-vent pressure types if the shifting time from unloading to on-loading is reduced.

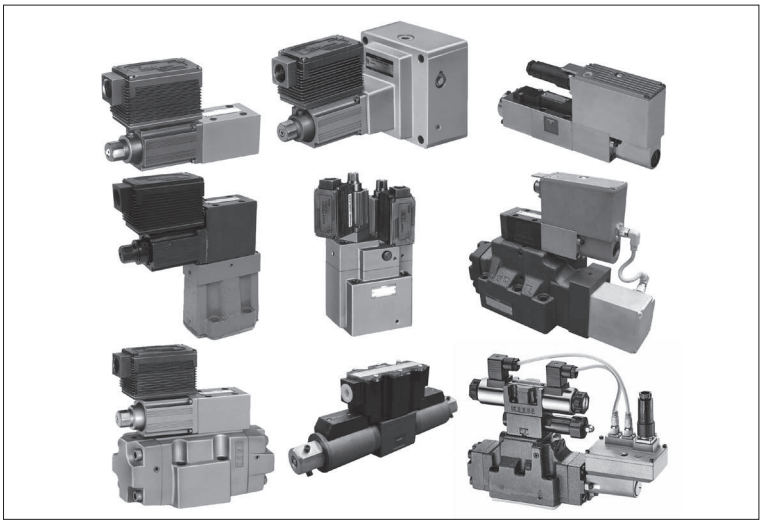
List of Cover Type (LBS)

Cover Type Designation	Graphic Symbols	Valve Size			
		16	25	32	50
Without Solenoid Valve (0)		○	○	○	○
Normally Closed for Unloading (1)		○	○	○	○
Normally Open for Unloading (2)		○	○	○	○
Normally Closed with Vent Restrictor (3)		○	○	○	○
Normally Open with Vent Restrictor (4)		○	○	○	○
Two Pressure Control (5)		○	○	○	○

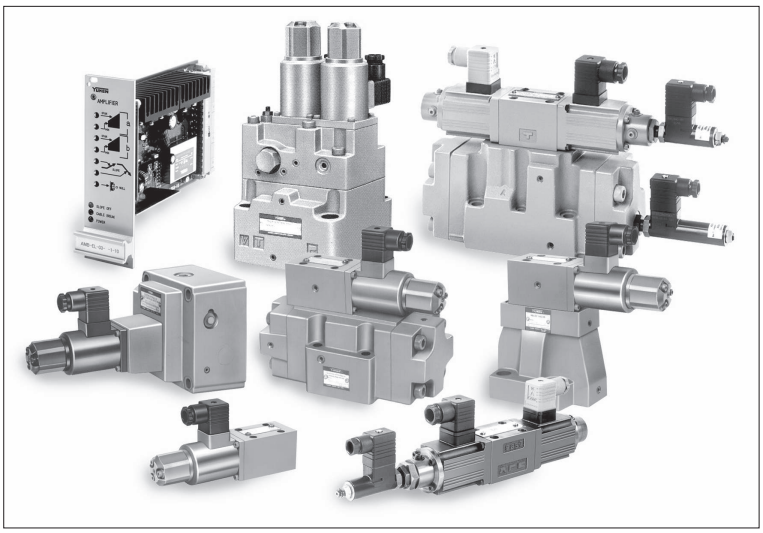
Cover Type Designation	Graphic Symbols	Valve Size			
		16	25	32	50
Three Pressure Control (6)		○	○	○	○
Two Pressure Control and Unloading (7)		○	○	○	○

PROPORTIONAL ELECTRO-HYDRAULIC CONTOROLS

■ **EH Series-Hybrid Components** ..... Page H-3
Proportional Electro-Hydraulic Control Valves



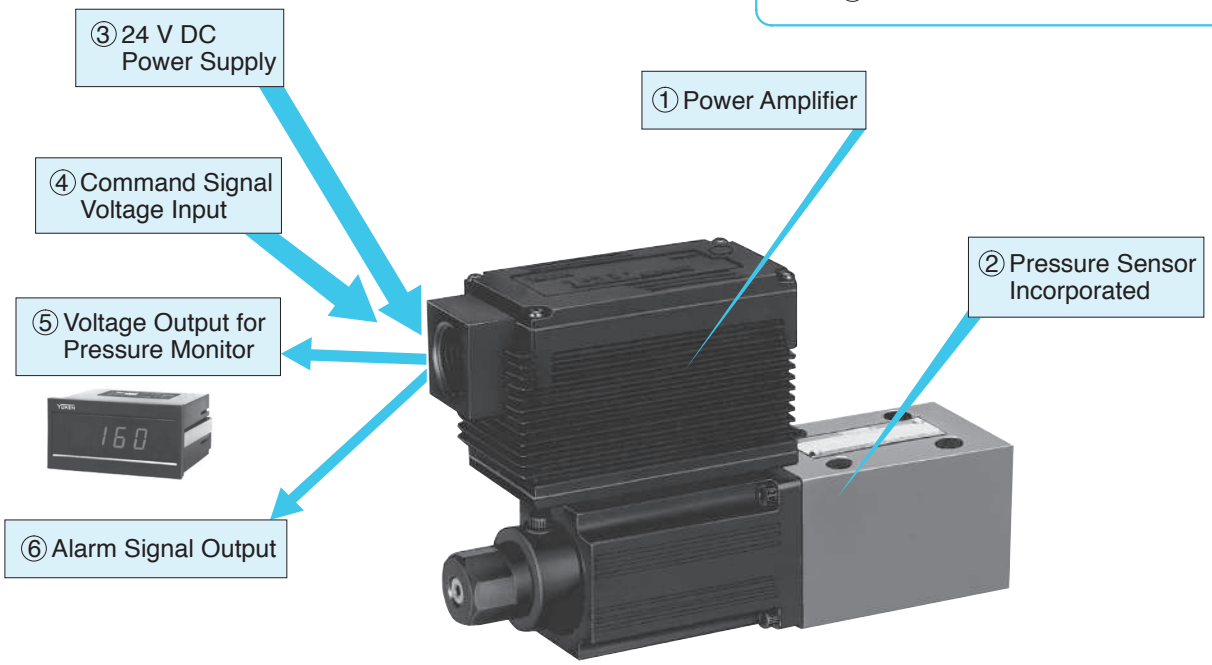
■ **E Series** ..... Page H-89
Proportional Electro-Hydraulic Controls



High-accuracy, simple, convenient
EH Series realizes your dreams.

Why simple ?

Highly accurate hydraulic control can be obtained only by supplying 24 V DC power ③[★3] and inputting a command signal voltage of 0 to 5 V ④.[★4]



Details of Proportional Electro-Hydraulic Relief Valve

Why high-accuracy ?

The power amplifier ① and pressure sensor ②[★1] are integrated in the control valve.
Furthermore, the closed-loop control [★2] design greatly improves the linearity, hysteresis and stability in control pressure.

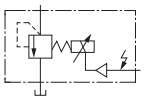
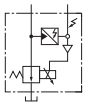
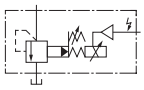
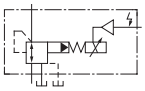
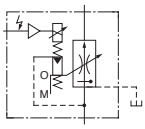
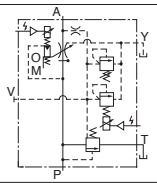
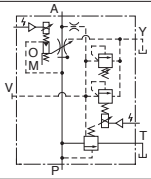
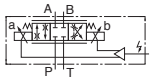
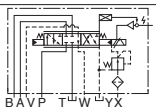
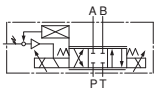
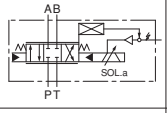
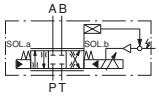
Why convenient ?

Analog voltages can be output by using the incorporated sensor for monitoring pressure, etc. ⑤[★5].
Pressure can be displayed remotely with the indicators obtainable in the market and also can be transmitted into a computer.

If any trouble arises in the system and the command signal does not match to the output, the alarm signal ⑥ is dispatched.
The trouble, if arises, can be easily detected by monitoring the dispatch of the alarm signal with sequence controller or computer.

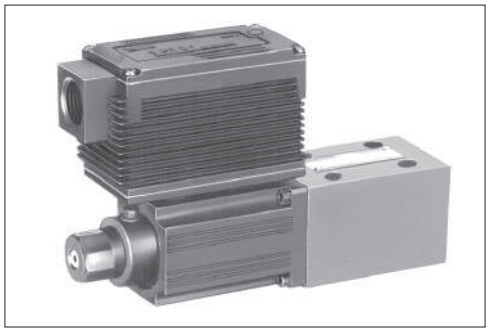
★1. Pressure sensors are incorporated only in pressure control valves. Directional and flow control valves (EHDFG-04,06) use a spool position sensor. However, some types of pressure control valves and directional/ flow control valves do not incorporate a sensor.
★2. Open-loop types are also available.
★3. EHDFG-04 and 06: ±24 V DC power supply is needed.
★4. The following products have the following command signal voltages and currents.
EHDFG-01, 03, 04, 06:0−±5 V
ELDFG-01EH, 03EH:0−±10 V, 4−20 mA, 0−±10 mA
ELDFHG-03EH, 04EH, 06EH, 10EH, ECDFHG-04EH, 06EH:
0−±10 V, 4−20 mA, 0−±10 mA
★5. Spool displacement for the following products is shown in %.
EHDFG-04, 06
ELDFG-01EH, 03EH
ELDFHG-03EH, 04EH, 06EH, 10EH
ECDFHG-04EH, 06EH

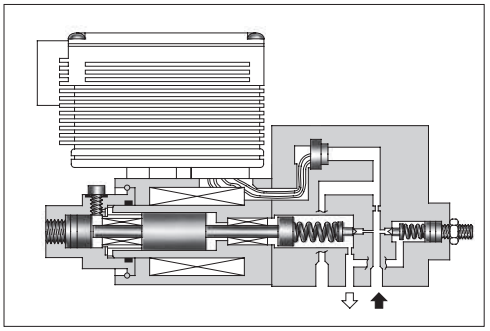
EH Series-Hybrid Components
Proportional Electro-Hydraulic Controls

Type	Graphic Symbol	Max. Operating Pressure MPa	Maximum Flow L/min: 1 2 3 5 10 20 30 50 100 200 300 500 1000 1500	Page
Pilot Relief Valves		24.5	EHDG 01	H-4
Pressure Control Valves		SB1110: 24.5 SB1190: 7.0	SB1110 / SB1190	H-11
Relief Valves		24.5	EHBG 03 06 10	H-15
Relieving and Reducing Valves		24.5	EHRBG 06 10	H-23
Flow Control (and Check) Valves		03: 20.6 06: 24.5	EHFG EHFCG 03 06	H-29
Flow Control and Relief Valves		24.5	EHFBG 03 06 10	H-36
High Flow Series Flow Control and Relief Valves		24.5	EHFBG 03 06	H-45
Directional and Flow Control Valves		25	EHDFG 01 03	H-51
High Response Type Directional and Flow Control Valves		15.7	EHDFG 04 06	H-57
Direct Operated and High Response Type Directional and Flow Control Valves		35	ELDFG 01EH 03EH	H-62
Two Stage Type High Response Type Directional and Flow Control Valves		04EH 06EH350:35 10EH 03EH 06EH500:31.5	ELDFHG 03EH 04EH 06EH 10EH	H-68
Directional and Flow Control Valves (with Main Valve Feedback Control)		04EH:35 06EH:31.5	ECDFHG 04EH 06EH	H-80

Proportional Electro-Hydraulic Pilot Relief Valves

The valve can be used as a pilot valve of the proportional electro-hydraulic control valves.
The valve can also be used as a relief valve for the hydraulic system where a small flow rate and continuous pressure control are required.



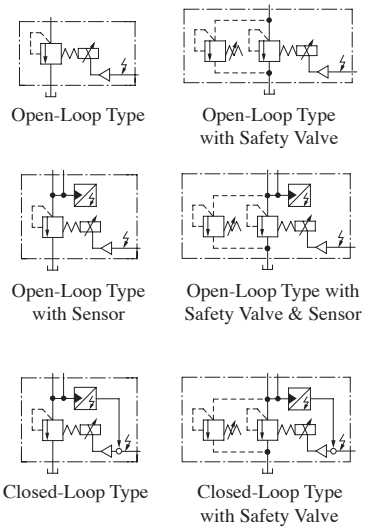


Specifications

Descriptions \ Model Numbers	EHDG-01∗
Max. Operating Pres. MPa	24.5
Max. Flow L/min	2
Min. Flow L/min	0.3
Pressure Adjustment Range	Refer to Model Number Designation
Coil Resistance	10 Ω
Hysteresis	3% (1%)★1 or less
Repeatability	1%★2 or less
Frequency Response	B : 10 (27) Hz★1 C : 10 (27) Hz★1 (-90 degree) H : 12 (27) Hz★1
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)
Power Input (Max.)	28 W
Input Signal Voltage	B : 6.9 MPa / 5 V DC C : 15.7 MPa / 5 V DC H : 24.5 MPa / 5 V DC
Input Impedance	10 kΩ
Alarm Signal Output (Open Collector)	Voltage: Max. 30 V DC Current: Max. 40 mA
Pressure Signal Output	B : 5 V DC / 6.9 MPa C : 5 V DC / 15.7 MPa H : 5 V DC / 24.5 MPa
Ambient Temperature	0 - 50°C (With Circulated Air)
Mass	Refer to Page H-6

★1. The value in parentheses is for the closed-loop type.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols



Model Number Designation

EHD	G	-01	V	-B	-S	-1	-PN	T15	M10	-50
Series Number	Type of Mounting	Valve Size	Applicable Control	Pres. Adj. Range MPa (PSI)	Control Type	Safety Valve	P-Line Orifice	T-Line Orifice	P-B Line Orifice	Design Number
EHD : Proportional Electro-Hydraulic Pilot Relief Valve	**G**: Sub-Plate Mounting	**01**	**None**: For general use **V** : Vent Control of Relief Valve (Omit if not required)	**B**: 0.5 - 6.9 **C**: 1 - 15.7 **H**: 1.2 - 24.5	**None**: Open-Loop **S**: Open-Loop with Sensor **L** : Closed-Loop★1	**None**: Without Safety Valve **1** : With Safety Valve	**PN** : Without Orifice (Standard)	**T15** **T13** **T11** ★2	— **M10**: Standard Orifice	**50**

★1. For closed-loop models, specify applicable control code "V" even though the valve may not be used as vent control of relief valve.
★2. Standard of T-line Orifice.
Pres. Adj. Range B:T15, C:T13, H:T11.
★3. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHDG-01＊-＊-＊-PNT＊	M5 × 45 L·····4 Pcs.
EHDG-01＊-＊-S＊-＊-PNT＊M10	M5 × 75 L·····4 Pcs.
EHDG-01V-＊-L＊-＊-PNT＊M10	

Sub-Plate

Sub-Plate Model Numbers	Thread Size Rc	Mass kg
DSGM-01-31	1/8	0.8
DSGM-01X-31	1/4	
DSGM-01Y-31	3/8	

● Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

Instructions

Piping to the Reservoir

The tank port should be connected directly to the reservoir with a back pressure of not more than 0.2 MPa. Be sure the end of pipe is dipped into the oil in the reservoir.

Vent Control

When this valve is to be used as a relief valve or for other valve vent control purposes, use 6 mm ID, 300 mm or less long pipes for piping connections.

If pressure instability is encountered, provide a 1 - 1.5 mm diameter orifice for the relief or other valve vent port.

Circuit Pressure Control

When circuit pressure is directly controlled by this valve, make sure that the trapped oil volume is exceeding 40 cm^3.

Low Flow Rates

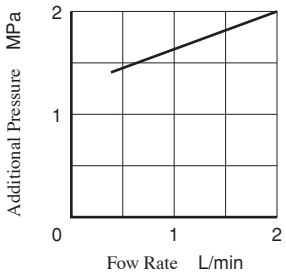
The preselected pressure may become instable. To avoid such pressure instability, the flow rate should not be lower than 0.3 L/min.

Safety Valve Pressure Setting

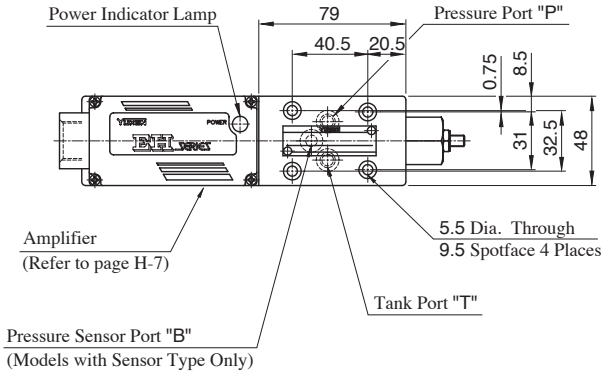
The safety valve pressure setting at the maximum flow rate is preset to a level that is 2 MPa higher than the pressure adjustment range upper limit. If the operating pressure upper limit is low or a different flow rate upper limit is used, make adjustment after calculating the safety valve pressure setting from the following equation:

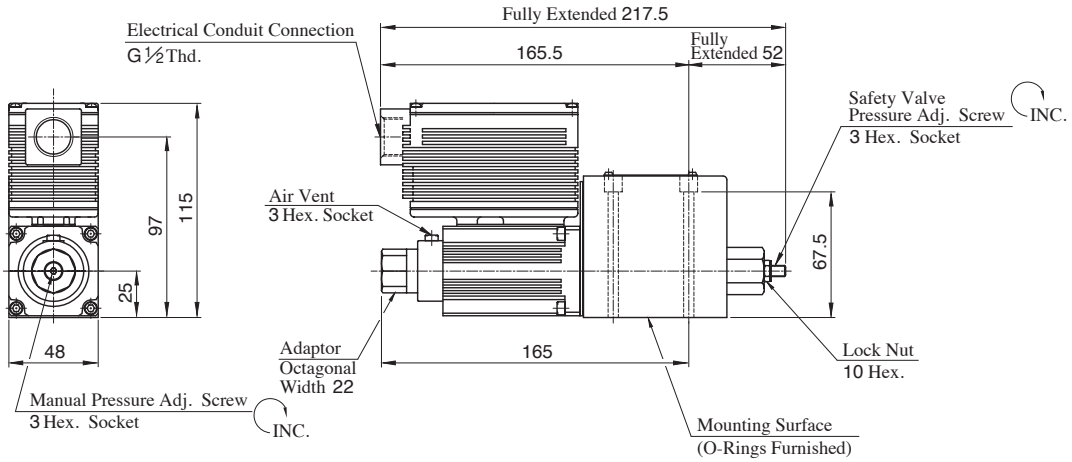
Pressure setting = (Operating pressure upper limit) + (Additional pressure indicated below)

To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.



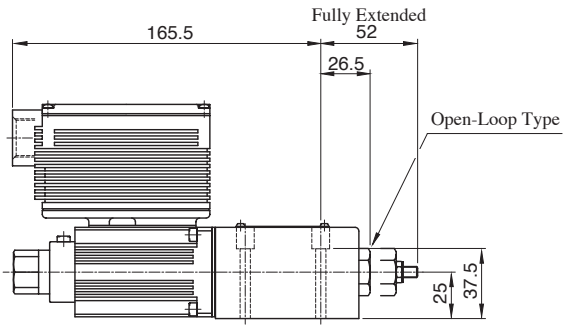
EHDG-01＊-＊-S-1-PNT＊M10-50：Open-Loop Type with Sensor and Safety Valve
EHDG-01＊-＊-L-1-PNT＊M10-50：Closed-Loop Type with Safety Valve





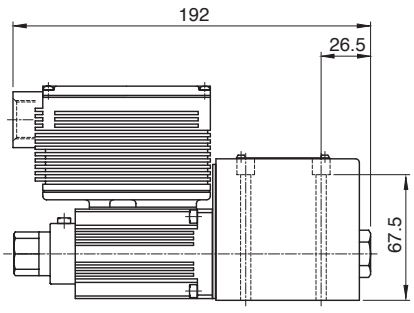
Mass·····2.9 kg

EHDG-01＊-＊-PNT＊-50：
Open-Loop Type
EHDG-01＊-＊-1-PNT＊-50：
Open-Loop Type with Safety Valve



Mass·····2.2 kg

EHDG-01＊-＊-S-PNT＊M10-50：
Open-Loop Type with Sensor
EHDG-01＊-＊-L-PNT＊M10-50：
Closed-Loop Type

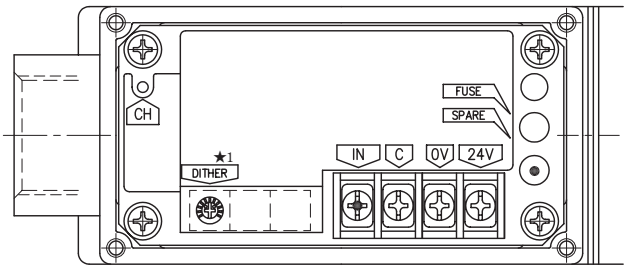


Mass·····2.9 kg

Detail of Amplifier

Connectiing Terminal

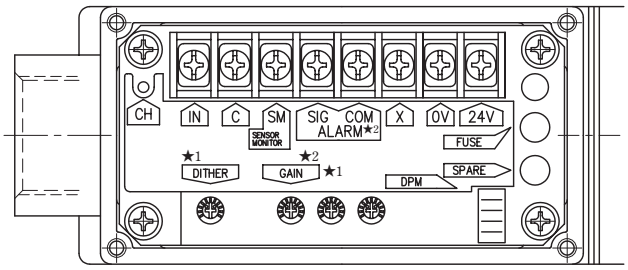
● Open-Loop Type



Terminal	Name
IN	Input Signal (+)
C	Input Signal (COM)
0 V	Power Supply
24V	
CH	Output Current Check (to C)

★1. DITHER/GAIN
Use as they are since they are factory-preset to the optimum position.
(Do not touch them in normal condition.)

● Closed-Loop Type
● Open-Loop Type with Sensor

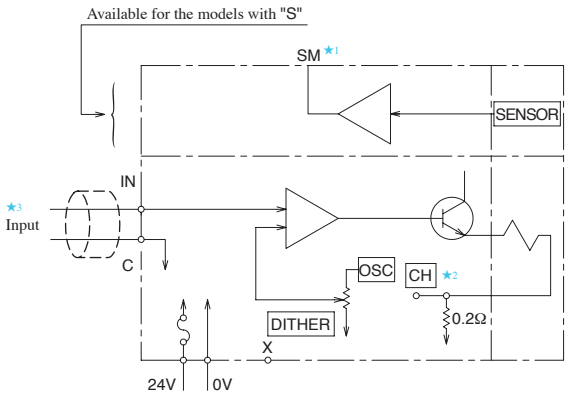


Terminal		Name
IN		Input Signal (+)
C		Input Signal (COM)
SM		Sensor Monitor (to C)
ALARM	SIG	Alarm Output★2
	COM	
X		(Open)
0 V		Power Supply
24V		
CH		Output Current Check (to C)

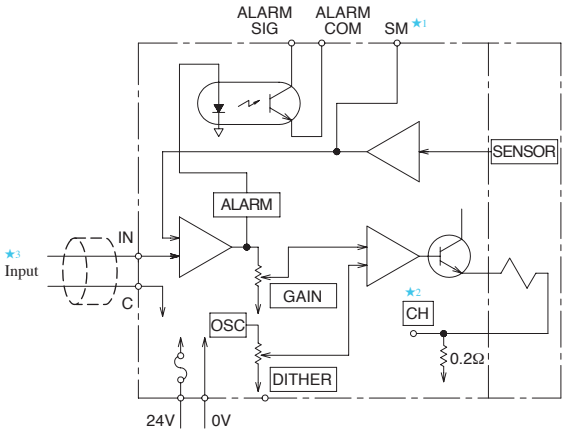
★2. GAIN/ALARM
GAIN adjusting volume is not available for open-loop type with sensor.

Circuit Schematic

● Open-Loop Type
● Open-Loop Type with Sensor

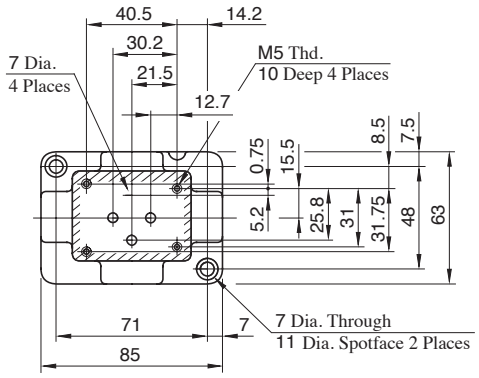


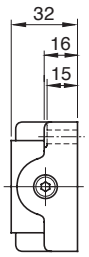
● Closed-Loop Type

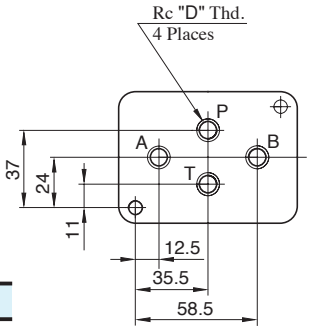


★1. For "SM" terminal, external instruments should have input impedance of more than 10 kΩ.
★2. For "CH" terminal, external instruments should have input impedance of more than 10 kΩ.
★3. Use shielded cable for "Input" connection. The ground of the shielded cable must be connected to input signal side.

Sub-Plates : DSGM-01, 01X, 01Y





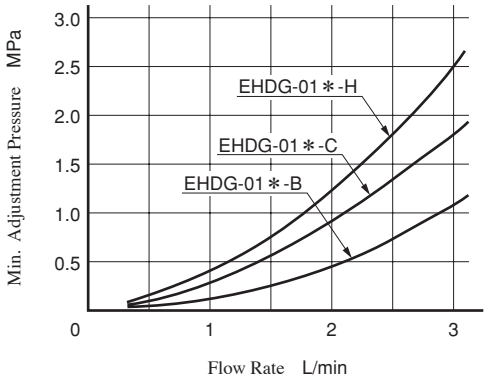


Sub-Plate Model No.	D
DSGM-01-31	1/8
DSGM-01X-31	1/4
DSGM-01Y-31	3/8

Min. Adjustment Pressure

EHDG-01∗-C B H

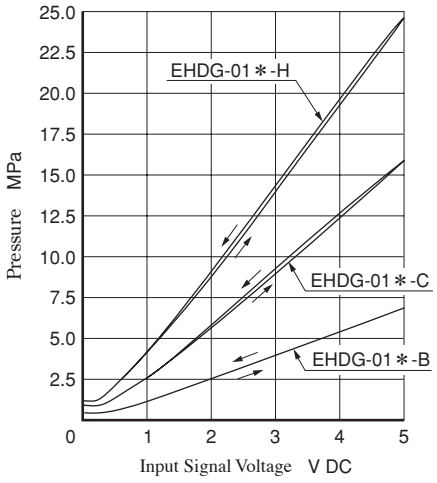
Viscosity: 30 mm²/s



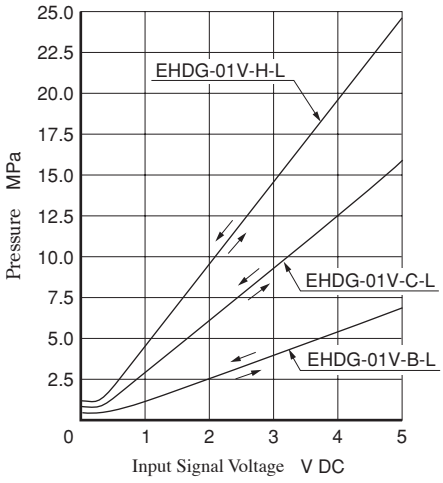
Input Signal Voltage vs. Pressure

Flow Rate : 2 L/min
Viscosity : 30 mm²/s

Open-Loop Type



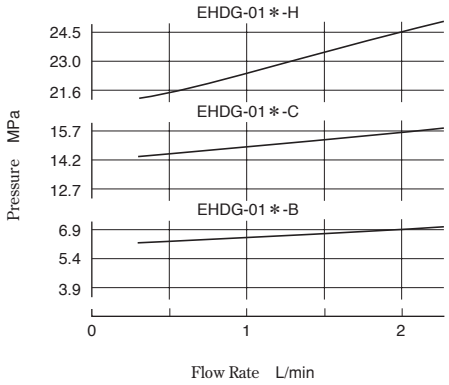
Closed-Loop Type



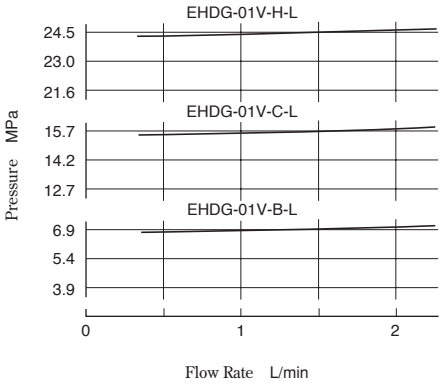
Flow Rate vs. Pressure

Viscosity : 30 mm²/s

Open-Loop Type
EHDG-01＊-＊



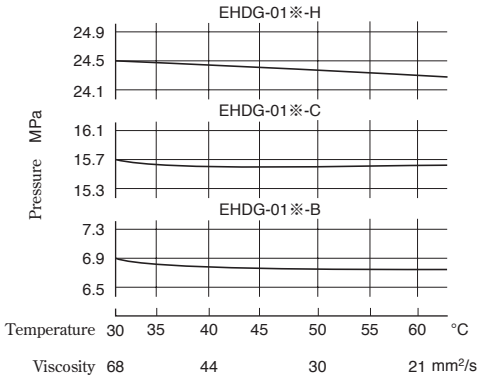
Closed-Loop Type
EHDG-01V-＊-L



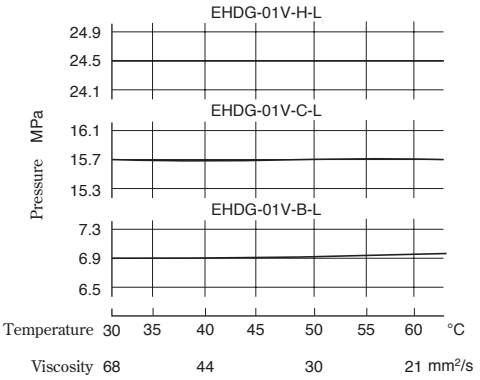
Viscosity vs. Pressure

Flow Rate : 2 L/min
Oil : ISO VG 46 Oil

Open-Loop Type
EHDG-01＊-＊

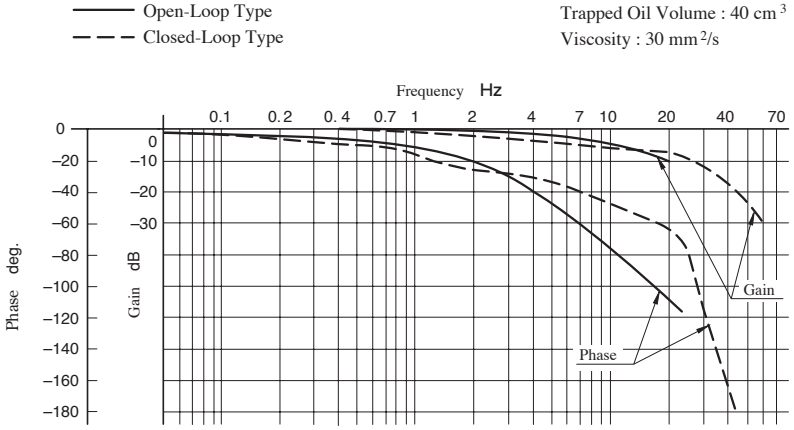


Closed-Loop Type
EHDG-01V-＊-L



Frequency Response

Flow Rate : 2 L/min
Pressure : 7.8 ± 1.6 MPa
Trapped Oil Volume : 40 cm³
Viscosity : 30 mm²/s



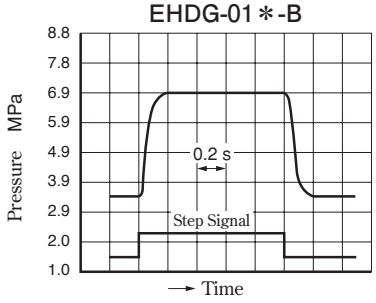
Step Response (Example)

The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combinations with other control valves.

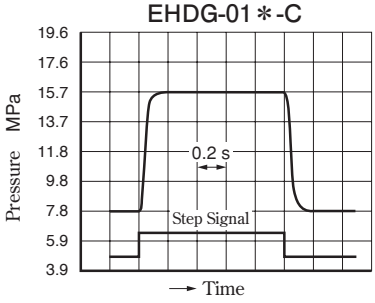
Flow Rate : 2 L/min
Trapped Oil Volume : 40 cm^3
Viscosity : 30 mm^2/s

Open-Loop Type

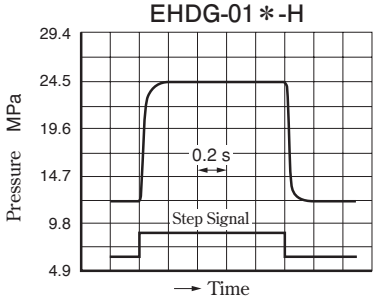
EHDG-01∗-B



EHDG-01∗-C

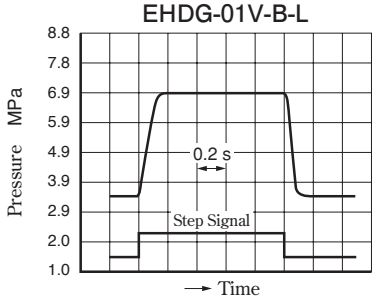


EHDG-01∗-H

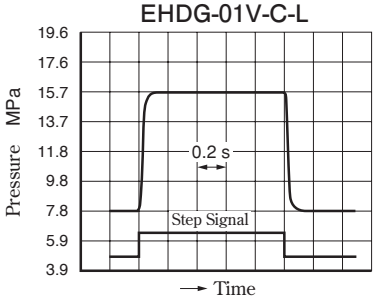


Closed-Loop Type

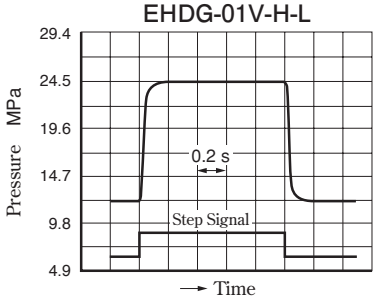
EHDG-01V-B-L



EHDG-01V-C-L

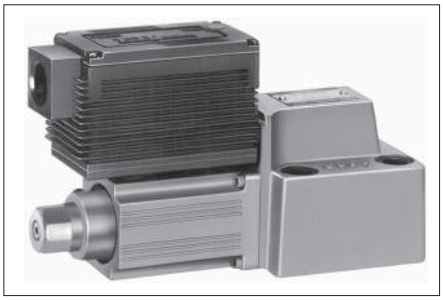


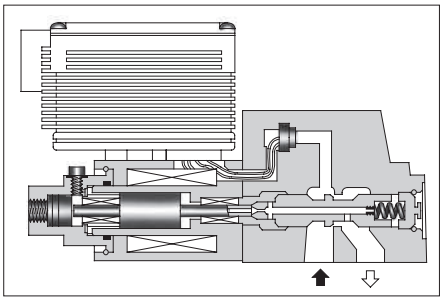
EHDG-01V-H-L



Proportional Electro-Hydraulic Pressure Control Valves

These are closed-loop type pressure control valves controlling the system pressure from low to high in proportion to the input voltage. The stable pressure control is possible even in a small flow rate.



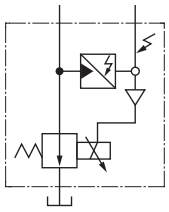


Specifications

Descriptions \ Model Numbers	SB1110	SB1190
Max. Operating Pres. MPa	B: 6.9 H: 24.5	7.0
Max. Flow L/min	30	70
Min. Flow L/min	B: 0.5 H: 0.5 (at 0.2 - 6.9 MPa) 1.5 (at 6.9 - 15.7 MPa) 3.0 (at 15.7 - 24.5 MPa)	1
Pressure Adjustment Range	Refer to Model Number Designation	
Coil Resistance	10 Ω	
Hysteresis	1 % or less	1.5 % or less
Repeatability	1 % ★1 or less	
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)	
Power Input (Max.)	28 W	
Input Signal Voltage	B: 6.9 MPa / 5 V DC H: 24.5 MPa / 5 V DC	7.0 MPa / 5 V DC
Input Impedance	10 kΩ	
Alarm Signal Output (Open Collector)	Voltage: Max. 30 V DC Current: Max. 40 mA	
Pressure Signal Output	B: 5 V DC / 6.9 MPa H: 5 V DC / 24.5 MPa	5 V DC / 7.0 MPa
Ambient Temperature	0 - 50°C (With Circulated Air)	
Mass	3.3 kg	10.2 kg

★1. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbol



Model Number Designation

SB1110	-B	-20
Series Number	Pres. Adj. Range MPa	Design Number
SB1110: Proportional Electro-Hydraulic Pressure Control Valve (3/8, Sub-Plate Mounting)	**B**: 0.2 ★- 6.9 **H**: 0.2 ★- 24.5	**20**
SB1190: Proportional Electro-Hydraulic Pressure Control Valve (3/4, Sub-Plate Mounting)	**B**: 0.2 ★ - 7.0	**10**

★1. The minimum adjustable pressure is the value obtained at Max. Flow.

★2. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
SB1110	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
SB1190	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7

- Sub-plates are available. Specify sub-plate model from the table above.
  When sub-plates are not used, the mounting surface should have a good machined finish. (▽)

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
SB1110	M12 × 65 L·····4 Pcs.
SB1190	M16 × 100 L·····4 Pcs.

Instructions

Safety Valve

As the function of safety valve has not been included in the valve itself, provide safety valve in the hydraulic circuit if required.

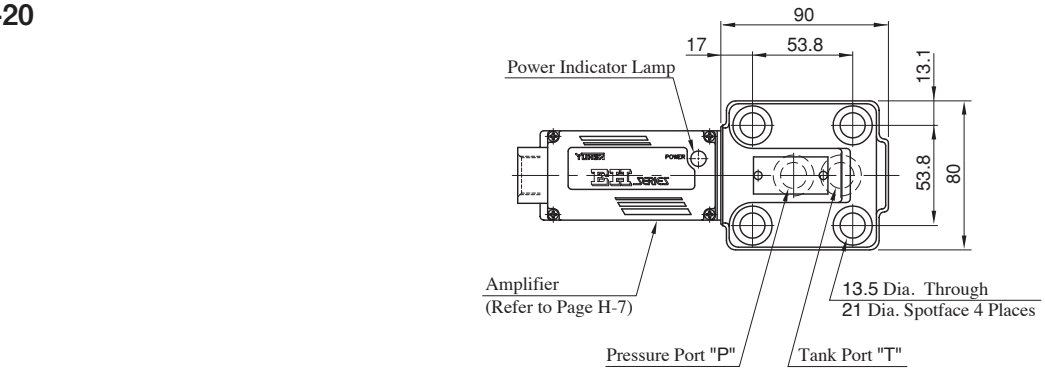
Piping to the Reservoir

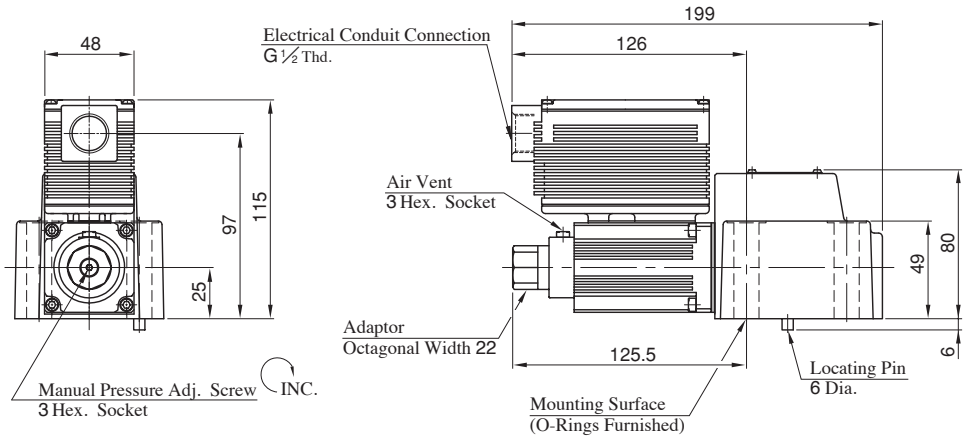
The tank port should be connected directly to the reservoir. Be sure the end of pipe is dipped into the oil in the reservoir.

Low Flow Rates

The preselected pressure may become instable. To aboid such pressure instability, the flow rate should not be lower than minimum flow.

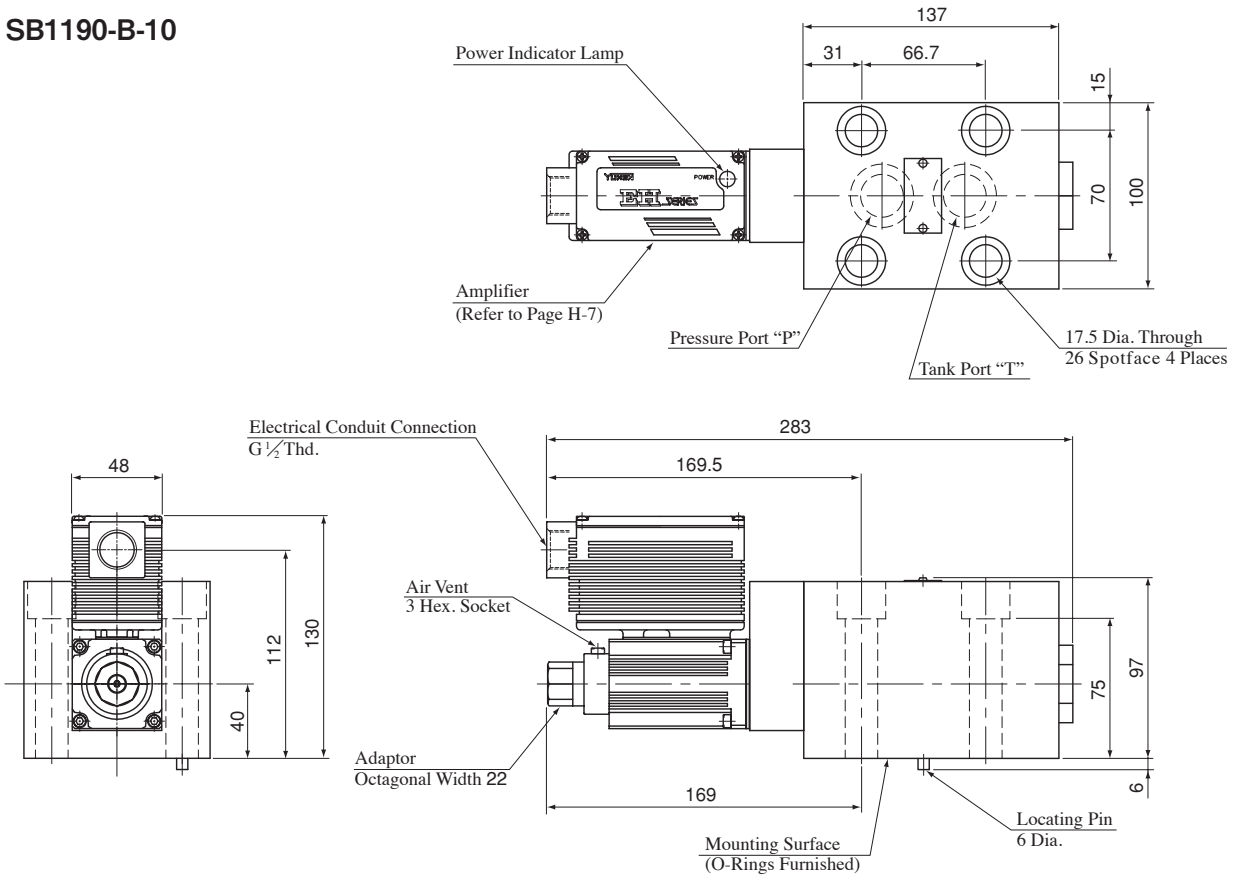
SB1110-∗-20





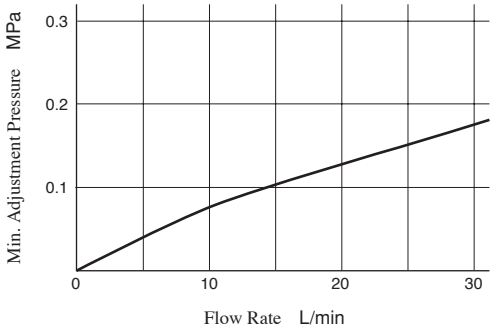
- Sub-plate is common to that of EBG-03. Refer to page H-18 for the dimensions of mounting surface.

SB1190-B-10

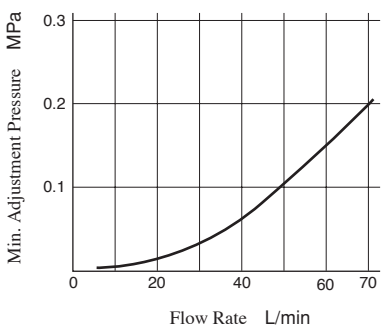


Min. Adjustment Pressure

SB1110 Viscosity : 30 mm²/s

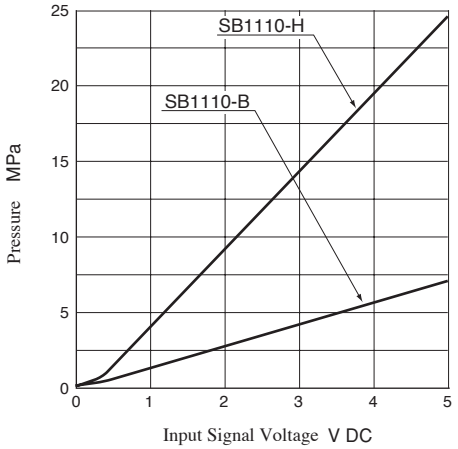


SB1190 Viscosity : 30 mm²/s

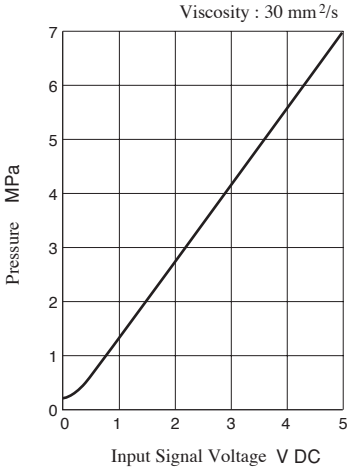


Input Signal Voltage vs. Pressure

SB1110 Flow Rate : 30 L/min
Viscosity : 30 mm²/s

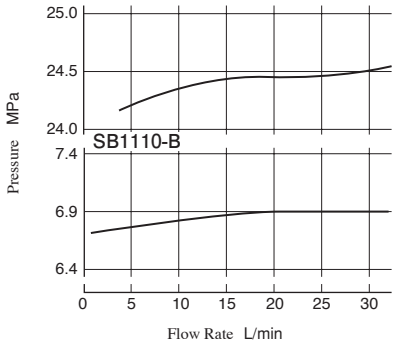


SB1190 Flow Rate : 70 L/min
Viscosity : 30 mm²/s

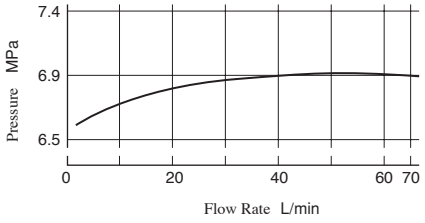


Flow Rate vs. Pressure

SB1110-H Viscosity : 30 mm²/s

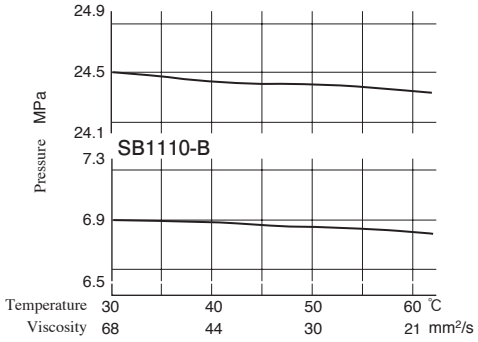


SB1119 Viscosity : 30 mm²/s

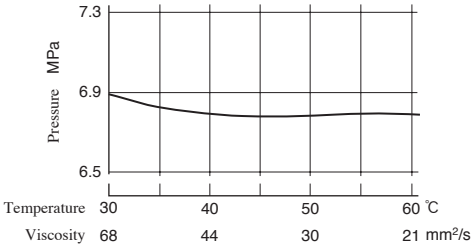


Viscosity vs. Pressure

SB1110-H Flow Rate : 30 L/min Oil : ISO VG46

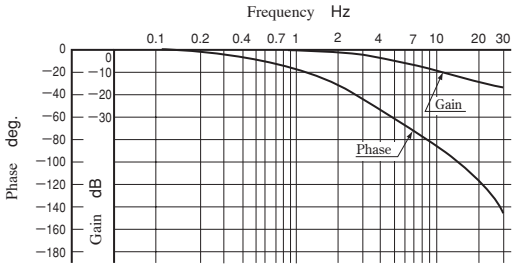


SB1119 Flow Rate : 70 L/min Oil : ISO VG46

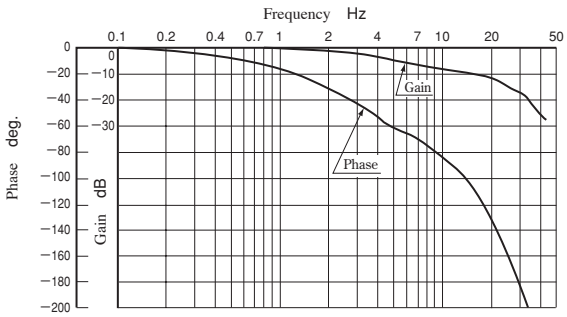


Frequency Response

Flow Rate : 30 L/min
Pressure : 7.8 ± 1.6 MPa
Trapped Oil Volume : 500 cm³
Viscosity : 30 mm²/s



Flow Rate : 70 L/min
Pressure : 3.4 ± 0.7 MPa
Trapped Oil Volume : 1035 cm³
Viscosity : 30 mm²/s

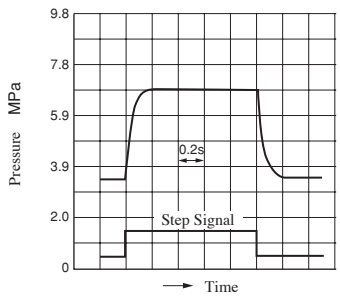


Step Response (Example)

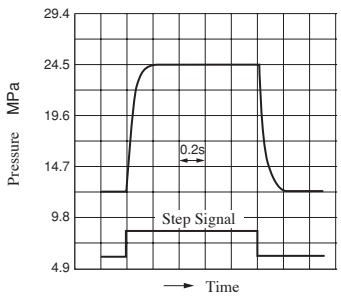
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

Flow Rate : 30 L/min
Trapped Oil Volume : 500 cm³
Viscosity : 30 mm²/s

SB1110-B

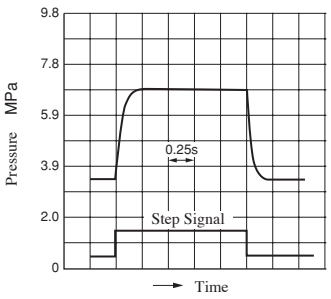


SB1110-H



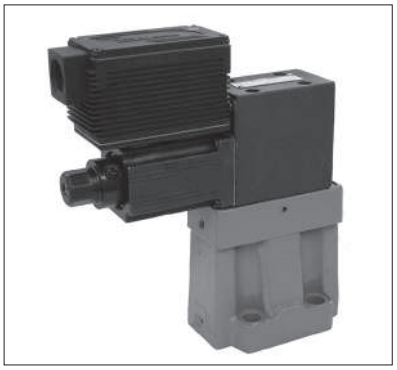
Flow Rate : 70 L/min
Trapped Oil Volume : 1035 cm³
Viscosity : 30 mm²/s

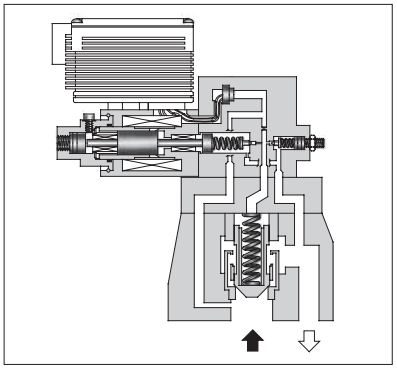
SB1190-B



Proportional Electro-Hydraulic Relief Valves

These valves, consist of a small size but high performance EH series electro-hydraulic proportional pilot relief valve and a low noise type relief valve. The valves control the system pressure proportionally through a controlled input voltage.



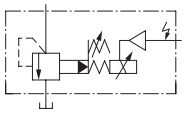


Specifications

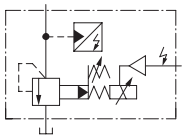
Descriptions \ Model Numbers	EHBG-03	EHBG-06	EHBG-10
Max. Operating Pres.	24.5 MPa		
Max. Flow	100 L/min	200 L/min	400 L/min
Min. Flow	3 L/min	3 L/min	3 L/min
Pressure Adjustment Range	Refer to Model Number Designation		
Coil Resistance	10 Ω		
Hysteresis	2% (1%) ★1 or less		
Repeatability	1% ★2 or less		
Frequency Response	C : 10 (22) Hz★1 H : 10 (25) Hz★1 (-90 degree)	C : 11 (22) Hz★1 H : 13 (24.5) Hz★1 (-90 degree)	C : 7 (10.5) Hz★1 H : 6 (14) Hz★1 (-90 degree)
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)		
Power Input (Max.)	28 W		
Input Signal Voltage	C : 15.7 MPa / 5 V DC H : 24.5 MPa / 5 V DC (At Max. Flow)		
Input Impedance	10 kΩ		
Alarm Signal Output (Open Collector)	Voltage: Max. 30 V DC Current: Max. 40 mA		
Pressure Signal Output	C : 5 V DC / 15.7 MPa H : 5 V DC / 24.5 MPa		
Ambient Temperature	0 - 50°C (With Circulated Air)		
Mass	Refer to Page H-17		

★1. The value in parentheses is for the closed-loop type.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

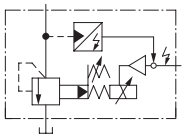
Graphic Symbols



Open-Loop Type



Open-Loop Type with Sensor



Closed-Loop Type

Model Number Designation

EHB	G	-03	-C	-S	-50
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa	Control Type	Design Number
EHB: Proportional Electro-Hydraulic Relief Valve	**G**: Sub-Plate Mounting	**03**	**C** : ★-15.7 **H** : ★-24.5	**None**: Open-Loop	**50**
		06		**S**: Open-Loop with Sensor	**50**
		10		**L** : Closed-Loop	**50**

Note1: For the lower limits of the adjustable pressure shown with an asterisk (★), see the minimum adjustable pressure characteristics on page H-19.
Note2: Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHBG-03	M12 × 40 L·····4 Pcs.
EHBG-06	M16 × 50 L·····4 Pcs.
EHBG-10	M20 × 60 L·····4 Pcs.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHBG-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
EHBG-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7
EHBG-10	BGM-10-20	1 1/4	8.4
	BGM-10X-20	1 1/2	10.3

● Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (▽16)

Instructions

Piping to the Reservoir

The tank port should be connected directly to the reservoir. Be sure the end of pipe is dipped into the oil in the reservoir.

Low Flow Rates

A flow rate of 3 L/min or higher should be used to avoid preselected pressure instability.

Safety Valve

At shipment, the pressure of safety valves is set to the upper limits of the adjustable pressure ranges plus the extra as shown below.

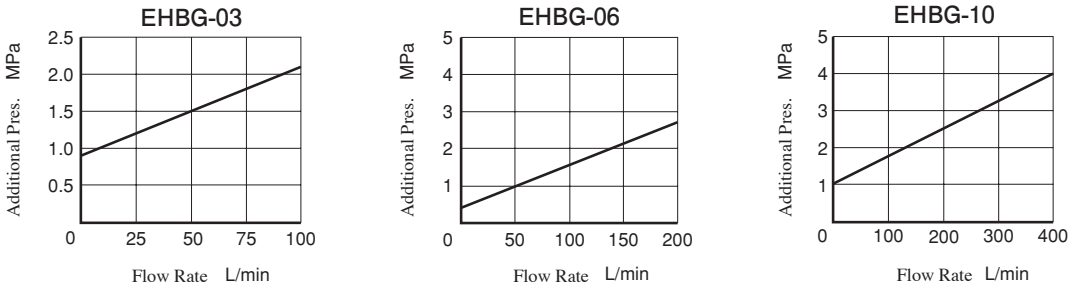
Additional Pressures for Safety Valves at Shipment

Model No.	Additional Pressures at Shipment MPa	
EHBG-03	1.5	(at 50 L/min)
EHBG-06	1.5	(at 100 L/min)
EHBG-10	2.5	(at 200 L/min)

If the operating pressure upper limit is low or a different flow rate upper limit is used, make adjustment after calculating the safety valve pressure setting from the following equation;

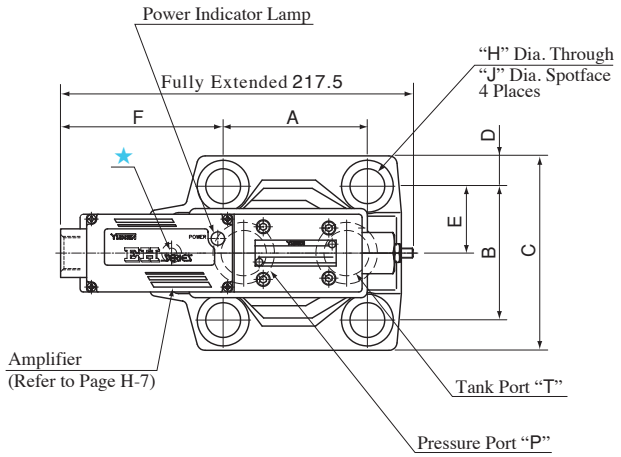
Pressure Setting = (Operating Pressure Upper Limit) + (Additional Pressure Indicated Below)

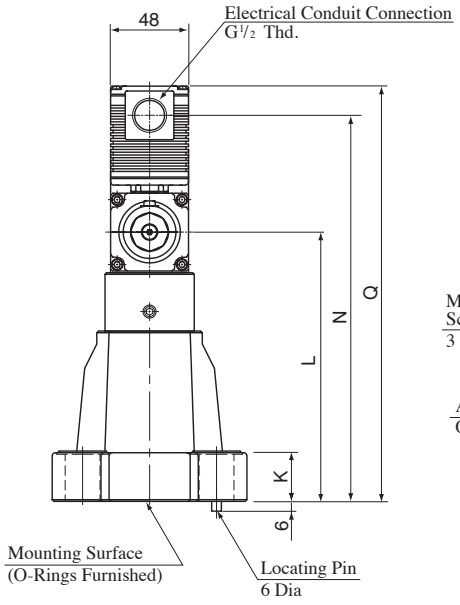
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

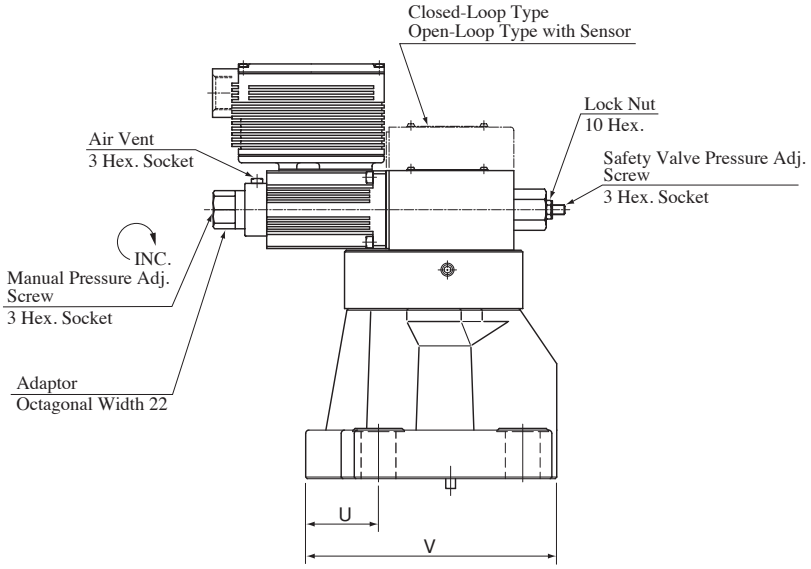


●EHBG-03/06/10-＊-50：Open-Loop Type
●EHBG-03/06/10-＊-S-50：Open-Loop Type with Sensor
●EHBG-03/06/10-＊-L-50：Closed-Loop Type

Model Numbers	Mass kg	
	Open-Loop Type	Open-Loop Type with Sensor Closed-Loop Type
EHBG-03	5.6	6.3
EHBG-06	6.8	7.5
EHBG-10	10.5	11.2







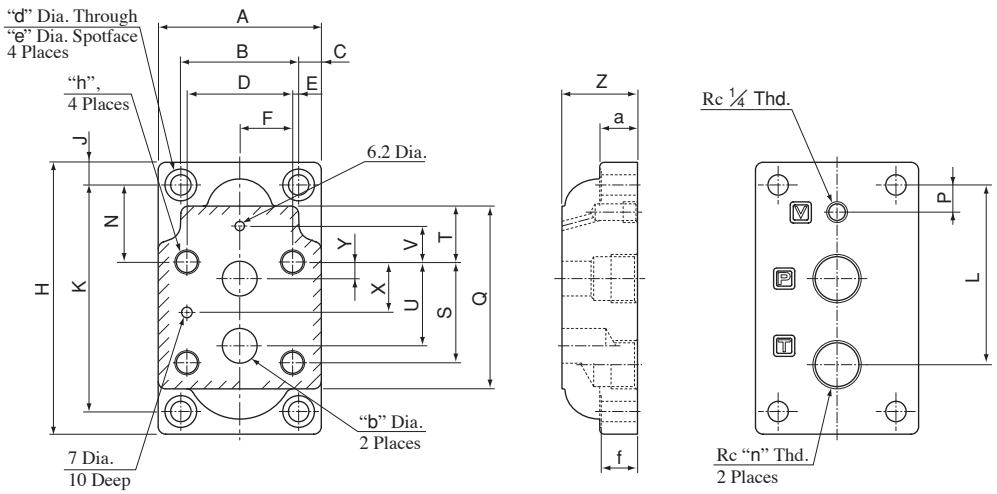
★ This port connection is not used.

Model No.	A	B	C	D	E	F	H	J	K
EHBG-03	53.8	53.8	76	11.1	26.9	119.1	13.5	21	21.5
EHBG-06	66.7	70	98	14	35	121	17.5	26	26
EHBG-10	88.9	82.6	120	18.7	41.3	102.5	21.5	32	33.5

Model No.	L	N	Q	U	V	Mounting Surface
EHBG-03	130	202	220	26.1	106	ISO 6264-AR-06-2-A
EHBG-06	130	202	220	36	122	ISO 6264-AS-08-2-A
EHBG-10	166	238	256	45	155	ISO 6264-AT-10-2-A

Sub-Plates

BGM-03, 03X
06, 06X
10, 10X



Model No.	A	B	C	D	E	F	H	J	K	L	N	P	Q	S
BGM-03	86	60	13	53.8	3.1	26.9	149	13	123	86	32	26	97	53.8
BGM-03X										95		21		
BGM-06	108	78	15	70	4	35	180	15	150	106.5	51	27.2	121	66.7
BGM-06X										119		18		
BGM-10	126	94	16	82.6	5.7	41.3	227	16	195	138.2	62	30.2	154	88.9
BGM-10X										158		17		

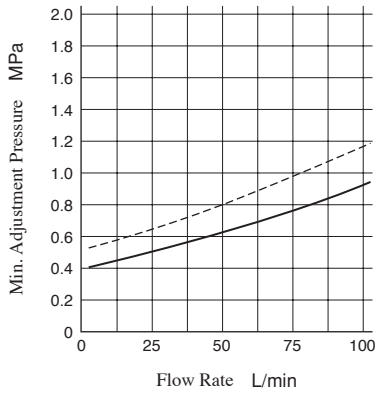
Model No.	T	U	V	X	Y	Z	a	b	d	e	f	h	n
BGM-03	19	47.4	0	22	22	32	20	14.5	11	17.5	19	M12 Thd. 20 Deep	3/8
BGM-03X						40							1/2
BGM-06	37	55.5	23.8	33.4	11	40	25	23	13.5	21	24	M16 Thd. 25 Deep	3/4
BGM-06X						50							1
BGM-10	42	76.2	31.8	44.5	12.7	50	32	28	17.5	26	31	M20 Thd. 28 Deep	1 1/4
BGM-10X						63							1 1/2

Min. Adjustment Pressure

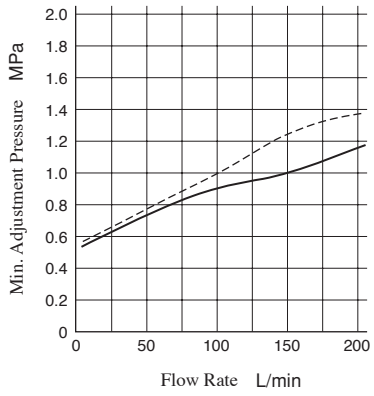
——— Open-Loop Type
- - - - - Closed-Loop Type

Viscosity : 30 mm²/s

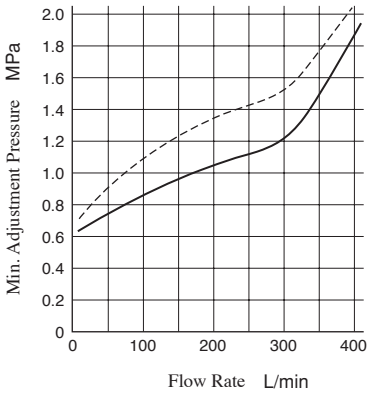
EHBG-03



EHBG-06



EHBG-10

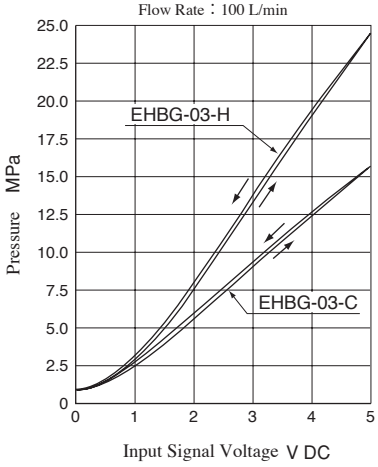


Input Signal Voltage vs. Pressure

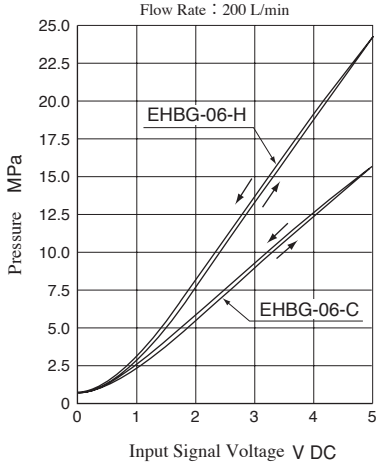
Open-Loop Type

Viscosity : 30 mm²/s

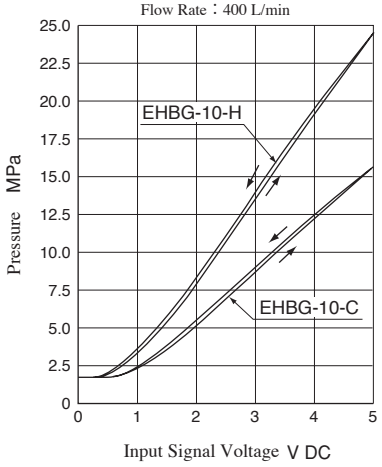
EHBG-03-＊
Flow Rate：100 L/min



EHBG-06-＊
Flow Rate：200 L/min

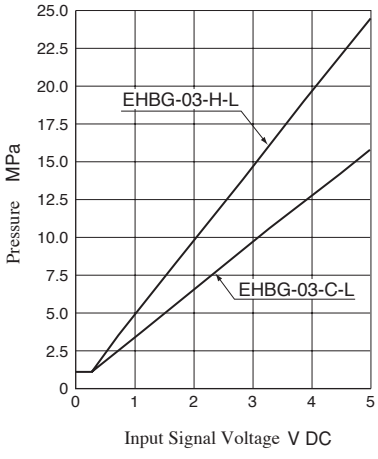


EHBG-10-＊
Flow Rate：400 L/min

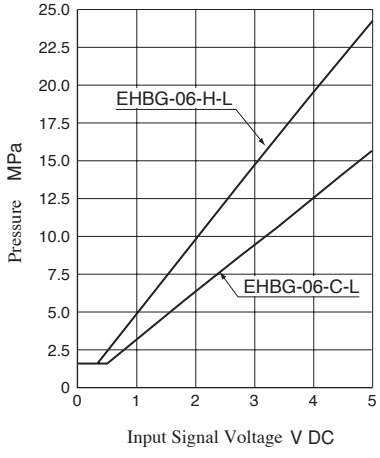


Closed-Loop Type

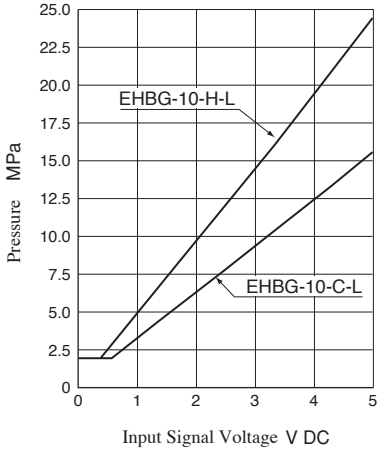
EHBG-03-＊
Flow Rate：100 L/min



EHBG-06-＊
Flow Rate：200 L/min



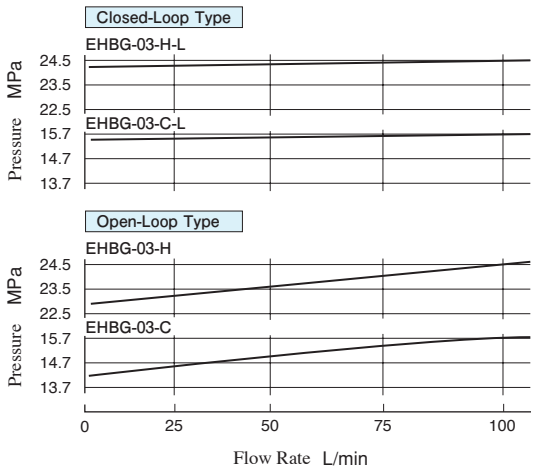
EHBG-10-＊
Flow Rate：400 L/min



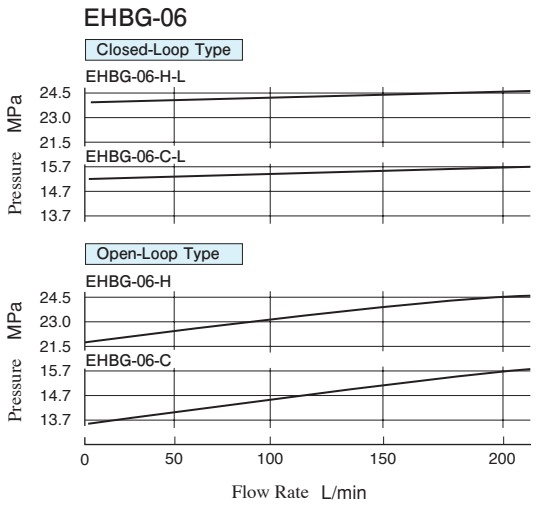
Flow Rate vs. Pressure

Viscosity : 30 mm²/s

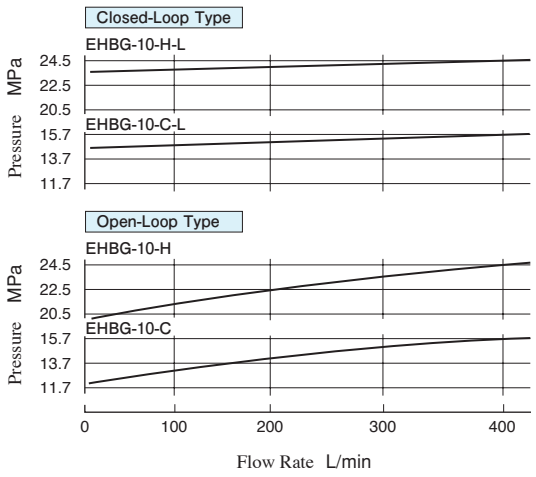
EHBG-03



EHBG-06



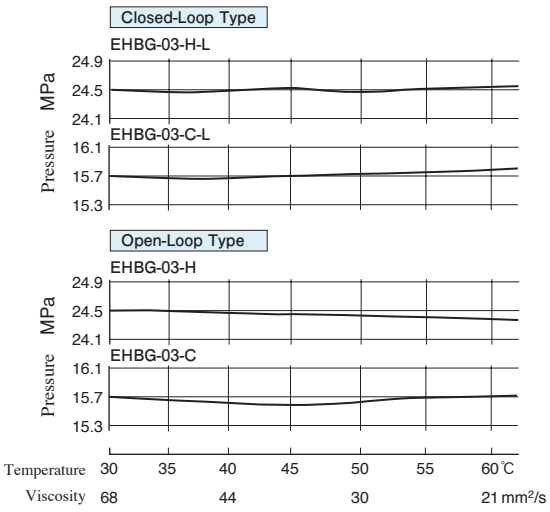
EHBG-10



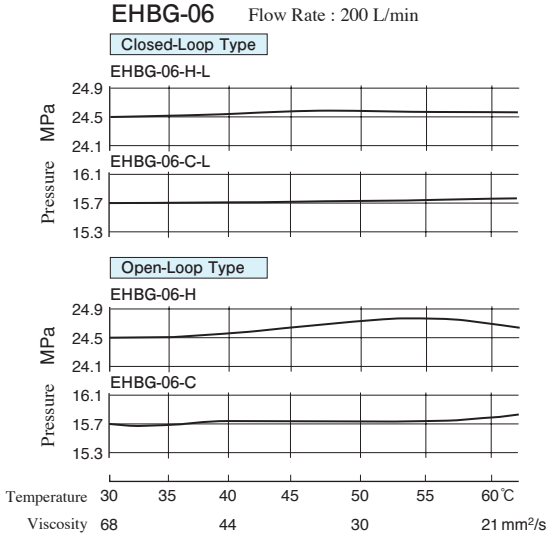
Viscosity vs. Pressure

Oil : ISO VG46 Oil

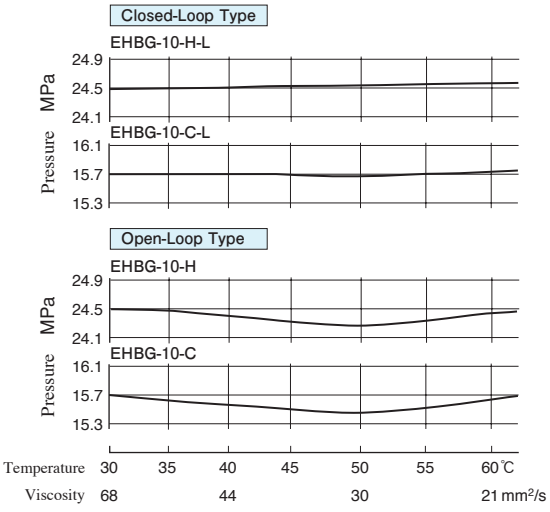
EHBG-03 Flow Rate : 100 L/min



EHBG-06 Flow Rate : 200 L/min



EHBG-10 Flow Rate : 400 L/min



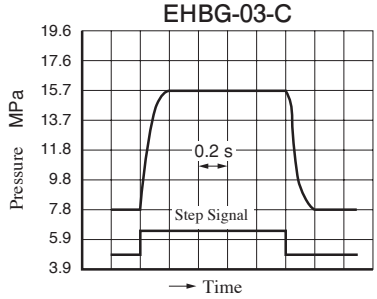
Step Response (Example)

The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combinations with other control valves.

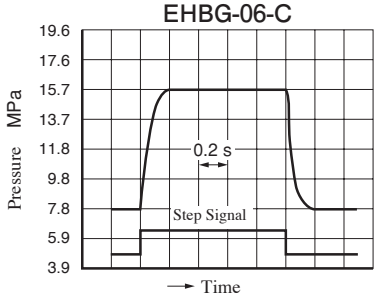
Trapped Oil Volume : 1 L
Viscosity : 30 mm²/s

Open-Loop Type

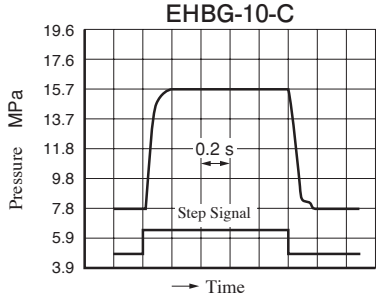
Flow Rate : 100 L/min

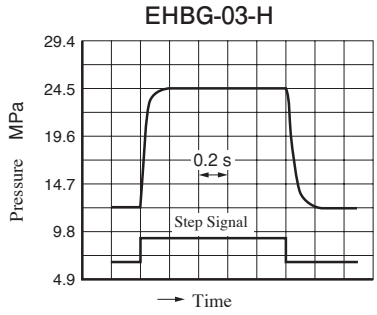


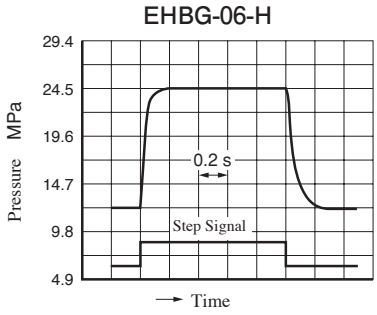
Flow Rate : 200 L/min

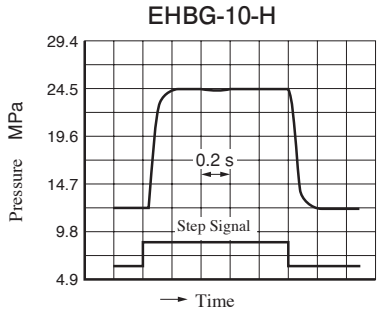


Flow Rate : 400 L/min



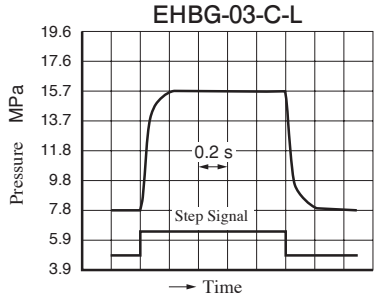




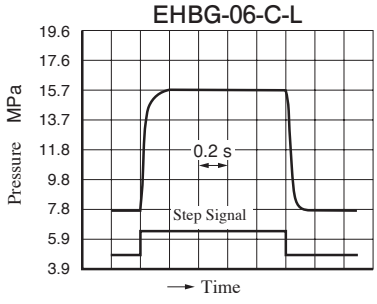


Closed-Loop Type

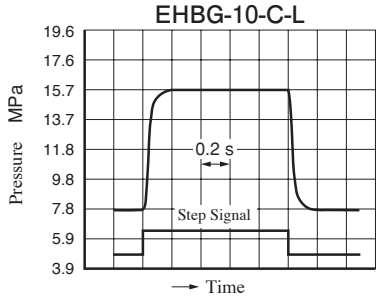
Flow Rate : 100 L/min

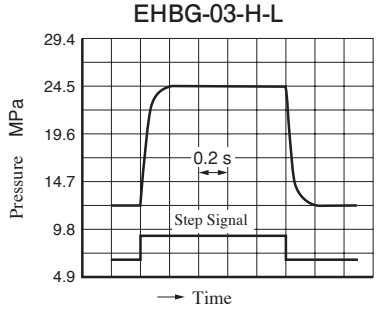


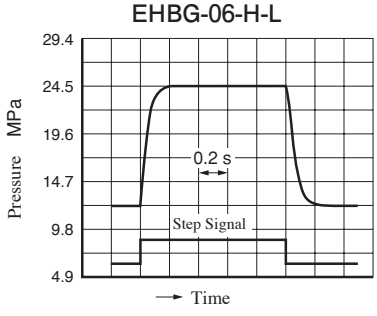
Flow Rate : 200 L/min

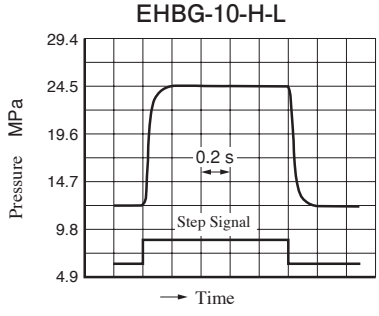


Flow Rate : 400 L/min







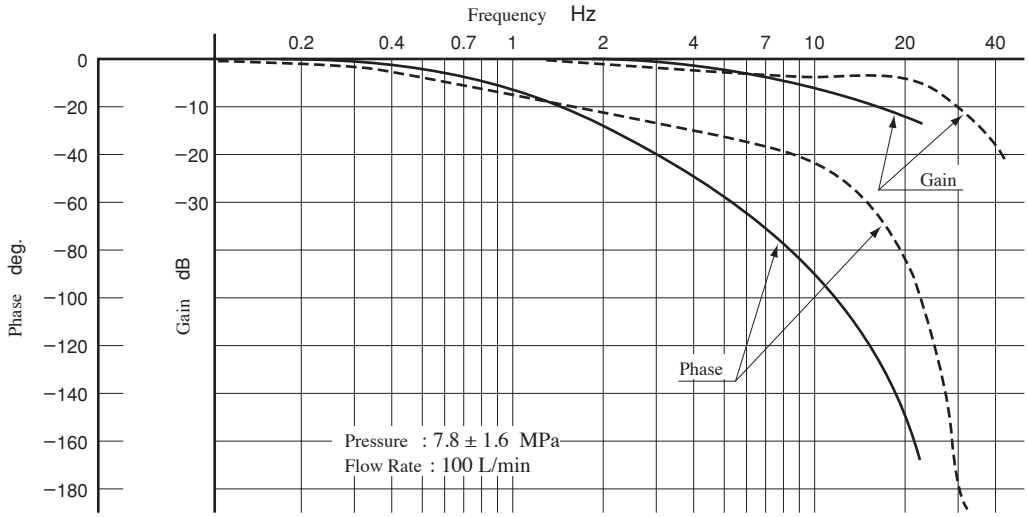


Frequency Response

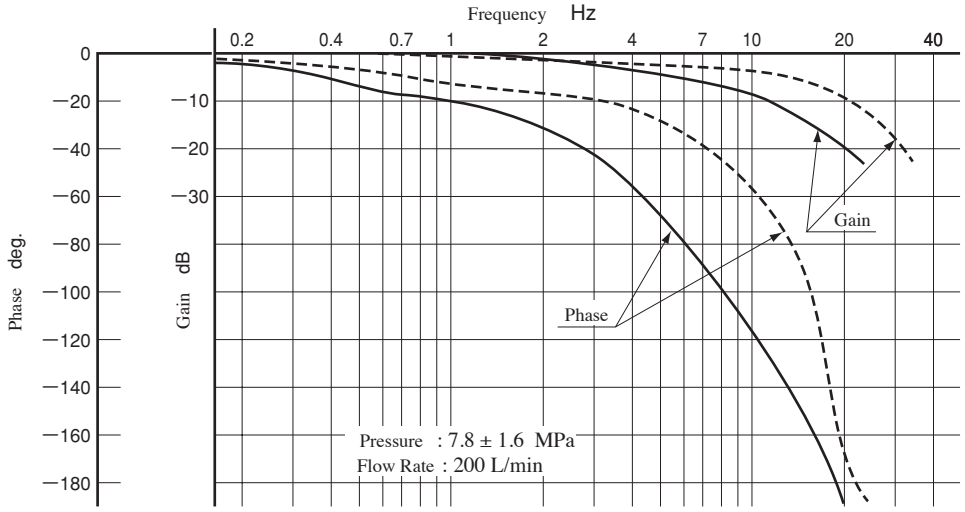
Open-Loop Type
Closed-Loop Type

Trapped Oil Volume : 1 L
Viscosity : 30 mm²/s

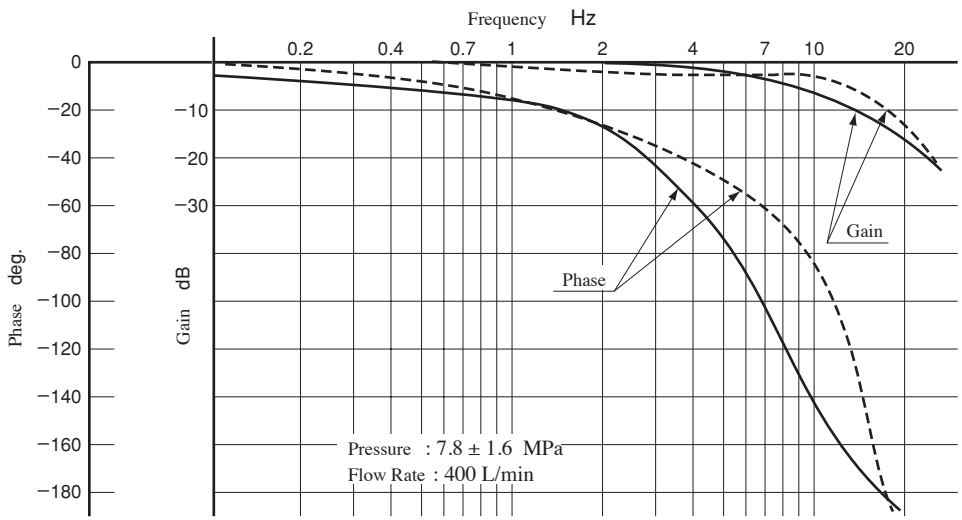
EHBG-03



EHBG-06

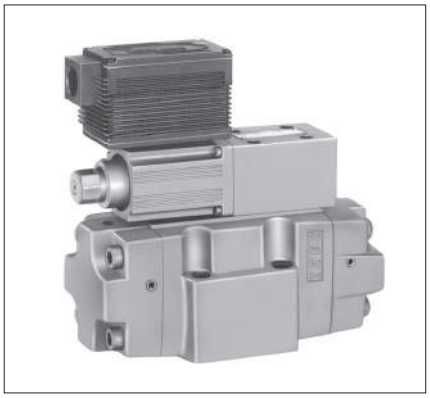


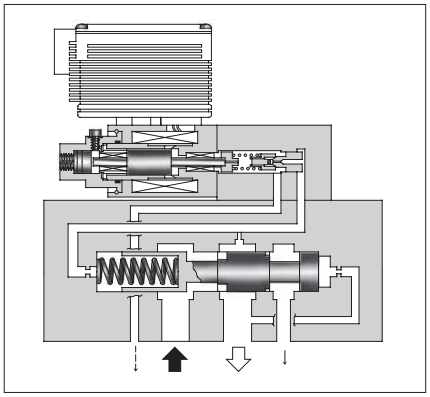
EHBG-10



Proportional Electro-Hydraulic Relieving and Reducing Valves

These valves consist of a small size but high performance electro-hydraulic proportional pilot relief valve and reducing valve with relief function. The valves control the system pressure proportionally through a controlled input voltage. Moreover, a good response speed in reducing the pressure even at a large load capacity can be obtained with the relief function of the valves.



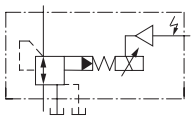


Specifications

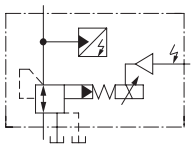
Descriptions \ Model Numbers	EHRBG-06	EHRBG-10
Max. Operating Pres. MPa	24.5	
Max. Flow L/min	100	250
Max. Relieving Flow L/min	35★1	15★1
Pressure Adjustment Range	Refer to Model Number Designation	
Coil Resistance	10 Ω	
Hysteresis	3% or less	
Repeatability	1%★2 or less	
Frequency Response	B : 4 Hz C : 3 Hz (-90 degree) H : 3 Hz	
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)	
Power Input (Max.)	28 W	
Input Signal Voltage	B : 6.9 MPa / 5 V DC C : 13.7 MPa / 5 V DC H : 20.6 MPa / 5 V DC (at Flow Rate Zero)	
Input Impedance	10 kΩ	
Pressure Signal Output	B : 5 V DC / 6.9 MPa C : 5 V DC / 13.7 MPa H : 5 V DC / 20.6 MPa	
Ambient Temperature	0 - 50°C (With Circulated Air)	
Mass	Refer to Pages H-24 & H-25	

★1. The figures shown are those obtained where the differential pressure between the secondary pressure port and tank port is 13.7 MPa.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols



Open-Loop Type



Open-Loop Type with Sensor

Model Number Designation

EHRB	G	-06	-C	-S	-50
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa	Control Type	Design Number
EHRB: Proportional Electro-Hydraulic Relieving & Reducing Valve	G: Sub-Plate Mounting	06	B: 0.8 - 6.9 C: 1.2 - 13.7 H: 1.5 - 20.6	None: Open-Loop	50
		10	B: 0.9 - 6.9 C: 1.2 - 13.7 H: 1.5 - 20.6	S: Open-Loop with Sensor	

★ Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Sub-Plate

Valve Model No.	Sub-Plate Model No.	Thread Size Rc	Mass kg
EHRBG-06	ERBGM-06-20	3/4	3.0
EHRBG-10	ERBGM-10-10	1 1/4	6.5

●Sub-plates are available. Specify sub-plates model from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

Accessories

Mounting Bolts

Model No.	Socket Head Cap Screw
EHRBG-06	M10 × 70 L·····4 Pcs.
EHRBG-10	M10 × 70 L·····6 Pcs.

Instructions

Pressure at the Primary Pressure Port

The necessary pressure at the primary pressure port should be equal to the set pressure plus 1 MPa.

Drain Port

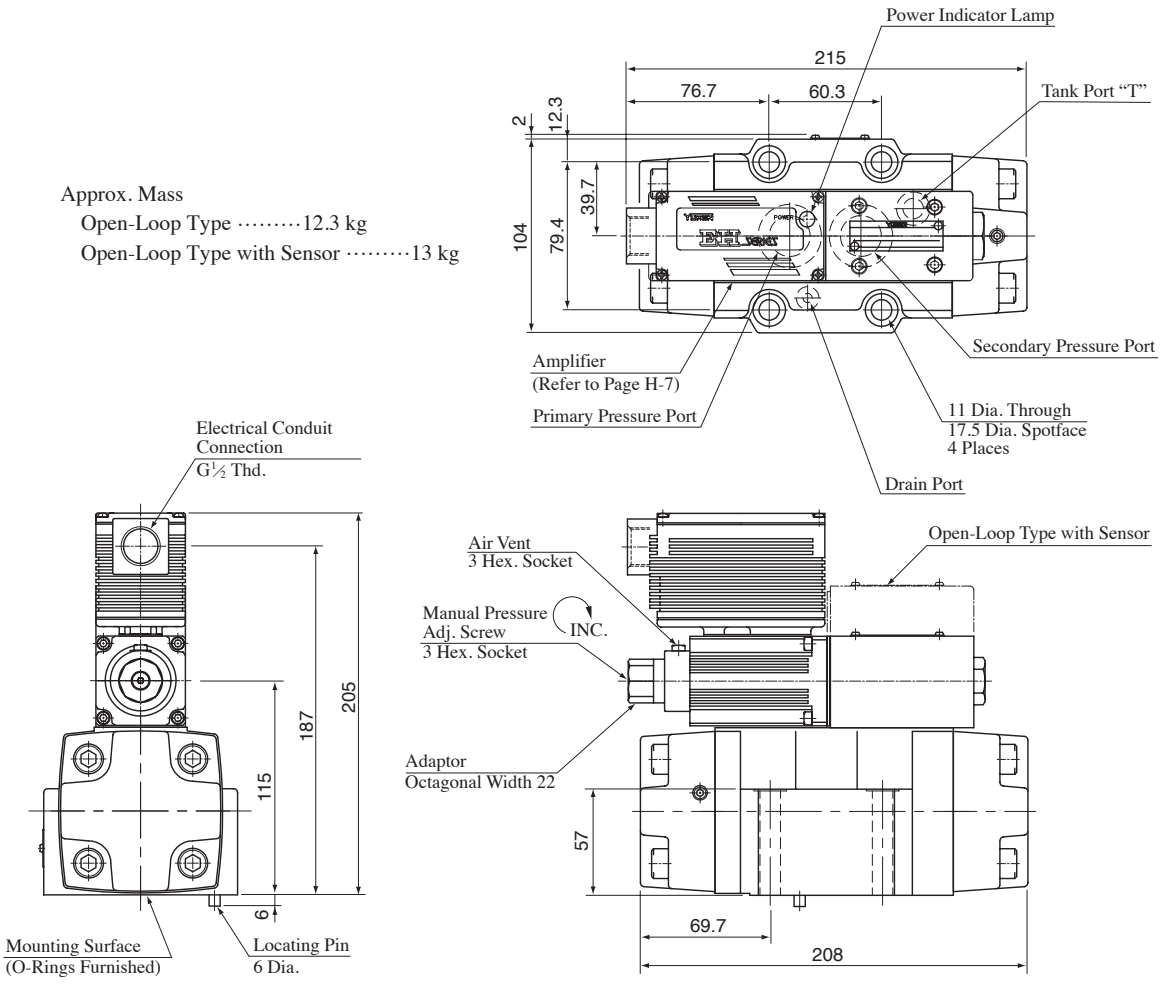
The back pressure at the drain port should be less than 0.2 MPa. The pipe from the drain port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

Load Capacity

The use of the valves at the load capacity of about 20 L is recommended. Even at the lowest, a load capacity of more than 1.4 L is required.

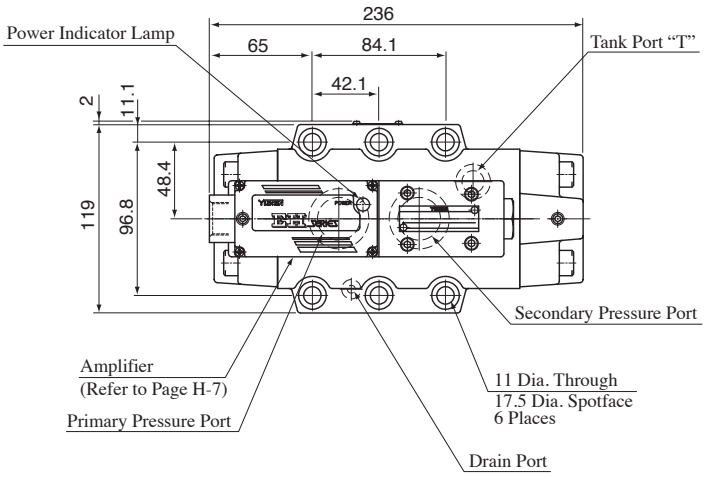
●EHRBG-06-＊-50：Open-Loop Type
●EHRBG-06-＊-S-50：Open-Loop Type with Sensor

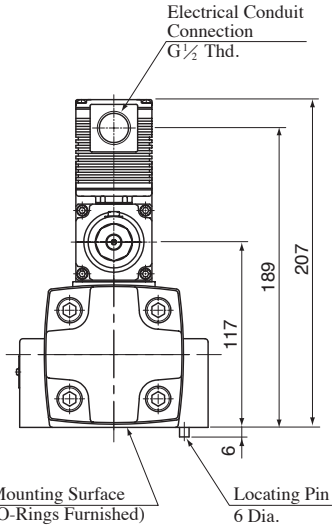
Approx. Mass
Open-Loop Type ·····12.3 kg
Open-Loop Type with Sensor ·····13 kg

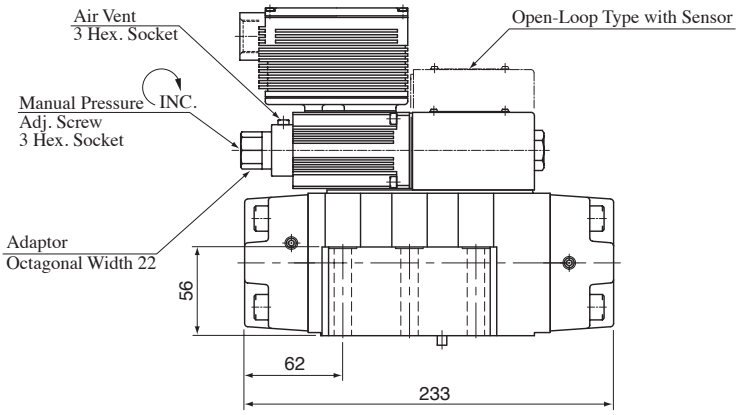


●EHRBG-10-＊-50：Open-Loop Type
●EHRBG-10-＊-S-50：Open-Loop Type with Sensor

Approx. Mass
Open-Loop Type ·····13.8 kg
Open-Loop Type with Sensor ·····14.5 kg

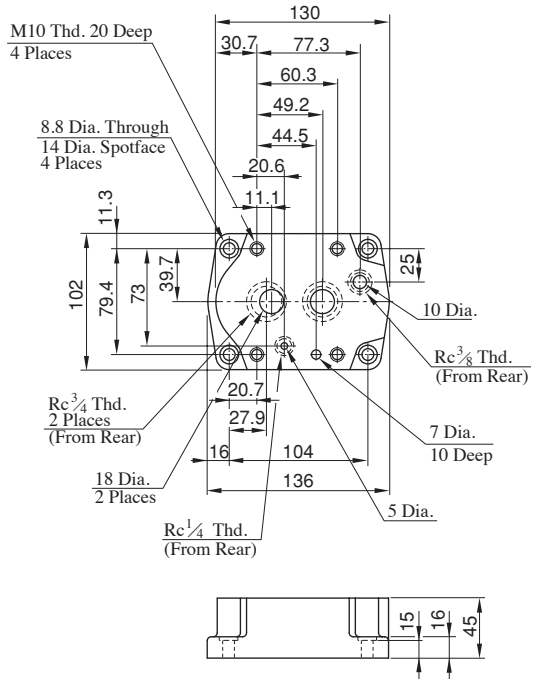




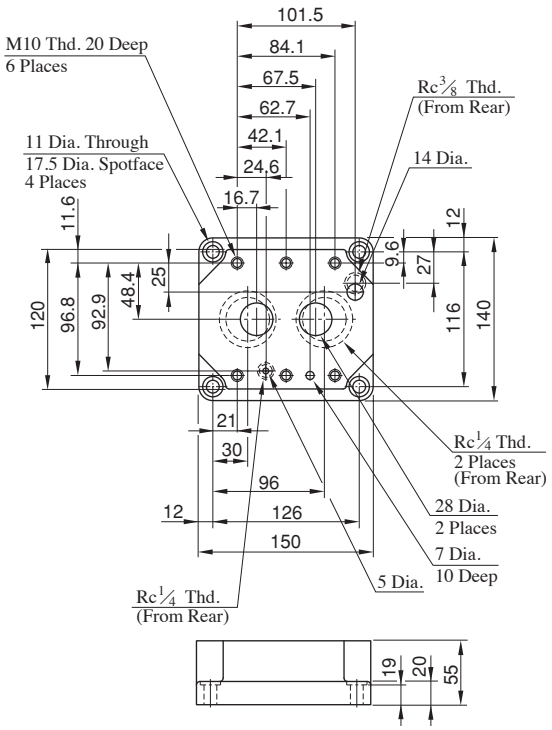


Sub-Plates

ERBGM-06



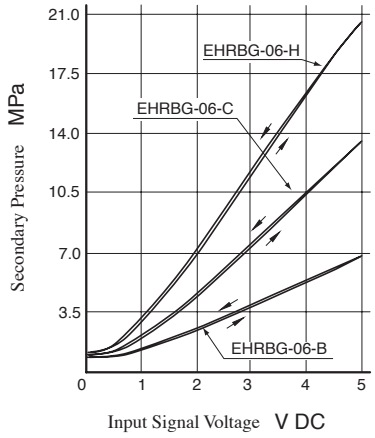
ERBGM-10



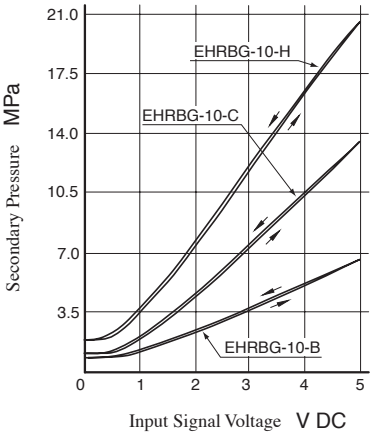
Input Signal Voltage vs. Secondary Pressure

Primary Pressure : 24.5 MPa
Viscosity : 30 mm²/s

EHRBG-06

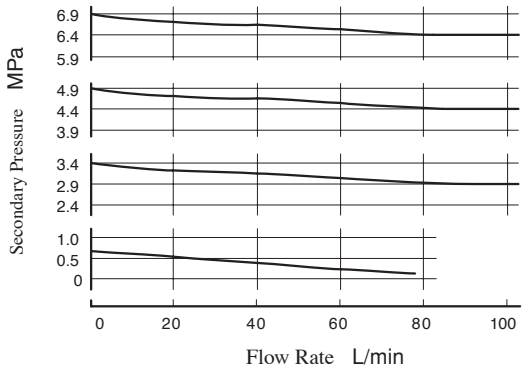


EHRBG-10

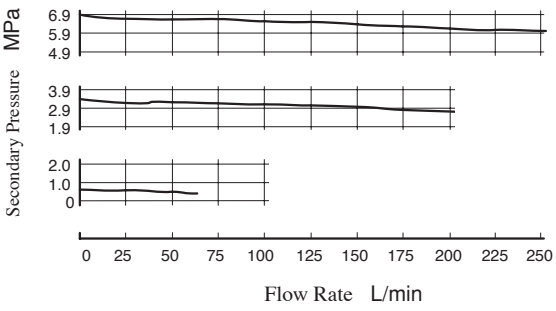


Flow vs. Secondary Pressure

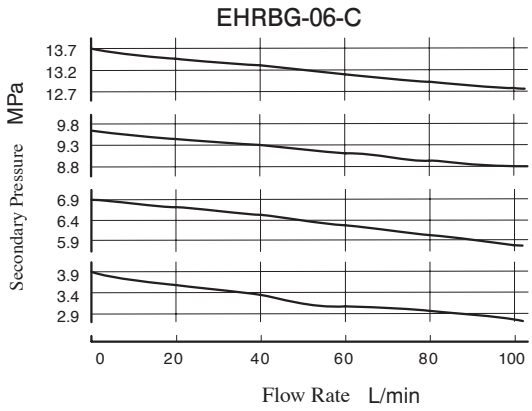
EHRBG-06-B



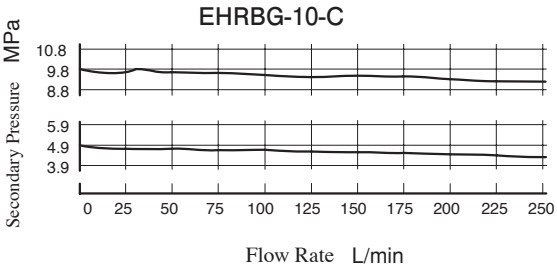
EHRBG-10-B



EHRBG-06-C



EHRBG-10-C



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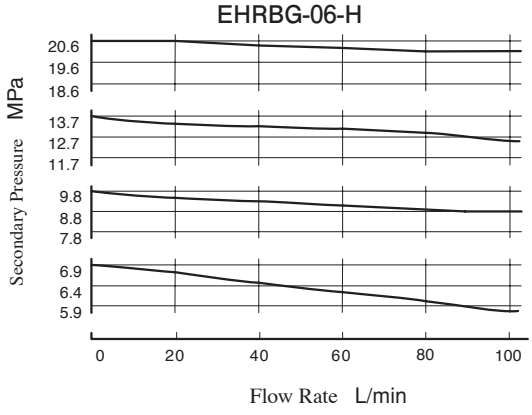
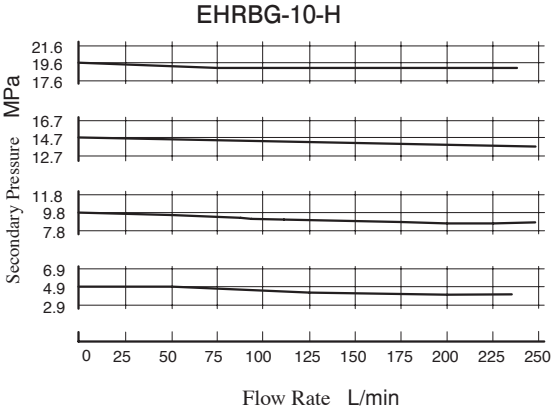
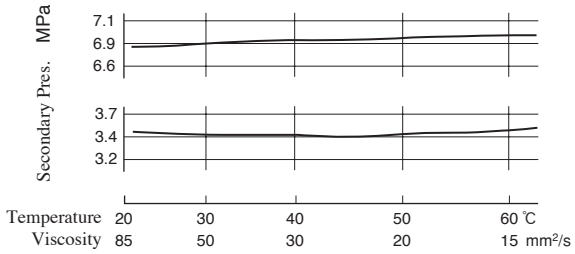


EHRBG-10-H

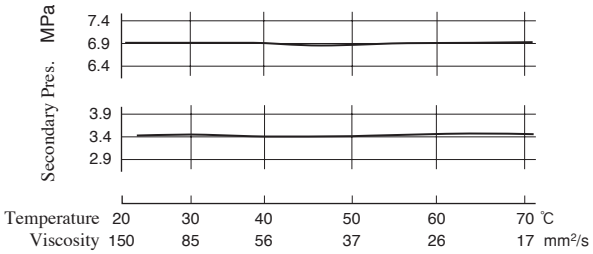


Viscosity vs. Secondary Pressure

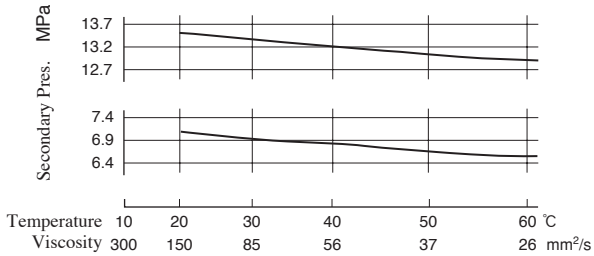
EHRBG-06-B
Oil : ISO VG 32 Oil



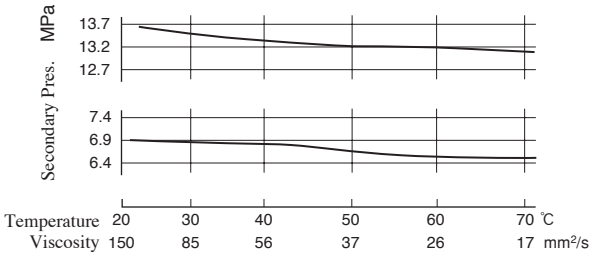
EHRBG-10-B
Oil : ISO VG 56 Oil



EHRBG-06-C
Oil : ISO VG 56 Oil



EHRBG-10-C
Oil : ISO VG 56 Oil



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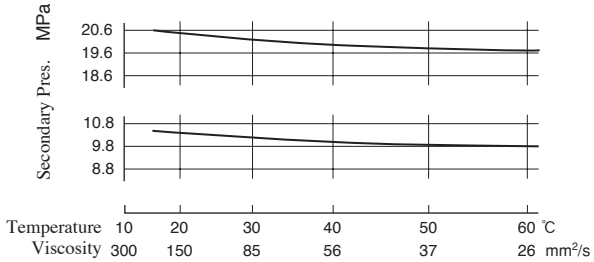
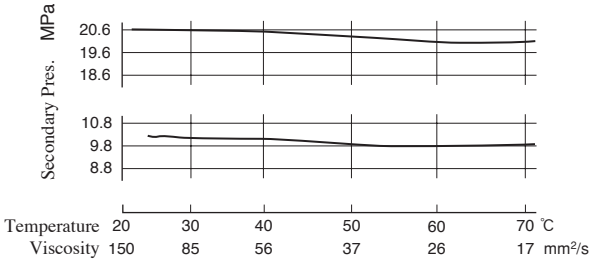
Oil : ISO VG 56 Oil



EHRBG-10-H
Oil : ISO VG 56 Oil

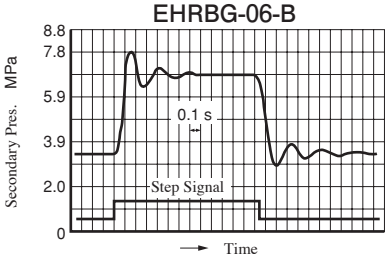


Step Response (Example)

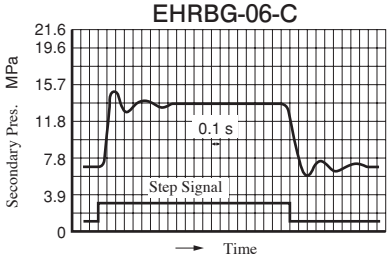
The following step response measurements are taken when the trapped oil volume is 20 L. The step response varies by trapped oil volume.

Primary Pressure : 24.5 MPa
Trapped Oil Volume : 20 L
Viscosity : 30 mm²/s

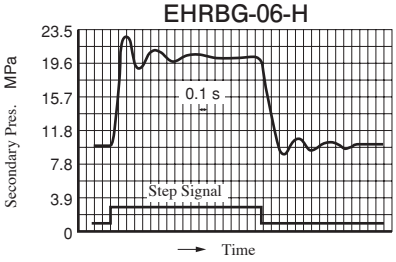
EHRBG-06-B



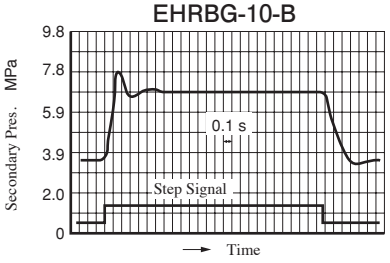
EHRBG-06-C



EHRBG-06-H



EHRBG-10-B



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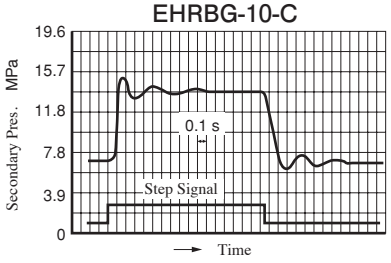
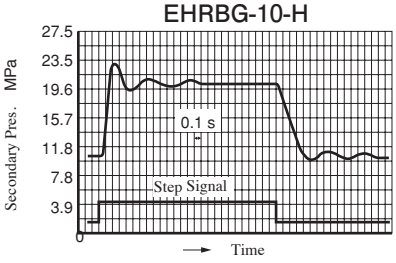


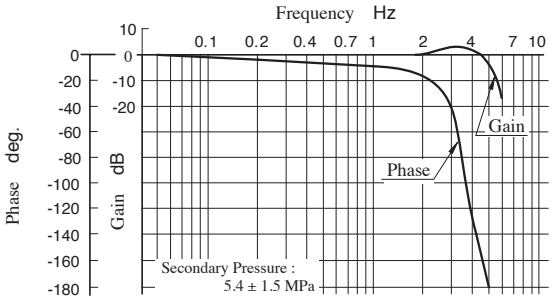
EHRBG-10-H



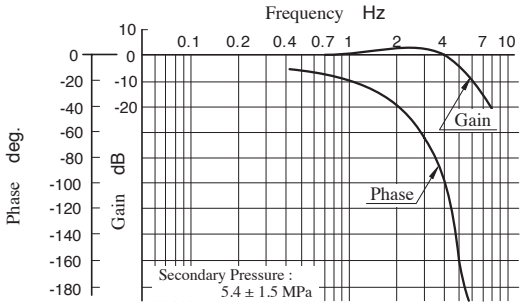
Frequency Response

Primary Pressure : 24.5 MPa
Trapped Oil Volume : 20 L
Viscosity : 30 mm²/s

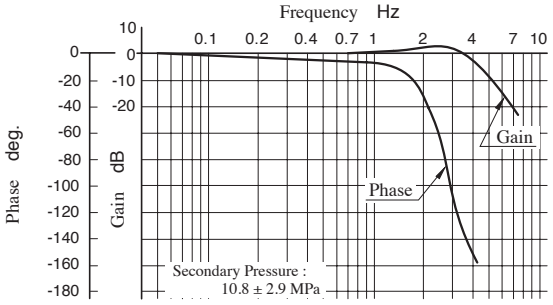
EHRBG-06-B



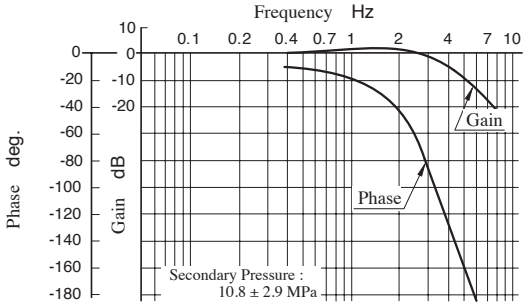
EHRBG-10-B



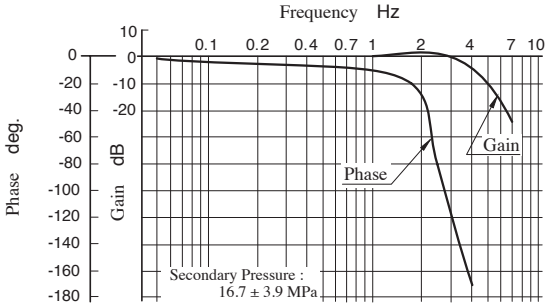
EHRBG-06-C



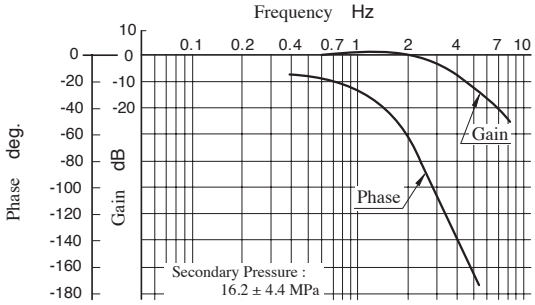
EHRBG-10-C



EHRBG-06-H

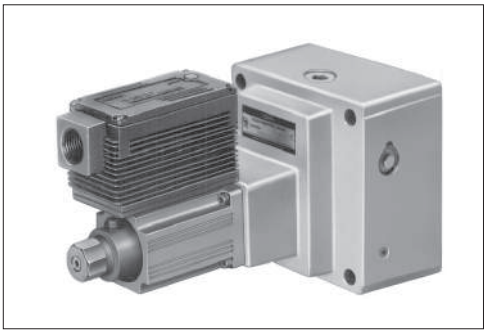


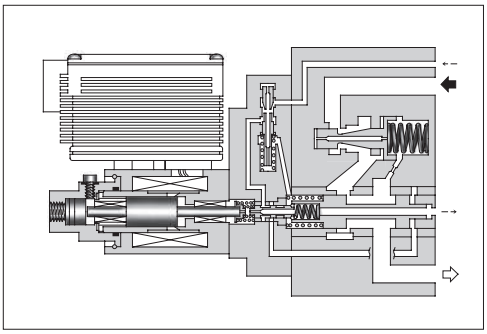
EHRBG-10-H



Proportional Electro-Hydraulic Flow Control (and Check) Valves

The system flow rate can be controlled remotely as desired by regulating input voltage. Further, since pressure and temperature compensation functions are provided, the preselected flow rate is not be affected by pressure (load) or temperature (fluid viscosity).





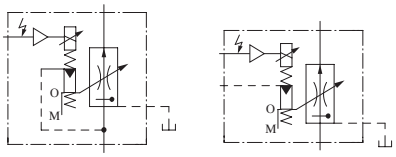
Specifications

Descriptions \ Model Numbers		EHF*G-03-60 / 125	EHF*G-06-250
Max. Operating Pres. MPa		20.6	24.5
Max. Metered Flow L/min		60: 60 125: 125	250
Min. Metered Flow L/min		1	2.5
Min. Differential Pressure ★1 MPa		1.0	1.0
Free Flow (Only with Check Valve) L/min		130	280
Pilot Flow L/min	at Normal	0.5	1
	at Transition	2.6	4
Min. Pilot Pressure MPa		1.0	1.5
Frequency Response		12 Hz (-90 degree)	
Hysteresis		3% or less	
Repeatability		1% ★2 or less	
Coil Resistance		10 Ω	
Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
Power Input (Max.)		28 W	
Input Signal Voltage		Max. Metered Flow / 5V DC	
Input Impedance		10 kΩ	
Ambient Temperature		0 - 50°C (With Circulated Air)	
Mass		10 kg	25 kg

★1. Minimum differential pressure means fine pressure compensation at inlet and outlet port.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

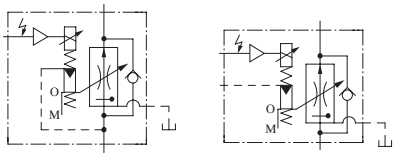
Graphic Symbols

● EHFG



Internal Pilot　　External Pilot

● EHFCG



Internal Pilot　　External Pilot

Model Number Designation

EHF	G	-03	-60	-E	-50
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pilot Connection	Design Number
EHF: Proportional Electro-Hydraulic Flow Control Valve **EHFC**: Proportional Electro-Hydraulic Flow Control and Check Valve	**G**: Sub-Plate Mounting	**03**	**60**: 60 **125**: 125	**None**: Internal Pilot **E**: External Pilot	**50**
		06	**250**: 250		**50**

★ Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHFG EHFCG -03	M10 × 80 L·····4 Pcs.
EHFG EHFCG -06	M16 × 130 L·····4 Pcs.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHFG EHFCG -03	EFGM-03Y-30	3/4	5.7
	EFGM-03Z-30	1	5.6
EHFG EHFCG -06	EFGM-06X-30	1	12.5
	EFGM-06Y-30	1 1/4	16.0

●Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa.

Pilot Type Selection

This valve is constructed so as to operate at a predetermined pilot pressure. For the 03, a pilot pressure of 1 MPa or higher is required. For the 06, the required pilot pressure is 1.5 MPa or higher.

To obtain such a required pilot pressure, select the pilot type according to the circuit examples on the right.

①/②

Use the external pilot type (type symbol: E) whether a meter-in or meter-out circuit is employed.

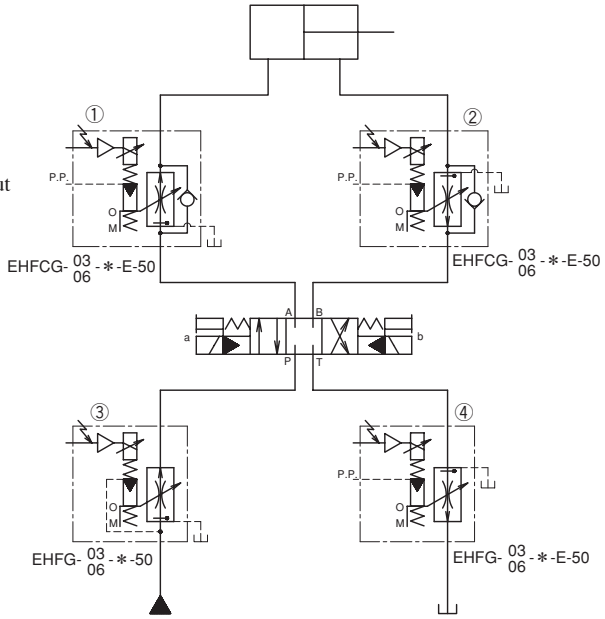
③

Use the internal pillot type (type symbol: None).

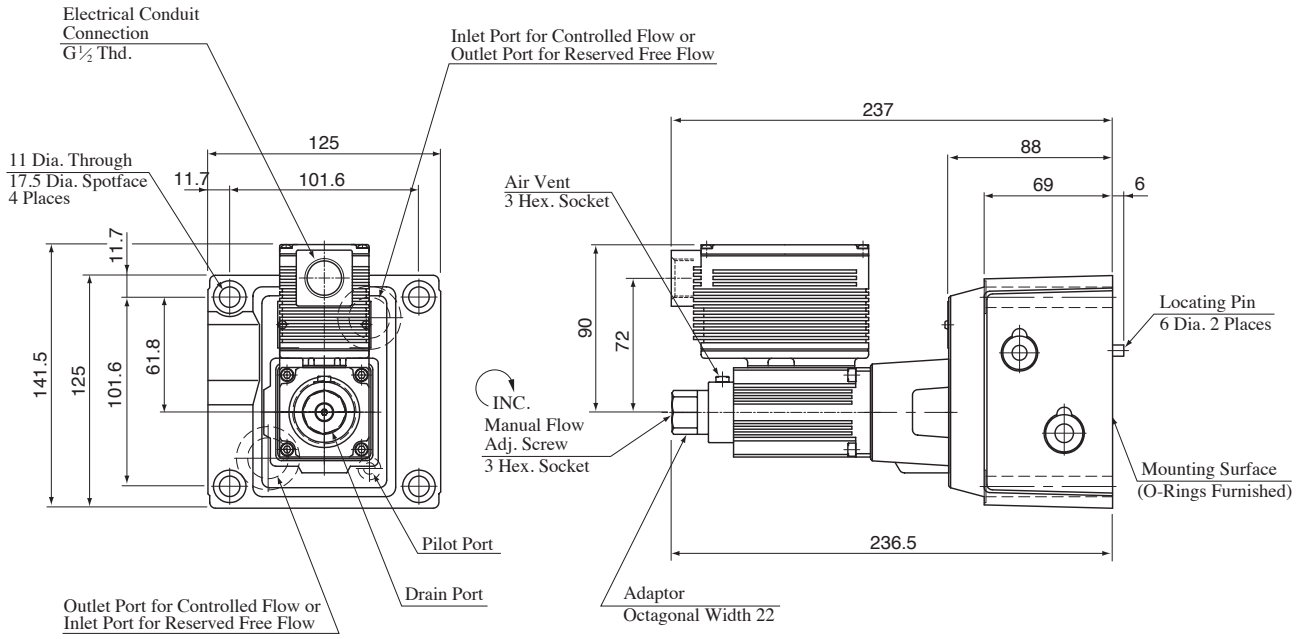
④

Use the external pilot type (type symbol: E).

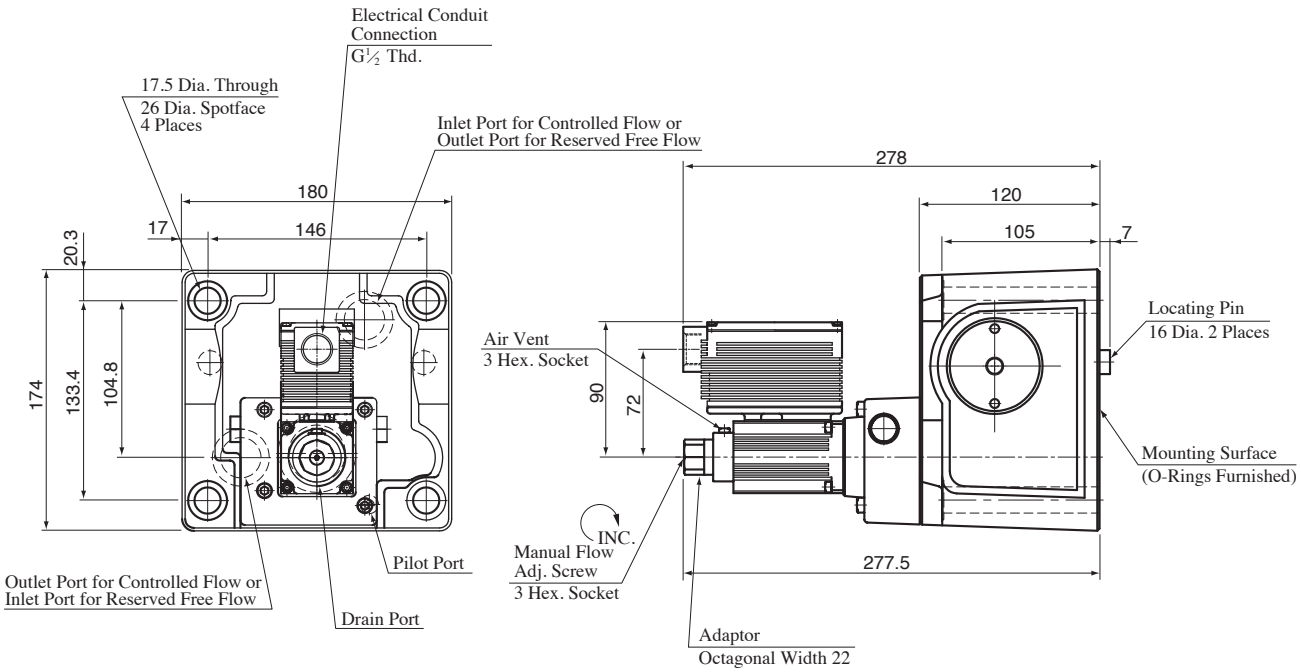
【Example of Circuit】



EHFG EHFCG-03

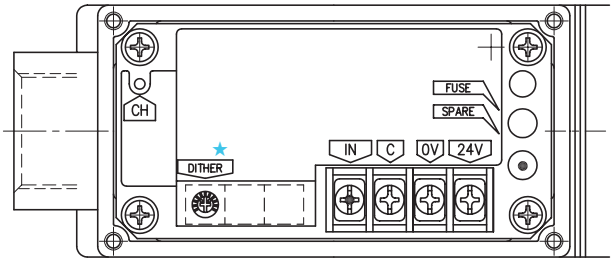


EHFG EHFCG-06



Detail of Amplifier

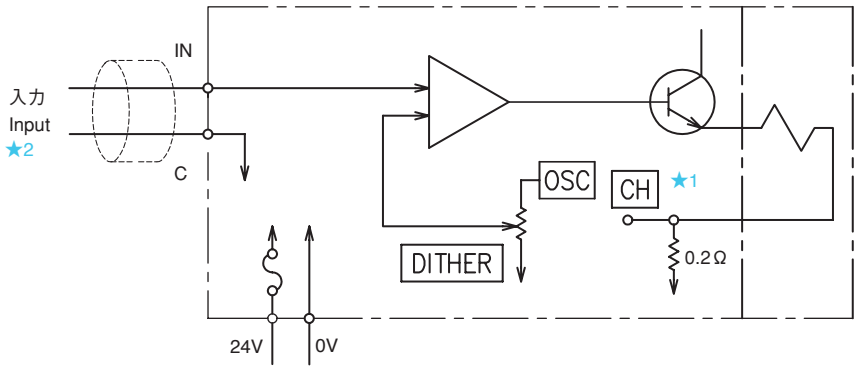
Connecting Terminals



★DITHER
Use as it is since they are factory preset to the optimum position.
(Do not touch as it is in normal condition.)

Terminal	Name
IN	Input Signal (+)
C	Input Signal (COM)
0 V	Power Supply
24 V	
CH	Output Current Check (to C)

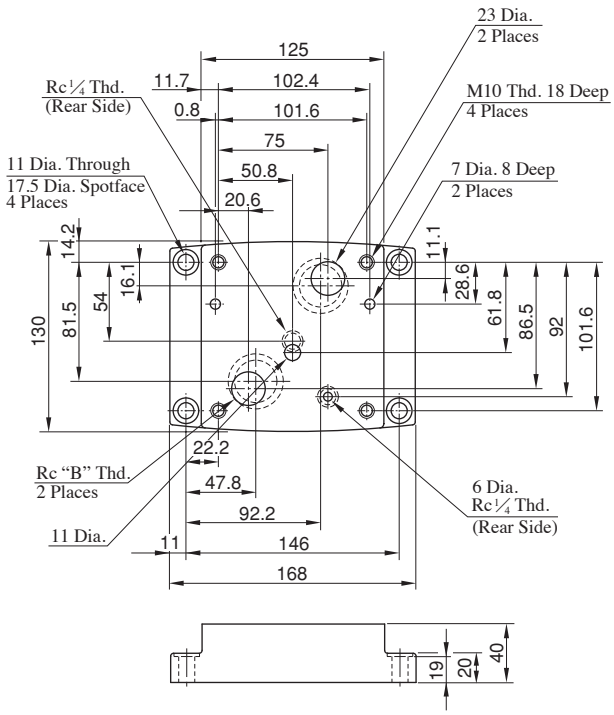
Circuit Schematic



★1. For “CH” terminal, external instruments should have input impedance of more than 10 kΩ.
★2. Use shielded cable for “Input” connection. The ground of the shielded cable must be connected to input signal side.

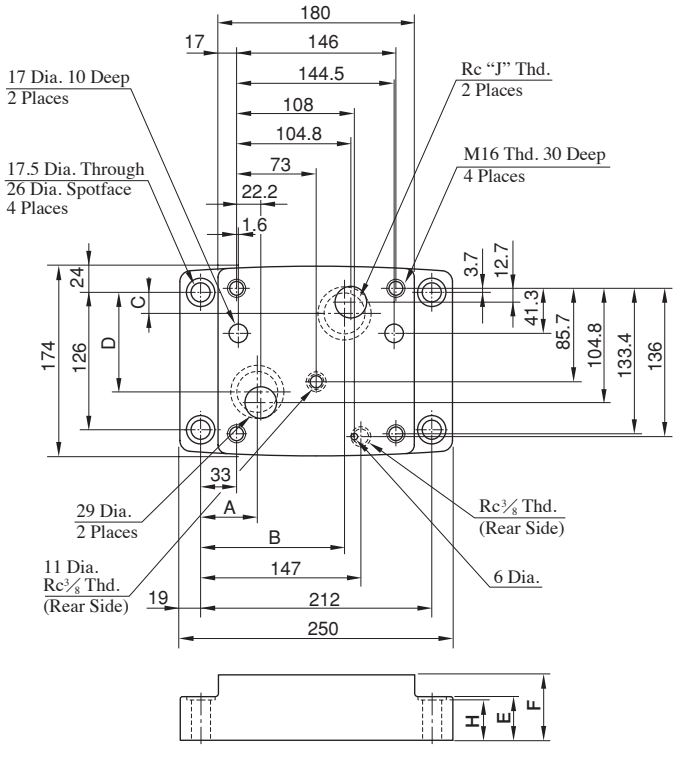
Sub-Plates

EFGM-03Y, 03Z



Sub-Plate Model Numbers	B
EFGM-03Y-30	3/4
EFGM-03Z-30	1

EFGM-06X, 06Y

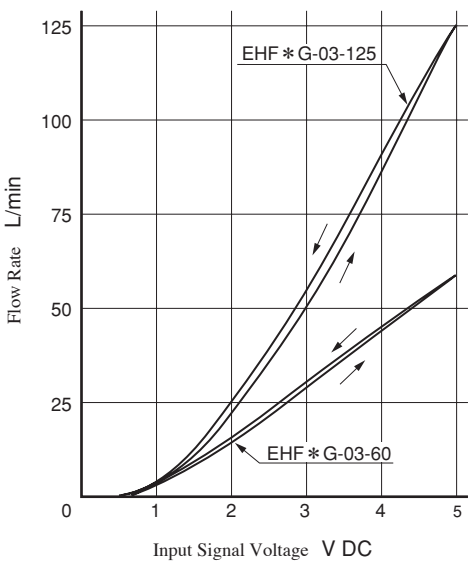


Sub-Plate Model Numbers	A	B	C	D	E	F	H	J
EFGM-06X-30	55.2	137.8	14.3	101.1	35	45	34	1
EFGM-06Y-30	52	132	19.3	91.3	40	60	39	1 1/4

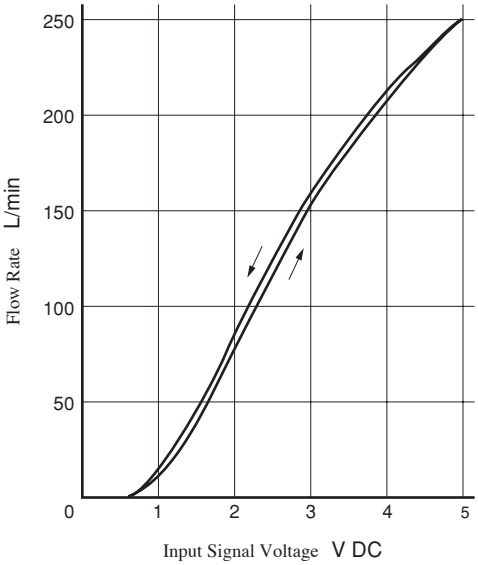
Input Signal Voltage vs. Flow Rate

Viscosity : 30 mm²/s

EHFG
EHFCG-03

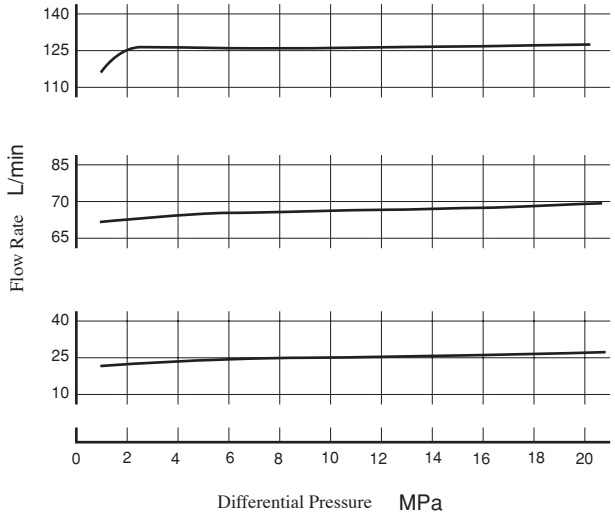


EHFG
EHFCG-06

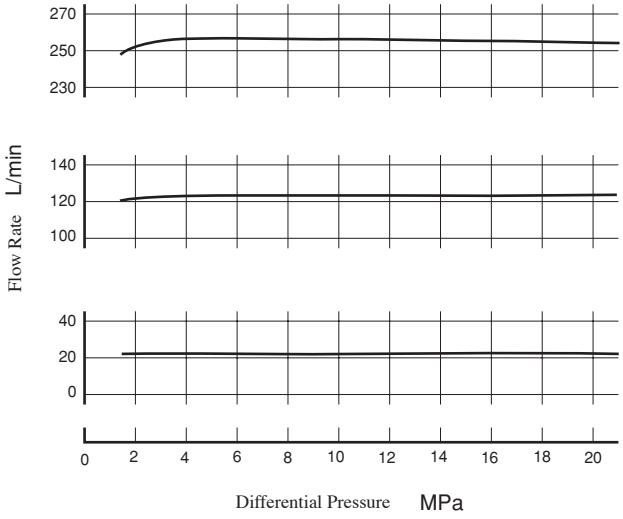


Differential Pressure vs. Flow Rate

EHFG
EHFCG-03



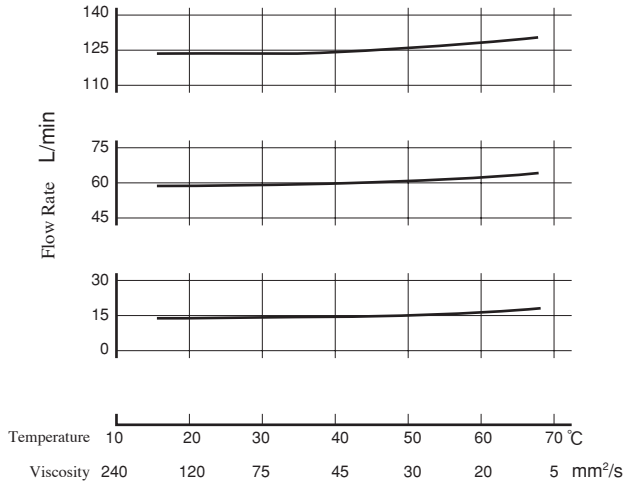
EHFG
EHFCG-06



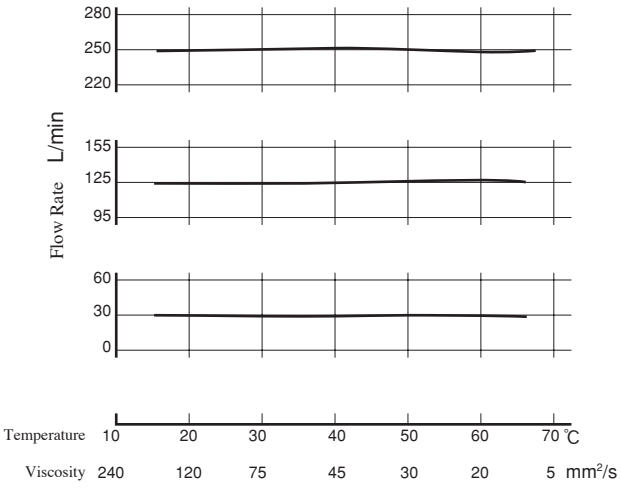
Viscosity vs. Flow Rate

Oil : ISO VG 46 Oil

EHFG
EHFCG-03



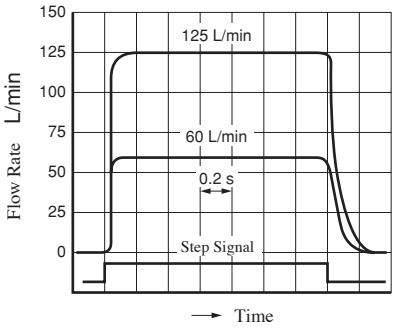
EHFG
EHFCG-06



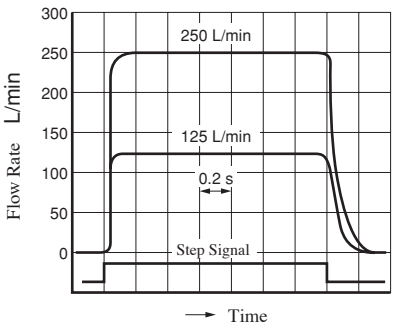
Step Response (Example)

The step responses right are those obtained when the valve itself is tested independently. The step responses may differ from them when the valve is used in combination with other control valves.

EHFG EHFCG-03



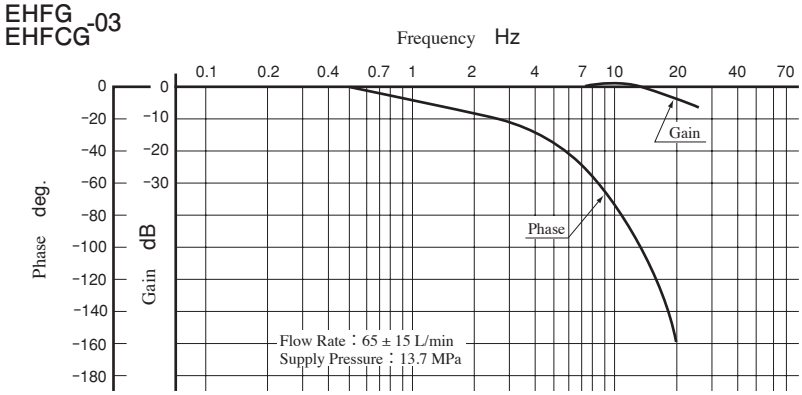
EHFG EHFCG-06



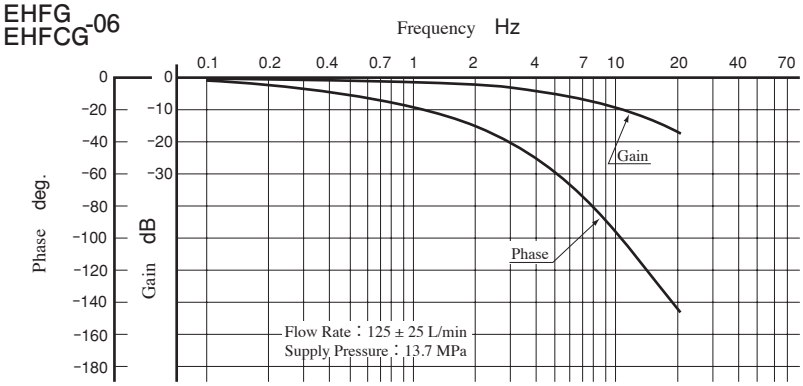
Frequency Response

Trapped Oil Volume : 1 L
Viscosity : 30 mm 2/s

EHFG EHFCG-03

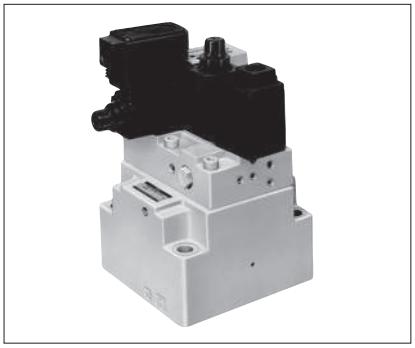


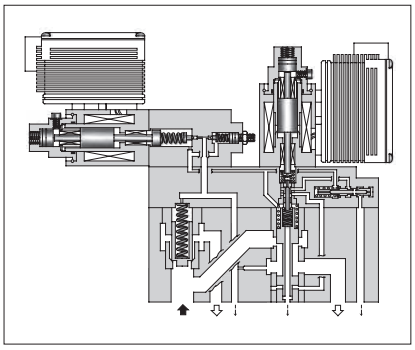
EHFG EHFCG-06



Proportional Electro-Hydraulic Flow Control and Relief Valves

These are proportional electro-hydraulic flow control valves having functions for controlling the direct electric current of meter-in type and for pressure control.
They are energy-saving valves for supplying the minimum pressure and flow required to operate actuators.



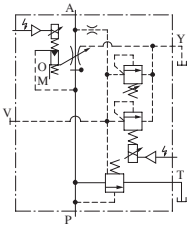


Specifications

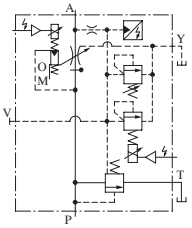
Descriptions \ Model Numbers			EHFBG-03-*	EHFBG-06-250	EHFBG-10-500
Max. Operating Pressure MPa			24.5	24.5	24.5
Max. Flow L/min			60 : 60 125 : 125	250	500
Metered Flow Capacity L/min			60 : 1-60 125 : 1-125	2.5-250	5-500
Min. Pilot Pressure MPa			1.5	1.5	1.5
Pilot Flow L/min		at Normal	1	1	1
		at Transition	3	4	6
Differential Pressure MPa			0.6	0.7	0.9
Flow Controls	Hysteresis		3% or less		
	Repeatability		1%★ or less		
	Input Signal Voltage		Max. Flow / 5 V DC		
	Coil Resistance		10 Ω		
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)		
	Input Impedance		10 kΩ		
	Power Input (Max.)		28 W		
Pressure Controls	Pres. Adj. Range MPa	Adj. Range:C	1.2-15.7	1.4-15.7	1.5-15.7
		Adj. Range:H	1.4-24.5	1.4-24.5	1.5-24.5
	Hysteresis		2% or less		
	Repeatability		1%★ or less		
	Coil Resistance		10 Ω		
	Input Signal Voltage		Max. Adj. Pres. / 5 V DC		
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)		
	Input Impedance		10 kΩ		
	Power Input (Max.)		28 W		
Output Signal (Sensor Monitor)			C : 5 V DC / 15.7 MPa H : 5 V DC / 24.5 MPa		
Ambient Temperature			0 - 50°C (With Circulated Air)		
Mass			Refer to Pages H-38 to H-40		

★1. The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.
★2. The specifications for pressure controls is applied to models with pilot relief valve. (Ex. EHFBG-03-125-C-*-50)
★3. Pressure adjustment range of the valves without pilot relief valves (Ex. EHFBG-03-125-*-50) is from a minimum adjustable pressure to 25 MPa.

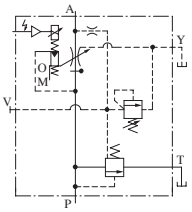
Graphic Symbols



Models with Proportional Pilot Relief Valve



Models with Proportional Pilot Relief Valve and Sensor



Models without Proportional Pilot Relief Valve

External Pilot Pres. Connection

Model Number Designation

EHFB	G	-03	-60	-C	-E	-S	-50
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pilot Relief Valve Pres. Adj. Range	Pilot Connection of Flow Control	Pressure Controls	Design Number
EHFB: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G**: Sub-Plate Mounting	**03**	**60** **125**	**None**: Without Proportional Pilot Relief Valve **C, H**: See Specifications	**None**: Internal Pilot **E**: External Pilot	**None**: Open-Loop **S**: Open-Loop with Sensor	**50**
		06	**250**				**50**
		10	**500**				**50**

★Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHFBG-03-60/125	M10 × 65 L ····· 4 Pcs.
EHFBG-06-250	M16 × 100 L ····· 4 Pcs.
EHFBG-10-500	M20 × 130 L ····· 4 Pcs.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHFBG-03	EFBGM-03Y-20	3/4	6
	EFBGM-03Z-20	1	6
EHFBG-06	EFBGM-06X-20	1	12.5
	EFBGM-06Y-20	1 1/4	16
EHFBG-10	EFBGM-10Y-20	1 1/2, 2Pipe Flange Mtg.	37

- Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)
- EFBGM-10Y is special type sub-plate to be used with pipe flange. When ordering EFBGM-10Y specify pipe flange in addition to EFBGM-10Y. Refer to Engineering Information Catalogue.

Instructions

Drain Back Pressure

Check that the drain back pressure does not exceed 0.2 MPa.

When Relief Valve Passing Flow Rate is Low in Pressure Control State

To avoid preselected pressure instability, use a passing flow rate of 15 L/min or higher.

Further, check that the tank-side back pressure does not exceed 0.5 MPa.

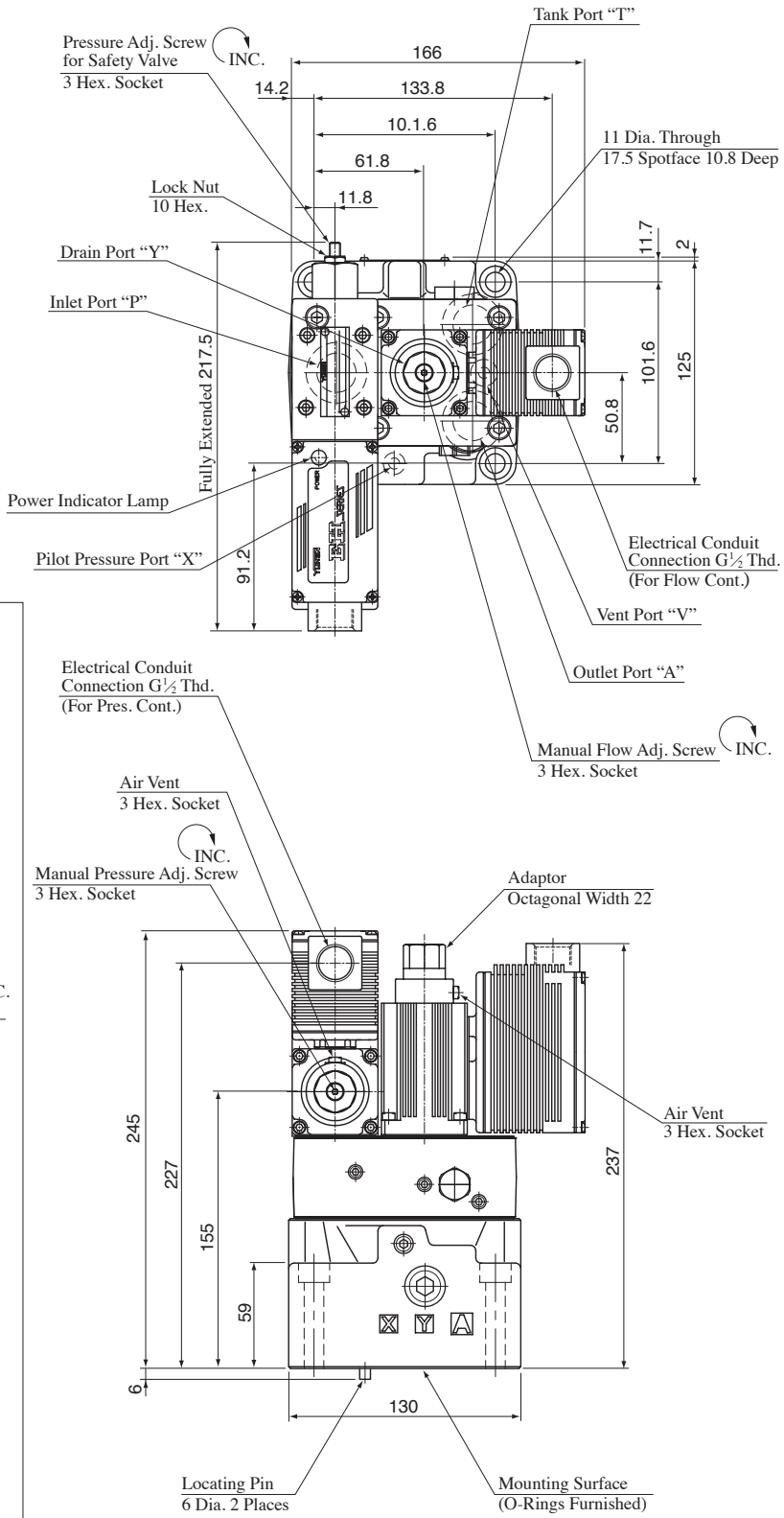
Safety Valve Pressure Setting

The safety valve is preset to a pressure that is 2 MPa higher than the maximum adjustment pressure.

Therefore, adjust this pressure setting as needed to suit the pressure used.

To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

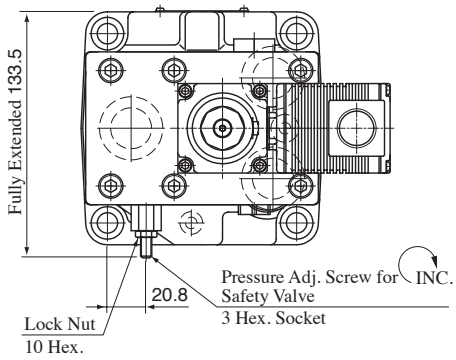
EHFBG-03-$\frac{60}{125}$-$\frac{C}{H}$(-E)-＊-50

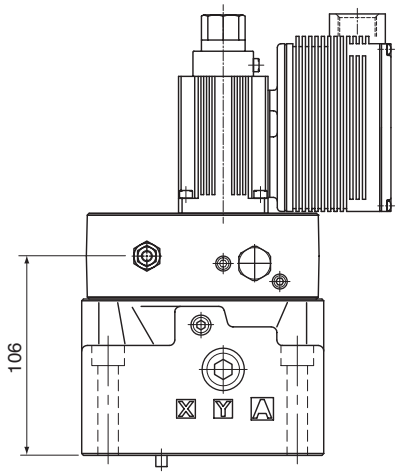


Mass ····· 17 kg

(Models with Sensor····· 17.7 kg)

EHFBG-03-$\frac{60}{125}$(-E)-50

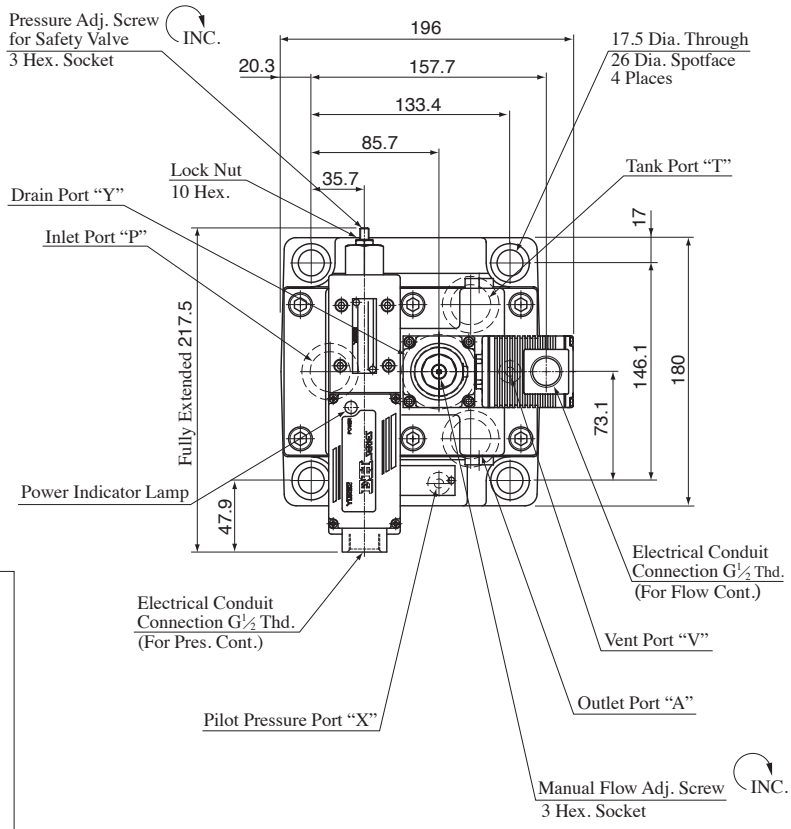




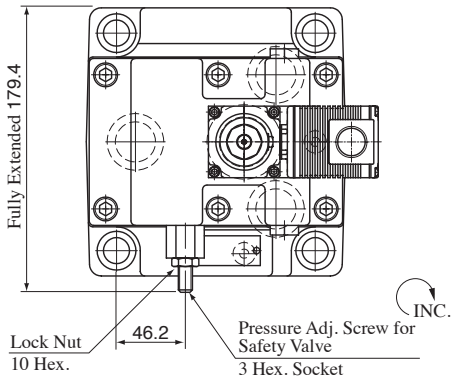
For other dimensions, refer to right drawing.

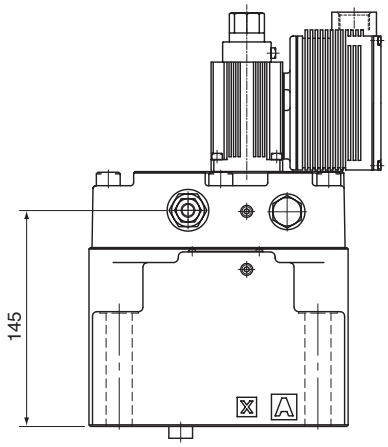
Mass ····· 14.8 kg

EHFBG-06-250-$\frac{C}{H}$(-E)-＊-50



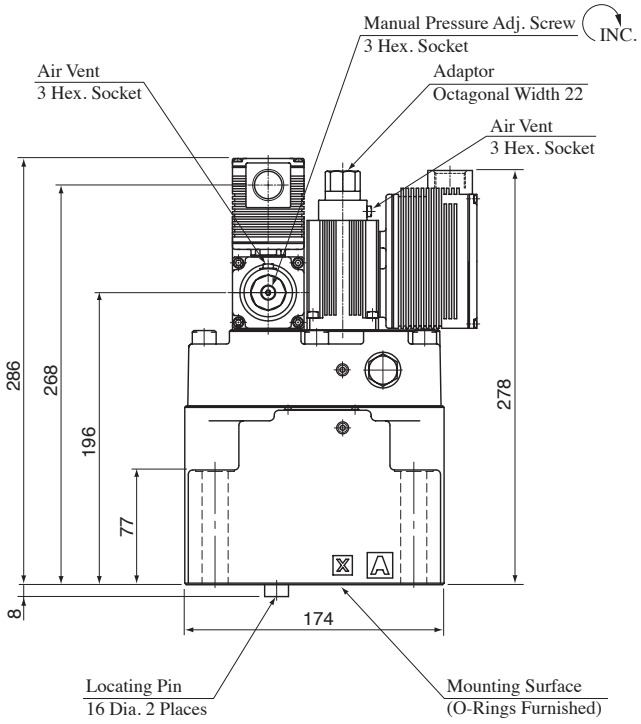
EHFBG-06-250(-E)-50





For other dimensions, refer to right drawing.

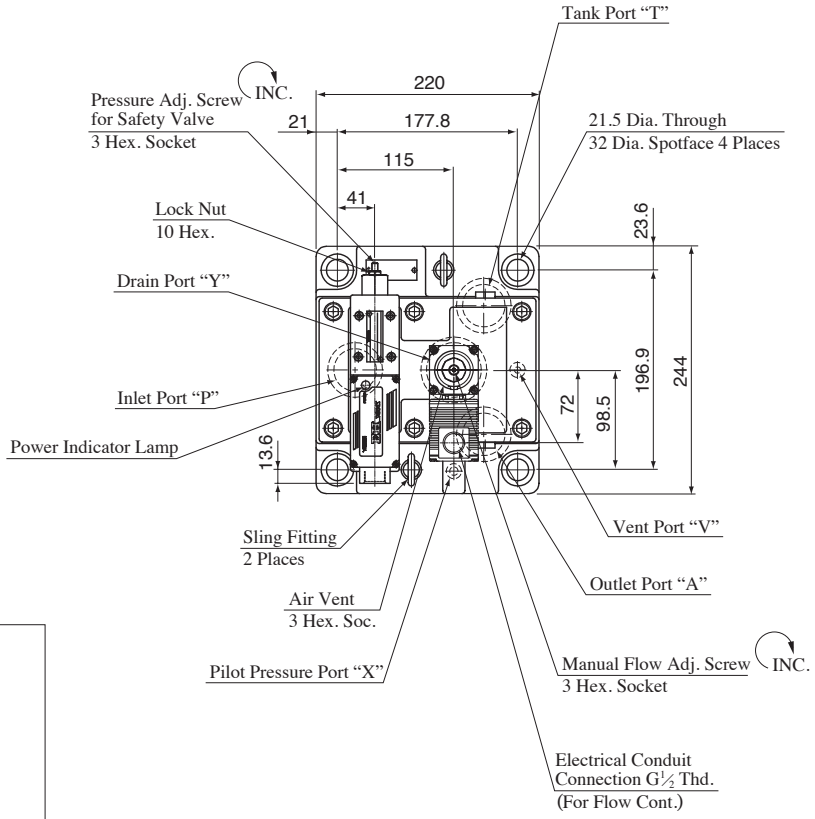
Mass …… 21.8 kg



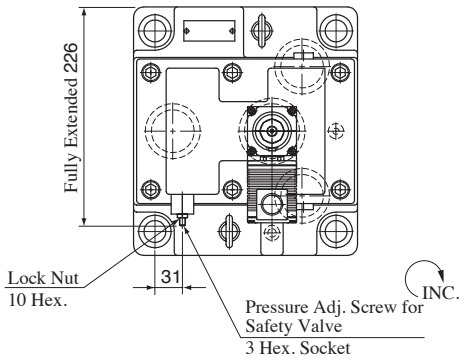
Mass …… 24 kg

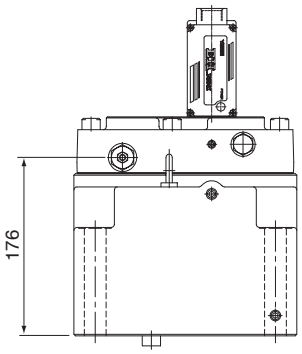
(Models with Sensor…… 24.7 kg)

EHFBG-10-500-$\frac{C}{H}$(-E)-＊-50



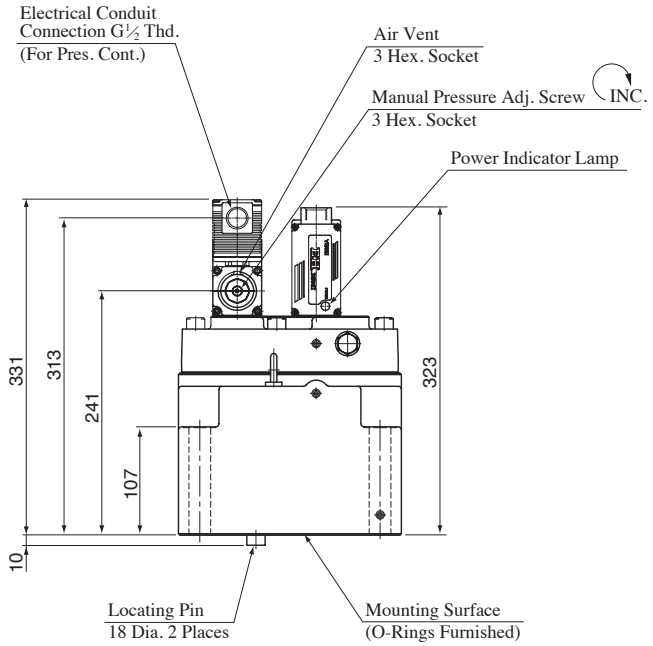
EHFBG-10-500(-E)-50





For other dimensions, refer to right drawing.

Mass …… 61.8 kg



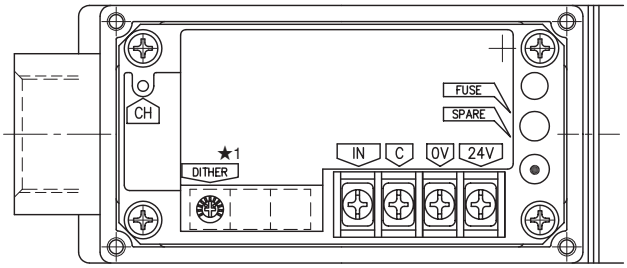
Mass…… 64 kg

(Models with Sensor…… 64.7 kg)

Detail of Amplifier

Connecting Terminal

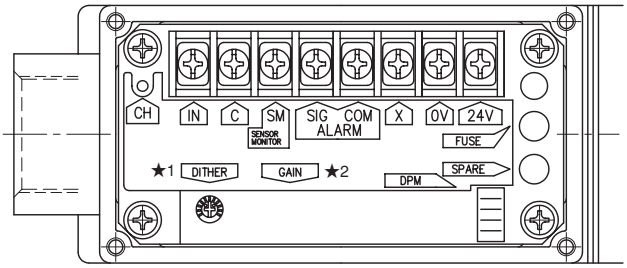
- Flow Control
- Pressure Controls···Open-Loop Type



Terminal	Name
IN	Input Signal (+)
C	Input Signal (COM)
0 V	Power Supply
24 V	
CH	Output Current Check (to C)

★1. DITHER
Use as they are since they are factory-preset to the optimum position. (Do not touch them in normal condition.)
★2. GAIN
GAIN adjusting volume is not available.

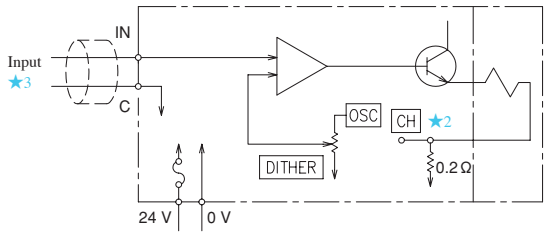
- Pressure Controls···Open-Loop Type with Sensor



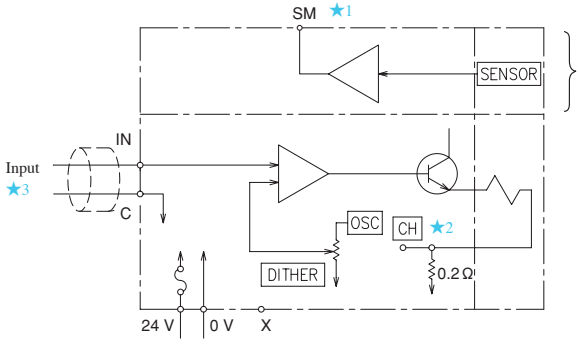
Terminal		Name
IN		Input Signal (+)
C		Input Signal (COM)
SM		Sensor Monitor (to C)
ALARM	SIG	(Open)
	COM	
X		(Open)
0 V		Power Supply
24 V		
CH		Output Current Check (to C)

Circuit Schematic

- Flow Controls



- Pressure Controls

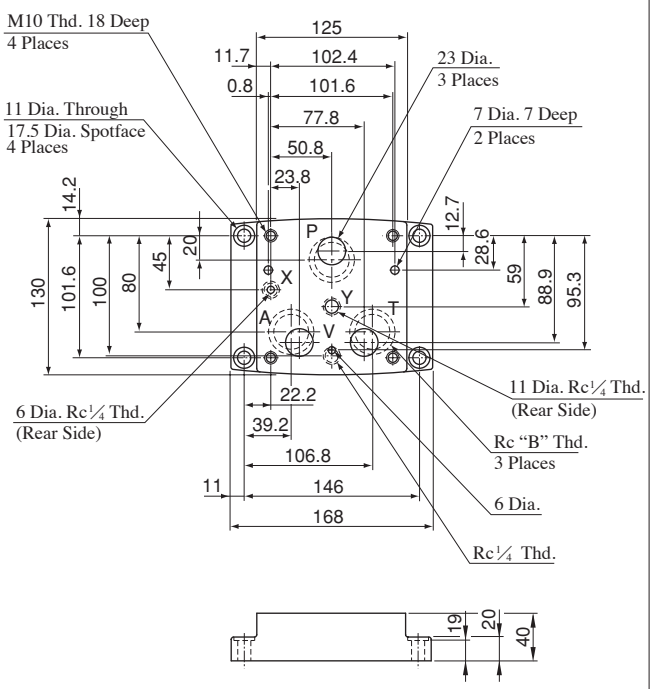


Available for the models with pres. controls " S"

★1. For "SM" terminal, external instruments should have input impedance of more than 10 kΩ.
★2. For "CH" terminal, external instruments should have input impedance of more than 10 kΩ.
★3. Use shielded cable for "Input" connection. The ground of the shielded cable must be connected to input signal side.

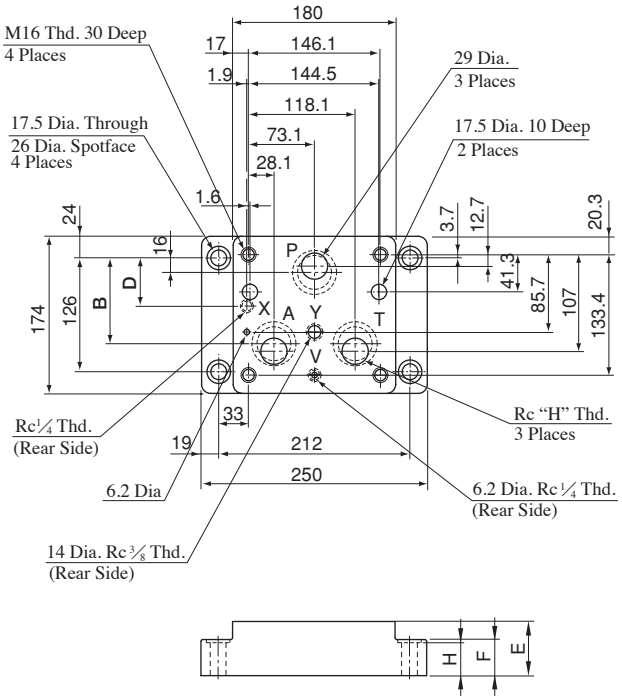
Sub-Plate

EFBGM-03Y -20 / 03Z -20



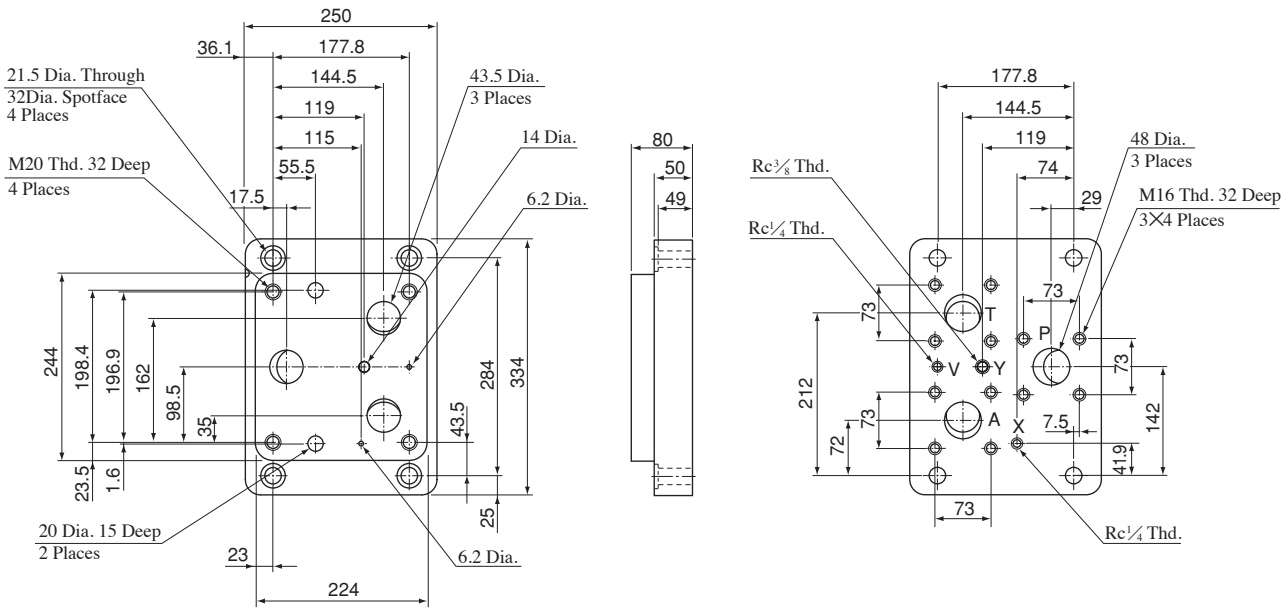
Sub-Plate Model Numbers	B
EFBGM-03Y-20	3/4
EFBGM-03Z-20	1

EFBGM-06X -20 / 06Y -20



Sub-Plate Model Numbers	B	D	E	F	H
EFBGM-06X-20	107	67	45	35	1
EFBGM-06Y-20	95	57	60	40	1 1/4

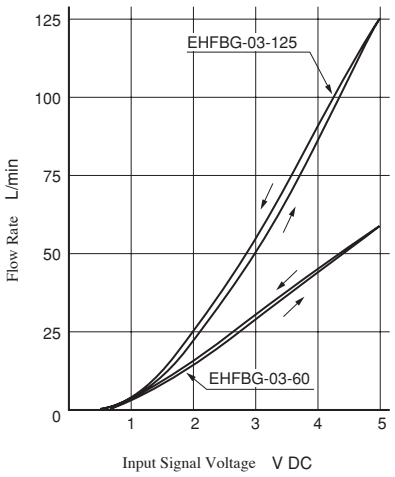
EFBGM-10Y-20



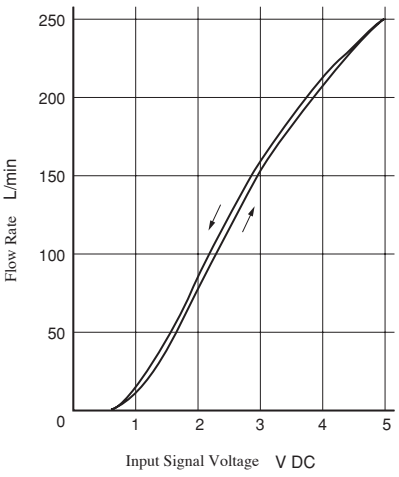
Input Signal Voltage vs. Flow

Viscosity : 30 mm²/s

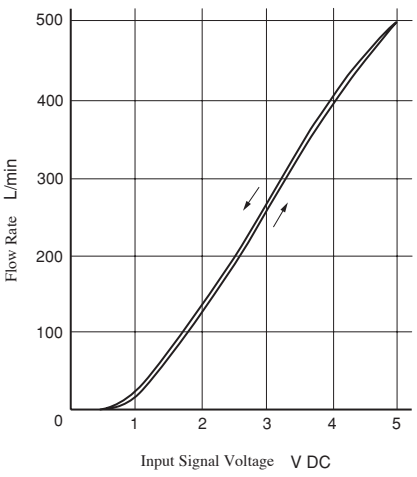
EHFBG-03



EHFBG-06



EHFBG-10

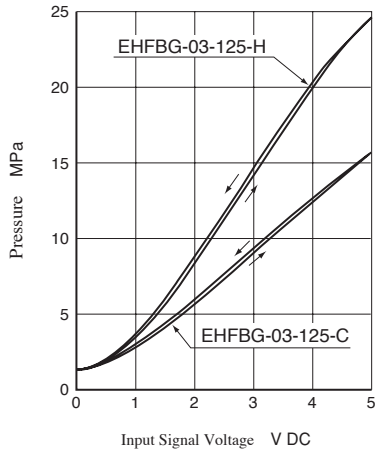


Input Signal Voltage vs. Pressure

Viscosity : 30 mm²/s

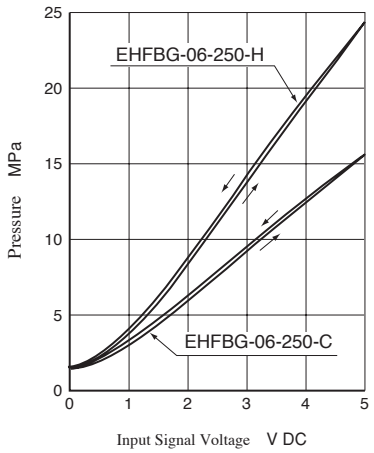
EHFBG-03

Flow Rate ： 125 L/min



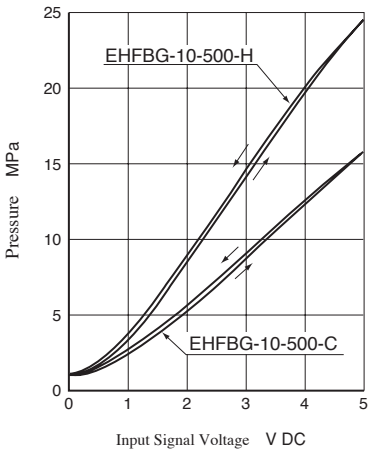
EHFBG-06

Flow Rate ： 250 L/min



EHFBG-10

Flow Rate ： 500 L/min

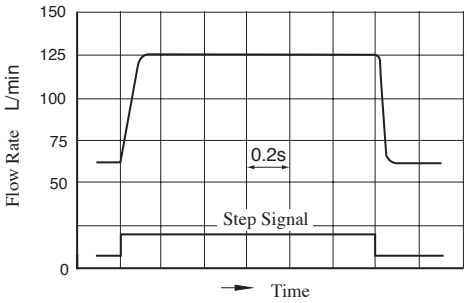


Step Response (Flow Controls)

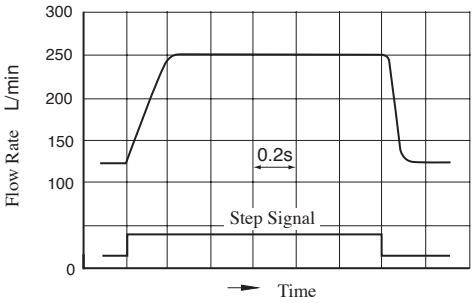
Viscosity : 30 mm²/s

The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

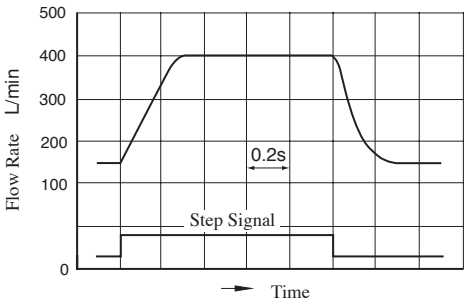
EHFBG-03



EHFBG-06



EHFBG-10

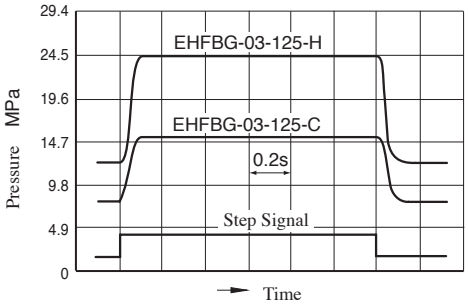


Step Response (Pressure Controls)

Viscosity : 30 mm²/s

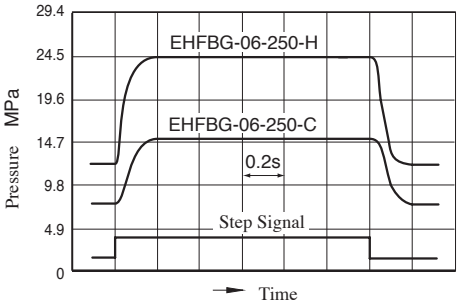
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

EHFBG-03



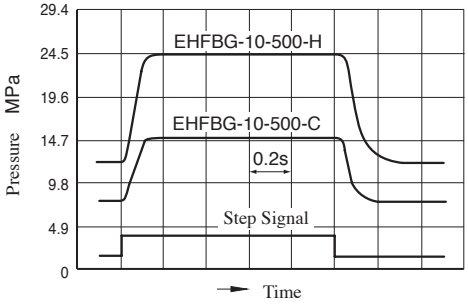
Flow Rate : 125 L/min
Trapped Oil Volume : < 1 L

EHFBG-06



Flow Rate : 250 L/min
Trapped Oil Volume : < 1 L

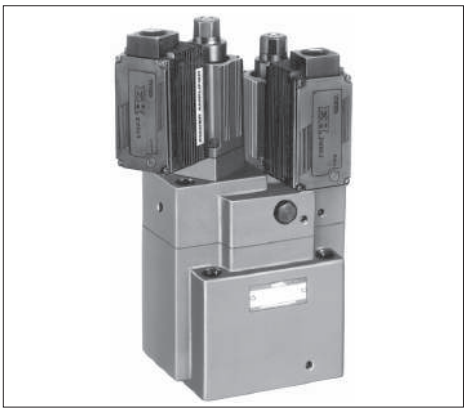
EHFBG-10

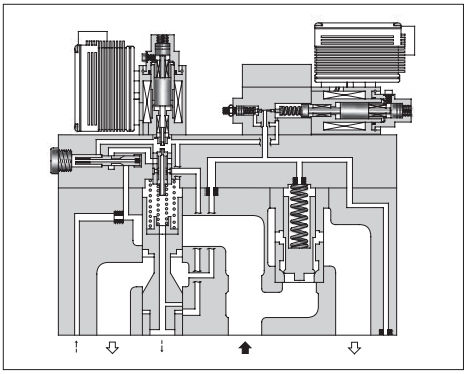


Flow Rate : 500 L/min
Trapped Oil Volume : < 1 L

High Flow Series
Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is a energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
For the High Flow Series, double maximum flow rate [03 size: 125 → 250 L/min, 06 size: 250 → 500 L/min] enables a smaller valve size than conventional products; compact-sized devices can be provided.



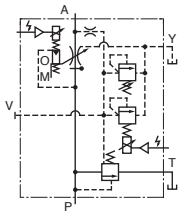


Specifications

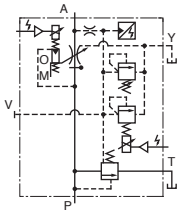
Descriptions \ Model Numbers			EHFBG-03-250	EHFBG-06-500
Max. Operating Pressure		MPa	24.5	24.5
Max. Flow		L/min	250	500
Metered Flow Capacity		L/min	2.5-250	5-500
Min. Pilot Pressure		MPa	1.5	1.5
Pilot Flow L/min	at Normal		1	1
	at Transition		4	6
Differential Pressure		MPa	0.8	0.9
Flow Controls	Hysteresis		3% or less	
	Repeatability		1%★ or less	
	Input Signal Voltage		Max. Flow / 5 V DC	
	Coil Resistance		10 Ω	
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
	Input Impedance		10 kΩ	
	Power Input (Max.)		28 W	
Pressure Controls	Pres. Adj. Range MPa	Adj. Range:C	1.6-15.7	1.5-15.7
		Adj. Range:H	1.8-24.5	1.5-24.5
	Hysteresis		3% or less	
	Repeatability		1%★ or less	
	Coil Resistance		10 Ω	
	Input Signal Voltage		Max. Adj. Pres. / 5 V DC	
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
	Input Impedance		10 kΩ	
	Power Input (Max.)		28 W	
Output Signal (Sensor Monitor)			C : 5 V DC / 15.7 MPa H : 5 V DC / 24.5 MPa	
Ambient Temperature			0 - 50°C (With Circulated Air)	
Mass			Refer to Pages H-47 to H-48	

★1. The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.
★2. The specifications for pressure controls is applied to models with pilot relief valve. (Ex. EHFBG-03-125-C-∗-50)
★3. Pressure adjustment range of the valves without pilot relief valves (Ex. EHFBG-03-250-∗-50) is from a minimum adjustable pressure to 24.5 MPa.

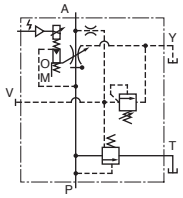
Graphic Symbols



Models with Proportional Pilot Relief Valve



Models with Proportional Pilot Relief Valve and Sensor



Models without Proportional Pilot Relief Valve

External Pilot Pres. Connection

Model Number Designation

EHFB	G	-03	-250	-C	-E	-S	-50
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pilot Relief Valve Pres. Adj. Range	Pilot Connection of Flow Control	Pressure Controls	Design Number
EHFB: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G**: Sub-Plate Mounting	**03**	**250**	**None**: Without Proportional Pilot Relief Valve	**None**: Internal Pilot	**None**: Open-Loop	**50**
		06	**500**	**C, H** : See Specifications	**E**: External Pilot	**S**: Open-Loop with Sensor	**50**

★Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHFBG-03-250	M12 × 120 L ····· 4 Pcs.
EHFBG-06-500	M16 × 120 L ····· 4 Pcs.

Instructions

Drain Back Pressure

Check that the drain back pressure does not exceed 0.2 MPa.

When Relief Valve Passing Flow Rate is Low in Pressure Control State

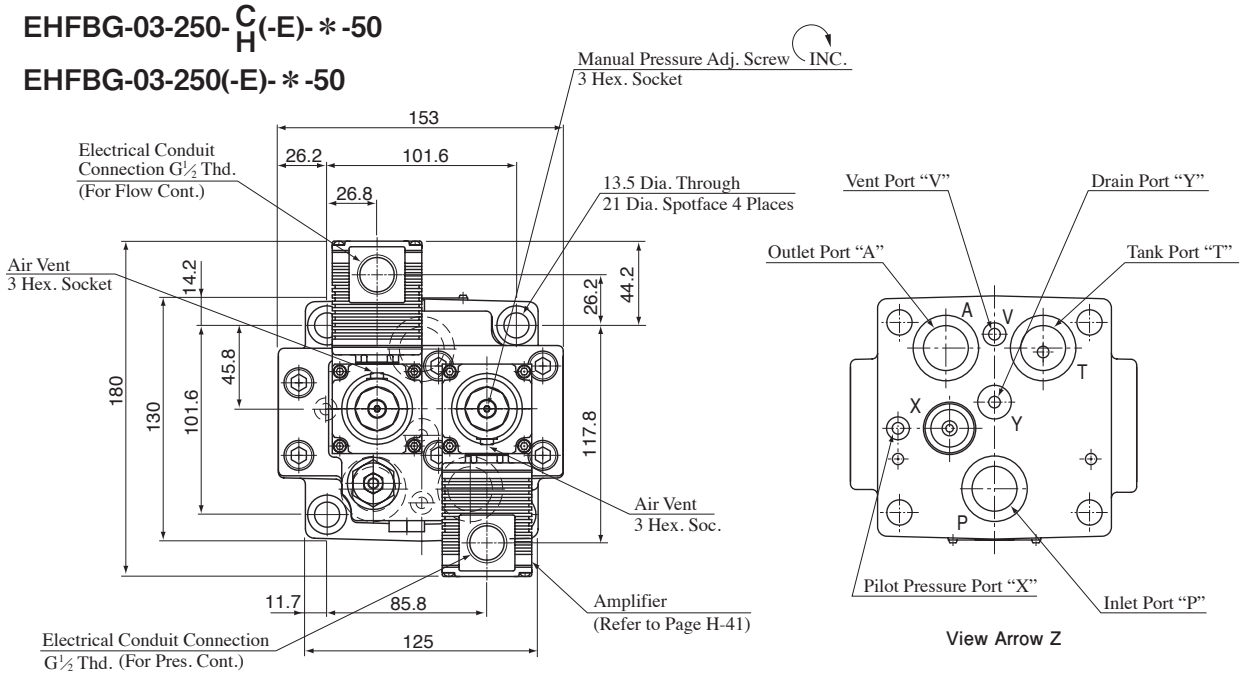
To avoid preselected pressure instability, use a passing flow rate of 15 L/min or higher.
Further, check that the tank-side back pressure does not exceed 0.5 MPa.

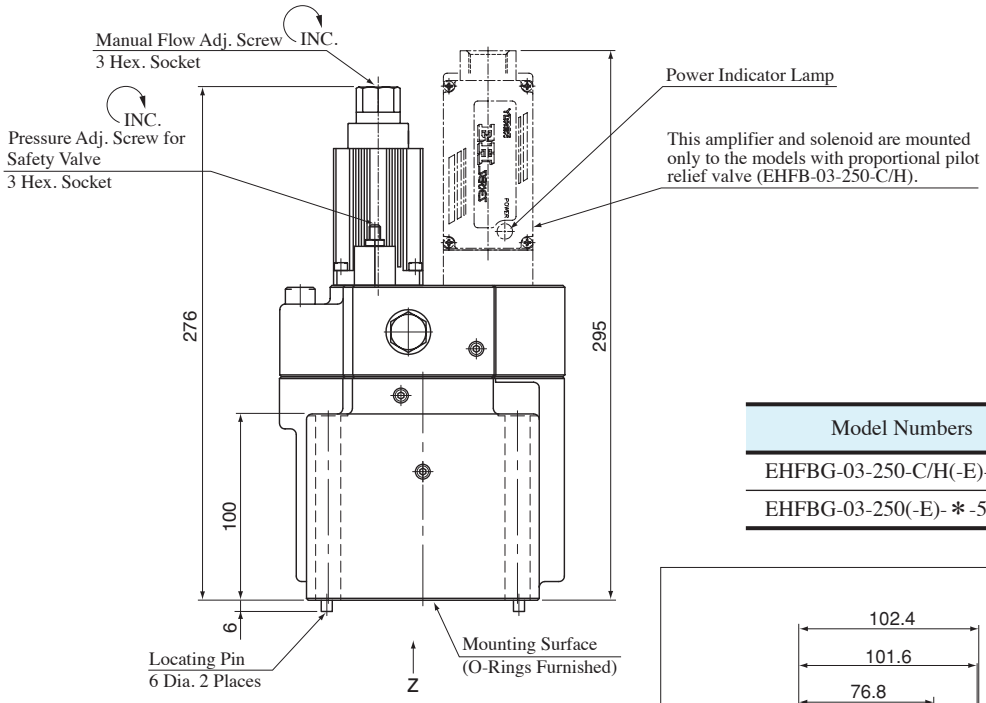
Safety Valve Pressure Setting

The safety valve is preset to a pressure that is 2 MPa higher than the maximum adjustment pressure.
Therefore, adjust this pressure setting as needed to suit the pressure used.
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

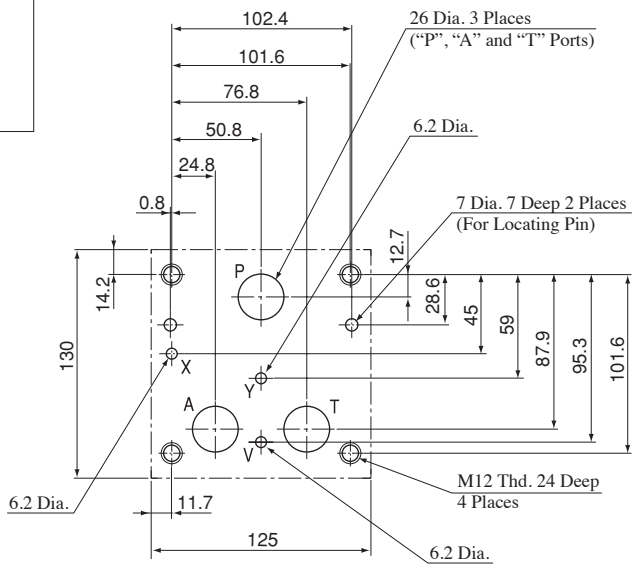
EHFBG-03-250-$\frac{C}{H}$(-E)-＊-50

EHFBG-03-250(-E)-＊-50





Model Numbers	Mass
EHFBG-03-250-C/H(-E)-＊-50	19 kg
EHFBG-03-250(-E)-＊-50	17.4 kg



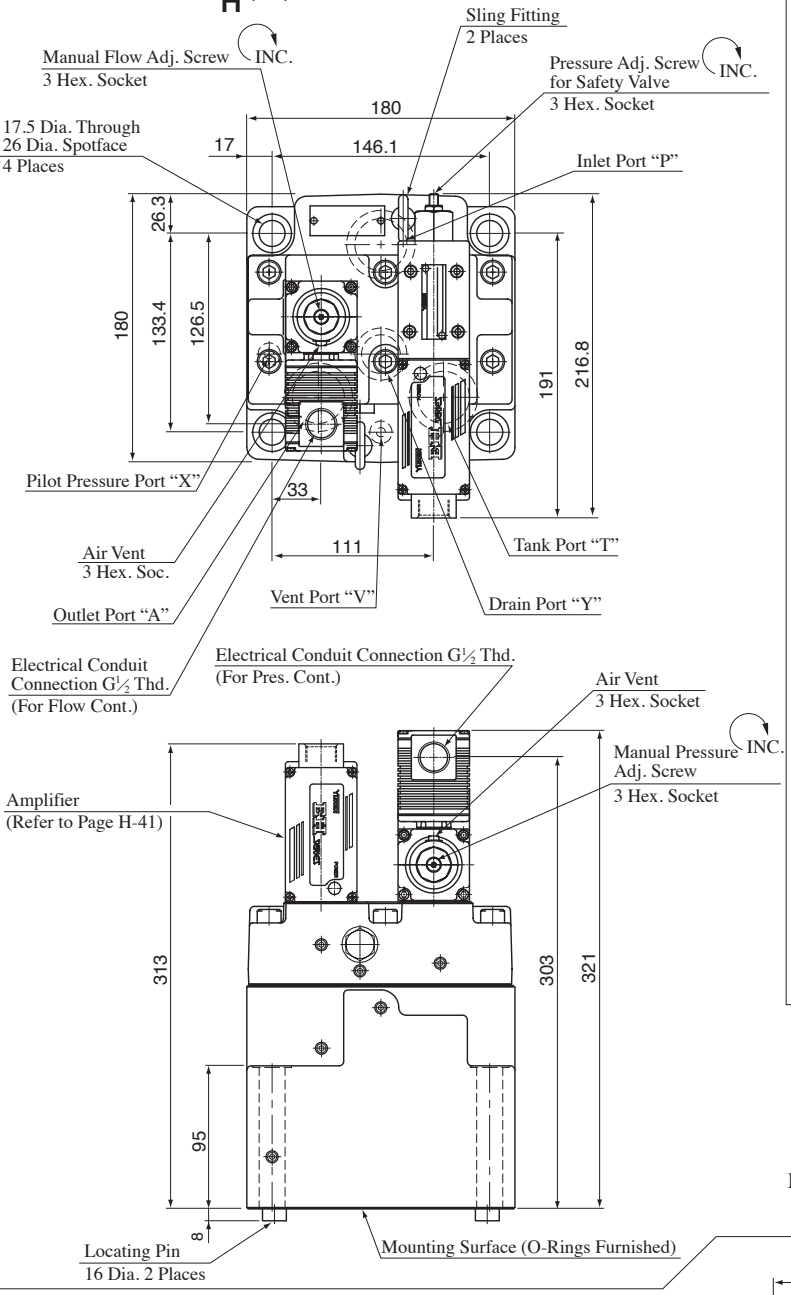
Dimensions of Valve Mounting Surface

Prepare the mounting surface as shown on the right.
It should be fine finished.

Mounting Interchangeability with Conventional Models

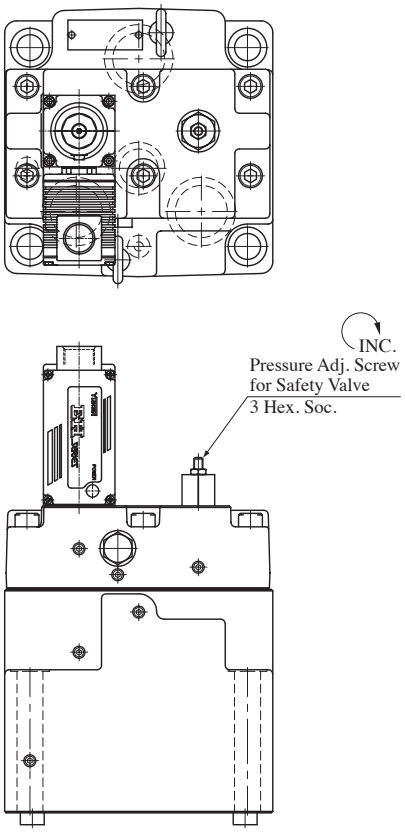
The high flow models are not interchangeable in mounting with the conventional models.

EHFBG-06-500-$\frac{C}{H}$(-E)-＊-50



Mass ····· 36 kg

EHFBG-06-500(-E)-＊-50

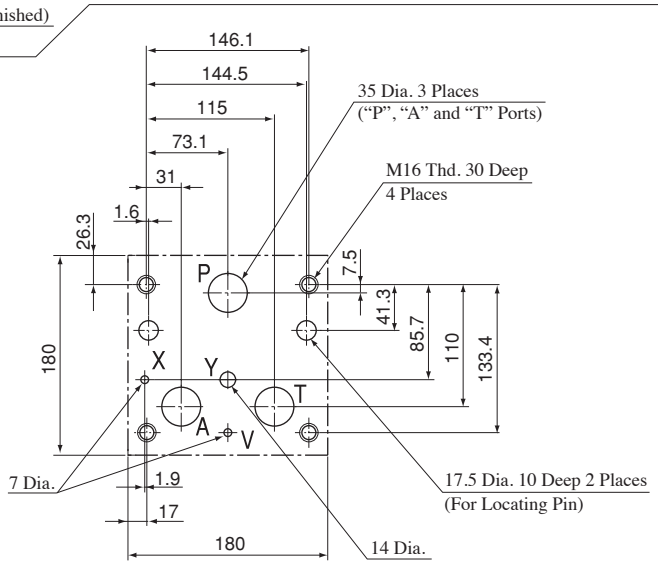


Mass ····· 33.8 kg

For other dimensions, refer to left drawing.

Dimensions of Valve Mounting Surface

Prepare the mounting surface as shown on the right.
It should be fine finished.



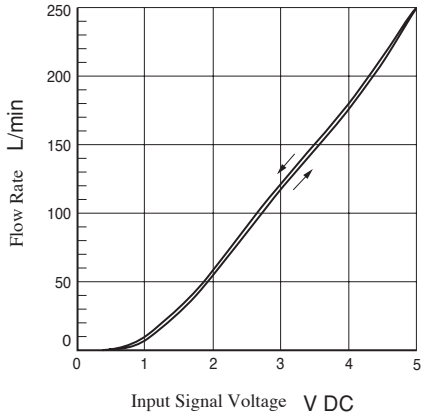
Mounting Interchangeability with Conventional Models

A valve in the high-flow series can be mounted on the mounting surface for a conventional valve.
(Conventional valve : EHFBG-06-250 cannot be mounted on a mounting surface for the high-flow series.)

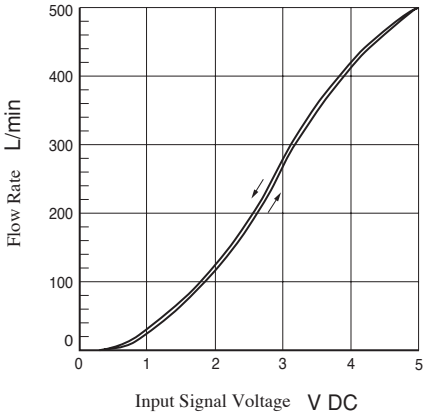
Input Signal Voltage vs. Flow

Viscosity : 30 mm²/s

EHFBG-03-250



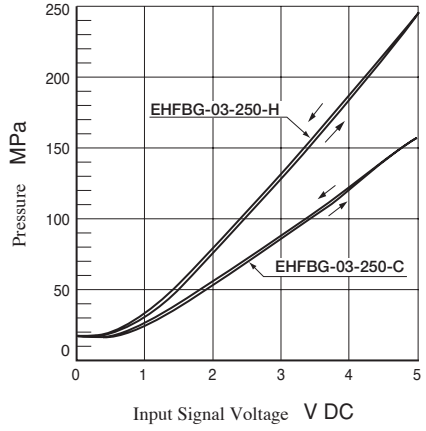
EHFBG-06-500



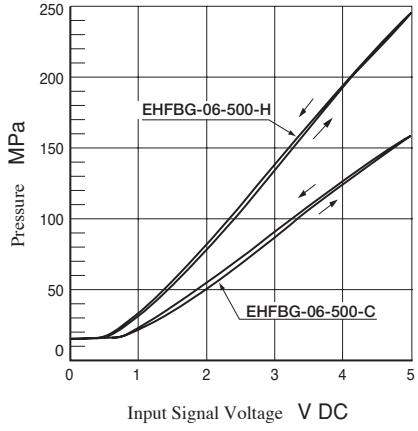
Input Signal Voltage vs. Pressure

Viscosity : 30 mm²/s

EHFBG-03-250



EHFBG-06-500

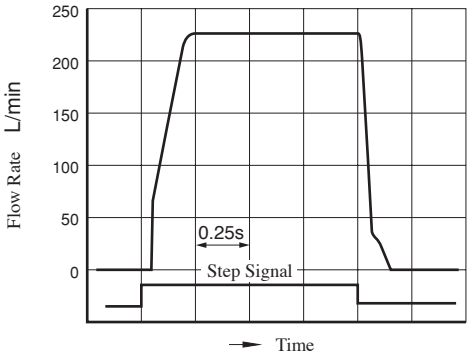


Step Response (Flow Controls)

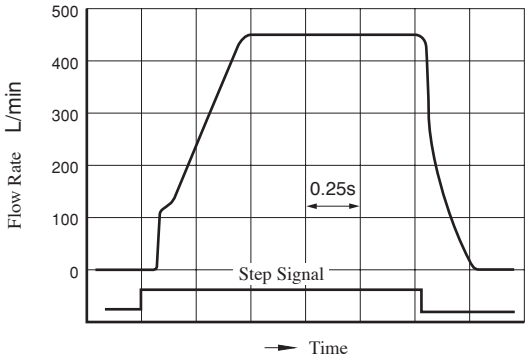
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

Viscosity : 30 mm²/s

EHFBG-03-250



EHFBG-06-500

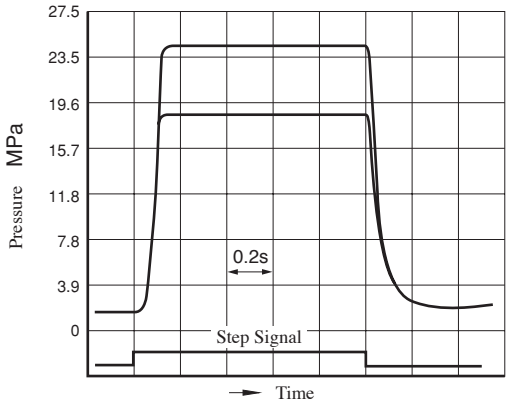


Step Response (Pressure Controls)

The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

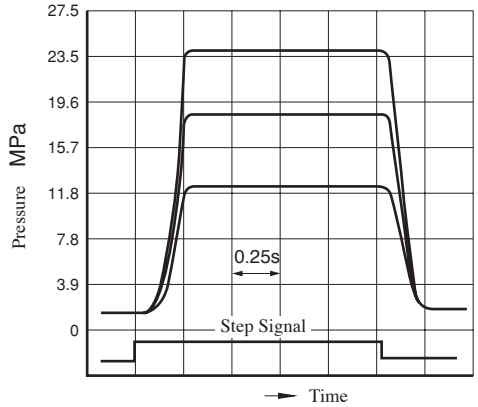
Viscosity : 30 mm²/s

EHFBG-03-250-H



Flow Rate : 250 L/min
Trapped Oil Volume : ＜1 L

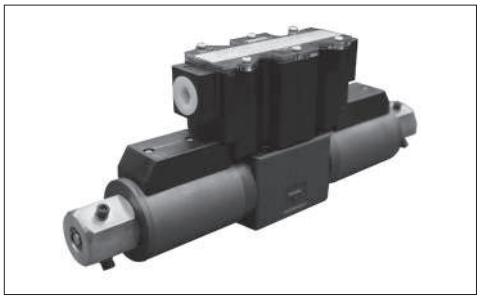
EHFBG-06-500-H

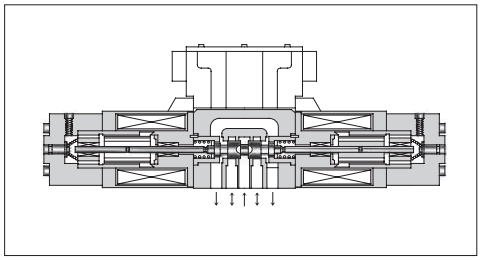


Flow Rate : 500 L/min
Trapped Oil Volume : ＜6 L

Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves incorporate two control functions - flow and direction - which simplify the hydraulic circuit composition and therefore the cost of the system is reduced.





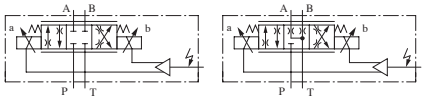
Specifications

Descriptions \ Model Numbers		EHDFG-01	EHDFG-03
Max. Operating Pressure	MPa	25	25
Max. Tank Line Back Pres.	MPa	7	7
Rated Flow [Valve ⊿P 7 MPa]	L/min	30	60
Hysteresis		5% or less	
Repeatability		1%★ or less	
Frequency Response		20 (Phase: -90°)	17 (Phase: -90°)
Coil Resistance		10.5 Ω	8.0 Ω
Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
Input Signal Voltage	By Controlling Variable Resistance (Using of Power from Amp.)	1 - 2 kΩ Volume Range	
	By Controlling Voltage (Using of Power outside Amp.)	0 - –5 V for SOL a 0 - +5 V for SOL b	
Input Impedance		10 kΩ	10 kΩ
Power Input (Max.)		40 W	45 W
Ambient Temperature		0 - 50°C (With Circulated Air)	
Mass		3.0 kg	9.2 kg

★The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.

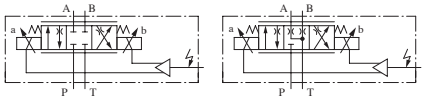
Graphic Symbols

● Meter-in • Meter-out Control



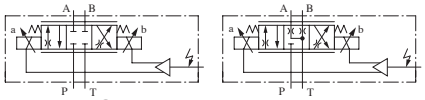
3C2 3C40

● Meter-out Control



3C2 3C40

● Meter-in Control



3C2 3C40

Model Number Designation

EHDF	G	-01	-30	-3C2	-E	-30
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type★	Direction of Flow	Design Number
EHDF: Proportional Electro-Hydraulic Directional and Flow Control Valve	**G**: Sub-Plate Mounting	**01**	**30**	**3C2**	**XY** : Meter-in · Meter-out	**30**
		03	**60**	**3C40**	**X** : Meter-in **Y** : Meter-out	**30**

★1. Spool type shown under the neutral position.
★2. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHDFG-01	M5×45 L ····· 4 Pcs.
EHDFG-03	M6×35 L ····· 4 Pcs.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHDFG-01	DSGM-01-31★	1/8	0.8
	DSGM-01X-31★	1/4	
	DSGM-01Y-31★	3/8	
EHDFG-03	DSGM-03-40	3/8	3
	DSGM-03X-40	1/2	
	DSGM-03Y-40	3/4	4.7

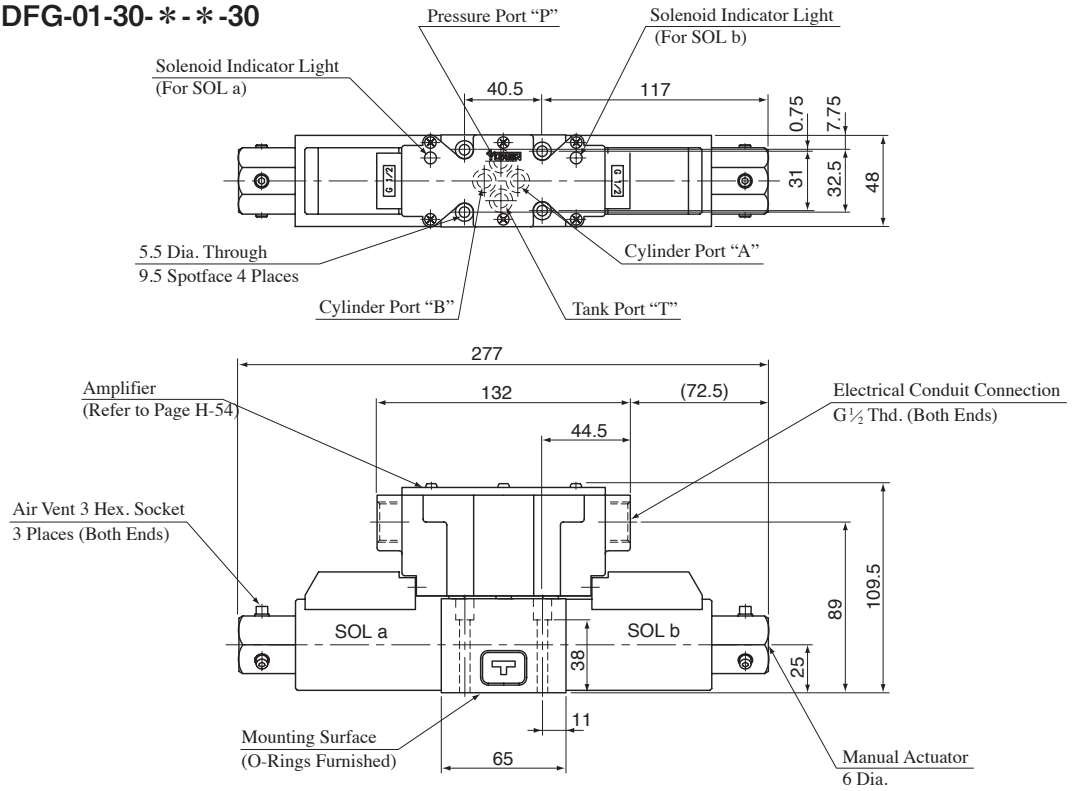
★ Refer to Page H-8.

● Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (▽)

Instructions

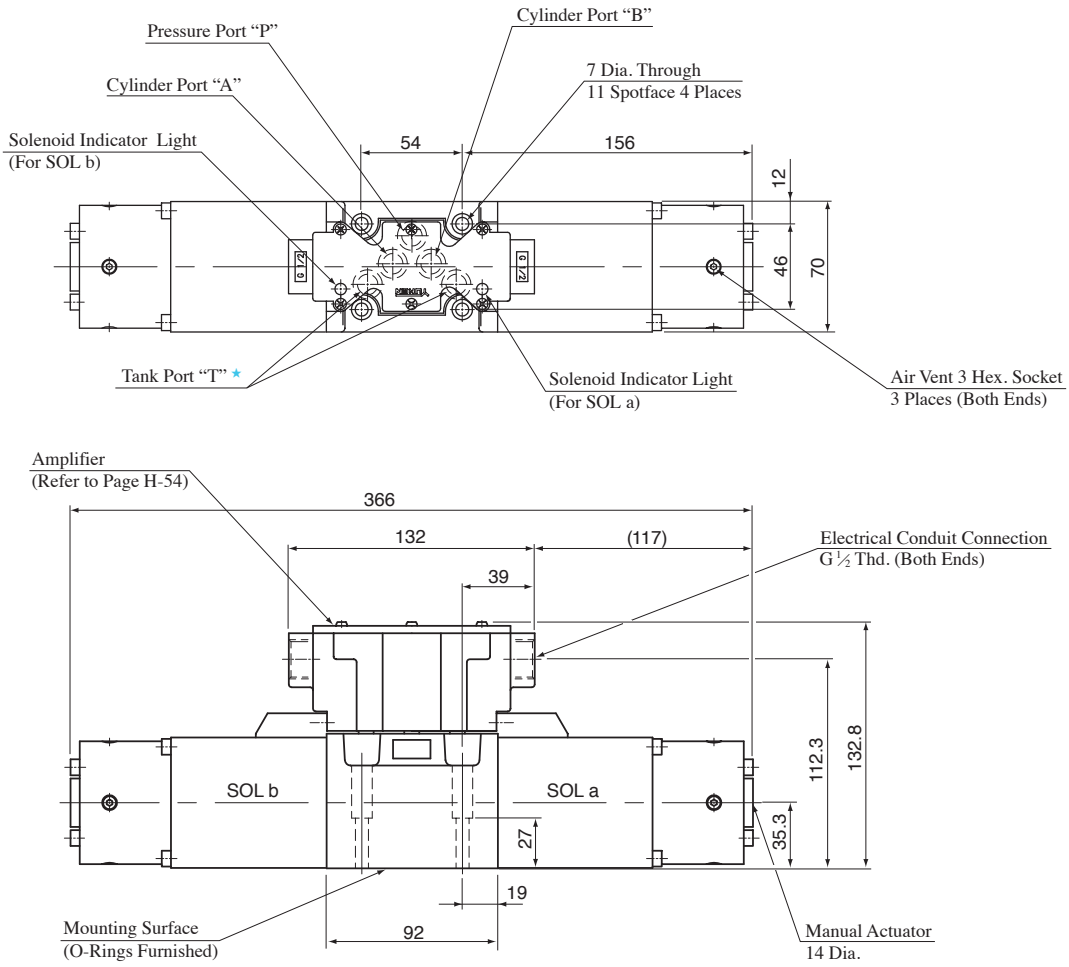
Take care of filling the valve tank port with the hydraulic oil at any time.
However, check valve with cracking pressure 0.04 MPa approx. shall be provided as required.
The pipe from the tank port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

EHDFG-01-30-＊-＊-30



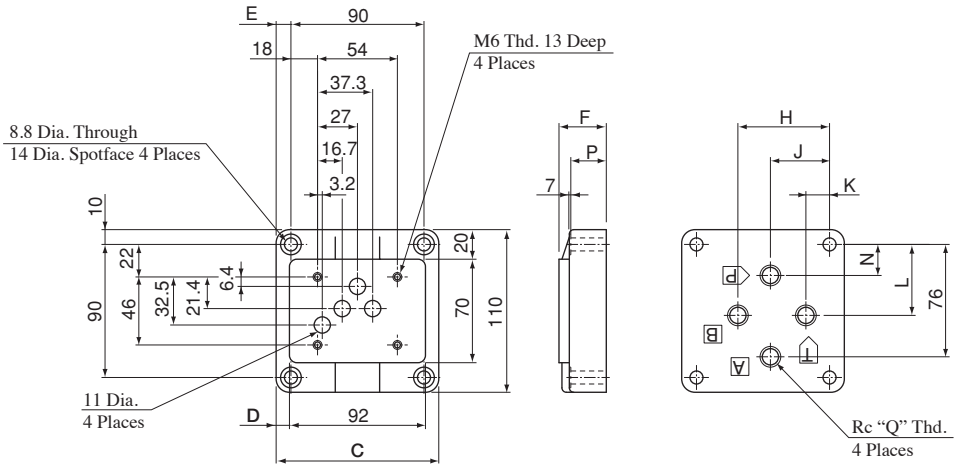
Note : Sub-plate is common to that of EHDG-01.
Refer to page H-8 for the dimensions of mounting surface.

EHDFG-03-60-＊-＊-30



★Of the two of tank port "T', the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

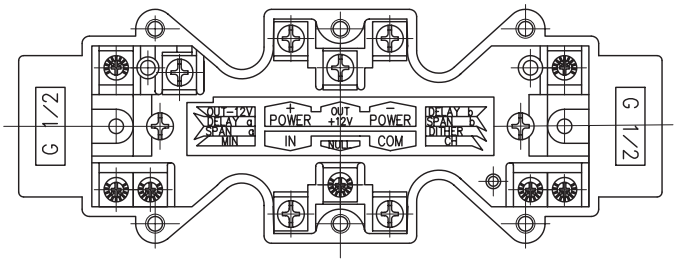
Sub-Plates



Sub-Plate Model Numbers	C	D	E	F	H	J	K	L	N	P	Q
DSGM-03-40	110	9	10	32	62	40	16	48	21	24	3/8
DSGM-03X-40											1/2
DSGM-03Y-40	120	14	15	50	80	45	10	47	16	42	3/4

Detail of Amplifier

Connecting Terminal

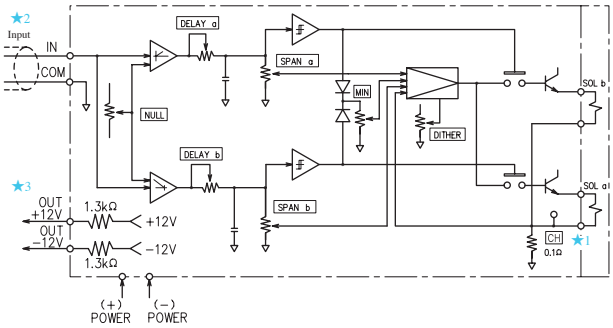


Terminal	Name
POWER ＋	24V DC Power Supply
POWER －	
IN	Input Signal
COM	Input Signal (COM)
OUT ＋12V	Internal Voltage Output ＋12V
OUT －12V	Internal Voltage Output －12V
CH	Output Current Check (to COM)

★1 DITHER / SPAN / NULL / MIN
Use as they are since they are factory-preset to the optimum position. (Do not touch them in normal condition.)

★2 DELAY
The adjusting volume is set to minimum at shipping. Set a delay time according to the machine conditions.

Circuit Schematic



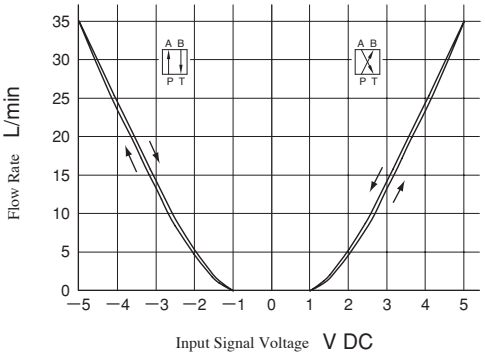
★1. For “CH” terminal, external instruments should have input impedance of more than 10 kΩ.

★2. Use shielded cable for “Input” connection.
The ground of shielded cable must be connected to input signal side.

★3. Internal output voltage ±12V terminal is used when input signal voltage is controlled by variable resister. Volume of 1 kΩ - 2 kΩ should be used.

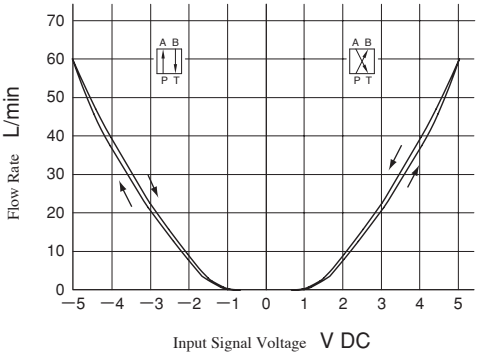
Input Signal Voltage vs Flow

EHDFG-01



Viscosity : 30 mm²/s
Valve Pres. Difference : 3.4 MPa

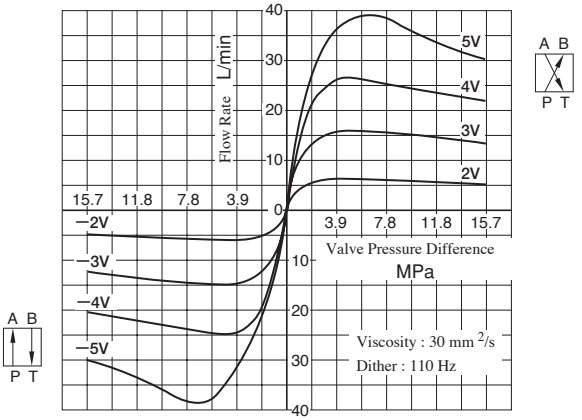
EHDFG-03



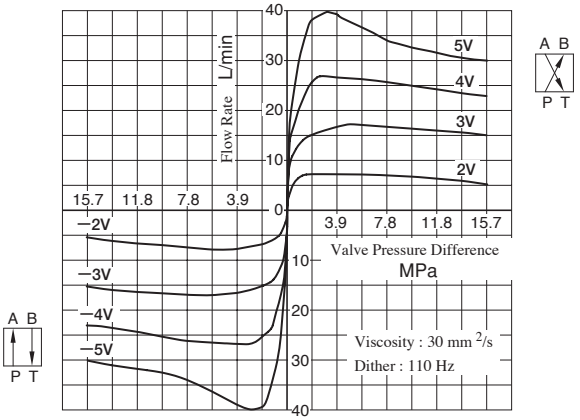
Viscosity : 30 mm²/s
Valve Pres. Difference : 3.4 MPa

Differential Pressure vs. Metered Flow

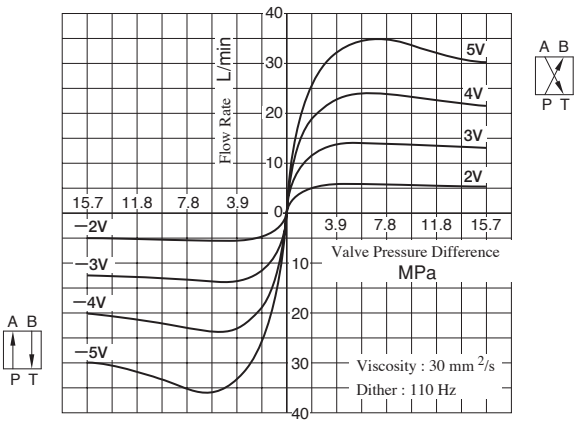
EHDFG-01-30-＊-XY-30



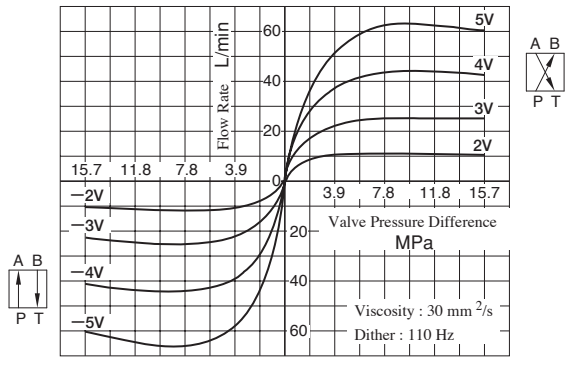
EHDFG-01-30-＊-X-30



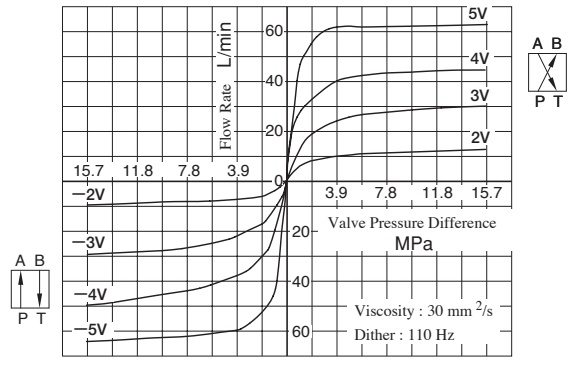
EHDFG-01-30-＊-Y-30



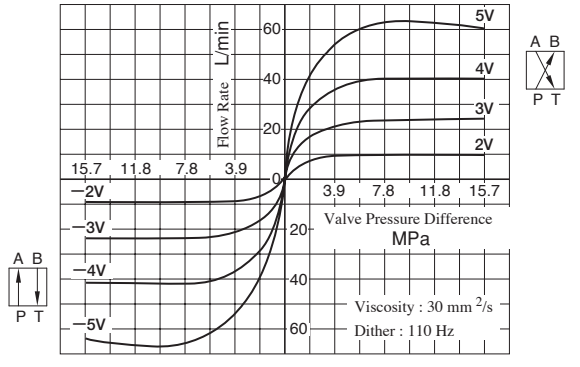
EHDFG-03-60-＊-XY-30



EHDFG-03-60-＊-X-30

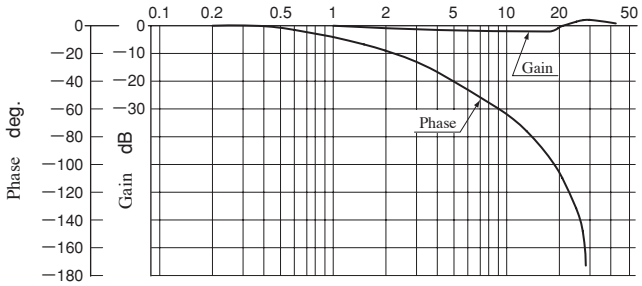


EHDFG-03-60-＊-Y-30



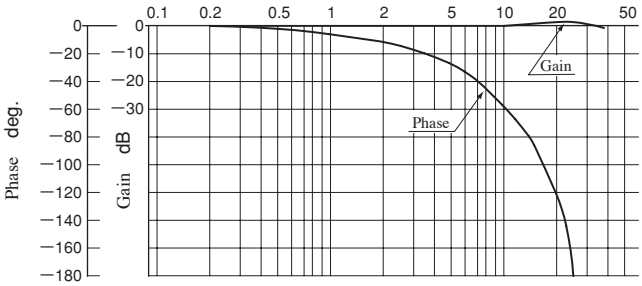
Frequency Response (Travel of Spool)

EHDFG-01



Model Number : EHDFG-01-03-∗-Y-30
Viscosity : 30 mm²/s
Supply Pressure : 6.9 MPa
Flow Rate : 15±6 L/min

EHDFG-03

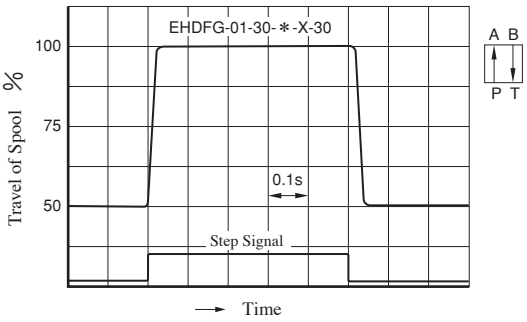


Model Number : EHDFG-03-60-∗-Y-30
Viscosity : 30 mm²/s
Supply Pressure : 6.9 MPa
Flow Rate : 30±6 L/min

Step Response (Example)

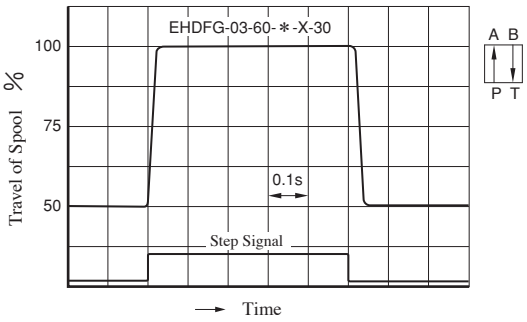
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

EHDFG-01



Viscosity : 30 mm²/s
Supply Pressure : 6.9 MPa

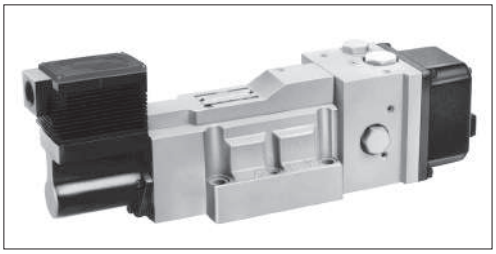
EHDFG-03

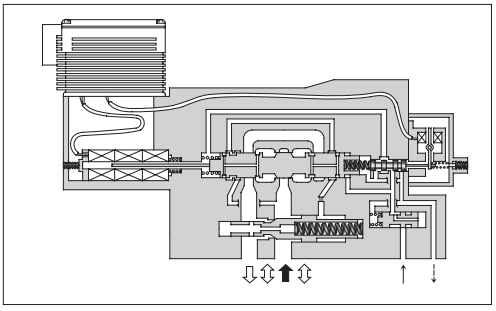


Viscosity : 30 mm²/s
Supply Pressure : 6.9 MPa

High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves pursue the ultimate performance of proportional electro-hydraulic directional & flow control valves and make themselves to have high response features.
The closed-loop is composed in the valve inside by combination of a differential transformer (LVDT) and a power amplifier. Thus, high accuracy and reliability are provided.
In addition to control in the open-loop, these can be used for the closed-loop system as simplified servo valves.





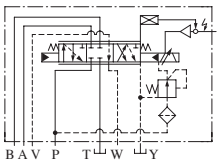
Specifications

Descriptions \ Model Numbers		EHDFG-04	EHDFG-06
Max. Operating Pressure MPa		15.7	15.7
Rated Flow L/min Valve Pres. Difference: 1.5 MPa		130	280
Min. Required Pilot Pressure MPa		1.5	1.5
Min. Required Pilot Flow L/min	at Normal	2	2
	at Transition	6	10
Max. Drain Line Back Pressure MPa		0.1	0.1
Hysteresis		1% or less	
Repeatability		1%★ or less	
Frequency Response		55 (Phase: -90°)	45 (Phase: -90°)
Coil Resistance		30 Ω	
Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
Input Signal Voltage		Rated Flow / 5 V DC	
Input Impedance		10 kΩ	
Power Input (Max.)		20 W	
Alarm Signal Output (Open Collector)		Voltage: Max. 30 V DC Current: Max. 30 mA	
LVDT Output (Sensor Monitor)		5 V DC / Rated Travel of Spool	
Ambient Temperature		0 - 50°C (With Circulated Air)	

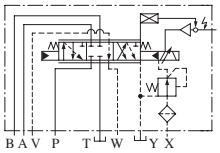
★The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols

● Models without Pressure Compensator Valve

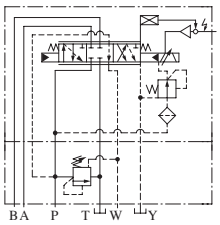


Internal Pilot



External Pilot

● Models with Pressure Compensator Valve



Internal Pilot

Model Number Designation

EHDF	G	-04	-130	-2	-E	-CB	-10
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type★	Pilot Connection	Relief Type Pres. Compensator	Design Number
EHDF: Proportional Electro-Hydraulic Directional and Flow Control Valve	**G**: Sub-Plate Mounting	**04**	**130**	**2**	**None**: Internal Pilot	**None**: Not Provided	**10**
		06	**280**	**40**	**E**: External Pilot	**CB**: Provided	**10**

★1. Spool type shown in the column is for the neutral position.
★2. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw		
	Models without Pres. Compensator	Models with Pres. Compensator	Q'ty
EHDFG-04	M6 × 40 L	M6 × 120 L	2
	M10 × 45 L	M10 × 125 L	4
EHDFG-06	M12 × 60 L	—	6
	—	Mtg. Bolt Kit MBK-06-01-30	1 Set

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHDFG-04	DHGM-04-20	1/2	4.4
	DHGM-04X-20	3/4	4.1
EHDFG-06	DHGM-06-50	3/4	7.4
	DHGM-06X-50	1	

● Sub-plates are available. Specify sub-plate model from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽L6)

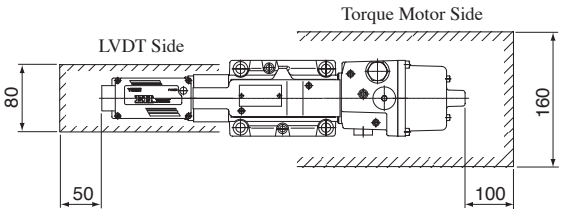
Instructions

Back Pressure to Drain Port

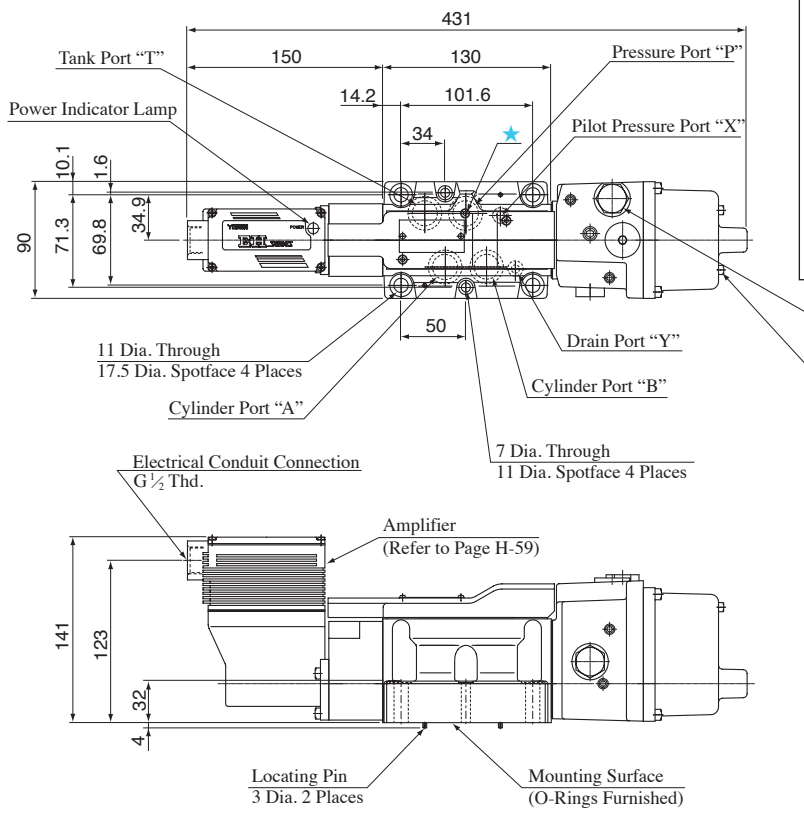
The drain port should be connected directly to the oil tank with a back pressure of not more than 0.1 MPa.

Installation Condition (Protection from Magnetic Field of DC SOL)

If a DC SOL. is installed near this valve, the magnetic field of DC SOL. may affect the control flow rate. Therefore, install the DC SOL. outside the area shown below.



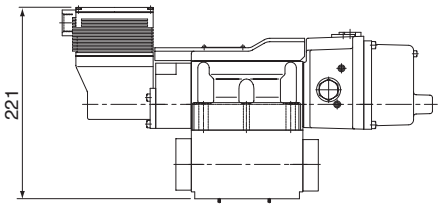
EHDFG-04-130-∗-∗-10



★For alternation of model from external pilot pressure to internal pilot pressure, take out another inner screw plug behind this plug.

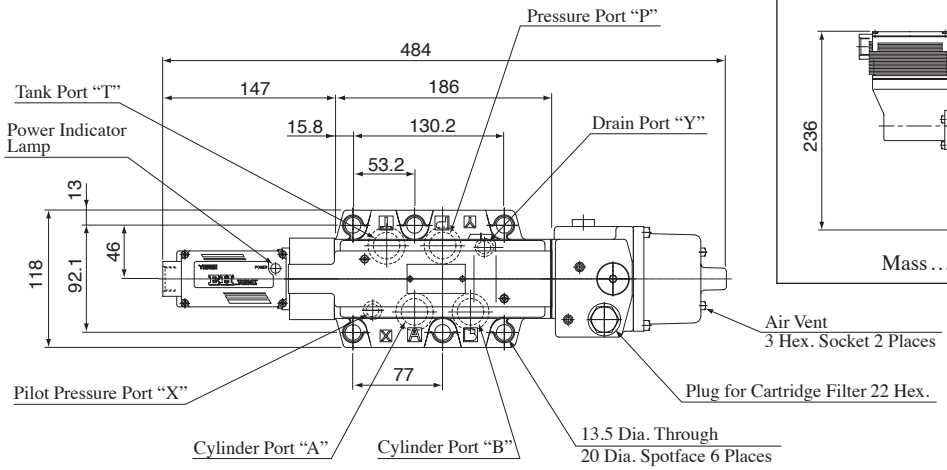
Mass ..... 10.5 kg

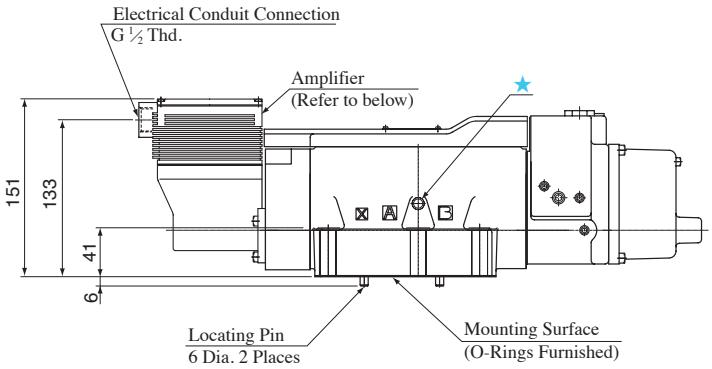
EHDFG-04-130-∗-∗-CB-10



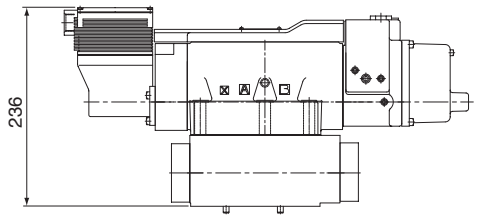
Mass ..... 17 kg

EHDFG-06-280-＊-＊-10





EHDFG-06-280-＊-＊-CB-10



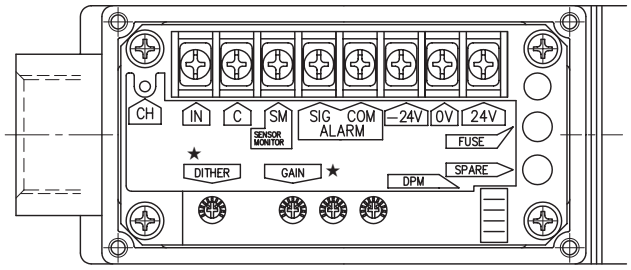
Mass ..... 29.6 kg

★For alternation of model from external pilot pressure to internal pilot pressure, take out another inner screw plug behind this plug.

Mass ..... 18.5 kg

Detail of Amplifier

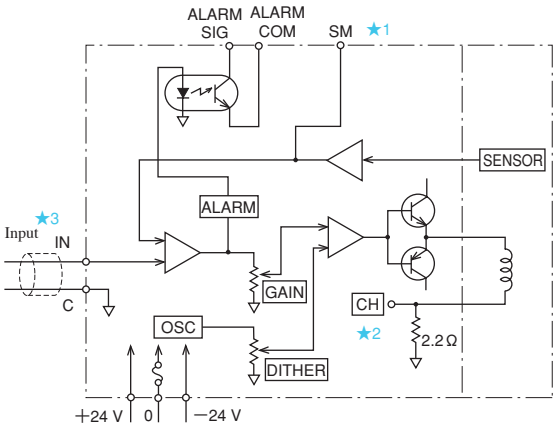
Connecting Terminal



Terminal		Name
IN		Input Signal (±)
C		Input Signal (COM)
SM		Sensor Monitor (to C)
ALARM	SIG	Alarm Output
	COM	
−24V		Power Supply
0V		
24V		
CH		Output Current Check (to C)

★DITHER / GAIN
Use as they are since they are factory-preset to the optimum position.
(Do not touch them in normal condition.)

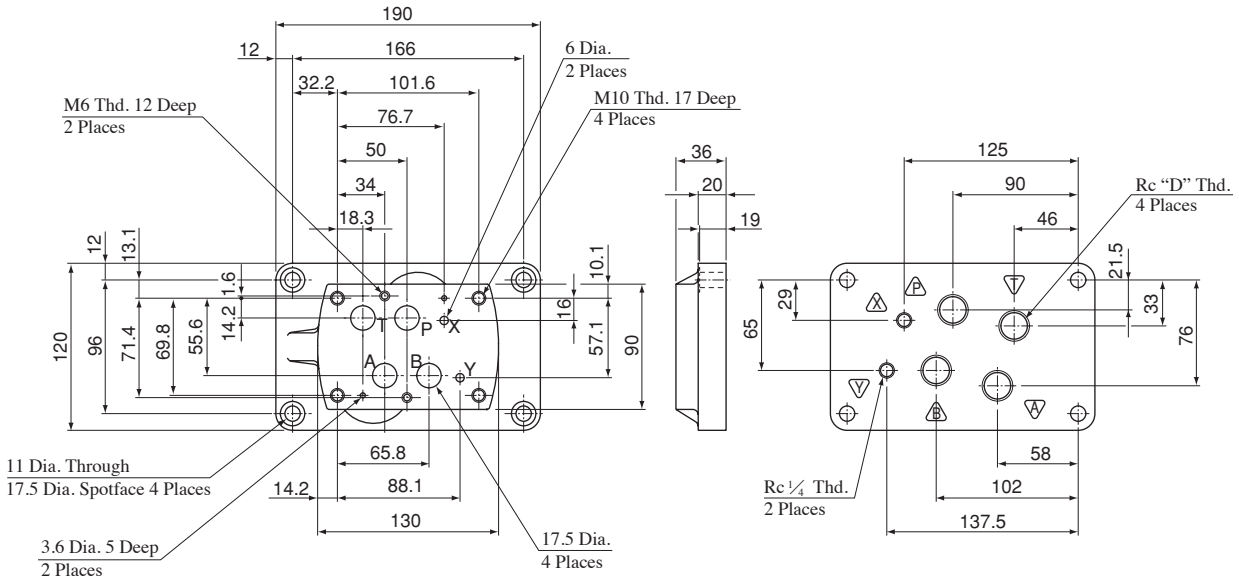
Circuit Schematic



★1. For "SM" terminal, external instruments should have input impedance of more than 10 kΩ.
★2. For "CH" terminal, external instruments should have input impedance of more than 10 kΩ.
★3. Use shielded cable for "Input" connection.
The ground of shielded cable must be connected to input signal side.

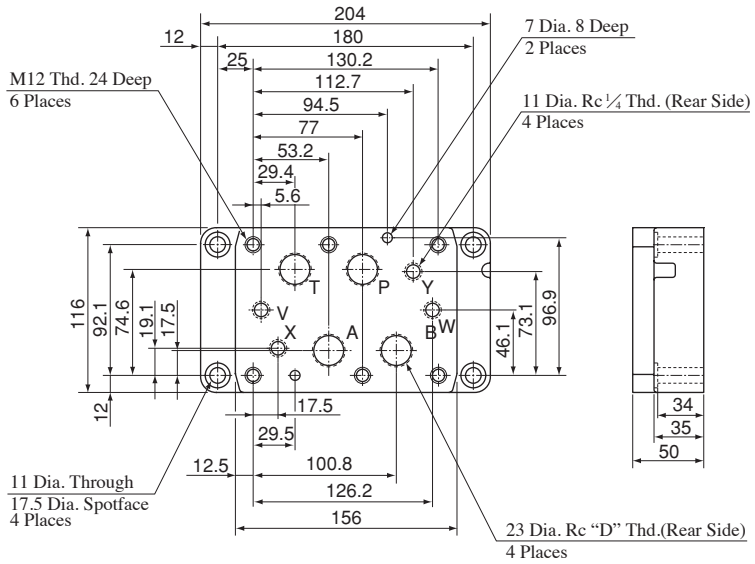
Sub-Plate

DHGM-04, 04X



Model Numbers	D
DHGM-04-20	1/2
DHGM-04X-20	3/4

DHGM-06, 06X

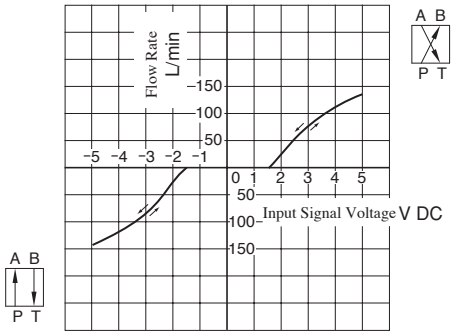


Model Numbers	D
DHGM-06-50	3/4
DHGM-06X-50	1

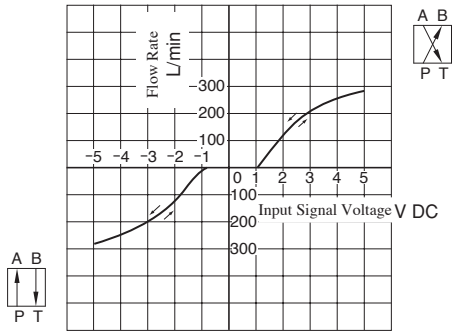
Input Signal Voltage vs. Flow

Viscosity : 30 mm²/s
Valve Pressure Difference : 1.5 MPa Const.

EHDFG-04



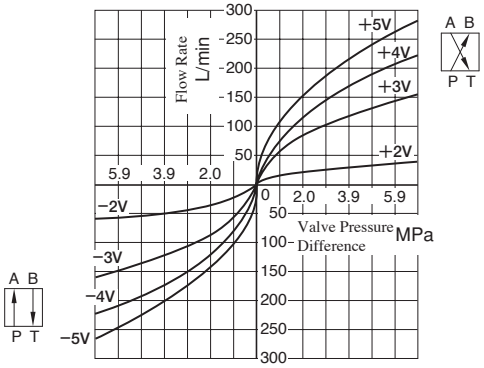
EHDFG-06



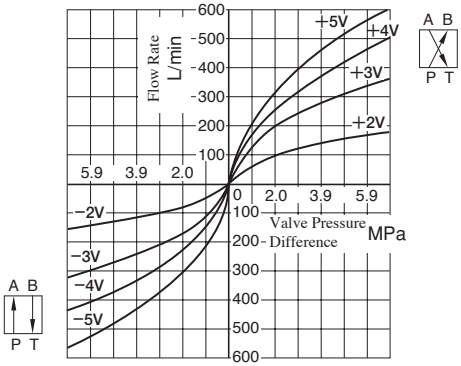
Differential Pressure vs. Metered Flow

Viscosity : 30 mm²/s

EHDFG-04

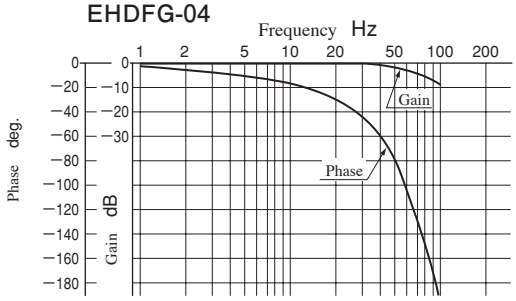


EHDFG-06



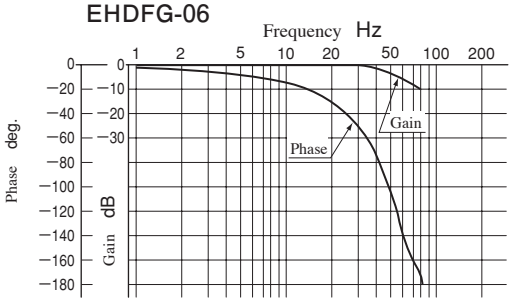
Frequency Response (Travel of Spool)

EHDFG-04



Model Number : EHDFG-04-130-2-E-10
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Rated Travel

EHDFG-06

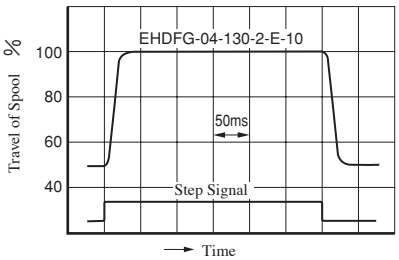


Model Number : EHDFG-06-280-2-E-10
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Rated Travel

Step Response

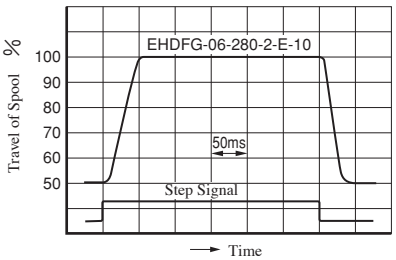
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

EHDFG-04



Viscosity : 30 mm²/s

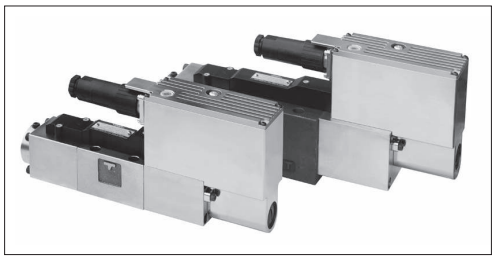
EHDFG-06



Viscosity : 30 mm²/s

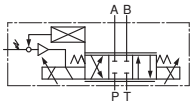
Direct Operated and High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves are closed-loop, high response type proportional electro-hydraulic directional and flow control valves with OBE (on board electronics). Two direct type models with a maximum rated flow rate up to 80 L/min (@ΔP = 1 MPa) are available. The addition of OBE to the well-received ELDFG series valves for simplified wiring offers simple operation and user-friendliness. With closed-loop control based on a combination of newly developed compact, powerful solenoids and a LVDT for spool position detection, the valves provide high response, high accuracy, and high reliability equivalent to those of simple servo valves.
2% Overlap spool type (spool type 3C2L) is suitable for position or pressure control.

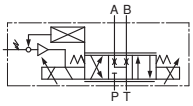


Graphic Symbols

3C2, 3C2L



3C40



Specifications

Descriptions \ Model Numbers			ELDFG-01EH			ELDFG-03EH	
			-10-3C*	-20-3C*	-35-3C*	-40-3C*	-80-3C*
Max. Operating Pressure		MPa	35			35	
Max. Tank Line Back Pressure		MPa	21				
Rated Flow [ΔP = 1 MPa (4-Way Valve)]★1		L/min	10	20	35	40	80
Hysteresis			0.1% or less				
Repeatability			0.1% or less				
Step Response Pilot Pressure : 14 MPa (Typical Rating)★2	(0→100%V)	ms	16			23	
	(100→0%V)	ms					
Frequency Response (±25% Amplitude) Pilot Pressure : 14 MPa (Typical Rating)★3	Gain: -3 dB	Hz	80			50	
	Phase: -90°	Hz					
Vibration Proof		G	10				
Protection			IP65				
Ambient Temperature		°C	-15 - +60				
Spool Stroke to Stops		mm	±2.5			±3	
Coil Resistance [20 °C]		Ω	3			2	
Current Consumption		A	2 (Impulse Load 3)				
Approx. Mass		kg	3.3			7.3	
Electric Connection			6 + PE Connector				

★1. Use the valves so that the relationship between the valve pressure difference and the flow rate, as specified in “Range of Flow Control” on page H-63, is met.
★2. This value is measured for each valve; it may differ depending on the actual circuit.
★3. There are restrictions on the mounting position. See “Mounting Position” on page H-64.

Model Number Designation

ELDF	G	-01	EH	-10	-3C2	-XY	-C	-D	-10
Series Number	Type of Mounting	Valve Size	Amplifier Type	Rated Flow L/min	Spool Type★1	Direction of Flow	Fail-Safe Function	Input Signal/Spool Travel Monitoring	Design Number
ELDF : Direct Operated and High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves	G : Sub-Plate Mounting	01 03	EH : OBE Type	10 20 35 40 80	3C2 : 10% Overlap 3C40 : A, B, T Connection 3C2L : 2% Overlap (Linear Flow Gain)	XY : Meter-In・Meter-Out	C : Neutral A : P-A, B-T Position B : P-B, A-T Position	D : Voltage Signal ±10 V (P→A→B→T Flow with Input Signal (+)) E : Current Signal 4 - 20 mA (P→A→B→T Flow with Current 12 - 20 mA Signal) F : Current Signal ±10 mA (P→A→B→T Flow with Input Signal (+))	10

★1. The spool in the neutral position is shown.
★2. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model No.	Mounting Bolt	Qty.	Tightening Torque Nm
ELDFG-01EH	Socket Head Cap Screw: M5 × 45L	4	6 - 8
ELDFG-03EH	Socket Head Cap Screw: M6 × 35L	4	13 - 16

Note) The connector is separately available. Use a 6 + PE connector [EN175201 Part 804].

Sub-Plate

Model Number	Sub-Plate Model Numbers	Thread Size Rc	Mass	Page
ELDFG-01EH	DSGM-01-31	1/8	0.8	H-8
	DSGM-01X-31	1/4		
	DSGM-01Y-31	3/8		
ELDFG-03EH	DSGM-03-40	3/8	3	H-53
	DSGM-03X-40	1/2		
	DSGM-03Y-40	3/4	4.7	

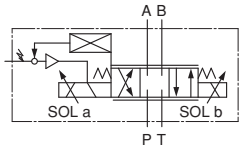
★Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish (▽).

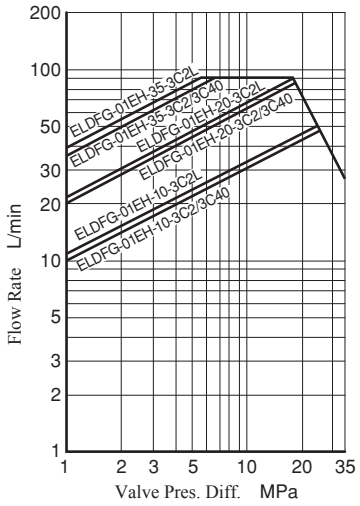
Instructions

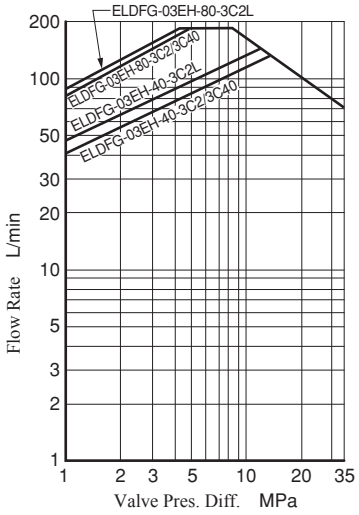
Take care of filling the valve tank port with the hydraulic oil at any time. However, check valve with cracking pressure 0.04 MPa approx. shall be provided as required. The pipe from the tank port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

Range of Flow Control

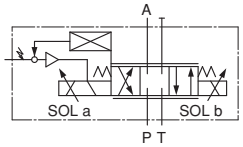
Control Method: 4-Way Valve

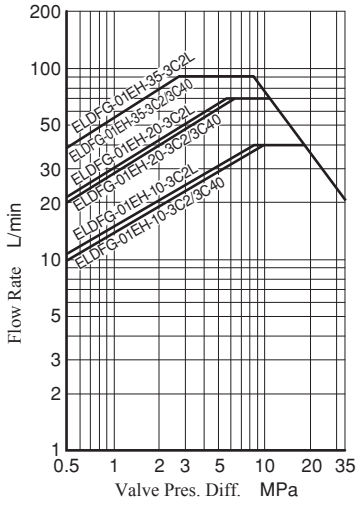


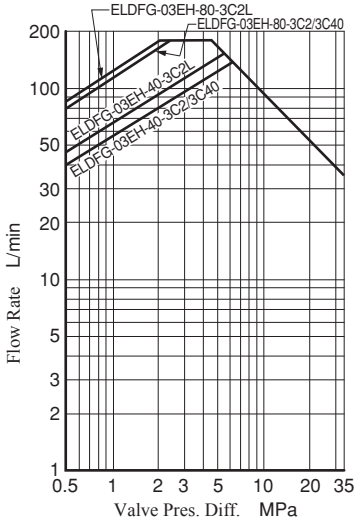




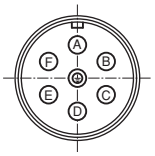
Control Method: 3-Way Valve







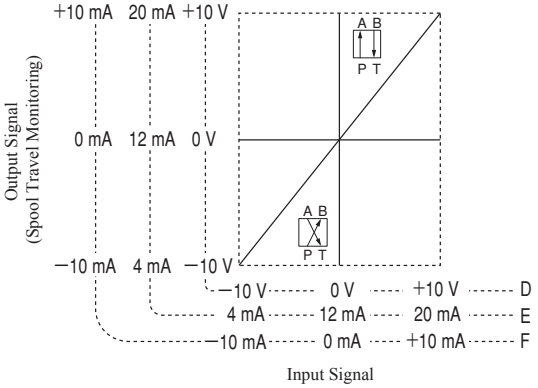
Electrical Specification



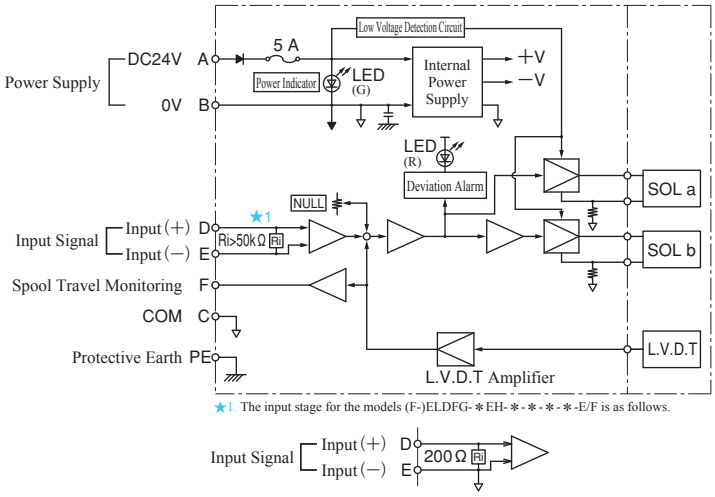
Pin \ Valve Model		ELDFG-＊EH-＊-D	ELDFG-＊EH-＊-E	ELDFG-＊EH-＊-F
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+) (Differential)★1	0 - ±10 V Ri ≧ 50 kΩ	4 - 20 mA Ri = 200 Ω	0 - ±10 mA Ri = 200 Ω
Pin E	Input (-) (Differential)★1			
Pin F	Spool Travel Monitoring	0 - ±10 V Ri ≧ 10 kΩ	4 - 20 mA Ri = 100 - 500 Ω★2	0 - ±10 mA Ri = 100 - 500 Ω★2
Pin ⏚	Protective Earth	—		

★1. Differential input signals can be used only for the valves with the voltage signal specifications of ±10 V (ELDFG-＊EH-＊-D).
★2. The recommended load resistance is 200 Ω.

I/O Signal Characteristics



Circuit Schematic



★1. The input stage for the models (F-)ELDFG-＊EH-＊-＊-＊-＊-E/F is as follows.

Details of the Valve Fail-Safe Functions

With reference to the information given table right, select the option for the fail-safe function according to the use of applications.
A separate safety circuit should be provided if the hydraulic actuator must be reliably held or stopped.

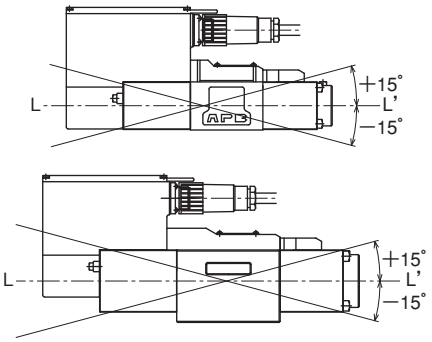
Condition: Electric System OFF

Model Numbers	Fail-Safe Function		
	Spool Position	Function	Graphic Symbol
ELDFG-＊＊EH-＊-3C2-XY-C	Neutral	All Ports Blocked	
ELDFG-＊＊EH-＊-3C2L-XY-C	Neutral	—	or or
ELDFG-＊＊EH-＊-3C40-XY-C	Neutral	A, B, T Connection	
ELDFG-01EH-＊-＊-XY-A	about 20%	PABT Position	
ELDFG-03EH-＊-＊-XY-A	about 17%		
ELDFG-01EH-＊-＊-XY-B	about 20%	PBAT Position	
ELDFG-03EH-＊-＊-XY-B	about 17%		

★The fail-safe function's activation time depends on the electric and hydraulic conditions.

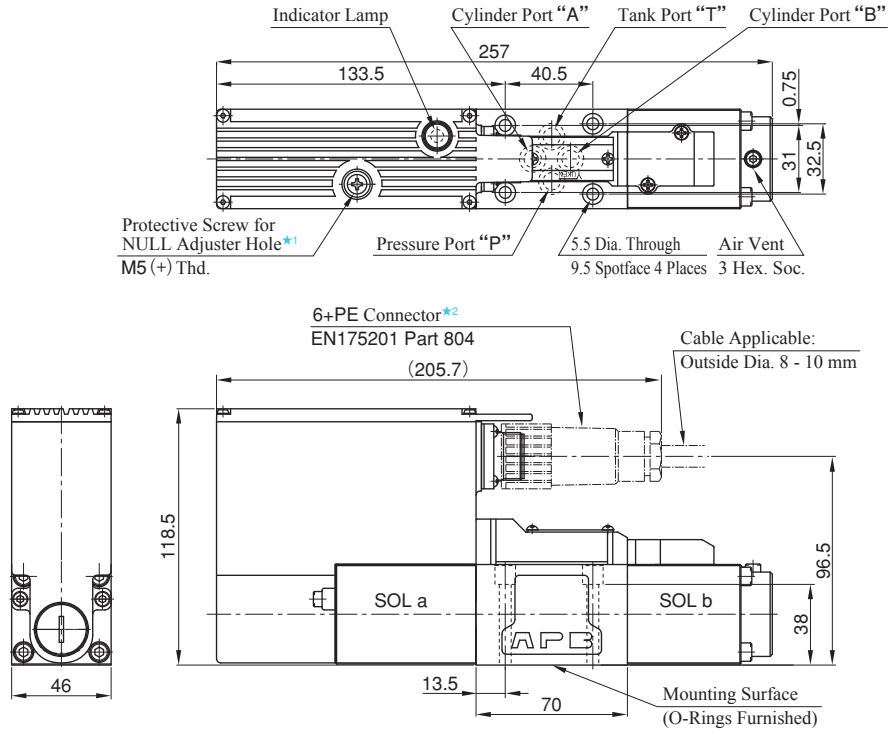
Mounting Position

Mount the valve with the angle of the axis line L-L′ within about ±15° from the horizontal plane, as shown in the right figures. If the axial direction of the spool corresponds to the principal vibration direction, an external force may cause the spool to malfunction. The valve must be mounted in such a way that the axial direction of the spool does not correspond to the principal vibration direction.



ELDFG-01EH-＊-＊-XY-＊-＊-10

Mounting surface: ISO4401-AB-03-02-0-05



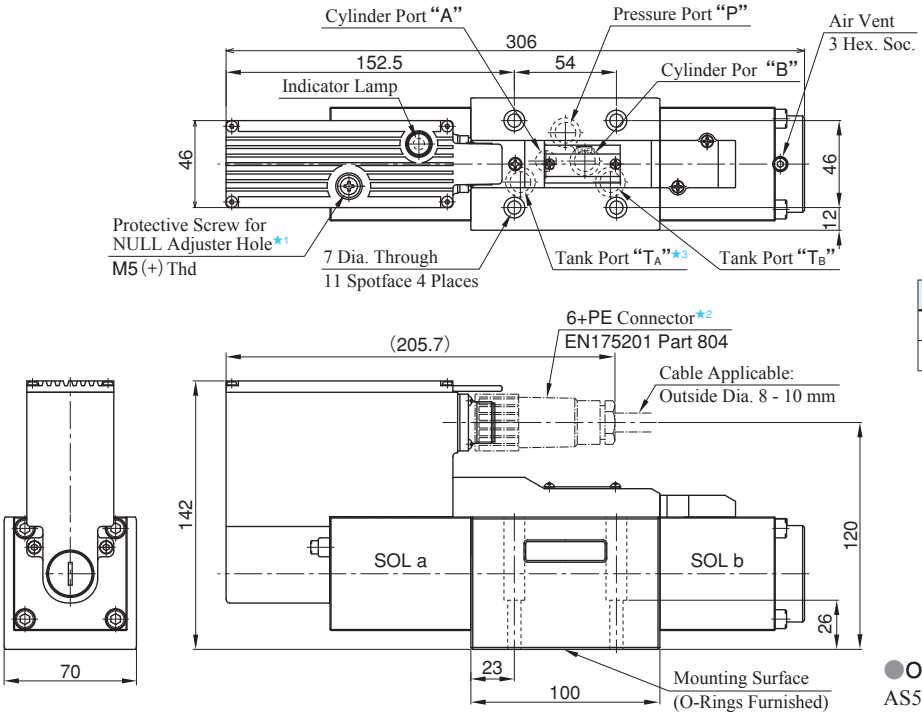
Color	Indicator Lamp
Green	Power Supply
Red	Deviation Alarm

●O-Rings for the Ports
AS568-012 (NBR-90): 4 Pieces

★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.
★2. The 6 + PE connector is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1
Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (H-8) in common use.

ELDFG-03EH-＊-＊-XY-＊-＊-10

Mounting surface: ISO4401-05-04-0-05



Color	Indicator Lamp
Green	Power Supply
Red	Deviation Alarm

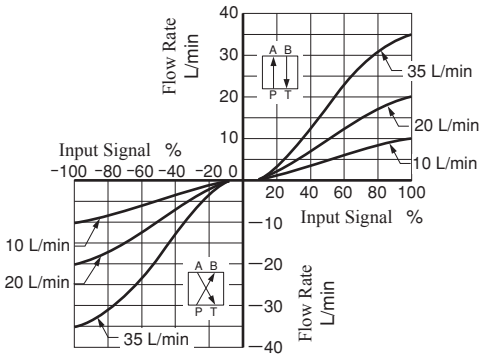
●O-Rings for the Ports
AS568-014 (NBR-90): 5 Pieces

★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.
★2. The 6 + PE connector is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1
★3. With standard sub-plates, one ("TA") of the two tank ports is used, but either one may be used.
Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (H-53) in common use.

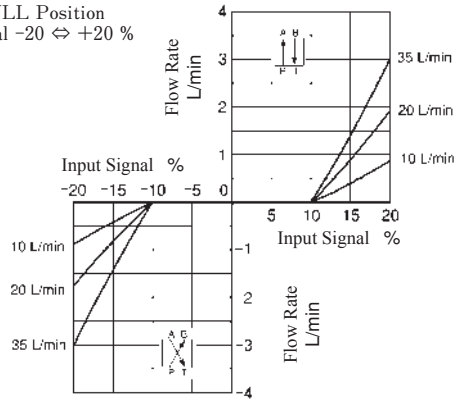
No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: 1 MPa ●Viscosity: 30 mm²/s

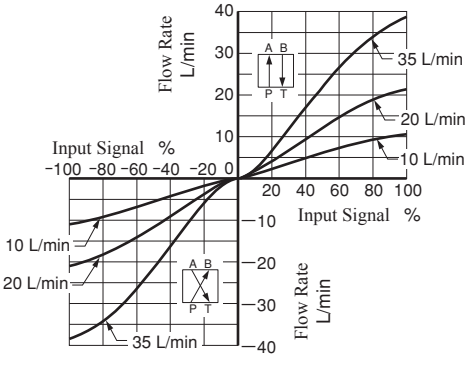
ELDFG-01EH-＊-3C2/3C40-XY-＊-＊-10



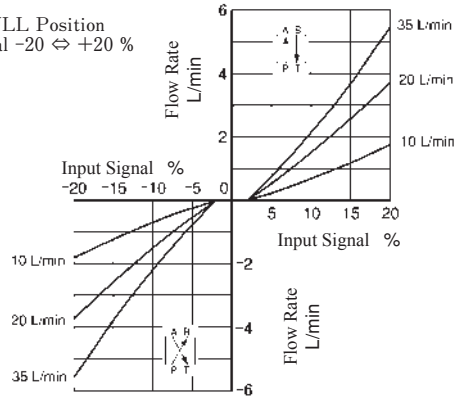
Around NULL Position
Input Signal −20 ⇔ +20 %



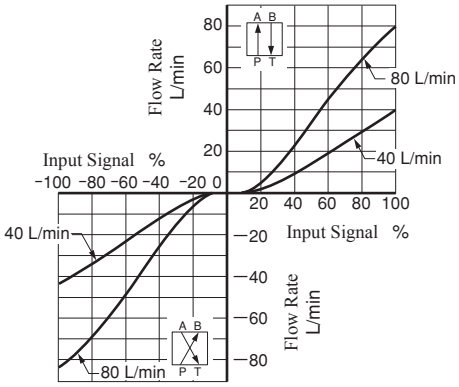
ELDFG-01EH-＊-3C2L-XY-＊-＊-10



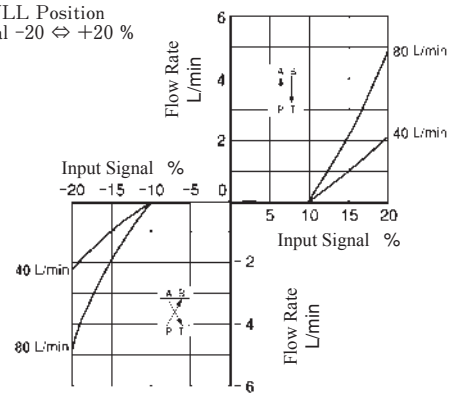
Around NULL Position
Input Signal −20 ⇔ +20 %



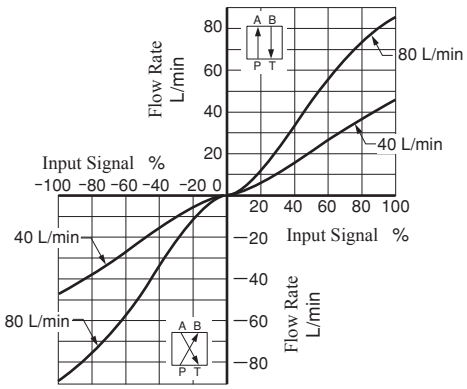
ELDFG-03EH-＊-3C2/3C40-XY-＊-＊-10



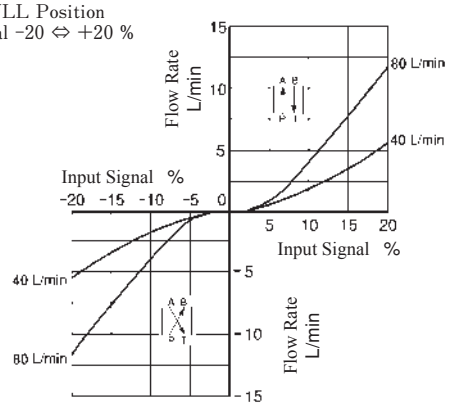
Around NULL Position
Input Signal −20 ⇔ +20 %



ELDFG-03EH-＊-3C2L-XY-＊-＊-10



Around NULL Position
Input Signal −20 ⇔ +20 %

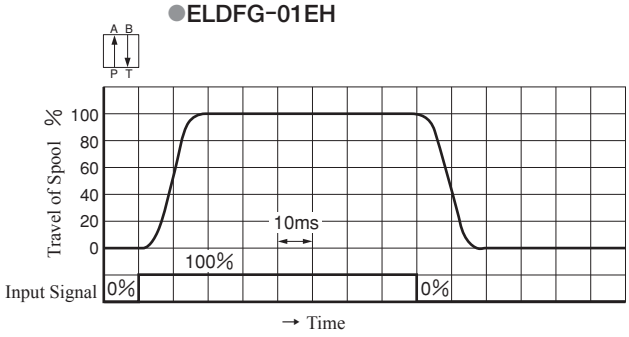


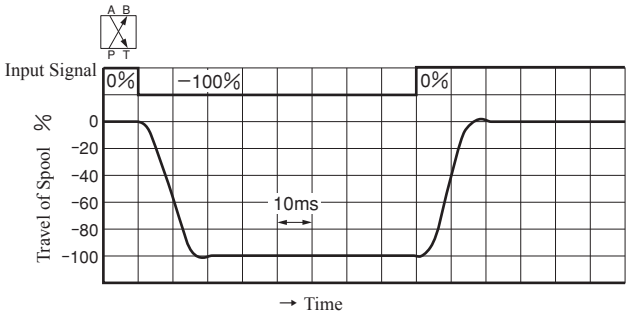
Step Response (Example)

〈Conditions〉●Hydraulic Circuit: Port A/B Closed ●Input Signal: 0 ↔ 100% ●Viscosity: 30 mm²/s

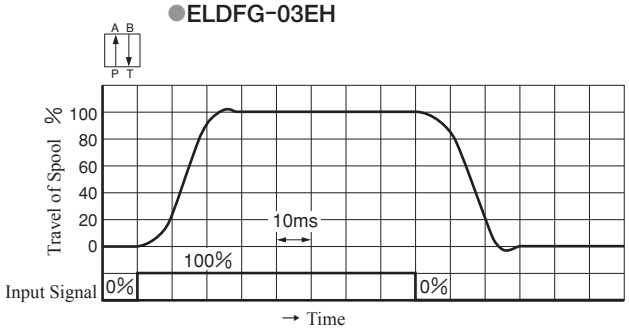
This value is measured for each valve; it may differ depending on the actual circuit.

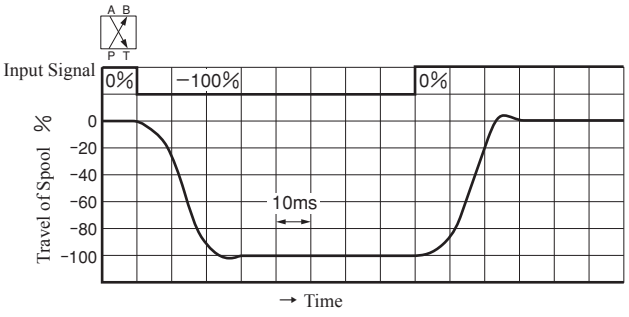
●ELDFG-01EH





●ELDFG-03EH

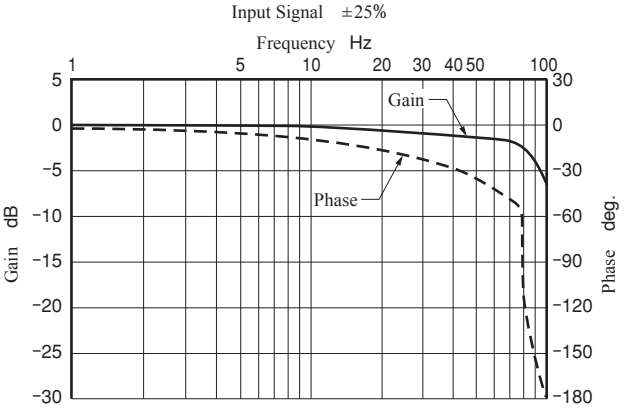


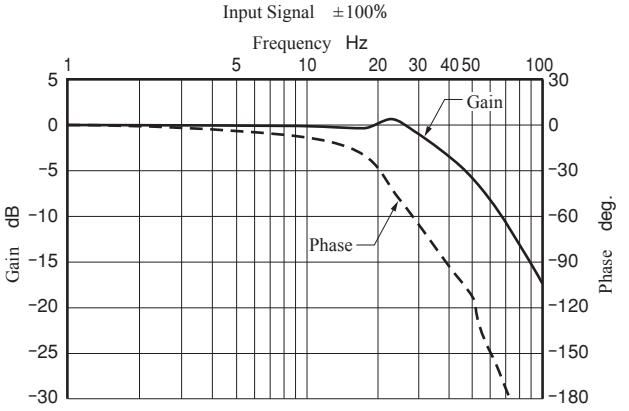


Frequency Response

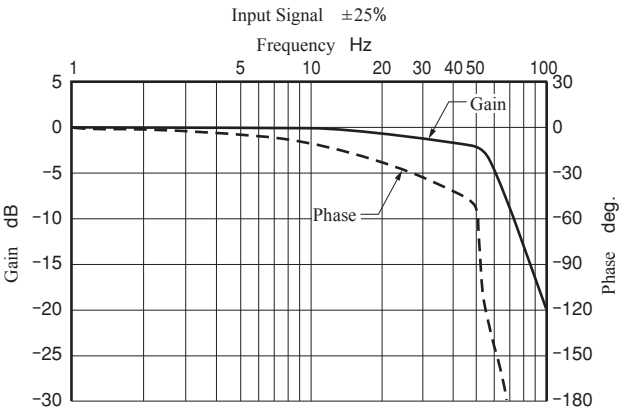
〈Conditions〉●Hydraulic Circuit: Port A/B Closed ●Supply Pressure: 14 MPa ●Viscosity: 30 mm²/s

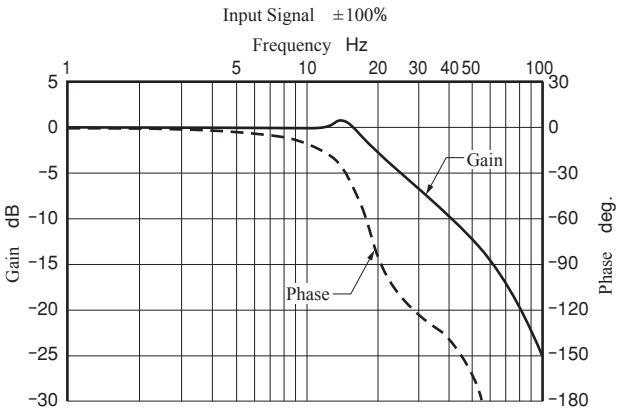
●ELDFG-01EH





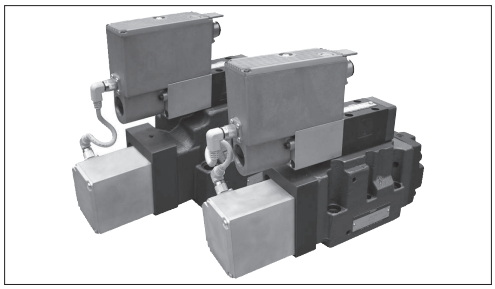
●ELDFG-03EH





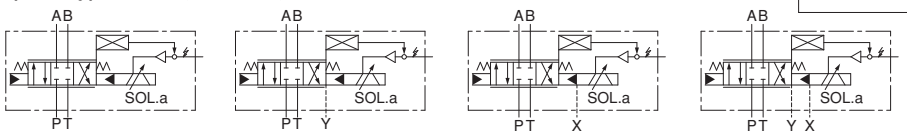
High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves (Two Stage Type)

These are high flow rate and two stage type valves as an addition to our highly appreciated product series: OBE type direct operated and high response proportional electro-hydraulic directional and flow control valve series.



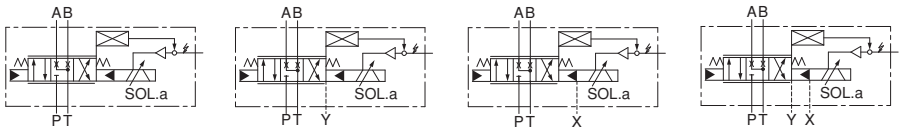
Graphic Symbols

Spool Type "3C2", "3C2P", "3C2L"

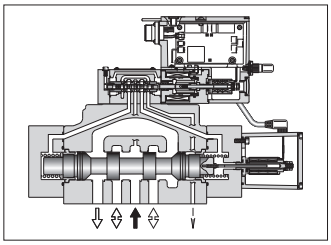


Internal Pilot Internal Drain Type | Internal Pilot External Drain Type | External Pilot Internal Drain Type | External Pilot External Drain Type

Spool Type "3C40"



Internal Pilot Internal Drain Type | Internal Pilot External Drain Type | External Pilot Internal Drain Type | External Pilot External Drain Type



* "SOL.a" is for the model 04EH & 03EH.
For the model-06EH & 10EH, it is "SOL.b"

Specifications

Descriptions \ Model Numbers				ELDFHG-03EH-100-3C2L	ELDFHG-03EH-100-*	ELDFHG-04EH	ELDFHG-06EH-350	ELDFHG-06EH-500	ELDFHG-10EH
Rated Flow [ΔP=1 MPa (4-Way Valve)] ΔP = 0.5 MPa per Land			L/min	90	100	280	350	500	1440
Max. Operating Pressure			MPa	31.5		35		31.5	35
Proof Pres. at Return Port★1	External Drain T Port		MPa	21		31.5	35	25	28
	External Drain Y Port		MPa	21					
	Internal Drain T & Y Ports		MPa	21					
Pilot Pressure★2			MPa	1.5 to 25					
Pilot Flow Rate★3			L/min	5 or more		11 or more	12 or more	16 or more	17 or more
Internal Leakage Supply Pressure: 14MPa Pilot Pressure: 14MPa Fluid Viscosity: 32mm²/s	Pilot Valve		L/min	1.5 or less		1.8 or less			1.5 or less
	Main Valve L/min	3C2		3C2L:1.6 or less	3C2:0.5 or less 3C40:1.0 or less 3C2P:5.6 or less	0.8 or less	0.9 or less	1.0 or less	5.0 or less
		3C40				1.6 or less	1.8 or less	1.8 or less	9.0 or less
		3C2P				6.8 or less	7.0 or less	8.0 or less	14.5 or less
		3C2L				2.1 or less	2.5 or less	2.5 or less	11.5 or less
Hysteresis				0.2% or less		0.1% or less			0.1% or less
Step Response (0 <=> 100%) V Pilot Pressure: 14MPa (Typical Rating)★4			ms	15	14	20	20	22	28
Frequency Response ±25% Amplitude Pilot Pressure: 14MPa (Typical Rating)★4	Phase: -90°		Hz	50	55	51	50	45	33
	Gain: -3 dB		Hz	56	60	56			40
Vibration Proof★5			m/s²	100					
Protection				Equivalent to IP65					
Ambient Temperature			℃	-15 - +60					
Spool Stroke to Stops			mm	±4	±3.5	±5	±5	±7	±7
Spool End Area			cm²	3		7	8	8	11.3
Current			A	2 (Impulse Loud 3)					
Coil Resistance at 20 ℃			Ω	3					
Approx. Mass			kg	10.7	8.2	13	19		74.5
Electric Connection				6 + PE Connector [EN 175201 Part 804]					

★1. Pressure at the return port should be the actual supply pressure or less.
★2. Supply pressure for the pilot valve should be within the range described above and should also be 60% of the actual main valve supply pressure or more.
★3. Pilot flow is calculated with the above step response time at pilot pressure 14 MPa.
★4. This value is measured on a per-valve basis under the conditions described above; it may differ depending on the actual circuit and operating conditions.
★5. There are restrictions on the mounting position. See page H-71 for details.

Model Number Designation

ELDFHG	- 04	EH	- 280	-3C2P	- XY	-E	T	- C	-D	-10
Series Number	Valve Size	Amplifier Type	Rated Flow L/min ΔP= 1 MPa (4-Way Valve)	Spool Type	Direction of Flow	Pilot Type	Drain Type	Fail-Safe Function	Input Signal/ Spool Travel Monitoring	Design Number
ELDFHG: Two Stage Type High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves (Sub-Plate Mounting)	03	EH: OBE Type	100★2	3C2: 10% Overlap 3C40: A, B, T Connection	XY: Meter-In /Meter-Out	None: Internal Pilot E: External Pilot	None: External Drain T: Internal Drain	C: Neutral	D: Voltage Signal ± 10 V (PABT Flow with Positive Input) E: Current Signal 4 to 20 mA (PABT Flow with 12 to 20 mA Input) F: Current Signal ± 10 mA (PABT Flow with Positive Input)	10
				3C2P: Zero Lap (Dual Flow Gain) 3C2L: 2% Overlap (Linear Flow Gain)				A: P→A,B→T Position (Valve Opening: 20%) B: P→B,A→T Position (Valve Opening: 20%)		
	04		280	3C2: 10% Overlap 3C40: A, B, T Connection				C: Neutral		
				3C2P: Zero Lap (Dual Flow Gain) 3C2L: 2% Overlap (Linear Flow Gain)				A: P→A,B→T Position (Valve Opening: 10%) B: P→B,A→T Position (Valve Opening: 10%)		
	06		350 500	3C2: 10% Overlap 3C40: A, B, T Connection				C: Neutral		
				3C2P: Zero Lap (Dual Flow Gain) 3C2L: 2% Overlap (Linear Flow Gain)				A: P→A,B→T Position (Valve Opening: 10%) B: P→B,A→T Position (Valve Opening: 10%)		
	10		1440	3C2: 10% Overlap 3C40: A, B, T Connection				C: Neutral		
				3C2P: Zero Lap (Dual Flow Gain) 3C2L: 2% Overlap (Linear Flow Gain)				A: P→A,B→T Position (Valve Opening: 20%) B: P→B,A→T Position (Valve Opening: 20%)		

★1. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

★2. In case of spool type "3C2L", it is 90L/min.

Details of the Valve Fail-Safe Functions

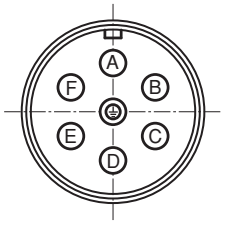
With reference to the information given below, select the option for the fail-safe function according to the use of applications.

A separate safety circuit should be provided if the hydraulic actuator must be reliably held or stopped.

No.	Model Numbers	Fail-Safe Function	
		Spool Position	Function
1	ELDFHG-＊EH-＊-3C2-XY-＊＊-C	Neutral	All Ports Blocked
2	ELDFHG-＊EH-＊-3C40-XY-＊＊-C	Neutral	A, B, T Connection
3	ELDFHG-＊EH-＊-3C2L/3C2P-XY-＊＊-A	Valve Opening: 10% (04EH, 06EH) Valve Opening: 20% (03EH, 10EH)	PABT Position
4	ELDFHG-＊EH-＊-3C2L/3C2P-XY-＊＊-B	Valve Opening: 10% (04EH, 06EH) Valve Opening: 20% (03EH, 10EH)	PBAT Position

＊The fail-safe function's activation time depends on the electric and hydraulic conditions.

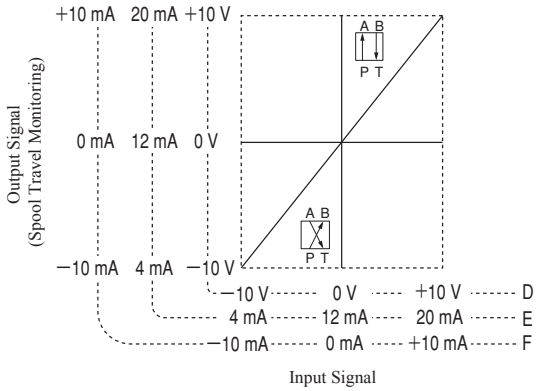
Electrical specifications



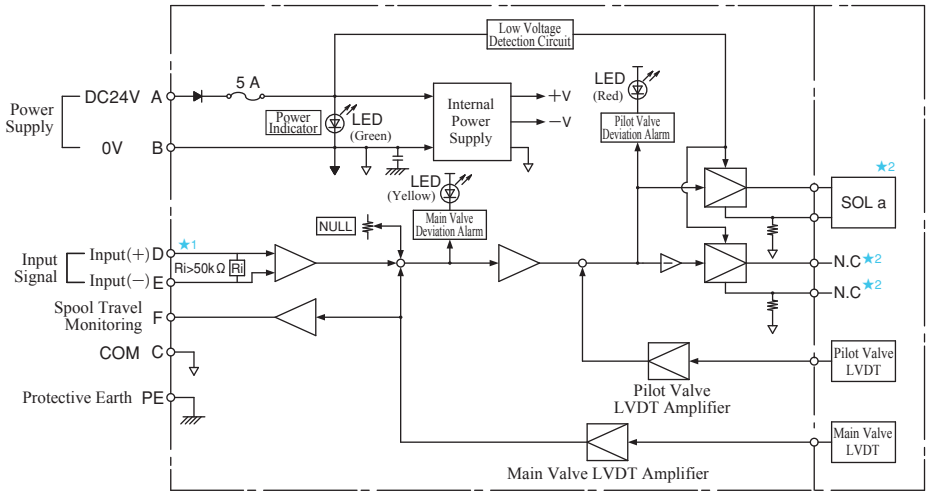
Input Signal		Voltage Signal "D"	Current Signal "E"	Current Signal "F"
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+)(Differential)★2	0-±10 V Ri ≧ 50 kΩ	4-20 mA Ri = 200 Ω	0-±10 mA Ri = 200 Ω
Pin E	Input (−)(Differential)★2			
Pin F	Spool Travel Monitoring	0-±10 V RL ≧ 10 kΩ	4-20 mA RL = 100-500 Ω★1	0-±10 mA RL = 100-500 Ω★1
Pin ⏚	Protective Earth	—		

★1. The recommended load resistance is 200 Ω.
★2. Differential input signals can be used only for the valves with the voltage signal specifications of ±10V. (ELDFHG-∗EH-∗-D)

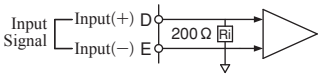
I/O Signal Characteristics



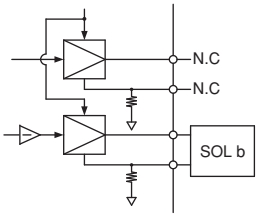
Block Diagram



★1. The input stage for the current signal "E" and "F" is as follows.



★2. The solenoid name is for the model ELDFHG-03EH & 04EH. The name for the model ELDFHG-06EH & 10EH are as follows.



Accessories

Mounting Bolts

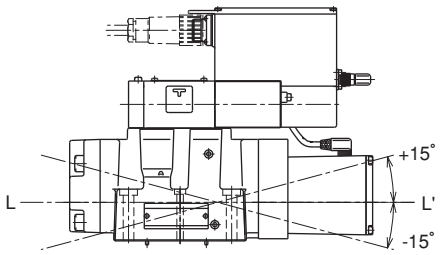
Valve Model Number	Mounting Bolt	Qty.	Tightening Torque Nm
ELDFHG-03EH	Hex. Socket Head Cap Screw: M6 × 35L	4	12.9 - 15.9
ELDFHG-04EH	Hex. Socket Head Cap Screw: M6 × 55L	2	
	Hex. Socket Head Cap Screw: M10×60L	4	60.6 - 74.1
ELDFHG-06EH	Hex. Socket Head Cap Screw: M12×85L	6	104 - 127
ELDFHG-10EH	Hex. Socket Head Cap Screw: M20×90L		493 - 603

Instructions

Take care of filling the valve tank port with the hydraulic oil at any time.
However, check valve with cracking pressure 0.04 MPa approx. shall be provided as required.
The pipe from the tank port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

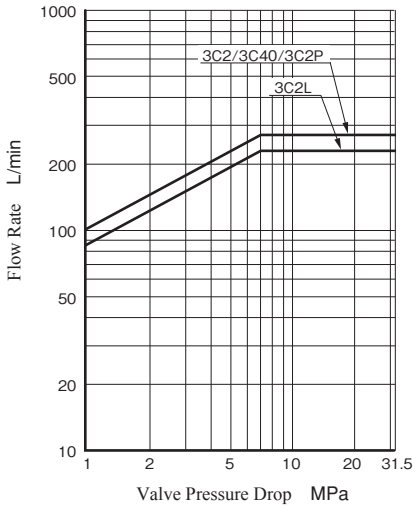
Mounting Position

Mount the valve with the angle of the axis line L-L' within about ±15° from the horizontal plane as shown in the right figure. When the principal vibration direction is consistent with the axial direction of the spool, the spool may malfunction due to external force. Make sure that the principal vibration direction is not consistent with the axial direction of the spool.

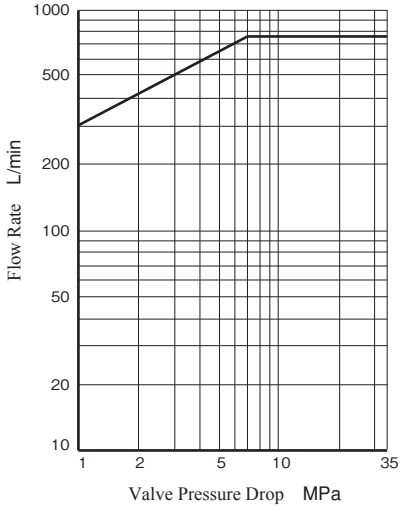


The Effective Range of The Fail-Safe Function

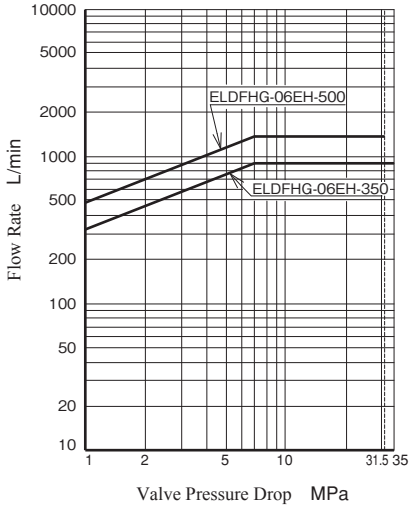
ELDFHG-03EH-100-3C2/3C40/3C2P/3C2L



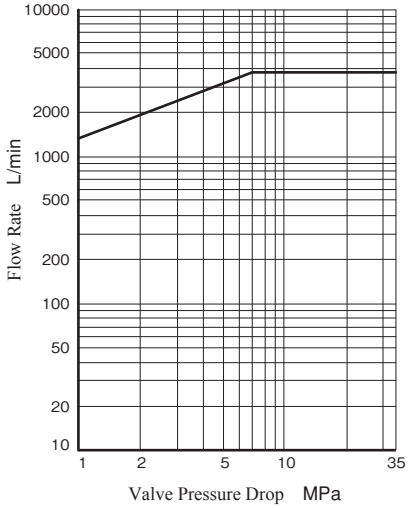
ELDFHG-04EH



ELDFHG-06EH

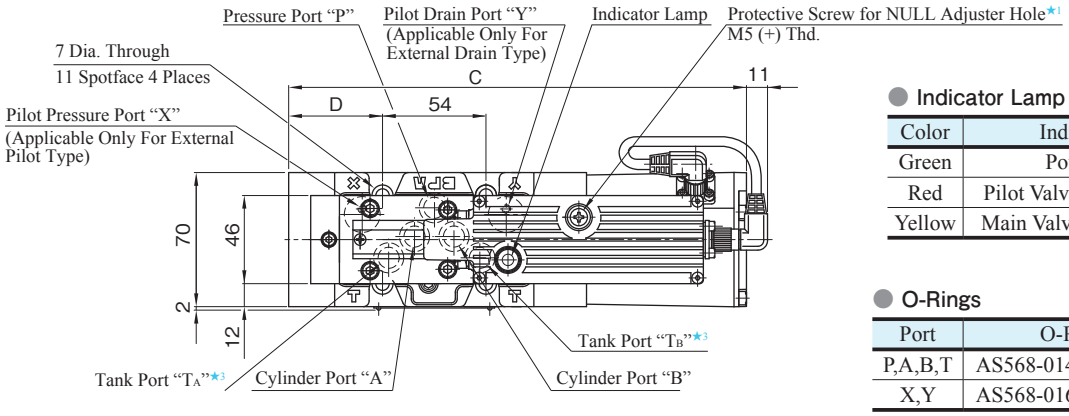


ELDFHG-10EH



ELDFHG-03EH-100-＊-XY-＊＊-＊-＊-10

Mounting Surface: ISO 4401-05-05-0-05

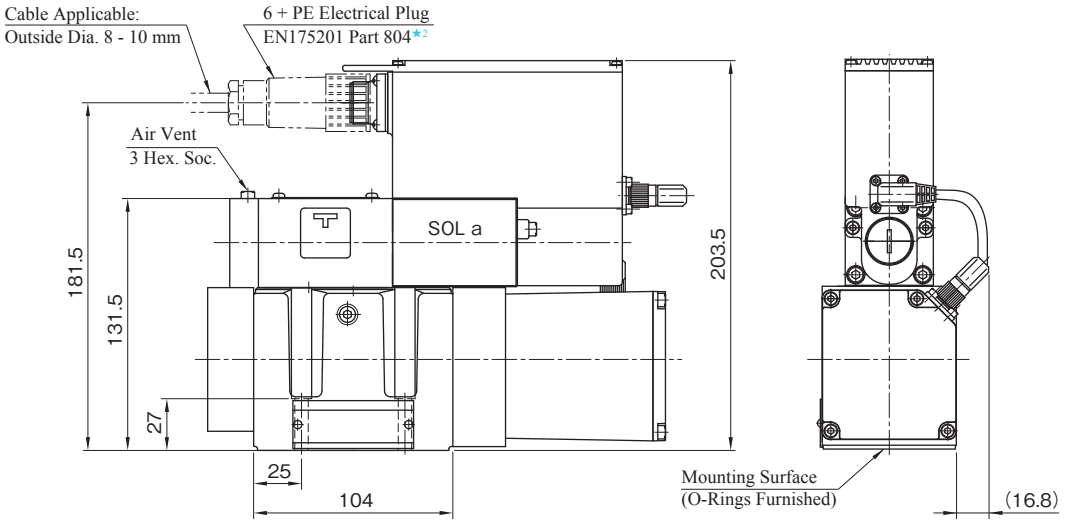


Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

O-Rings

Port	O-Ring	Qty.
P,A,B,T	AS568-014 (NBR-90)	5
X,Y	AS568-016 (NBR-90)	2

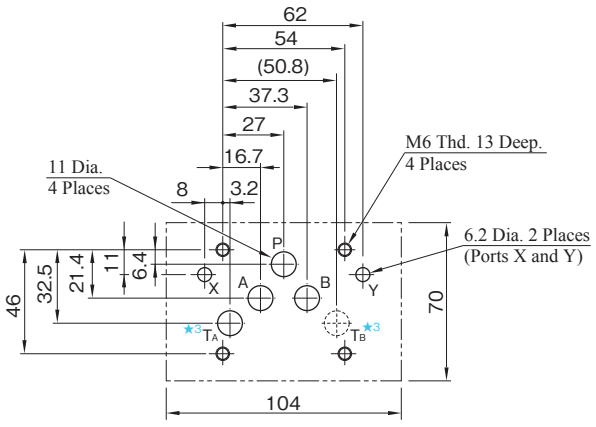


Model Numbers	C	D
ELDFHG-03EH-100-3C2/3C40/3C2P	239	49
ELDFHG-03EH-100-3C2L	248	58

Dimensions of Mounting Surface

Prepare the mounting surface as shown below.

The mounting surface should have a good machined finish. (▽6)



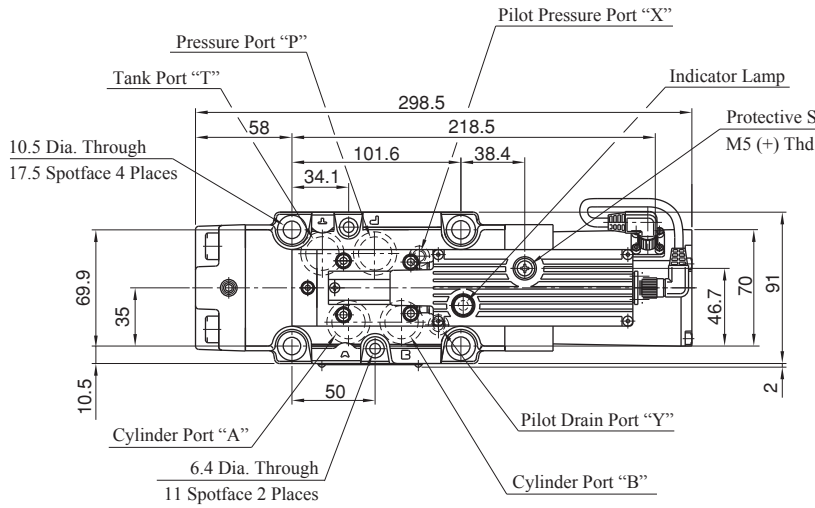
★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.

★2. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately. YUKEN parts number: TK290457-1

★3. There are two tank ports "TA" and "TB"; however, "TA" may be used alone.

ELDFHG-04EH-280-＊-XY-＊＊-＊-＊-10

Mounting Surface: ISO 4401-07-07-0-05

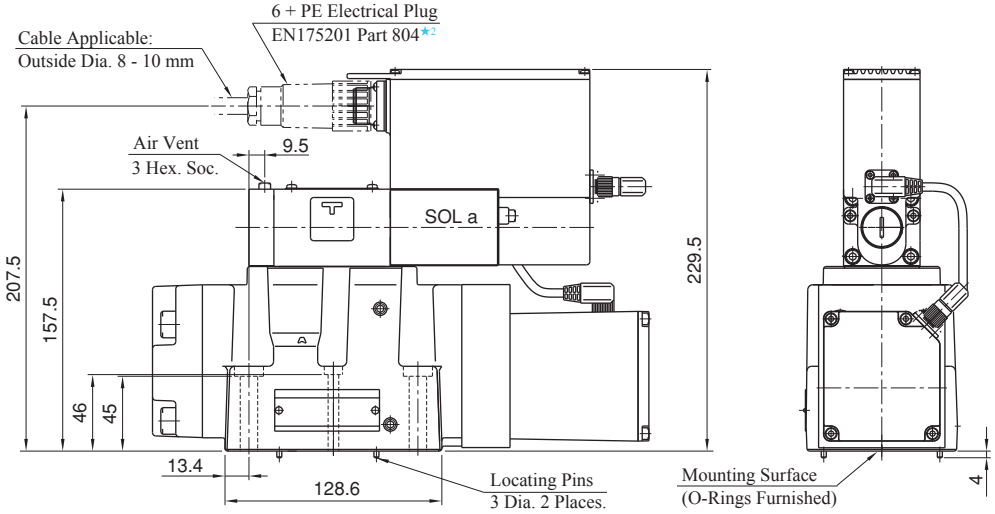


Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

O-Rings

Port	O-Ring	Qty.
P,A,B,T	OR NBR-90 P22-N	4
X,Y	AS568-012 (NBR-90)	2



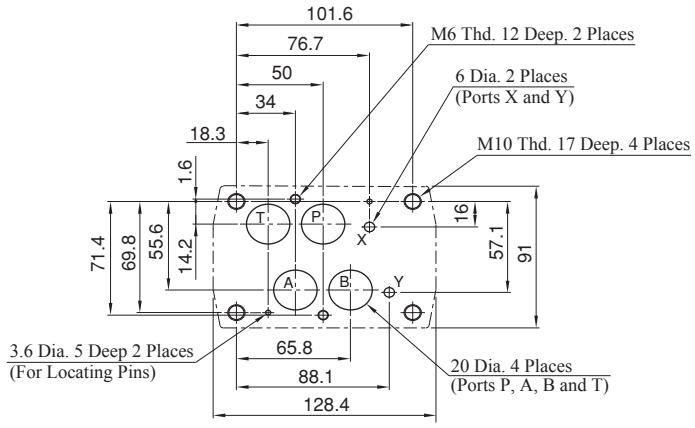
★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw.
After adjustment, be sure to attach the protective screw.

★2. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1

Dimensions of Mounting Surface

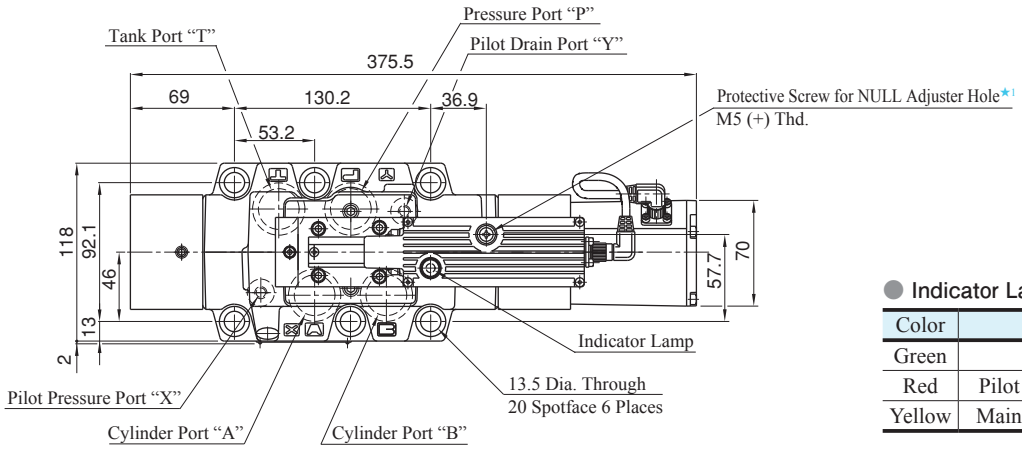
Prepare the mounting surface as shown below.

The mounting surface should have a good machined finish. (1.6▽)



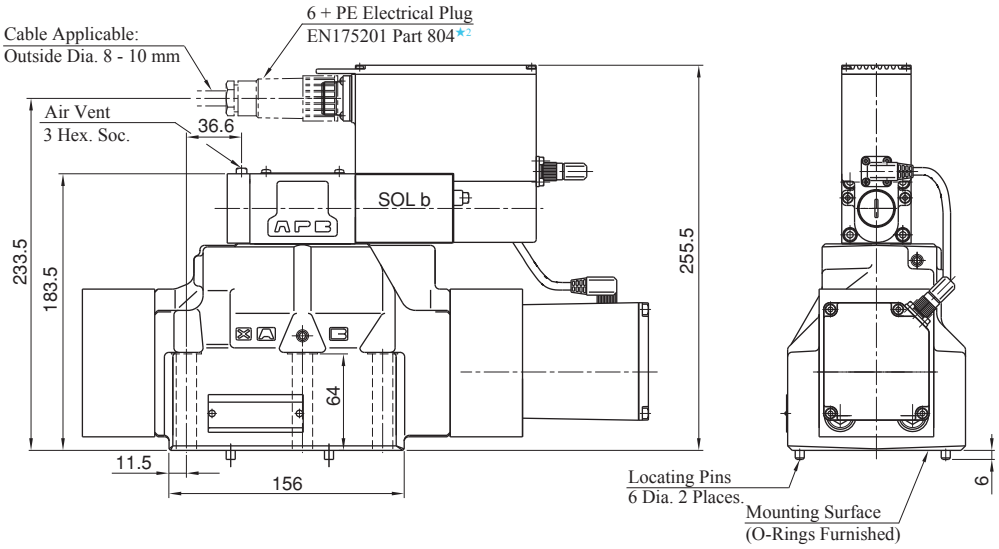
ELDFHG-06EH-350/500-＊-XY-＊＊-＊-＊-10

Mounting Surface: ISO 4401-08-08-0-05



Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm



O-Rings

Port	Model Numbers	O-Ring	Qty.
P,A,B,T	ELDFHG-06EH-350	AS568-123 (NBR-90)	4
	ELDFHG-06EH-500	AS568-126 (NBR-90)	4
X,Y	ELDFHG-06EH-350/500	OR NBR-90 P14-N	2

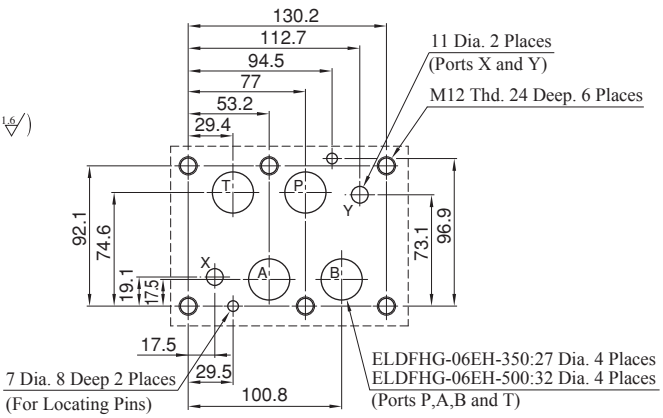
★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw.
After adjustment, be sure to attach the protective screw.

★2. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1

Dimensions of Mounting Surface

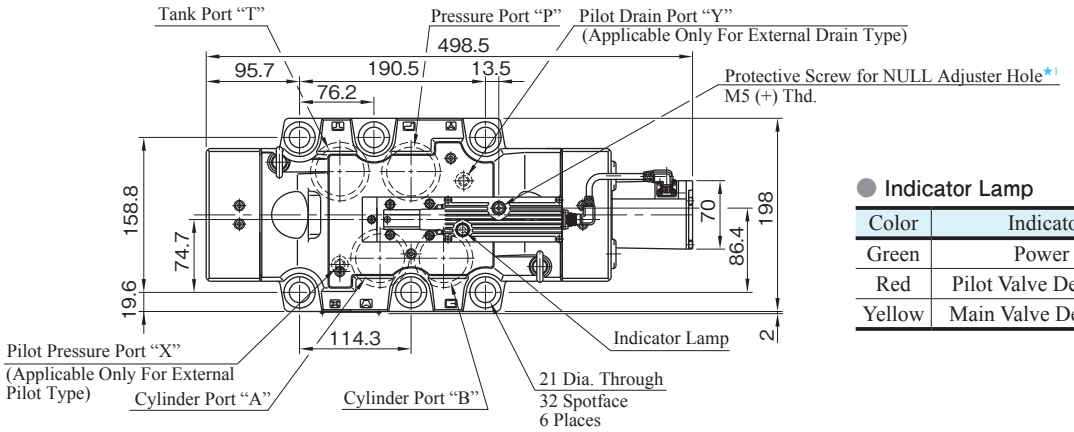
Prepare the mounting surface as shown in the right figure

The mounting surface should have a good machined finish. (1.6)



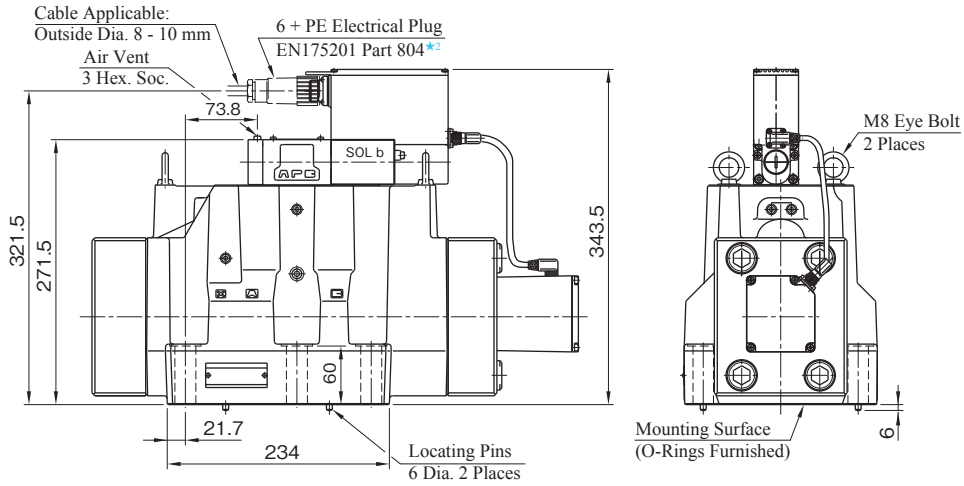
ELDFHG-10EH-1440-＊-XY-＊＊-＊-＊-10

Mounting Surface: ISO 4401-10-09-0-05



Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm



O-Rings

Port	O-Ring	Qty.
P,A,B,T	AS568-227 (NBR-90)	4
X,Y	AS568-015 (NBR-90)	2

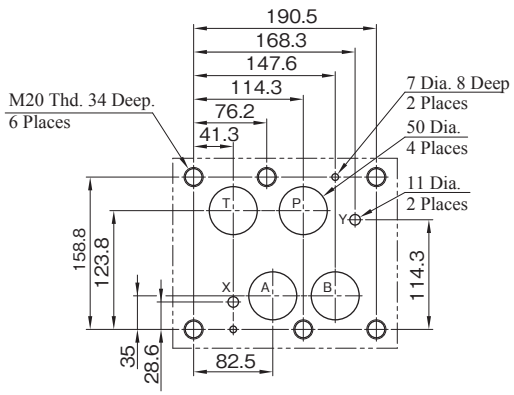
★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw.
After adjustment, be sure to attach the protective screw.

★2. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1

Dimensions of Mounting Surface

Prepare the mounting surface as shown in the below figure

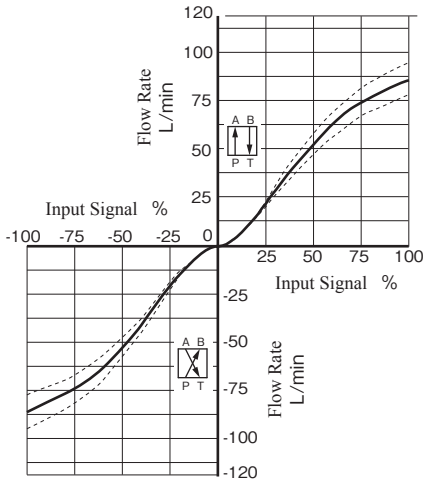
The mounting surface should have a good machined finish. (1.6▽)



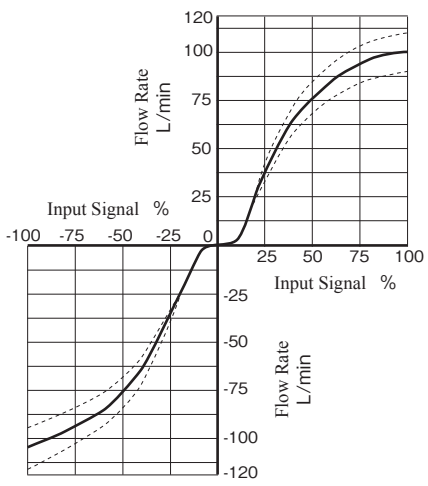
No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: 1 MPa (4-Way Valve/Pressure Difference per Land: 0.5 MPa)
●Viscosity: 30 mm^2/s

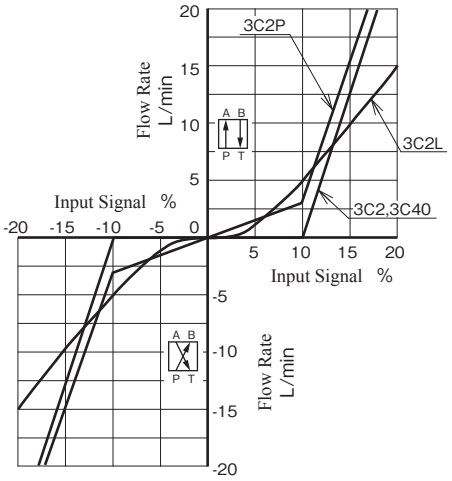
ELDFHG-03EH-100-3C2L



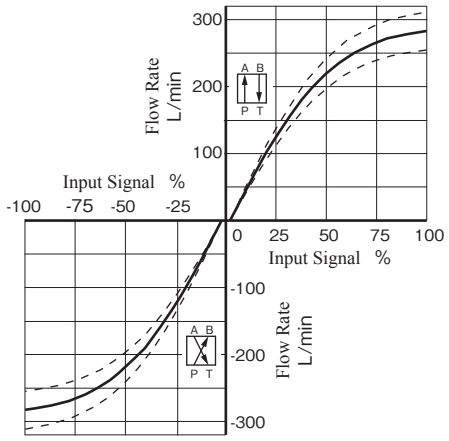
ELDFHG-03EH-100-3C2/3C40/3C2P



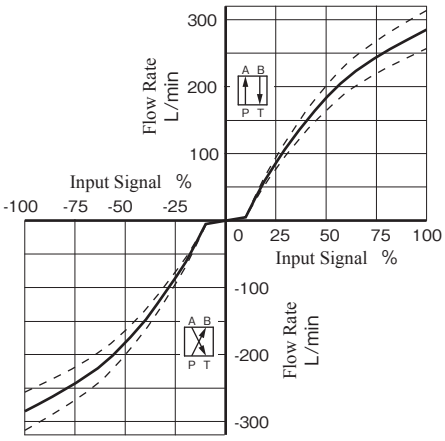
Around Null Position
Input Signal -20⇔+20%



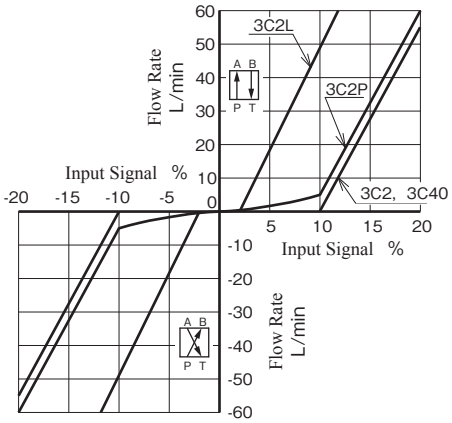
ELDFHG-04EH-280-3C2L



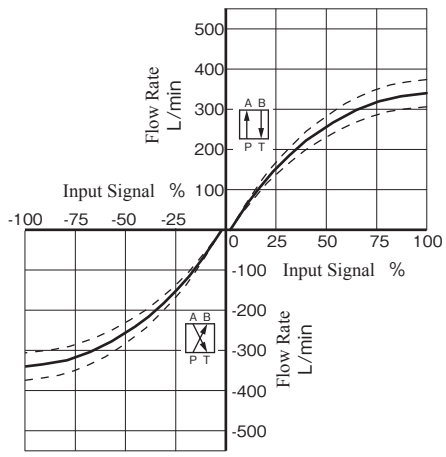
ELDFHG-04EH-280-3C2/3C40/3C2P



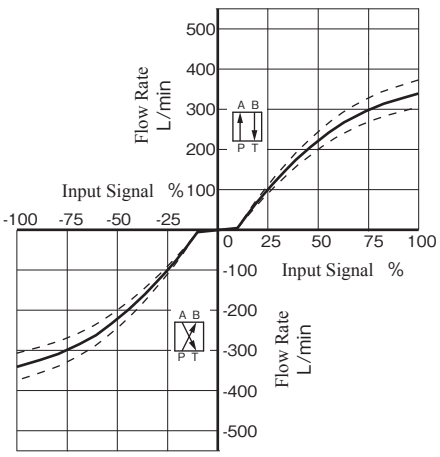
Around Null Position
Input Signal -20⇔+20%



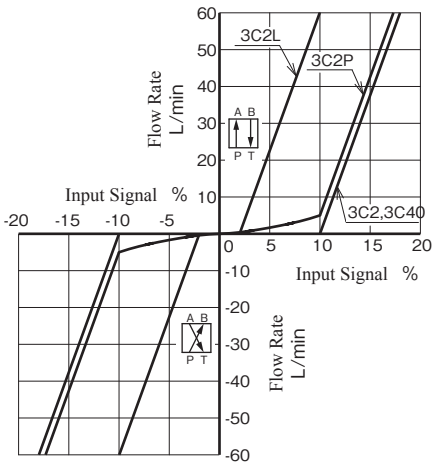
ELDFHG-06EH-350-3C2L



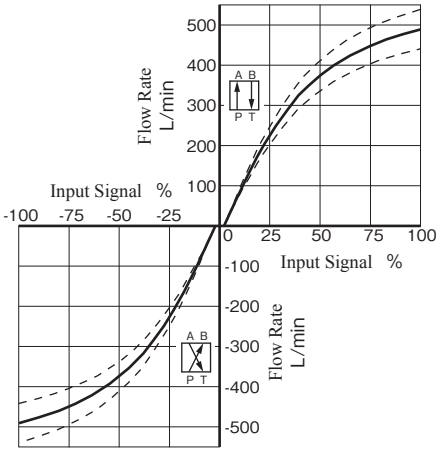
ELDFHG-06EH-350-3C2/3C40/3C2P



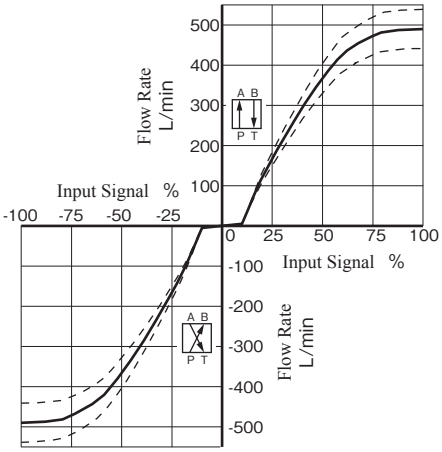
Around Null Position
Input Signal -20⇔+20%



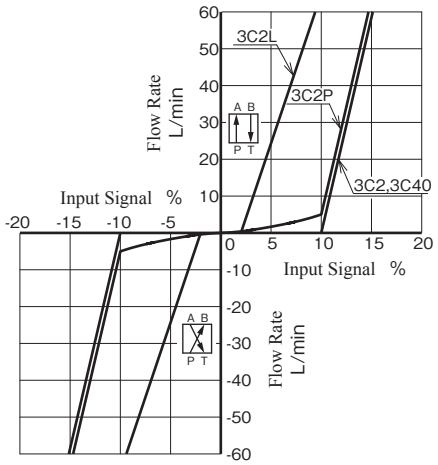
ELDFHG-06EH-500-3C2L



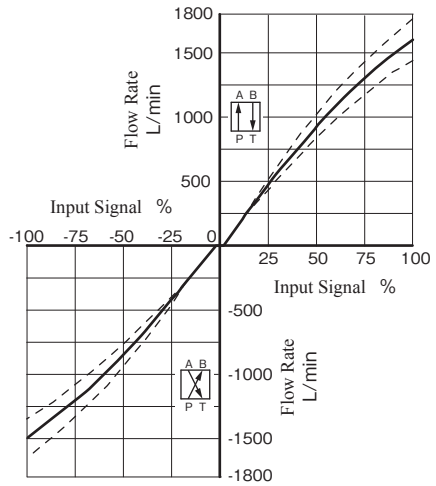
ELDFHG-06EH-500-3C2/3C40/3C2P



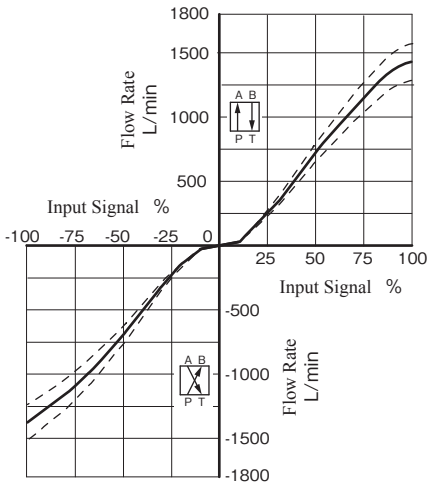
Around Null Position
Input Signal -20⇔+20%



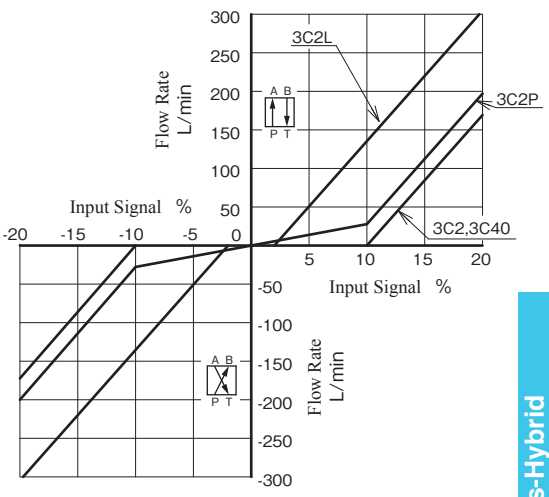
ELDFHG-10EH-1440-3C2L



ELDFHG-10EH-1440-3C2/3C40/3C2P



Around Null Position
Input Signal -20⇔+20%

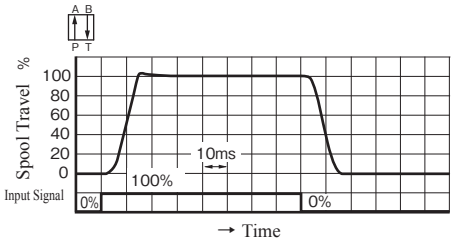


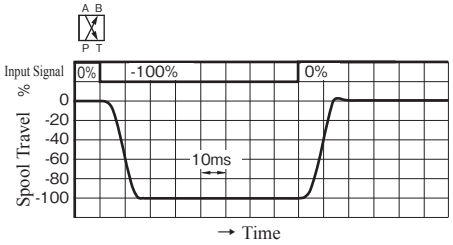
Step Response (Example)

〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply Pressure and Pilot Pressure: 14 MPa
●Input Signal: 0⇔100% ●Viscosity: 30 mm²/s

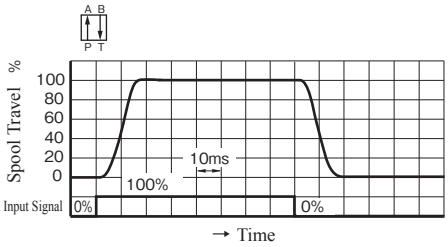
This value is measured on a per valve basis; the actual step response may differ depending on the actual circuit.

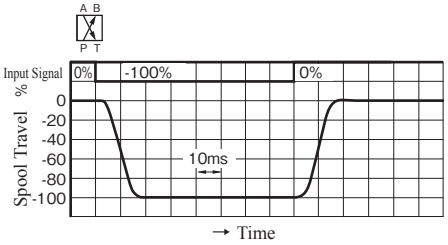
ELDFHG-03EH-100-3C2/3C40/3C2P



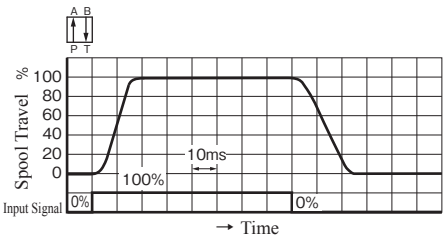


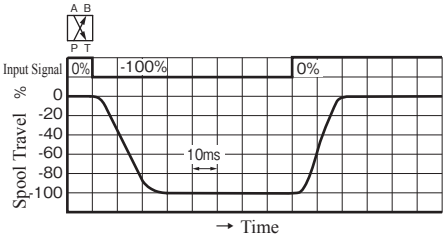
ELDFHG-03EH-100-3C2L



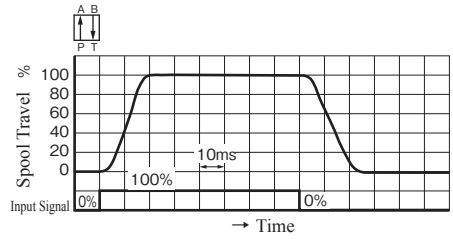


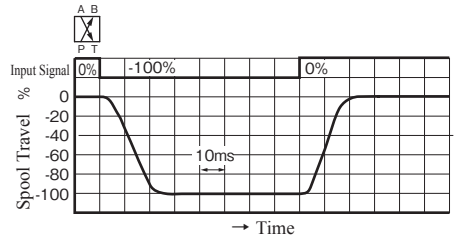
ELDFHG-04EH



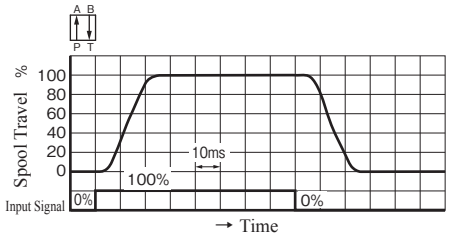


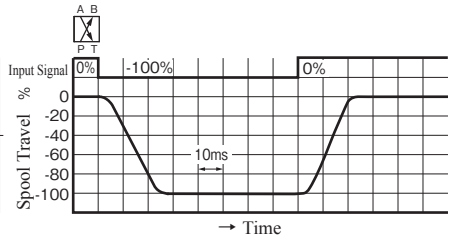
ELDFHG-06EH-350



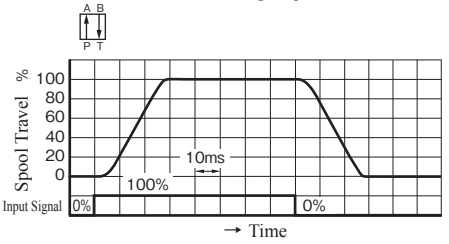


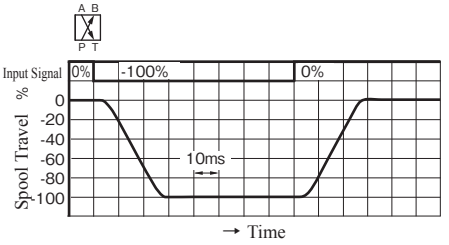
ELDFHG-06EH-500





ELDFHG-10EH





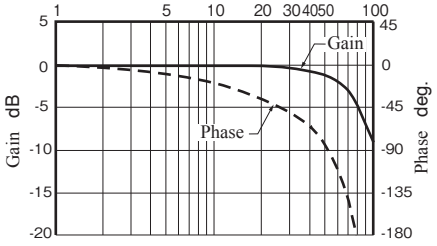
Frequency Response (Example)

〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply Pressure and Pilot Pressure: 14 MPa
●Viscosity: 30 mm²/s

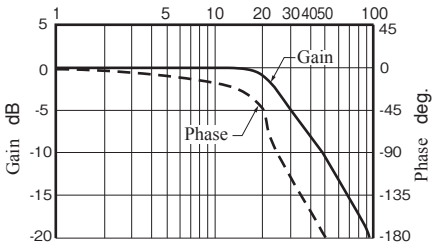
This value is measured on a per valve basis; the actual frequency response may differ depending on the actual circuit.

ELDFHG-03EH-100-3C2/3C40/3C2P

Input Signal ±25%

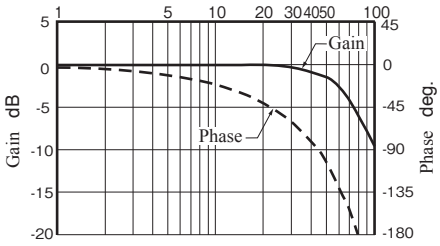


Input Signal ±100%

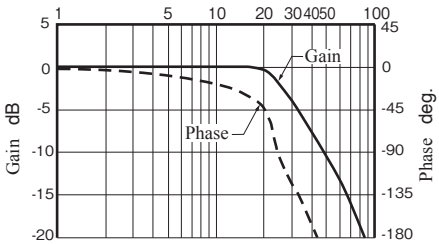


ELDFHG-03EH-100-3C2L

Input Signal ±25%

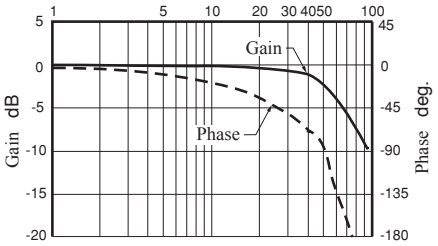


Input Signal ±100%

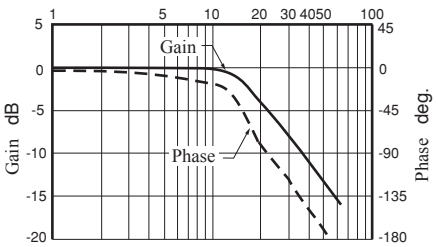


ELDFHG-04EH

Input Signal ±25%

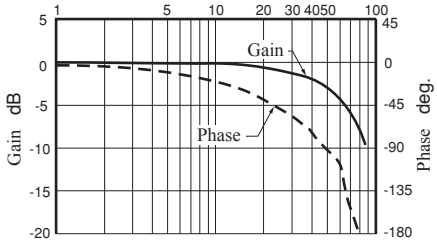


Input Signal ±100%

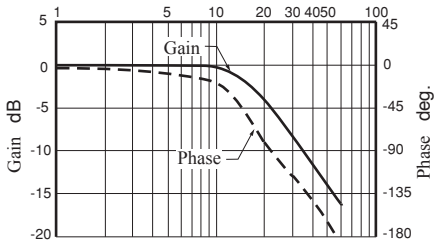


ELDFHG-06EH-350

Input Signal ±25%

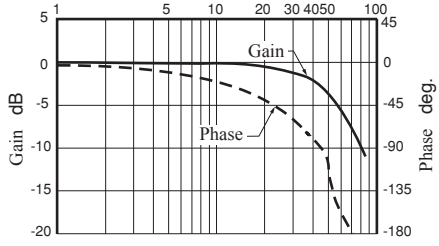


Input Signal ±100%

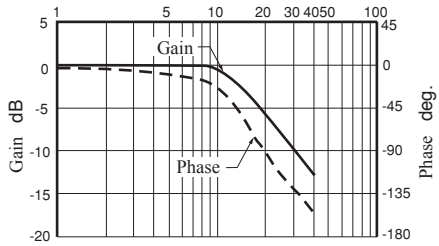


ELDFHG-06EH-500

Input Signal ±25%

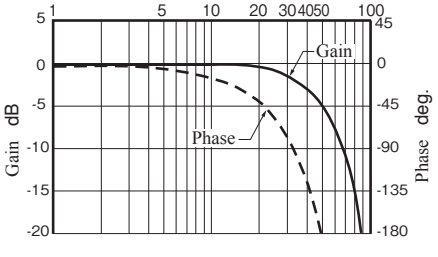


Input Signal ±100%

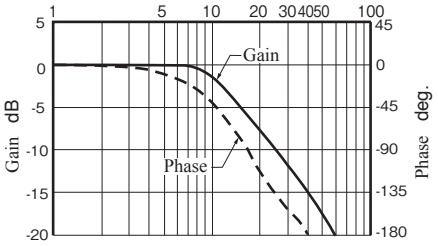


ELDFHG-10EH

Input Signal ±25%

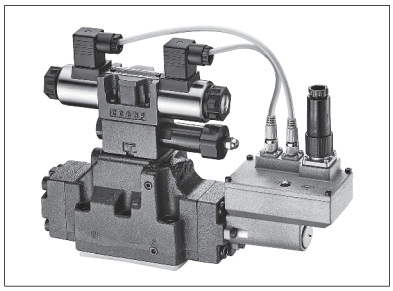


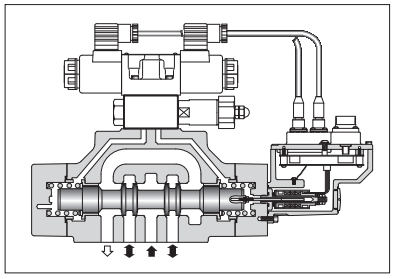
Input Signal ±100%



Proportional Electro-Hydraulic Directional and Flow Control Valves (with Main Valve Feedback Control)

OBE (on-board electronics) type proportional electro-hydraulic directional and flow control valve with a LVDT for spool position detection built into the main valve. High accuracy is achieved by configuring a closed loop.





Features

Simpler

Highly accurate hydraulic control can be obtained only by supplying 24 V DC power and inputting a command signal

High Accuracy

Hysteresis : 0.5 % or less

Safety

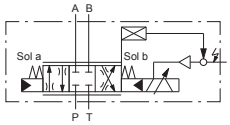
The valves support a fail-safe function to ensure safe operation in the event of electric failure (power failure, power cable disconnection, etc.).

High Flow

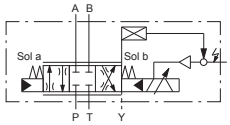
Significantly increased flow rate compared to current products

Graphic Symbols

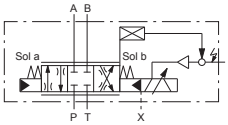
Spool Type "3C2" , "3C21, "3C22"



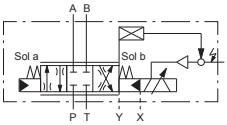
Internal Pilot
Internal Drain Type



Internal Pilot
External Drain Type

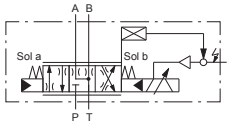


External Pilot
Internal Drain Type

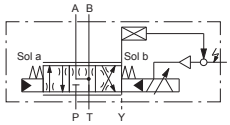


External Pilot
External Drain Type

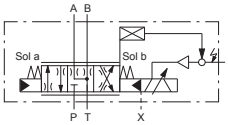
Spool Type "3C40"



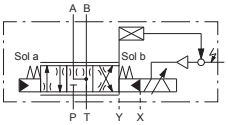
Internal Pilot
Internal Drain Type



Internal Pilot
External Drain Type



External Pilot
Internal Drain Type



External Pilot
External Drain Type

Specifications

Model Numbers			ECDFHG-04EH-150	ECDFHG-04EH-200	ECDFHG-06EH-350	ECDFHG-06EH-500
Rated Flow [ΔP=1 MPa (4-Way Valve)] ΔP = 0.5 MPa per Land		L/min	3C21(P→B, B→T) 3C22(P→A, A→T) :120	3C2, 3C40 : 200	3C21(P→B, B→T) 3C22(P→A, A→T) :230	3C2, 3C40 : 500
			3C2, 3C40 3C21(P→A, A→T) :150 3C22(P→B, B→T)		3C2, 3C40 3C21(P→A, A→T) :350 3C22(P→B, B→T)	
Max. Operating Pressure		MPa	35		31.5	
Pilot Pressure★1		MPa	2.5 - 35		2.5 - 31.5	
Pilot Flow Rate★2		L/min	5.5		7.5	
Proof Pres. at Return Port★3	External Drain T Port	MPa	31.5		25	
	External Drain Y Port	MPa	1 or less		1 or less	
	Internal Drain T&Y Ports	MPa	1 or less			
Internal Leakage★4	Pilot Valve	L/min	1.2 or less			
	Main Valve	L/min	3C2, 3C21, 3C22 : 1.0 or less	3C2 : 1.4 or less	3C2, 3C21, 3C22 : 1.5 or less	3C40 : 2.0 or less
			3C40 : 1.4 or less	3C40 : 2.8 or less	3C40 : 2.0 or less	3C40 : 4.0 or less
Step Response (0 → 100%)★5		ms	38		45	
Frequency Response ±25% Amplitude★5	Phase: -90°	Hz	26		24	
	Gain: -3 dB	Hz	30		27	
Hysteresis			0.5% or less			
Repeatability			0.5% or less			
Power Supply			21.6 - 26.4 V DC Included Ripple			
Ambient Temperature			˚C		-15 - +60	
Current		A	2 (Impulse Loud 3)			
Power Input		VA	75			
Coil Resistance at 20 ºC		Ω	4.6			
Input Signal			±10V, 4 - 20 mA, ±10 mA			
Electric Connection			6 + PE Connector [EN 175201 Part 804]			
Protection			Equivalent to IP64			
Approx. Mass		kg	13		21	

★1. Pilot pressure should be between 2.5 MPa and 35 MPa (04EH), 2.5 MPa and 31.5 MPa (06EH), and should exceed 60% of the actual supply pressure to main valve.
★2. Pilot flow is calculated with the above step response time at pilot pressure 3 MPa.
★3. Return pressure should be less than the actual supply pressure.
★4. This value is measured at a supply pressure of 14 MPa, pilot pressure of 14 MPa, and viscosity of 30 mm^2 /s; it may vary depending on the actual circuit/operation conditions.
★5. This value is measured for each valve based a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.

Details of the Valve Fail-Safe Functions

With reference to the information given below, select the option for the fail-safe function according to the use of applications.
A separate safety circuit should be provided if the hydraulic actuator must be reliably held or stopped.

No.	Model Numbers	Fail-Safe Function★	
		Spool Position	Function
1	ECDFHG-＊EH-＊-3C2-XY-＊＊-C ECDFHG-＊EH-＊-3C21-XY-＊＊-C ECDFHG-＊EH-＊-3C22-XY-＊＊-C	Neutral	All Ports Blocked
2	ECDFHG-＊EH-＊-3C40-XY-＊＊-C		A, B, T Connection

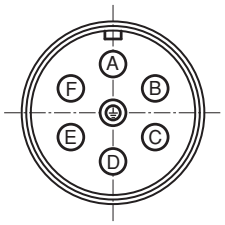
★The fail-safe function's activation time depends on the electric and hydraulic conditions.

Model Number Designation

ECDFHG	- 04	EH	- 150	- 3C2	- XY	- E	T	- C	- D	- 10
Series Number	Valve Size	Amplifier Type	Rated Flow L/min ΔP= 1 MPa (4-Way Valve)	Spool Type	Direction of Flow	Pilot Type	Drain Type	Fail-Safe Function★2	Input Signal/ Spool Travel Monitoring	Design Number
★1 ECDFHG: Proportional Electro-Hydraulic Directional and Flow Control Valves (with Main Valve Feedback Control)	04	EH: OBE Type	150 : 150 L/min	3C2 3C40 3C21 3C22	XY: Meter-in/ Meter-out	None: Internal Pilot E: External Pilot	None: External Drain T: Internal Drain	C: Neutral	D: Voltage Signal ± 10 V (PABT Flow with Positive Input) E: Current Signal 4 to 20 mA (PABT Flow with 12 to 20 mA Input) F: Current Signal ± 10 mA (PABT Flow with Positive Input)	10
			200 : 200 L/min	3C2 3C40						
	06		350 : 350 L/min	3C2 3C40 3C21 3C22						
			500 : 500 L/min	3C2 3C40						

★1. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
★2. Refer to the previous page for details on the fail-safe function.

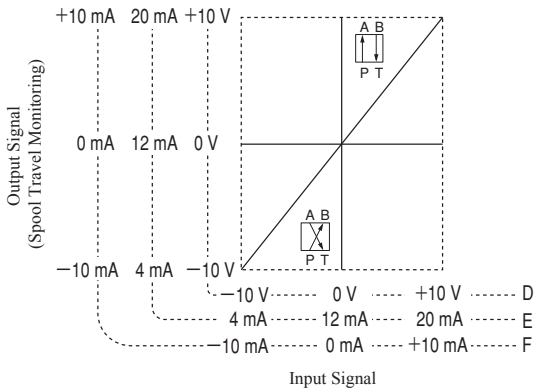
Electrical Specifications



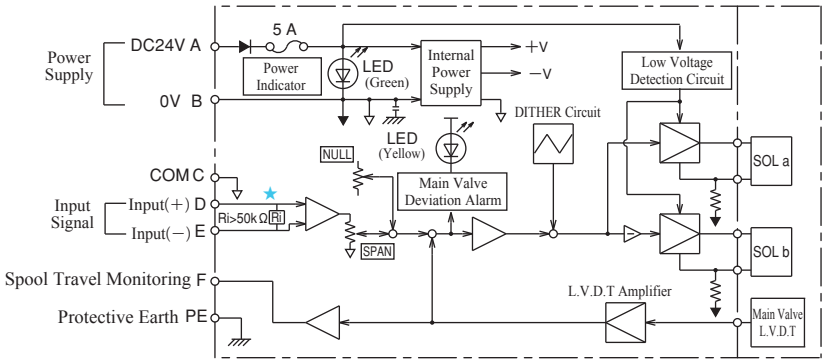
Input Signal		Voltage Signal "D"	Current Signal "E"	Current Signal "F"
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+)(Differential)★1	0 - ±10 V R i≧50 kΩ	4 - 20 mA R i=200 Ω	0 - ±10 mA R i=200 Ω
Pin E	Input (−)(Differential)★1			
Pin F	Spool Travel Monitoring	0 - ±10 V R_L≧10 kΩ	4 - 20 mA R_L=100 - 500 Ω★2	0 - ±10 mA R_L=100 - 500 Ω★2
Pin ⏚	Protective Earth	—		

★1. Differential input signals can be used only for the valves with the voltage signal specifications of ±10V. (ECDFHG-∗EH-∗-D)
★2. The recommended load resistance is 200 Ω.

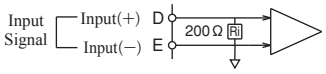
I/O Signal Characteristics



Block Diagram



★The input stage for the current signal "E" and "F" is as follows.



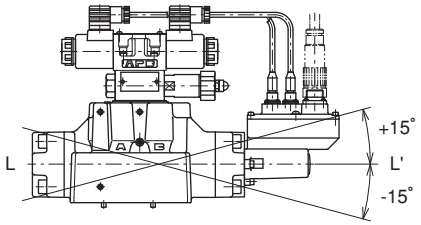
Accessories

Mounting Bolts

Valve Model Numbers	Mounting Bolt	Qty.	Tightening Torque Nm
ECDFHG-04EH	Hex. Socket Head Cap Screw: M6 × 55L	2	12.9 - 15.9
	Hex. Socket Head Cap Screw: M10×60L	4	60.6 - 74.1
ECDFHG-06EH	Hex. Socket Head Cap Screw: M12×85L	6	104 - 127

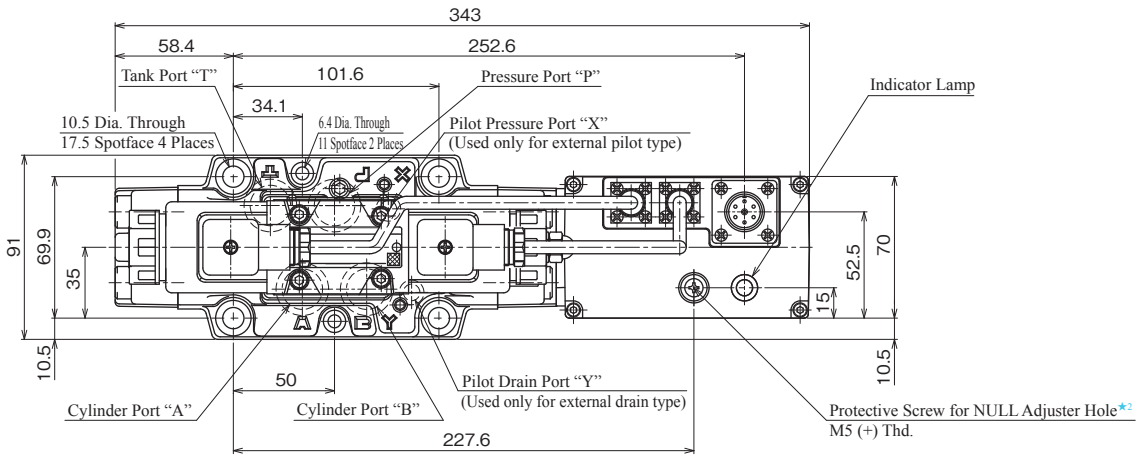
Mounting Position

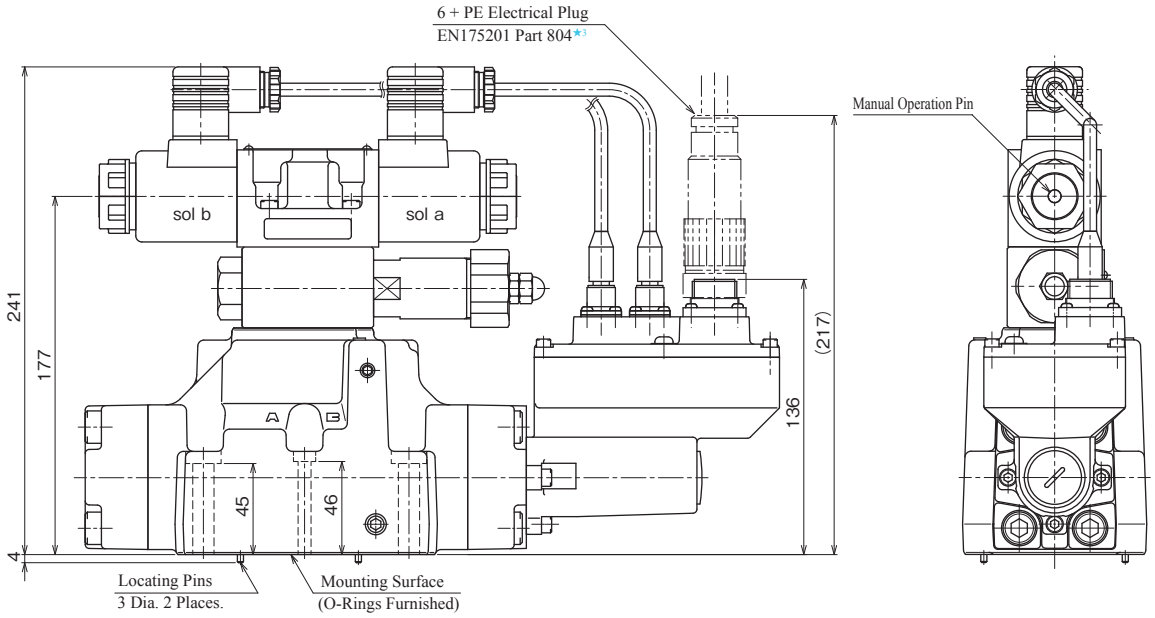
Mount the valve with the angle of the axis line L-L' within about ±15° from the horizontal plane as shown in the right figure. When the principal vibration direction is consistent with the axial direction of the spool, the spool may malfunction due to external force. Make sure that the principal vibration direction is not consistent with the axial direction of the spool.



ECDFHG-04EH

Mounting Surface: ISO 4401-07-07-0-05★1





Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Yellow	Main Valve Deviation Alarm

O-Rings

Port	O-Ring	Qty.
P,A,B,T	OR NBR-90 P22-N	4
X,Y	OR NBR-90 P9-N	2

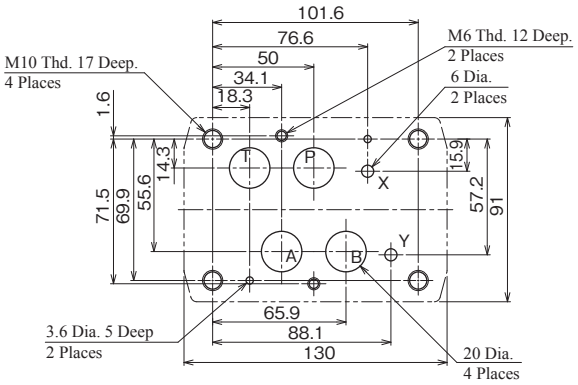
★1. This valve can be mounted on ISO mounting surface. However, in this case, the pressure loss becomes large and the rated flow rate cannot be achieved.

★2. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.

★3. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1

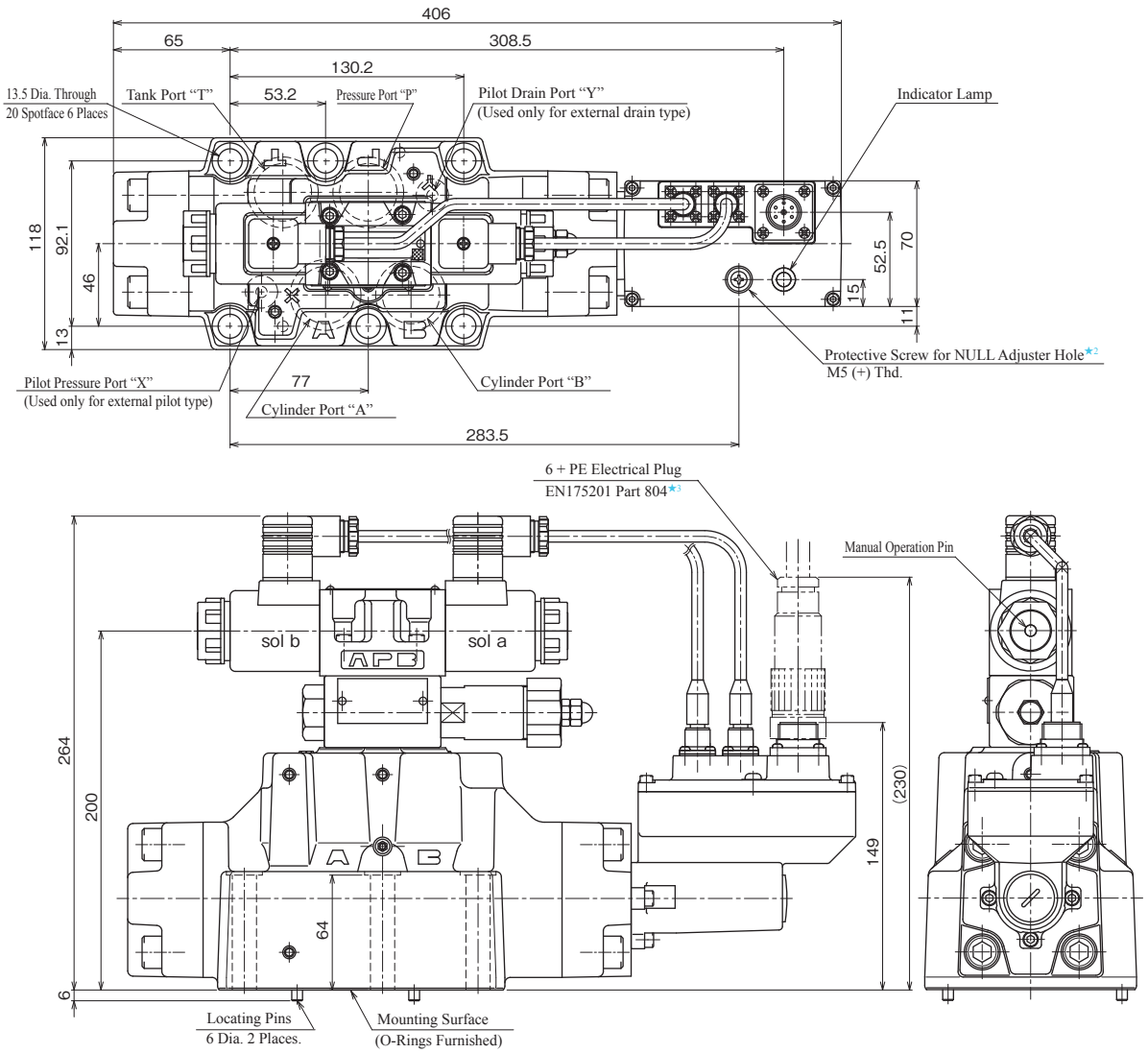
Dimensions of Mounting Surface

Prepare the mounting surface as shown in the figure below.
The mounting surface should have a good machined finish (▽).



ECDFHG-06EH

Mounting Surface: ISO 4401-08-08-0-05★1



Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Yellow	Main Valve Deviation Alarm

O-Rings

Port	O-Ring	Qty.
P,A,B,T	AS568-126 (NBR-90)	4
X,Y	OR NBR-90 P14-N	2

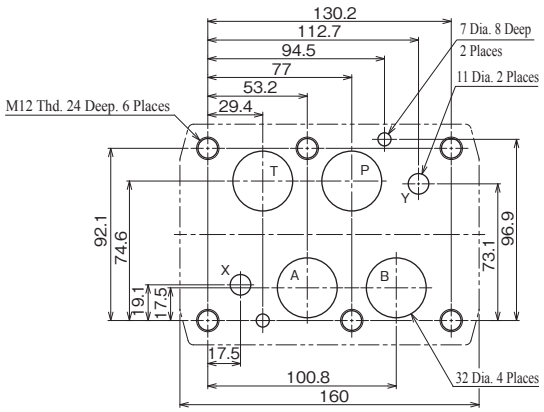
★1. This valve can be mounted on ISO mounting surface.
However, in this case, the pressure loss becomes large and the rated flow rate cannot be achieved.

★2. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.

★3. The 6 + PE Electrical Plug is not included with the valve.
Prepare it separately.
YUKEN parts number: TK290457-1

Dimensions of Mounting Surface

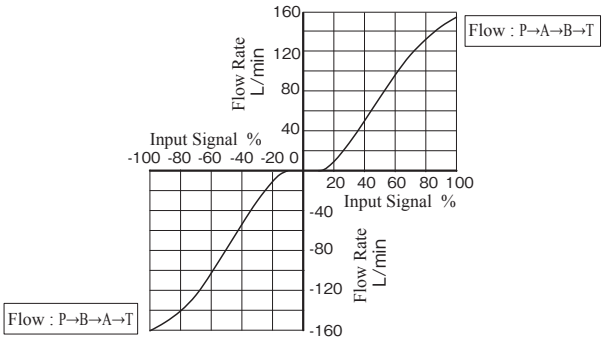
Prepare the mounting surface as shown in the figure below.
The mounting surface should have a good machined finish (▽).



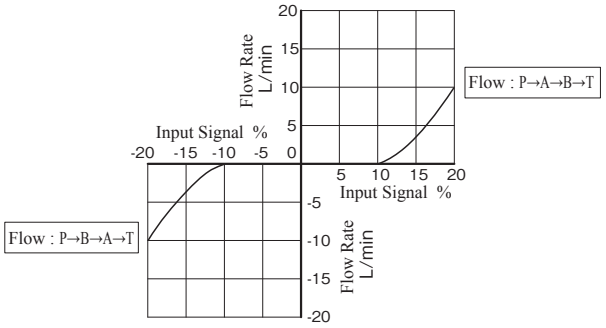
No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: 1 MPa (4-Way Valve/Pressure Difference per Land: 0.5 MPa)
●Viscosity: 30 mm^2/s

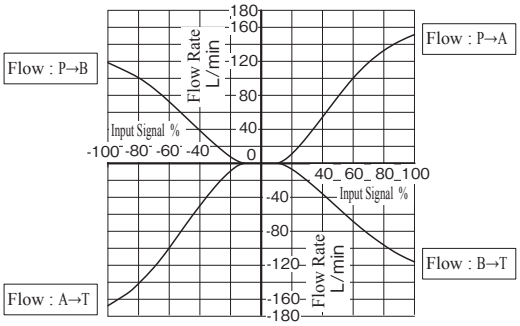
ECDFHG-04EH-150-3C2/3C40



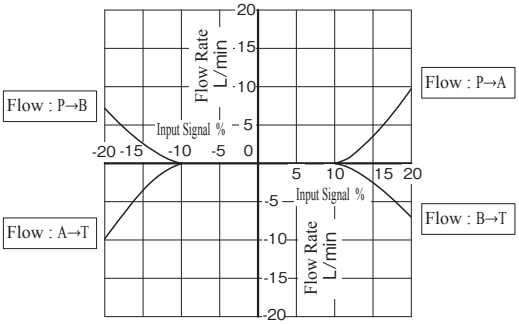
Around Null Position
Input Signal -20⇔+20%



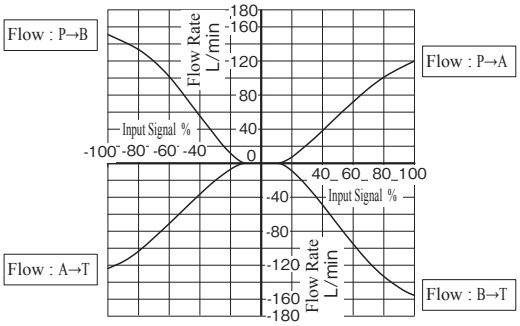
ECDFHG-04EH-150-3C21



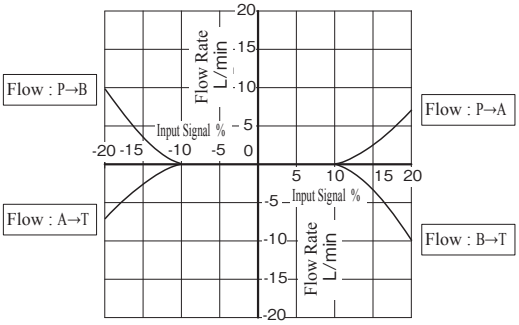
Around Null Position
Input Signal -20⇔+20%



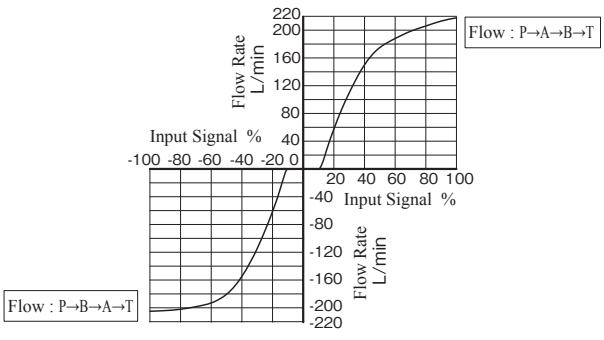
ECDFHG-04EH-150-3C22



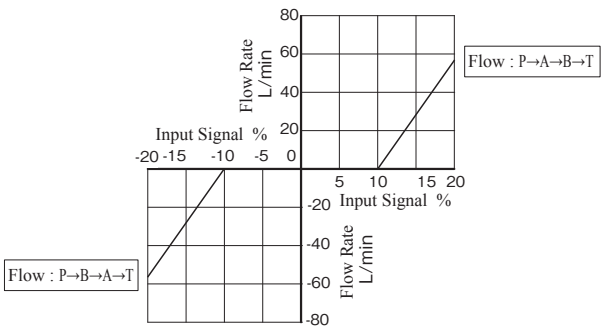
Around Null Position
Input Signal -20⇔+20%



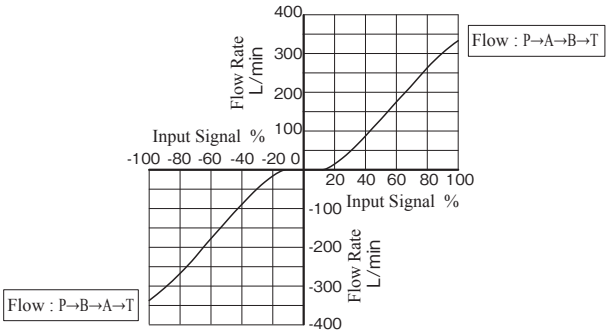
ECDFHG-04EH-200-3C2/3C40



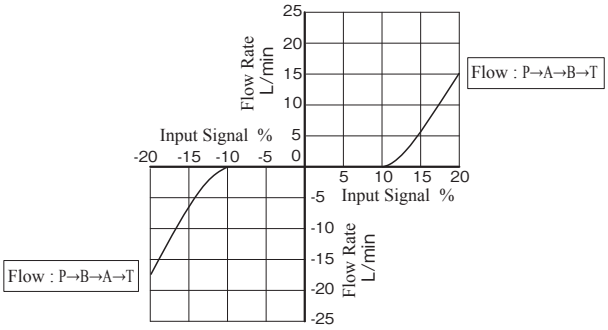
Around Null Position
Input Signal -20⇔+20%



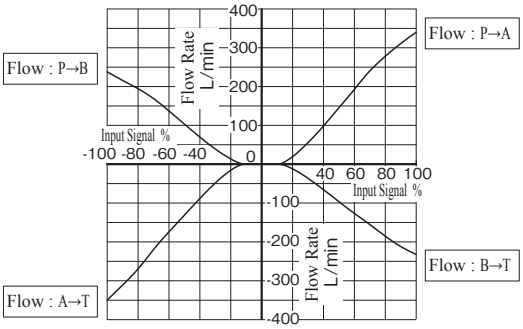
ECDFHG-06EH-350-3C2/3C40



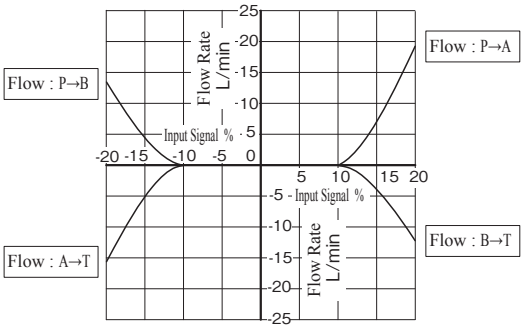
Around Null Position
Input Signal -20⇔+20%



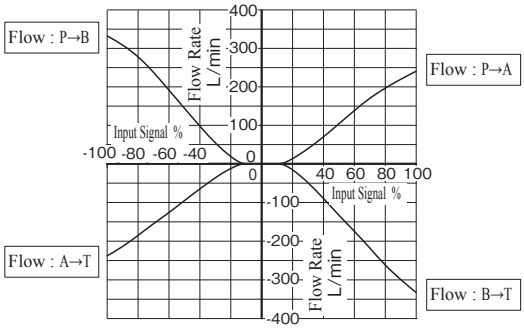
ECDFHG-06EH-350-3C21



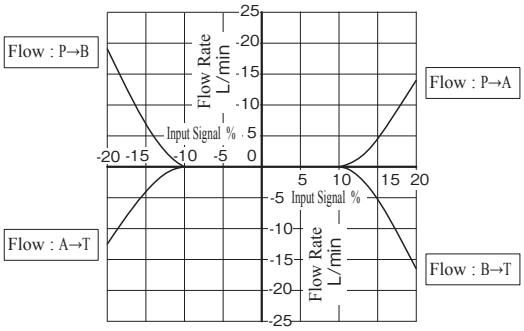
Around Null Position
Input Signal -20⇔+20%



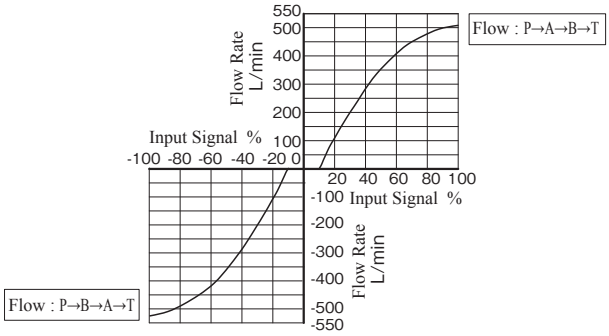
ECDFHG-06EH-350-3C22



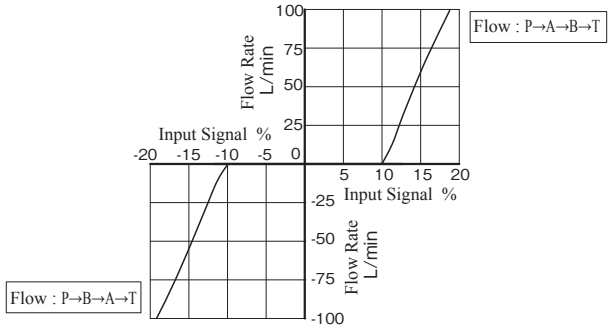
Around Null Position
Input Signal -20⇔+20%



ECDFHG-06EH-500-3C2/3C40



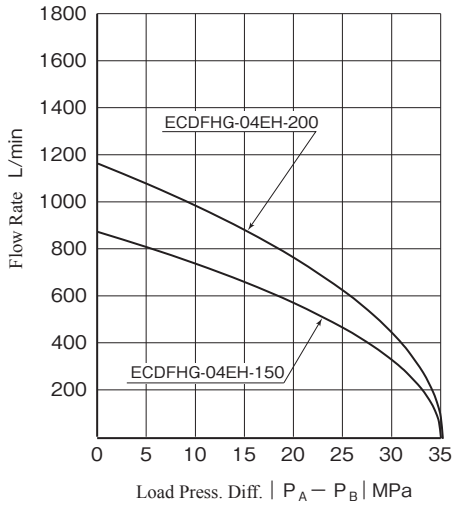
Around Null Position
Input Signal -20⇔+20%



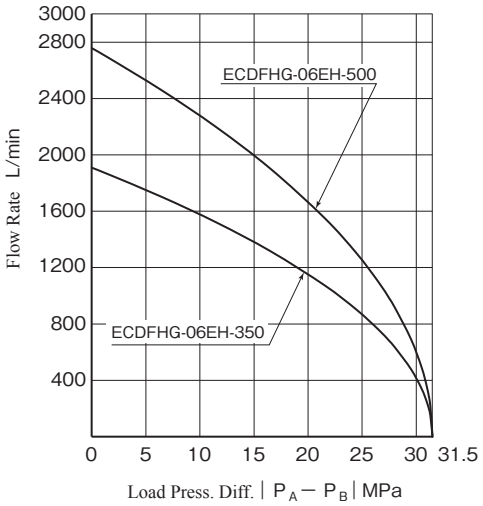
Load Flow Characteristics

〈Conditions〉●Viscosity: 30 mm²/s

ECDFHG-04EH-*-3C2/3C40



ECDFHG-06EH-*-3C2/3C40

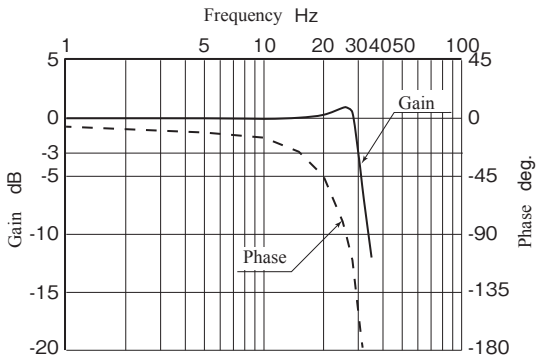


Frequency Response

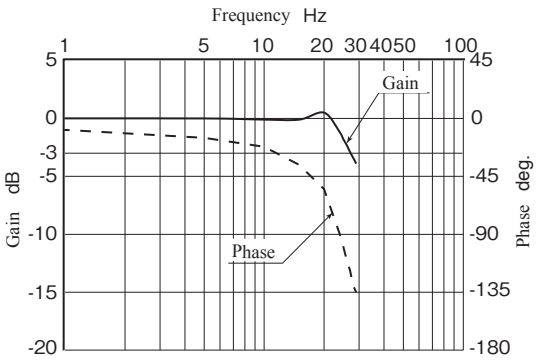
〈Conditions〉●Hydraulic Circuit: Port A/B Closed ●Supply Pressure and Pilot Pressure: 14 MPa
●Viscosity: 30 mm²/s ●Amplitude: 50±25%

This value is measured on a per valve basis; the actual frequency response may differ depending on the actual circuit.

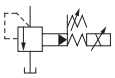
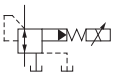
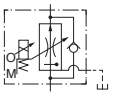
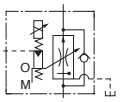
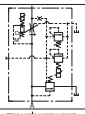
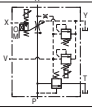
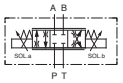
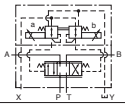
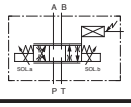
ECDFHG-04EH



ECDFHG-06EH



E Series Proportional Electro-Hydraulic Controls

Types	Graphic Symbols	Max. Operating Pressure MPa	Maximum Flow L/min (1 2 3 5 10 20 30 50 100 200 300 500 1000)	Page
Pilot Relief Valves		24.5	EDG 01	H-93
Relief Valves		24.5	EBG 03 06 10	H-99
Relieving and Reducing Valves		24.5	ERBG 06 10	H-108
40 Ω Series Flow Control (and Check) Valves		20.6	EFG EFCG 02 03 06 10	H-118
10 Ω Series Flow Control (and Check) Valves		03: 20.6 06: 24.5	EFG EFCG 03 06	H-128
10 Ω - 10 Ω Series Flow Control and Relief Valves		24.5	EFBG 03 06 10	H-135
High Flow Series Flow Control and Relief Valves		24.5	EFBG 03 06 10	H-145
Shockless Type Directional and Flow Control Valves		25	EDFG 01	H-155
Directional and Flow Control Valves		25	EDFHG 03 04 06	H-157
High Response Type Directional and Flow Control Valves		01/03: 31.5 04/06: 35	ELDFG 01 03 ELDFHG 04 06	H-163

Power Amplifiers ..... Page H-172
Setting Adjusters ..... Page H-194

Hydraulic Fluids

Fluid Types

Any type of hydraulic fluid listed in the table below can be used.

Petroleum Base Oils	Use fluids equivalent to ISO VG 32 or VG 46.
Synthetic Fluids	Use phosphate ester or polyol ester fluids. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
Water-containing Fluids	Use water-glycol fluid.

Note: For use with hydraulic fluids other than those listed above, please consult your Yuken representatives in advance.

Recommended Fluid Viscosity and Temperature

Use hydraulic fluids which satisfy the both recommended viscosity and oil temperatures given in the table below.

Name	Viscosity	Temperature
Pilot Relief Valves Relief Valves Relieving and Reducing Valves	15 - 400 mm^2/s	-15 - +70°C
Flow Control Valves Flow Control and Check Valves Flow Control and Relief Valves	20 - 200 mm^2/s	
Directional and Flow Control Valves	20 - 400 mm^2/s	0 - +60°C
Shockless Type Directional and Flow Control Valves High Response Type Directional and Flow Control Valves (Direct Type)	20 - 200 mm^2/s	0 - +60°C
High Response Type Directional and Flow Control Valves (Two Stage Type)	15 - 400 mm^2/s	-15 - +60°C

Control of Contamination

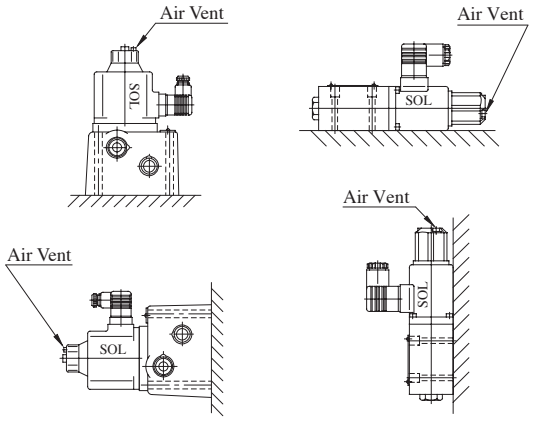
Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valve. Please maintain the degree of contamination within NAS 1638-Grade 11. Use 20 µm or finer line filter.

Instructions

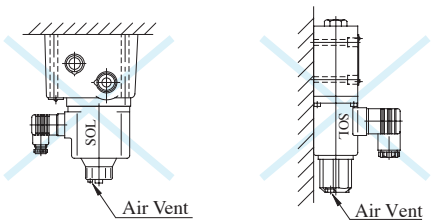
Mounting

Be sure that the air vent faces up.
In addition, if the valve is mounted vertically, the minimum adjustment pressure is 0.2 MPa or higher.

[Good example]

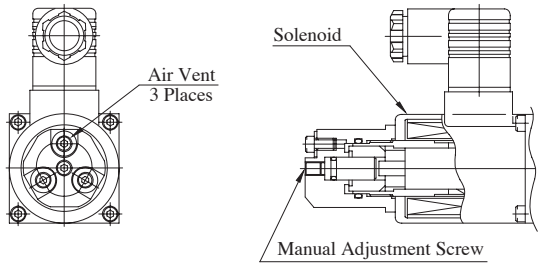


[Bad example]



Air Bleeding

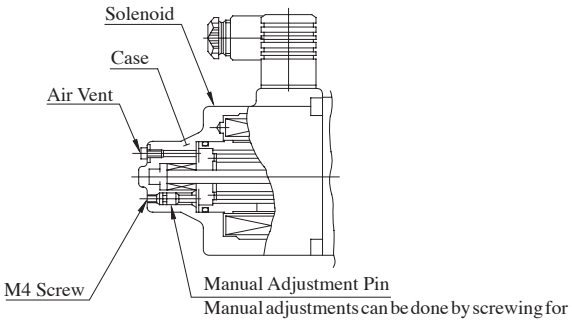
To ensure stable control, bleed the air from solenoid completely and fill its core with oil.
Bleeding can be done by slowly loosening one of the air vents at the end of the solenoid. Choose one of the three air vents which is expected to work most effectively (see the figure to the right).



10 Ω Series Solenoid

Manual Adjustment Screw

When initial adjustments are to be made or when no current is supplied to the valve due to electrical failure or other problem, turn the manual adjustment screw to temporarily set the valve pressure / flow rate. In that case, when turn the manual adjustment screw clockwise, the valve pressure / flow rate increases. Under normal condition, however, this screw must be kept in its original position (see the figure to the right).



40 Ω Series Solenoid

Tank and Drain Piping

The tank-line back pressure and drain back pressure directly affect the minimum adjustment pressure. Therefore, do not connect the tank or drain pipes to other lines, but connect them directly to the reservoir maintaining the back pressure as low as possible. Be sure that the tank and drain pipe ends are immersed in fluid.

Hysteresis and Repeatability Value Indications

The hysteresis and repeatability values indicated in the specifications for each control valve are determined under the following conditions:

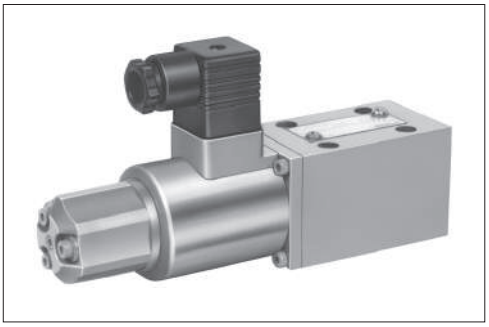
- Hysteresis Value: Obtained when Yuken's applicable power amplifier is used.
- Repeatability Value: Obtained when Yuken's applicable power amplifier is used under the same conditions.

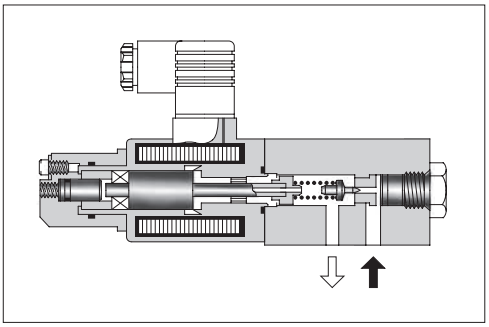
Interchangeability between Current and New Model Change Products

Name	Model Numbers	Design Number		Installation Interchangeability	Major Changes	Page
		Current	New			
Pilot Relief Valves	EDG-01	50	51	YES	● Solenoid Ass'y Change	H-98
Relief Valves	EBG-03	50	51	YES	● Pilot Valve Change EDG-01V, 50→51 Design	H-107
	EBG-06	50	51	YES		
	EBG-10	50	51	YES		
Relieving and Reducing Valves	ERBG-06	50	51	YES	● Pilot Valve Change EDG-01V, 5001→5101 Design ● No change in specifications	H-117
	ERBG-10	50	51	YES		
10Ω Series Flow Control (and Check) Valves	EFG EFCG -03	50	51	YES	● Solenoid Ass'y Change ● No change in specifications	H-133
	EFG EFCG -06	50	51	YES		
10Ω - 10Ω Series Flow Control and Relief Valves	EFBG-03	50・51	61	YES	● 03/06 : 50^{D}, 51^{D}→61^{D} ・Pilot Valve (EDG-01) is now integrated into the cover ・Solenoid Ass'y Change ● 03/06 : 60^{D}, 61^{D}, 10 : 50^{D}→51^{D} ・Solenoid Ass'y Change	H-144
		60				
	EFBG-06	50・51	61	YES		
		60				
	EFBG-10	50	51	YES		
High Flow Series Flow Control and Relief Valves	EFBG-03	50	51	YES	● Solenoid Ass'y Change	H-154
	EFBG-06	50	51	YES	● Pilot Valve Change EDG-01V, 5003→5103 Design ● Solenoid Ass'y Change	
Directional and Flow Control Valves	EDFHG-03	30	31	YES	● Solenoid Ass'y Change ● No change in specifications	H-160
	EDFHG-04	30	31	YES		
	EDFHG-06	30	31	YES		
Power Amplifiers For 40Ω Series Flow Control Valves	AME-D	41	50	YES	● Additional power supply, functions and installation	H-180
	AME-DF	22	50	YES		
Power Amplifiers For High Response Type Directional and Flow Control Valves	AMB-EL	10	20	YES	● Addition of input/output classification	H-194
Multifunction Slope Controllers	AMC-T	10	20	YES	● Compact and Lightweight ● Shockless control mode and stop mode functions added	H-200

Proportional Electro-Hydraulic Pilot Relief Valves

This valve consists of a small DC solenoid and a direct-acting relief valve. It serves as a pilot valve for a low flow rate hydraulic system or a proportional electro-hydraulic control valve and controls the pressure in proportion to the input current. Note that this valve is used in conjunction with the applicable power amplifier.

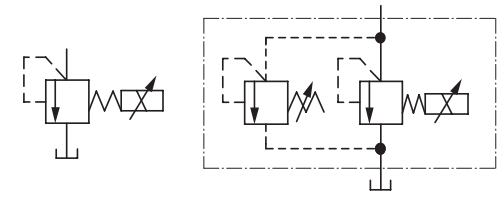




Specifications

Descriptions \ Model Numbers		EDG-01
Max. Operating Pres.	MPa	24.5
Max. Flow	L /min	2
Min. Flow	L /min	0.3
Pressure Adj. Range	MPa	Refer to Model Number Designation
Rated Current	mA	EDG-01∗-B : 800 EDG-01∗-C : 900 EDG-01∗-H : 950
Coil Resistance	Ω	10
Hysteresis		3% or less
Repeatability		1% or less
Mass	kg	2

Graphic Symbols



Without Safety Valve With Safety Valve

Model Number Designation

ED	G	-01	V	-C	-1	-PN	T13	-51
Series Number	Type of Mounting	Valve Size	Applicable Control ★1	Pressure Adj. Range MPa	Safety Valve	P-Line Orifice	T-Line★2 Orifice	Design Number
ED: Proportional Electro-Hydraulic Pilot Relief Valve	G: Sub-Plate Mounting	01	None: General Use V: Vent Control of Relief Valve (Omit if not required)	B: 0.5 - 6.9 C: 1.0 - 15.7 H: 1.2 - 24.5	None: Without Safety Valve 1: With Safety Valve	PN: Without Orifice (Standard)	T15 T13 T11	51

★1. When the valve is to be used for vent control purpose, orifice adjustment is required due to piping capacity limitations. Therefore, consult your Yuken representative in advance.

★2. Standard orifices for T-line orifices are as follows.
Pressure Adj. Range B: T15, C: T13, H: T11
The orifice used as the pilot valve may differ from the standard orifice.

Accessories

Mounting Bolts

Socket Head Cap Screw
M5 ×45 L ····· 4 pcs.

Applicable Power Amplifier

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see pages H-173, H-177 and H-183).

Model Numbers : AME-D-10-∗-20
AME-D2-1010-∗-11
SK1022-∗-∗-11
SK1015-11 (For DC power supply)
AMN-D-10 (For DC power supply)

Sub-Plate

Piping Size	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
1/8	DSGM-01-31	1/8	0.8
1/4	DSGM-01X-31	1/4	0.8
3/8	DSGM-01Y-31	3/8	0.8

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
- Sub-plates are those for 1/8 solenoid operated directional valves. For dimensoins, see page H-8.

Instructions

Tank-Line Back Pressure

Check that the tank line back pressure does not exceed 0.2 MPa.

Vent Control

When the valve is used for vent control of relief valves or others, use the pipes of 6 mm ID. 300 mm or less length for connection.

If the pressure is instable, provide a 1.0 to 1.5 mm diameter orifice to the vent port of the relief valves or others.

Circuit Pressure Control

When the pressure in a circuit is directly controlled with this valve, set the trapped oil volume being more than 40cm^3.

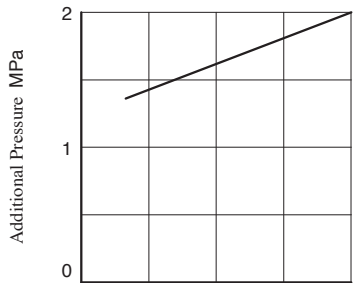
Safety Valve Pressure Setting

The pressure of the safty valve at the maximum flow is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa.

In case where the upper limit of operating pressure is low or the upper limit of flow rate to be used is different from the specified maximum flow, please adjust and determine the setting pressure of the safety valve at the value calculated from the following formula.

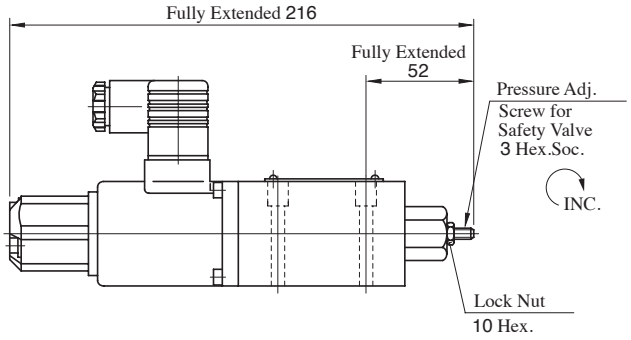
Setting pressure = (Operating pressure upper limit) + (Additional pressure indicated below)

To lower the setting pressure, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.



EDG-01∗-∗-1-PNT∗-51

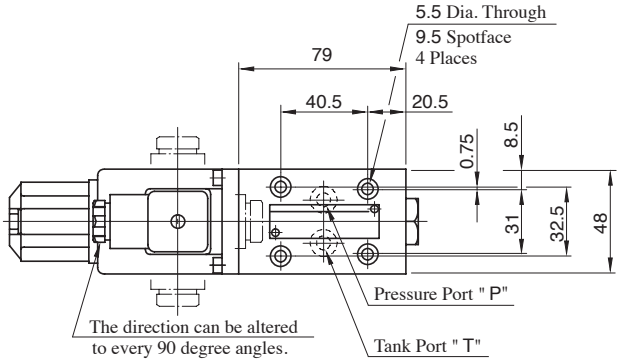
With Safety Valve

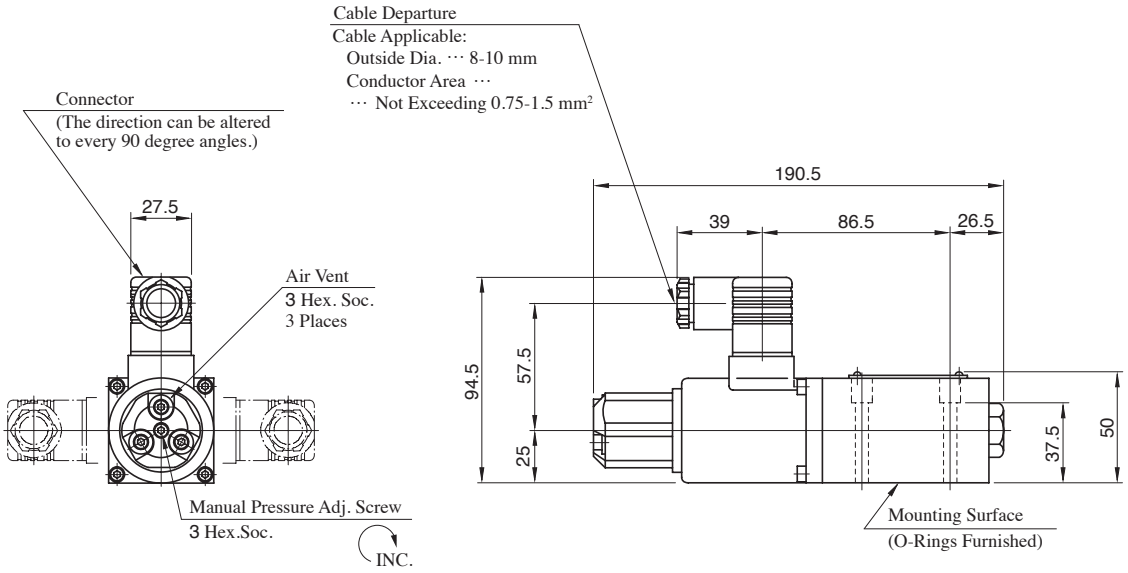


● For other dimensions, refer to the without safety valve.

EDG-01∗-∗-PNT∗-51

Without Safety Valve





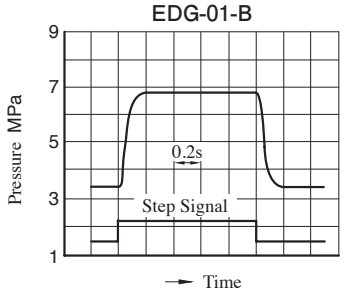
Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-8) in common use.

Step Response (Example)

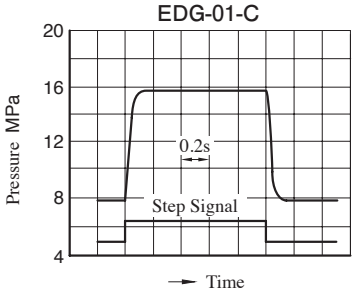
These characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

Flow Rate : 2 L/min
Trapped Oil Volume : 40 cm^3
Viscosity : 30 mm^2/s

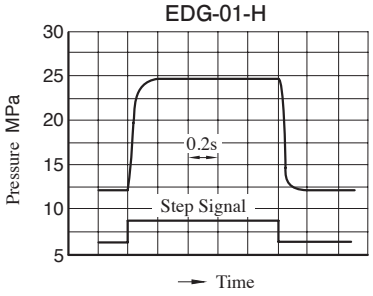
EDG-01-B



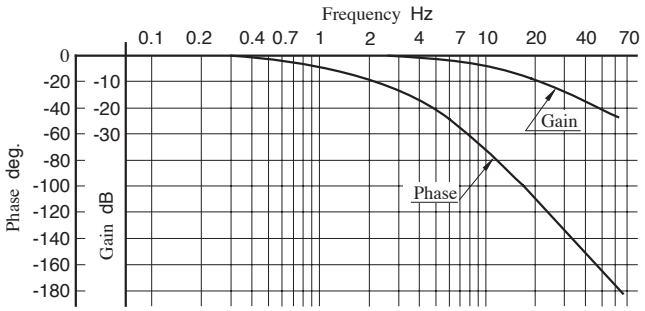
EDG-01-C



EDG-01-H



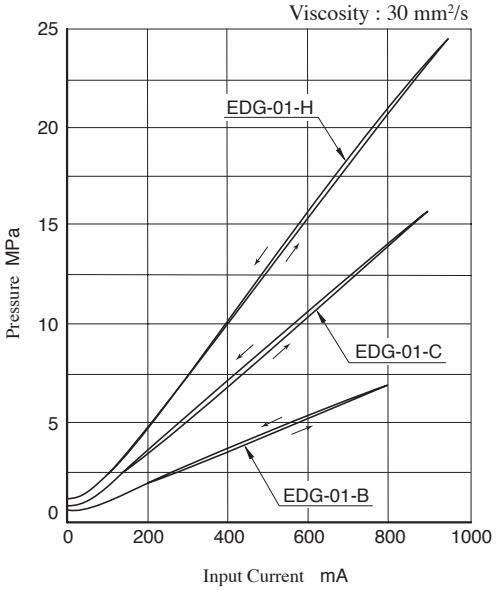
Frequency Response



Flow Rate : 2 L/min
Pressure :7.8 ± 1.6 MPa
Trapped Oil Volume : 30 cm^3
Viscosity : 30 mm^2/s

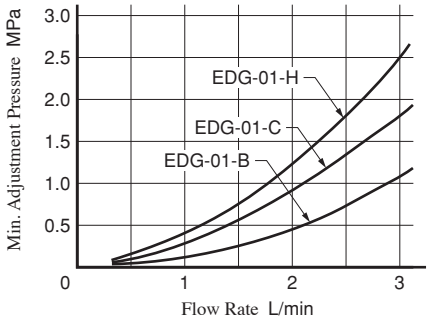
Control Pressure vs. Input Current

Viscosity : 30 mm^2/s



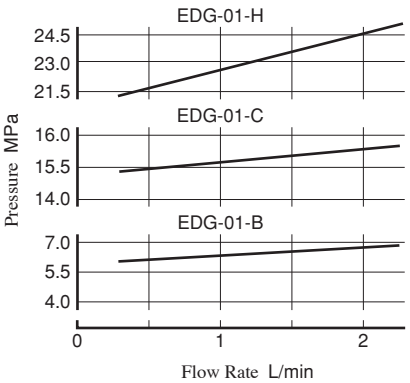
Min. Adjustment Pressure

Viscosity : 30 mm^2/s



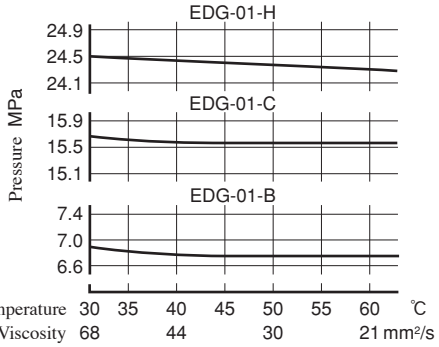
Flow Rate vs. Pressure

Viscosity : 30 mm^2/s



Viscosity vs. Pressure

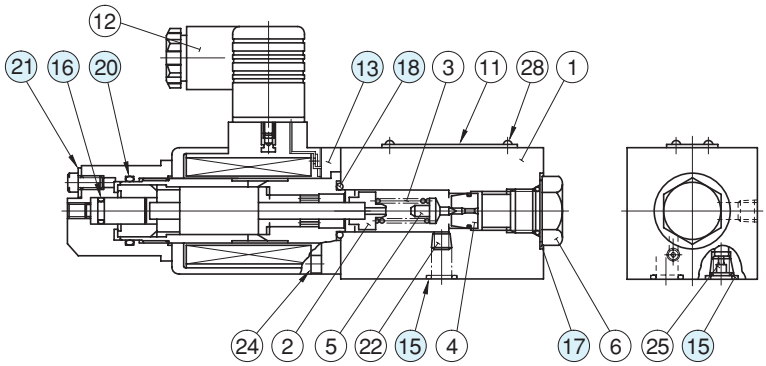
Flow Rate : 2 L/min
Oil : ISO VG 46 Oil



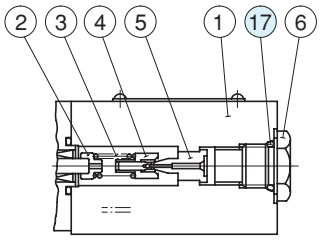
List of Seals and Solenoid Ass'y

Without Safety Valve

EDG-01∗-∗-PNT∗-51
EDG-01V-∗-PNT∗-5103

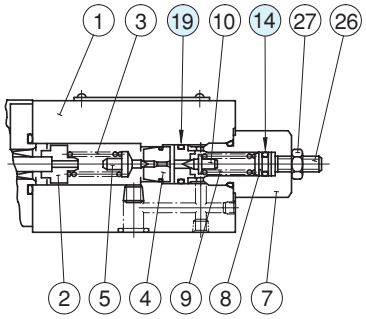


EDG-01-∗-PNT∗-5101



With Safety Valve

EDG-01∗-∗-1-PNT∗-51
EDG-01V-∗-1-PNT∗-5103
EDG-01V-∗-1-PNT20-5197



List of Seals

Item	Name of Parts	Part Numbers	Qty.
14	O-Ring	OR NBR-70-1 P6-N	1
15	O-Ring	OR NBR-90 P9-N	2
16	O-Ring	OR NBR-90 P7-N	1
17	O-Ring	OR NBR-90 P14-N	1
18	O-Ring	OR NBR-90 P18-N	1
19	O-Ring	AS568-013(NBR-90)	1
20	O-Ring	OR NBR-90 P22-N	1
21	Fastener Seal	W4	3

Note: O-ring (Item 16, 18, 20) and the fastener seal (Item 21) are included in the solenoid assembly.

Solenoid Ass'y

Valve Model Numbers	⑬ Solenoid Ass'y
EDG-01V-∗-∗-P∗T∗-51 EDG-01-∗-∗-P T -5101	E318-Y06M1-28-61
EDG-01-∗-∗-P∗T∗-51	E318-Y06M1-05-61
EDG-01V-∗-∗-PNT∗-5103	E318-Y06M1-04-61

Note: The connector assembly GDM-211-B-11 (Item 12) is not included in the solenoid assembly.

Pilot Valve

Model numbers of proportional electro-hydraulic control valves whose pilot valve is this valve (EDG-01∗) and the pilot valve are shown.

Valve Model No.	Pilot Valve Model Numbers
EBG-03-C-51	EDG-01V-C-1-PNT09-51
EBG-03-H-51	EDG-01V-H-1-PNT09-51
EBG-03-C-T-51	EDG-01V-C-PNT09-51
EBG-03-H-T-51	EDG-01V-H-PNT09-51
EBG-06-C-51	EDG-01V-C-1-PNT10-51
EBG-06-H-51	EDG-01V-H-1-PNT10-51
EBG-06-C-T-51	EDG-01V-C-PNT10-51
EBG-06-H-T-51	EDG-01V-H-PNT10-51
EBG-10-C-51	EDG-01V-C-1-PNT11-5103
EBG-10-H-51	EDG-01V-H-1-PNT11-5103
EBG-10-C-T-51	EDG-01V-C-PNT11-5103
EBG-10-H-T-51	EDG-01V-H-PNT11-5103
ERBG-06-B-51	EDG-01-B-PNTN-5101
ERBG-06-C-51	EDG-01-C-PNTN-5101
ERBG-06-H-51	EDG-01-H-PNT15-5101
ERBG-10-B-51	EDG-01-B-PNTN-5101
ERBG-10-C-51	EDG-01-C-PNTN-5101
ERBG-10-H-51	EDG-01-H-PNT15-5101
EFBG-10-500-C-∗-51	EDG-01V-C-1-PNT12-5103
EFBG-10-500-H-∗-51	EDG-01V-H-1-PNT12-5103
EFBG-06-500-C-∗-51	EDG-01V-C-1-PNT11-5103
EFBG-06-500-H-∗-51	EDG-01V-H-1-PNT11-5103
EFBG-10-1000-C-∗-51	EDG-01V-C-1-PNT20-5197
EFBG-10-1000-H-∗-51	EDG-01V-H-1-PNT20-5197

Interchangeability between Current and New Design

EDG-01 series valve has changed model from 50 to 51 design in line with the solenoid improvement.

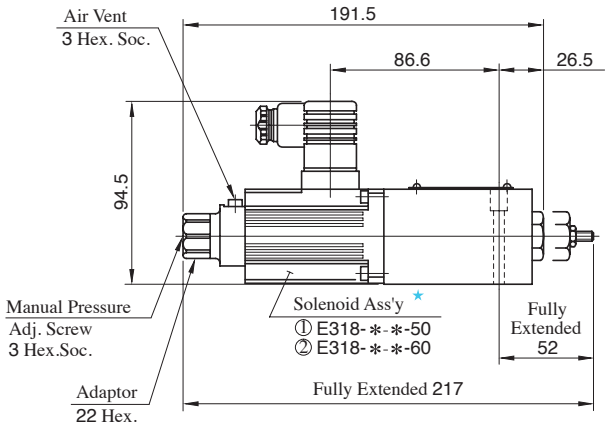
Specifications and Characteristics

Input current-pressure characteristics differ between current and new design. Please inquire separately for details.
Other specifications remain unchanged.

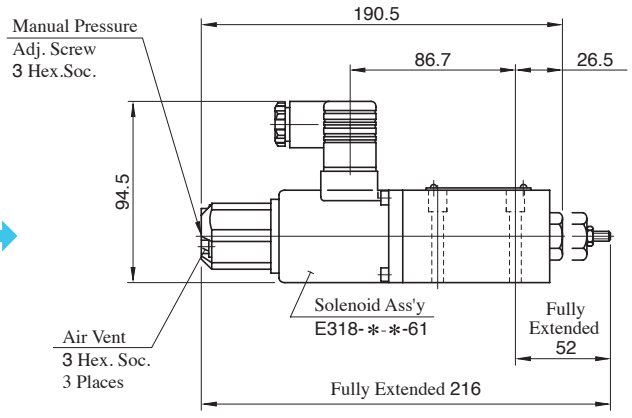
Mounting Interchangeability

There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to solenoid improvement and other modifications.

Current: Design 50



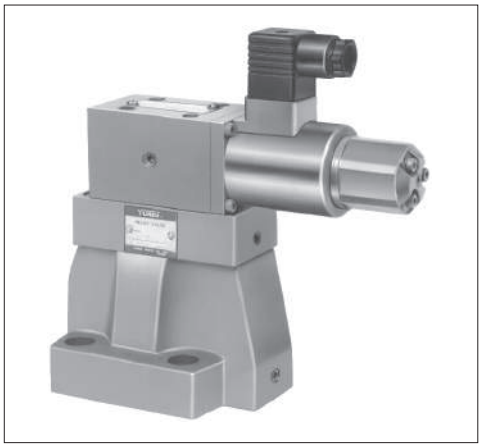
New: Design 51

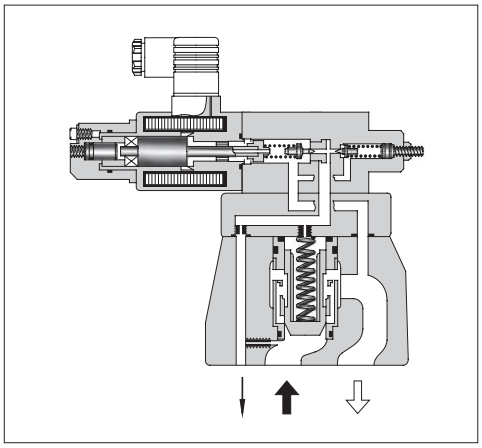


★The solenoid assembly current design comes in two types: ① E318-50 design and ② 60 design.
See the figure on the left for an external view of type ①. See the figure on the right for type ②.

Proportional Electro-Hydraulic Relief Valves

This valve is derived by combining a small, high-performance 1/8 proportional electro-hydraulic pilot relief valve with a specially developed low-noise relief valve.
With this valve, it is possible to regulate the system pressure in proportion to the input current. Note that this valve is used in conjunction with the applicable power amplifier.

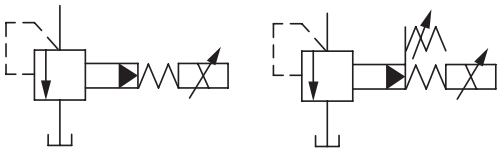




Specifications

Descriptions \ Model Numbers		EBG-03	EBG-06	EBG-10
Max. Operating Pres.	MPa	24.5	24.5	24.5
Max. Flow	L/min	100	200	400
Min. Flow	L/min	3	3	3
Pressure Adjustment Range	MPa	Refer to Model Number Designation		
Rated Current	mA	C: 770 H: 820	C: 750 H: 800	C: 730 H: 780
Coil Resistance	Ω	10	10	10
Hysteresis		3% or less	3% or less	3% or less
Repeatability		1% or less	1% or less	1% or less
Approx. Mass	kg	5.6	6.3	10

Graphic Symbols



Without Safety Valve | With Safety Valve

Model Number Designation

EB	G	-03	-C	-T	-51
Series Number	Type of Mounting	Valve Size	Pressure Adj. Range MPa	Safety Valve	Design Number
EB: Proportional Electro-Hydraulic Relief Valve	**G:** Sub-Plate Mounting	**03** **06** **10**	**C:** ✻-15.7★1 **H:** ✻-24.5★1	**None:** With Safety Valve **T:** Without Safety Valve	**51**

★1. Min. adjustment pressure shall be referred to the curves on page H-103.

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EBG-03	M12 × 40 L	4
EBG-06	M16 × 50 L	4
EBG-10	M20 × 60 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see pages H-173, H-177 and H-183).

Model Numbers : AME-D-10-＊-20 SK1022-＊-＊-11
AME-D2-1010-11 SK1015-11 (For DC power supply)
AMN-D-10 (For DC power supply)

Sub-Plates

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
EBG-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
EBG-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7
EBG-10	BGM-10-20	1-1/4	8.4
	BGM-10X-20	1-1/2	10.3

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽ 1.6)
- Sub-plates are those for pilot operated relief valves. For dimensions, see page H-18.

Instructions

A flow rate of 3 L/min or higher should be used to avoid preselected pressure instability.

Safety Valve

At shipment, the pressure of safety valves is set to the upper limits of the adjustable pressure ranges plus the extra as shown below.

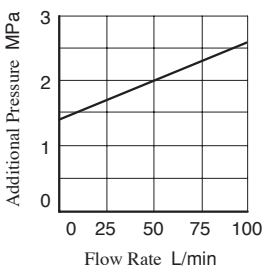
Additional Pressures for Safety Valves at Shipment

Valve Model Numbers	Additional Pressures at Shipment MPa
EBG-03	2.0 (at 50 L/min)
EBG-06	3.5 (at 100 L/min)
EBG-10	4.0 (at 200 L/min)

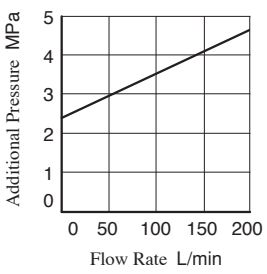
In case where the upper limit of operating pressure is low or the upper limit of flow rate to be used is different from the specified maximum flow, please adjust and determine the setting pressure of the safety valve at the value calculated from the following formula.

Setting pressure = (Operating pressure upper limit) + (Additional pressure indicated below)

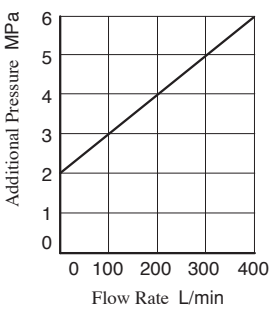
EBG-03



EBG-06



EBG-10

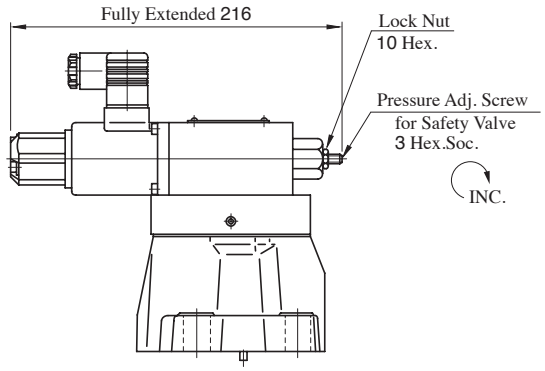


To lower the setting pressure, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

Mounting Surface
EBG-03 : ISO 6264-06-09-1-97
EBG-06 : ISO 6264-08-13-1-97

EBG-03/06-⁎-51

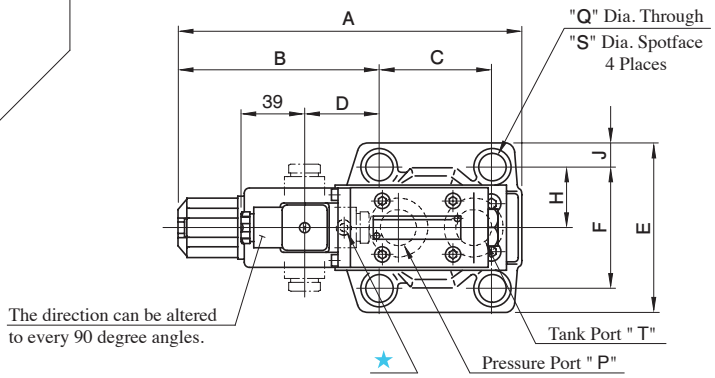
With Safety Valve

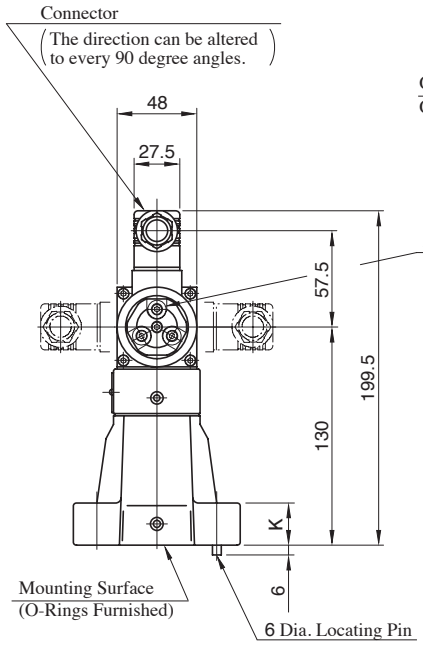


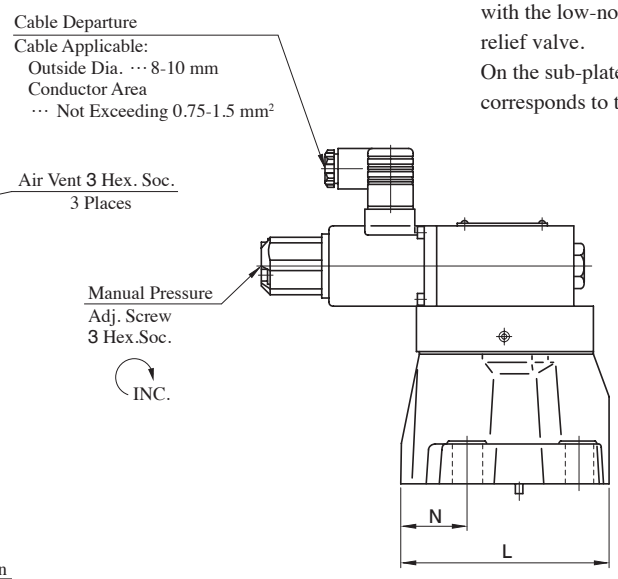
● For other dimensions, refer to the without safety valve.

EBG-03/06-⁎-T-51

Without Safety Valve







★This port is not used. It is provided because of the common use of the body with the low-noise type pilot operated relief valve.
On the sub-plate, plug the port which corresponds to this port.

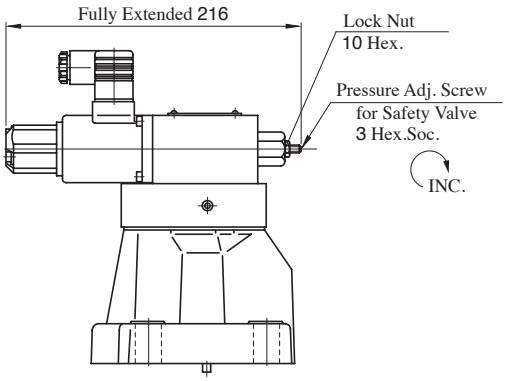
Model Numbers	Dimensions mm												
	A	B	C	D	E	F	H	J	K	L	N	Q	S
EBG-03	197.5	117.6	53.8	40.2	76	53.8	26.9	11.1	21.5	106	26.1	13.5	21
EBG-06	205.5	119.5	66.7	42.1	98	70	35	14	26	122	36	17.5	26

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-18) in common use.

Mounting Surface: ISO 6264-10-17-1-97

EBG-10-＊-51

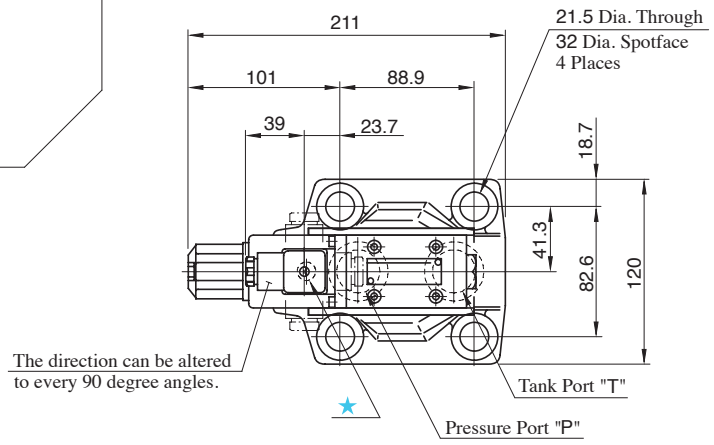
With Safety Valve



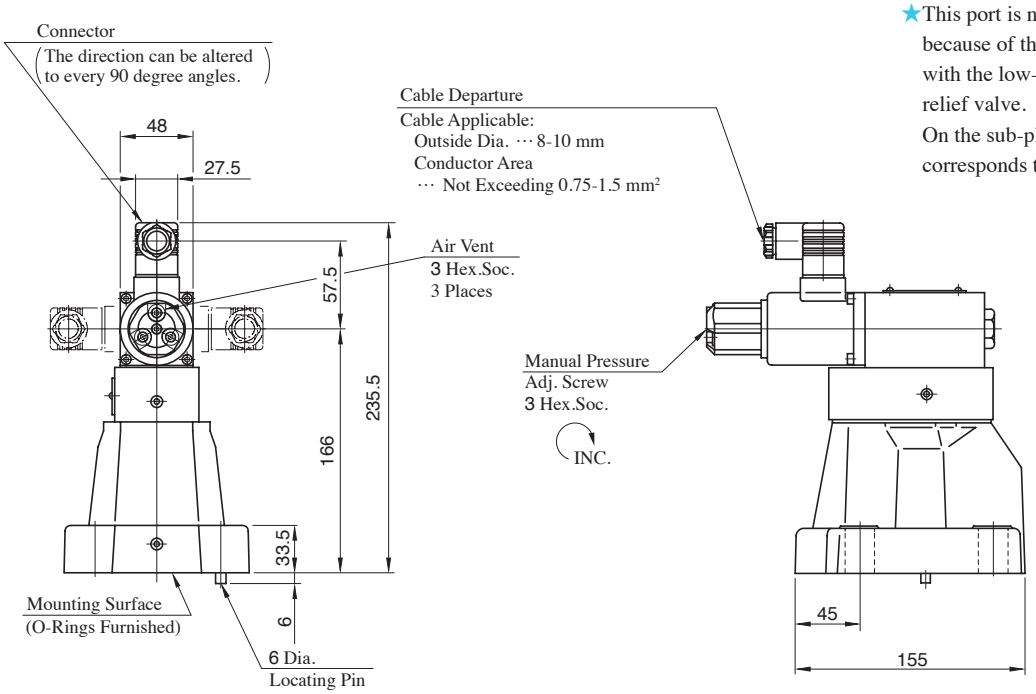
● For other dimensions, refer to the without safety valve.

EBG-10-＊-T-51

Without Safety Valve



★This port is not used. It is provided because of the common use of the body with the low-noise type pilot operated relief valve.
On the sub-plate, plug the port which corresponds to this port.

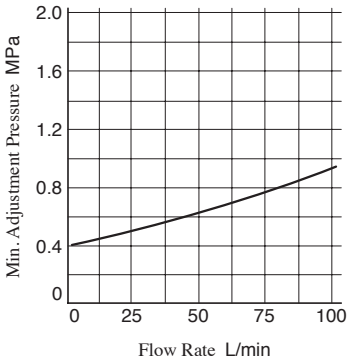


Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-18) in common use.

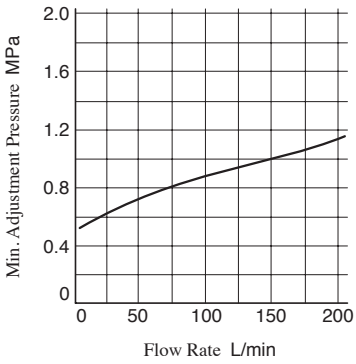
Min. Adjustment Pressure

Viscosity : 30 mm²/s

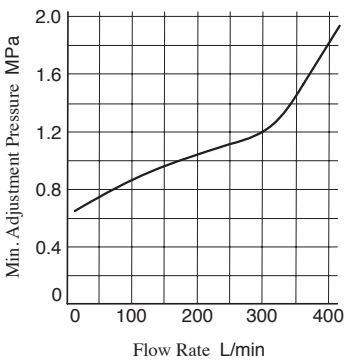
EBG-03



EBG-06



EBG-10

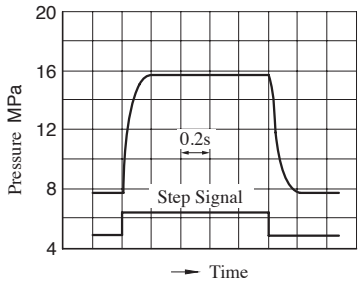


Step Response (Example)

These Characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

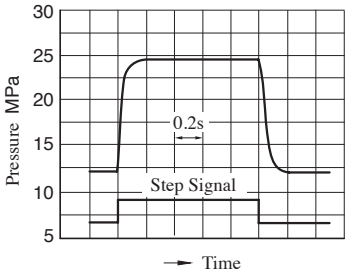
Trapped Oil Volume : 1 L
Viscosity : 30 mm²/s

EBG-03-C



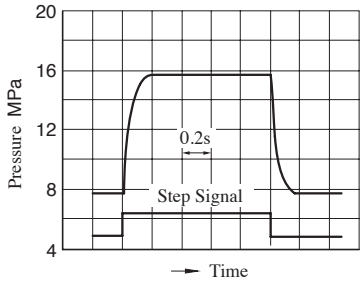
(Flow Rate : 100 L/min)

EBG-03-H



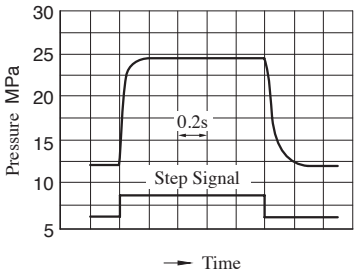
(Flow Rate : 100 L/min)

EBG-06-C



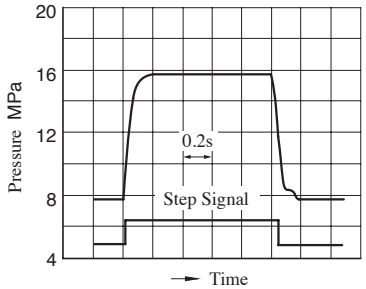
(Flow Rate : 200 L/min)

EBG-06-H



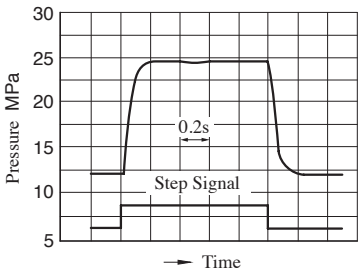
(Flow Rate : 200 L/min)

EBG-10-C



(Flow Rate : 400 L/min)

EBG-10-H

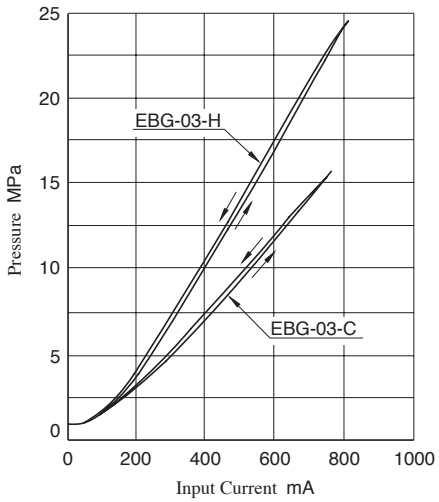


(Flow Rate : 400 L/min)

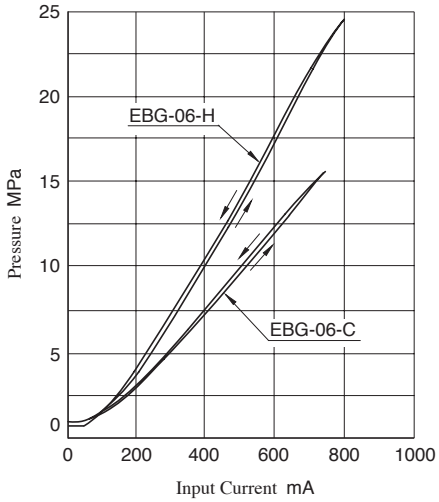
Input Current vs. Pressure

Viscosity : 30 mm²/s

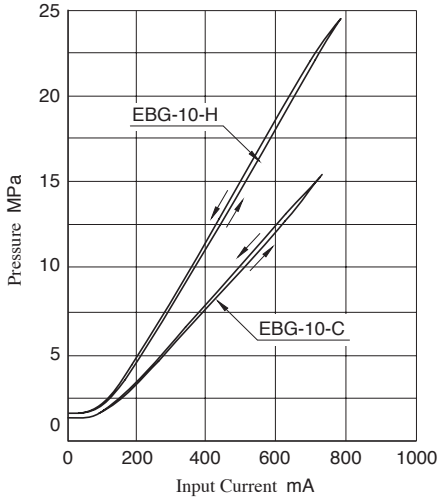
EBG-03



EBG-06



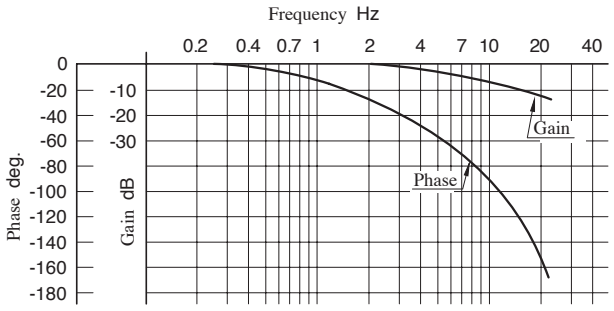
EBG-10



Frequency Response

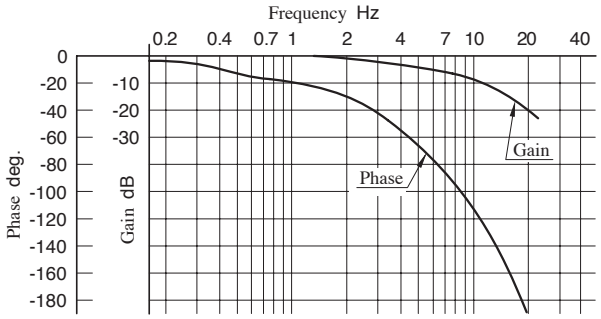
Trapped Oil Volume : 1 L
Viscosity : 30 mm²/s

EBG-03



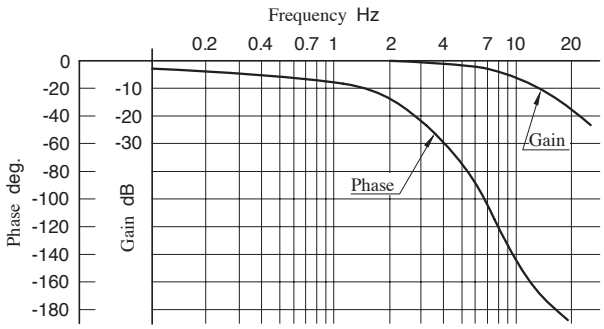
Pressure : 7.8 ± 1.6 MPa
Flow Rate : 100 L/min

EBG-06



Pressure : 7.8 ± 1.6 MPa
Flow Rate : 200 L/min

EBG-10

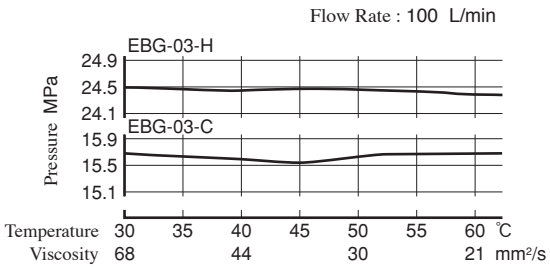


Pressure : 7.8 ± 1.6 MPa
Flow Rate : 400 L/min

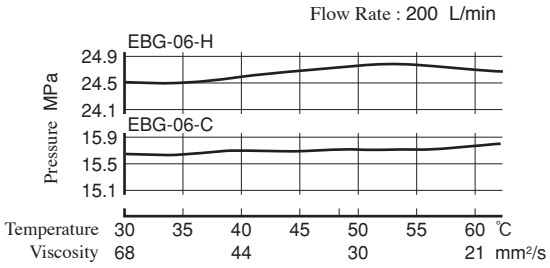
Viscosity vs. Pressure

Oil : ISO VG 46

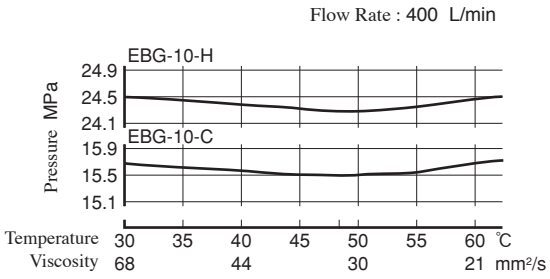
EBG-03



EBG-06



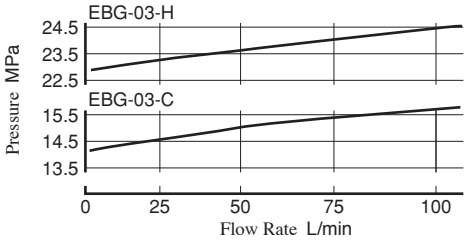
EBG-10



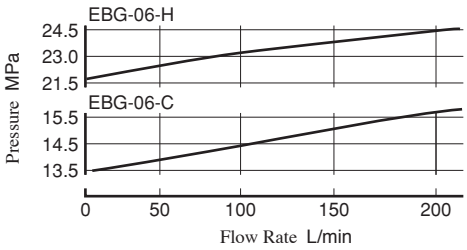
Flow Rate vs. Pressure

Viscosity : 30 mm²/s

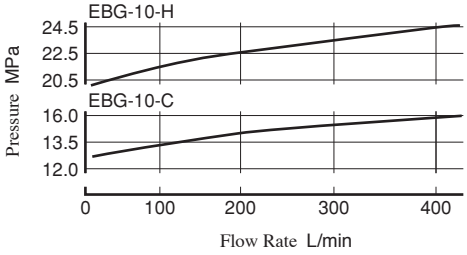
EBG-03



EBG-06

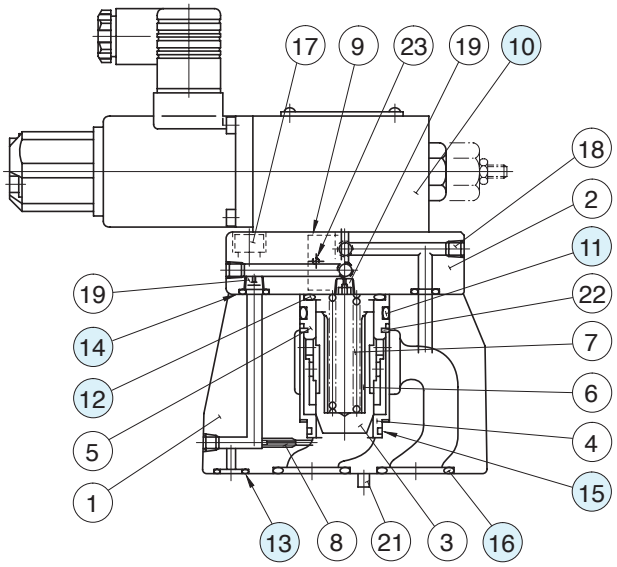


EBG-10



List of Seals and Pilot Valves

EBG-03, 06, 10



Pilot Valves

Valve Model Numbers	⑩ Pilot Valve Model Numbers
EBG-03-C-51	EDG-01V-C-1-PNT09-51
EBG-03-H-51	EDG-01V-H-1-PNT09-51
EBG-03-C-T-51	EDG-01V-C-PNT09-51
EBG-03-H-T-51	EDG-01V-H-PNT09-51
EBG-06-C-51	EDG-01V-C-1-PNT10-51
EBG-06-H-51	EDG-01V-H-1-PNT10-51
EBG-06-C-T-51	EDG-01V-C-PNT10-51
EBG-06-H-T-51	EDG-01V-H-PNT10-51
EBG-10-C-51	EDG-01V-C-1-PNT11-5103
EBG-10-H-51	EDG-01V-H-1-PNT11-5103
EBG-10-C-T-51	EDG-01V-C-PNT11-5103
EBG-10-H-T-51	EDG-01V-H-PNT11-5103

Note: For the details of pilot valves, refer to "Pilot Relief Valves" on page H-97.

List of Seals

Item	Name of Parts	Part Numbers			Qty.
		EBG-03	EBG-06	EBG-10	
11	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1
12	O-Ring	OR NBR-90 P28-N	OR NBR-90 P28-N	OR NBR-90 P28-N	1
13	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	OR NBR-90 P9-N	1
14	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	2
15	O-Ring	AS568-024(NBR-90)	AS568-024(NBR-90)	AS568-128(NBR-90)	1
16	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2

Interchangeability between Current and New Design

EBG-03/06/10 series valves have changed model from 50 to 51 design in line with the model change of pilot valve (EDG-01).

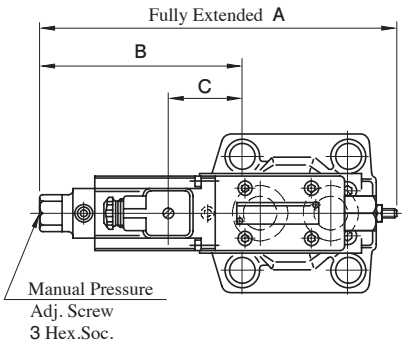
Specifications and Characteristics

Input current-pressure characteristics differ between current and new design. Please inquire separately for details.
Other specifications remain unchanged.

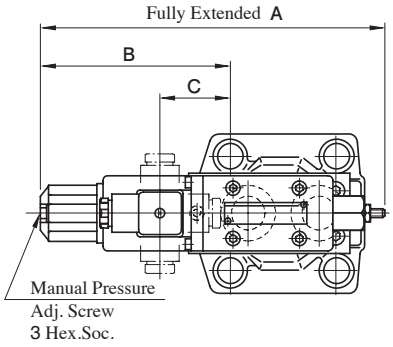
Mounting Interchangeability

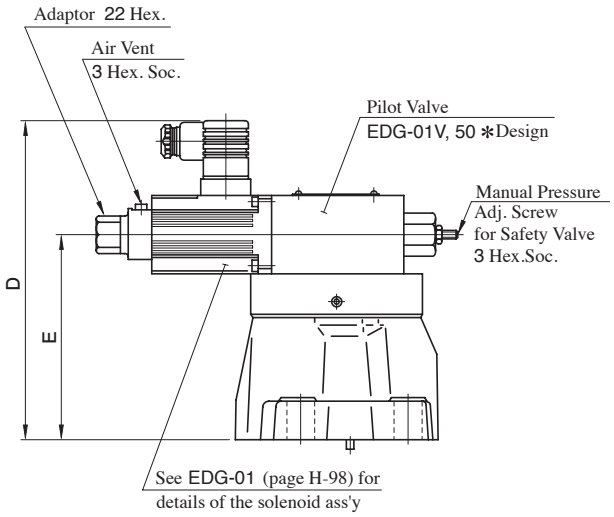
There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to pilot valve improvement and other modifications.

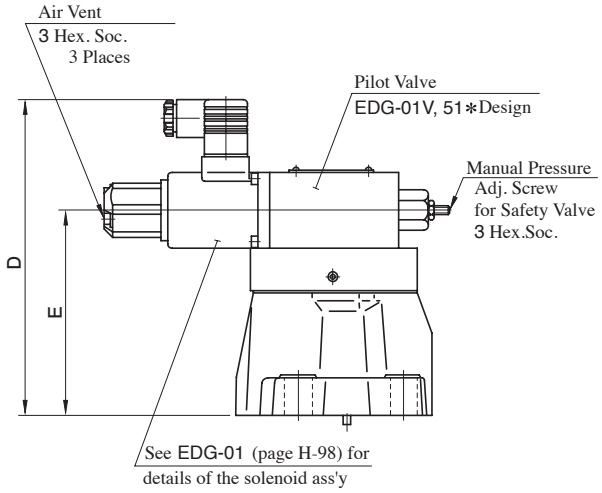
Current: Design 50



New: Design 51



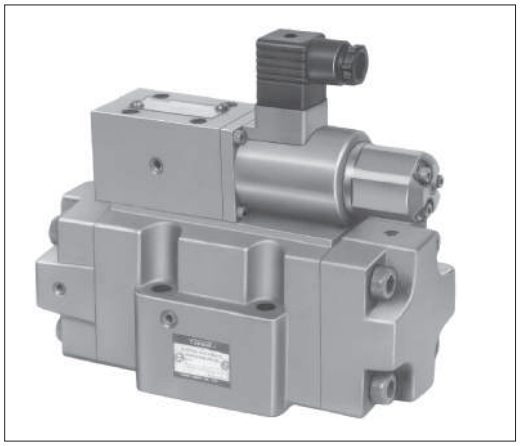


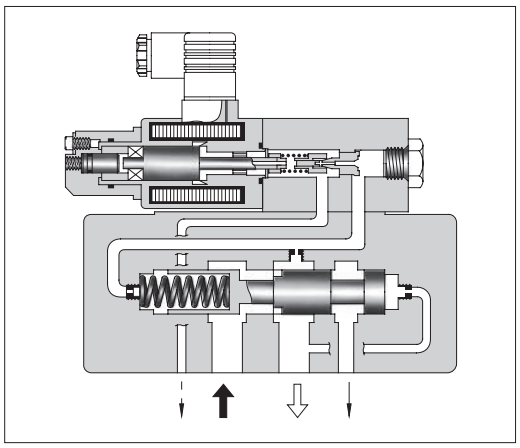


Model Numbers		A	B	C	D	E
Current	EBG-03-∗-∗-50	217	118.6	40.2	199.5	130
New	EBG-03-∗-∗-51	216	117.6	40.2		
Current	EBG-06-∗-∗-50	217	120.5	42.1	199.5	130
New	EBG-06-∗-∗-51	216	119.5	42.1		
Current	EBG-10-∗-∗-50	217	102	23.6	235.5	166
New	EBG-10-∗-∗-51	216	101	23.6		

Proportional Electro-Hydraulic Relieving and Reducing Valves

This valve is derived by combining a small, high-performance 1/8 proportional electro-hydraulic pilot relief valve with a relieving and reducing valve.
With this valve, it is possible to regulate the system pressure in proportion to the input current.
Incorporating a relief mechanism, this valve provides a good response speed and the pressure decreases even if the load is large. Note that this valve is used in conjunction with the applicable power amplifier.



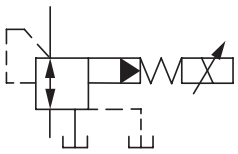


Specifications

Descriptions \ Model Numbers		ERBG-06	ERBG-10
Max. Operating Pres.	MPa	24.5	24.5
Max. Flow	L/min	100	250
Max. Relieving Flow	L/min	35	15
Secondary Pres. Adj. Range	MPa	Refer to Model Number Designation	
Rated Current	mA	B: 800 C: 800 H: 950	B: 800 C: 800 H: 950
Coil Resistance	Ω	10	10
Hysteresis		3% or less	3% or less
Repeatability		1% or less	1% or less
Mass	kg	12	13.5

★ The values shown are those obtained where the differential pressure between the secondary pressure port and tank port is 13.7 MPa.

Graphic Symbol



Model Number Designation

ERB	G	-06	-C	-51
Series Number	Type of Mounting	Valve Size	Secondary Pres. Adj. Range MPa	Design Number
ERB: Proportional Electro-Hydraulic Relieving and Reducing Valve	**G:** Sub-Plate Mounting	**06**	**B:** 0.8 - 6.9 **C:** 1.2 - 13.7 **H:** 1.5 - 20.6	**51**
		10	**B:** 0.9 - 6.9 **C:** 1.2 - 13.7 **H:** 1.5 - 20.6	

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
ERBG-06	M10 × 70 L	4
EBBG-10	M10 × 70 L	6

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see pages H-173, H-177 and H-183).

Model Numbers : AME-D-10-✻-20
AME-D2-1010-11
AMN-D-10 (For DC power supply)
SK1022-✻-✻-11
SK1015-11 (For DC power supply)

Sub-Plates

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
ERBG-06	ERBGM-06-20	3/4	3.0
ERBG-10	ERBGM-10-20	1-1/4	6.5

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)

Instructions

Primary Pressure Required for Preselected Pressure

The primary pressure must be 1 MPa higher than the preselected pressure.

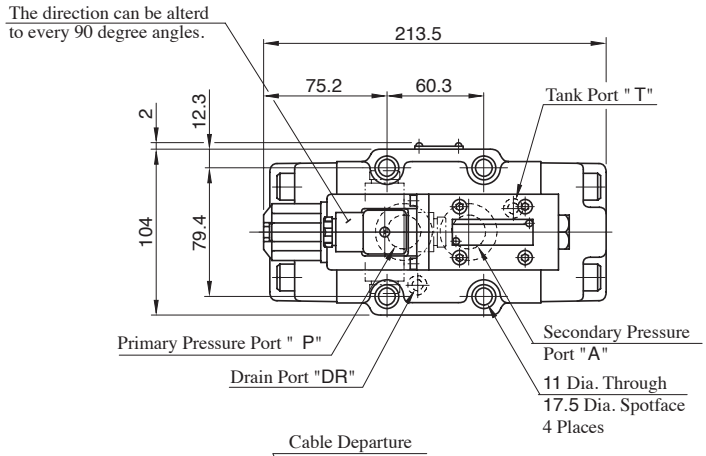
Drain Back Pressure

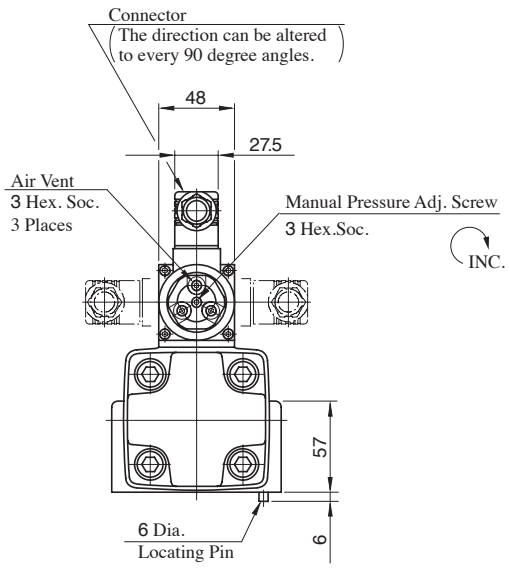
Check that the drain back pressure does not exceed 0.2 MPa.

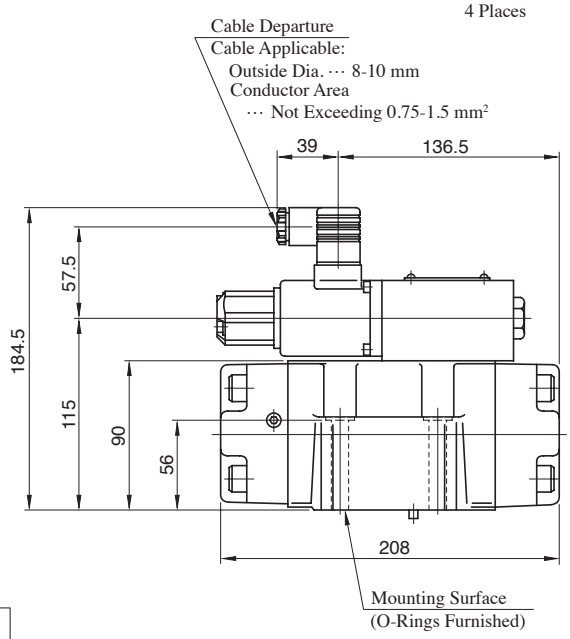
Trapped Oil Volume

The recommended secondary side trapped oil volume is about 20 liters. Note that the trapped oil volume must not be lower than 1.4 liters.

ERBG-06

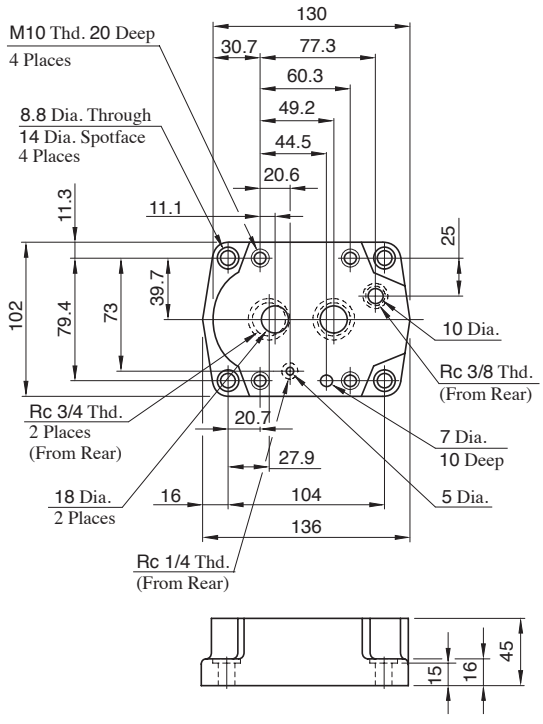




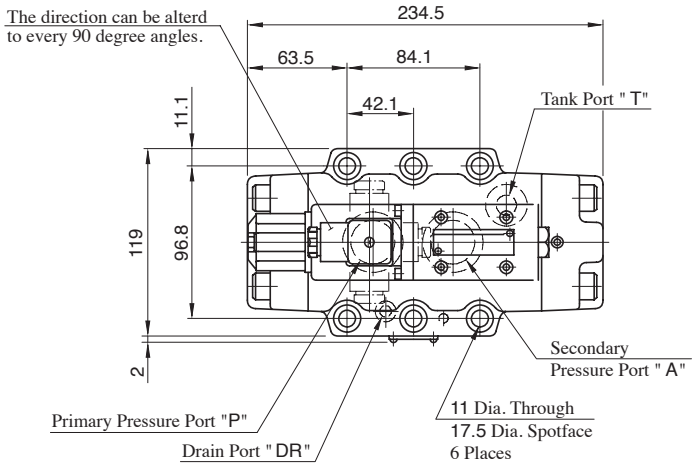


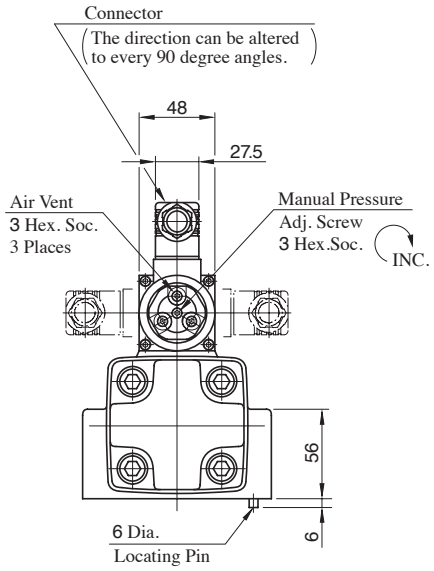
Sub-Plate

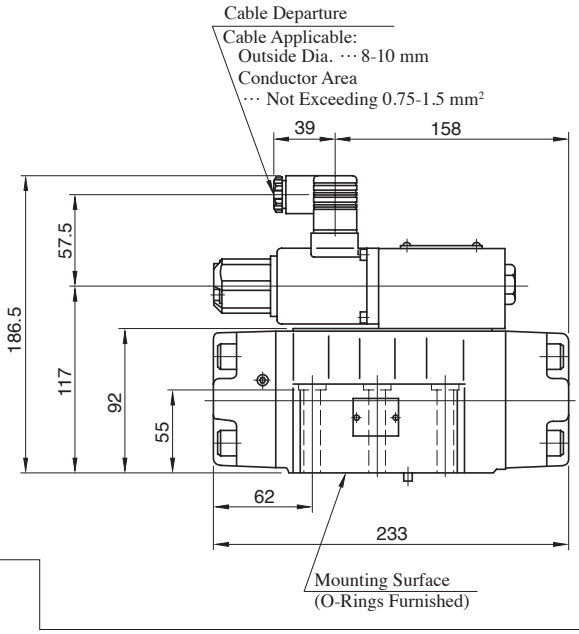
ERBGM-06



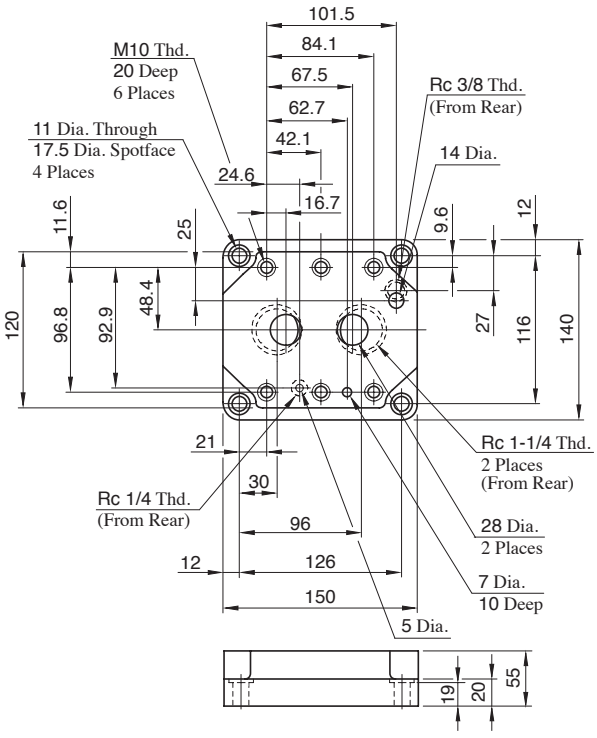
ERBG-10







Sub-Plate
ERBGM-10

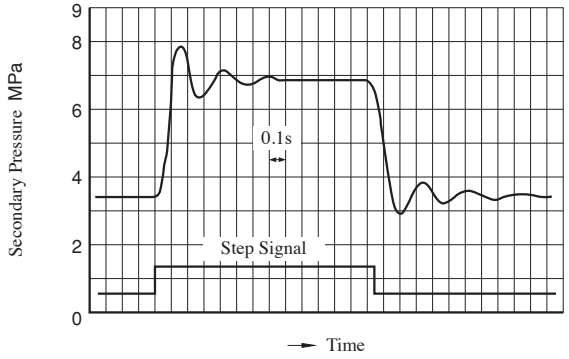


Step Response (Example)

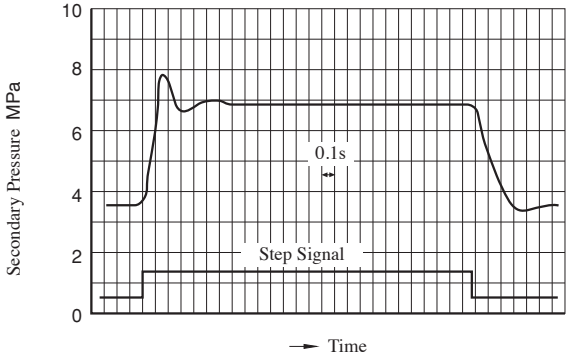
The following step response characteristics are taken when the trapped oil volume is 20 liters.
The step response varies by trapped oil volume.

Primary Pressure : 24.5 MPa
Trapped Oil Volume : 20 L
Viscosity : 30 mm^2/s

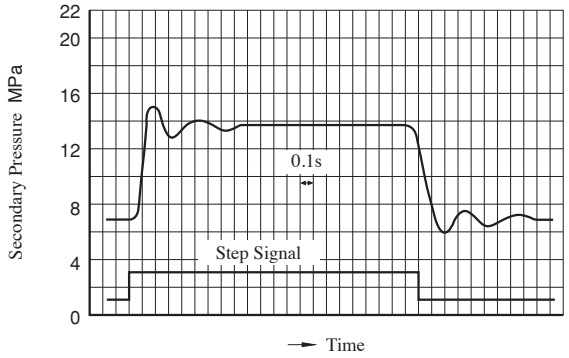
ERBG-06-B



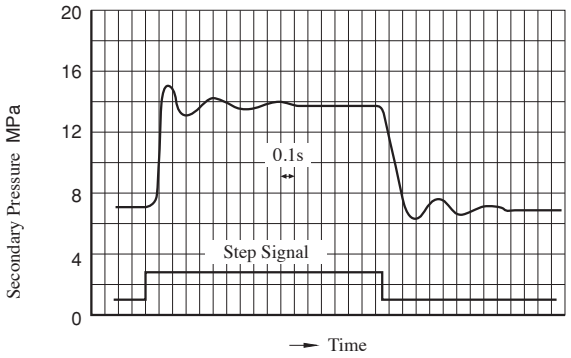
ERBG-10-B



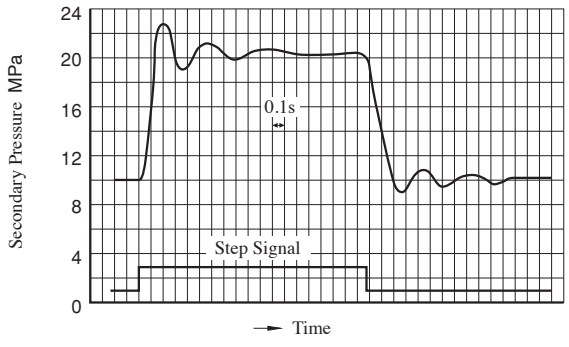
ERBG-06-C



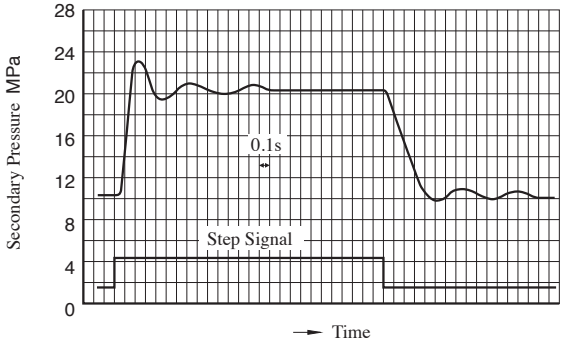
ERBG-10-C



ERBG-06-H



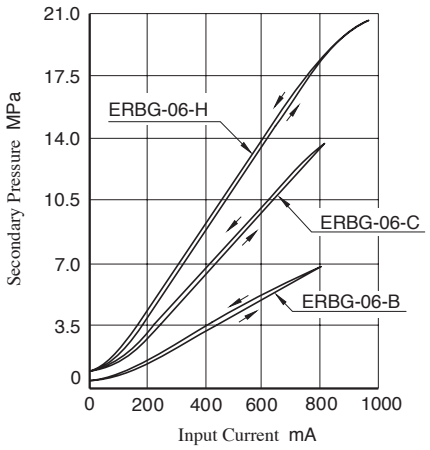
ERBG-10-H



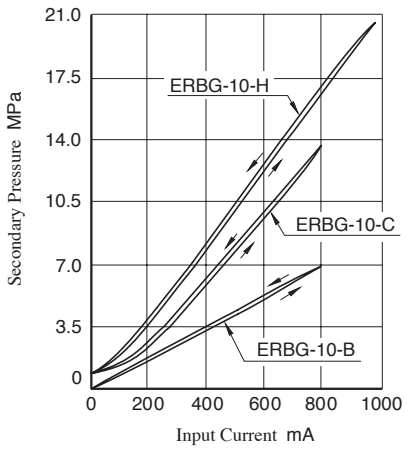
Input Current vs. Secondary Pressure

Primary Pressure : 24.5 MPa
Viscosity : 30 mm²/s

ERBG-06



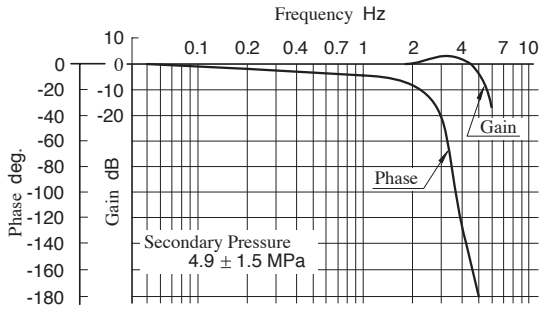
ERBG-10



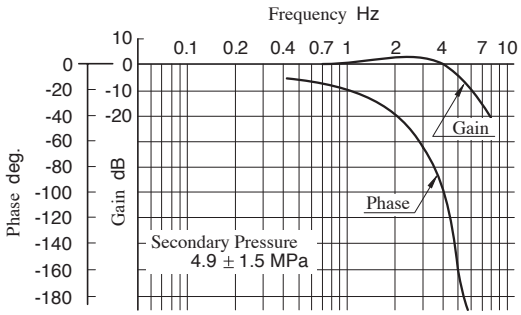
Frequency Response

Primary Pressure : 24.5 MPa
Trapped Oil Volume : 20 L
Viscosity : 30 mm²/s

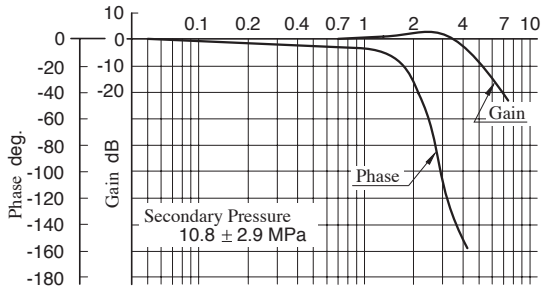
ERBG-06-B



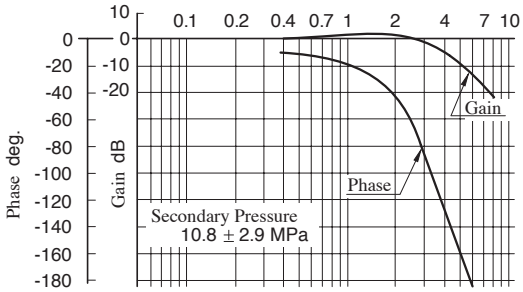
ERBG-10-B



ERBG-06-C



ERBG-10-C



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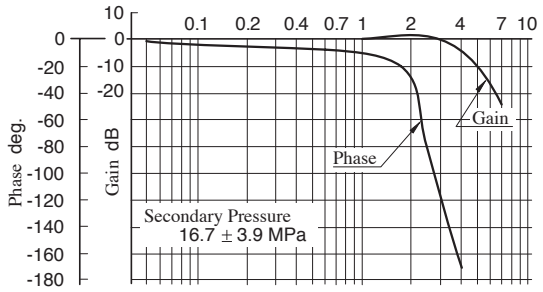
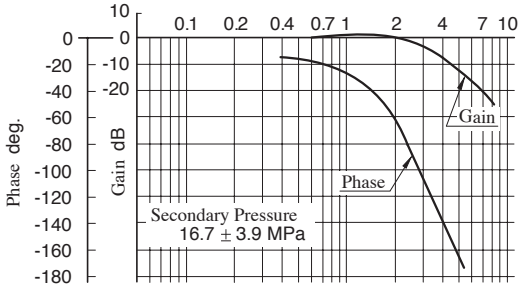


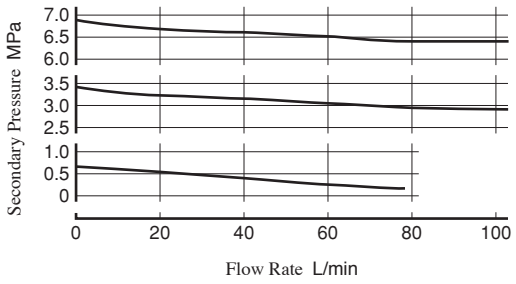
ERBG-10-H



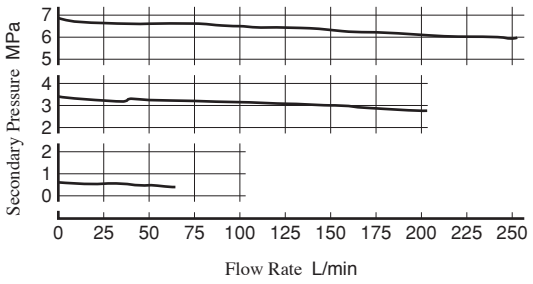
Flow Rate vs. Secondary Pressure

Viscosity : 30 mm²/s

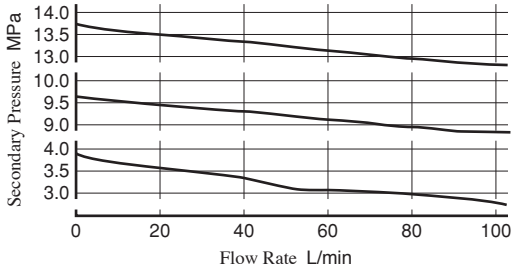
ERBG-06-B



ERBG-10-B



ERBG-06-C



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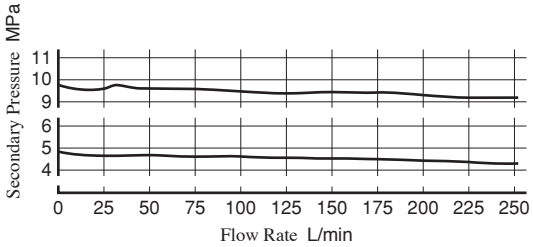

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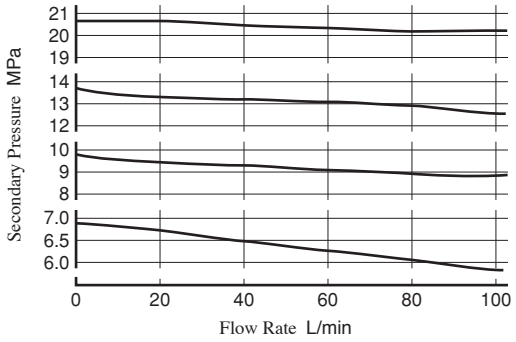

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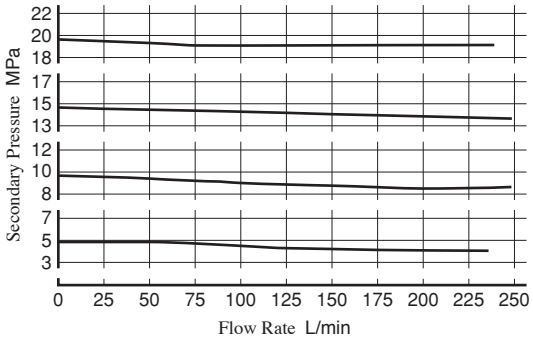
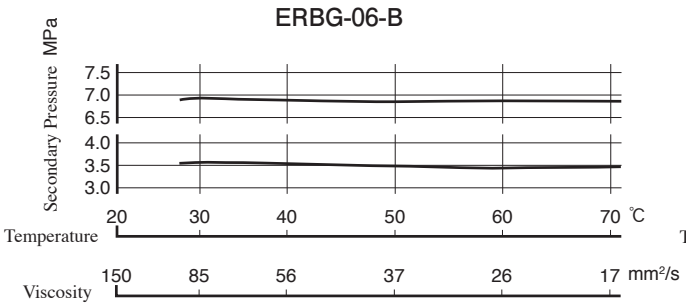


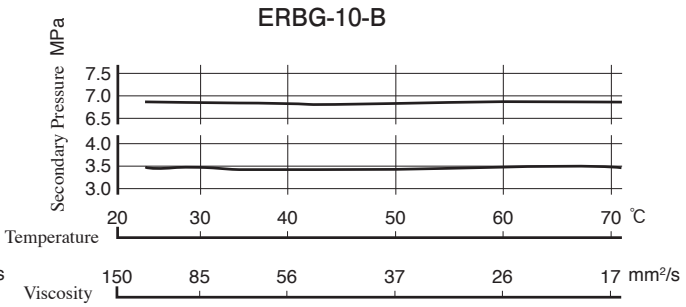
Viscosity vs. Secondary Pressure

Oil: ISO VG32

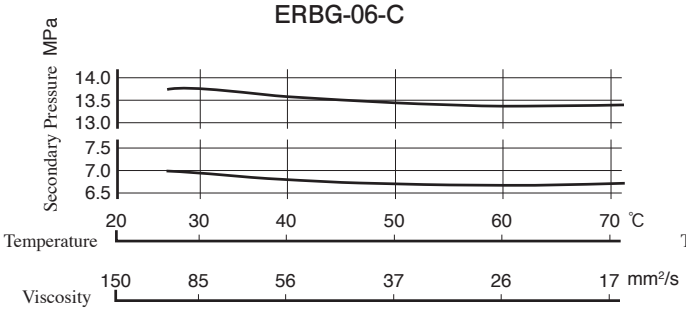
ERBG-06-B



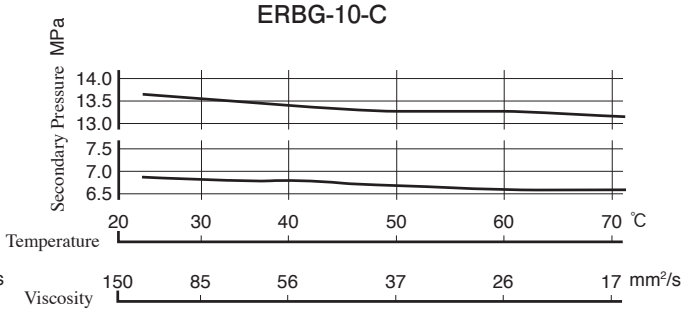
ERBG-10-B



ERBG-06-C



ERBG-10-C



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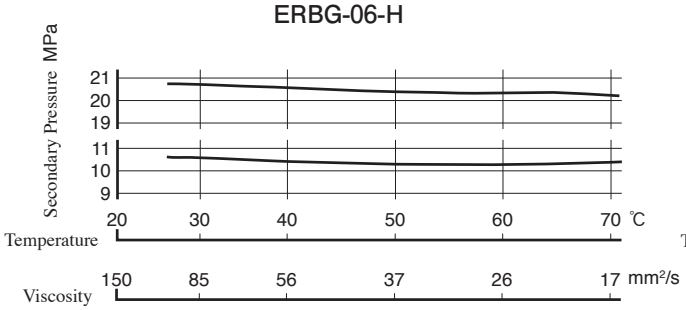
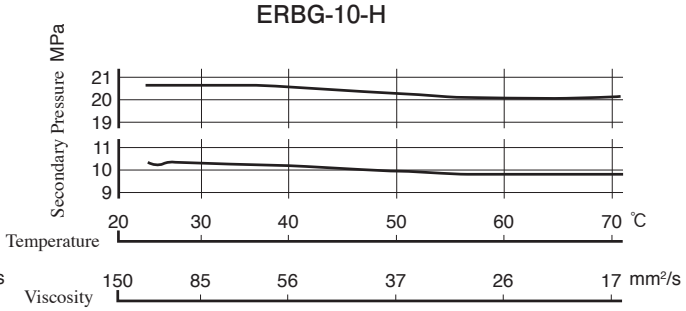
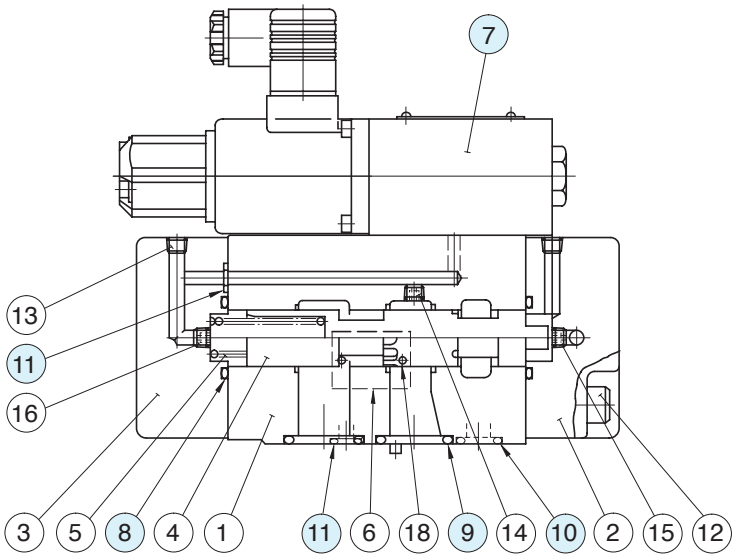


ERBG-10-H



List of Seals and Pilot Valves

ERBG-$^{06}_{10}$



List of Seals

Item	Name of Parts	Part Numbers		Qty.
		ERBG-06	ERBG-10	
8	O-Ring	OR NBR-90 G30-N	OR NBR-90 P36-N	2
9	O-Ring	OR NBR-90 P28-N	OR NBR-90 P28-N	2
10	O-Ring	OR NBR-90 P14-N	OR NBR-90 P18-N	1
11	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	3

Pilot Valves

Valve Model No.	⑦ Pilot Valve Model Numbers
ERBG-06-B-51	EDG-01-B-PNTN-5101
ERBG-06-C-51	EDG-01-C-PNTN-5101
ERBG-06-H-51	EDG-01-H-PNT15-5101
ERBG-10-B-51	EDG-01-B-PNTN-5101
ERBG-10-C-51	EDG-01-C-PNTN-5101
ERBG-10-H-51	EDG-01-H-PNT15-5101

Note: For the details of pilot valves, refer to "Pilot Relief Valves" on page H-97.

Interchangeability between Current and New Design

ERBG-06/10 series valves have changed model from 50 to 51 design in line with the model change of pilot valve (EDG-01).

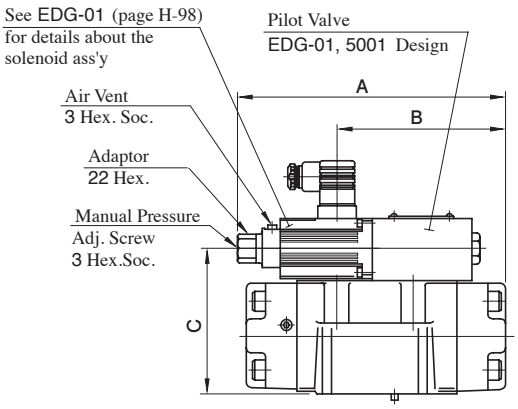
Specifications and Characteristics

Input current-secondary pressure characteristics differ between current and new design. Please inquire separately for details. Other specifications remain unchanged.

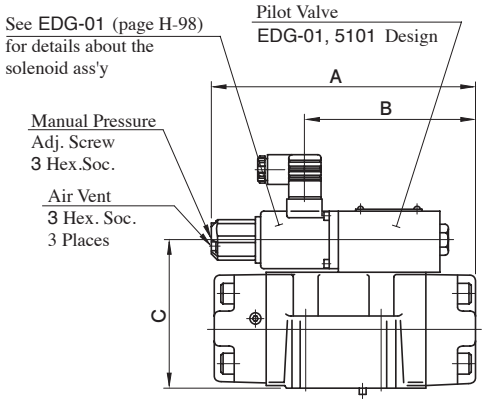
Mounting Interchangeability

There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to pilot valve improvement and other modifications.

Current: Design 50



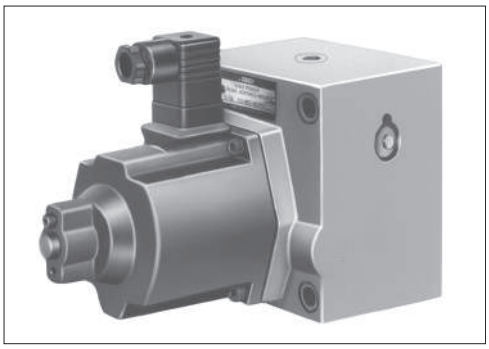
New: Design 51

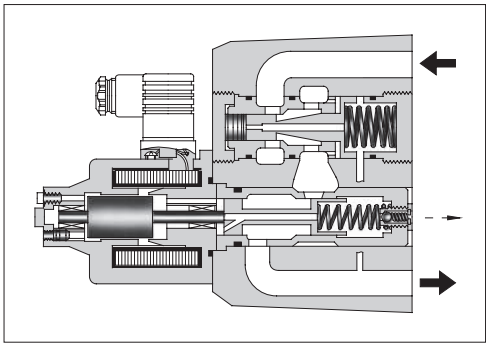


Model Numbers		A	B	C
Current	ERBG-06-＊-50	214.5	136.5	115
New	ERBG-06-＊-51	213.5	136.5	115
Current	ERBG-10-＊-50	235.5	158	117
New	ERBG-10-＊-51	234.5	158	117

40Ω Series
Proportional Electro-Hydraulic Flow Control (and Check) Valves

Since the preselected flow rate continuously varies in proportion to the current input to the valve, the system flow rate can be remote-controlled as desired by regulating the amplifier current output. Further, since pressure and temperature compensation functions are provided, the preselected flow rate is not affected by pressure (load) or temperature (fluid viscosity).
This valve is ideal for use where actuator startup, stop, and speed changes are to be implemented without producing a shock. Note that this valve is used in conjunction with the applicable power amplifier.



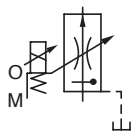


Specifications

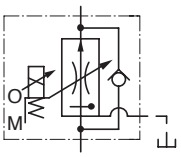
Descriptions \ Model No.	EFG / EFCG -02- 10 / 30	EFG / EFCG -03- 60 / 125	EFG / EFCG -06-250	EFG / EFCG -10-500
Max. Operating Pres. MPa	20.6	20.6	20.6	20.6
Metered Flow Adjustment Range L/min	**10**: 0.3-10 **30**: 0.3-30	**60**: 2-60 **125**: 2-125	3-250	5-500
Min. Differential Pres.★ MPa	0.6	1.0	1.3	2.0
Free Flow (EFCG Models Only.) L/min	40	130	280	550
Rated Current mA	600	600	600	600
Coil Resistance Ω	45	45	45	45
Hysteresis	5% or less	7% or less	7% or less	7% or less
Repeatability	1% or less	1% or less	1% or less	1% or less
Mass kg	8.2	12.5	25	51

★ Min. pressure difference required between inlet and outlet ports to maintain function as pressure compensator.

Graphic Symbols



EFG-∗



EFCG-∗

Model Number Designation

EFC	G	-02	-10	-N	-31
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pres. Compensator Stroke Adjustment	Design Number
EF: Proportional Electro-Hydraulic Flow Control Valve **EFC:** Proportional Electro-Hydraulic Flow Control and Check Valve	**G:** Sub-Plate Mounting	**02**	**10** **30**	**N:** Applicable only for Press. Compensator Stroke Adjustment (Option - Omit if not required)	**31**
		03	**60** **125**		**26, 2603**★
		06	**250**		**22**
		10	**500**		**11**

Note: If you are going to use the model with pressure compensator stroke adjustment screw, consult your Yuken representative in advance.
★ Only for the "EFG-03-∗-N," the design number is "2603."

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EFG EFCG-02	M8 × 75 L	4
EFG EFCG-03	M10 × 100 L	4
EFG EFCG-06	M16 × 130 L	4
EFG EFCG-10	M20 × 160 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-178).

Model Numbers : AME-D-＊-＊-50
AME-DF-＊-＊-52
AME-T-S-＊-22

Sub-Plates

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EFG EFCG-02	EFGM-02X-20	3/8	2.3
	EFGM-02Y-20	1/2	3.1
EFG EFCG-03	EFGM-03Y-3001	3/4	5.7
	EFGM-03Z-3001	1	5.6
EFG EFCG-06	EFGM-06X-3001	1	12.5
	EFGM-06Y-3001	1-1/4	16
EFG EFCG-10	EFGM-10Y-10★	1-1/2, 2 Flange Mounting	37

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽1.6)
- When ordering the EFGM-10Y, please order “F3” Series Pipe Flange Kits separately. Please inquire separately for details on the “F3” Series Pipe Flange Kits.

Models with Pressure Compensator Stroke Adjustment Screw

A models with pressure compensator stroke adjustment screw is optionally available to minimize the actuator protrusion (jumping) at startup. For the details, please consult us or your Yuken distributors.

Instructions

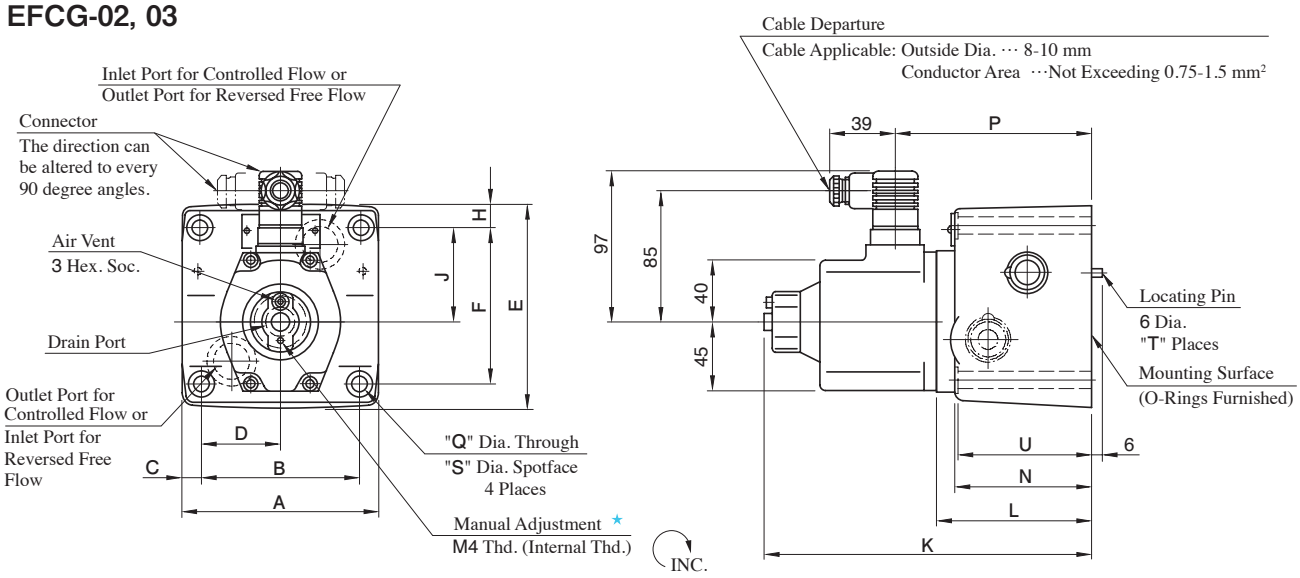
Drain Back Pressure

Check that the drain back pressure does not exceed 0.2 MPa.

Models with Check Valve

A models with check valve makes it possible to obtain a free flow in the direction opposite that of the controlled flow without respect to the input current.

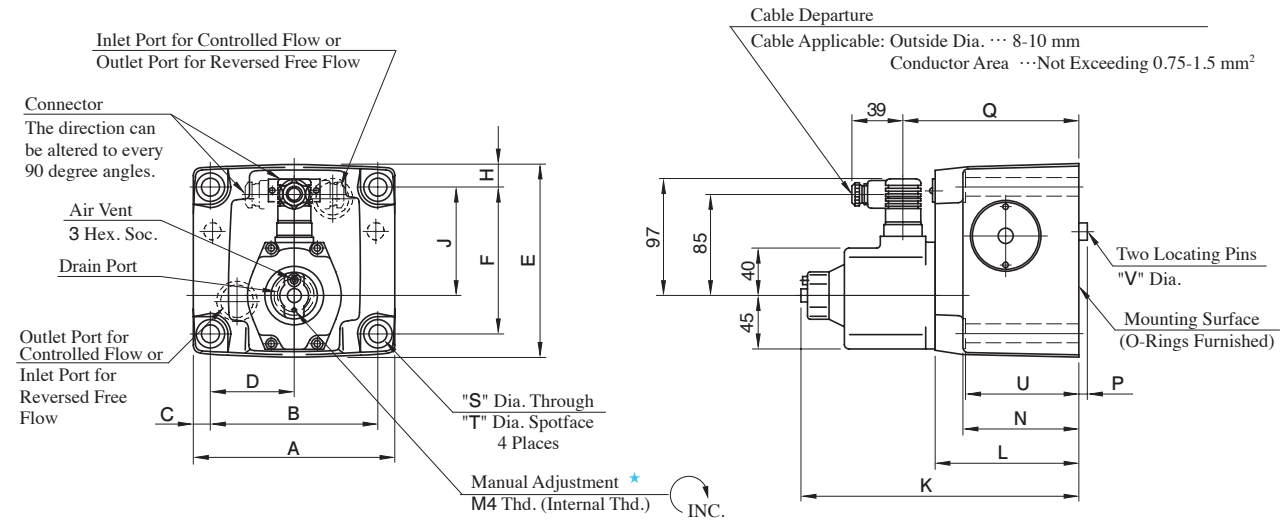
EFG-02, 03
EFCG-02, 03



★Manual adjustment can be done by screwing for example an M4 × 20 L screw in the M4 thread or pushing in a rod etc. there.

Model Numbers	Dimensions mm															U
	A	B	C	D	E	F	H	J	K	L	N	P	Q	S	T	
EF∗G-02	96	76.2	9.9	38.1	106	82.6	11.7	46.3	195	81	66	108	8.8	14	1	65
EF∗G-03	125	101.6	11.7	50.8	130	101.6	14.2	61.8	212	98	85	125	11	17.5	2	84

EFG-06, 10
EFCG-06, 10

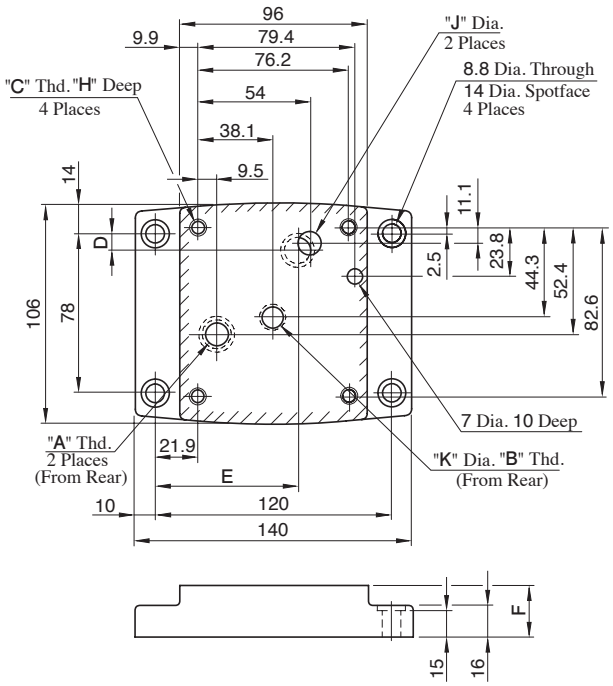


★Manual adjustment can be done by screwing for example an M4 × 20 L screw in the M4 thread or pushing in a rod etc. there.

Model Numbers	Dimensions mm																
	A	B	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V
EF∗G-06	180	146.1	17	73.1	174	133.4	20.3	99	244	130	105	7	157	17.5	26	103.5	16
EF∗G-10	244	196.9	23.5	98.5	228	177.8	25	144.5	274	160	137	10	187	21.5	32	135	18

Sub-Plate

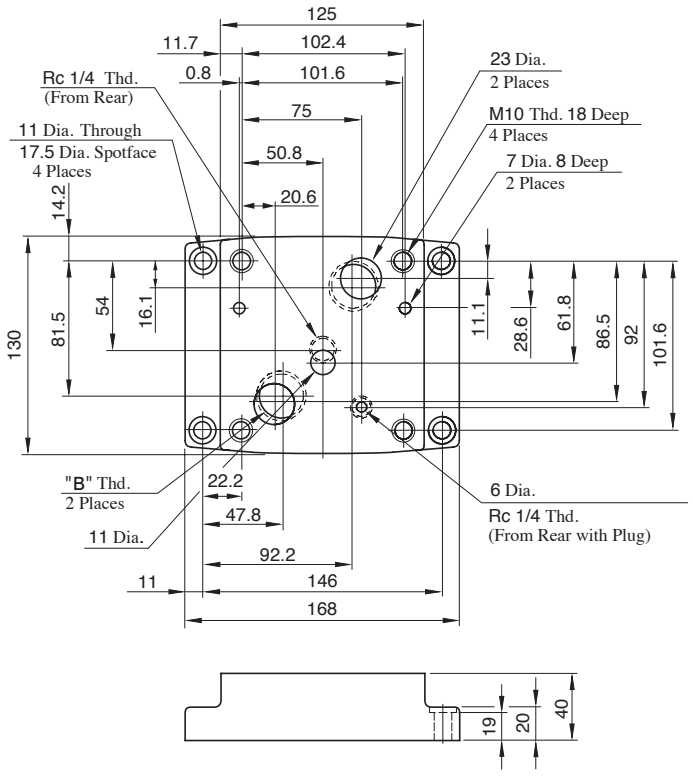
EFGM-02X, 02Y



Sub-Plate Model Numbers	Thread Size		
	"A" Thd.	"B" Thd.	"C" Thd.
EFGM-02X-20	Rc 3/8	Rc 1/4	M8
EFGM-02Y-20	Rc 1/2		

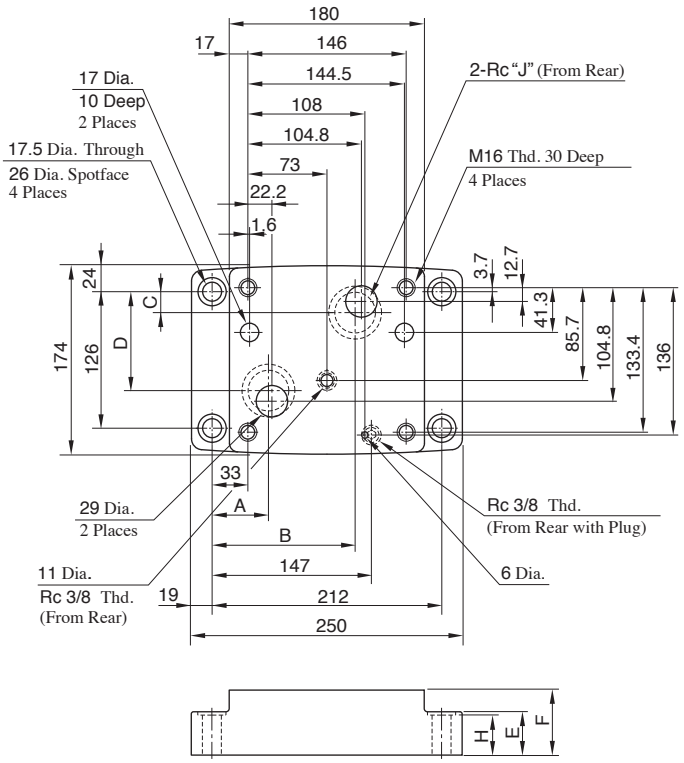
Sub-Plate Model Numbers	Dimensions mm					
	D	E	F	H	J	K
EFGM-02X-20	8.6	75.9	25	14	14	11
EFGM-02Y-20	11.5	72.9	35			

EFGM-03Y, 03Z (3001D)



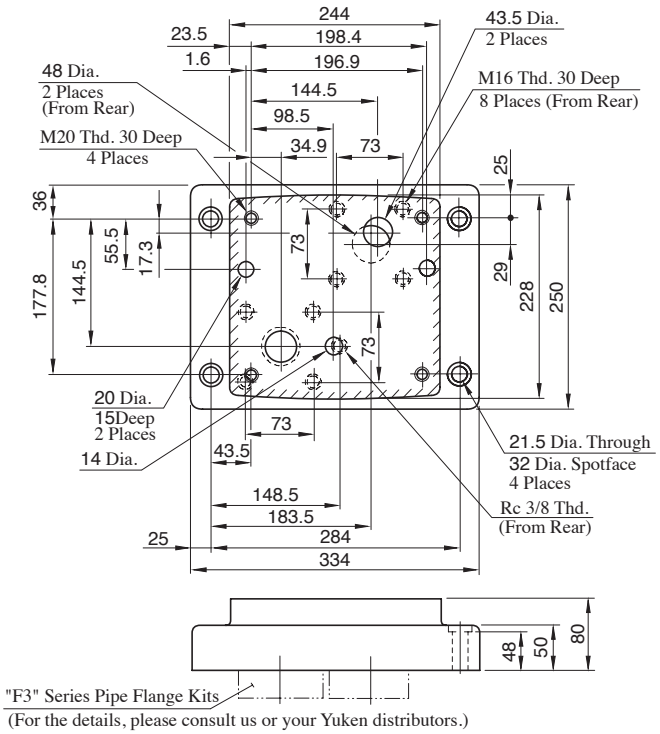
Sub-Plate Model Numbers	Thread Size
	"B" Thd.
EFGM-03Y-3001	Rc 3/4
EFGM-03Z-3001	Rc 1

Sub-Plate
EFGM-06X, 06Y (3001D)



Sub-Plate Model Numbers	A	B	C	D	E	F	H	J
EFGM-06X-3001	55.2	137.8	14.3	101.1	35	45	34	1
EFGM-06Y-3001	52	132	19.3	91.3	40	60	39	1-1/4

EFGM-10Y

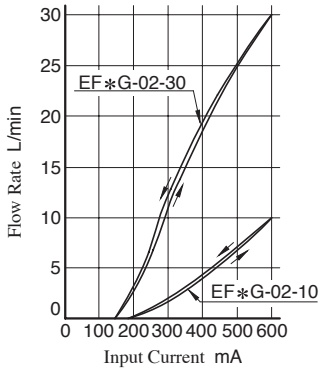


"F3" Series Pipe Flange Kits
(For the details, please consult us or your Yuken distributors.)

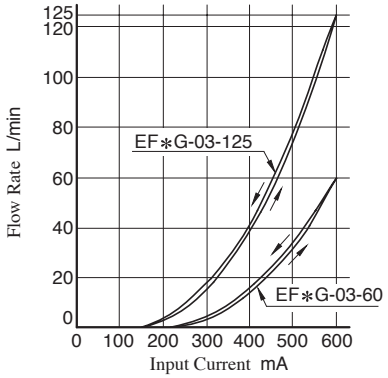
Input Current vs. Flow

Viscosity: 30 mm²/s

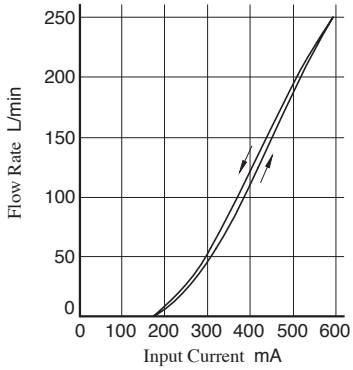
EFG EFCG-02



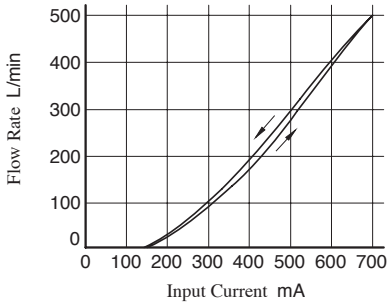
EFG EFCG-03



EFG EFCG-06



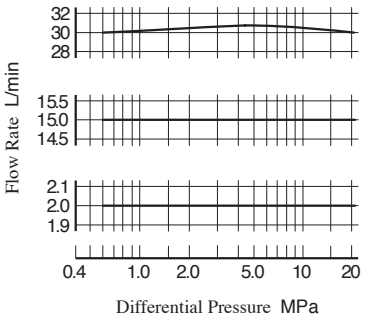
EFG EFCG-10



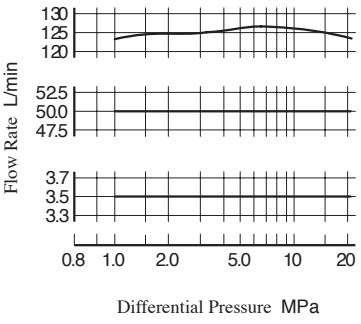
Differential Pressure vs. Metered Flow

Viscosity: 30 mm²/s

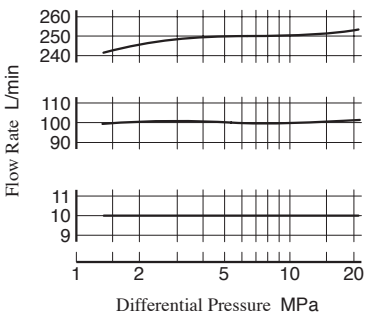
EFG EFCG-02



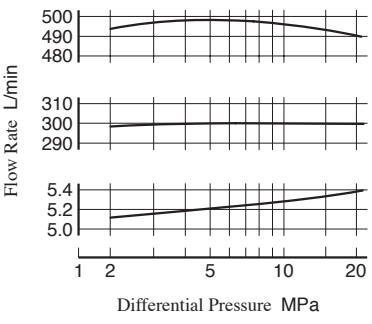
EFG EFCG-03



EFG EFCG-06



EFG EFCG-10

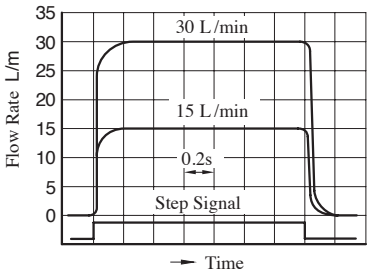


Step Response

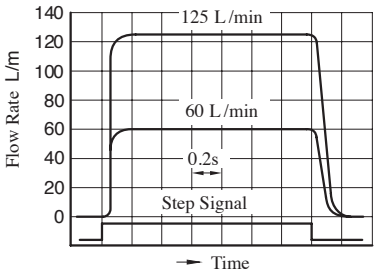
Viscosity: 30 mm²/s

These characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

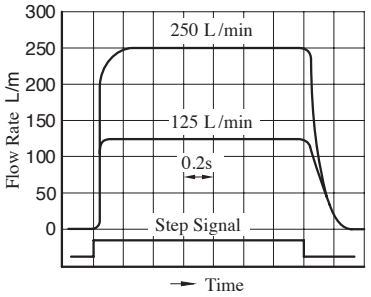
EFG EFCG-02



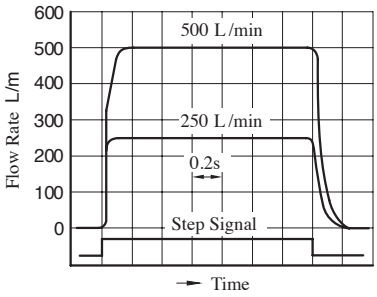
EFG EFCG-03



EFG EFCG-06



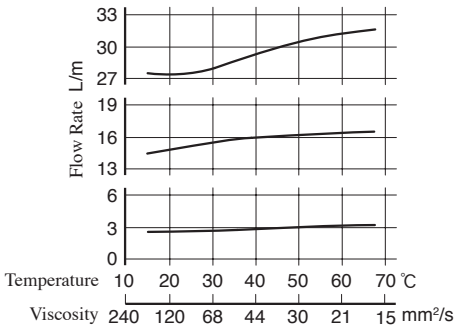
EFG EFCG-10



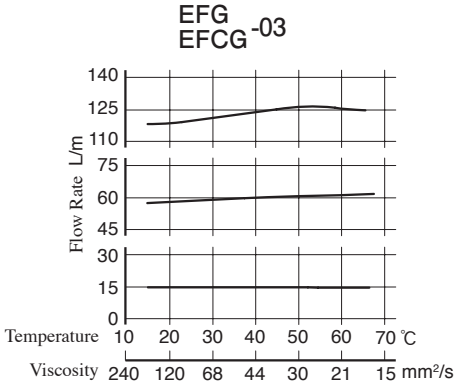
Viscosity vs. Flow

Oil: ISO VG 46

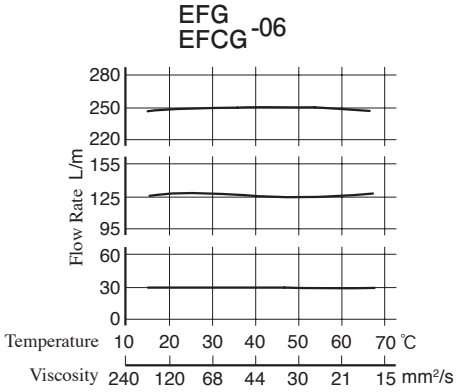
EFG EFCG-02



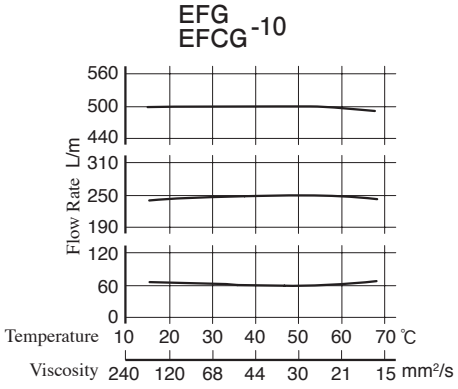
EFG EFCG-03



EFG EFCG-06



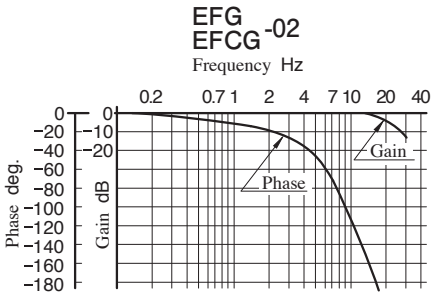
EFG EFCG-10



Frequency Response

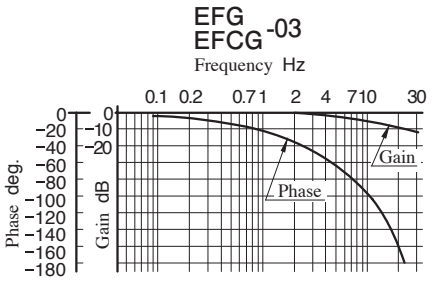
Viscosity: 30 mm²/s

EFG EFCG-02



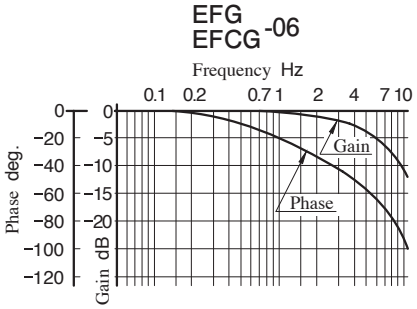
Input Current : 400 ± 100 mA
Pressure : 6.9 MPa

EFG EFCG-03



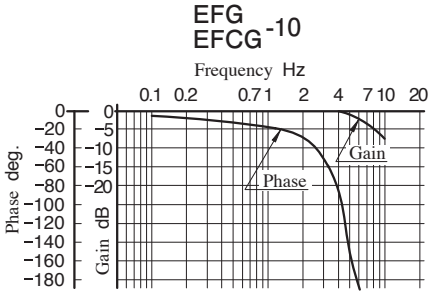
Input Current : 460 ± 70 mA
Pressure : 6.9 MPa

EFG EFCG-06



Input Current : 460 ± 70 mA
Pressure : 6.9 MPa

EFG EFCG-10

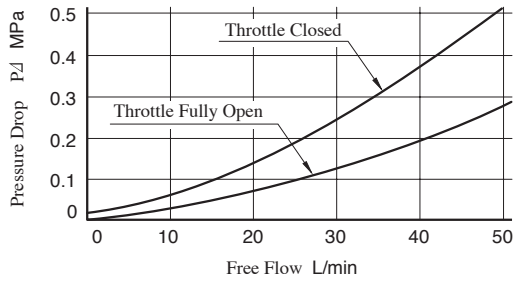


Input Current : 475 ± 125 mA
Pressure : 6.9 MPa

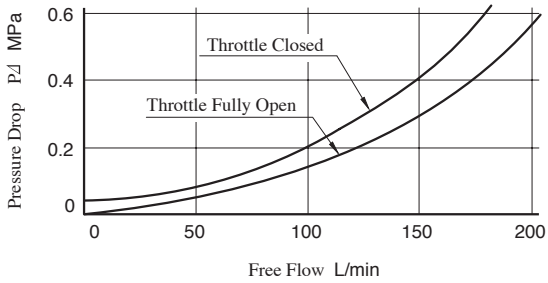
Pressure Drop for Reversed Free Flow (Only for "EFCG" Models)

Oil Viscosity: 35 mm²/s
Specific Gravity: 0.850

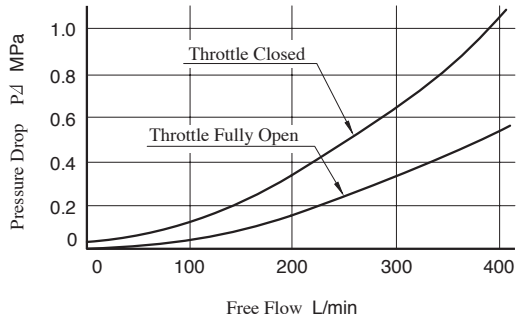
EFCG-02



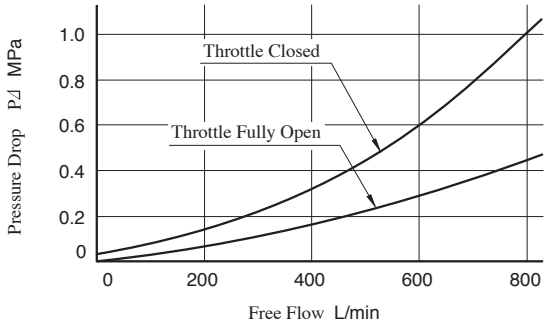
EFCG-03



EFCG-06



EFCG-10



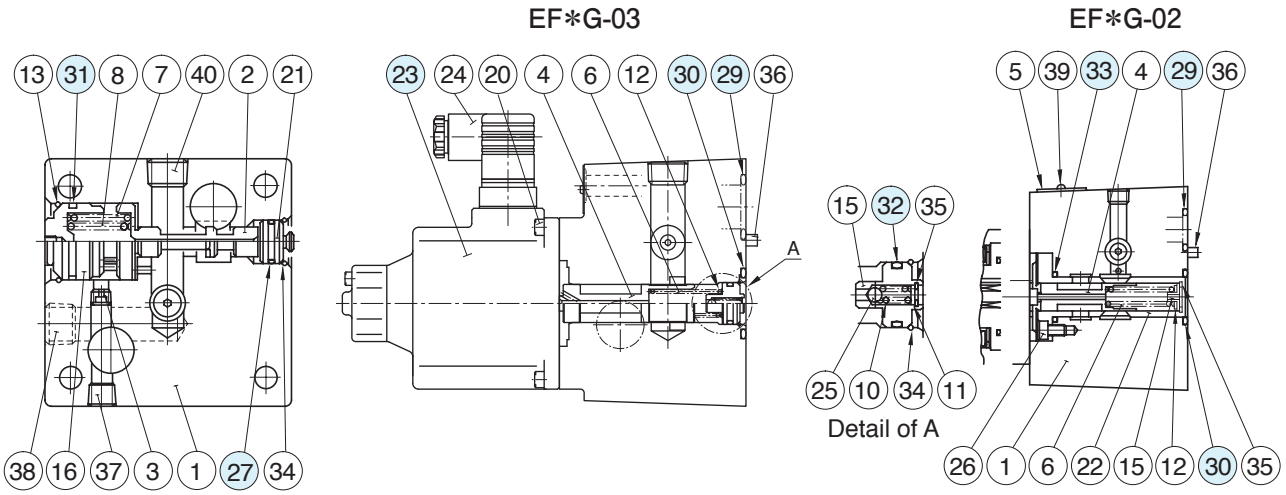
- For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	20	40	60	80	100
Factor	0.87	1.03	1.14	1.23	1.30

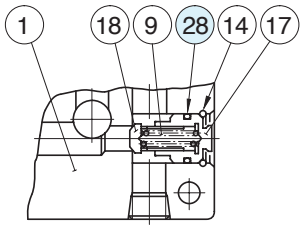
- For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.
  ⊿P'=⊿P (G'/0.850)

List of Seals and Solenoid Ass'y

EFG EFCG-02, 03



With Check Valve (EFCG-02, 03)



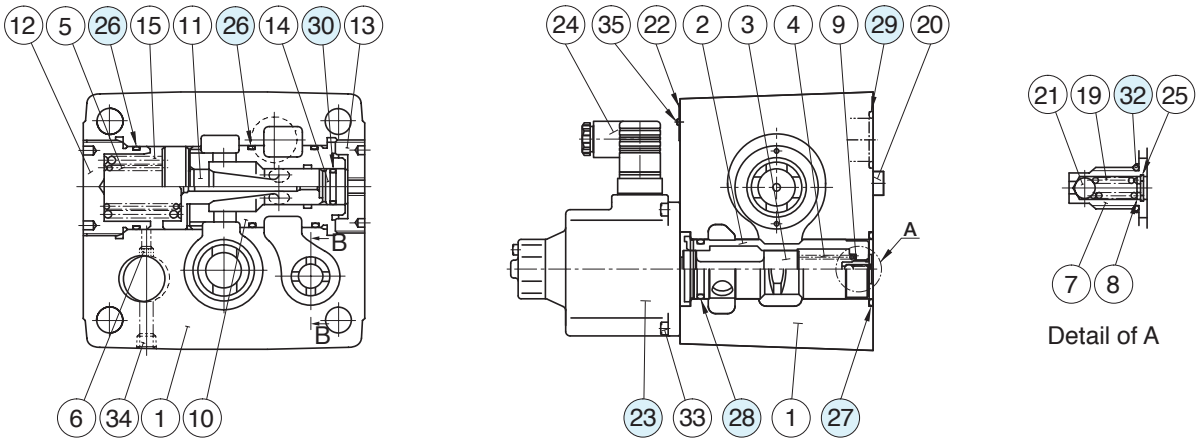
List of Seals and Solenoid Ass'y

Item	Name of Parts	Part Numbers		Qty.
		EF∗G-02	EF∗G-03	
23	Solenoid Ass'y	E321-45-20	E321-45-20	1
27	O-Ring	OR NBR-90 P18-N	OR NBR-90 P18-N	1
28	O-Ring	OR NBR-90 P10A-N	OR NBR-90 P21-N	1
29	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	2
30	O-Ring	OR NBR-90 P22-N	OR NBR-90 P31-N	1
31	O-Ring	OR NBR-90 G25-N	OR NBR-90 G35-N	1
32	O-Ring	—	OR NBR-90 P18-N	1
33	O-Ring	OR NBR-90 P22-N	—	1

Note 1: The connector assembly GDM-211-B-11 (Item 24) is not included in the solenoid assembly.

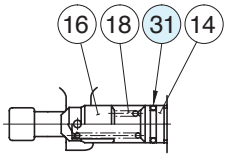
List of Seals and Solenoid Ass'y

EFG
EFCG-06, 10



Detail of A

With Check Valve (EFCG-06, 10)



Section B-B

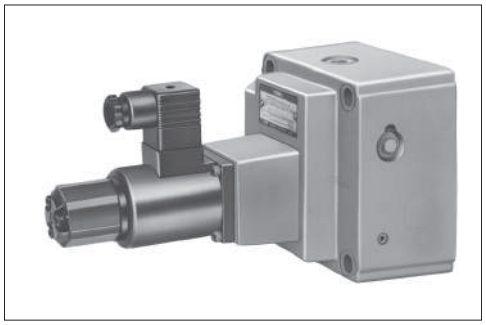
List of Seals and Solenoid Ass'y

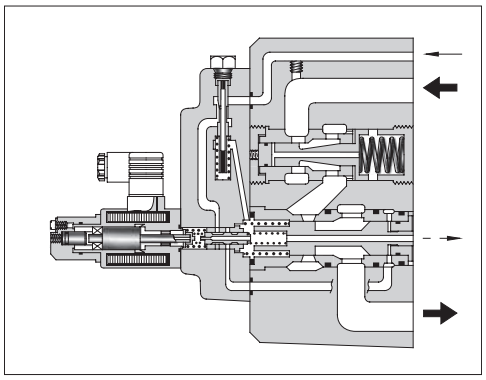
Item	Name of Parts	Part Numbers		Qty.
		EF＊G-06	EF＊G-10	
23	Solenoid Ass'y	E321-45-20	E321-45-20	1
26	O-Ring	OR NBR-90 P50-N	OR NBR-90 G75-N	3
27	O-Ring	OR NBR-90 P44-N	OR NBR-90 G60-N	1
28	O-Ring	OR NBR-90 P34-N	OR NBR-90 P50-N	1
29	O-Ring	OR NBR-90 P32-N	OR NBR-90 P48-N	2
30	O-Ring	OR NBR-90 P21-N	OR NBR-90 P34-N	1
31	O-Ring	OR NBR-90 P21-N	OR NBR-90 P26-N	1
32	O-Ring	OR NBR-70-1 P10-N	OR NBR-70-1 P10-N	1

Note 1: The connector assembly GDM-211-B-11 (Item 24) is not included in the solenoid assembly.

10Ω Series
Proportional Electro-Hydraulic Flow Control (and Check) Valves

Since the preselected flow rate continuously varies in proportion to the current input to the valve, the system flow rate can be remote-controlled as desired by regulating the current output from the amplifier. Further, since the pressure and temperature compensation functions are provided, the preselected flow rate is not be affected by pressure (load) or temperature (fluid viscosity). This valve is ideal for use where actuator startup, stop, and speed changes are to be implemented without producing a shock. Note that this valve is used in conjunction with the applicable power amplifier.





Specifications

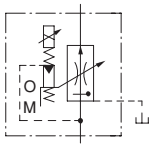
Descriptions \ Model Numbers		EFG EFCG-03-60 125	EFG EFCG-06-250
Max. Operating Pressure	MPa	20.6	24.5
Metered Flow Adj. Range	L/min	60: 1-60 125: 1-125	2.5-250
Min. Differential Pressure★1	MPa	1.0	1.0
Free Flow (EFCG Models Only)	L/min	130	280
Min. Pilot Pressure★2	MPa	1.0	1.5
Min. Pilot L/min	at Normal	0.5	1
	at Transition	2.6	4
Rated Current	mA	780	820
Coil Resistance	Ω	10	10
Hysteresis		3% or less	3% or less
Repeatability		1% or less	1% or less
Approx. Mass	kg	10	25

★1. Min. pressure difference required between inlet and outlet ports to maintain function as pressure compensator.

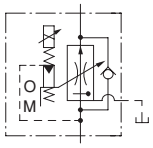
★2. The minimum required value for the external pilot type.

Graphic Symbols

Internal Pilot

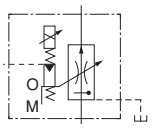


EFG-∗

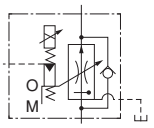


EFCG-∗

External Pilot



EFG-∗



EFCG-∗

Model Number Designation

EFC	G	-03	-125	-E	-51
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pilot Connection	Design Number
EF: Proportional Electro-Hydraulic Flow Control Valve	**G:** Sub-Plate Mounting	**03**	**60** **125**	**None:** Internal Pilot	**51**
EFC: Proportional Electro-Hydraulic Flow Control and Check Valve		**03**	**250**	**E:** External Pilot	**51**

Accessories

Mounting bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EFG / EFCG-03	M10 × 80 L	4
EFG / EFCG-06	M16 × 130 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-173, H-177 and H-183).

Model Numbers : AME-D-10-＊-20 AMN-D-10 (For DC power supply)
SK1022-＊-＊-11
AME-D2-1010-11 SK1015-11 (For DC power supply)

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
EFG / EFCG-03	EFGM-03Y-30	3/4	5.7
	EFGM-03Z-30	1	5.6
EFG / EFCG-06	EFGM-06X-30	1	12.5
	EFGM-06Y-30	1-1/4	16

● Sub-plates are available. Specify the sub-plate model number from the tabel above. When sub-ptates are not used, the mounting surface should have a good machined finish. (1.6▽)

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa.

Pilot Type Selection

This valve is constructed so as to operate at a predetermined pilot pressure. For the 03, a pilot pressure of 1 MPa or higher is required. For the 06, the requied pilot pressure is 1.5 MPa or higher.

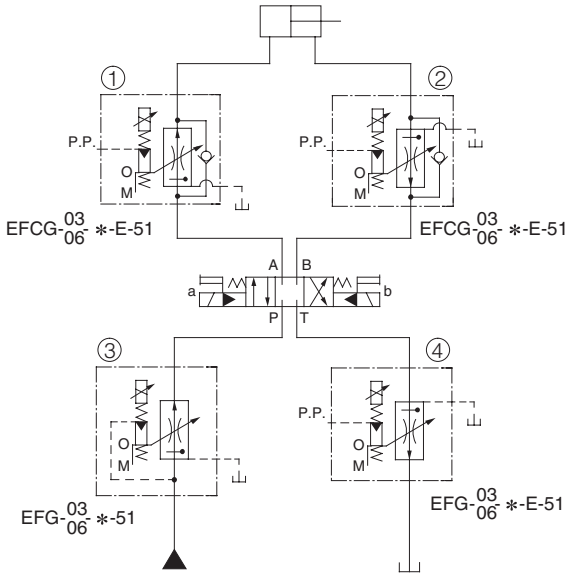
To obtain such a required pilot pressure, select the pilot type according to the circuit examples on the right.

①/②
Use the external pilot type (pilot connection code: E) whether a meter-in or meter-out circuit is employed.

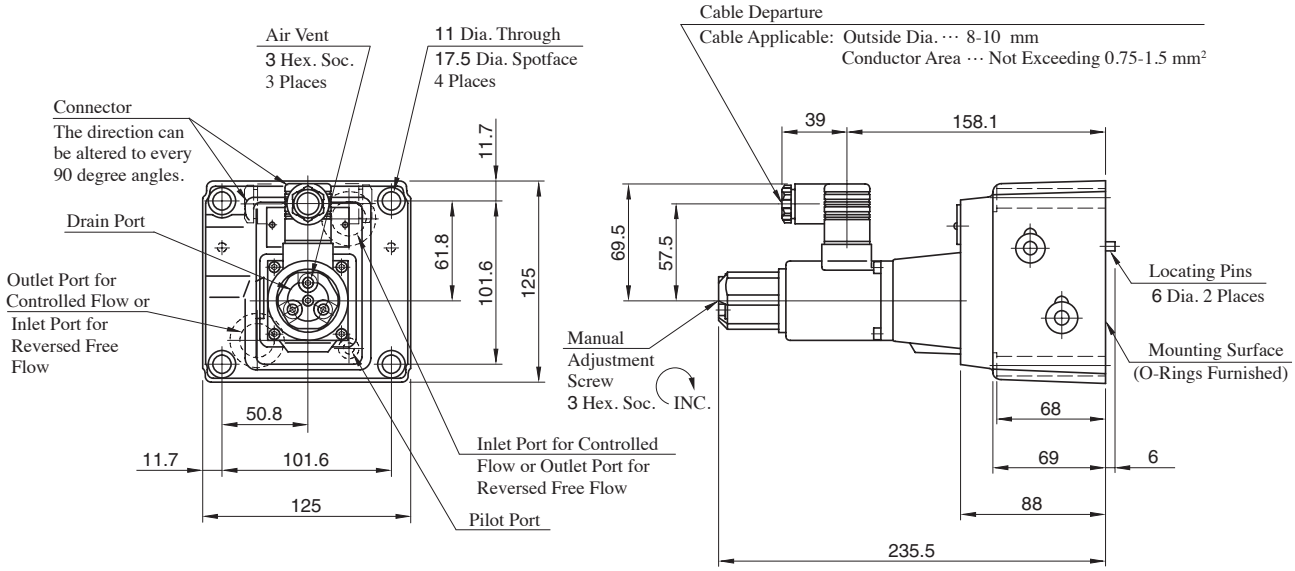
③
Use the internal pilot type (pilot connection code: None)

④
Use the external pilot type (pilot connection code: E)

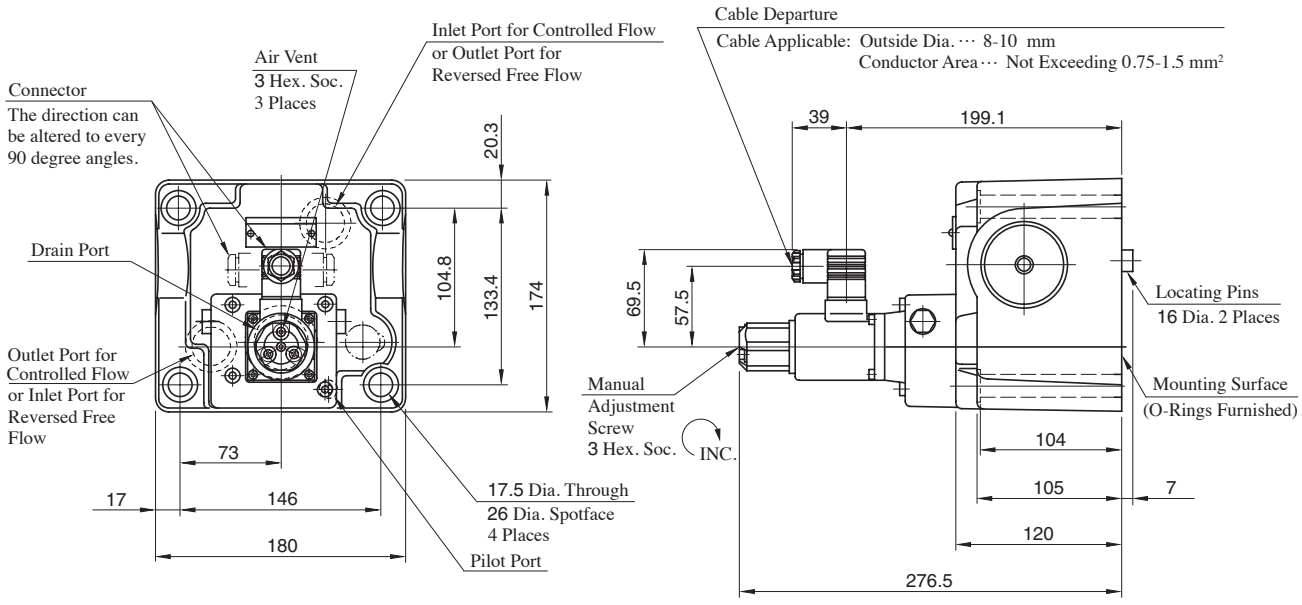
[Example of Circuit]



EFG
EFCG-03

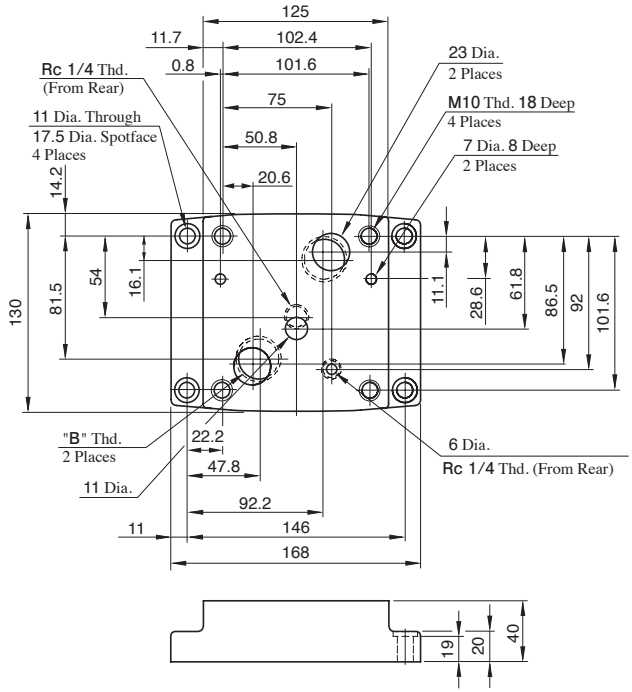


EFG
EFCG-06



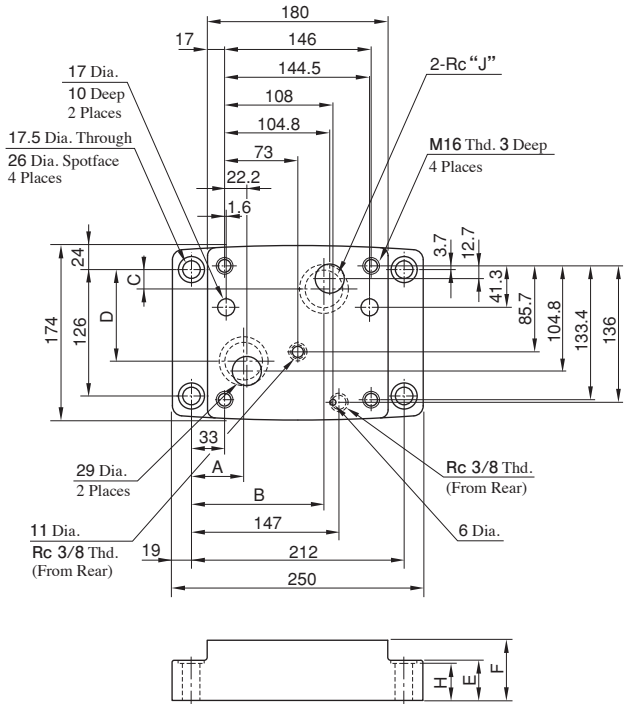
Sub-Plate

EFGM-03Y, 03Z



Sub-Plate Model Numbers	Thread Size "B" Thd.
EFGM-03Y-30	Rc 3/4
EFGM-03Z-30	Rc 1

EFGM-06X, 06Y

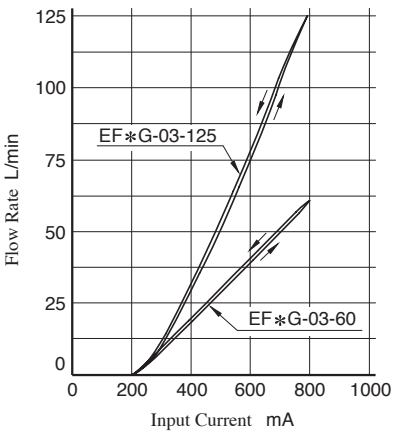


Sub-Plate Model Numbers	A	B	C	D	E	F	H	J
EFGM-06X-30	55.2	137.8	14.3	101.1	35	45	34	1
EFGM-06Y-30	52	132	19.3	91.3	40	60	39	1-1/4

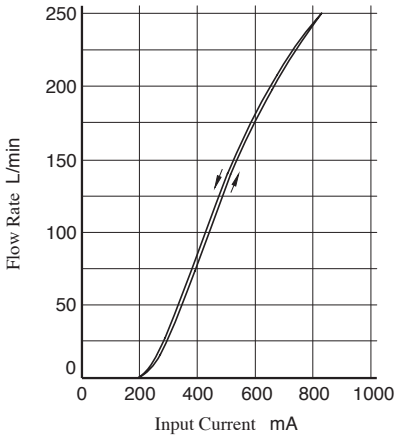
Input Current vs. Flow

Viscosity: 30 mm²/s

EFG EFCG -03



EFG EFCG -06

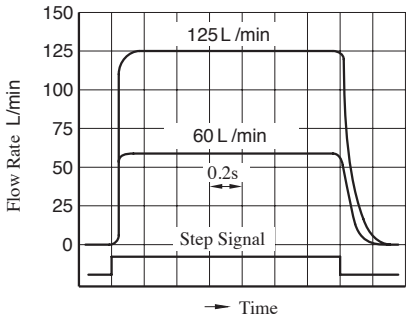


Step Response

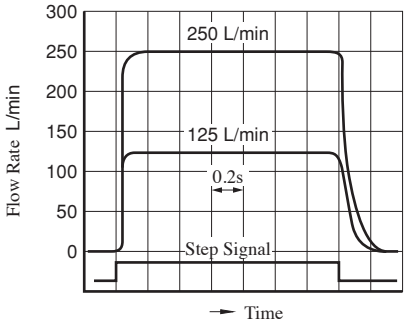
These characteristics have been obtained by measuring on each valve. Therefore , they may vary according to a hydraulic circuit to be used.

Viscosity: 30 mm²/s

EFG EFCG -03



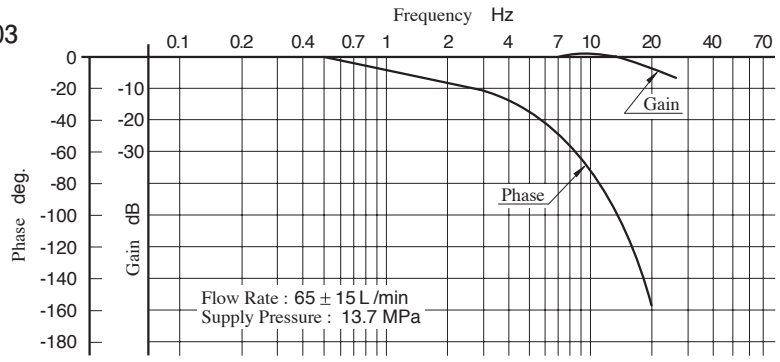
EFG EFCG -06



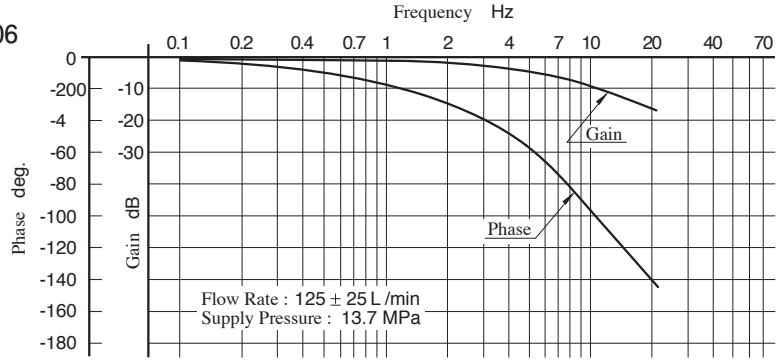
Frequency Response

Viscosity: 30 mm²/s

EFG EFCG -03

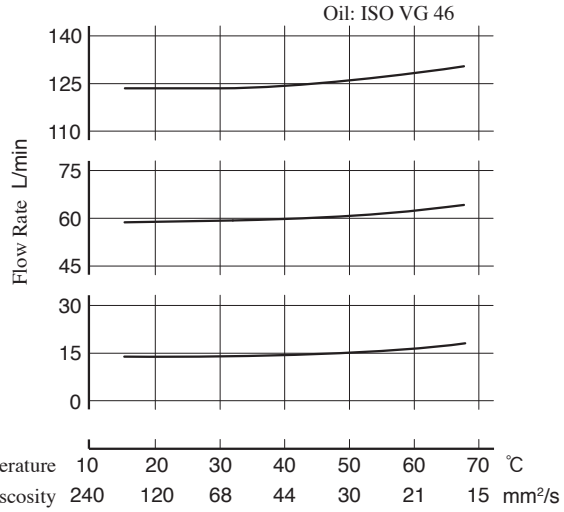


EFG EFCG -06

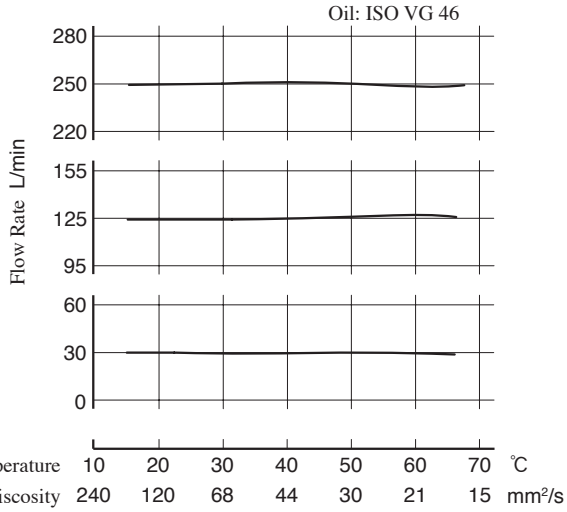


Viscosity vs. Flow

EFG EFCG -03

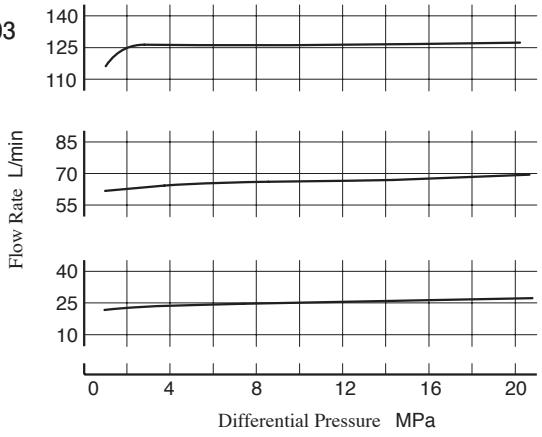


EFG EFCG -06

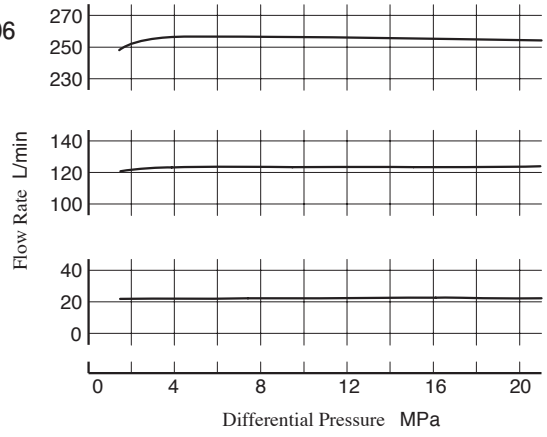


Differential Pressure vs. Metered Flow

EFG EFCG -03



EFG EFCG -06



Interchangeability between Current and New Design

Specifications and Characteristics

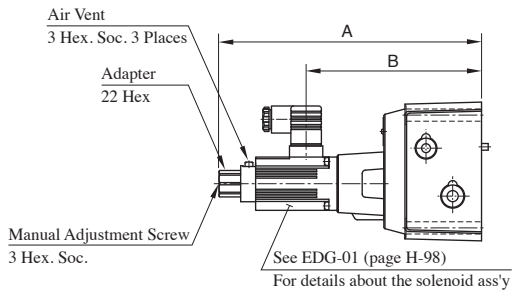
Input current-flow characteristics differ between current and new design.
Please inquire separately for details.
Other specifications remain unchanged.

Model Numbers		A	B
(Current)	EF✻G-03-✻-✻-50	236.5	158.1
(New)	EF✻G-03-✻-✻-51	235.5	158.1
(Current)	EF✻G-06-250-✻-50	277.5	199.1
(New)	EF✻G-06-250-✻-51	276.5	199.1

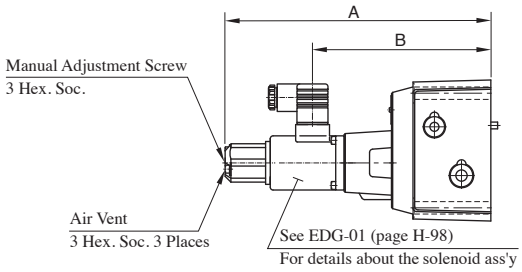
Installation Interchangeability

There is an interchangeability in the mounting dimensions between current and new design, however, note that because of improvements made on the solenoids, the overall shapes and dimensions have been changed as shown below.

Current : 50 Design

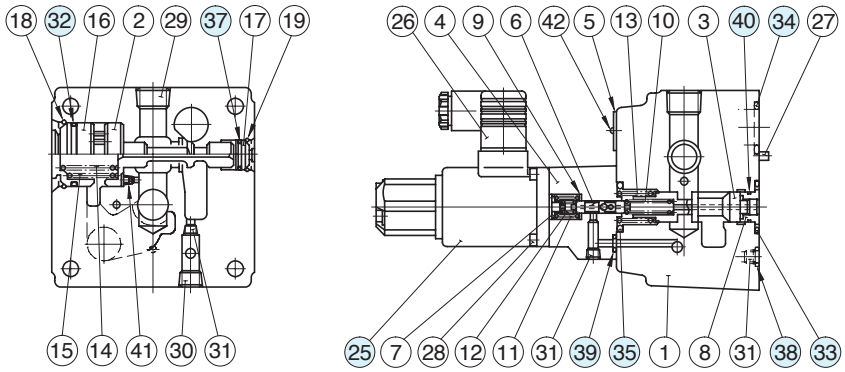


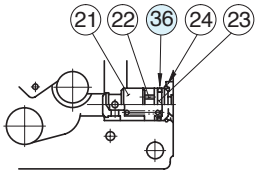
New : 51 Design



List of Seals and Solenoid Ass'y

EFG EFCG-03





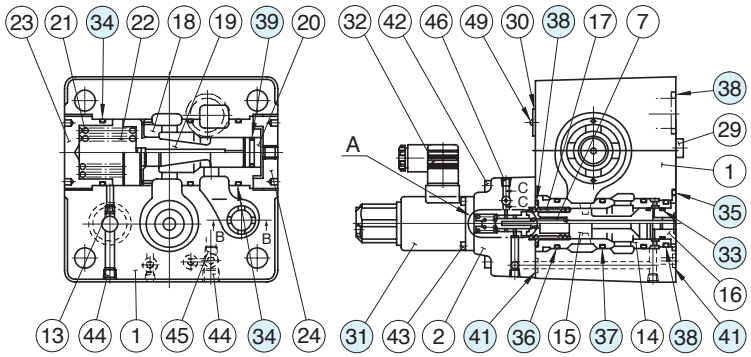
With Check Valve (EFCG-03)

Note) The connector assembly GDM-211-B-11 (Item 26) is not included in the solenoid assembly.

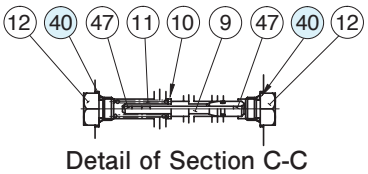
● List of Seals and Solenoid Ass'y

Item	Name of Parts	Part Numbers	Qty.
25	Solenoid Ass'y	E318-Y06M1-28-61	1
32	O-Ring	OR NBR-90 G35-N	1
33	O-Ring	OR NBR-90 P28-N	1
34	O-Ring	OR NBR-90 P28-N	2
35	O-Ring	OR NBR-90 P26-N	1
36	O-Ring	OR NBR-90 P16-N	1
37	O-Ring	OR NBR-90 P14-N	1
38	O-Ring	OR NBR-90 P9-N	1
39	O-Ring	OR NBR-90 P6-N	2
40	O-Ring	AS568-016(NBR-70-1)	1

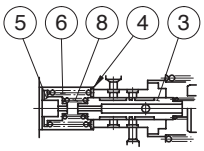
EFG EFCG-06



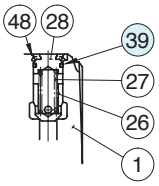
With Check Valve (EFCG-06)



Detail of Section C-C



Detail of "A"



Section B-B

Note) The connector assembly GDM-211-B-11 (Item 32) is not included in the solenoid assembly.

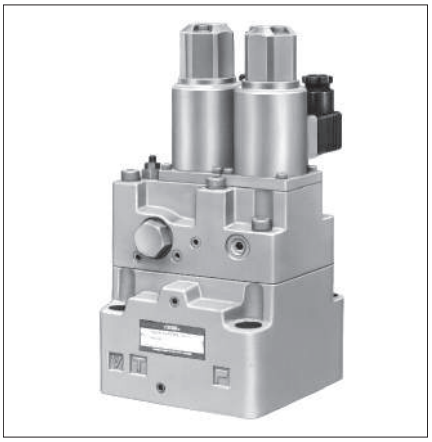
● List of Seals and Solenoid Ass'y

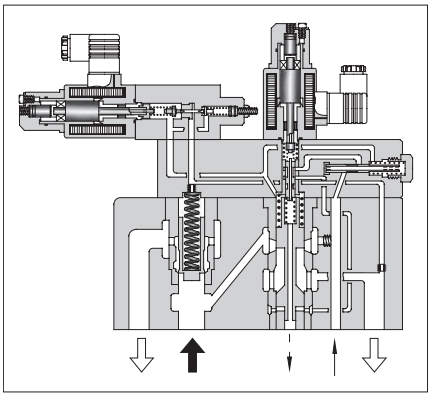
Item	Name of Parts	Part Numbers	Qty.
31	Solenoid Ass'y	E318-Y06M1-28-61	1
33	O-Ring	OR NBR-70-1 P21-N	1
34	O-Ring	OR NBR-90 P50-N	3
35	O-Ring	OR NBR-90 P46-N	1
36	O-Ring	OR NBR-90 P36-N	1
37	O-Ring	OR NBR-90 P34-N	2
38	O-Ring	OR NBR-90 P32-N	4
39	O-Ring	OR NBR-70-1 P21-N	1★
40	O-Ring	OR NBR-90 P10-N	2
41	O-Ring	OR NBR-90 P9-N	3

★Two o-rings are required for the EFCG.

10Ω–10Ω Series
Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is an energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
Since this valve controls the pump pressure by following the load pressure while keeping the differential pressure minimized, it serves as a low power-consumption energy-saving, meter-in, controlled flow control valve.
Further, since a temperature compensation function is incorporated, this valve provides consistent flow control without respect to the fluid temperature.





Specifications

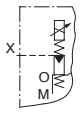
Descriptions \ Model Numbers			EFBG-03-125 -∗-∗-61	EFBG-06-250 -∗-∗-61	EFBG-10-500 -∗-∗-61
Max. Operating Pressure		MPa	24.5	24.5	24.5
Max. Flow		L/min	125	250	500
Metered Flow Adjustment Range		L/min	1-125	2.5-250	5-500
Min. Pilot Pressure		MPa	1.5	1.5	1.5
Pilot Flow L/min	at Normal		1	1	1
	at Transition		3	4	6
Flow Controls	Rated Current	mA	800	750	900
	Coil Resistance	Ω	10	10	10
	Differential Pressure	MPa	0.7	0.7	0.9
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Pressure Controls ★1	Pres. Adj. Range	MPa ★2	C: 1.4-15.7 H: 1.4-24.5	C: 1.4-15.7 H: 1.4-24.5	C: 1.5-15.7 H: 1.5-24.5
	Rated Current	mA	C: 890 H: 930	C: 820 H: 880	C: 800 H: 900
	Coil Resistance	Ω	10	10	10
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Approx. Mass		kg	Refer to pages H-137 to H-139		

★1. The specifications for pressure controls are applied to models with proportional pilot relief valve. (Ex. EFBG-03-125-C-∗-61)
★2. The maximum pressure adjustment range of the models without proportional pilot relief valves is 24.5 MPa.

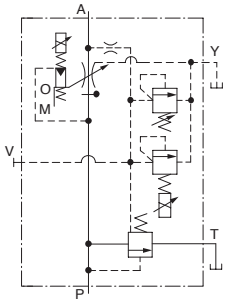
Graphic Symbols

With Proportional Pilot Relief Valve

External Pilot

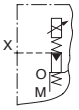


Internal Pilot

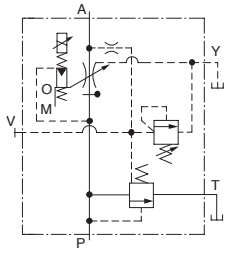


Without Proportional Pilot Relief Valve

External Pilot



Internal Pilot



Model Number Designation

EFB	G	-03	-125	-C	-E	-61
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Proportional Pilot Relief Valve Pressure Adj. Range	Pilot Connection	Design Number
EFB: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G:** Sub-Plate Mounting	**03**	**125**	**C, H:** See Specifications	**None:** Internal Pilot	**61**
		06	**250**	**None:** Without Proportional Pilot Relief Valve	**E:** External Pilot	**61**
		10	**500**			**51**

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EFBG-03	M10 × 65 L	4
EFBG-06	M16 × 100 L	4
EFBG-10	M20 × 130 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-173, H-177 and H-183).

Valve Model Numbers	Power Amplifier Model Numbers	
	For Flow Control	For Pres. Control
EFBG-03-125(-E)-61 EFBG-06-250(-E)-61 EFBG-10-500(-E)-51	AME-D-10-＊-20 AMN-D-10 (For DC Power Supply)	—
EFBG-03-125C/H(-E)-61 EFBG-06-250C/H(-E)-61 EFBG-10-500C/H-(E)-51	AME-D2-1010-11	

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
EFBG-03	EFBGM-03Y-20	3/4	6
	EFBGM-03Z-20	1	
EFBG-06	EFBGM-06X-20	1	12.5
	EFBGM-06Y-20	1-1/4	16
EFBG-10	EFBGM-10Y-20★	1-1/2, 2 Flange Mounting	37

● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽)

★When ordering the EFBGM-10Y, also order a F3 series pipe flange kit. For details on the kit, consult us.

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa.

When Relief Valve Passing Flow Rate is Low in Pressure Control State

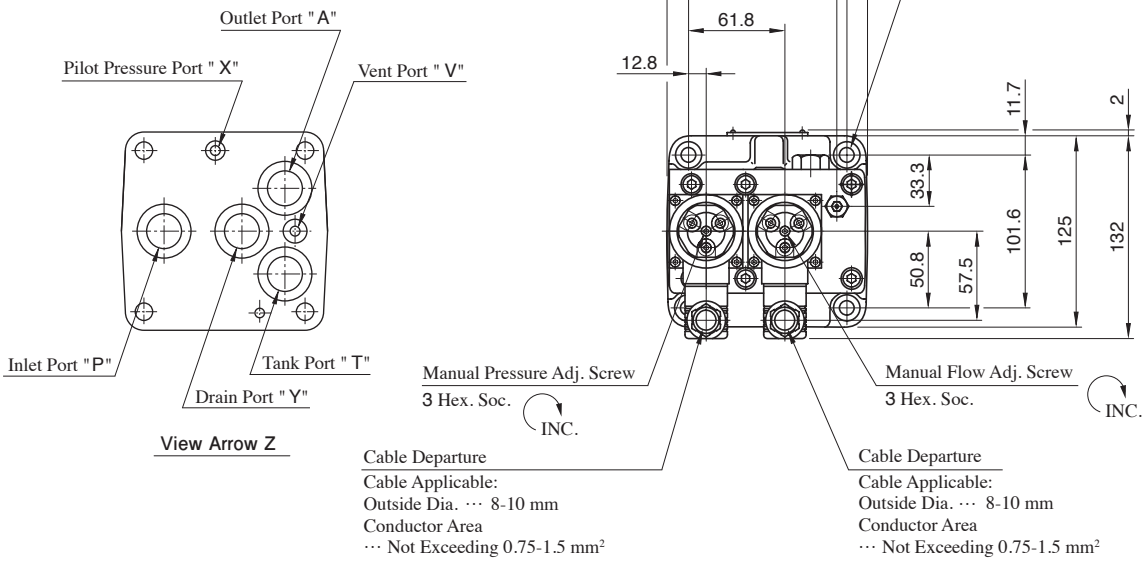
To avoid preselected pressure instability, use a passing flow rate of 15 L/min or higher.
Further, check that the tank-line back pressure dose not exceed 0.5 MPa.

Safety Valve Pressure Setting

The pressure of the safety valve is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa. Please adjust the pressure of the valve so preset to meet the pressure to be used actually.
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

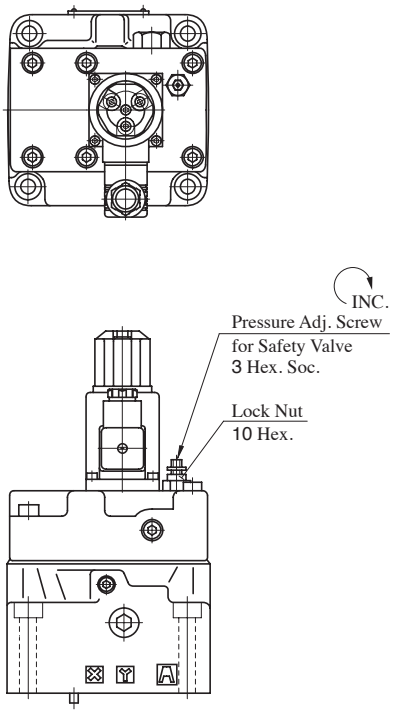
Models with Proportional Pilot Relief Valve

EFBG-03-125 -$^{C}_{H}$(-E)-61



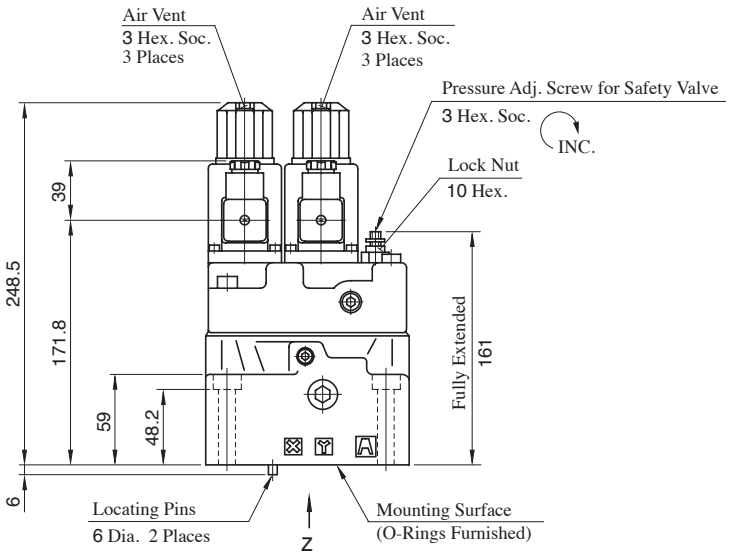
Models without Proportional Pilot Relief Valve

EFBG-03-125(-E)-61



● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

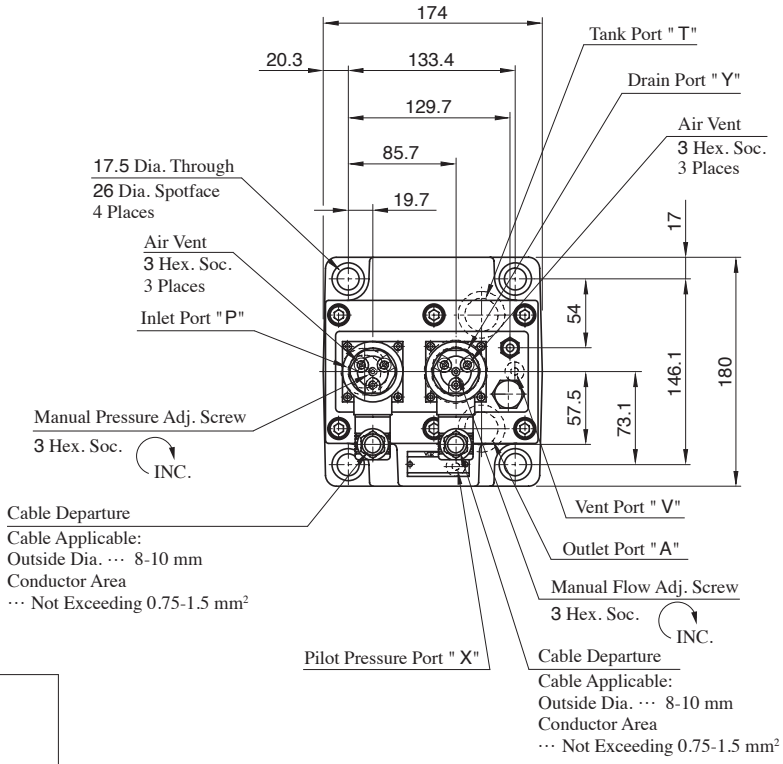
Approx. Mass ..... 13.3 kg



Approx. Mass ..... 14 kg

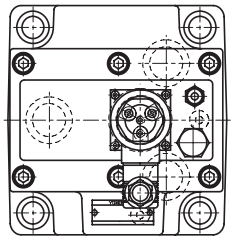
Models with Proportional Pilot Relief Valve

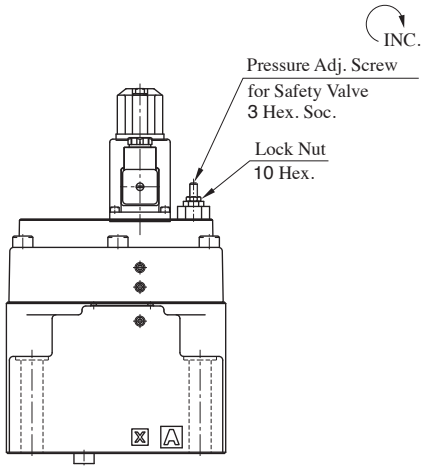
EFBG-06-250 - $\frac{C}{H}$(-E)-61



Models without Proportional Pilot Relief Valve

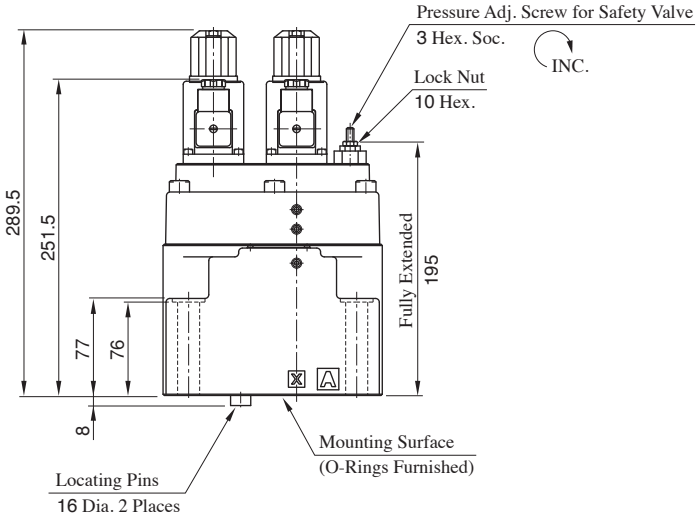
EFBG-06-250(-E)-61





● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

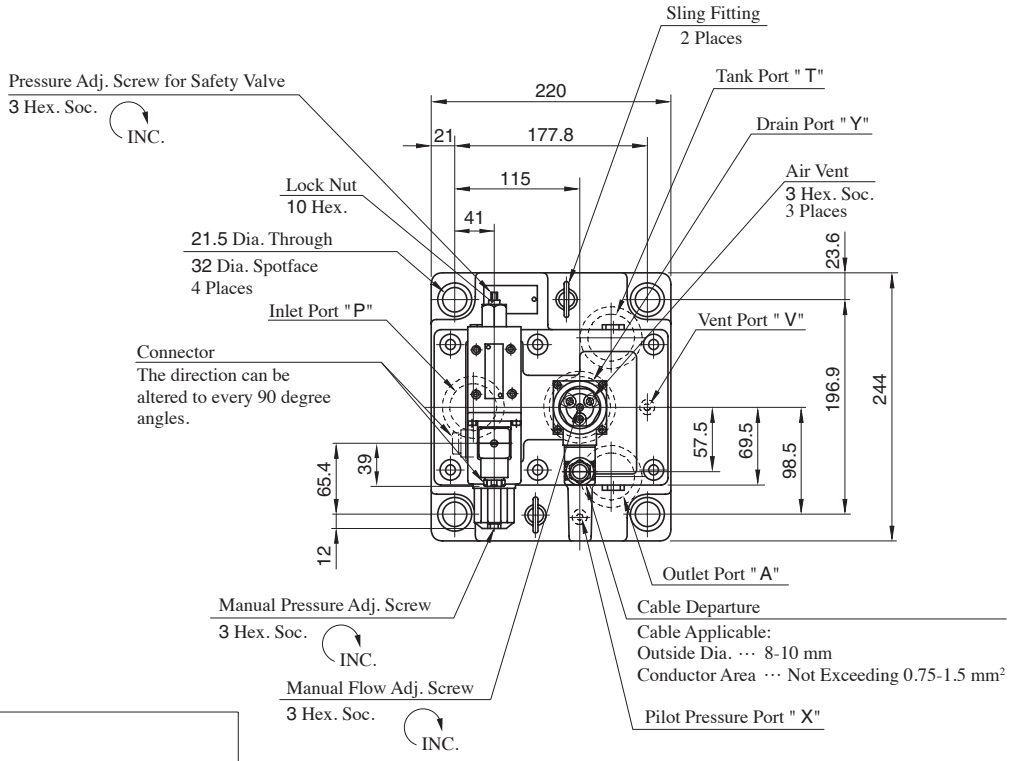
Approx. Mass ..... 21.3 kg



Approx. Mass ..... 22 kg

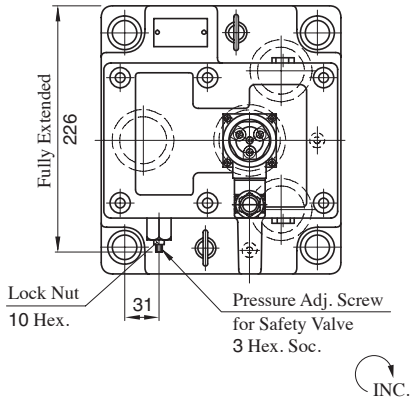
Models with Proportional Pilot Relief Valve

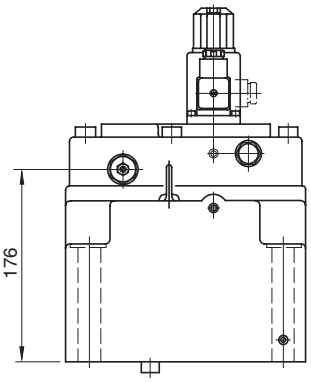
EFBG-10-500 - $\frac{C}{H}$(-E)-51



Models without Proportional Pilot Relief Valve

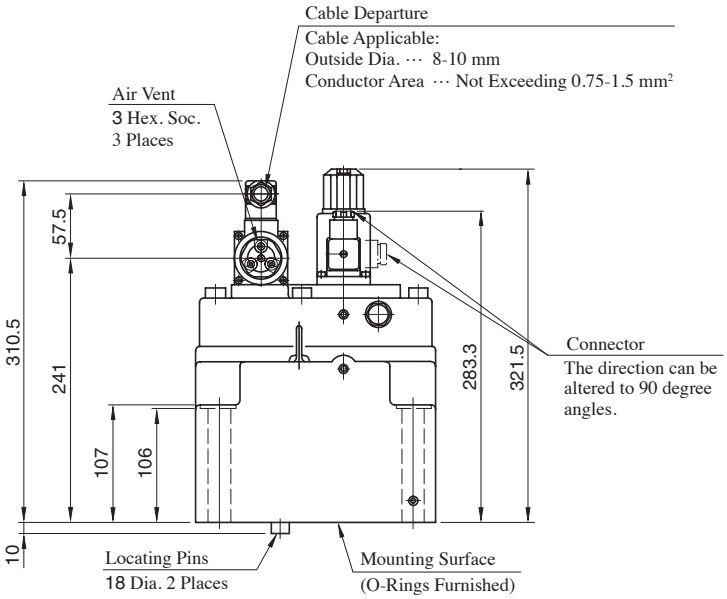
EFBG-10-500(-E)-51





● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

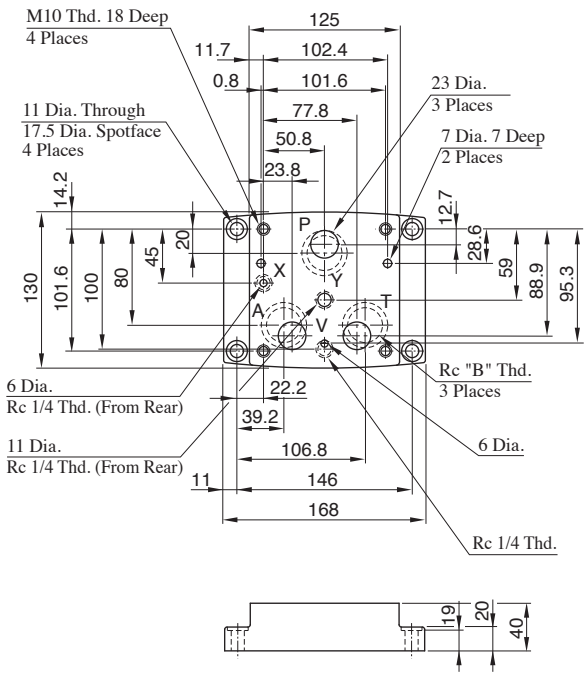
Approx. Mass ..... 60 kg



Approx. Mass ..... 62 kg

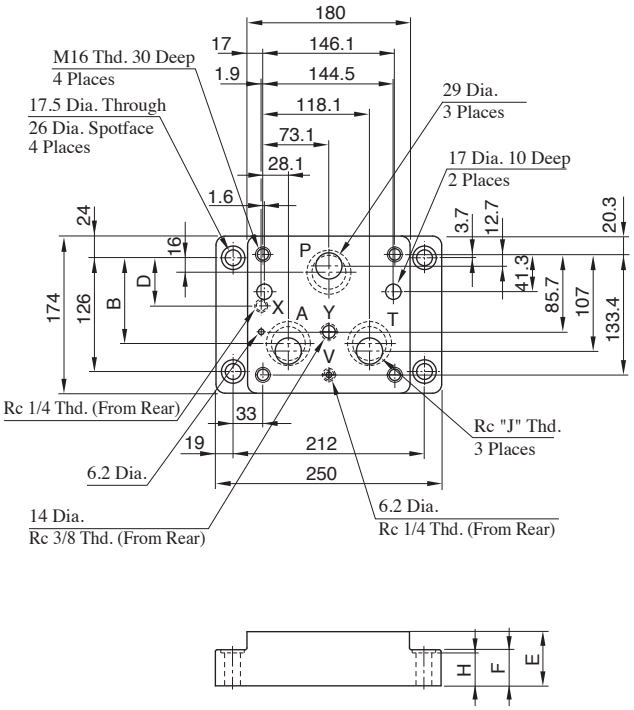
Sub Plates

EFBGM-$^{03Y}_{03Z}$-20



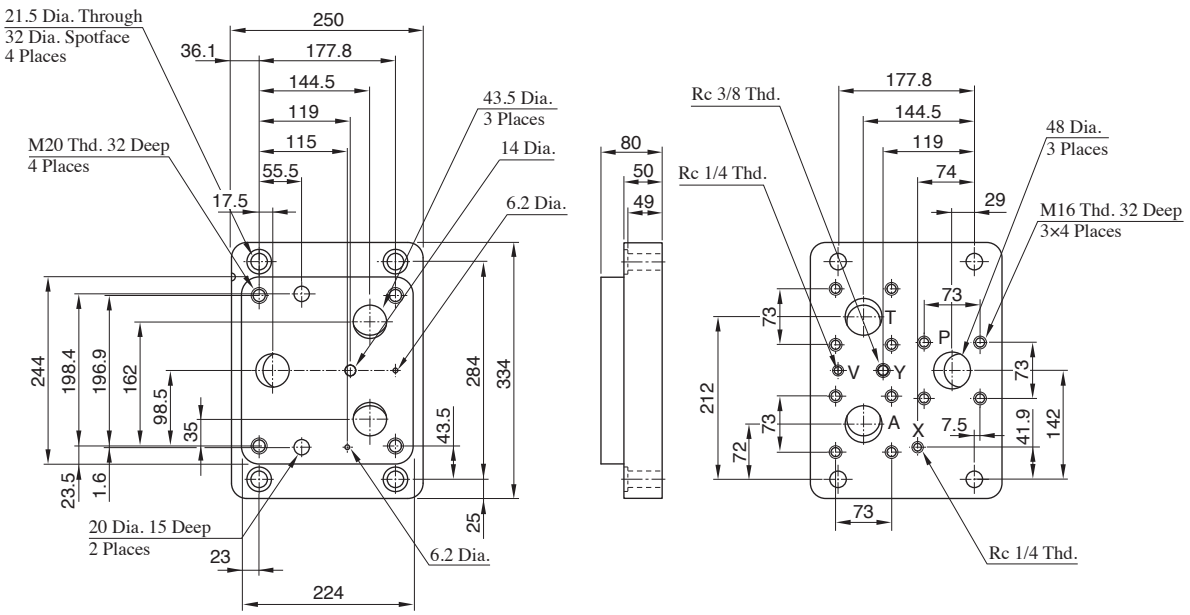
Sub-Plate Model Numbers	B
EFBGM-03Y-20	$^{3}/_{4}$
EFBGM-03Z-20	1

EFBGM-$^{06X}_{06Y}$-20



Sub-Plate Model Numbers	B	D	E	F	H	J
EFBGM-06X-20	103.3	63.3	45	35	34	1
EFBGM-06Y-20	95	53.3	60	40	39	$1\,^{1}/_{4}$

EFBGM-10Y-20



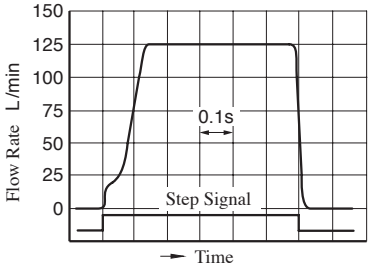
Step Response

These characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

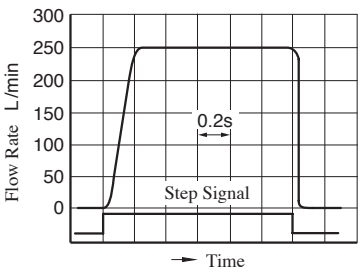
Viscosity: 30 mm²/s

Flow Controls

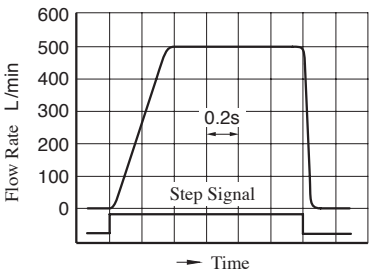
EFBG-03



EFBG-06

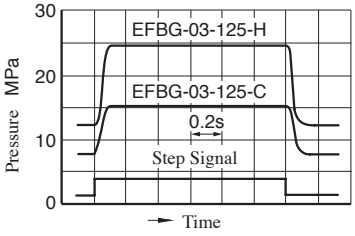


EFBG-10



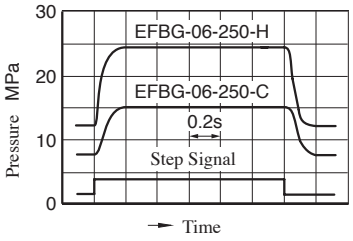
Pressure Controls

EFBG-03



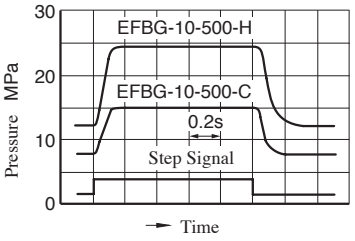
Flow Rate : 125 L/min
Trapped Oil Volume : < 1 L

EFBG-06



Flow Rate : 250 L/min
Trapped Oil Volume : < 1 L

EFBG-10

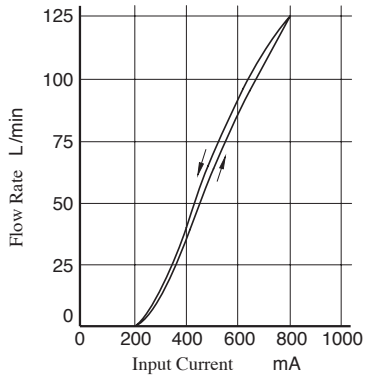


Flow Rate : 500 L/min
Trapped Oil Volume : < 1 L

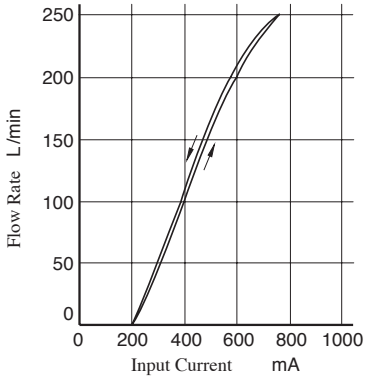
Input Current vs. Flow

Viscosity: 30 mm²/s

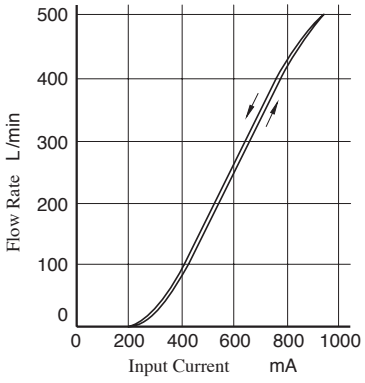
EFBG-03



EFBG-06



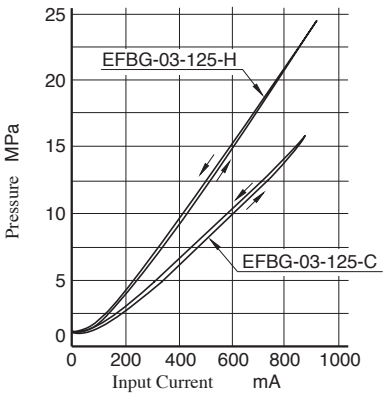
EFBG-10



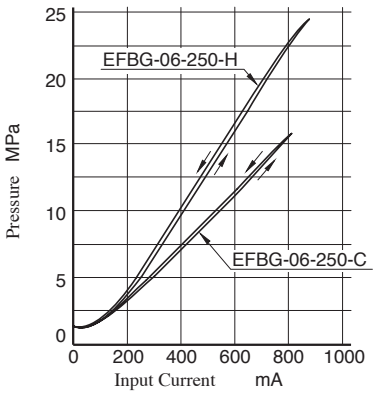
Input Current vs. Pressure

Viscosity: 30 mm²/s

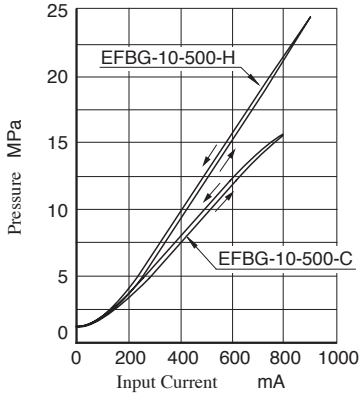
EFBG-03



EFBG-06

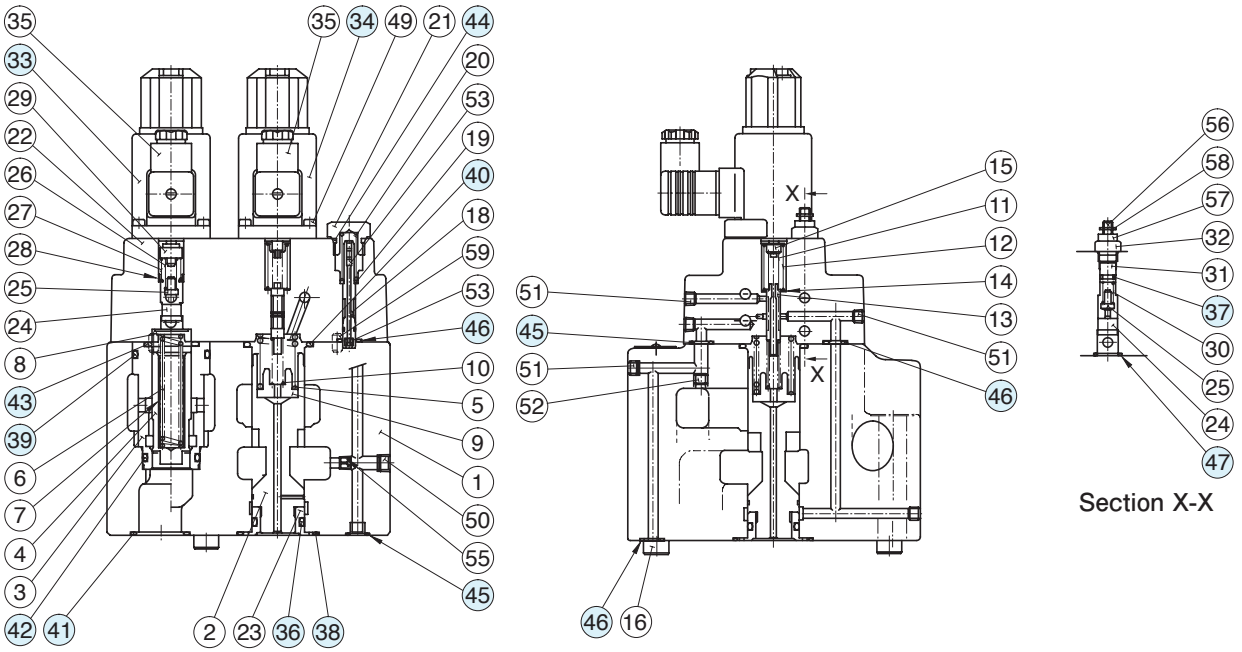


EFBG-10



List of Seals and Solenoid Ass'y

EFBG-03-125-∗-∗-61
EFBG-06-250-∗-∗-61



List of Seals and Solenoid Ass'y

Item	Name of Parts	EFBG-03		EFBG-06	
		Part Numbers	Qty.	Part Numbers	Qty.
36	O-Ring	AS568-016(NB-70-1)	1	OR NBR-70-1 P26-N	1
37	O-Ring	OR NBR-70-1 P6-N	1	OR NBR-70-1 P6-N	1
38	O-Ring	OR NBR-90 P28-N	1	OR NBR-90 P44-N	1
39	O-Ring	OR NBR-90 P32-N	1	OR NBR-90 P42-N	1
40	O-Ring	OR NBR-90 P28-N	1	OR NBR-90 P36-N	1
41	O-Ring	OR NBR-90 P28-N	3	OR NBR-90 P32-N	3
42	O-Ring	OR NBR-90 G30-N	1	OR NBR-90 P30-N	1
43	O-Ring	OR NBR-90 P28-N	1	OR NBR-90 P28-N	1
44	O-Ring	OR NBR-90 P15-N	1	OR NBR-90 P15-N	1
45	O-Ring	OR NBR-90 P11-N	2	OR NBR-90 P11-N	2
46	O-Ring	OR NBR-90 P9-N	5	OR NBR-90 P11-N	4
47	O-Ring	AS568-016(NB-70-1)	1	AS568-016(NB-90)	1

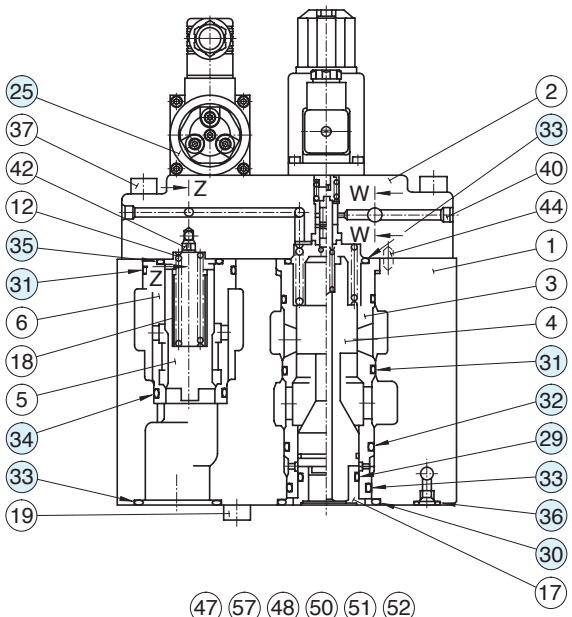
Solenoid Ass'y

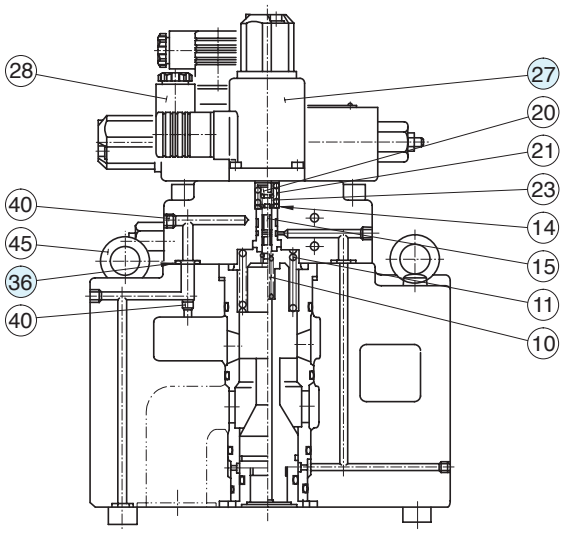
Valve Model Numbers	㉝ Solenoid Ass'y Model Numbers	㉞ Solenoid Ass'y Model Numbers
EFBG-$^{03}_{06}$-$^{125}_{250}$-C(E)-61	E318-Y06M1-04-61	E318-Y06M1-28-61
EFBG-$^{03}_{06}$-$^{125}_{250}$-E(E)-61		
EFBG-$^{03}_{06}$-$^{125}_{250}$-(E)-61	—	

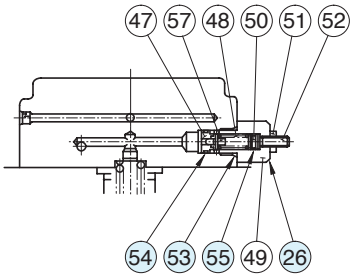
Note) The connector assembly GDM-211-B-11 (Item 35) is not included in the solenoid assembly.

List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

EFBG-10-500-∗-∗-51

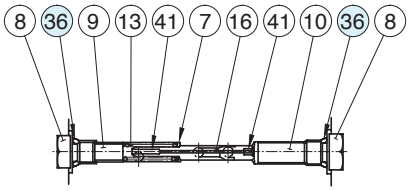






Section W-W

(Only for Models without Pilot Relief Valve)



Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.	
			Models with Pilot Relief Valve	Models without Pilot Relief Valve
29	O-Ring	OR NBR-70-1 P34-N	1	1
30	O-Ring	OR NBR-90 G60-N	1	1
31	O-Ring	OR NBR-90 G55-N	3	3
32	O-Ring	OR NBR-90 P50-N	1	1
33	O-Ring	OR NBR-90 P48-N	5	5
34	O-Ring	OR NBR-90 P42-N	1	1
35	O-Ring	OR NBR-90 P36-N	1	1
36	O-Ring	OR NBR-90 P11-N	8	8
53	O-Ring	OR NBR-90 P14-N	—	1
54	O-Ring	AS568-013(NBR-90)	—	1
55	O-Ring	OR NBR-70-1 P6-N	—	1

Pilot Valve, Solenoid Ass'y and Safety Valve

Valve Model Numbers	㉕ Pilot Valve Model Numbers	㉗ Solenoid Ass'y Model No.	㉖ Safety Valve Model No.
EFBG-10-500-C(-E)-51	EDG-01V-C-1-PNT12-5103	E318-Y06M1-28-61	—
EFBG-10-500-H(-E)-51	EDG-01V-H-1-PNT12-5103		—
EFBG-10-500(-E)-51	—		SB1094-2002

Note) The connector assembly GDM-211-B-11 (Item 28) is not included in the solenoid assembly.

Interchangeability between Current and New Design

Model changes have been made from 50, 51 to 61 design in the EFBG-03/06 because of changes in the pilot valve building-in method and model changes have been made from 50 to 51 design in the EFBG-10 because of improvement in solenoid ass'y.

Specification and Characteristics

The input current and pressure–flow characteristics differ between the new and old models. Ask Yuken for details.
No changes in specifications and characteristics between current and new design.

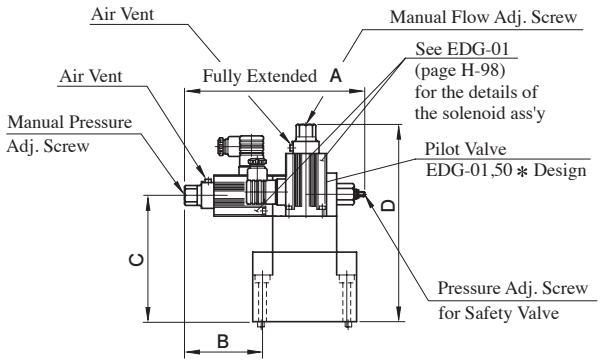
Safety Valve Pressure Setting

・EFBG-03/06

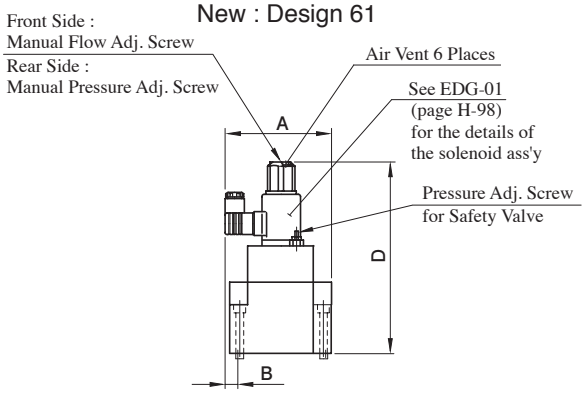
50・51 Design → 61 Design

The mounting surface are interchangeable. However, the method of building in the pilot valve has been changed, bringing about changes in the appearance shapes and dimensions as shown below.

Current : Design 50・51



New : Design 61



Valve Model Numbers		A	B	C	D
(Current)	EFBG-03-125-∗-∗-$^{50}_{51}$	217	93.2	155	2236.5
(New)	EFBG-03-125-∗-∗-61	132	18.7	—	248.5
(Current)	EFBG-06-250-∗-∗-$^{50}_{51}$	217	53.3	196	277.5
(New)	EFBG-06-125-∗-∗-61	180	16.9	—	289.5

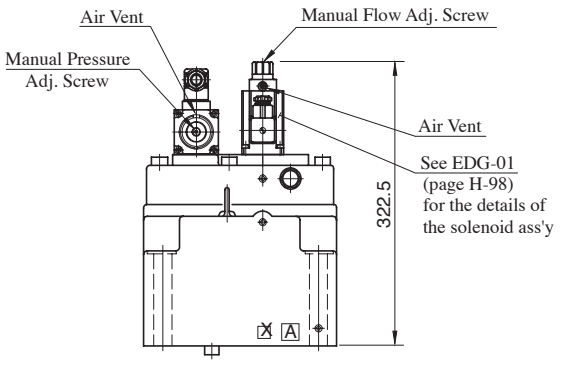
60 Design → 61 Design

The mounting surface are interchangeable. There are no changes in the appearance shapes and dimensions.

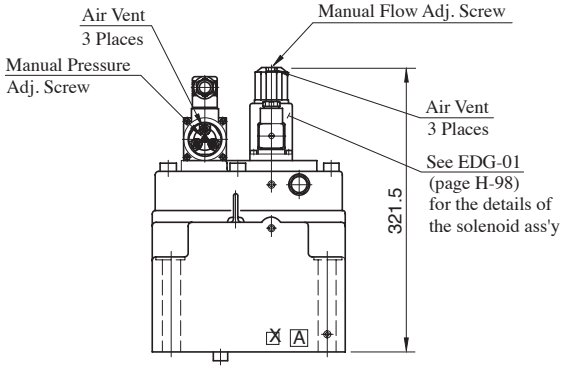
・EFBG-10

Mounting compatibility is provided.
Note that because of improvements made on the solenoids, the overall shapes have been changed as shown below.

Current : Design 50

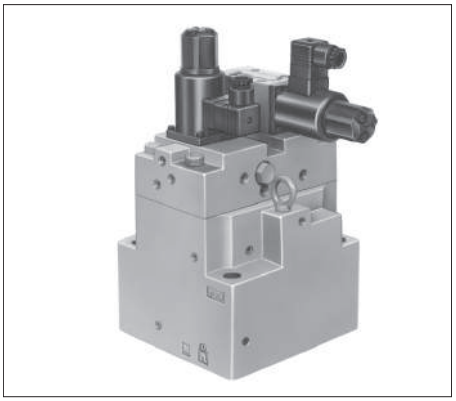


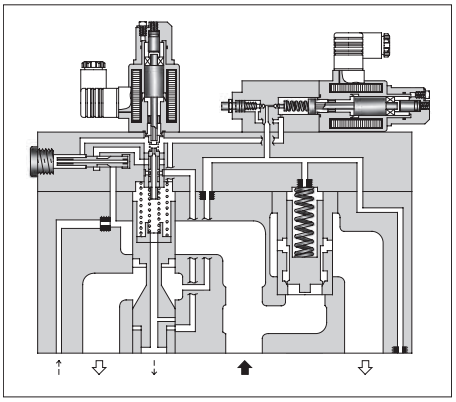
New : Design 51



High Flow Series Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is an energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
For the High Flow Series, double maximum flow rate [03 size: 125→250 L/min, 06 size: 250→500 L/min, 10 size: 500→1000 L/min] enables a smaller valve size than conventional products; compact-sized devices can be provided.





Specifications

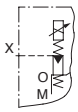
Descriptions		Model No.	EFBG-03 -250-＊-＊-51	EFBG-06 -500-＊-＊-51	EFBG-10 -1000-＊-＊-51
Max. Operating Pressure		MPa	24.5	24.5	24.5
Max. Flow		L/min	250	500	1000
Metered Flow Adjustment Range		L/min	2.5-250	5-500	10-1000
Min. Pilot Pressure		MPa	1.5	1.5	1.5
Pilot Flow	L/min	at Normal	1	1	4.5
		at Transition	4	6	10.0
Flow Controls	Rated Current	mA	830	780	830
	Coil Resistance	Ω	10	10	10
	Differential Pressure	MPa	0.8	0.9	1.2
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Pressure Controls ★1	Pres. Adj. Range	MPa ★2	C: 1.6-15.7 H: 1.8-24.5	C: 1.5-15.7 H: 1.5-24.5	C: 1.1-15.7 H: 1.1-24.5
	Rated Current	mA	C: 850 H: 870	C: 800 H: 900	C: 900 H: 950
	Coil Resistance	Ω	10	10	10
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Approx. Mass		kg	Refer to pages H-147 to H-149		

★1. The specifications for pressure controls are applied to models with proportional pilot relief valve. (Ex. EFBG-03-250-C-＊-51)
★2. The maximum pressure adjustment range of the valves without proportional pilot relief valves is 24.5 MPa.

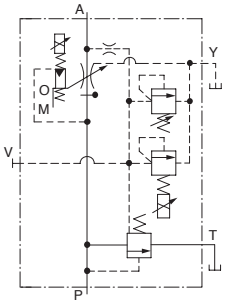
Graphic Symbols

With Proportional Pilot Relief Valve

External Pilot

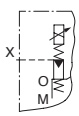


Internal Pilot

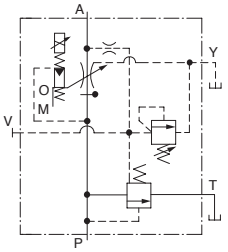


Without Proportional Pilot Relief Valve

External Pilot



Internal Pilot



Model Number Designation

EFB	G	-03	-250	-C	-E	-51
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Proportional Pilot Relief Valve Pressure Adj. Range	Pilot Connection	Design Number
EFB: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G:** Sub-Plate Mounting	**03**	**250**	**C, H:** See Specifications	**None:** Internal Pilot	**51**
		06	**500**	**None:** Without Proportional Pilot Relief Valve	**E:** External Pilot	**51**
		10	**1000**			**51**

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EFBG-03	M12 × 120 L	4
EFBG-06	M16 × 120 L	4
EFBG-10	M20 × 150 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see pages H-173, H-177 and H-183).

Valve Model Numbers	Power Amplifier Model Numbers	
	For Flow Control	For Pres. Control
EFBG-03- 250(-E)-51 EFBG-06- 500(-E)-51 EFBG-10-1000(-E)-51	AME-D-10-＊-20 AMN-D-10 (For DC Power Supply)	—
EFBG-06- 500 -C/H(-E)-51 (03 125 / 10 1000)	AME-D2-1010-11	

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa.

When Relief Valve Passing Flow Rate is Low in Pressure Control State

To avoid preselected pressure instability, use a passing flow rate of 15 L/min or higher.
Further, check that the tank-line back pressure dose not exceed 0.5 MPa.

Safety Valve Pressure Setting

The pressure of the safety valve is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa. Please adjust the pressure of the valve so preset to meet the pressure to be used actually.
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

Interchangeability in Installation with Conventional Valves (10Ω-10Ω Series)

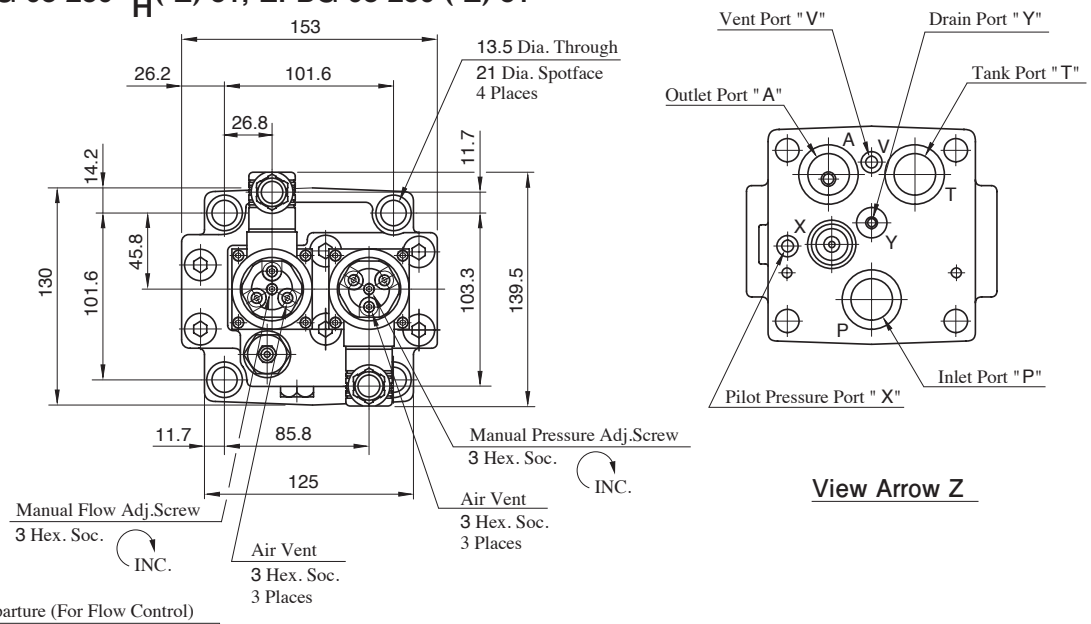
- **EFBG-03**

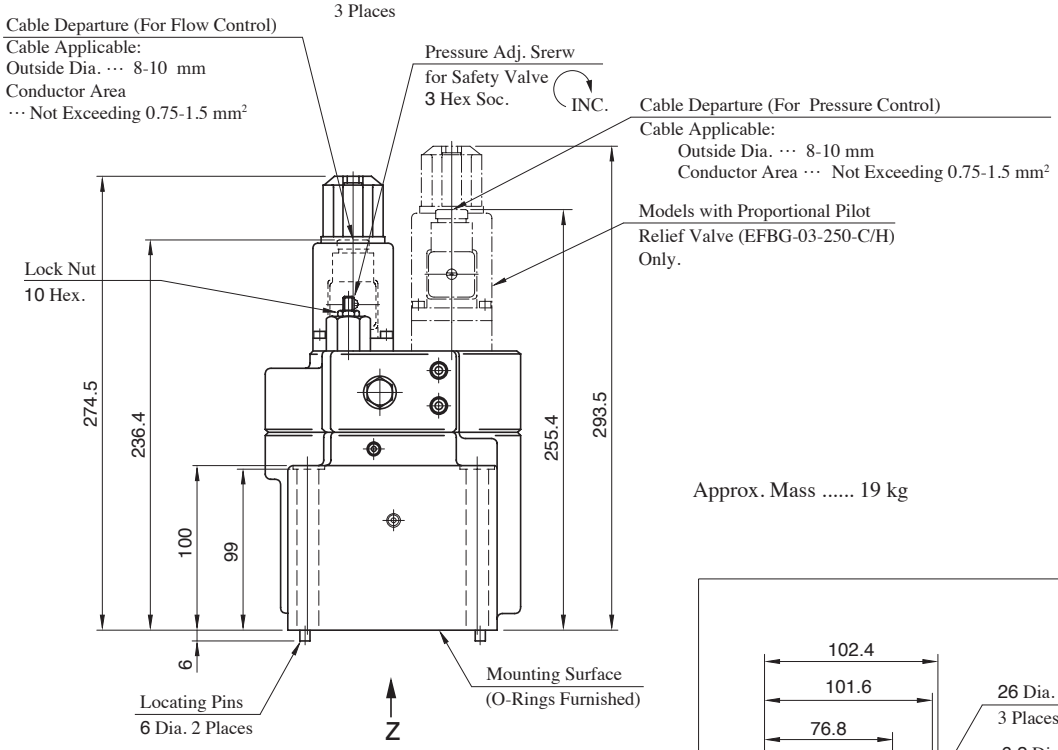
  There is no interchangeability in installation.

- **EFBG-06/10**

  A product in the high-flow series can be mounted on the conventional mounting surface but no conventional product can be mounted on the mounting surface of the high-flow series.

EFBG-03-250-$\frac{C}{H}$(-E)-51, EFBG-03-250 (-E)-51

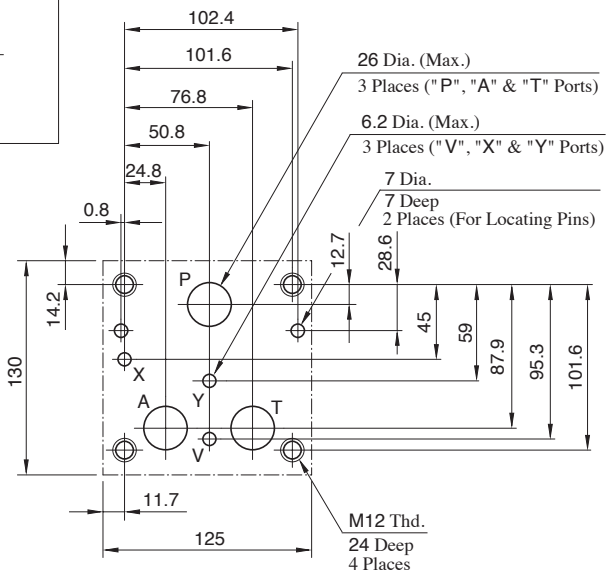




Approx. Mass ..... 19 kg

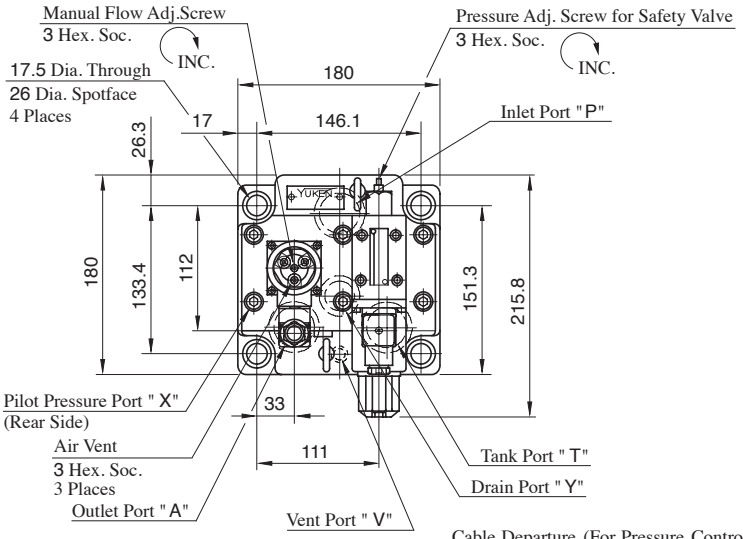
Dimensions of Valve Mounting Surface

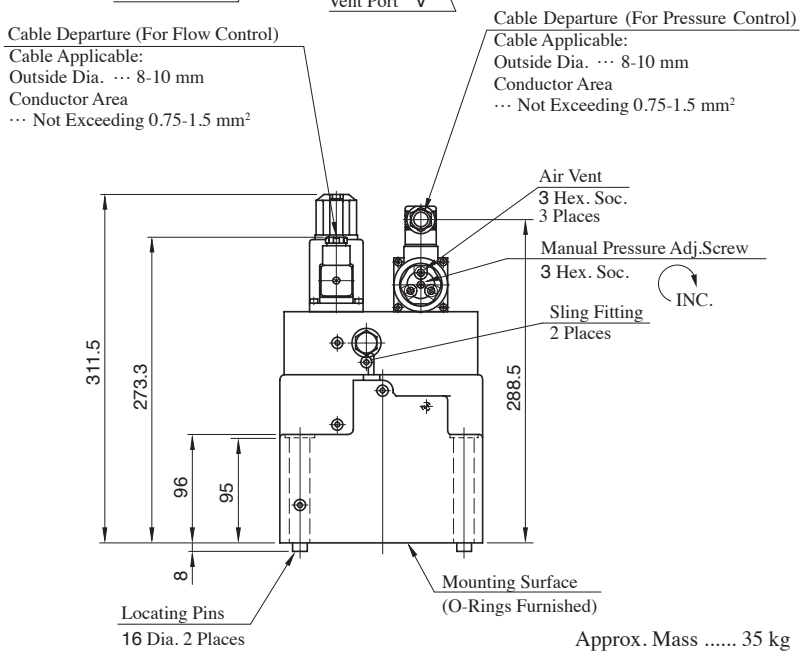
Prepare a mounting surface as shown to the right.
Also finish it finely. (1.6▽)



Models with Proportional Pilot Relief Valve

EFBG-06-500 -$\frac{C}{H}$(-E)-51

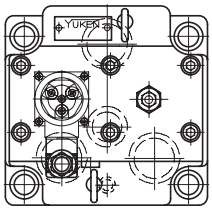


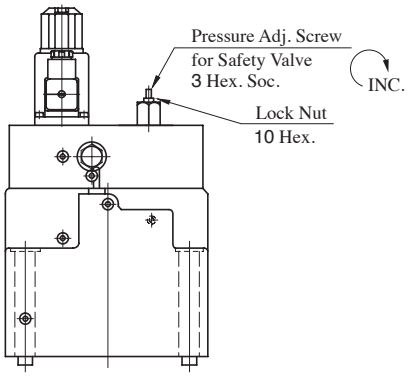


Approx. Mass ..... 35 kg

Models without Proportional Pilot Relief Valve

EFBG-06-500(-E)-51



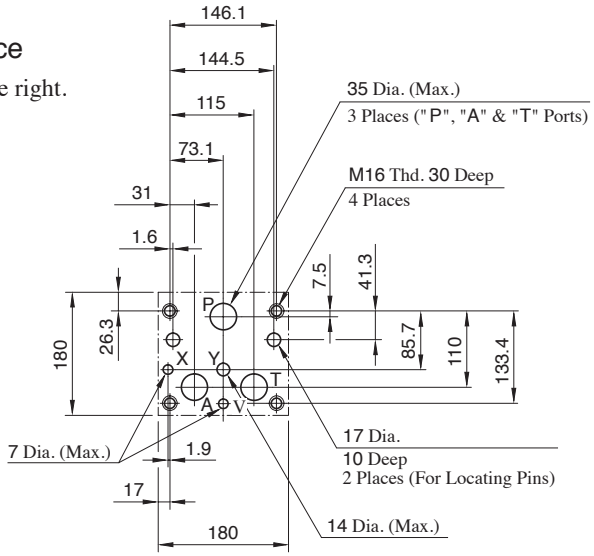


●For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass ..... 33 kg

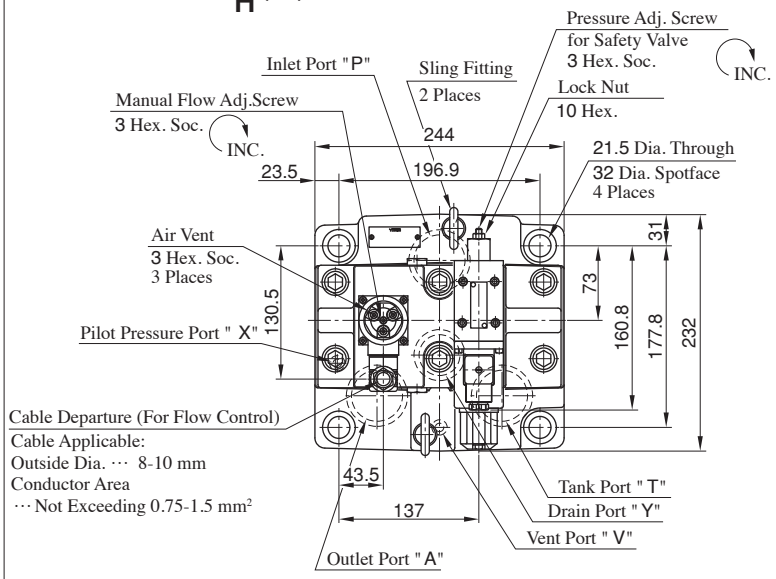
Dimensions of Valve Mounting Surface

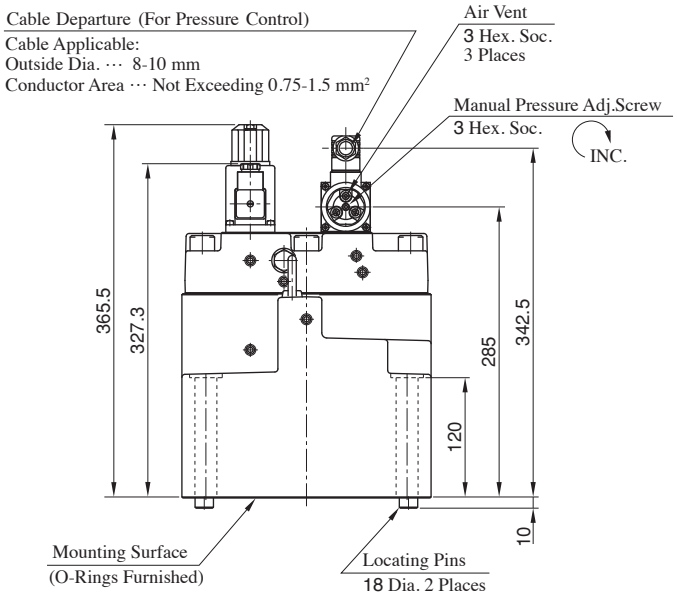
Prepare a mounting surface as shown to the right.
Also finish it finely. (1.6▽)



Models with Proportional Pilot Relief Valve

EFBG-10-1000-$\frac{C}{H}$(-E)-51

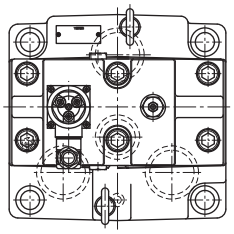


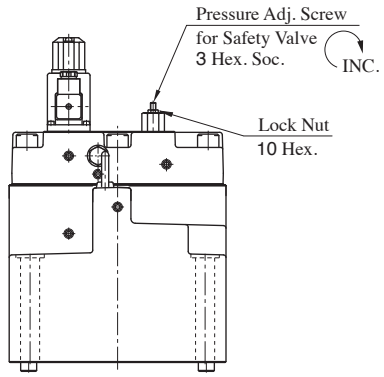


Approx. Mass ..... 76 kg

Models without Proportional Pilot Relief Valve

EFBG-10-1000(-E)-51



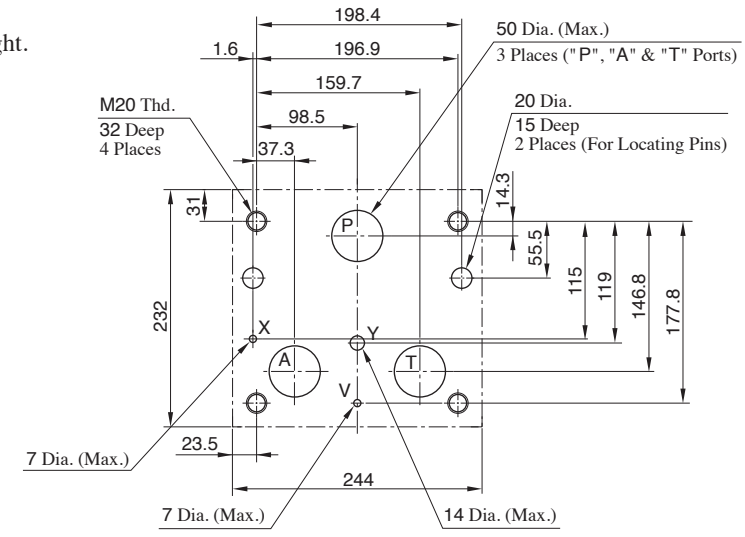


● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass ..... 74 kg

Dimensions of Valve Mounting Surface

Prepare a mounting surface as shown to the right. Also finish it finely. ($\frac{1.6}{\nabla}$)



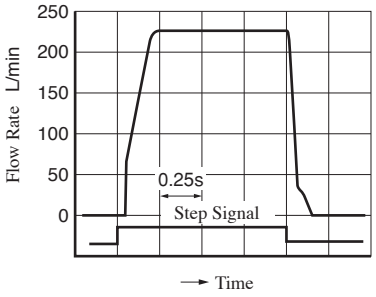
Step Response

Viscosity: 30mm²/s

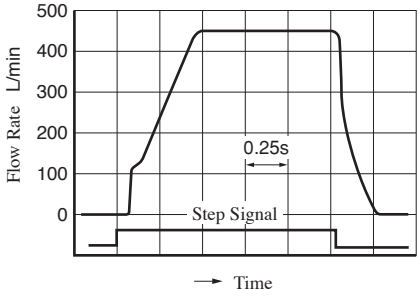
These characteristics have been obtained by measuring on each valve.
Therefore , they may vary according to a hydraulic circuit to be used.

Flow Controls

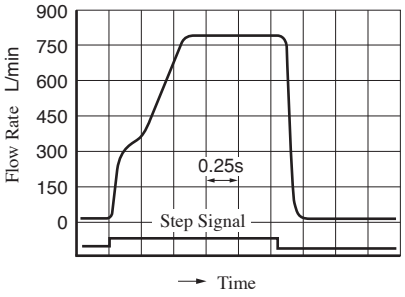
EFBG-03-250



EFBG-06-500

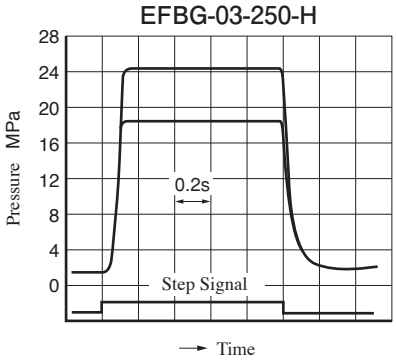


EFBG-10-1000

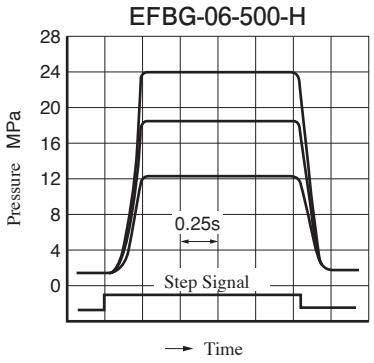


Pressure Controls

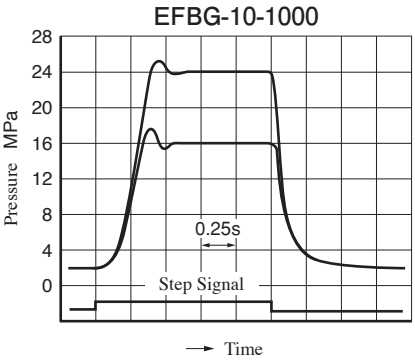
EFBG-03-250-H



EFBG-06-500-H



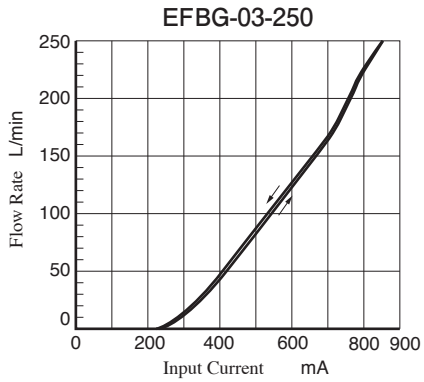
EFBG-10-1000



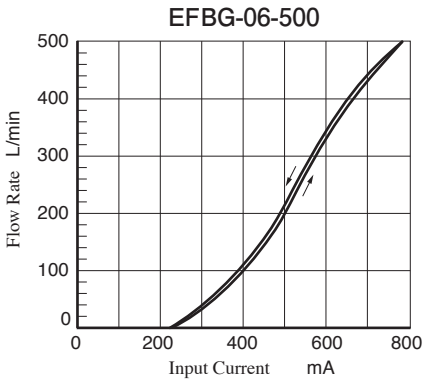
Input Current vs. Flow

Viscosity: 30mm²/s

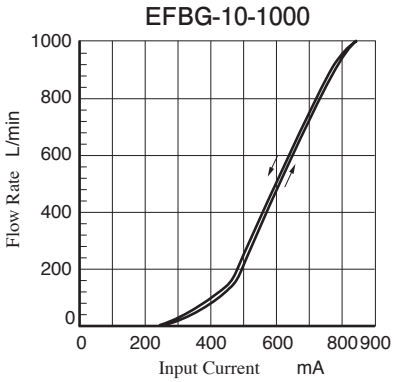
EFBG-03-250



EFBG-06-500



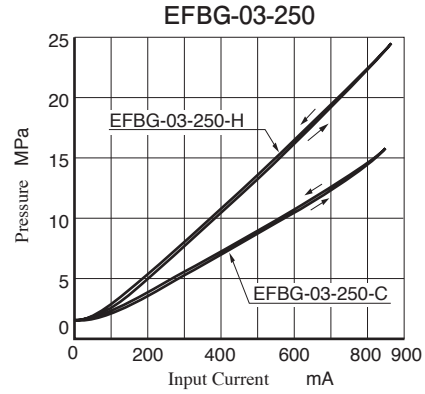
EFBG-10-1000



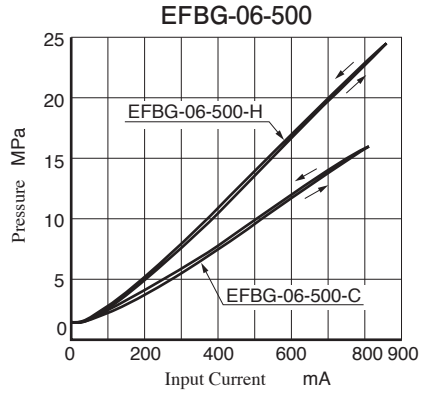
Input Current vs. Pressure

Viscosity: 30mm²/s

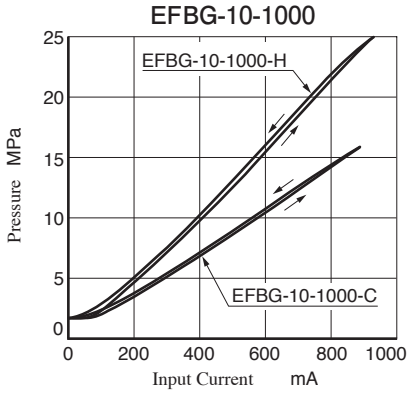
EFBG-03-250



EFBG-06-500

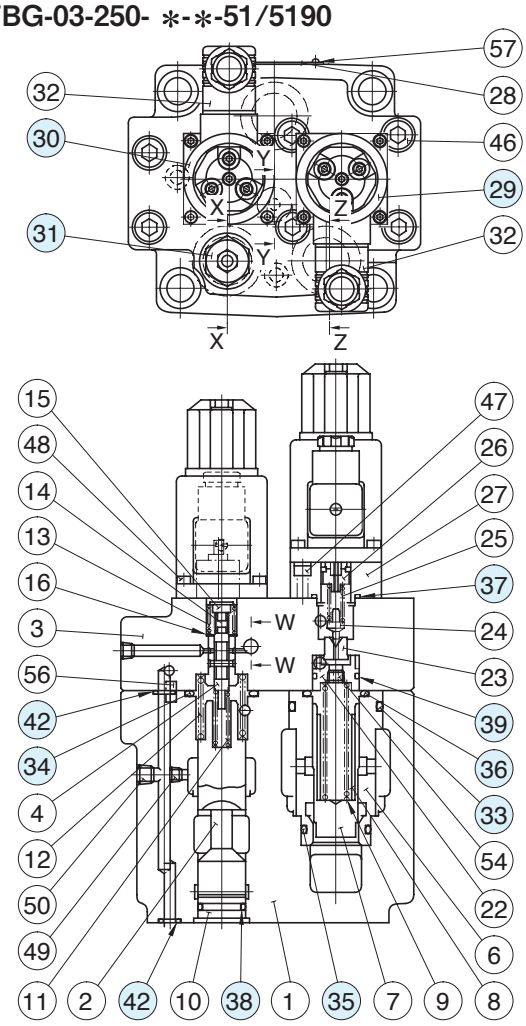


EFBG-10-1000

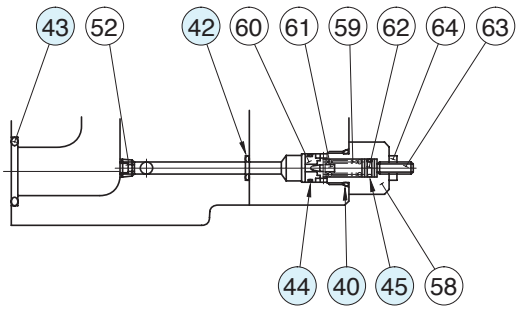


List of Seals, Solenoid Ass'y and Safety Valve

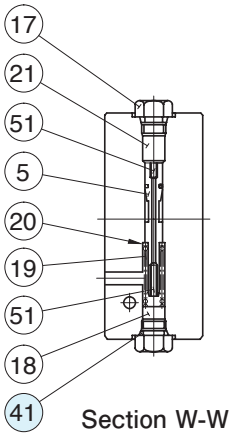
EFBG-03-250- ∗-∗-51/5190



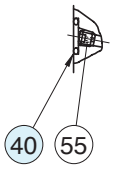
Detail of Safety Valve
(Item 31)



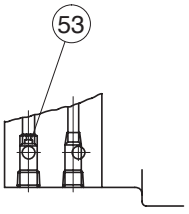
Section X-X



Section W-W



Section Y-Y



Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.
33	O-Ring	OR NBR-90 P42-N	1
34	O-Ring	OR NBR-90 P32-N	1
35	O-Ring	OR NBR-90 P30-N	1
36	O-Ring	OR NBR-90 P28-N	1
37	O-Ring	OR NBR-90 P22-N	1★
38	O-Ring	OR NBR-90 P21-N	1
39	O-Ring	OR NBR-90 P20-N	1★
40	O-Ring	OR NBR-90 P14-N	2
41	O-Ring	OR NBR-90 P11-N	2
42	O-Ring	OR NBR-90 P9-N	6
43	O-Ring	OR NBR-90 G30-N	3
44	O-Ring	AS568-013(NBR-90)	1
45	O-Ring	OR NBR-70-1 P6-N	1

★O-rings, item 37 and 39, are used only with the proportional pilot relief valve (EFBG-03-250-C/H).

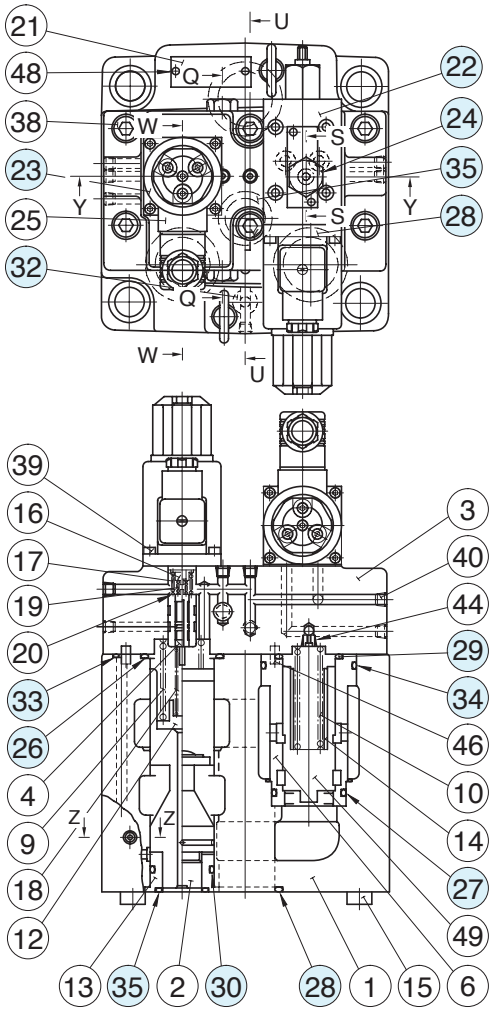
Solenoid Ass'y and Safety Valve

Valve Model Numbers	㉙ Solenoid Ass'y Model No.	㉚ Solenoid Ass'y Model No.	㉛ Safety Valve Model No.
EFBG-03-250-C/H(-E)-51	E318-Y06M1-04-61	E318-Y06M1-28-61	SB1094-2002
EFBG-03-250(-E)-51	—		

Note 1) For details on the solenoid ass'y, refer to proportional pilot relief valve (page H-97).
Note 2) The connector assembly GDM-211-B-11 (Item 32) is not included in the solenoid assembly.

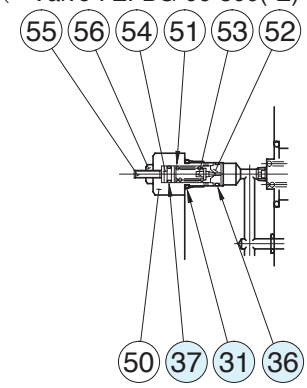
List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

EFBG-06-500- ∗-∗-51/5190

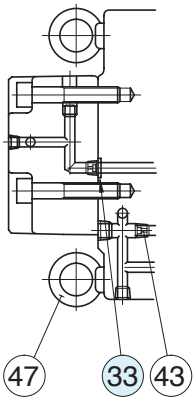


Detail of Safety Valve (Item 24)

Models Without Pilot Relief Valve : EFBG-06-500(-E)



Section S-S



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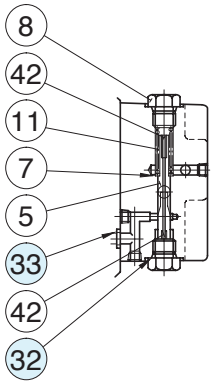

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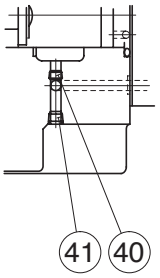

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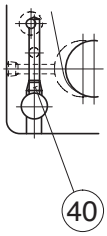


Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.
26	O-Ring	OR NBR-90 P46-N	1
27	O-Ring	OR NBR-90 P42-N	1
28	O-Ring	OR NBR-90 P40-N	3
29	O-Ring	OR NBR-90 P36-N	1
30	O-Ring	OR NBR-90 P34-N	1
31	O-Ring	OR NBR-90 P14-N	1★
32	O-Ring	OR NBR-90 P11-N	4
33	O-Ring	OR NBR-90 P9-N	4
34	O-Ring	OR NBR-90 G55-N	1
35	O-Ring	OR NBR-90 G30-N	2
36	O-Ring	AS568-013(NBR-90)	1★
37	O-Ring	OR NBR-70-1 P6-N	1★

★O-rings, item 31, 36 and 37, are used only without the proportional pilot relief valve [(EFBG-06-500(-E)].

Pilot Valve, Solenoid Ass'y and Sefety Valve

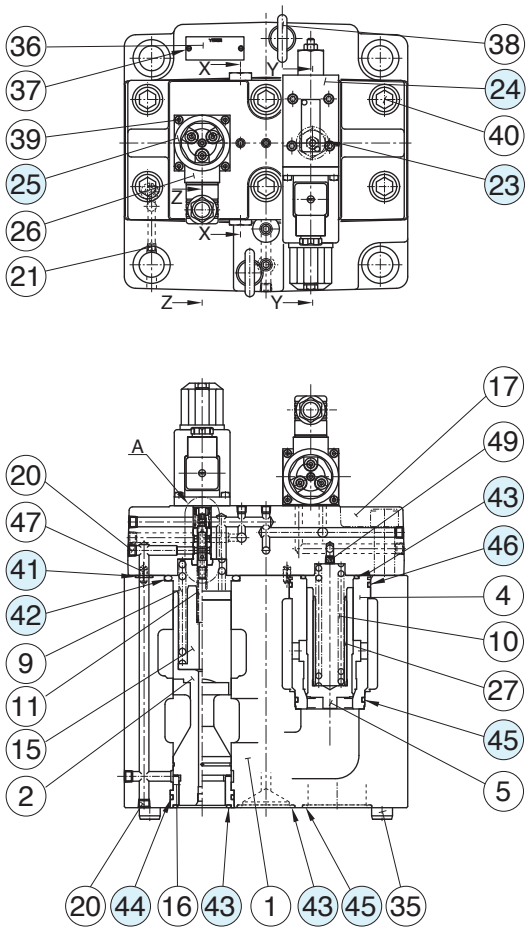
Valve Model Numbers	㉒ Pilot Valve Model Numbers	㉓ Solenoid Ass'y Model No.	㉔ Safety Valve Model No.
EFBG-06-500-C(-E)-51	EDG-01V-C-1-PNT11-5103	E318-Y06M1-28-61	—
EFBG-06-500-H(-E)-51	EDG-01V-H-1-PNT11-5103		—
EFBG-06-500(-E)-51	—		SB1094-2002

Note 1) For details on the pilot valves, refer to proportional pilot relief valve (page H-97).

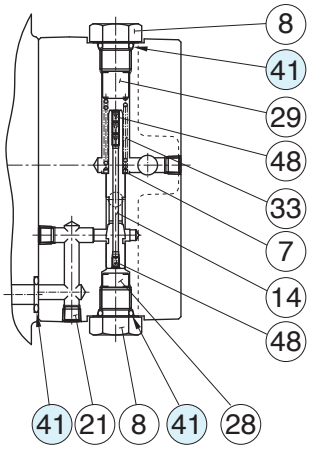
Note 2) The connector assembly GDM-211-B-11 (Item 25) is not included in the solenoid assembly.

List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

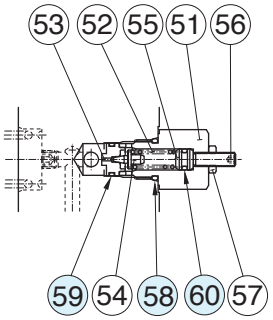
EFBG-10-1000-∗-∗-51



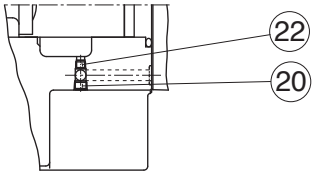
Detail of SafetyValve (Item 23)
〔Models Without Pilot Relief Valve : EFBG-10-1000(-E)〕



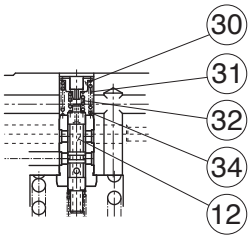
Section X-X



Section Y-Y



Section Z-Z



Detail A

List of Seals

Item	Name of Parts	Part Numbers	Qty.
41	O-Ring	OR NBR-90 P11-N	8
42	O-Ring	OR NBR-90 P55-N	1
43	O-Ring	OR NBR-90 G45-N	3
44	O-Ring	OR NBR-90 G50-N	1
45	O-Ring	OR NBR-90 G55-N	4
46	O-Ring	OR NBR-90 G65-N	1
58	O-Ring	OR NBR-90 P14-N	1★
59	O-Ring	AS568-013(NBR-90)	1★
60	O-Ring	OR NBR-70-1 P6-N	1★

★ O-rings, item 58, 59 and 60, are used only without the proportional pilot relief valve [EFBG-10-1000(-E)].

Pilot Valve, Solenoid Ass'y and Safety Valve

Valve Model Numbers	㉔ Pilot Valve Model Numbers	㉕ Solenoid Ass'y Model No.	㉓ Safety Valve Model No.
EFBG-10-1000-C(-E)-51	EDG-01V-C-1-PNT20-5197	E318-Y06M1-28-61	—
EFBG-10-1000-H(-E)-51	EDG-01V-H-1-PNT20-5197		—
EFBG-10-1000(-E)-51	—		SB1094-2002

Note 1) For details on the pilot valves, refer to proportional pilot relief valve (page H-97).
Note 2) The connector assembly GDM-211-B-11 (Item 25) is not included in the solenoid assembly.

Interchangeability between Current and New Design

EFBG-03/06/10 series valves have changed model from 50 to 51 design in line with the model change of solenoid ass'y.

Specifications and Characteristics

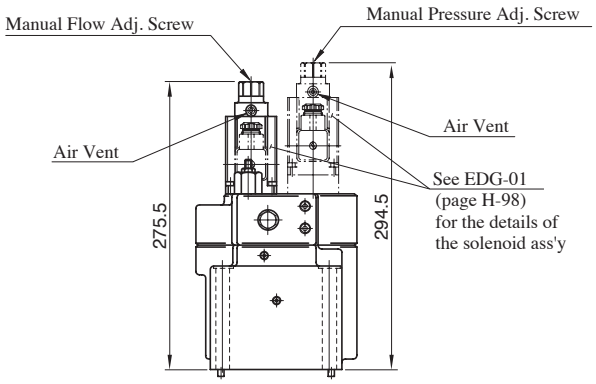
The input current and pressure–flow characteristics differ between the new and old models. Ask Yuken for details.
No changes in specifications and characteristics between current and new design.

Mounting Interchangeability

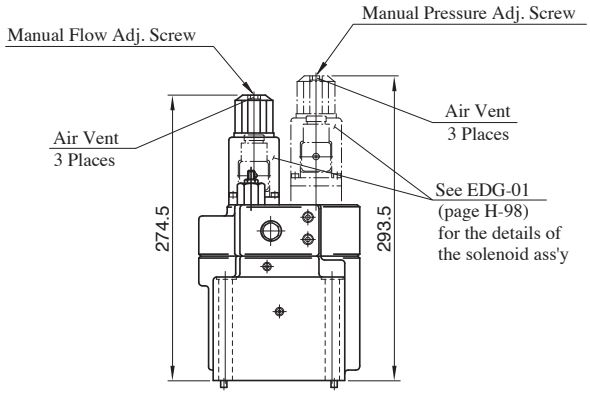
There is an interchangeability in the mounting dimensions between current and new design, however, note that because of improvements made on the solenoids, the overall shapes have been changed as shown below.

・EFBG-03

Current : Design 50

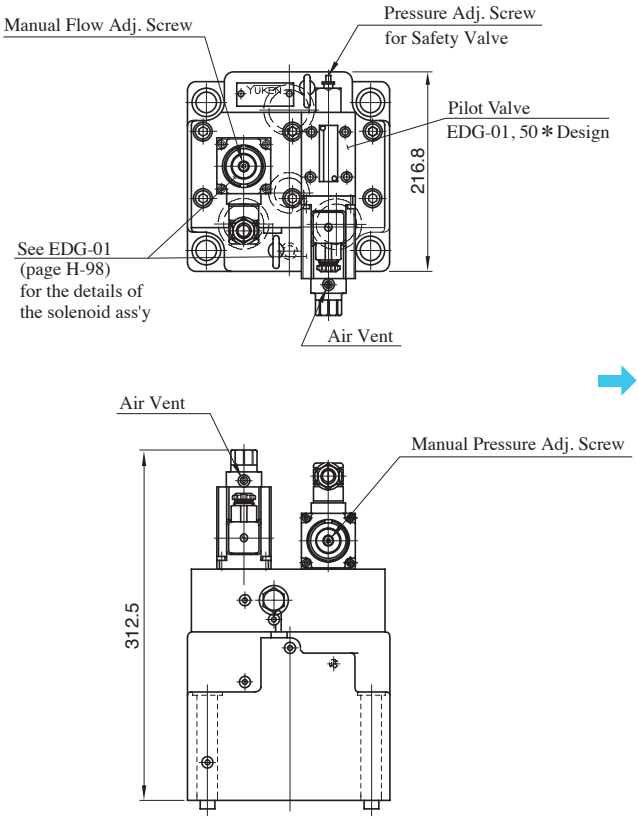


New : Design 51

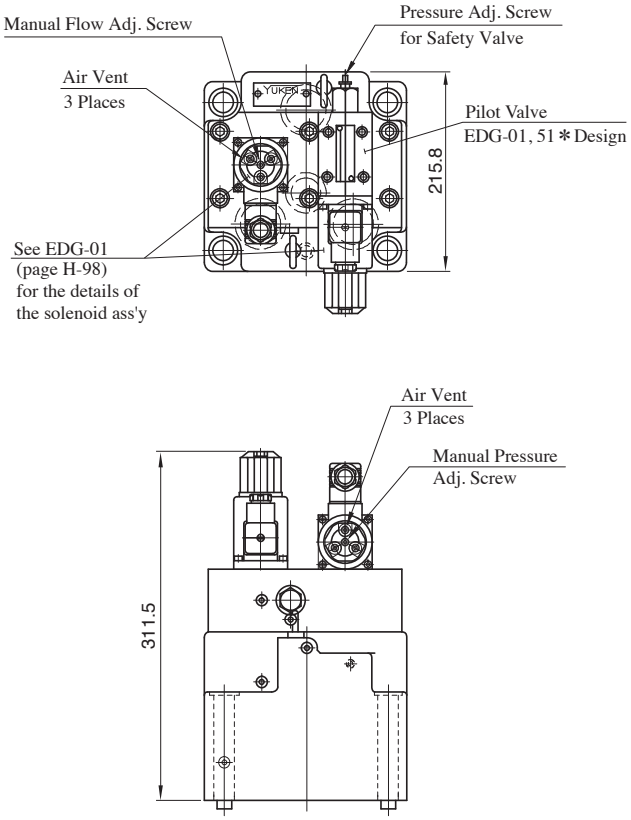


・EFBG-06/10

Current : Design 50



New : Design 51

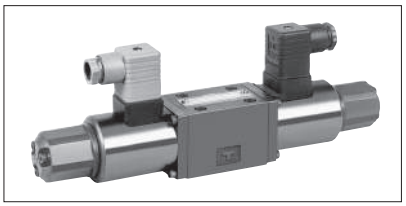


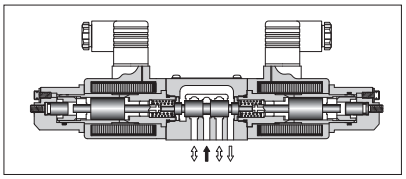
Shockless Type Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves are well accepted by industrial users as shifting time adjustable type shockless valves. By employing the basic design concept of the "G series solenoid operated directional valves", we have been successful developing the shifting time adjustable shockless valves with high performance which makes the speed setting possible at any high speed operation.
In combination with the newly developed digital amplifiers, the further enhancement of maneuverability and repeatability of the valves can be realized.

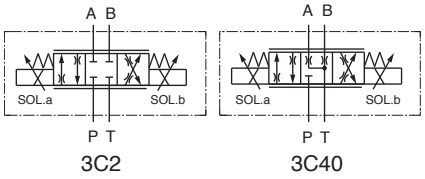
Specifications

Descriptions \ Model No.		EDFG-01
Max. Operating Pressure	MPa	25
Max. Flow	L/min	30
Max. Tank Line Back Pressure	MPa	14
Rated Current	mA	1100
Coil Resistance	Ω	10.8
Hysteresis		5% or less
Repeatability		1% or less
Step Response (Typical Rating) (0 ⇔ 100%)		100 ms or less
Frequency Response (50% ±25%)	Phase	20 Hz (–90 degree)
	Gain	25 Hz (–3 dB)
Approx. Mass	kg	2.4





Graphic Symbols



Model Number Designation

EDF	G	-01	-30	-3C2	-XY	-50
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type	Direction of Flow	Design Number
EDF: Shockless Type Proportional Directional and Flow Control Valve	**G:** Sub-Plate Mounting	**01**	**30**	**3C2** **3C40**	**XY:** Meter - in Meter - out	**50**

Accessories

Mounting Bolts

Soc. Hd. Cap Screw	Qty.	Tightening Torque Nm
M5 × 45 L	4	5~7

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-186).

Control Type	Model No.
Pattern Control	AMN-G-10
Analog Control	AMN-W-10

Sub-Plate

Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSGM-01-31	1/8	0.8
DSGM-01X-31	1/4	
DSGM-01Y-31	3/8	

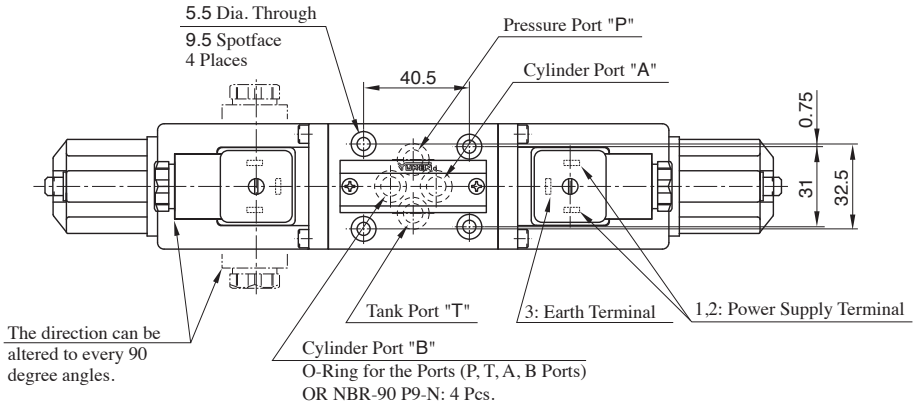
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)
- Sub-plates are those for 1/8 solenoid operated directional valves. For dimensoins, see page H-8.

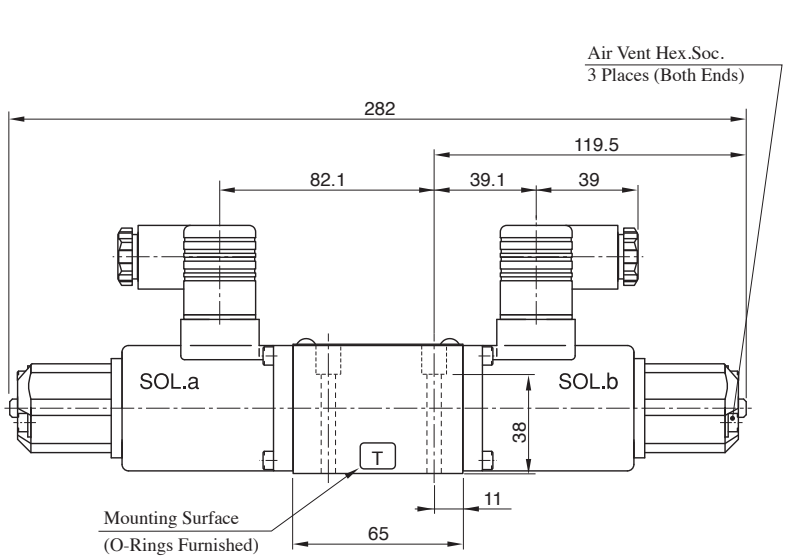
Instructions

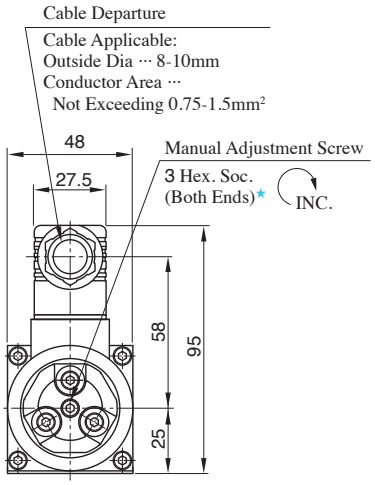
- During piping work, special care should be taken so that the tank port "T" is constantly filled with hydraulic fluid. Because back pressure is applied, using a check valve whose cracking pressure is about 0.04 MPa is recommended. Also, connect the tank port piping directly to the oil tank, but do not connect it other piping. For this reason, be sure to immerse the pipe end in fluid.
- In the event of an electrical failure or other emergency, the flow rate and oil flow direction can be switched by screwing in the manual adjustment screw. After operation, be sure to return the manual adjustment screw completely to the original position.

EDFG-01-30-3C∗-XY-50

Mounting Surface
ISO 4401-03-02-0-05





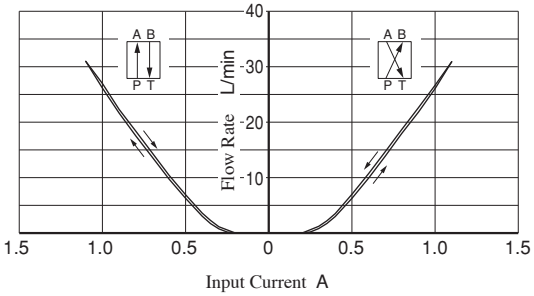


★ Under normal conditions, however, this screw must be kept in its original position.

Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-8) in common use.

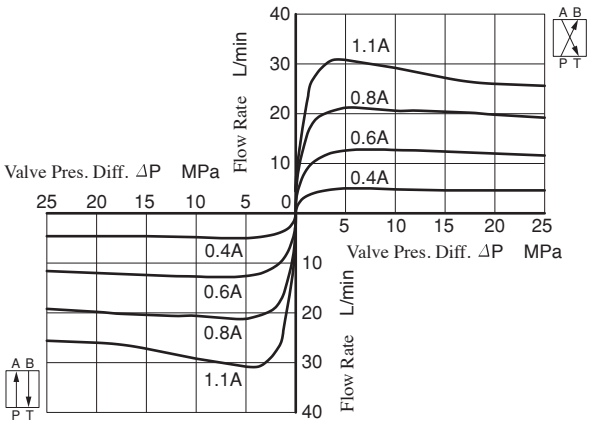
Input Current vs. Flow

Viscosity: 30mm²/s
Valve Pres. Difference: 7 MPa



Valve Pressure Difference vs. Flow

Viscosity: 30mm²/s



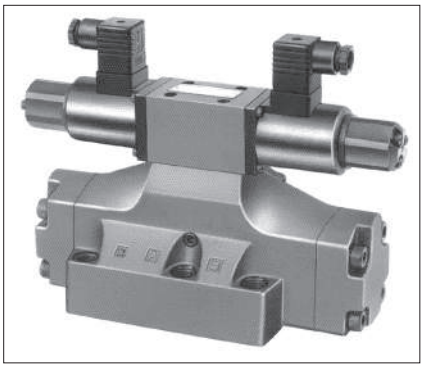
Proportional Electro-Hydraulic Directional and Flow Control Valves

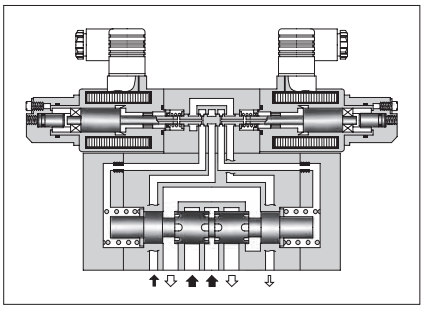
These valves are double-deck directional and flow control valves employing as their pilot the electro-hydraulic proportional pressure reducing valves with two proportional solenoids. The flow rate can be controlled by changing an input current to the solenoids and the direction of the flow can be controlled by providing the current to either solenoid of the two.
By combining the valves with the power amplifiers specially designed for the valves, the speed control, acceleration, deceleration and directional control can be done with a single valve, which eventually makes the hydraulic circuits simple and contributes the cost of the hydraulic systems.

Specifications

Descriptions \ Model No.		EDFHG-03	EDFHG-04	EDFHG-06
Max. Operating Pressure	MPa	25		
Rated Flow ★1 at Valve Pressure Difference: 1.0 MPa	L/min	100	140	280
Pilot Pressure ★2	MPa	1.5 - 16		
Pilot Flow L/min	at Normal	1	1	1
	at Transition	3	4	6
Max. Tank Line Back Pressure	MPa	16	21	21
Max. Drain Line Back Pressure ★3	MPa	3.0		
Rated Current	mA	800	980	900
Coil Resistance	Ω	10		
Hysteresis		5% or less ★4		
Repeatability		1% or less ★4		
Approx. Mass	kg	11	12	15

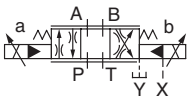
★1. The rated flow rate is valid at a differential pressure of 1.0 MPa of "P→A(B)" or "A(B)→T."
★2. Take care to keep the difference between the pilot pressure and drain port back pressure consistently greater than 1.5 MPa.
★3. To obtain stable performance, keep the drain port back pressure low and minimize its fluctuations.
★4. The hysteresis and repeatability values indicated in the specifications for each control valve are determined under the following conditions:
- Hysteresis Value: Obtained when Yuken's applicable power amplifier is used.
- Repeatability Value: Obtained when Yuken's applicable power amplifier is used under the same conditions.



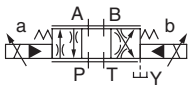


Graphic Symbols

External Pilot Type



Internal Pilot Type



Model Number Designation

EDFH	G	-03	-100	-3C2	-XY	-E	-31
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type★1	Direction of Flow	Pilot Connection	Design Number
EDFH: Proportional Electro-Hydraulic Directional and Flow Control Valves	**G:** Sub-Plate Mounting	**03**	**100**	**3C2** **3C40**	**XY:** Meter-in Meter-out	**E:** External Pilot **None:** Internal Pilot	**31**
		04	**140**				**31**
		06	**280**				**31**

★1. Spool type shown in the column is for the center position.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw	Qty.	Tightening Torque Nm
EDFHG-03	M6 × 35 L	4	12 - 15
EDFHG-04	M6 × 45 L	2	12 - 15
	M10 × 50 L	4	58 - 72
EDFHG-06	M12 × 60 L	6	100 - 123

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
EDFHG-03	DHGM-03Y-10	3/4	4.7
EDFHG-04	DHGM-04-20	1/2	4.4
	DHGM-04X-20	3/4	4.1
EDFHG-06	DHGM-06-50	3/4	7.4
	DHGM-06X-50	1	

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽6.3)
- Sub-plates are those for solenoid controlled pilot operated directional valves. For details, contuct us.

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-188).
Model Numbers: SK1091-D24-10

Instructions

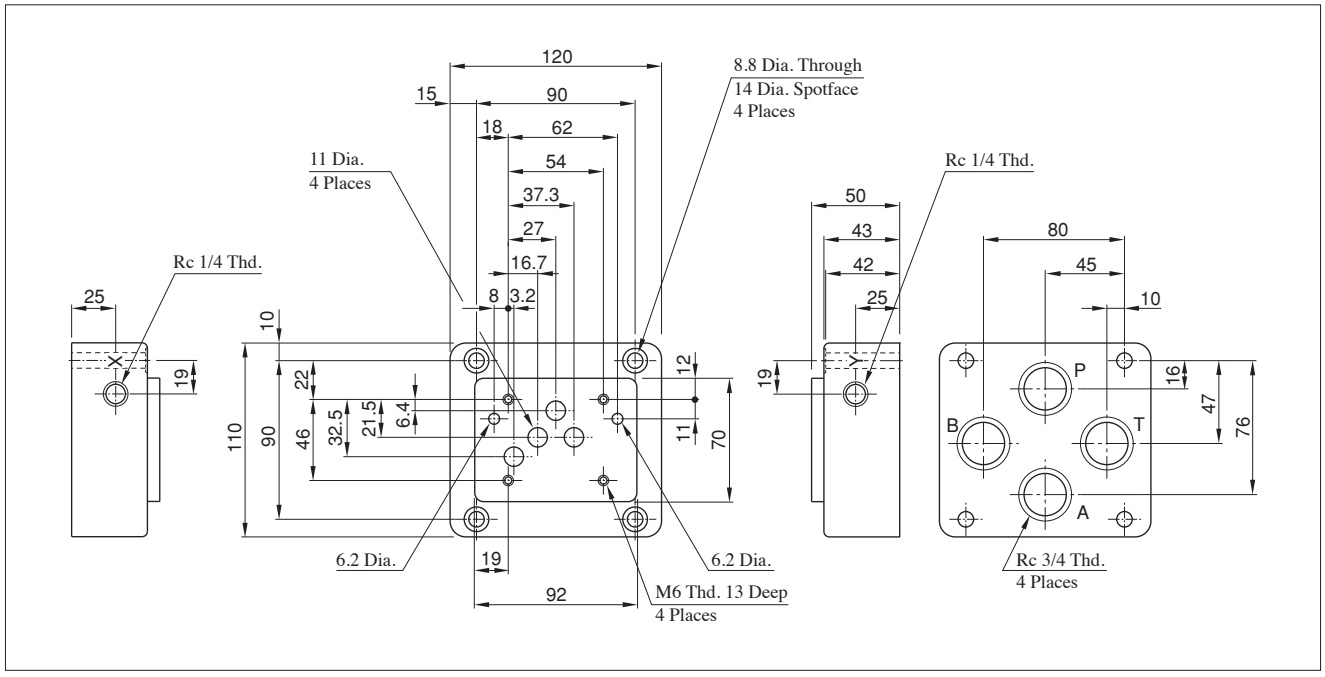
Manual Adjustment

In the event of an electric fault or emergency, a manual shift can be made by screwing in the manual adjustment screw.
Take care, however, that this manual shift has no flows adjusting function.
For this operation, set the pilot pressure (or P-port pressure on an internal-pilot model) below 7 MPa.
After operation, be sure to return the manual adjustment screw completely to the original position.

During Piping

During piping work, special care should be taken so that the tank port “T” is constantly filled with hydraulic fluid.
Because back pressure is applied, using a check valve whose cracking pressure is about 0.04 MPa is recommended.
Also, connect the tank port piping directly to the oil tank, but do not connect it other piping. For this reason, be sure to immerse the pipe end in fluid.

Sub Plates: DHGM-03Y

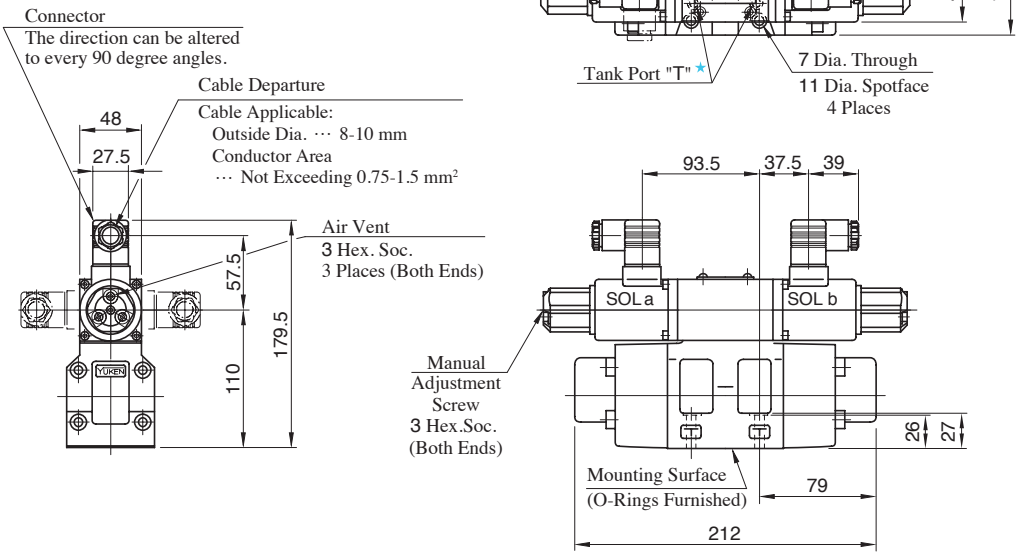


Mounting Surface: Conform to ISO 4401-05-05-0-05

EDFHG-03

★ Of the two tank ports "T", the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-158) in common use.

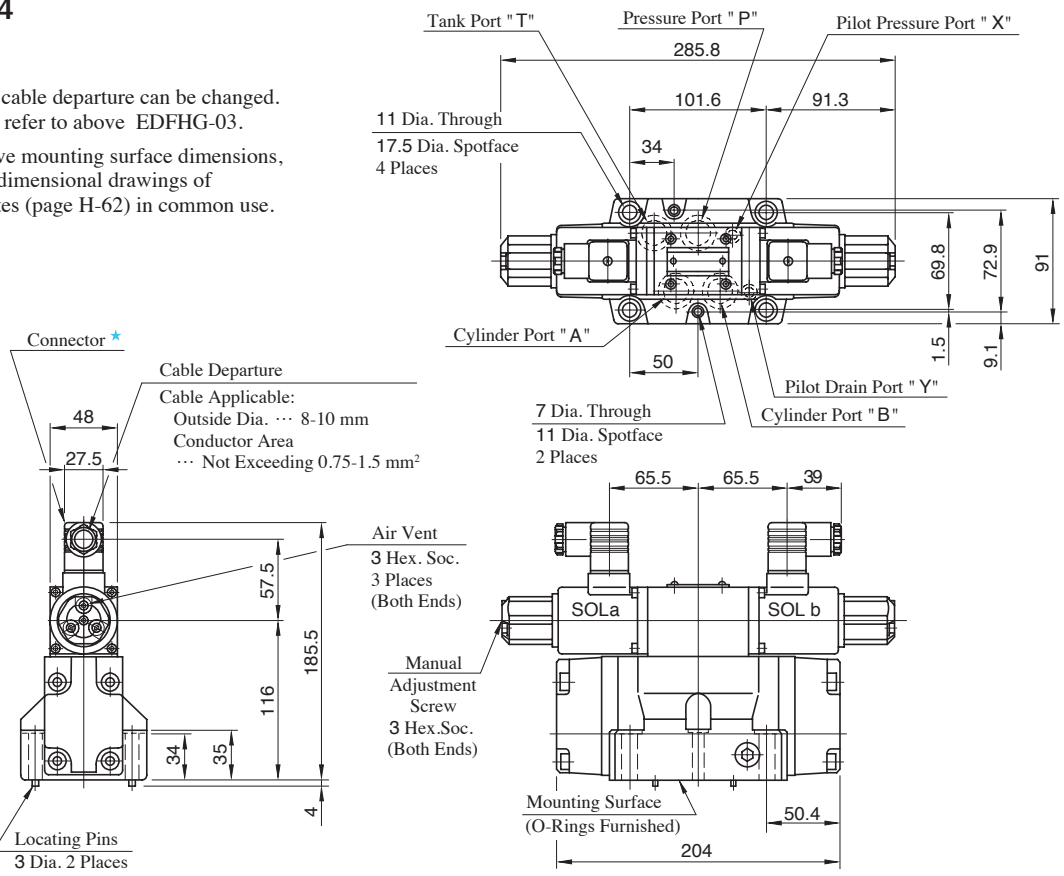


Mounting Surface: Conform to ISO 4401-07-07-0-05

EDFHG-04

★ Position of cable departure can be changed. For details, refer to above EDFHG-03.

Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-62) in common use.

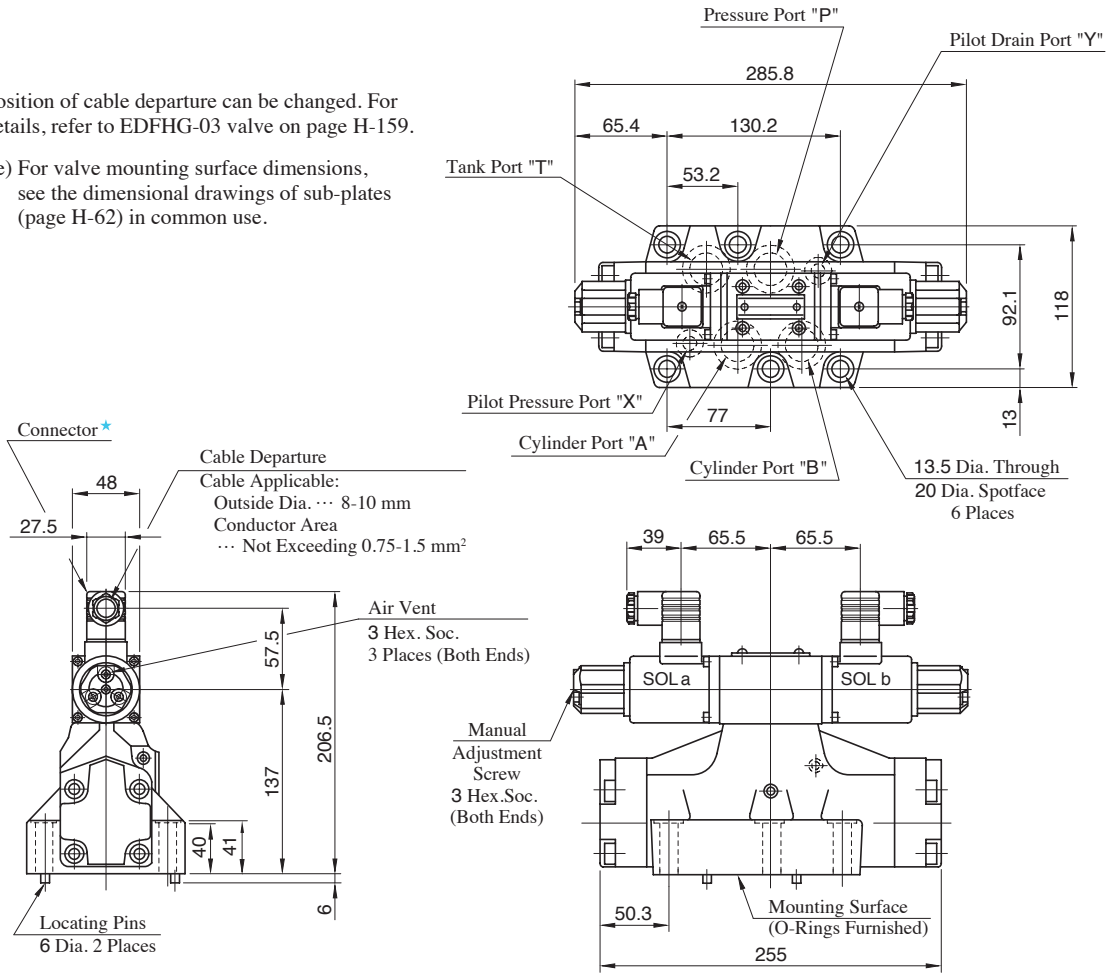


EDFHG-06

Mounting Surface: Conform to ISO 4401-08-08-0-05

★Position of cable departure can be changed. For details, refer to EDFHG-03 valve on page H-159.

Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-62) in common use.



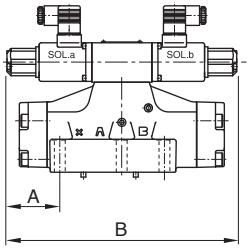
Interchangeability between Current and New Design

Specifications and Characteristics

The input current and flow characteristics differ between the new and old models. Consult Yuken for details.
Also, There is no change in specifications and characteristics between current and new design.

Installation Interchangeability

There is an interchangeability in the mounting dimensions between current and new design, however, note that because of improvements made on the solenoids, the overall shapes and dimensions have been changed as shown below.

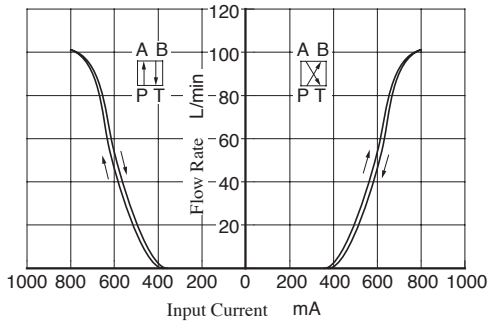


Model Numbers		A	B
(Current)	EDFHG-03-100-＊-＊-＊-30	117.9	287.8
(New)	EDFHG-03-100-＊-＊-＊-31	116.9	285.8
(Current)	EDFHG-04-140-＊-＊-＊-30	93.9	287.8
(New)	EDFHG-04-140-＊-＊-＊-31	92.9	285.8
(Current)	EDFHG-06-280-＊-＊-＊-30	66.4	287.8
(New)	EDFHG-06-280-＊-＊-＊-31	65.4	285.8

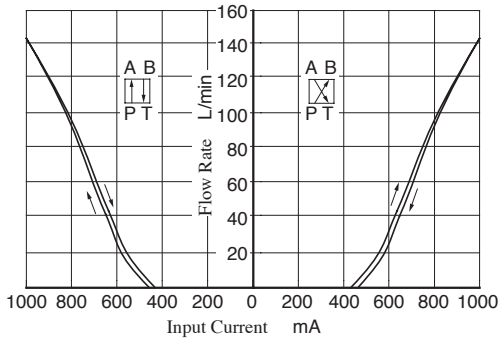
Input Current vs. Flow

Viscosity : 30 mm²/s
Valve Pres. Difference : P→A (B), B (A) →T 1 MPa

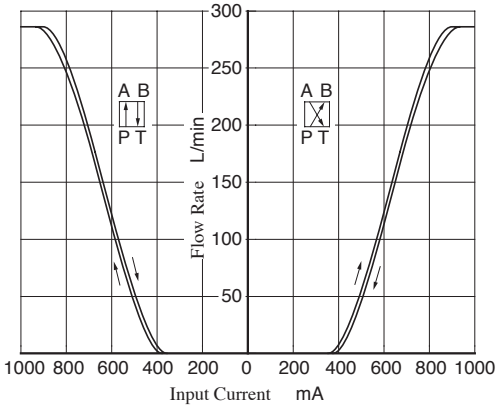
EDFHG-03



EDFHG-04



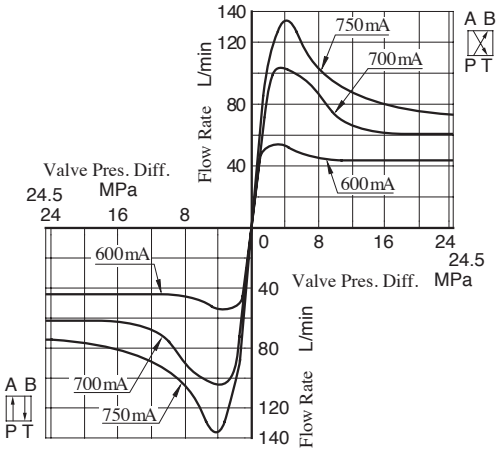
EDFHG-06



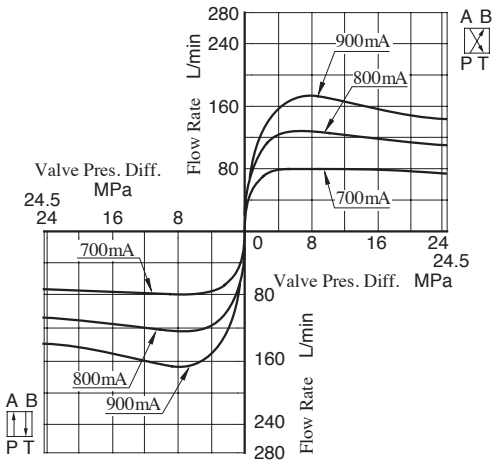
Valve Pressure Difference vs. Flow

Viscosity : 30 mm²/s

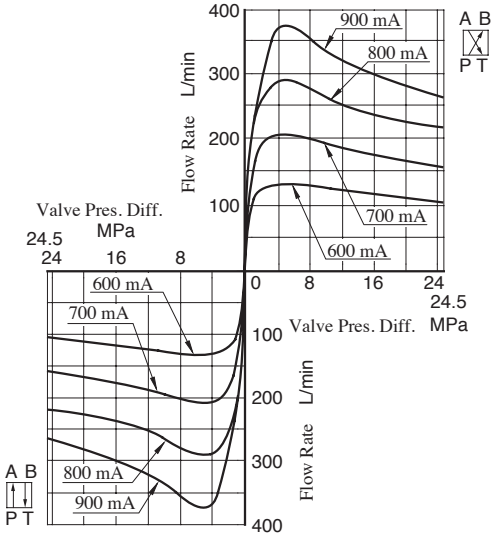
EDFHG-03



EDFHG-04

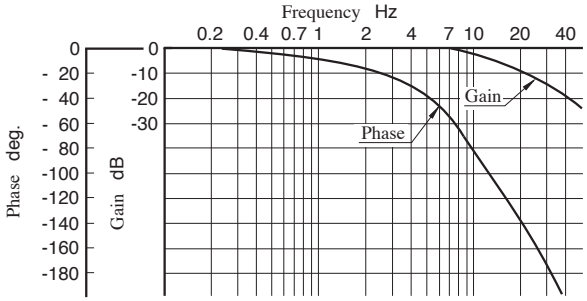


EDFHG-06



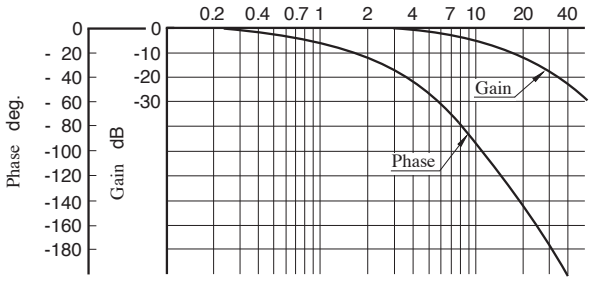
Frequency Response

EDFHG-03



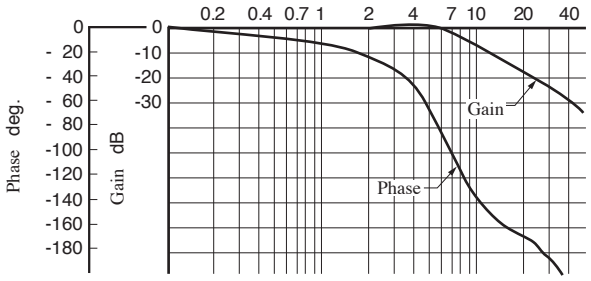
Model Number : EDFHG-03-100-3C2-E-31
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Maximum Stroke

EDFHG-04



Model Number : EDFHG-04-140-3C2-E-31
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Maximum Stroke

EDFHG-06



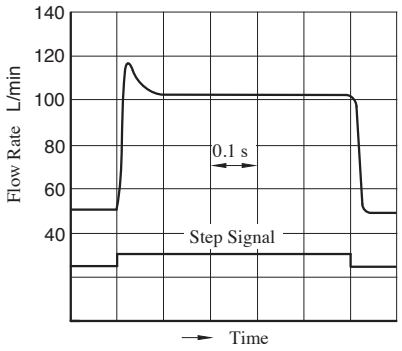
Model Number : EDFHG-06-280-3C2-E-31
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Maximum Stroke

Step Response

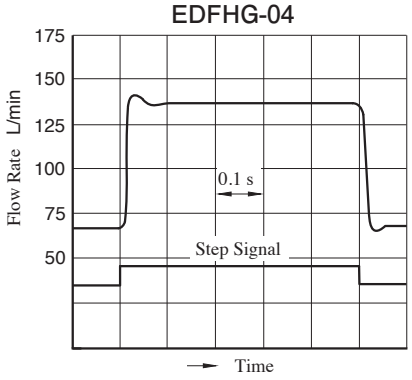
These characteristics have been obtained by measuring on each valve. Therefore, they may vary according to a hydraulic circuit to be used.

Viscosity : 30 mm²/s
Supply Pressure : 15.7 MPa

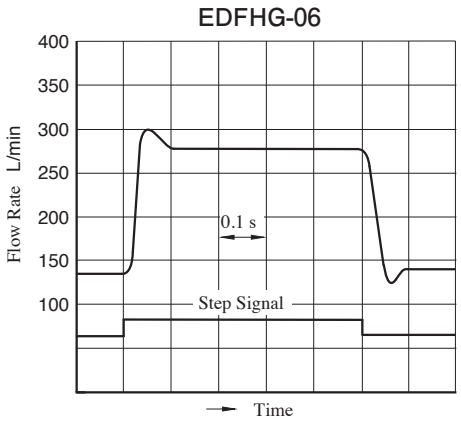
EDFHG-03



EDFHG-04



EDFHG-06



High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

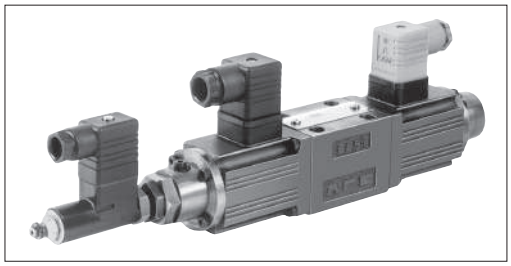
High response, high precision and high reliability are achieved by a combination of a compact and powerful solenoid and a spool-position-detection LVDT.
Direct type ELDFG-01/03 and two stage type ELDFG-04/06 (which use the ELDFG-01 as a pilot) are available.

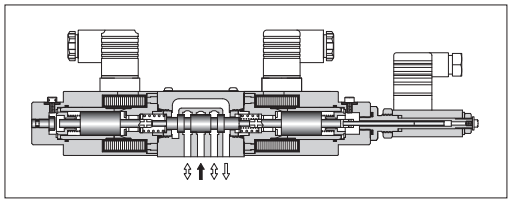
Direct Operated Type Directional and Flow Control Valves

This product can be interchanged with the simplified servo valve to perform position control and pressure control.
Compared to nozzle flapper type servo valve, this product has excellent contamination-related problems.

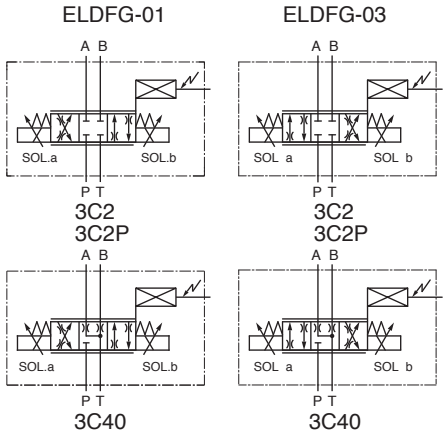
Specifications

Descriptions \ Model No.		ELDFG-01	ELDFG-03
Max. Operating Pressure	MPa	31.5	
Max. Tank Line Back Pressure	MPa	21	
Rated Flow Valve Pres. Diff. : 1.5 MPa	L/min	**10**: 10 **20**: 20 **35**: 35	**40**: 40 **80**: 80
Hysteresis		0.5% or less	
Repeatability		0.5% or less	
Step Response (Typical Rating)	0 → 100%	30 ms	**3C2, 3C40**: 29 ms **3C2P**: 25 ms
	100 → 0%	—	**3C2, 3C40**: 26 ms **3C2P**: 23 ms
Frequency Response (0 ± 25 %V)	Phase -90 degree	48 Hz	**3C2, 3C40**: 36 Hz **3C2P**: 41 Hz
	Gain -3 dB	52 Hz	**3C2, 3C40**: 35 Hz **3C2P**: 38 Hz
Rated Current	A	Max. 2.5	Max. 3
Coil Resistance [20°C]	Ω	3.9	3
Power Input	W	Max. 25	Max. 27
Approx. Mass	kg	3.2	7.5



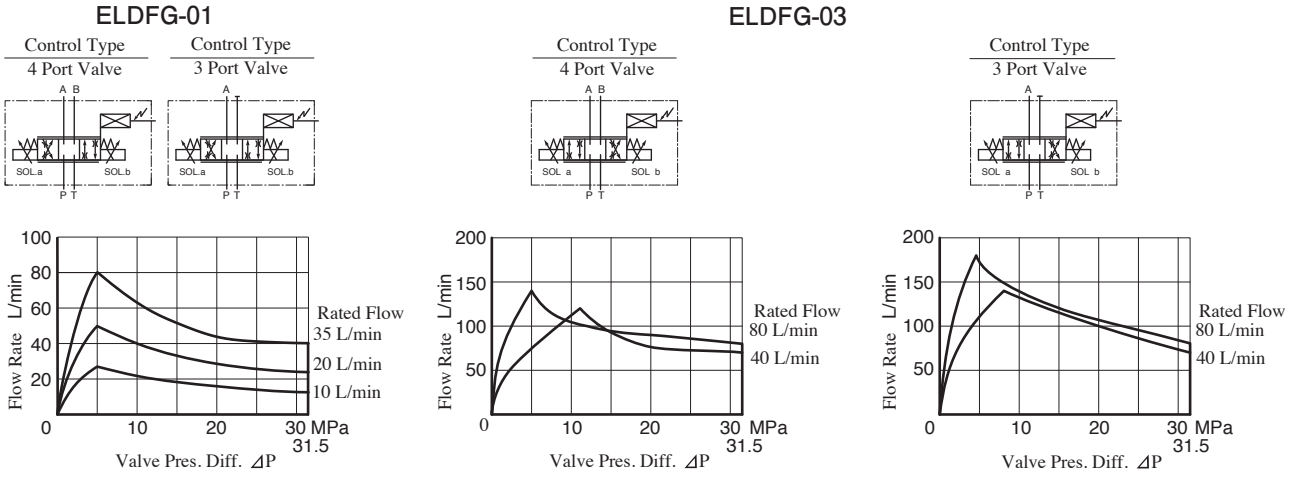


Graphic Symbols



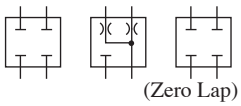
Range of Flow Control

See “Valve Pres. Difference vs. Flow Rate” below charactristics for the appropriate range.



★ Valve pressure difference “⊿P” is reference by follows. In addition, “P”, “A”, “B”, “T”, are pressure of each port.
4 Port Valve: ⊿P = [(P–A) + (B–T)] or [(P–B) + (A–T)]
3 Port Valve: ⊿P = (P–A) or (A–T)

Model Number Designation

ELDF	G	-01	-35	-3C2	-XY	-10
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type	Direction of Flow	Design Number
ELDF: High Response (Direct) Type Proportional Electro-Hydraulic Directional and Flow Control Valves	**G:** Sub-Plate Mounting	**01**	**10** **20** **35**	3C2 3C40 3C2P  (Zero Lap)	**XY:** Meter-in Meter-out	**10**
		03	**40** **80**			**10**

Accessories

Mounting Bolts

Four socket head cap screws in the table below are included.

Model No.	Socket Head Cap Screw	Qty.	Tightening Torque
ELDFG-01	M5 × 45 L	4	5 - 7 Nm [Applicable to working pressure more than 25 MPa: 6 - 7 Nm]
ELDFG-03	M6 × 35 L	4	12 - 15 Nm

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
ELDFG-01	DSGM-01-31	1/8	0.8
	DSGM-01X-31	1/4	
	DSGM-01Y-31	3/8	
ELDFG-03	DSGM-03-40	3/8	3.0
	DSGM-03X-40	1/2	
	DSGM-03Y-40	3/4	4.7

- Sub-plates are available. Specify the sub-plate model number from the table above.
  When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)
- The Sub-plates are those for 1/8 and 3/8 solenoid operated directional valves. For dimensions, see pages H-8 and H-53.

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-190).

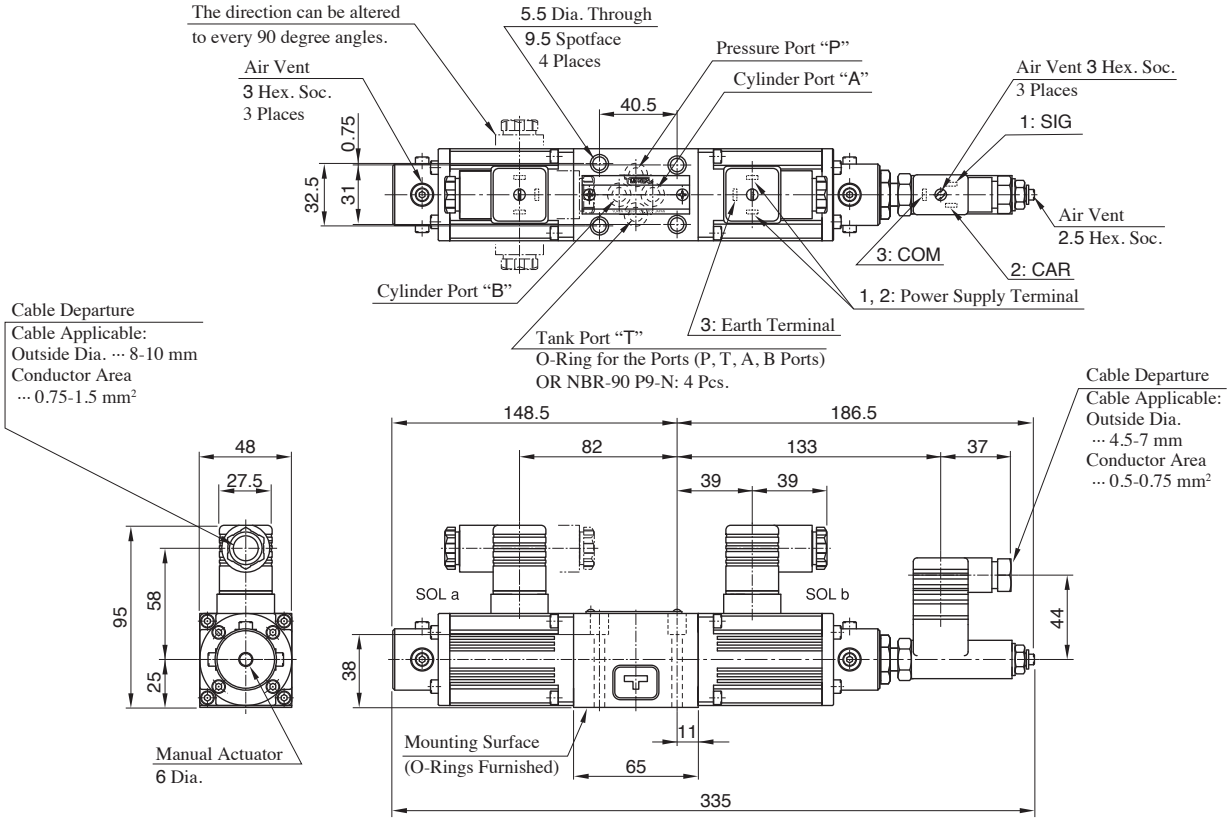
Valve Model Numbers	Power Amplifier Model Numbers
ELDFG-01-∗-3C2 3C40	AMN-L-01-1-10 AMB-EL-01-★-∗-20
ELDFG-01-∗-3C2P	AMN-L-01-3-2P-10 AMB-EL-01-2P-★-∗-20
ELDFG-03-∗-3C2 3C40	AMB-EL-03-1-∗-20
ELDFG-03-∗-3C2P	AMB-EL-03-2P-1-∗-20

Instructions

During piping work, special care should be taken so that the tank port “T” is constantly filled with hydraulic fluid. Because back pressure is applied, using a check valve whose cracking pressure is about 0.04 MPa is recommended. Also, connect the tank port piping directly to the oil tank, but do not connect it other piping. For this reason, be sure to immerse the pipe end in fluid.

ELDFG-01-∗-∗ -XY-10

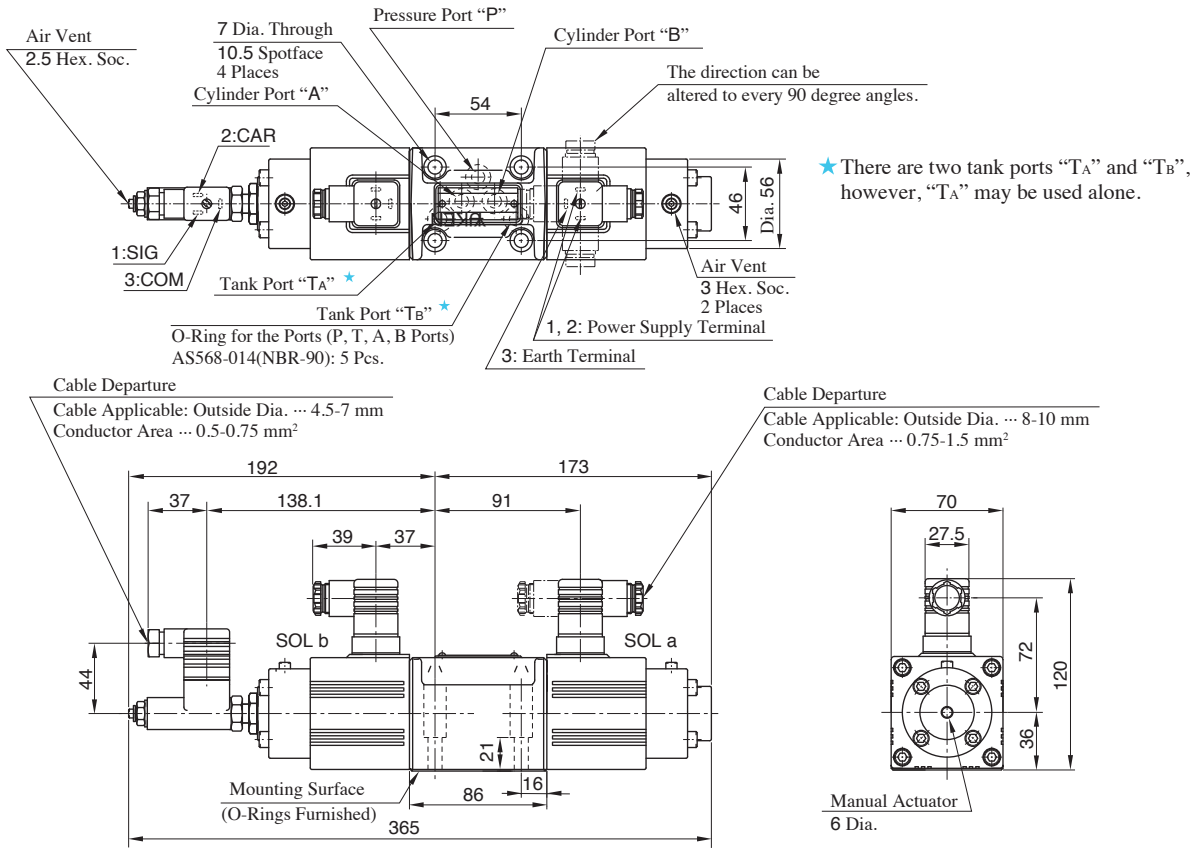
Mounting Surface: Conform to ISO4401-03-02-0-05



Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-8) in common use.

ELDFG-03-∗-∗ -XY-10

Mounting Surface: Conform to ISO4401-05-04-0-05

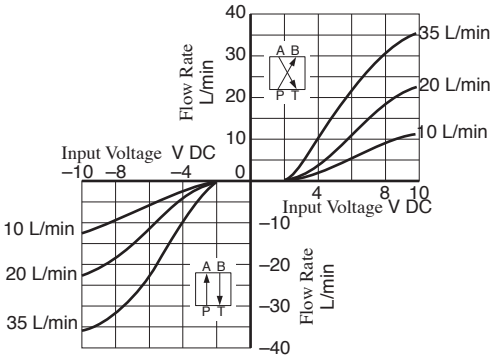


Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-53) in common use.

Input Voltage vs. Flow Rate

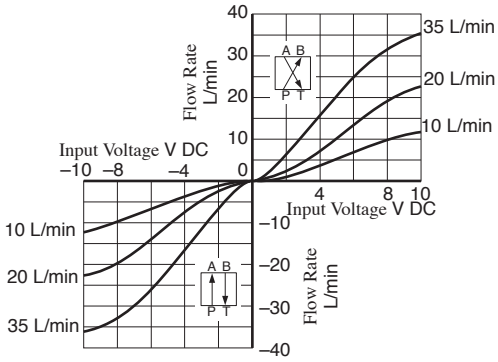
ELDFG-01-∗-3C2/3C40

Valve Pres. Diff. : 1.2 MPa
Viscosity : 30 mm²/s



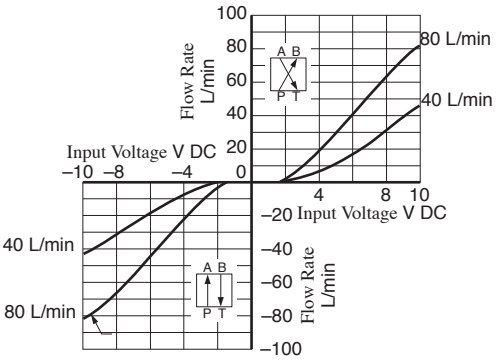
ELDFG-01-∗-3C2P

Valve Pres. Diff. : 1.2 MPa
Viscosity : 30 mm²/s



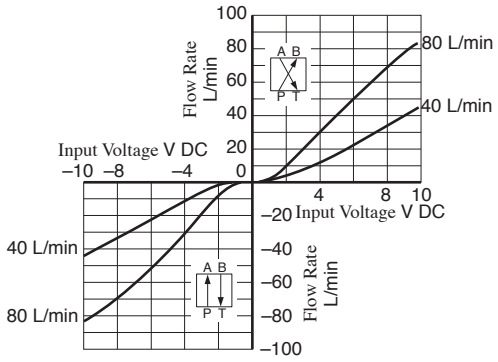
ELDFG-03-∗-3C2/3C40

Valve Pres. Diff. : 1.5 MPa
Viscosity : 30 mm²/s



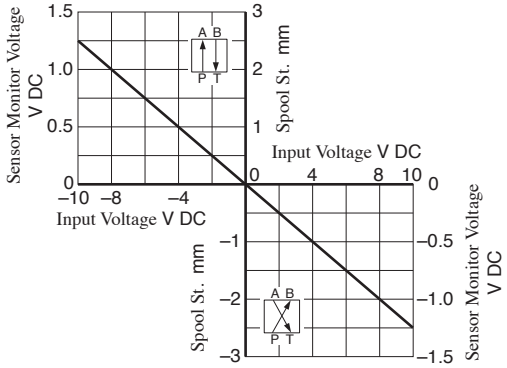
ELDFG-03-∗-3C2P

Valve Pres. Diff. : 1.5 MPa
Viscosity : 30 mm²/s

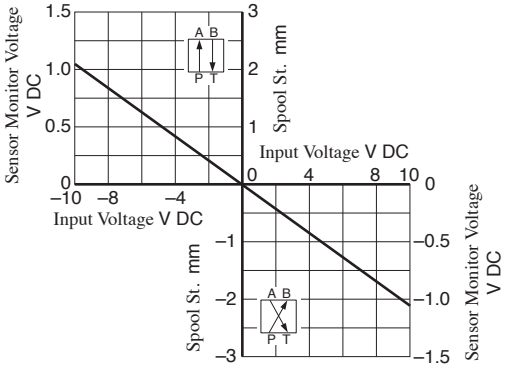


Input Voltage vs. Spool St.

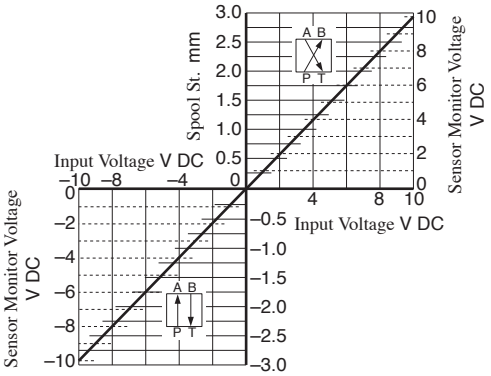
ELDFG-01-∗-3C2/3C40



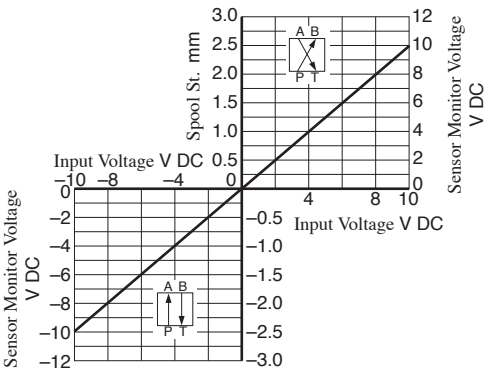
ELDFG-01-∗-3C2P



ELDFG-03-∗-3C2/3C40



ELDFG-03-∗-3C2P



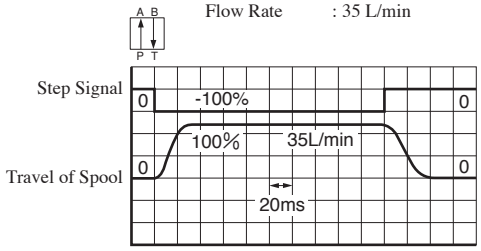
Step Response (Example)

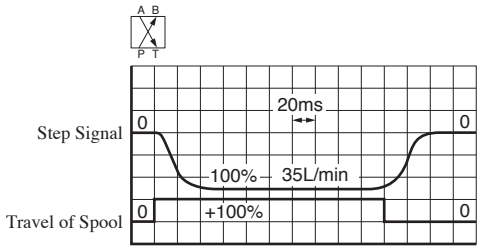
Viscosity : 30 mm²/s

The values were measured on independent valves. They vary by circuit.

ELDFG-01-35-3C2/3C40

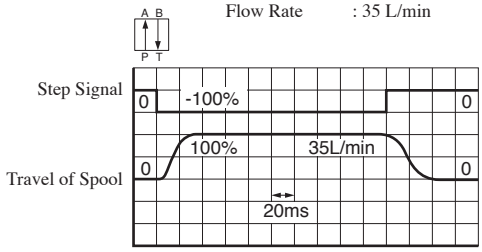
Supply Pressure : 2 MPa
Flow Rate : 35 L/min

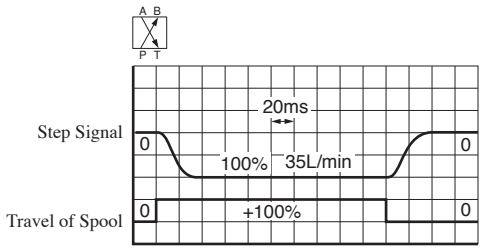




ELDFG-01-35-3C2P

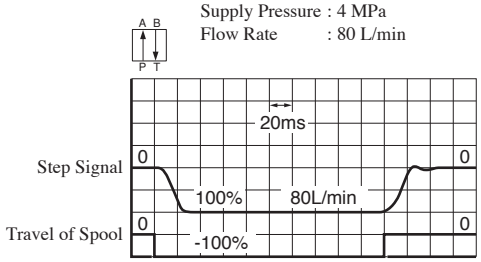
Supply Pressure : 2 MPa
Flow Rate : 35 L/min

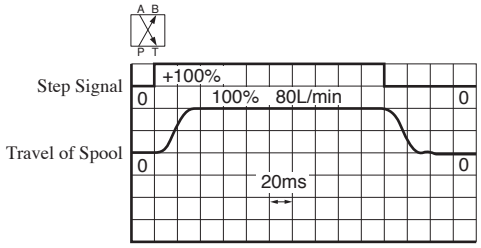




ELDFG-03-80-3C2/3C40

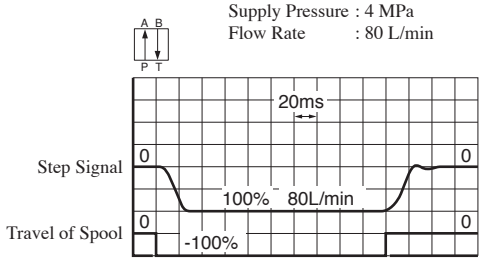
Supply Pressure : 4 MPa
Flow Rate : 80 L/min

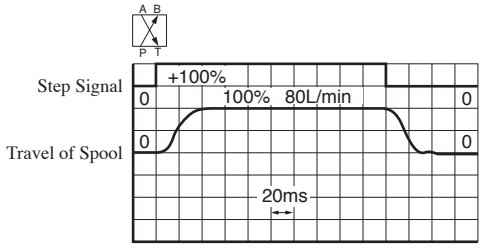




ELDFG-03-80-3C2P

Supply Pressure : 4 MPa
Flow Rate : 80 L/min

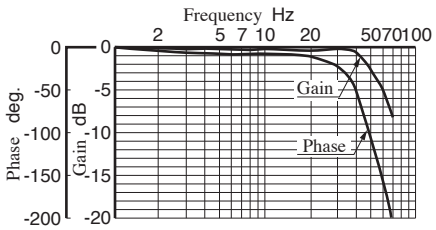




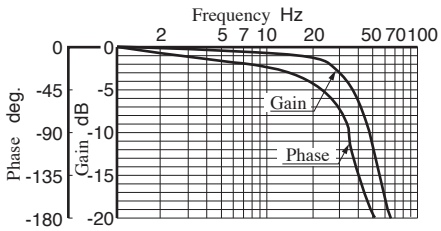
Frequency Response

Input Signal : 0 ± 25 %V
Primary Pressure : 14 PMa
Viscosity : 30 mm²/s

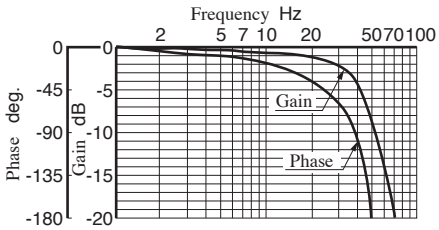
ELDFG-01-35-3C2/3C40/3C2P



ELDFG-03-80-3C2/3C40



ELDFG-03-80-3C2P

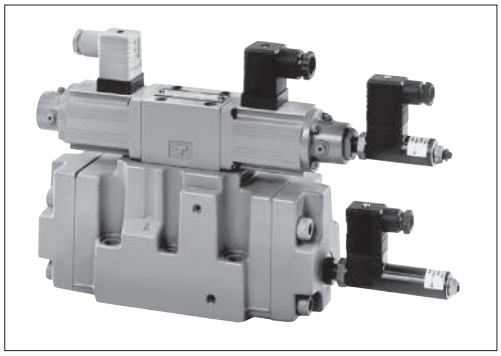


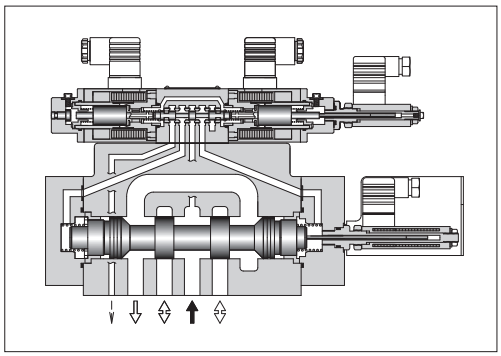
Two Stage Type Directional and Flow Control Valves

Specifications

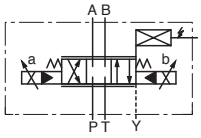
Descriptions \ Model No.		ELDFHG-04	ELDFHG-06
Rated Flow Valve Pres. Diff. : 1 MPa	L/min	280	350 500
Max. Operating Pressure	MPa	35	350: 35 500: 31.5
Proof Pressure at Return Port ★1 (External Drain)	MPa	"T" Port : 31.5 "Y" Port : 21	350 "T" Port : 35 "Y" Port : 21 500 "T" Port : 25 "Y" Port : 21
Proof Pressure at Return Port (Internal Drain)	MPa	21	
Pilot Pressure ★2	MPa	1.5-31.5	
Pilot Flow ★3		16 L/min or more	350: 16 L/min or more 500: 19 L/min or more
Null Leakage ★4	Ps=14 MPa, Pp=14 MPa	3C2: 3 L/min or less 3C2P: 10 L/min or less	3C40: 4 L/min or less
Step Response (0↔100%)	(Typical Rating) Pp=14 MPa	13 ms	350: 15 ms 500: 18 ms
Frequency Response (0±25%V, Phase) Pp=14 MPa		46 Hz (–90 degree)	350: 40 Hz 500: 39 Hz (–90 degree)
Water - Proofness		IP64	
Operating Temperature Range		–15 - +60 °C	
Spool Type		3C2: 3C2P: (Zero Rap) 3C40:	
Approximate Spool Stroke to Stops		±5 mm	350: ±5 mm 500: ±7 mm
Main Spool End Area	cm^2	7.1	8
Rated Current	A	Max. 2.5	
Coil Resistance [20 °C]	Ω	3.9	
Approx. Mass	kg	10	350: 18 500: 19

★1. Return pressure should be less than the actual supply pressure.
★2. Pilot pressure should be between 1.5 MPa and 31.5 MPa, and should exceed 60% of the actual supply pressure to main valve.
★3. Pilot flow is calculated with the above step response time at pilot pressure 14 MPa.
★4. Added up leakage of main and pilot spools are stated.

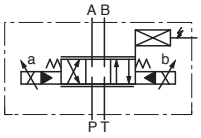




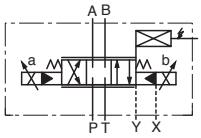
Graphic Symbols



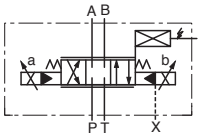
Internal Pilot /
External Drain Type



Internal Pilot /
Internal Drain Type

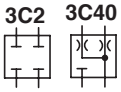
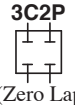


External Pilot /
External Drain Type



External Pilot /
Internal Drain Type

Model Number Designation

ELDFH	G	-04	-280	-3C2P	-XY	-E	T	-10
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type	Direction of Flow	Pilot Connection	Drain Connection	Design Number
ELDFH: High Response (Two Stage) Type Proportional Electro-Hydraulic Directional and Flow Control Valves	**G**: Sub-Plate Mounting	**04**	**280**	**3C2**  **3C40** **3C2P**  (Zero Lap)	**XY** : Meter-in Meter-out	**None**: Internal Pilot **E**: External Pilot	**None**: External Drain **T**: Internal Drain	**10**
		06	**350** **500**					**10**

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-190).

Model Numbers	Power Amplifier Model Numbers
ELDFHG-04-280-3C2 / 3C40	AMB-EL-04-2-∗-20
ELDFHG-04-280-3C2P	AMB-EL-04-2P-2-∗-20
ELDFHG-06-350-3C2 / 3C40	AMB-EL-06-3-∗-20
ELDFHG-06-350-3C2P	AMB-EL-06-2P-3-∗-20
ELDFHG-06-500-3C2 / 3C40	AMB-EL-06-4-∗-20
ELDFHG-06-500-3C2P	AMB-EL-06-2P-4-∗-20

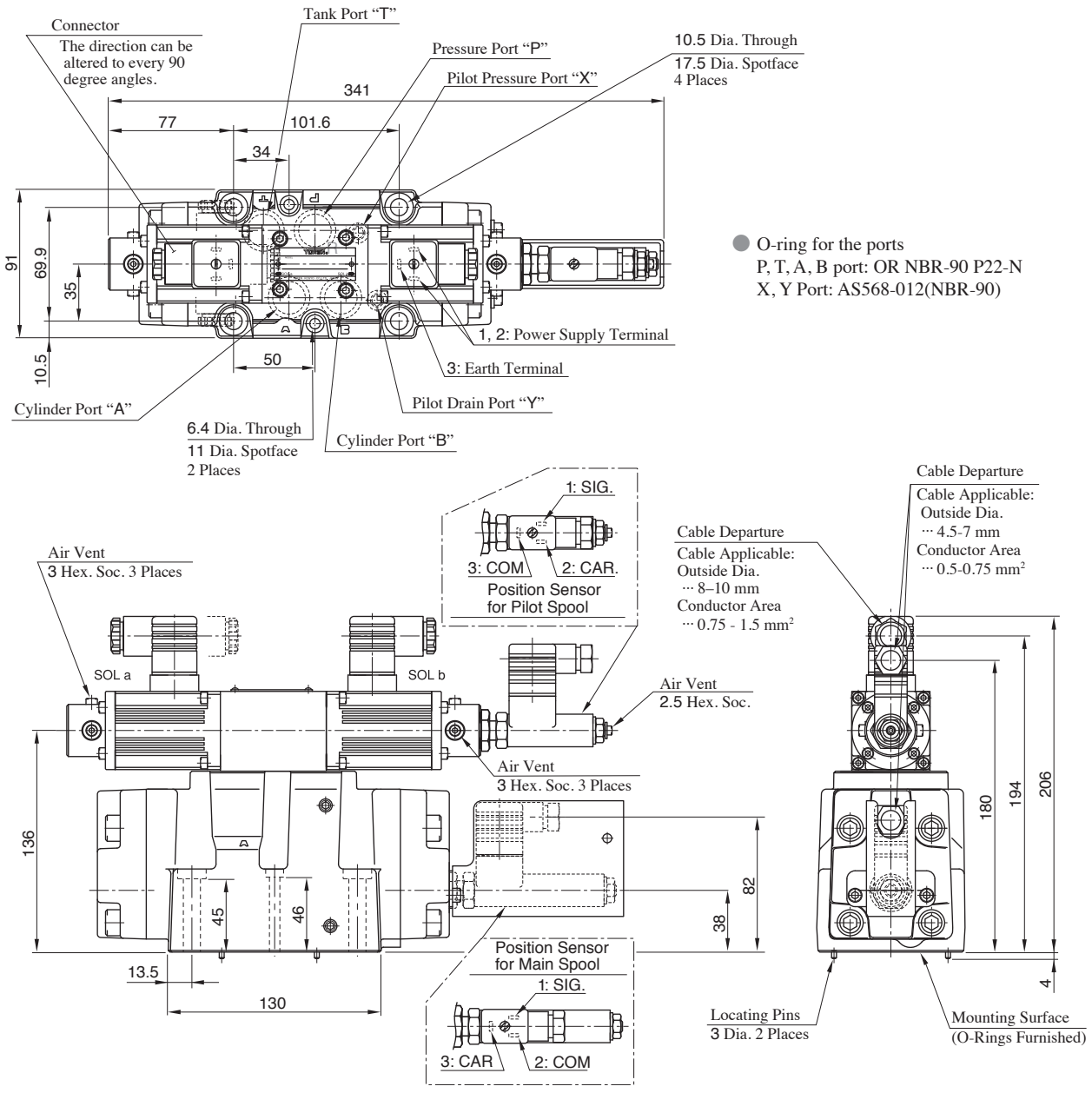
Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw	Qty.
ELDFHG-04	M6 × 55 L M10 × 60 L	2 4
ELDFHG-06	M12 × 85 L	6

ELDFHG-04-280-∗-XY-∗-∗ -10

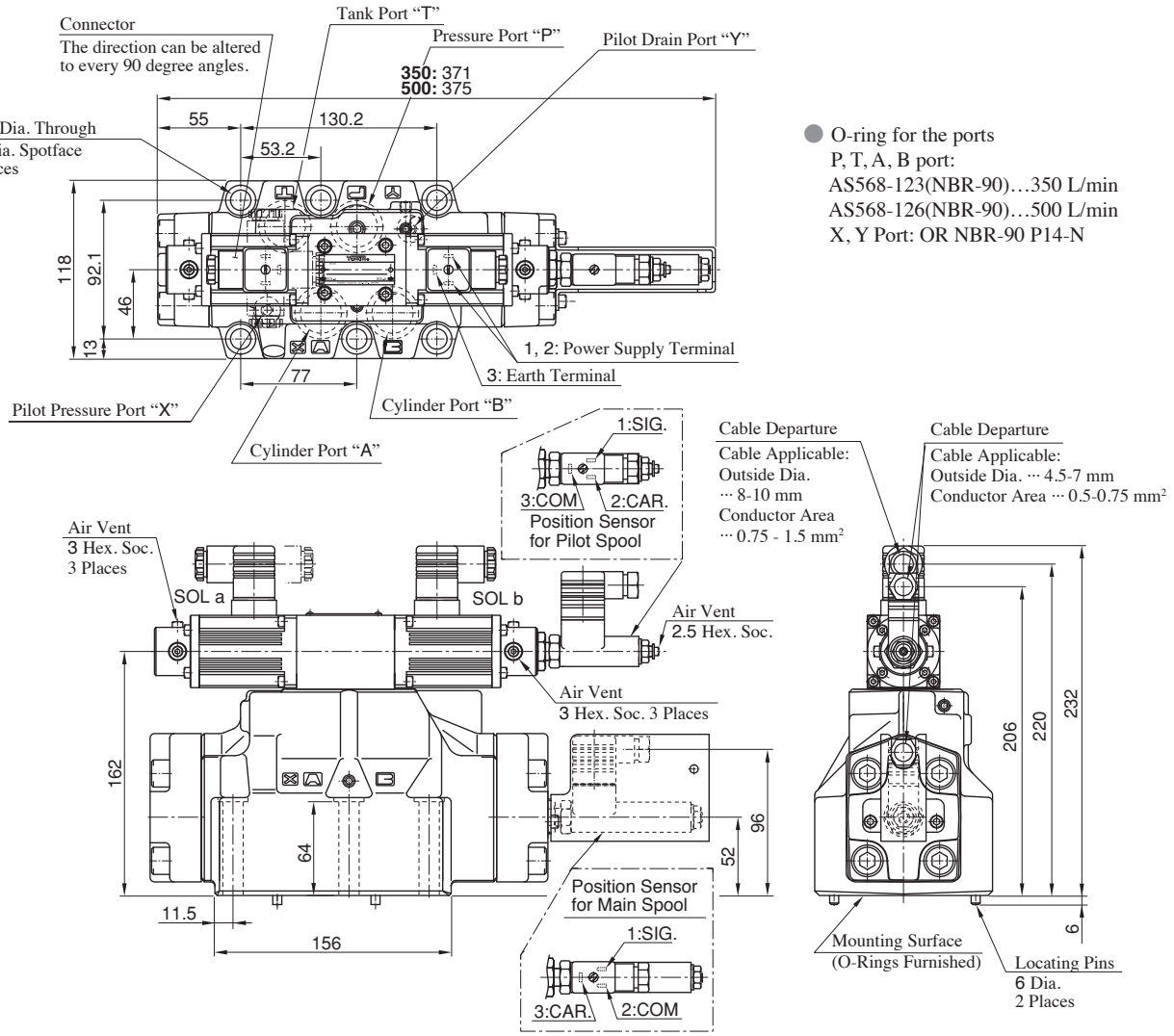
Mounting Surface: Conform to ISO4401-07-07-0-05



Note) For valve mounting surface dimensions, refer to page H-170.

ELDFHG-06-∗-∗-XY-∗-∗-10

Mounting Surface: Conform to ISO4401-08-08-0-05

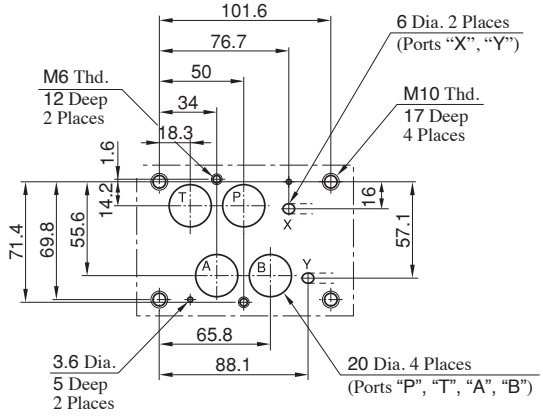


- O-ring for the ports
  P, T, A, B port:
  AS568-123(NBR-90)…350 L/min
  AS568-126(NBR-90)…500 L/min
  X, Y Port: OR NBR-90 P14-N

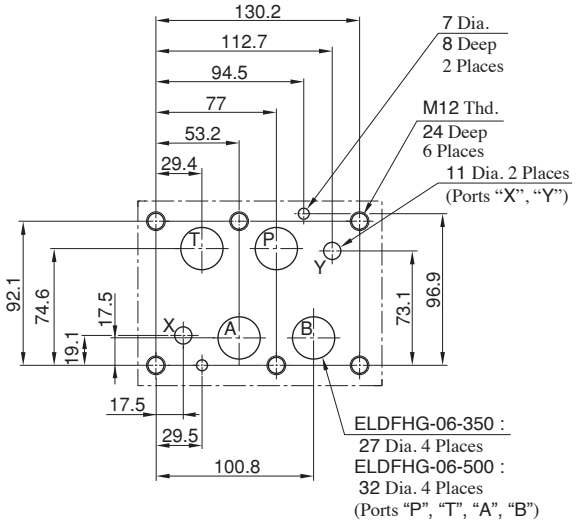
Dimensions of Valve Mounting Surface

Prepare a mounting surface as shown to the below.
Also finish it finely.

ELDFHG-04



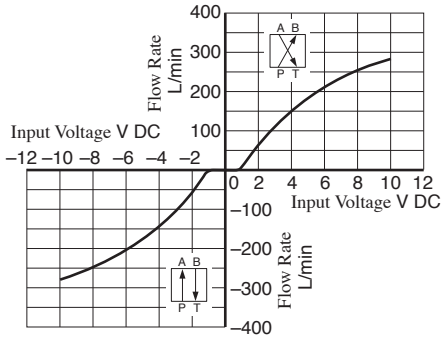
ELDFHG-06



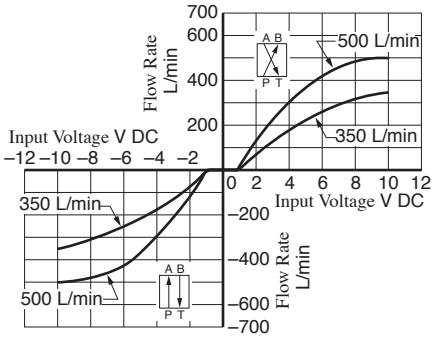
Input Voltage vs. Flow Rate

Valve Pres. Diff. : 1 MPa
Viscosity : 30 mm²/s

ELDFHG-04



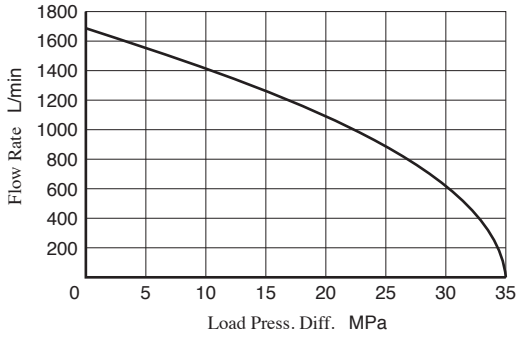
ELDFHG-06



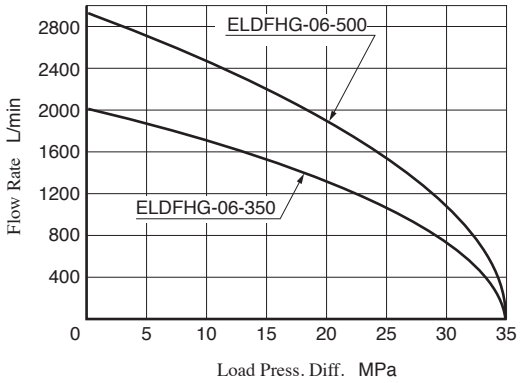
Load Flow Characteristics

Viscosity : 30 mm²/s

ELDFHG-04



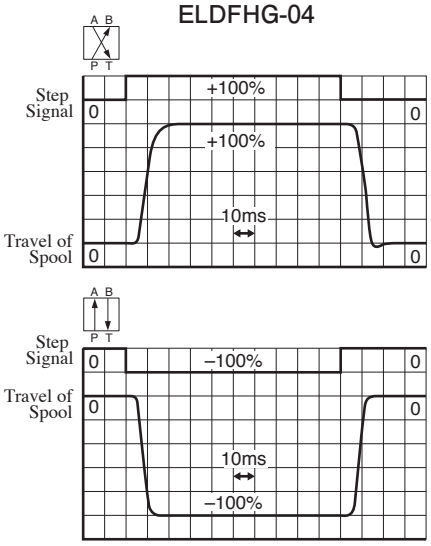
ELDFHG-06



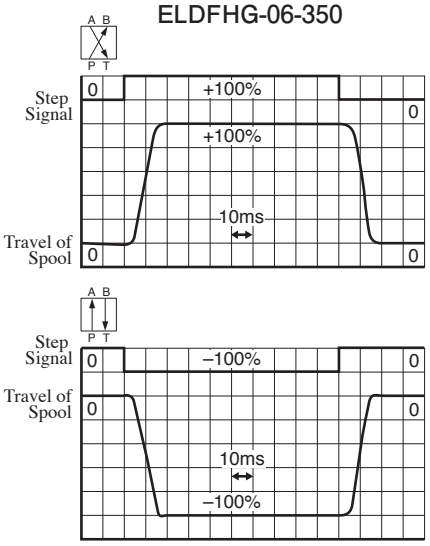
Step Response (Example)

Viscosity : 30 mm²/s

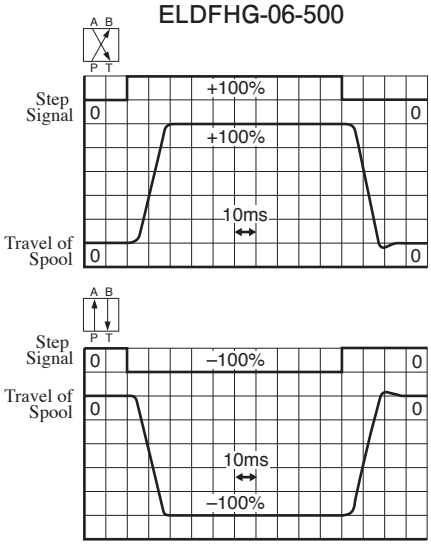
ELDFHG-04



ELDFHG-06-350



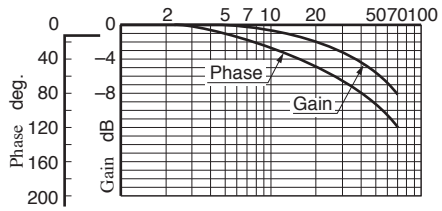
ELDFHG-06-500



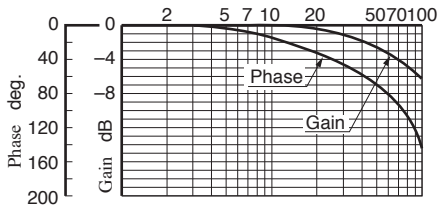
Frequency Response

Input Signal : 0 ± 25 %
Hydrauric Circuit : Port A/B Closed
Supply and Pilot Pressure : 14 PMa
Viscosity : 30 mm²/s

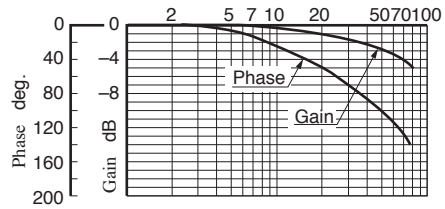
ELDFHG-04



ELDFHG-06-350

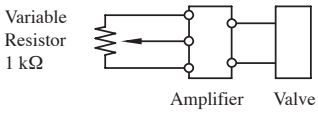
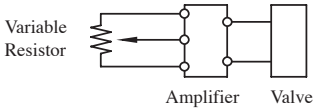


ELDFHG-06-500



Power Amplifiers / Setting Adjusters For Proportional Electro-Hydraulic Control Valves

These are power amplifiers to be used exclusively to operate the electro-hydraulic proportional valves. Various type and models on available for a variety of applications.

Type	Model Numbers	Applicable to Control Valve	Function
DC Input	AME-D-10-∗-20	Pressure or Flow Control (For 10 Ω Sol.)	By giving the command of DC voltage (0 -10 V) to the amplifier, current in proportion to that voltage will flow into the solenoid of the control valve in order to control pressure or flow rate. An external setting unit which makes the command voltage of 0 -10 V and a DC power supply (or a function generator) are necessary, but if a variable resistor for external setting is only one, the internal power supply for amplifier can be used. 
	AME-D-S-∗-50	Flow Control (For 40 Ω Sol.)	
	AME-D2-1010-∗-11	Flow Control and Relief (For 10 Ω -10 Ω Sol.)	
DC Input-Feedback	SK1022-∗-∗-11	Pressure or Flow Control (For 10 Ω Sol.)	Basically, this is a DC input type with a feedback operating unit. This is for high-accuracy control and used to feedback the pressure or flow rate converted to electric signals.
	AME-DF-S-∗-50	Flow Control (For 40 Ω Sol.)	
Slow Up-Down	AME-T-S-∗-22	Flow Control (For 40 Ω Sol.)	A slow up-down signal generator and the functions of a DC input type are incorporated. This is used to control the pressure or flow rate by slow up-down pattern and the command signals are given by relay contacts, limit switches, timer contacts, etc.
DC Input For DC Power 24 V DC	SK1015-11 AMN-D-10	Pressure or Flow Control (For 10 Ω Sol.)	An amplifier which is operated by a battery power supply (24 V). By giving the command of DC voltage to the amplifier, current in proportion to that voltage will flow in the solenoid of the control valve in order to control pressure or flow rate. An external setting unit which makes the command voltage and a DC power supply (or a function generator) are necessary, but if a variable resistor for external setting is only one, the internal power supply for amplifier can be used.  SK1015 amplifier can be used in automobile construction machine.
	AMN-W-10 SK1091-D24-10	Directional and Flow Control	
DC Input with Minor Feedback	SK1115-∗-20	Flow Control (For 10 Ω Sol.)	An amplifier which is operated by a battery power supply (24V). This is for high-response, high-accuracy control and used to feedback the pressure or flow rate converted to electric signals.
	AMN-L-01-∗-∗-10	High Response Type Directional and Flow Control	
	AMB-EL-∗-∗-∗-∗-20		
Shockless	AMN-G-10	Shockless Directional and Flow Control	Outputs shockless patterns, low speed (Level 1) high-speed (Level 2) low speed (Level 3). Shockless speed control is enabled just by providing SOL a and SOL b only contact signals in the same control mode as the mode for the "G" series of shifting time adjustable type shockless valves.

Instructions

- The power amplifiers should be kept away from hot and humid conditions which may deteriorate some components of the power amplifiers. They also should be installed in the clean and dry place where the vibration is minimal.
  Please avoid to install the power amplifiers in the complete enclosure or get them enclosed totally as they need to radiate the heat from semiconductors or ICs inside.
- Please use shielded wires for input signal transmission to prevent the amplifiers from any interference such as noise from outside.

Power Amplifiers For 10Ω Series Control Valves

These power amplifiers are used to drive the 10 Ω series proportional electro-hydraulic pressure or flow control valves.

Model Number Designation

AME	-D	-10	-100	-20
Series Number	Type of Function	Coil Resistance of Valve	Power Supply	Design Number
AME	**D**: DC Input Type	**10**: 10 Ω	**100**: 100 V AC **200**: 200 V AC	**20**

SK1022	-A	-100	-11
Series Number	Type of Function	Power Supply	Design Number
SK1022: DC Input-Feedback Type	**A**: Polarity of Feedback Voltage...(–) **B**: Polarity of Feedback Voltage...(+)	**100**: 100 V AC **200**: 200/220 V AC	**11**
SK1015: DC Input Type for DC Power Supply	———	———★	**11**

★Use with 24 V DC since this is for a battery power supply.

Applicable to Valve

Name of Valve	Model Numbers
Pilot Relief Valves	EDG-01∗
Relief Valves	EBG-03 EBG-06 EBG-10
Relieving and Reducing Valves	ERBG-06 ERBG-10
10 Ω Series Flow Control Valves	EFG-03/06 EFCG-03/06 (51 Design)
Flow Control and Relief Valves	EFBG-03 EFBG-06 EFBG-10

Specifications

Descriptions \ Model No.	AME-D-10-∗-20	SK1022-A-∗-11	SK1022-B-∗-11	SK1015-11
Type of Function	DC Input Type	DC Input Feedback Type	DC Input Feedback Type	DC Input Type
Max. Output Current	1 A (10 Ω Solenoid)	1 A (10 Ω Solenoid)	1 A (10 Ω Solenoid)	0.9 A (10 Ω Solenoid)
Max. Input Voltage	+ 10 V DC	+ 10 V DC	+ 10 V DC	+ 10 V DC
Feedback Voltage	—	0 to –10V	0 to +10V	—
Input Impedance	10 kΩ	50 kΩ	50 kΩ	50 kΩ
Max. Gain	1 A / 5 V	1 A / 0.5 V	1 A / 0.5 V	0.9 A / 5 V
Dither	Variable	Fix	Fix	Fix
Temperature Drift (Max.)	0.2 mA /°C	0.2 mA /°C	0.2 mA /°C	1 mA /°C
Power Supply	100 V AC, 200 V AC (50/60 Hz)★	100 V AC, 200/220 V AC ±10% (50/60 Hz)		22-30 V DC
Power Input (Max.)	55 VA	45 VA	45 VA	25 VA
Ambient Temperature	0 - 50°C	0 - 50°C	0 - 50°C	0 - 50°C
External Setting Resistance	1 kΩ	1 kΩ	1 kΩ	10 kΩ
Mass	2.1 kg	4.5 kg	4.5 kg	0.4 kg

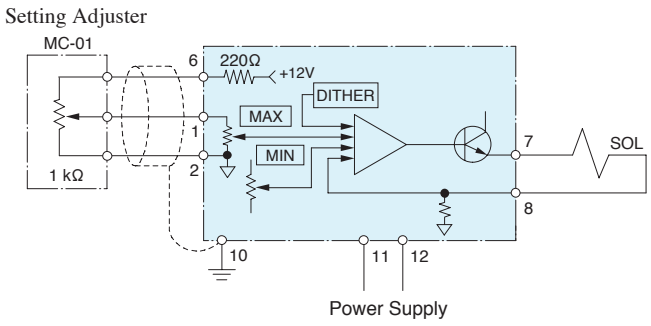
★Serviceable Range: 100 V AC can be used from 90 to 132 V AC, 200 V AC can be used from 180 to 264 V AC.

Instructions

Power supply for the setting adjuster can be provided from this power amplifier, but for only one.
However, please use the variable resistor or potentiometer of which impedance is 1 kΩ (in case of model SK1015, use 10 kΩ) for the setting adjuster.

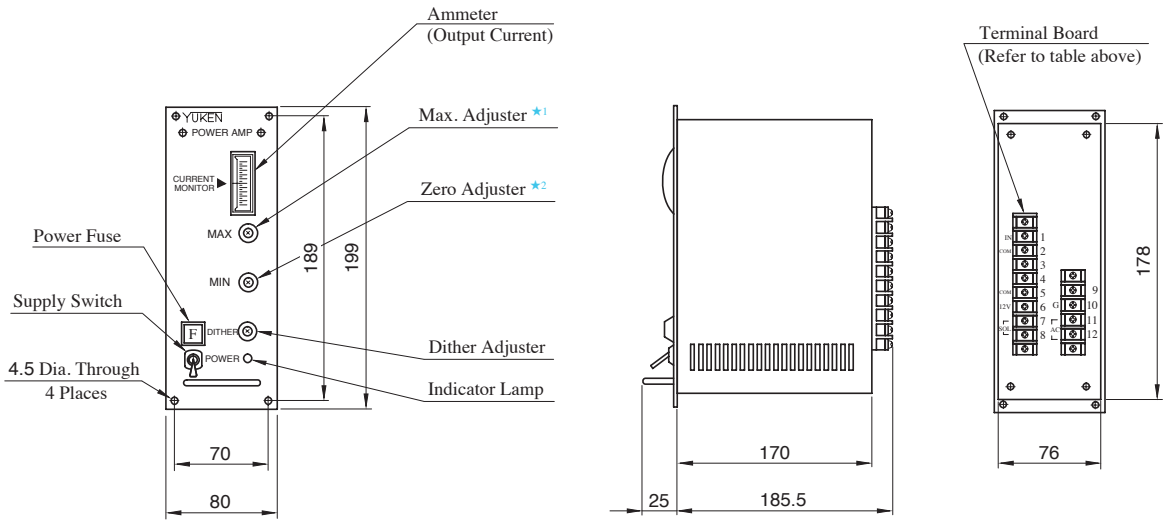
AME-D-10

[Example Diagram]



● Detail of Terminal Board

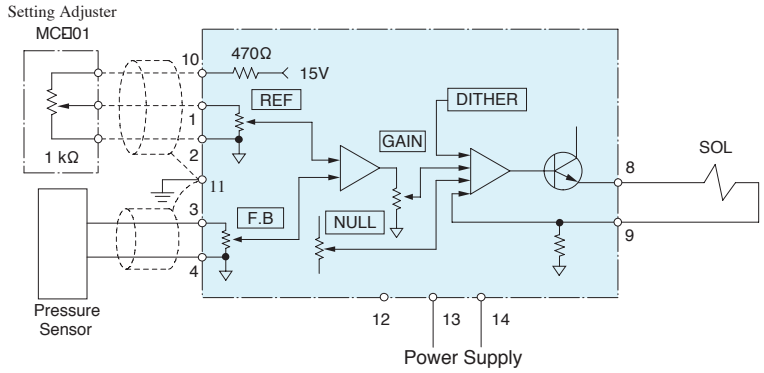
Terminal Number	Name	
1	Input Signal	IN
2	Input Signal	COM
3	—	
4	—	
5	Input Signal	COM
6	Internal Power Supply	+12 V
7	Output to Valve Solenoid	SOL
8		
9	—	
10	Ground	G
11	Power Supply 100/200 VAC	
12		



★1. Adjustment of upper limit of usable range
★2. Adjustment of lower limit of usable range

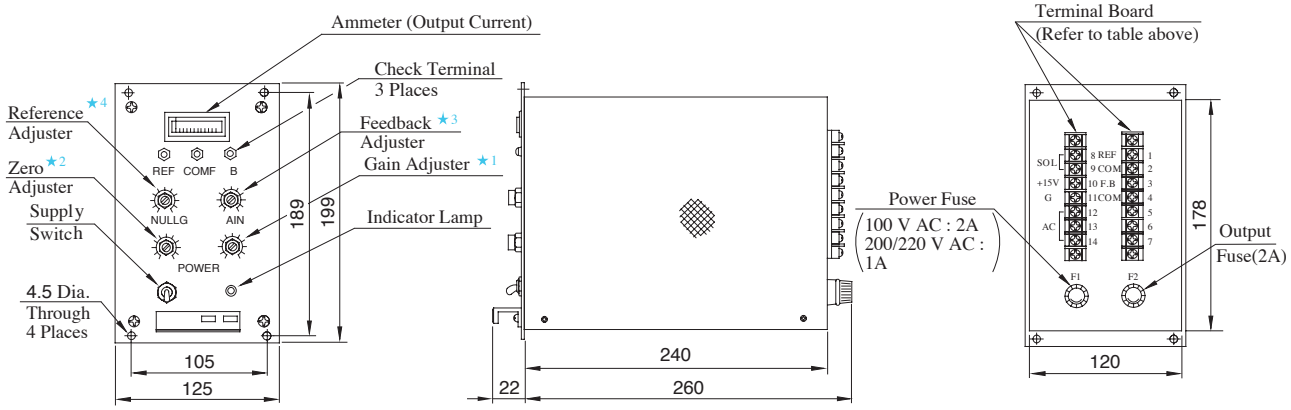
SK1022-A/B

[Example Diagram]



Detail of Terminal Board

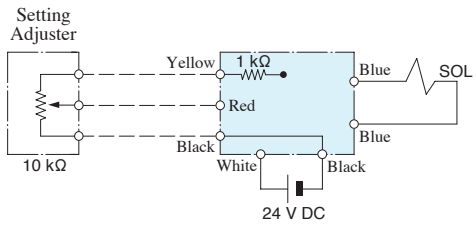
Terminal Number	Name	
1	Input Signal	REF
2	Input Signal	COM
3	Feedback Signal	F.B
4	Feedback Signal	COM
5	—	
6	—	
7	—	
8	Output to Valve Solenoid	SOL
9		
10	Power Supply for Setting Adjuster (10 V at 1 kΩ)	+15V
11	Ground	G
12	Power Supply 100 V AC, 200V AC : 13, 14 220 V AC : 12, 14	
13		
14		

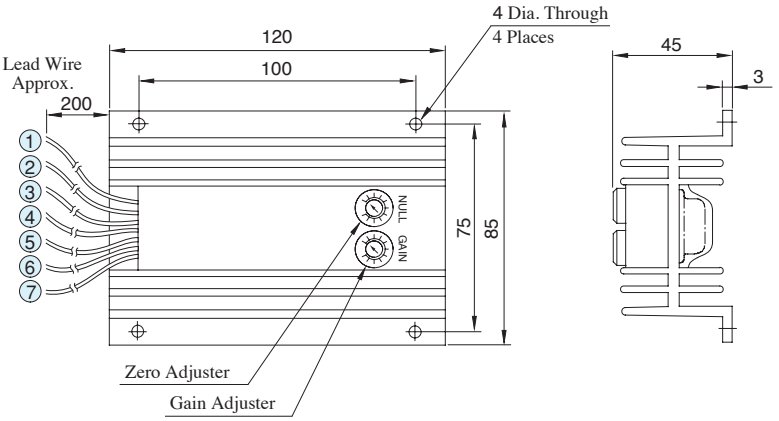


★1. Adjustment of upper limit of usable range
★2. Adjustment of lower limit of usable range
★3. Adjustment of feedback voltage ratio
★4. Adjustment of input voltage ratio

SK1015

[Example Diagram]





Lead Wire Detail

① White.....Plus of 24 V DC
② Black.....Zero of 24 V DC
③ Blue..... } Output to Valve Solenoid
④ Blue..... }
⑤ Yellow.....15 V Power Supply for Setting Adjuster (10 V at 10 kΩ)
⑥ Red.....Input Signal
⑦ Black.....Zero of Input Signal

Instructions

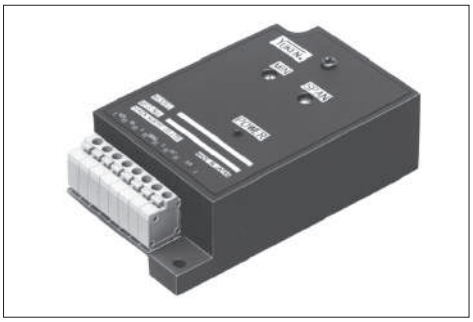
Supply Switch

The power amplifier has no power supply switch.

As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

Compact Power Amplifiers For 10Ω Series Control Valves

Compact power amplifiers for 10Ω proportional solenoids. The power supply is 24 V DC. It uses a new circuitry to be slow to heat.



Model Number Designation

AMN	-D	-10
Series Number	Type of Function	Design Number
AMN	**D** : DC Input Type	**10**

Specifications

Descriptions \ Model No.	AMN-D-10
Type of Function	DC Input Type
Max. Output Current	1 A (10 Ω Solenoid)
Power Input (Max.)	+ 10 V DC
Input Impedance	10 kΩ
Max. Gain	1 A / 5 V
Dither	Variable
Temperature Drift (Max.)	0.2 mA /°C
Power Supply	24 V DC (20 - 30 V DC)
Max. Input Power	25 W
Ambient Temperature	0 - 50°C
External Setting Resistance	1 kΩ
Approx. Mass	0.2 kg

Applicable to Valve

Name of Valve	Model Numbers
Pilot Relief Valves	EDG-01✻
Relief Valves	EBG-03 EBG-06 EBG-10
Relieving and Reducing Valves	ERBG-06 ERBG-10
10Ω Series Flow Control Valves	EFG-03/06 EFCG-03/06 (51 Design)
10Ω -10Ω Series High Flow Series Flow Control and Relief Valves	EFBG-03 EFBG-06 EFBG-10

Instructions

Power Supply of the Outside Setting Adjuster

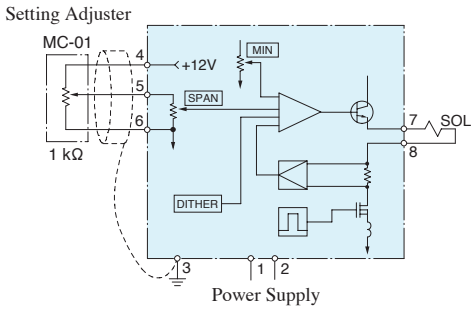
When the power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 1 kΩ for the setting adjuster.

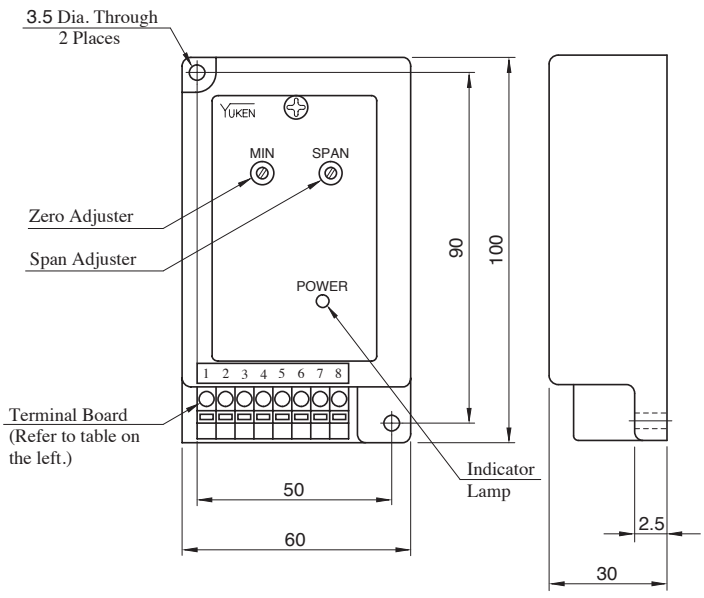
Supply Switch

The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

AMN-D

[Example Diagram]





Detail of Terminal Board

Terminal Number	Name	
1	Power Supply	+24 V
2	Power Supply	0 V
3	Ground	G
4	Internal Power Supply	+12 V
5	Input Signal	IN
6	Input Signal	COM
7	Output to Valve Solenoid	SOL
8		

Power Amplifiers For 40Ω Series Flow Control Valves

These power amplifiers are used to drive the 40W series proportional electro-hydraulic flow control valves.

Model Number Designation

AME	-D	-S	-AC	-50
Series Number	Type of Function	Type of Mounting	Power Supply	Design Number
AME	**D:** DC Input Type **DF:** DC Input Feedback Type	**None:** Wall Mount Type **S:** Panel Mount Type	**AC:** 85 - 230 V AC **DC:** 20 - 55 V DC	50

★No wall mount types (None) are available for DC input feedback types (DF).

AME	-T	-S	-100	-22
Series Number	Type of Function	Type of Mounting	Power Supply	Design Number
AME	**T:** Slow Up Down Type	**S:** Panel Mounting Type	**100:** 100 V AC **200:** 200/220 V AC	22

Applicable to Valve

Name of Valve	Model Numbers
40Ω Series Flow Control Valves	EFG EFCG-02 (31 Design)
	EFG EFCG-03 (26 Design)
	EFG EFCG-06 (22 Design)
	EFG EFCG-10 (11 Design)

Specifications

Descriptions \ Model Numbers	AME-D-AC-50	AME-D-DC-50	AME-D-S-AC-50	AME-D-S-DC-50	AME-DF-S-AC-50	AME-DF-S-DC-50	AME-T-S-*-22
Type of Fuction	DC Input Type				DC Input Feedback Type		Slow Up Down Type
Max. Output Current	0.8 A (40 Ω Solenoid) / 1.0 A (10 Ω Solenoid) ★						0.8A (40Ω Solenoid)
Max. Input Voltage	+10V DC (Single-Ended Input)						—
Feedback Voltage	—				±10 V DC (Differential Input)		—
Input Impedance	10 kΩ						—
Slow Up Down Range	5 V / A						0.05 - 1 s/100 mA
Max. Gain	0.25 A/ V		0.16 A / V		1.6 A / V		—
Max. Gain of Feedback	—				2 A / V		—
Dither	Variable						Fix
Temperature Drift (Max.)	0.2 mA /°C						
Power Supply	85-230 V AC	20-55 V DC	85-230 V AC	20-55 V DC	85-230 V AC	20-55 V DC	100 V AC, 200/220 V AC 10% (50/60 Hz)
Power Input (Max.)	50 W						90 VA
Ambient Temperature	0 ~ 50 °C/90% RH or less (without condensation)						0 - 50°C
External Setting Resistance	1 kΩ						—
Approx. Mass	1.1 kg		2.1 kg		2.2 kg		4.5 kg

★Before shipment, the max. output current is set to 0.8 A.

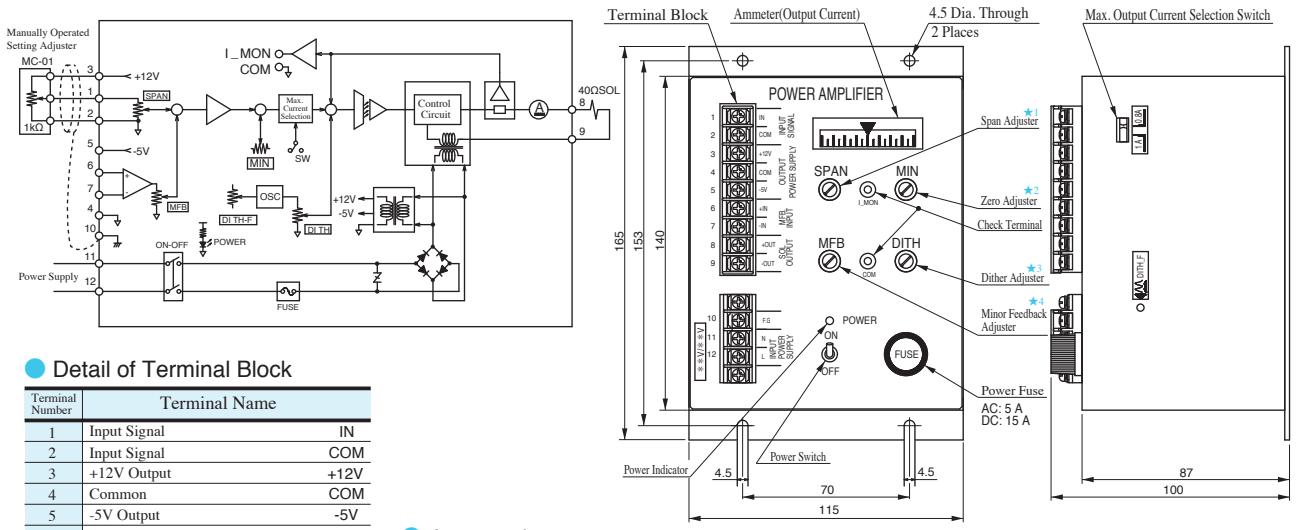
Instructions

Power Supply of the Outside Setting Adjuster

When DC input type (AME-D-40) or DC input-feedback type (AME-DF-S) power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 1 kΩ for the setting adjuster.

AME-D-＊-50

[Example Diagram]



Detail of Terminal Block

Terminal Number	Terminal Name	
1	Input Signal	IN
2	Input Signal	COM
3	+12V Output	+12V
4	Common	COM
5	-5V Output	-5V
6	Minor Feedback Input (+)	+IN
7	Minor Feedback Input (-)	-IN
8	Output to Valve (+)	+OUT
9	Output to Valve (-)	-OUT
10	Frame Ground	F.G
11	Power Supply(No Polarity)	N
12	Power Supply(No Polarity)	L

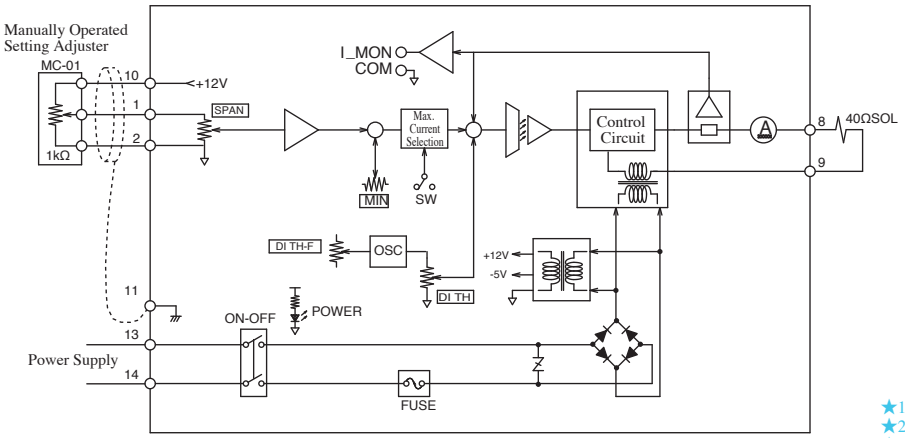
Accessories

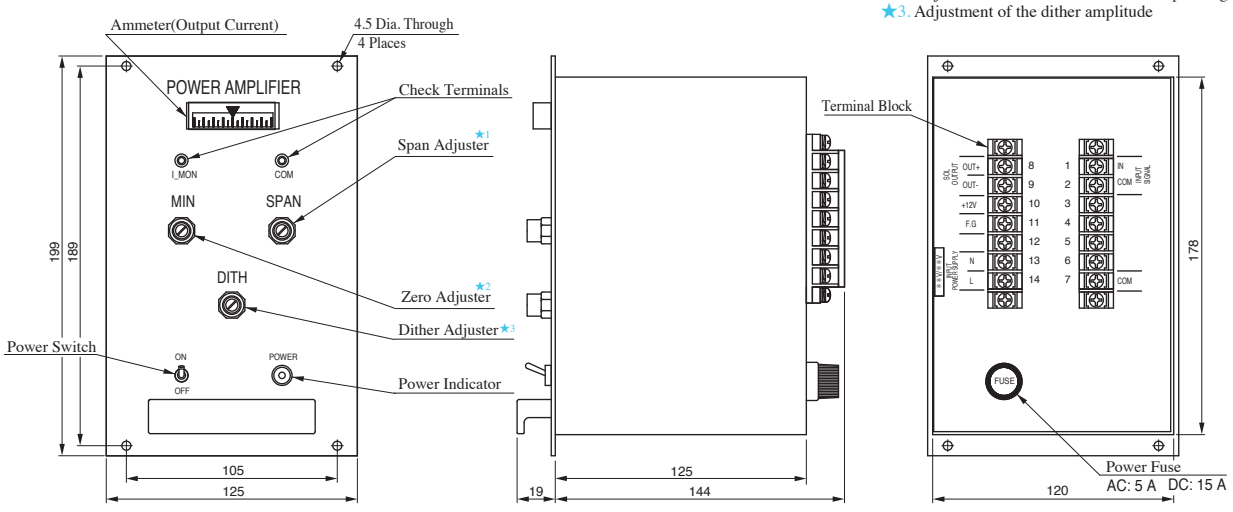
Spare Fuses
AC specifications: 5A 250V (Dia. 6.4×30 mm) 1 pc
DC specifications: 15A 250V (Dia. 6.4×30 mm) 1 pc
Test Pins (Manufactured by MAC8)
OP6-1 (Red) 1 pc
OP6-1 (Black) 1 pc

★1. Adjustment of the upper limit of the operating range
★2. Adjustment of the lower limit of the operating range
★3. Adjustment of the dither amplitude
★4. Adjustment of the minor feedback voltage ratio

AME-D-S-＊-50

[Example Diagram]





Detail of Terminal Block

Terminal Number	Terminal Name	
1	Input Signal	IN
2	Input Signal	COM
3	———	
4	———	
5	———	
6	———	
7	Common	COM
8	Output to Valve (+)	+OUT
9	Output to Valve (-)	-OUT
10	+12V Output	+12V
11	Frame Ground(Case Earth)	F.G
12	———	
13	Power Supply(No Polarity)	N
14	Power Supply(No Polarity)	L

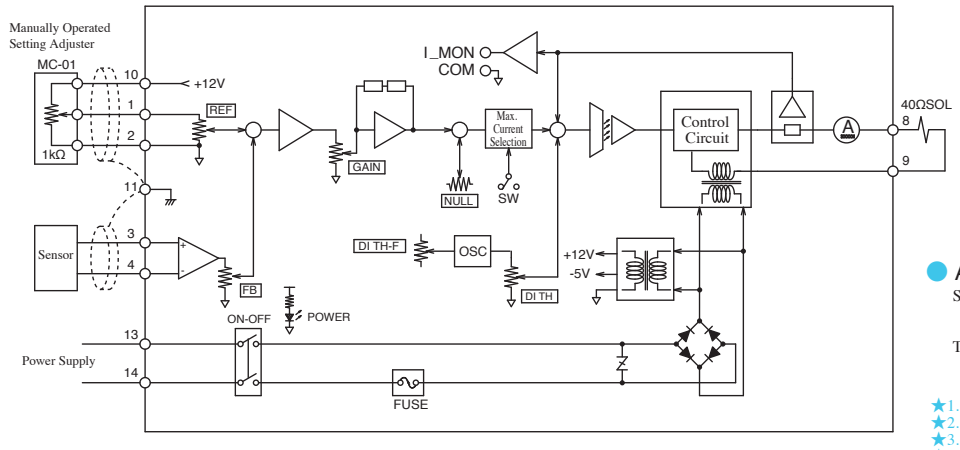
Accessories

Spare Fuses
AC specifications: 5A 250V (Dia. 6.4×30 mm) 1 pc
DC specifications: 15A 250V (Dia. 6.4×30 mm) 1 pc
Test Pins (Manufactured by MAC8)
OP6-1 (Red) 3 pcs.
OP6-1 (Black) 1 pc

★1. Adjustment of the upper limit of the operating range
★2. Adjustment of the lower limit of the operating range
★3. Adjustment of the dither amplitude

AME-DF-S＊-50

[Example Diagram]



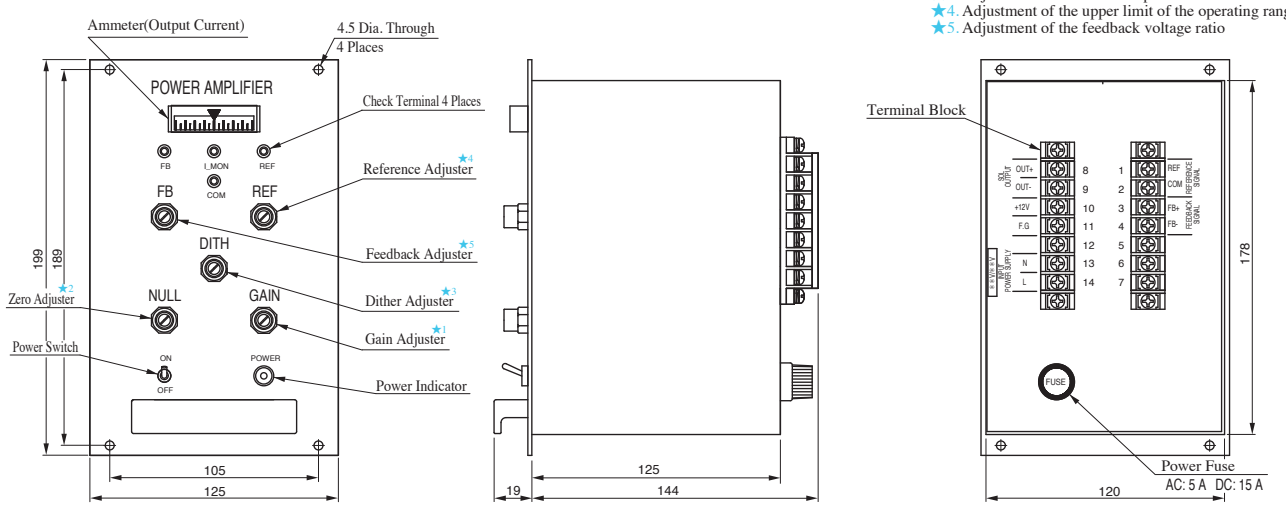
Detail of Terminal Block

Terminal Number	Terminal Name	
1	Input Signal	REF
2	Input Signal	COM
3	Feedback Input (+)	FB+
4	Feedback Input (-)	FB-
5	———	
6	———	
7	———	
8	Output to Valve (+)	+OUT
9	Output to Valve (-)	-OUT
10	+12V Output	+12V
11	Frame Ground(Case Earth)	F.G
12	———	
13	Power Supply(No Polarity)	N
14	Power Supply(No Polarity)	L

Accessories

Spare Fuses
AC specifications: 5A 250V (Dia. 6.4×30 mm) 1 pc
DC specifications: 15A 250V (Dia. 6.4×30 mm) 1 pc
Test Pins (Manufactured by MAC8)
OP6-1 (Red) 3 pcs.
OP6-1 (Black) 1 pc

★1. Adjustment of the responsiveness waveform
★2. Adjustment of the lower limit of the operating range
★3. Adjustment of the dither amplitude
★4. Adjustment of the upper limit of the operating range
★5. Adjustment of the feedback voltage ratio



Interchangeability between Current and New Design

Some models of power amplifiers for 40Ω series flow control valves have undergone a model change from 22,41 to 50 design with additional power supply, functions and installation.

Affected Models

Name	New Model Numbers	Old Model Numbers
Power Amplifiers for 40Ω Series Flow Control Valves (DC input type)	AME-D-DC-50 AME-D-AC-50	AME-D-40-200-41 AME-D-40-100-41
Power Amplifiers for 40Ω Series Flow Control Valves (DC input-feedback type)	AME-DF-S-DC-50 AME-DF-S-AC-50	AME-DF-S-220-50 AME-DF-S-200-50 AME-DF-S-100-50

Changes

[AME-D/AME-DF]

・Compatible with DC power (formerly AC power only)
・Adoption of variable dithering. Install dither adjustment trimmer (formerly fixed dithering)
・The max. output current is switchable [0.8 A or 1 A].(formerly fixed to 0.8 A)
・Output current monitor terminals installed on the front cover

[AME-D]

・A minor feedback adjustment trimmer installed on the front cover
・Panel mounting type newly added

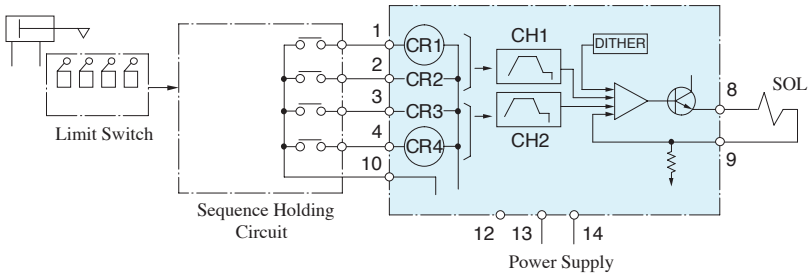
Installation Interchangeability

Yes

There are no changes in mounting dimensions of both panel mount and wall mount models (but the depth of each housing is shorter than that of the previous models).

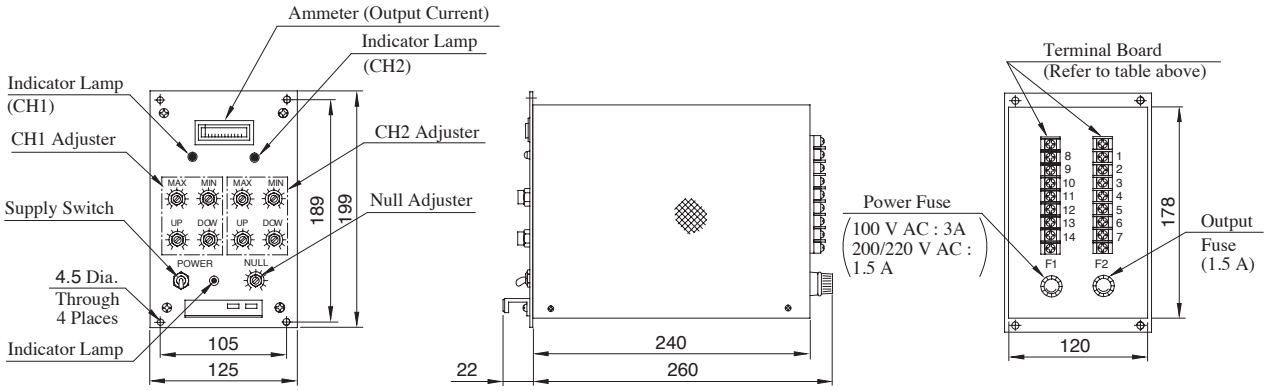
AME-T-S

[Example Diagram]

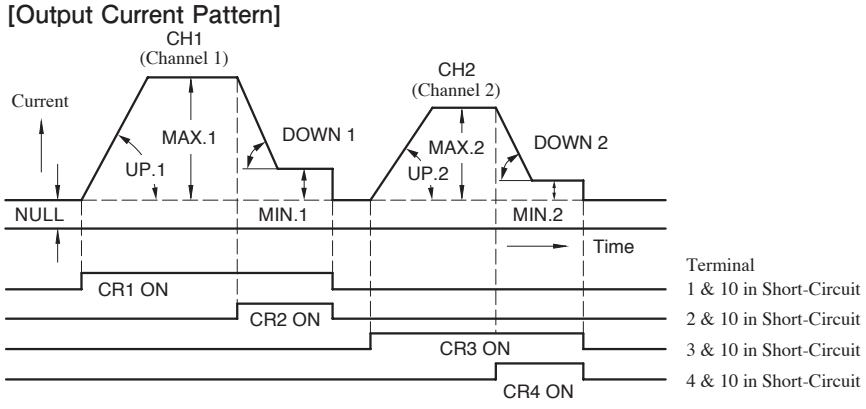


Detail of Terminal Board

Trminal Number	Name	
1	Input Command	CR1
2	Input Command	CR2
3	Input Command	CR3
4	Input Command	CR4
5	—	
6	—	
7	—	
8	Output to Valve Solenoid	SOL
9		
10	Input Command	CR. COM
11	Ground	G
12	Power Supply	
13	100 V AC, 200 V AC: 13, 14	
14	220 V AC: 12, 14	



[Output Current Pattern]



Note) 1. CR1 to CR4: Relays in the power amplifier.
The output patterns CH1 and CH2 can not be obtained simultaneously nor can they be transmitted halfway to another pattern.
2. The words such as MAX, MIN, UP and DOWN show the volume adjustment of the power amplifier.

How to Calculate Accelerating and Decelerating Time (Example)

Question: Wish to accelerate and decelerate the actuator in between 5 L/min and 25 L/min in the use of proportional flow control valve model EFG-02-30.
In such case, what are the maximum and minimun time adjustable for the acceleration and deceleration?

Answer: The input current for EFG-02-30 at the flow rate of 5 L/min and 25 L/min can be obtained respectively from the chart below. The chart shows:

Input current at 5 L/min 300 mA
Input current at 25 L/min 520 mA

Then, the difference between the above two can be obtained with the following formula:

520 mA – 300 mA = 220 mA

While, the specification for the model AME-T-S shows the amplifier's gradient for acceleration or deceleration as being between 0.05 s/100 mA and 1.0 s/100 mA (which means that the minimum time is 0.05 second and the maximum time is 1.0 second for every 100 mA variation).

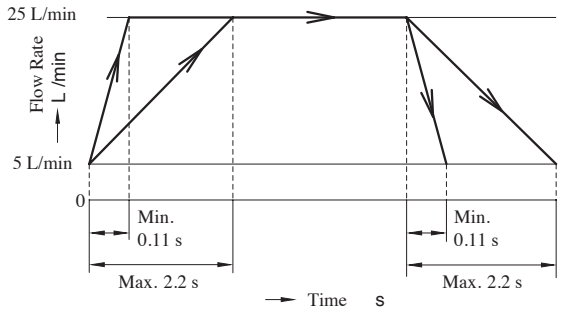
Therefore, the minimum and maximum adjustable time can be obtained as follows:

$$\frac{220\ mA}{100\ mA} \times 0.05 \text{ second} = 0.11 \text{ second (Minimum)}$$

$$\frac{220\ mA}{100\ mA} \times 1.0 \text{ second} = 2.2 \text{ second (Maximum)}$$

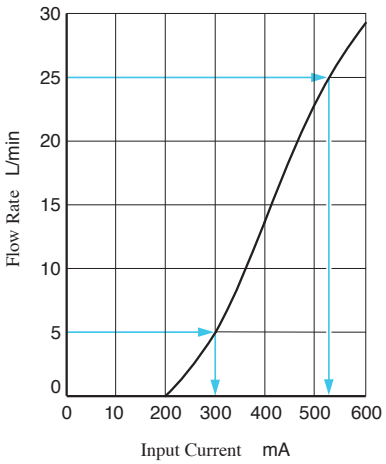
The result above are as illustrated on the below.

[Flow Pattern]



[Input Current vs. Flow]

EFG-02



Power Amplifiers For 10Ω - 10Ω Series Control Valves

These power amplifiers can drive two solenoid of 10 Ω load simultaneously or separately, and the control can be done in the same way even though the object is separated by pressure system and flow rate system. Although the display of control unit on the front panel is PRESS and FLOW , they are exactly the same circuit, so there is no distinction between the two system when used.

Model Number Designation

AME	-D2	-1010	-11
Series Number	Type of Function	Coil Resistance of Valve	Design Number
AME	**D2:** DC Input Type	**1010**: 10 Ω × 2	**11**

Applicable to Valve

Name of Valve	Model Numbers
Pilot Relief Valves	EDG-01∗
Relief Valves	EBG-03 EBG-06 EBG-10
Relieving and Reducing Valves	ERBG-06 ERBG-10
10Ω Series Flow Control Valves	EFG-03/06 EFCG-03/06 (51 Design)
10Ω -10Ω Series High Flow Series Flow Control and Relief Valves	EFBG-03 EFBG-06 EFBG-10

Specifications

Descriptions \ Model No.	AME-D2-1010-11
Type of Function	DC Input Type
Max. Output Current	1 A (10 Ω Solenoid)
Max. Input Voltage	+ 10 V DC
Input Impedance	10 kΩ
Max. Gain	1 A / 5 V
Dither	Variable 100 - 300 mA
Temperature Drift (Max.)	0.2 mA /°C
Power Supply	100/200 V AC (50/60 Hz)
Power Input (Max.)	120 VA
Ambient Temperature	0 - 50°C
External Setting Resistance	1 kΩ
Approx. Mass	4.3 kg

Applicable to Piston Pump

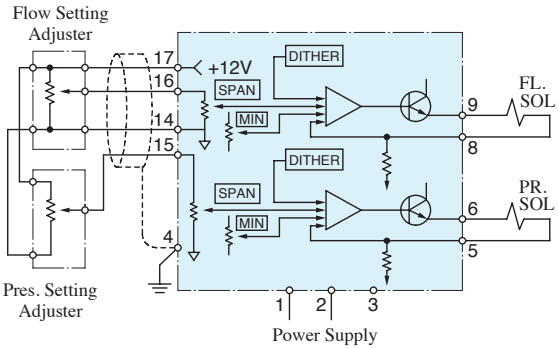
Name of Pump	Model Numbers
"A" Series Variable Displacement Piston Pump (Proportional Electro-Hydraulic Load Sensing Type)	A16 A22 A37-∗R-04 A56 Also, double pumps combined with the models listed above and fixed displacement vane pumps.

Instructions

Power supply for the setting adjuster up to two set can be provided from this power amplifier. However, please use the variable resistor or potentiometer of which impedance is 1 kΩ for the setting adjuster.

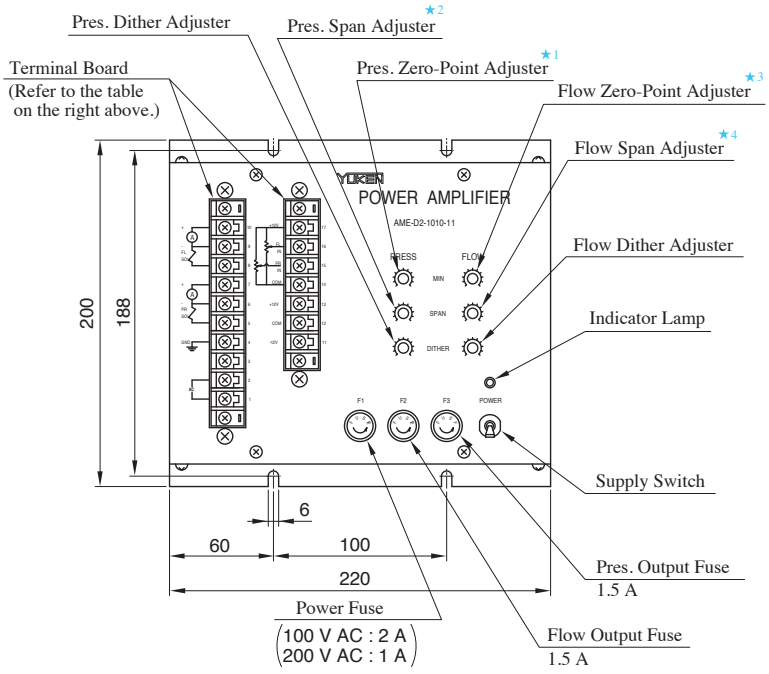
AME-D2-1010-11

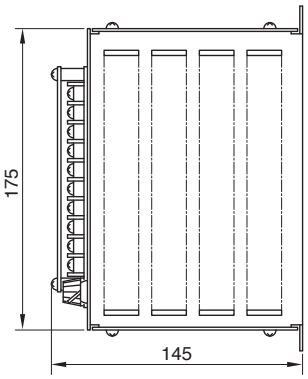
[Example Diagram]



Detail of Terminal Board

Terminal Number	Name	
1	Power Supply 85 - 264 VAC	
2		
3	———	
4	Ground	G
5	Output to Pressure Control Valve Solenoid	PR. SOL
6		
7	Ammeter	
8	Output to Flow Control Valve Solenoid	FL. SOL
9		
10	Ammeter	
11	-12 V OUT	-12 V
12	Common	COM
13	+12 V OUT	+12 V
14	Common	COM
15	Input Signal for PRES.	PR.IN
16	Input Signal for FLOW	FL.IN
17	+12 V OUT	+12 V

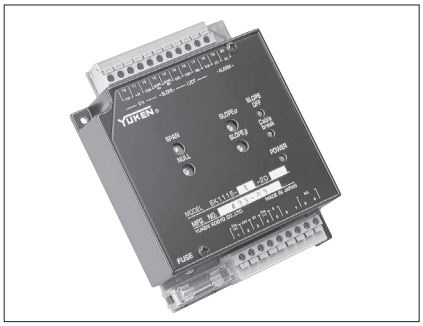




★1. Minimum Pressure Setting
★2. Variable Pressure Range Setting
★3. Minimum Flow Setting
★4. Variable Flow Range Setting

Power Amplifiers For Flow Control and Relief Valves

These power amplifiers are used to drive the proportional electro-hydraulic flow control and rerief valves,



Specifications

Descriptions \ Model No.	SK1115-＊-20
Type of Function	DC Input Type
Max. Output Current	2.5 A
Max. Input Voltage	0 - +10 V DC
Input Impedance	10 kΩ
Power Supply	24 V DC (Power Supply Range : 20-30V)
Sensor Monitor Output	-0.5 V/1 mm st.
Alarm Output	MAX 30 V DC, 10 mA
Ambient Temperature	0 - 50°C
Ambient Humidity	90 % RH or less
Approx. Mass	0.3 kg

Model Number Designation

SK1115	-1	-20
Series Number	Compensation	Design Number
SK1115	**1 :** For ELFBG-03 -125 **2 :** For ELFBG-03 -170	20

Applicable to Valve

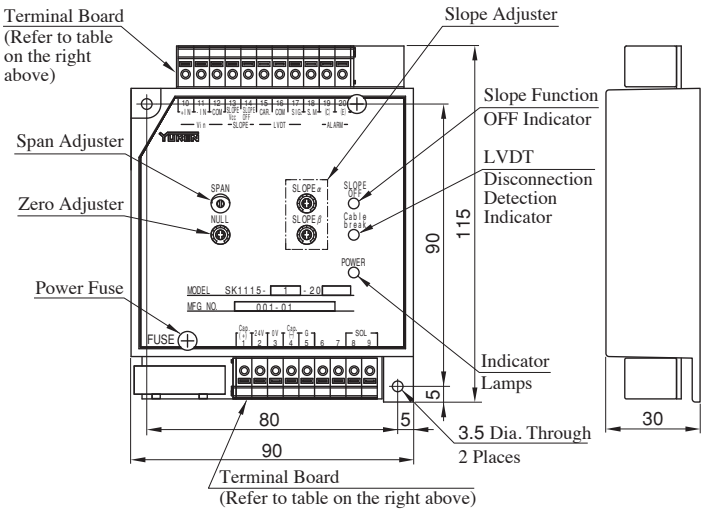
Name of Valve	Model Number
Proportional Elecctro-Hydraulic Flow Control and Relief Valves	ELFBG-03

Instructions

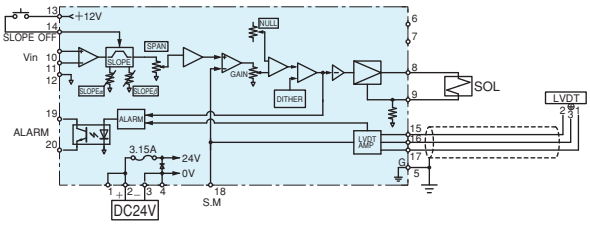
Supply Switch

The power amplifier has no power supply switch.
As soon as it is connected to a power supply, it comes to be alive.
Provide a power switch externally.

SK1115-＊-20



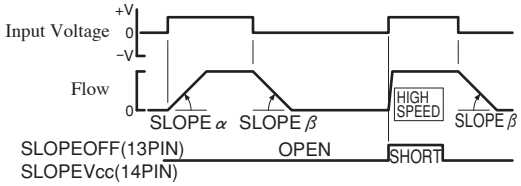
[Example Diagram]



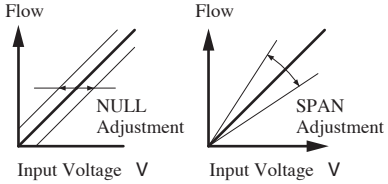
Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	CAPACITOR(+)	10	Imput Signal	+IN
2	Power Supply	+24	11	Imput Signal	–IN
3	Power Supply	0V	12	Imput Signal	COM
4	Power Supply	CAPACITOR(–)	13	Slope Function ON/OFF	SLOPE Vcc
5	Frame Ground	G)	14	Slope Function ON/OFF	SLOPE OFF
6		—	15	LVDT Terminal	CAR.
7		—	16	LVDT Terminal	COM
8	Output to Valve Solenoid	SOL(+)	17	LVDT Terminal	SIG.
9	Output to Valve Solenoid	SOL(–)	18	Sensor Monitor Output	S.M
			19	Alarm Output	ALM(C)
			20	Alarm Output	ALM(E)

Slope Adjuster



NULL, SPAN Adjuster



Power Amplifiers
For Shockless Type Directional and Flow Control Valves

These power amplifiers are used to drive the shockless type proportional and flow control valves.

Model Number Designation

AMN	-G	-10
Series Number	Type of Function	Design Number
AMN	G : Shockless Directional and Flow Control Type	10
	W : DC Input Type	10

Applicable to Valve

Name of Valve	Model Numbers
Shockless Type Proportional Directional and Flow Control Valves	EDFG-01

Specifications

Descriptions \ Model Numbers		AMN-G-10	AMN-W-10
Max. Output Current		1.3 A (10 Ω Solenoid)	
Setting Resolution		0 - 99 % (1 % Units)	—
Number of Preselection Pattern		SOLa : 3 Patterns SOLb : 3 Patterns	—
Sequence Input	Input Current	10 mA/24 V	—
	Voltage Range	10 - 28 V DC	—
Maximum Input Voltage		—	–10 V DC : SOLa +10 V DC : SOLb
Input Impedance		—	10 kΩ
Maximum Gain		—	1.3 A/–5 V : SOLa 1.3 A/+5 V : SOLb
Dither		Variable (Internal)	
Slope Adjustment Range		0 - 99 % / Max. slope time	—
Maximum Slope Time		1 - 99 s	—
Delay Time Adjustment Range		—	0.1 - 3 s
Temperature Drift		0.2 mA /°C	
Power Supply		24 V DC (Power Supply Range : 20 - 30 V)	
Power Input		25 W	
Ambient Temperature		0 - 50°C	
Ambient Humidity		90 % RH or less	
Approx. Mass		0.2 kg	

Instructions

Power Supply of the Outside Setting Adjuster

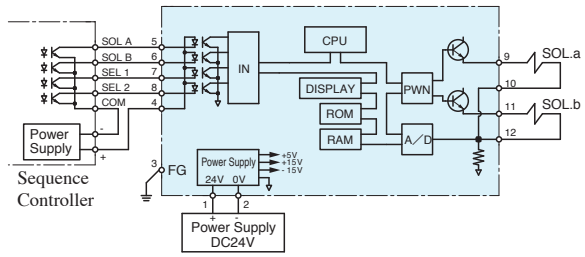
When DC input type (AMN-W) power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 2 kΩ for the setting adjuster.

Supply Switch

The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

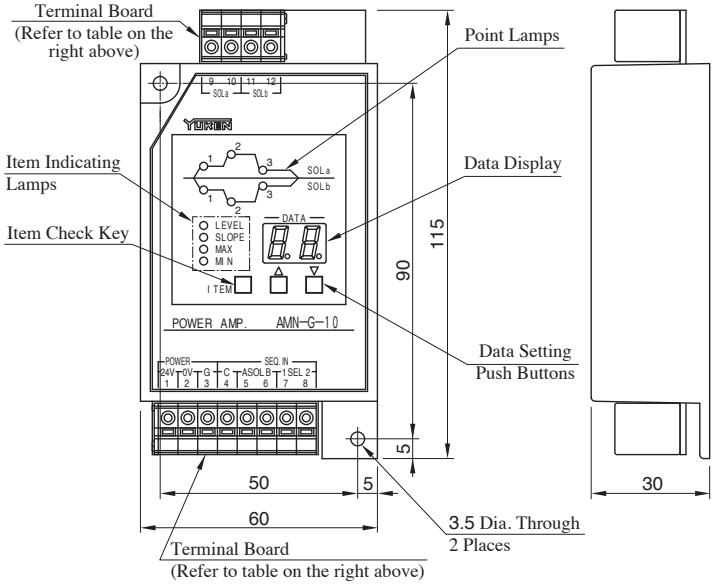
AMN-G-10

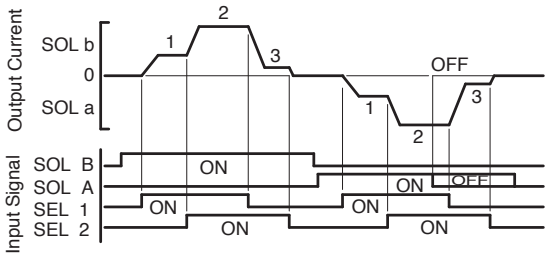
[Example Diagram]



Detail of Terminal Board

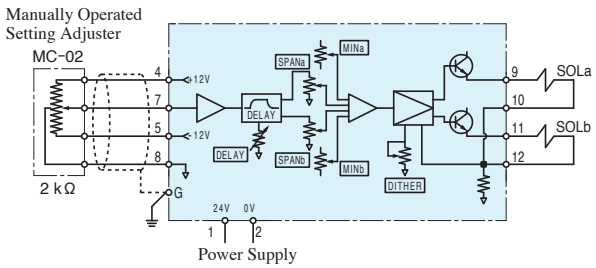
Terminal Number	Name		Terminal Number	Name	
1	Power Supply	+24V	7	Sequence Input	SEL 1
2	Power Supply	0V	8	Sequence Input	SEL 2
3	Ground	G	9	Output to Valve Solenoid	SOL a
4	Sequence Input	IN COM	10		
5	Sequence Input	SOL A	11	Output to Valve Solenoid	SOL b
6	Sequence Input	SOL B	12		





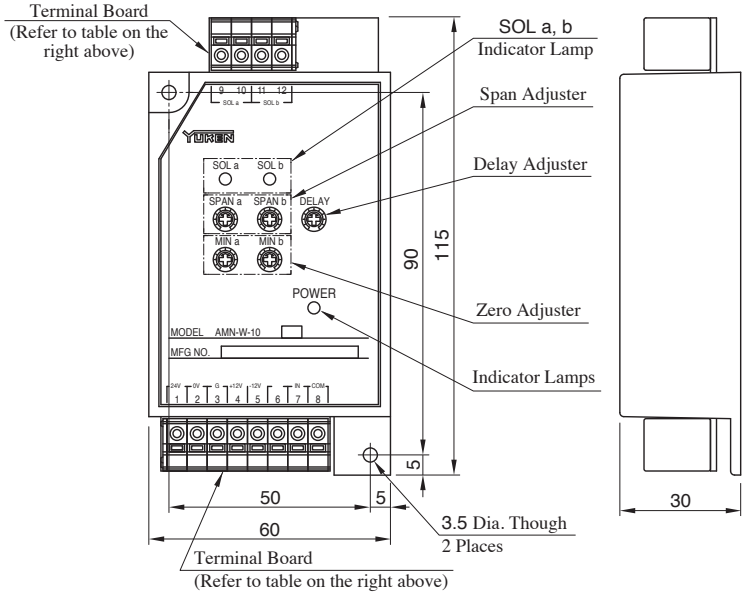
AMN-W-10

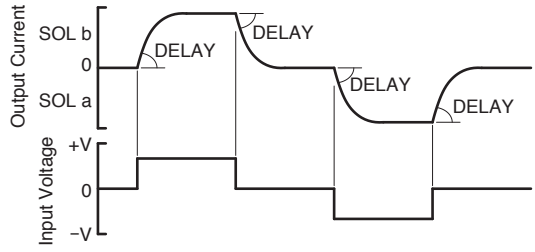
[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	+24V	7	Input Signal	IN
2	Power Supply	0V	8	Input Signal	COM
3	Ground	G	9	Output to Valve Solenoid	SOL a
4	Internal Power Supply	+12V	10		
5	Internal Power Supply	–12V	11	Output to Valve Solenoid	SOL b
6		———	12		





Power Amplifiers For Directional and Flow Control Valves

These power amplifiers are used to drive the proportional electro-hydraulic directional and flow control valves.

Model Number Designation

SK1091	-D24	-10
Series Number	Power Supply	Design Number
SK1091	**D24**: 24 V DC	**10**

Applicable to Valve

Name of Valve	Model Numbers
Directional and Flow Control Valve	EDFHG- 03 04 06

Specifications

Model No. / Descriptions	SK1091-D24-10
Max. Output Current	1 A (10 Ω Solenoid)
Max. Input Voltage	–10 V DC for SOL a +10 V DC for SOL b
Input Impedance	10 kΩ
Max. Gain	1 A / ±5 V
Dither	Variable
Delay Time Adjustment Range	0.15 - 3 s
Temperature Drift (Max.)	0.2 mA /°C
Power Supply	24 V DC (21-28 V Included Ripple)
Required Current	1.5 A or more
Power Input (Max.)	25 W
Ambient Temperature	0 - 50°C
Ambient Humidity	90 % RH or less
External Setting Resistance	2 kΩ
Approx. Mass	1.0 kg

Instructions

Power Supply for the Setting Adjuster

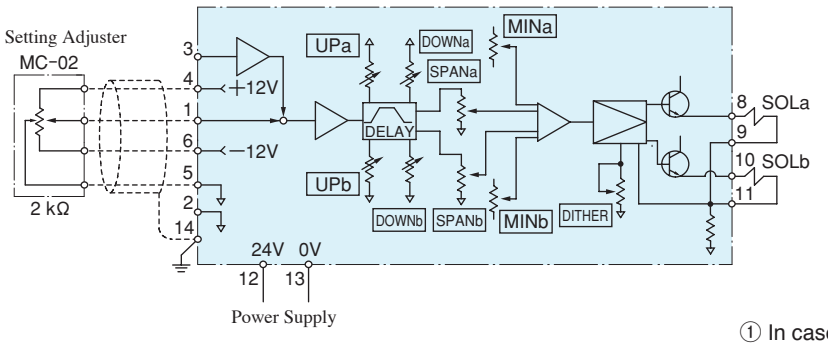
Power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 2 kΩ for the setting adjuster.

Power Switch

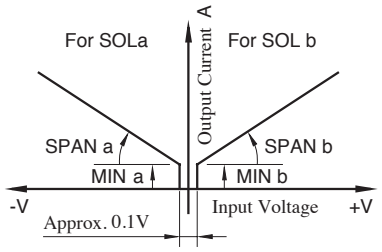
The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

SK1091-D24-10

[Example Diagram]

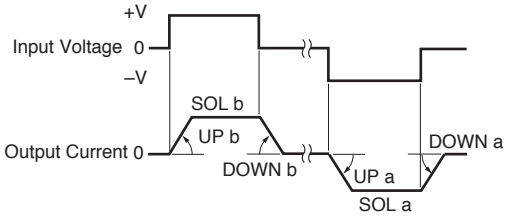


[Input-Output Characteristics]

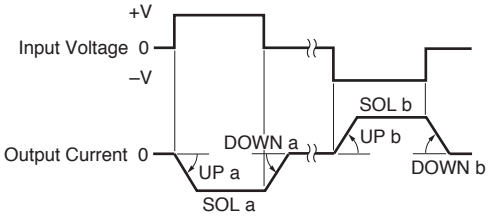


[Delay Function]

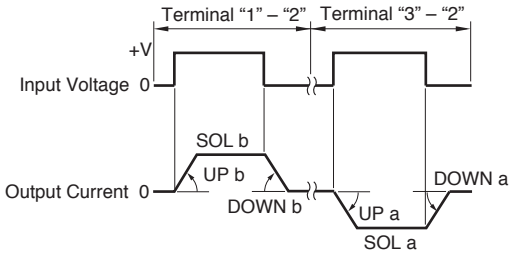
① In case "1" and "2" Input signal terminals are used.



② In case "3" and "2" Input signal terminals are used.



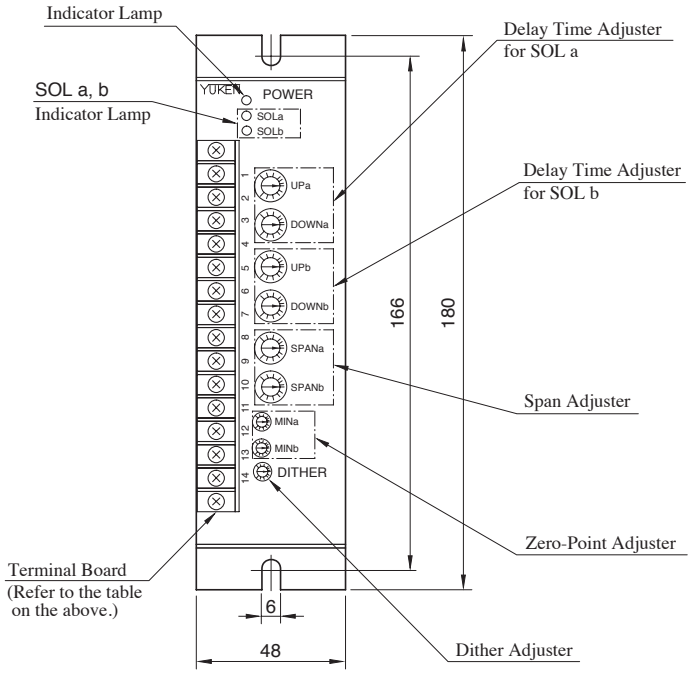
③ In case "1" , "2" and "3" Input signal terminals are used.

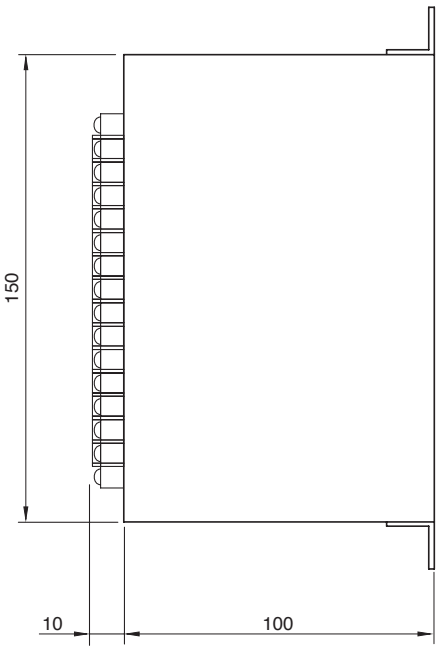


Detail of Terminal Board

Terminal Number	Name	
1	Input Signal	IN★
2	Input Signal	COM
3	Input Signal	IN★
4	Power Supply for Setting Adjuster	+12V
5	Power Supply for Setting Adjuster	COM
6	Power Supply for Setting Adjuster	–12V
7	—	
8	Output to Valve Solenoid	SOL a
9		
10	Output to Valve Solenoid	SOL b
11		
12	Power Supply	24 V
13	Power Supply	0 V
14	Frame Ground	FG

★ Three (3) usages are available as shown ① to ③ of "Delay Function" at right hand side for Input signal terminal (IN).





Power Amplifiers

Power Amplifiers
For High Response Type Directional and Flow Control Valves

These power amplifiers are used to drive the high response type proportional electro-hydraulic directional and flow control valves.
A compact AMN-L model and a euro card type AMB-EL model are available.
The single height [3U: 100 × 160 mm] is employed for the euro card size of the AMB-EL model.

AMN-L

AMB-EL

Model Number Designation

AMN-L

AMN	-L	-01	-3	-2P	-10
Series Number	Type of Function	Size of Applicable Valve	Compensation	Applicable Spool Type	Design Number
AMN	**L:** DC Input Type Directional and Flow Control with Miner feedback	**01:** 01 Size	**1:** Type 1	**None:** 3C2, 3C40	**10**
			3: Type 3	**2P:** 3C2P	

AMB-EL

AMB	-EL	-03	-2P	-1	-A	-20
Series Number	Type of Function	Size of Applicable Valve	Applicable Spool Type	Compensation	I/O signal type	Design Number
AMB	**EL:** DC Input Type Directional and Flow Control with Miner feedback	**01:** 01 Size	**None:** 3C2, 3C40 **2P:** 3C2P	★1	**A:** Voltage Signal ±10 V (P→B→A→T Flow with Input Signal (+)) **B:** Current Signal 4 - 20 mA (P→B→A→T Flow with Current 12 - 20 mA) **C:** Current Signal ±10 mA (P→B→A→T Flow with Input Signal (+)) **D:** Voltage Signal ±10 V (P→A→B→T Flow with Input Signal (+)) **E:** Current Signal 4 - 20 mA (P→A→B→T Flow with Current 12 - 20 mA) **F:** Current Signal ±10 mA (P→A→B→T Flow with Input Signal (+))	**20**
		03: 03 Size		**1:** For flow rate 40/80 L/min		
		04: 04 Size		**1:** For flow rate 280 L/min		
		06: 06 Size		**3:** For flow rate 350 L/min **4:** For flow rate 500 L/min		

Please refer to us for ★1.

Specifications

Descriptions \ Model Numbers	AMN-L-01-1	AMN-L-01-3-2P	AMB-EL-01	AMB-EL-03	AMB-EL-04	AMB-EL-06
Max. Output Current	2.5 A (3.9 Ω Solenoid)		2.5 A (3.9 Ω Solenoid)	3.0 A (3 Ω Solenoid)	2.5 A (3.9 Ω Solenoid)	
Max. Input Voltage	+10 V DC: P→B→A→T –10 V DC: P→A→B→T		Voltage Signal Type (A, D) : ±10 V/±5 V Current Signal Type (B, E) : 4-20 mA Current Signal Type (C, F) : ±10 mA			
Input Impedance	10 kΩ or more		Voltage Signal Type (A, D) : 100 kΩ (50 kΩ in single-ended mode) Current Signal Type (B, C, E, F) : 200 Ω			
Slope-off input	Terminal Number 13-14 Short	—	4 - 28 V DC			
Slope Adjust Time	0.03 - 5 s	—	0.05 - 5 s (Slope adjustment function is not available with "AMB-EL-✻-2P")			
Monitor Voltage	1.5 V /±3 mm st.		Voltage Signal Type (A, D) : ±10 V / rated st (RL≧10kΩ) Current Signal Type (B, E) : 4-20 mA/ rated st (RL 100-500Ω) Current Signal Type (C, F) : ±10 mA/ rated st (RL 100-500Ω)			
Alarm	Open Collector (30 V DC, 10 mA Max.)		Open Collector (30 V DC, 10 mA Max.)			
Supply Voltage Range	24 V DC (20 - 30 V DC)		24 V DC (21 - 28 V DC)			
Power Input	75 W		30 W	40 W	30 W	
Ambient Temperature	0 - 50°C		0 – 50°C			
Ambient Humidity	90 % RH or less		85 % RH or less			
Connector	—		DIN 41612 - F32			
Approx. Mass	0.3 kg		0.28 kg		0.34 kg	

★1. The input signal voltage can be switched between ±10 V and ±5 V by the "input sensitivity selection jumper plug" in the amplifier.
★2. For AMB-EL-04/06, the value corresponds to the monitoring of the main spool stroke; the monitor signal for the pilot spool stroke is ±10 V/rated stroke.

Applicable to Valve

Power Amplifiers Model Numbers	Valve Model Numbers
AMN-L	ELDFG-01
AMB-EL	ELDFG-01/03 ELDFHG-04/06

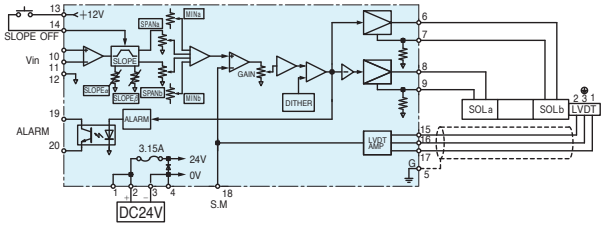
Instructions

Power Switch

The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

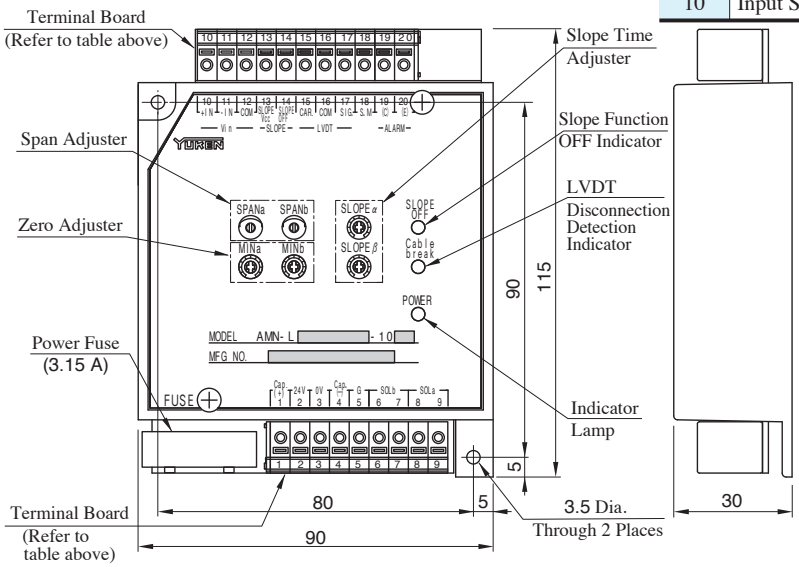
AMN-L-01-1-10

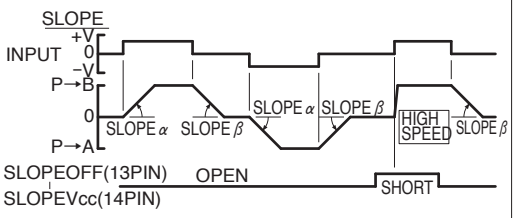
[Example Diagram]



Detail of Terminal Board

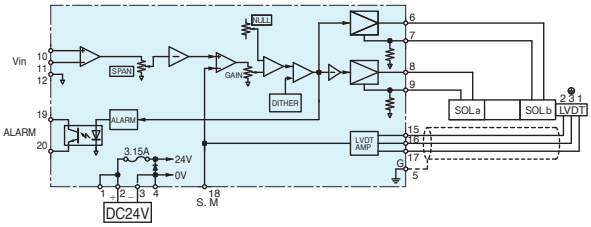
Terminal Number	Name		Terminal Number	Name	
1	Power Supply	CAPACITOR(+)	11	Input Signal	–IN
2	Power Supply	+24V	12	Input Signal	COM
3	Power Supply	0V	13	Slope Control ON/OFF Terminal	SLOPE Vcc
4	Power Supply	CAPACITOR(–)	14	Slope Control ON/OFF Terminal	SLOPE OFF
5	Frame Ground	G	15	LVDT Terminal	CAR.
6	Output to Valve Solenoid	SOL b	16	LVDT Terminal	COM
7			17	LVDT Terminal	SIG.
8	Output to Valve Solenoid	SOL a	18	Sensor Moniter Output	S.M
9			19	Alarm Output	ALM(C)
10	Input Signal	+IN	20	Alarm Output	ALM(E)





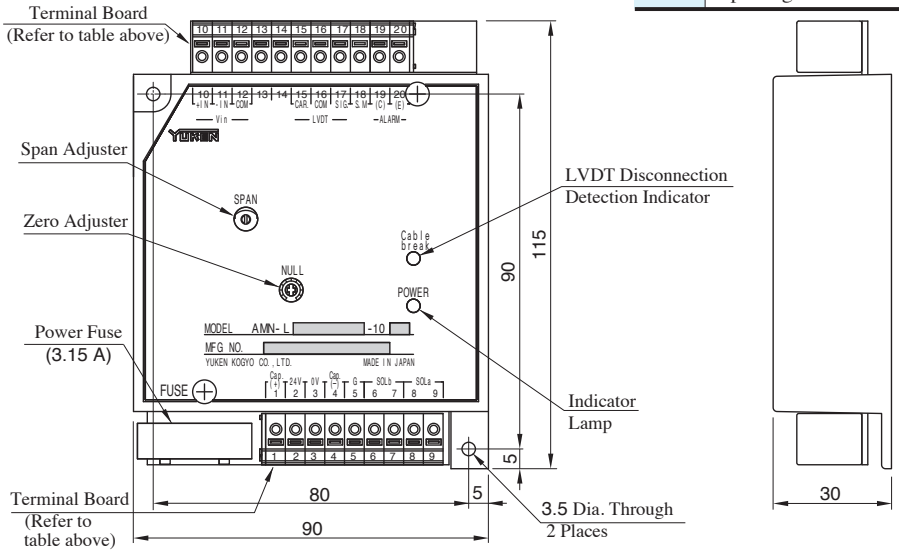
AMN-L-01-3-2P-10

[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	CAPACITOR(+)	11	Input Signal	–IN
2	Power Supply	+24V	12	Input Signal	COM
3	Power Supply	0V	13	———	
4	Power Supply	CAPACITOR(–)	14	———	
5	Frame Ground	G	15	LVDT Terminal	CAR.
6	Output to Valve Solenoid	SOL b	16	LVDT Terminal	COM
7			17	LVDT Terminal	SIG.
8	Output to Valve Solenoid	SOL a	18	Sensor Moniter Output	S.M
9			19	Alarm Output	ALM(C)
10	Input Signal	+IN	20	Alarm Output	ALM(E)



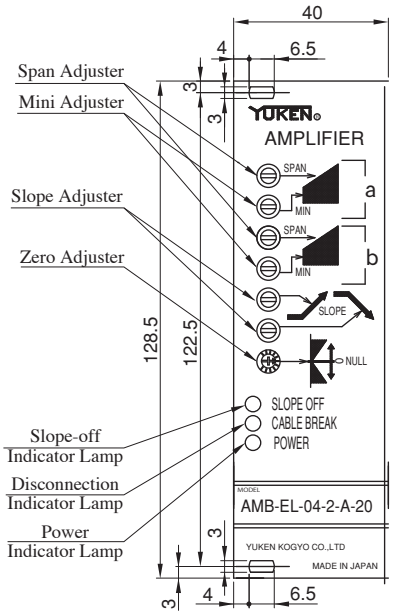
AMB-EL-∗-∗-∗-20

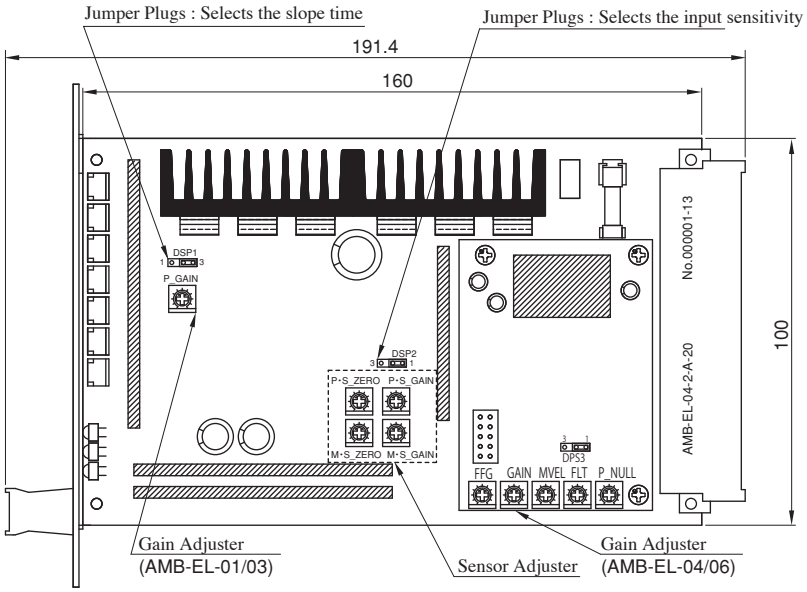
This power amplifier requires connector cards for connection. A connector card attached model is also available.
Please ask for details if interested.

Pin Connections and Functions

Pin Number	Name		Pin Number	Name	
b02	Power Supply	0V	z02	sol a(+)	
b04	Power Supply	0V	z04	sol a(–)	
b06	sol b(+)		z06	———	
b08	sol b(–)		z08	———	
b10	———		z10	Command Input	(+)
b12	———		z12	Command Input	(–)
b14	COM		z14		
b16	Power Supply	+24V	z16	COM (No.2)	★1 Connected to main valve sensor. See "Sensor Connection"
b18	Power Supply	+24V	z18	Carrier (No.3)	
b20	Slope Off		z20	Signal (No.1)	
b22	COM (No.3)	★1 Connected to pilot valve sensor. See "Sensor Connection"	z22	———	
b24	Signal (No.1)		z24	Alarm Output	(–)
b26	Carrier (No.2)		z26	Alarm Output	(+)
b28	Output	24V	z28	Stroke Monitor Signal	(P)★2
b30	Output	24V	z30	Stroke Monitor Signal	(S)★3
b32	FG		z32	———	

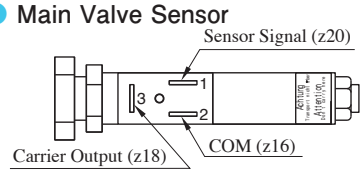
See the "Sensor Connection" diagram on the bottom left.
- (according to the I/O signal type)
- Pilot spool travel monitoring (fixed to ±10 V)



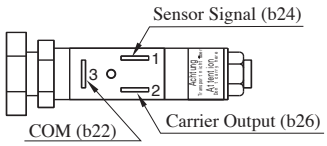


Sensor Connection

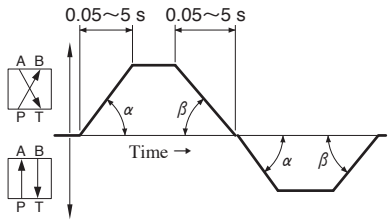
Main Valve Sensor



Pilot Valve Sensor

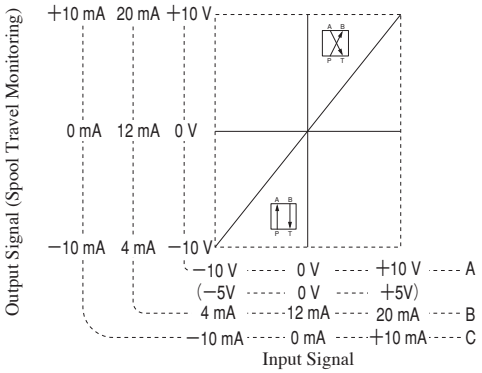


Lamp Pattern

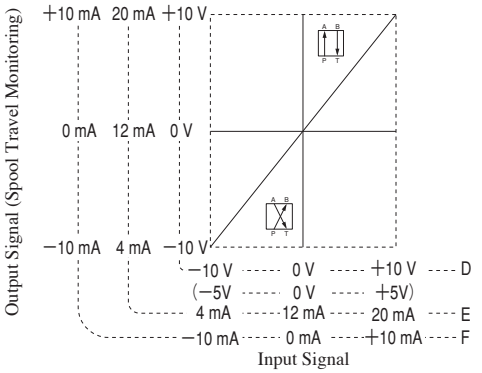


I/O Signal Characteristics

AMB-EL-∗-∗-∗-A/B/C



AMB-EL-∗-∗-∗-D/E/F



Interchangeability in Installation Current and New Design

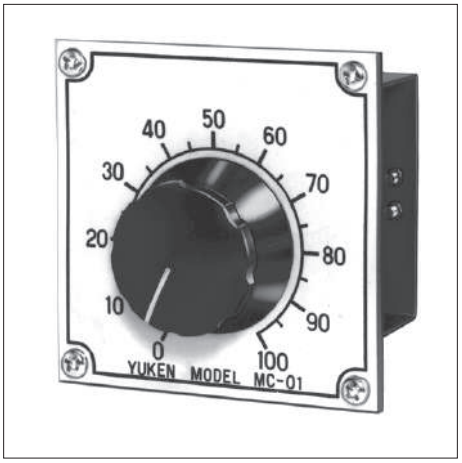
The power amplifier AMB-EL models were remodeled because I/O signal types were added, and the design number was changed from 10 to 20.

There are no changes to external dimensions and installation.

Setting Adjusters

The setting adjuster supplies the command signal voltage to the power amplifier. Since the setting adjuster is closely related to actual machine operating procedure, the user generally provides this device.

Yuken makes the following standard setting adjusters for general use and designs and manufactures special setting adjusters to order.

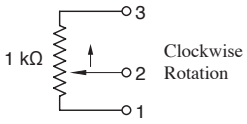


Type	Model Number	Function
Manually Operated Setting Adjuster	MC-01	This is the simplest setting adjuster, consisting of a trimmer (1 kΩ) and a dial.
	MC-02	Consisting of a center-tapped trimmer (1 kΩ - 1 kΩ) and a dial, this setting adjuster is ideal for a servo system.
6-point Setting Adjuster	AMC-V6-S-∗-10	Six trimmers are incorporated, so it is possible to set six points.
Multifunction Slope Controller	AMC-T-20	This multifunction slope controller generates any desired two-channel analog voltage patttern outputs. It can also be used with slope-proportional and time-proportional systems.
Slope Controller	AMN-T-10	Slope and output can be set optionally 4-bit signal.

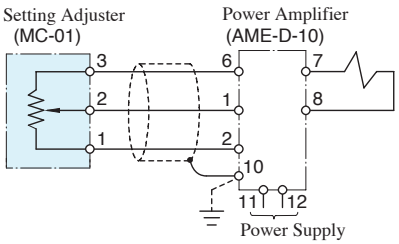
Manually Operated Setting Adjuster

MC-01

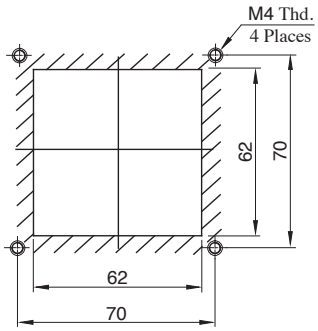
[Electric Circuit]

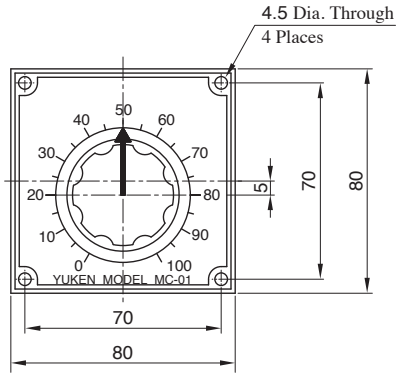


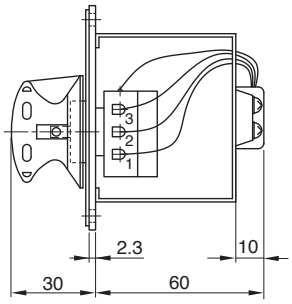
[Example Diagram]

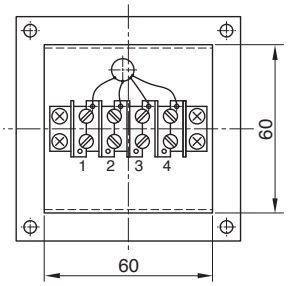


[Mounting Panel]









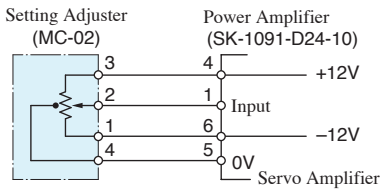
Approx. Mass.....0.5 kg

MC-02

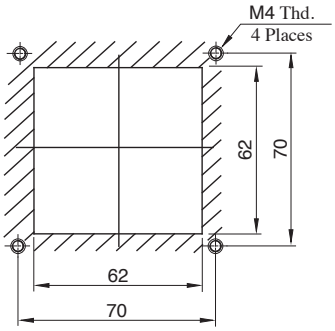
[How to Use]

This setting adjuster is for using positive and negative voltages to the right and left of the zero point. Most suitable for servo systems. Please contact us for usage details.

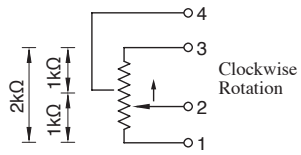
[Example Diagram]

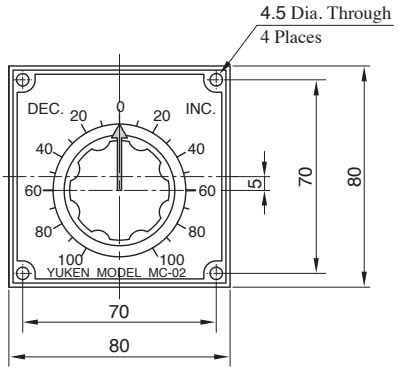


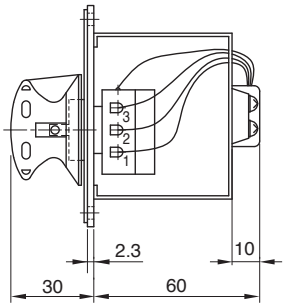
[Mounting Panel]

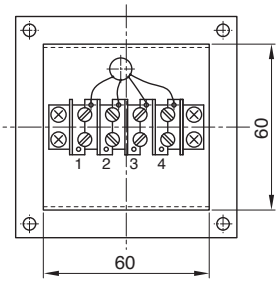


[Electric Circuit]









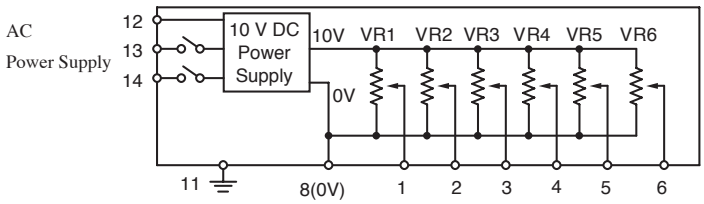
Approx. Mass.....0.5 kg

6-Point Setting Adjuster

AMC-V6-S-∗-10

Power Supply
100 ..... 100 V AC
200 ..... 200 V AC
220 ..... 220 V AC

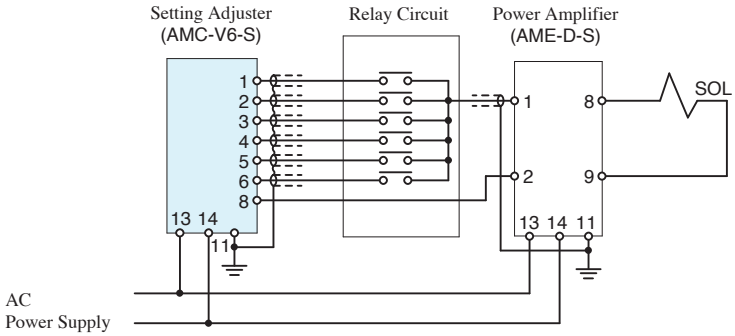
[Electric Circuit]

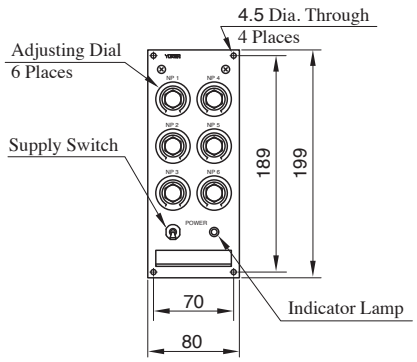


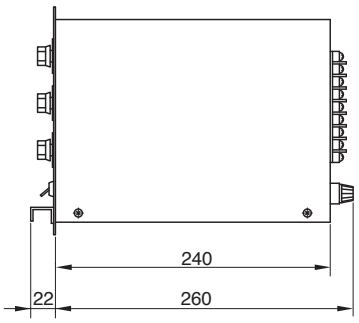
Detail of Terminal Board

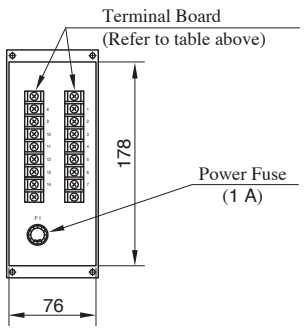
Terminal Number	Name
1	1 OUT (VR1)
2	2 OUT (VR2)
3	3 OUT (VR3)
4	4 OUT (VR4)
5	5 OUT (VR5)
6	6 OUT (VR6)
7	—
8	0V COM
9	—
10	—
11	Ground G
12	—
13	Power Supply 85- 265 VAC
14	

[Example Diagram]





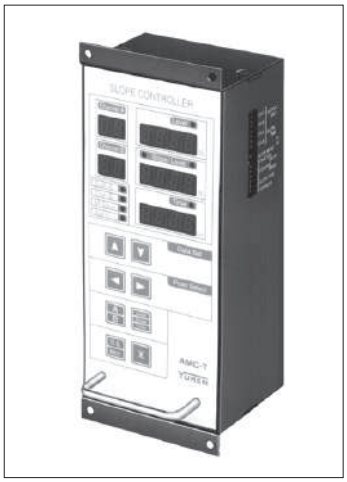




Approx. Mass.....1.6 kg

Multifunction Slope Controllers

This controller can generate any desired two-channel analog voltage pattern outputs and can be used with slope-constant and time-constant systems. Although two-channel outputs can be used independently, this controller can also be used as a setting adjuster for the EH Series variable piston pumps.



Model Number Designation

AMC	-T	-20
Series Number	Type of Function	Design Number
AMC: Setting Adjuster	**T**: Acceleration/Deceleration Signal Type (Slope Controller)	**20**

Specifications

Model No. / Descriptions	AMC-T-20
Number of Output Channels	2 Channels (A, B)
Maximum Output Range	0 - +5 V ★, 0 - ±5 V, 0 - +10 V, 0 - ±10 V (The settings are DIP switch selectable)
Two Categories of Slopes	Slope-constant ★ 5s/Max. output voltage With a level change, the slope will not change (but arrival time changes.) Time-constant 5s With a level change, the time will not change (but the slope changes.) } (to be selected by DIP switch)
Acceleration/Deceleration Signal Type	4 Types Polygonal Line Signal ★ : 1 Type Curve Compensation Signal : 3 Types (to be selected by DIP switch)
Max. Slope Time	5 s ★, 20 s, 50 s, 100 s (The settings are DIP switch selectable)
Setting Resolution	The level and slope settings are variable in 0.1% units from 0 to ±99.9%
Control Mode Number of Preselected Patterns	Mode 1, 4-bit binary code input, 15 patterns Mode 2, 6-bit binary code input, 63 patterns Mode 3, Timer control, 9 patterns (4 variations)
Stop Mode (Applicable Only for Control Mode 1)	ON : The stop mode is to retain the state of controller output at the instant an external input signal is interrupted. When the external signal is input again, the operation is resumed from the retained state. OFF ★ : When external input signal is interrupted, function goes back to the initial setting (Pattern No.0).
Control Input Signal	Current input type, 10 mA /bit max. Usable as a voltage input type (voltage range: 8 to 48 V DC) Photocoupler insulation input
Control Output Signal	Output from transister open collector Max. 30 V, 50 mA
Data Save	EEP-ROM (Battery not needed)
Power Supply	100/200 V AC, 50/60 Hz (85 - 260 V AC)
Power Input	10 VA or less
Ambient Temperature	0 - 50°C
Ambient Humidity	85%RH or less (Bedewing must be avoided)
Approx. Mass	1 kg

Note) ★ Indicates preset conditions.

Instructions

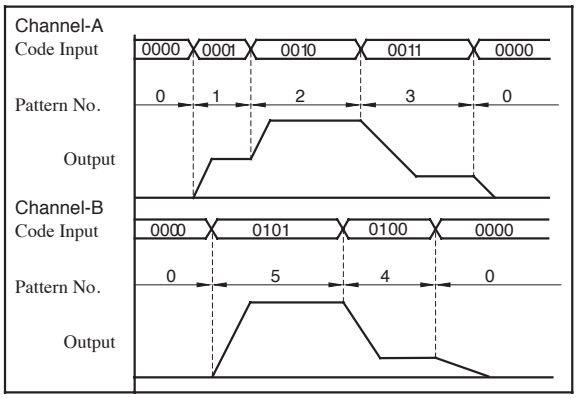
- Since this controller incorporates a micro computer, do subject it to undue electrical noise.

Control Modes

One among the following three types of control modes can be chosen by changing DIP swicth.

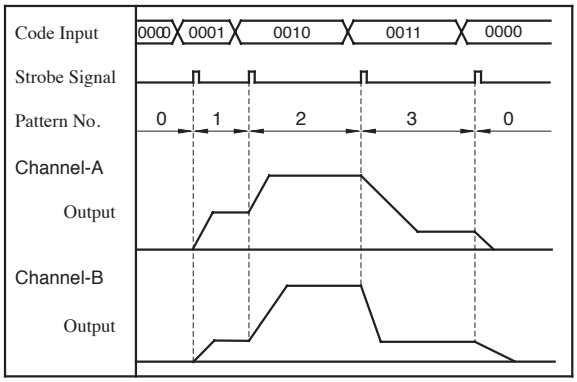
Control Mode 1

Channels A and B generate optional slopes independently each other.



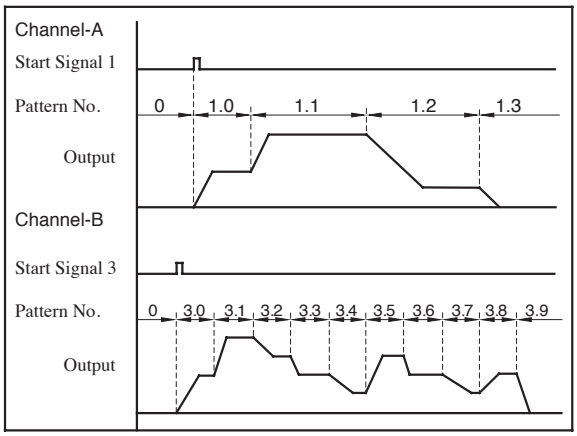
Control Mode 2

A slope is generated by a strobe signal (signal for change to next signal). Channels A and B operate synchronously.



Control Mode 3

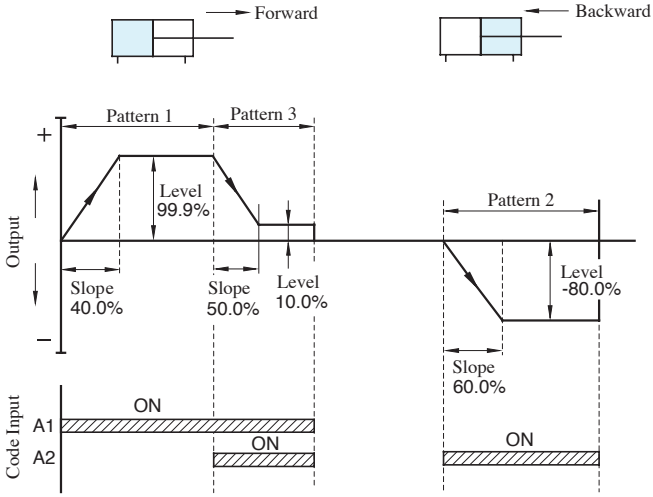
The internal timer is activated by a start signal, causing the slopes to be generated successively in memory. Channels A and B operate independently.



Setting Example

Control Mode 1 Channel - A

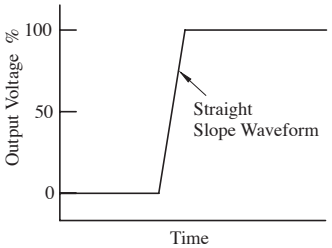
Code Input				Pattern No.	Setting %		Remarks
A8	A4	A2	A1		Level	Slope	
OFF	OFF	OFF	OFF	0	0	0	Stop
OFF	OFF	OFF	ON	1	99.9	40.0	Cylinder forward acceleration
OFF	OFF	ON	OFF	2	-80.0	60.0	Cylinder backward acceleration
OFF	OFF	ON	ON	3	10.0	50.0	Cylinder forward deceleration
ON	ON	ON	ON	15	10.0	10.0	



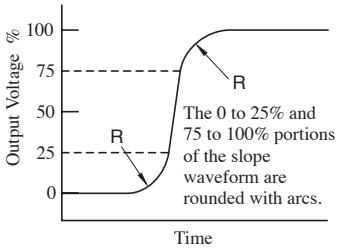
Slope Type

One among the follwing four types can be chosen by changing DIP switch.

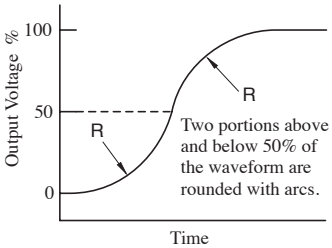
Type 1



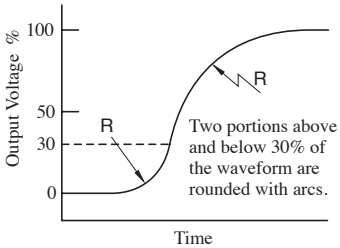
Type 2



Type 3

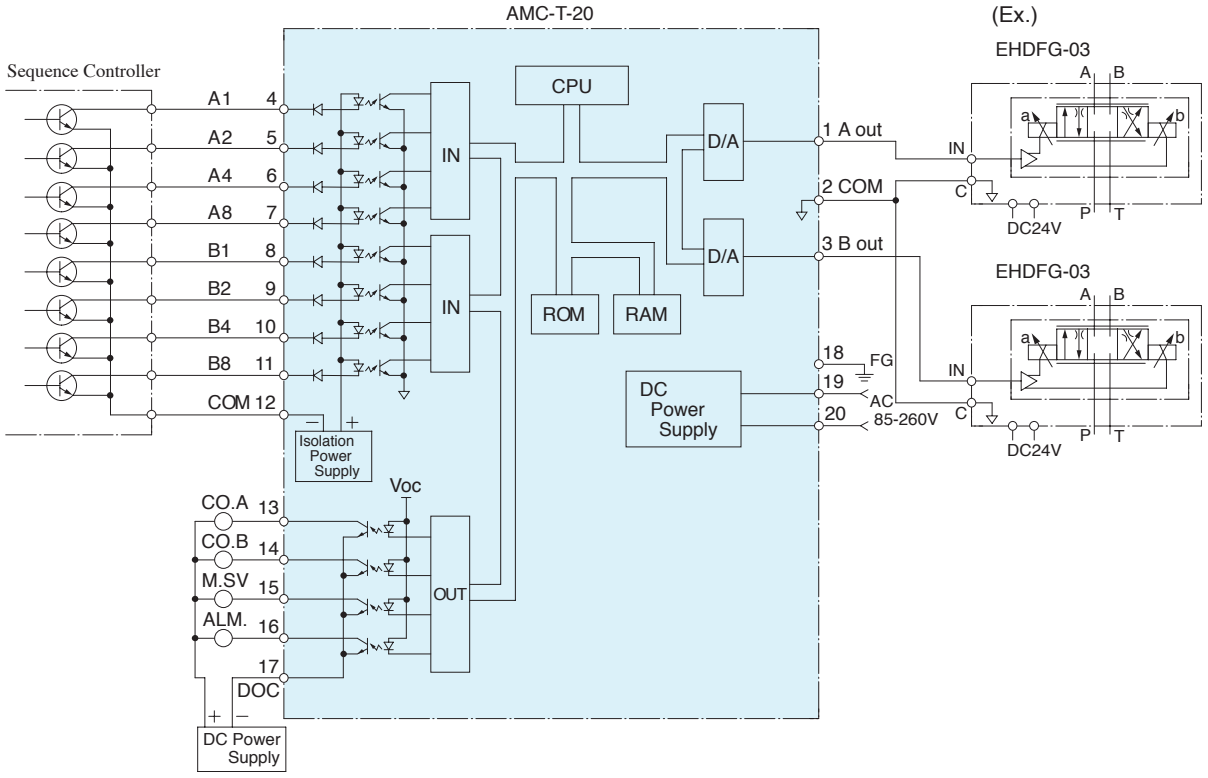


Type 4



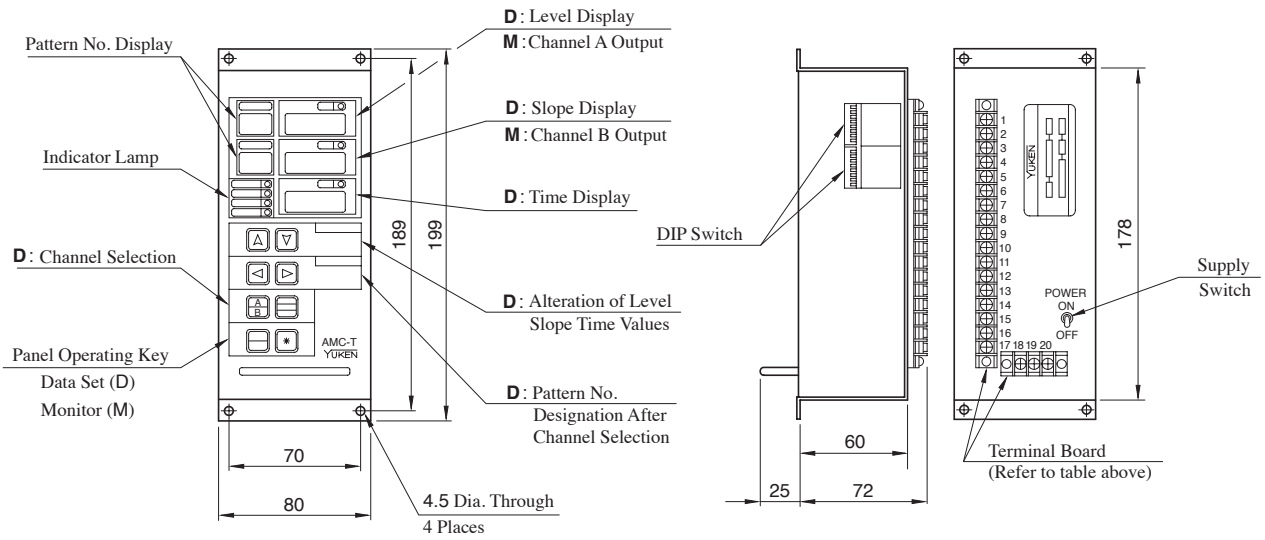
AMC-T-20

[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Channel A Output	A out	11	Code Input	B8
2	Common	COM	12	Code Input Common	DCOM
3	Channel B Output	B out	13	Coincidental Output Signal with "A"	CO.A
4	Code Input	A1	14	Coincidental Output Signal with "B"	CO.B
5	Code Input	A2	15	Data Save Signal	M.SV
6	Code Input	A4	16	Alarm Signal Output	ALM.
7	Code Input	A8	17	Output Common	DOC
8	Code Input	B1	18	Frame Ground	FG
9	Code Input	B2	19	Power Supply	AC
10	Code Input	B4	20		



Interchangeability between Current and New Design

Specifications

Specifications unchanged unless specified below.

Descriptions \ Model No.	New : AMC-T-20	Current : AMC-T-10
Control Output Signal	Output from transister open collector Max. 30 V, 50 mA	Output from transister open collector Max. 30 V, 10 mA
Slope Types	4 Types (Polygonal Line Signal : 1 Type, Curve Compensation Signal : 3 Types) to be selected by DIP switch	1 Type : Polygonal Line Signal
Stop Mode (Applicable only for Control Mode 1)	ON, OFF	——
Data Save	EEP-ROM Battery not needed	Battery Required
Approx. Mass	1 kg	1.8 kg

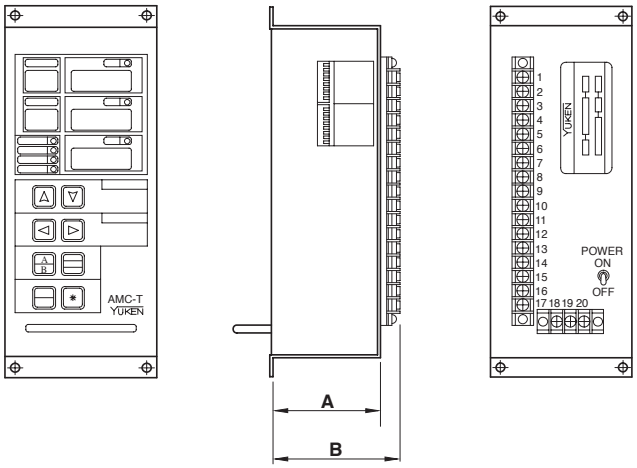
Terminal

The following are differences between current and new.

Terminal Number	Name		Remarks
	New : Design 20	Current : Design 10	
13	Coincidental Output Signal with "A" "CO.A"	Coincidental Output Signal with "A" "DO1"	Abbreviation of the terminals are changed, though functionally the same.
14	Coincidental Output Signal with "B" "CO.B"	Coincidental Output Signal with "B" "DO2"	
15	Data Save Signal "M.SV"	——	Added new functions.
16	Alarm Signal Output "ALM."	——	

Interchangeability in Installation

There is an interchangeability in installation, although depths (dimensions "**A**" and "**B**") are different.



Model Numbers		mm	
		A	B
Current	AMC-T-10	185	200
New	AMC-T-20	60	72

Slope Controllers

This slope controller is considerably smaller and lighter compared to conventional slope controllers.
4-bit switching signals allow the pattern output of given levels and acceleration/deceleration times. One-touch disconnection is supported.
The mass and the volume have been reduced to one-fifth and one-fourth, respectively.

Model Number Designation

AMN	-T	-10
Series Number	Type of Function	Design Number
AMN	T: Slope Controller	10

Specifications

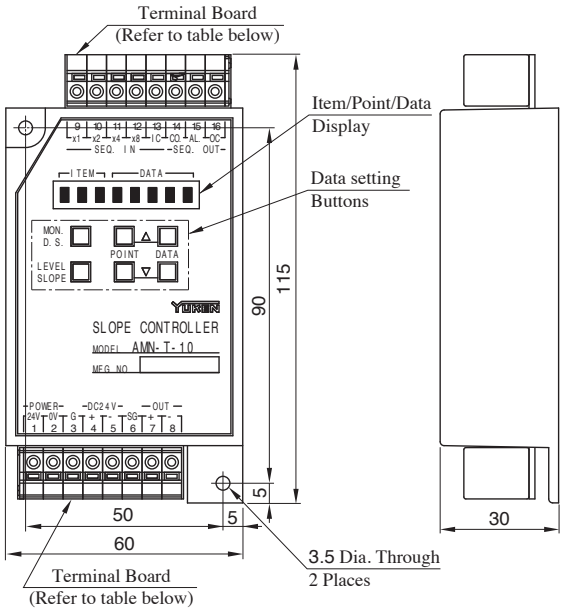
Model Numbers / Descriptions	AMN-T-10
Number of Output Channels	1 Channel
Maximum Output Range	0 - +5 V (Factory Preset) 0 - +10 V 5 V 10 V
Maximum Slope Time	● Slope-constant type: ★1 1-9999 s/Max. Output Signal (Factory Setting, 5 s) ● Time-constant type: ★2 1-9999 s (Can be set in 1 second increments)
Acceleration/Deceleration Signal Type ★3	Polygonal Line Signal: 1 Type (Factory Setting) Curve Compensation Signal: 3 Type
Setting Resolution	The level and slope setting are variable in 0.1 % units from 0 to 99.9%
Number of Preselected Patterns	4-bit binary code input 15 patterns
Sequence Input	Input Current: 10 mA/24 V Voltage Range: 10 - 28 V
Sequence Output	Load Current: Max. 50 mA Supply Voltage: Max. 32 V
Power Supply Voltage	24 VDC (20 - 30 VDC)
Power Input	3 W
Ambient Temperature	0 - 50°C
Ambient Humidity	90 % RH or less
Approx. Mass	0.2 kg

★1. A fixed slope means that the slope endpoint time changes while the slope gradient remains unchanged when the level is changed.
★2. A fixed time means that the slope endpoint time remains unchanged when the level is changed.
★3. The same slope types as those for the multifunction slope controller are supported. See page H-198 for details.

Instructions

● Since this controller incorporates a micro computer, do subject it to undue electrical noise.

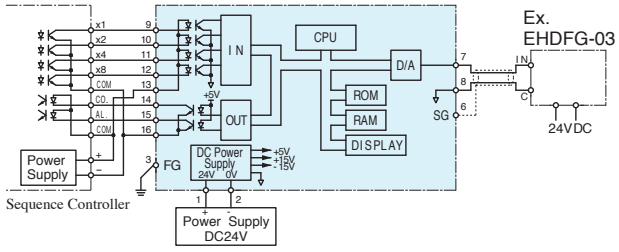
AMN-T-10



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	+24V	9	Sequence Input	×1
2	Power Supply	0V	10	Sequence Input	×2
3	Frame Ground	G	11	Sequence Input	×4
4	Internal Power Supply	+24V	12	Sequence Input	×8
5	Internal Power Supply	0V	13	Sequence Input	IN COM
6	Signal Ground	SG	14	Sequence Output	COL N.
7	Output Signal	+	15	Sequence Output	ALARM
8	Output Signal	−	16	Sequence Output	OUT COM

[Example Diagram]



I

SERVO VALVES

Valve Type		Maximum Operating Pressure MPa	Rated Flow L/min (Valve Pressure Difference:7 MPa)	Page
High-Speed Linear Servo Valves	Direct Type	35	LSVG-03 4 10 20 40 60	I-5
	Two Stage Type	35	LSVHG-04 750	I-10
		900 : 35 1300 : 31.5	LSVHG-06 900 1300	
		35	LSVHG-10 3800	
OBE Type Linear Servo Valves (Std. Type)	Direct Type	35	LSVG-01EH 4 10 20	I-22
		35	LSVG-03EH 40 60	
	Two Stage Type	31.5	LSVHG-03EH 210 230 270	I-31
		35	LSVHG-04EH 580 750 900	
		900 : 35 1300 : 31.5	LSVHG-06EH 820 1300	
		35	LSVHG-10EH 3800	
OBE Type Linear Servo Valves (High Performance Type)	Two Stage Type	31.5	LSVHG-03EH-※-S 60 100 160	I-52
		35	LSVHG-04EH-※-S 100 200 280 450	
		35	LSVHG-06EH-※-S 500 900	

■ Linear Servo Amplifier AMLS-＊ ····· Page I-19
■ Servo Amplifiers & Controllers SK1056/AMS-＊ ····· Page I-61

Hydraulic Fluids

Type of Fluids

Any type of hydraulic fluid listed in the table below can be used.

Petroleum Base Oils	Use fluids equivalent to ISO VG32 or VG46.
Synthetic Fluids	Use phosphate ester or polyol ester type. When phosphate ester type fluid is used, prefix "F-" to the model number because a special seal (fluororubber) will be used.
Water Containing Fluids	Use water-glycol fluids. Water-glycol fluids cannot be used for valves "without Y port" (wet type: LSVG-*EH-*-W) or "without DR port" (wet type pilot valve: LSVHG-*EH-*-*-W).

Note: For use with hydraulic fluids other than those listed above, please consult your Yuken representatives in advance.

Recommended Viscosity and Temperature

Use hydraulic fluids which satisfy both recommended viscosity and oil temperatures given in the table below.

Viscosity	Temperature
15 - 400 mm^2/s	−15 - +60 ℃

Control of Contamination

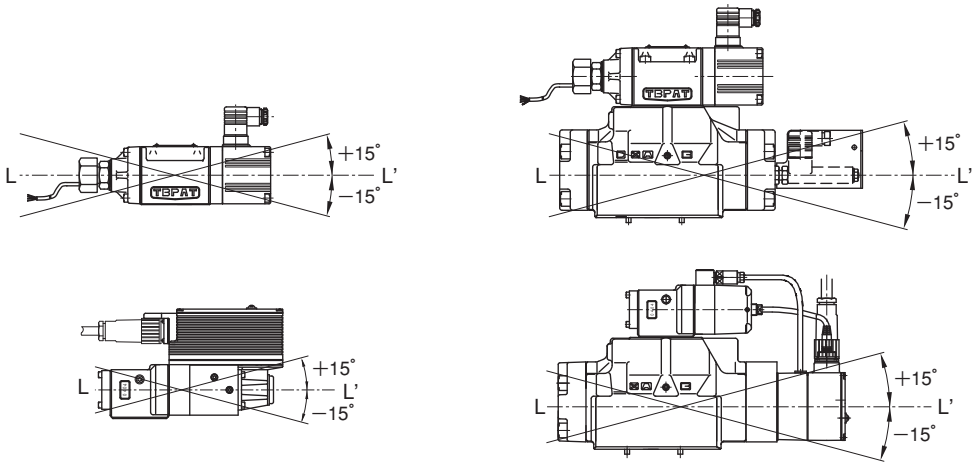
Keep the hydraulic fluid clean and provide a line filter so that contamination of the fluid will not obstruct proper valve operation. To assure long life of linear servo valves, it is recommended to improve fluid cleanliness before use.

Contamination Level	Line Filter
NAS1638 Class 10 ISO4406 21/19/15	Absolute 20 μm

Instructions

Mounting

Mount the valve with the angle of the axis line L-L' within about ±15° from the horizontal plane, as shown below. The valve must be mounted in such a way that the spool axis direction is not matched with the main vibration direction; otherwise, an external force may cause the spool to malfunction.



Installation Requirements

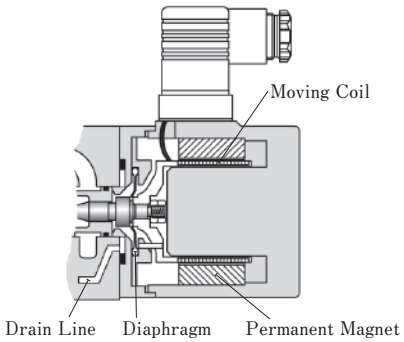
Avoid installing the valve in a strong magnetic field. Especially, the position sensor for detecting the spool position is affected by the magnetic field. Keep the valve away from devices that generate magnetic fields, such as solenoid operated directional valves. At the same time, a magnetic field generated by the valve may affect other devices; any device vulnerable to magnetic fields must not be installed near the valve.

Drain Piping (LSVG: Y Port/LSVHG: DR Port)

LSVG/LSVHG series high speed linear servo valves have a diaphragm mechanism that keeps the inside of the linear motor dry in order to meet the requirements below.

1) Keeping response characteristics almost unchanged when fluid viscosity varies (the response characteristics of existing proportional/servo valves vary with changes in fluid viscosity).
2) Protecting moving coils from iron powder or moisture in hydraulic fluids.
   A special drain port is provided to define the upper limit of pressure for the diaphragm, if any, so that the valve performance is maintained. For valve installation, provide a drain line by taking into account the following piping considerations.

①Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.
②The drain line should be open to the air (the line end must not contact the fluid).
★There are two types of pilot valves available: a dry type good in response characteristics and a wet type that eliminates the Y or DR port to improve usability.



Structure of the Linear Motor

Cable Length for I/O Signals

1) High speed linear servo valves (amplifier-separated type)
   Use a cable of up to 30 m in length.
   Consult us for customized products (Model: LSVG-03/LSVHG-04, 06) that allow the use of a cable of up to 200 m in length.
2) OBE (on-board electronics) type liner servo valves
   The maximum cable length depends on the I/O signal type. See the table below.

I/O Signal Type	Valve Model Number	Max. Cable Length
±10 V	LSV(H)G-＊＊EH-＊＊-＊-＊-＊-A＊/D＊-10	50 m★
4 - 20 mA	LSV(H)G-＊＊EH-＊＊-＊-＊-＊-B＊/E＊-10	300 m
±10 mA	LSV(H)G-＊＊EH-＊＊-＊-＊-＊-C＊/F＊-10	

★Consult us when the cable length exceeds 50 m.

For both valve types in 1) and 2), pay attention to ensure that the power cable resistance is within 1 Ω and is as low as possible.

Electrical Failure and Safety Measures for Startup

Provide a separate safety circuit (e.g. uninterruptible power supply), if required, to securely continue/stop the operation of the hydraulic actuator for safety in case of electrical failure (power failure, cable disconnection, etc.) or upon startup.

Supply Pressure

The servo valves are designed to operate at constant supply pressure; variations in supply pressure should be avoided as much as possible. Especially, for systems requiring high accuracy, the circuit must be designed to keep the supply pressure constant.
Ideally, an accumulator will be installed in the supply pressure line near the servo valve to avoid supply pressure fluctuations during pressure transients.

Pressure at the Return Port

The return port of the servo valve may be subject to a considerably high pressure depending on the circuit type. However, it should be used at atmospheric pressure or similar pressure as much as possible. The pressure at the return port should be equal to or below actual supply pressure.

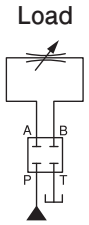
Disassembly/Reassembly

Linear servo valves consist of high precision components. You are prohibited from disassembling or reassembling the valves; otherwise, the designed valve performance may be degraded.

Valve Pressure Difference/Load Pressure Difference

This catalog uses two terms related to pressure differences: "valve pressure difference" (used for the range of flow control and no-load flow characteristics) and "load pressure difference" (used for load flow characteristics). The terms are described below.

Valve Pressure Difference



Suppose that, in the circuit shown on the right, the fluid flows from P to A and from B to T. In this case, the sum of the pressure differences between P and A and between B and T is the pressure difference of this valve. For this four-way valve, the valve pressure difference "ΔP" is:

Valve Pressure Difference = [(Pres. at P) - (Pres. at A)] + [(Pres. at B) - (Pres. at T)].

In relation to the flow rate, an increase in the flow through the valve with a constant valve opening leads to an increase in the valve pressure difference due to increased flow resistance at the control part.

Load Pressure Difference

In the circuit above, the absolute pressure difference between A and B is the load pressure difference.

Load Pressure Difference = | (Pres. at A) - (Pres. at B) |

If the resistance of piping, etc. is ignored, the difference between the supply pressure and the load pressure difference is the valve pressure difference of the linear servo valve. Therefore, a smaller load pressure difference means a larger valve pressure difference, allowing increasing the flow rate through the valve.

Flow Rate

In this catalog, the rated flow tolerance is ±10 %

The flow rate depends on the viscosity and specific gravity of each hydraulic fluid.

- Multiply each viscosity by the corresponding coefficient in the table below.

Viscosity mm^2/s	15	20	30	40	50	60	70	80	90	100
Coefficient	1.19	1.11	1.00	0.93	0.88	0.84	0.81	0.78	0.76	0.74

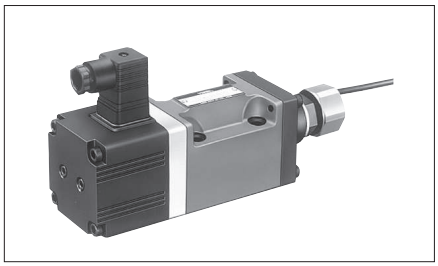
- Use the following formula to obtain the flow rate corresponding to a specific gravity. $Q' = Q\sqrt{(0.85/G')}$

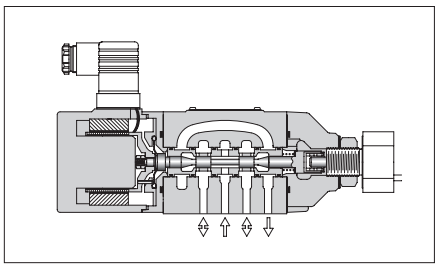
- Use the following formula to obtain the relationship between the flow rate and the pressure for a servo valve.

$$Q_X = Q_{rate}\sqrt{\frac{\Delta P_X}{7}}$$

where Q_X : Flow rate to be determined;
Q_{rate} : Rated flow rate (at $\Delta P = 7$ MPa); and
ΔP_X: Valve pressure difference in the actual circuit.

Direct type High-Speed Linear Servo Valves





Direct type high speed linear servo valves use a compact and powerful linear motor as an actuator and have an extremely simple structure that connects the linear motor moving coil, the spool, and the position sensor in series.

●High accuracy

These valves have a low hysteresis of 0.1 % or less, achieving high accuracy. They allow the main unit to operate with much higher repeatability.

●High response characteristics

The valves provide significantly high levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 2 ms (0 <=> 100 %)★, and the frequency response is 450 Hz/-90° (±25 % amplitude)★. Thus, the valves ensure that the main unit can achieve unprecedented high response. (★: Representative values)

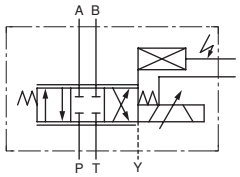
●Excellent vibration-proof characteristics

With a simple structure, the valves offer high vibration resistance.

●Excellent contamination resistance

The valves are also featured by excellent contamination resistance since they have a simple structure that directly connects the linear motor moving coil, the spool, and the position sensor. Compared to conventional servo valves for which the permissible contamination level is up to NAS 1638 class 7, the direct type linear servo valves can accept a contamination level of up to NAS 1638 class 10. These valves can contribute to greatly reducing the cost of fluid management.

Graphic Symbols



■ Model Number Designation

F—	LSVG	—03	—40	—R	—10
Fluid Type	Series Number	Valve Size	Rated Flow @ ΔP = 7 MPa	Cable Departure Direction	Design Number
F： Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**LSVG：** Direct Type High Speed Linear Servo Valves	**03**	**4：** 4 L/min **10：** 10 L/min **20：** 20 L/min **40：** 40 L/min **60：** 60 L/min	(Viewed from the linear motor side) **None：** Upper (Standard) **R：** Right **L：** Left	**10**

■ Exclusive Amplifiers

To ensure stable performance, it is recommended to use Yuken's AMLS series linear servo amplifiers.

Valve Model Number	Amplifier Model
LSVG-03-4/10/20/40	AMLS-A-D＊-＊-10
LSVG-03-60	AMLS-B-D＊-＊-10

■ Accessories

Mounting Bolt	Bolt Tightening Torque
Hex. Soc. Head Cap Screw: M8×65L…4 Pieces	30.8 - 37.7 Nm

Specifications

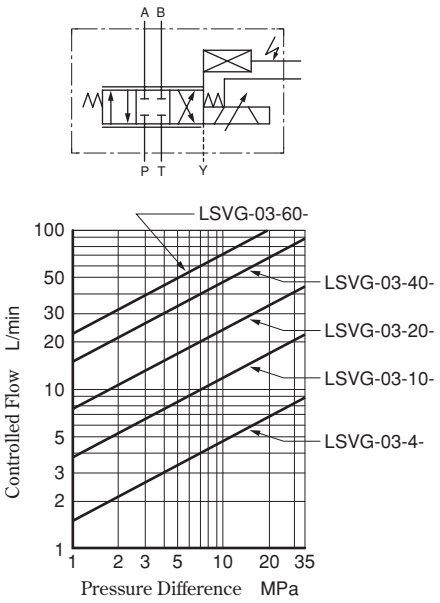
The specifications below are for use with a 48 V DC type exclusive amplifier; for use with a 24 V DC type amplifier, see the values in parentheses.

Descriptions \ Model Numbers			LSVG-03-4/10/20/40	LSVG-03-60
Rated Flow @ ΔP = 7 MPa (1)		L/min	4, 10, 20, 40	60
Max. Operating Pressure		MPa	35	
Proof Pres. at Return Port		MPa	35	
Drain Port (Y Port) Permissible Back Pres. (2)		MPa	0.05	
Internal Leakage (PS = 14 MPa) (Viscosity: 32 mm^2/s)		L/min	1.7 or less	
Hysteresis		%	0.1 or less	
Step Response (0 <=> 100 %, Typical) (3)		ms	2 (3)	3 (4)
Frequency Response (±25 % Amplitude, Typical) (3)	Gain: -3 dB	Hz	350 (300)	330 (240)
	Phase: -90°	Hz	450 (370)	410 (330)
Vibration Proof (4)			Frequency: 10 - 60 Hz, Amplitude: 4 mm, Acceleration: 7.8 - 282 m/s^2 Frequency: 61 - 2000 Hz, Amplitude: 4 - 0.0038 mm, Acceleration: 294 m/s^2	
Protection			IP 64	
Ambient Temperature		℃	−15 - +60	
Spool Type			Neutral/Zero Lap	
Spool Stroke to Stops		mm	±0.5	±0.75
Polarity			See the description about I/O signal characteristics on page I-19	
Linear Motor Specification	Current	A	2 [Max. 6]	
	Coil Resistance	Ω	4.5 [at 20 ℃]	
Mass		kg	5	

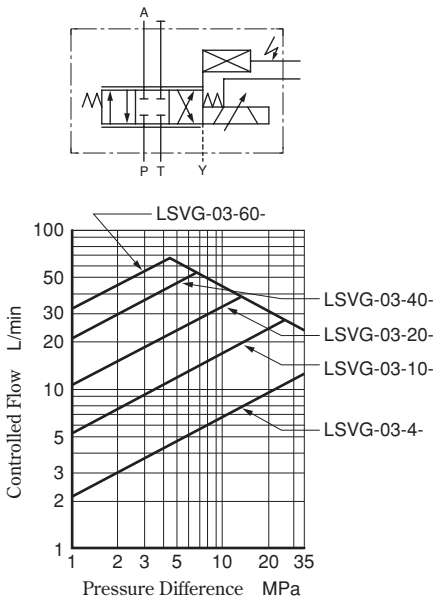
Note: (1) Use the valves so that the relationship between the valve pressure difference and the flow rate, as specified below in "Range of Flow Control", is met.
(2) Back pressure at the drain port (Y) should be 0.05 MPa or less and not be a negative pressure.
(3) This value is measured for each valve; it may vary depending on the actual circuit.
(4) There are restrictions on the mounting position; refer to the instructions for details.

Range of Flow Control

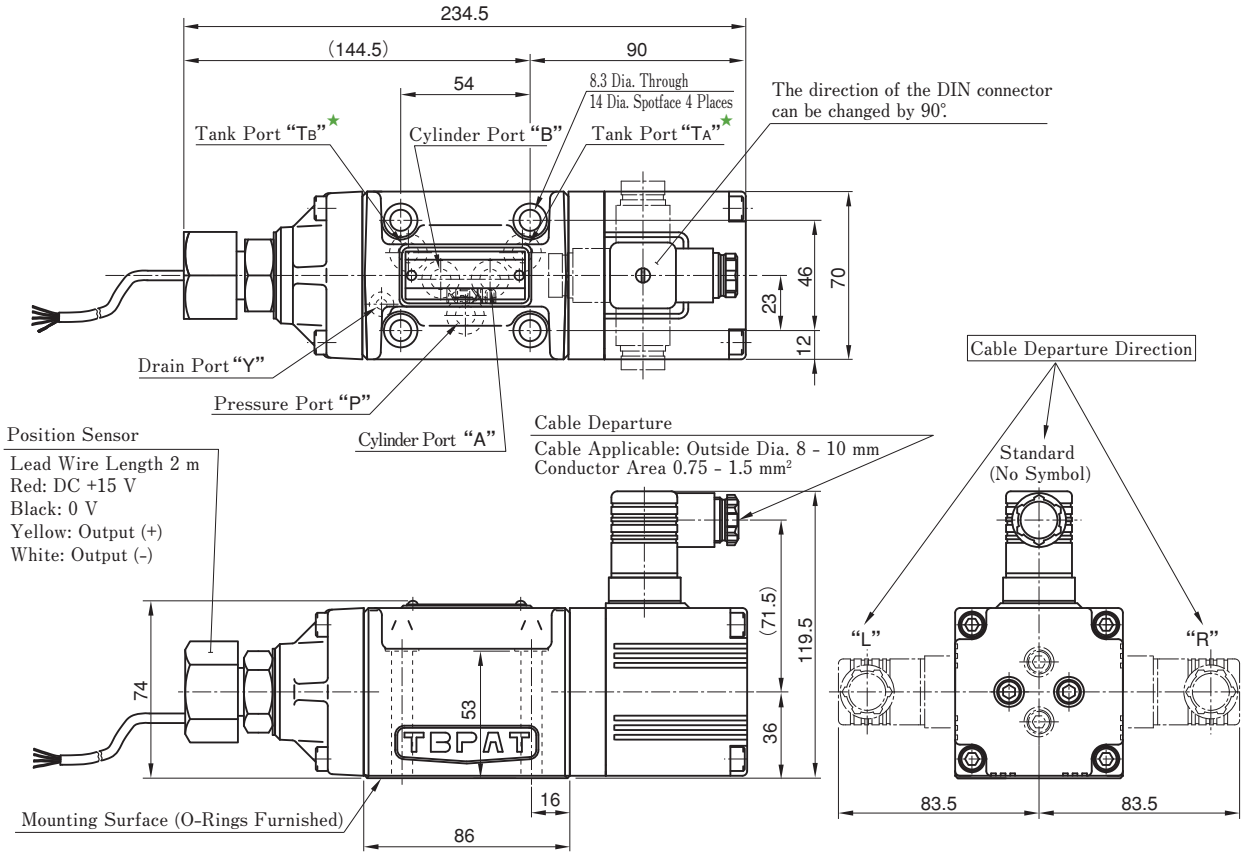
●Control Method: 4-Way Valve



●Control Method: 3-Way Valve



LSVG-03



Note) Refer to the wiring diagram on page I-21 for detailed connection between the DIN connector/position sensor and the amplifier.

● O-Rings for the Ports

Port	O-Ring Size	Qty.
P, A, B, T	AS568-014 (NBR-90)	5
Y	OR NBR-90 P7-N	1

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

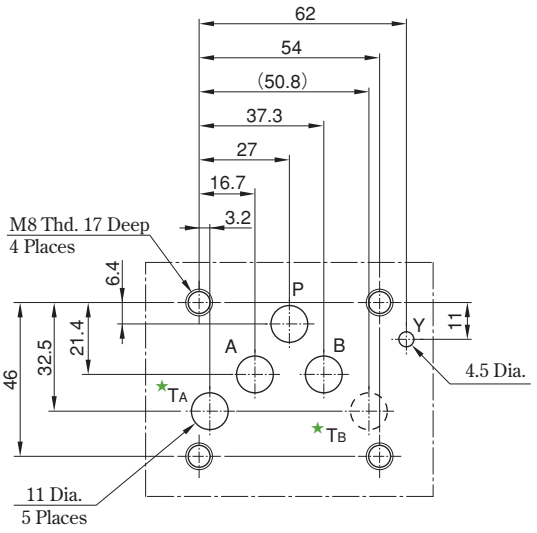
【Mounting Surface】

Prepare a mounting surface shown on the right. Basically, the dimensions of the mounting surface conform to the ISO standard, but the specifications for valve mounting screws are different as follows.

Consult us for valves available with M6 mounting screws.

	ISO 4401-05-04-0-94	Mounting Surface for LSVG-03
Valve Mounting Screw	M6	M8

The mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)



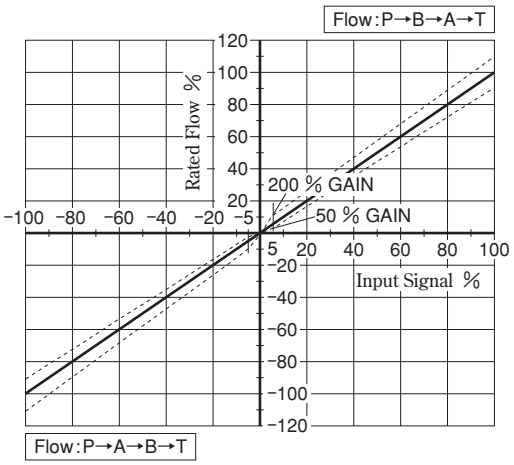
★There are two tank ports "TA" and "TB" ; however, "TA" may be used alone.

Characteristics of LSVG-03-4/10/20/40/60 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

〈Conditions〉

●Valve Pressure Difference : 7 MPa

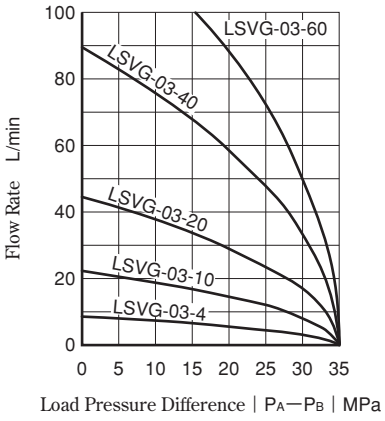


Load Flow Characteristics

〈Conditions〉

●Input Signal : 100 %

Note) Tolerance for Load Flow : ±10 %



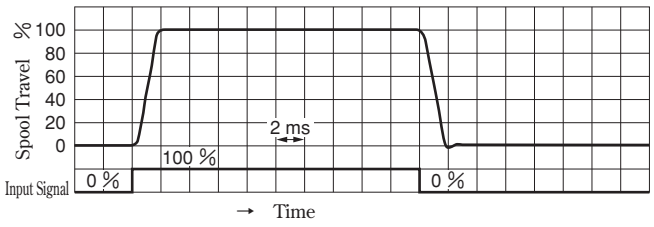
Step Response

〈Conditions〉

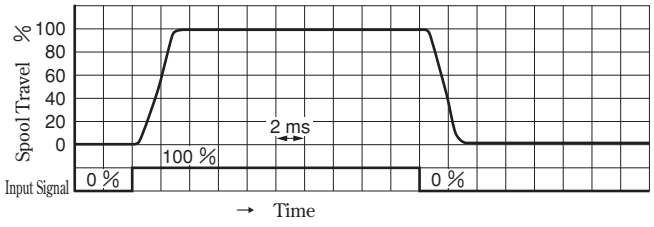
●Input Amplitude : 0 ⇔100 %　●Supply Pressure : 14 MPa

●LSVG-03-4/10/20/40-10

Amplifier : AMLS-A-D48-＊-10 (Power Supply: 48 V DC)

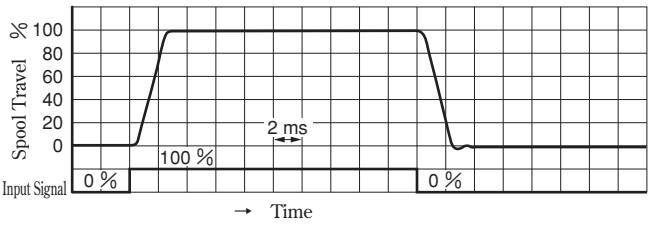


Amplifier : AMLS-A-D24-※-10 (Power Supply: 24 V DC)

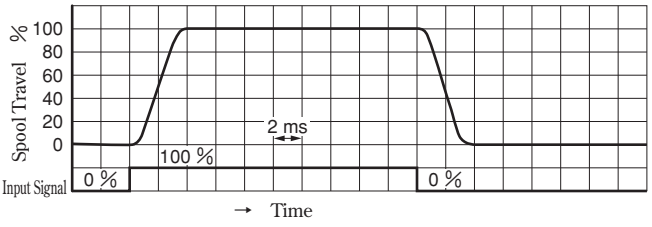


●LSVG-03-60-10

Amplifier : AMLS-B-D48-＊-10 (Power Supply: 48 V DC)



Amplifier : AMLS-B-D24-※-10 (Power Supply: 24 V DC)



Frequency Response

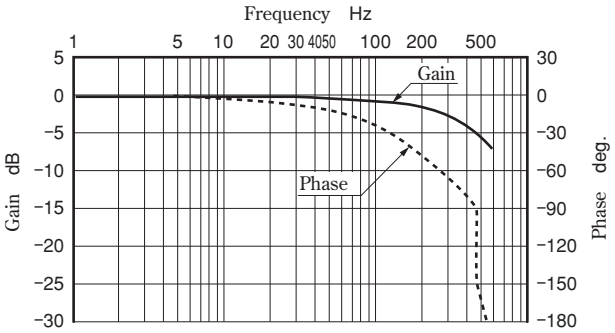
〈Conditions〉

●Hydraulic Circuit: Port A/B Closed ●Supply Pressure：14 MPa

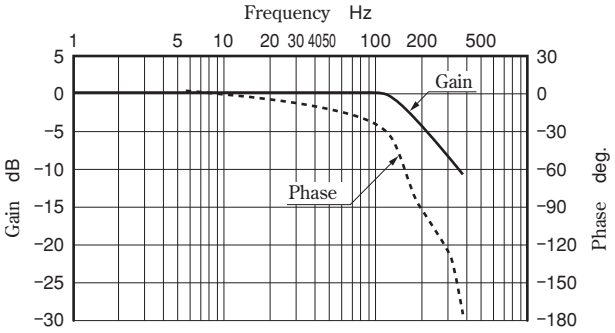
●LSVG-03-4/10/20/40-10

Amplifier：AMLS-A-D48-＊-10 (Power Supply: 48 V DC)

Input Signal ±25 %

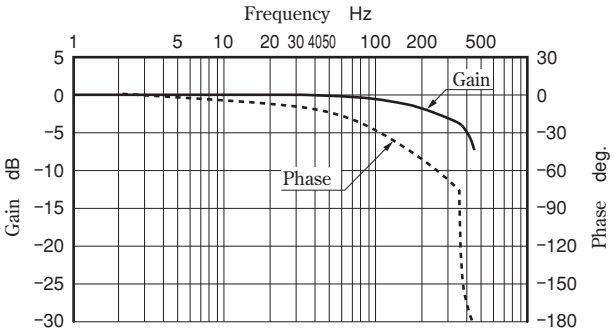


Input Signal ±100 %

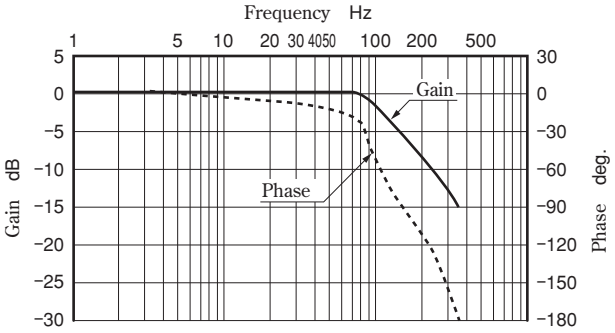


Amplifier：AMLS-A-D24-＊-10 (Power Supply: 24 V DC)

Input Signal ±25 %



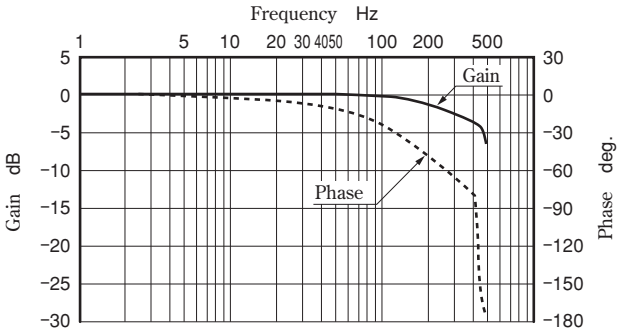
Input Signal ±100 %



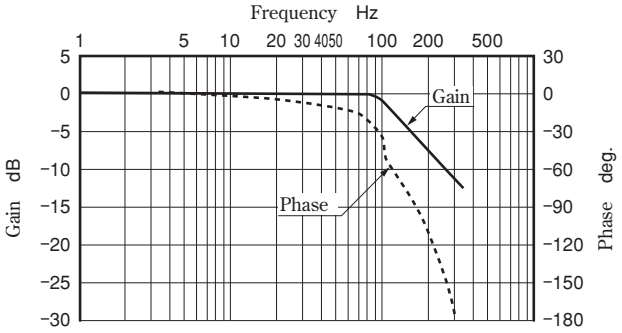
●LSVG-03-60-10

Amplifier：AMLS-B-D48-＊-10 (Power Supply: 48 V DC)

Input Signal ±25 %

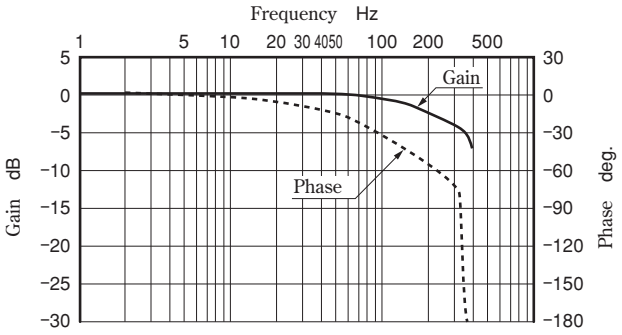


Input Signal ±100 %

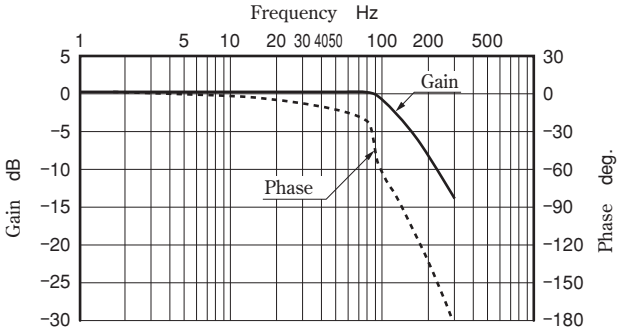


Amplifier：AMLS-B-D24-＊-10 (Power Supply: 24 V DC)

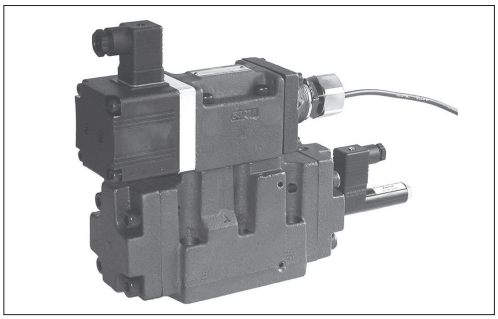
Input Signal ±25 %



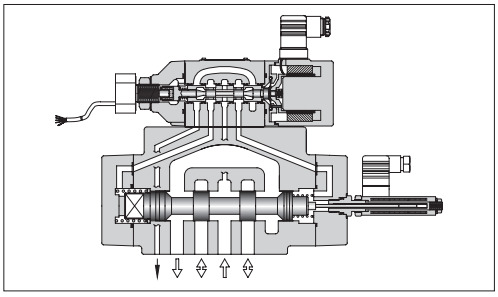
Input Signal ±100 %



Tow Stage Type High-Speed Linear Servo Valves



Two stage type linear servo valves are a type of high-flow servo valve that has a direct type high speed linear servo valve in its pilot stage to drive the main spool. These valves control the positions of the pilot and main spools with electrical feedback, achieving high accuracy and response.



●High flow

The valves consist of two stages to provide a high flow rate (Rated flow at ΔP =7 MPa: 750 - 3800 L/min).

●High accuracy

The valves have a low hysteresis of 0.1 % or less, achieving high accuracy. They allow the main unit to operate with much higher repeatability.

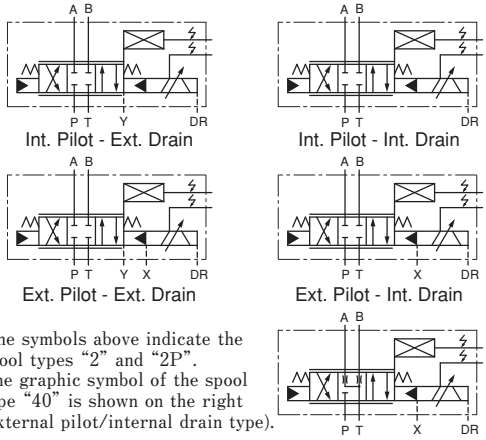
●High response characteristics

The valves provide significantly high levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 8 ms (0 <=> 100 %), and the frequency response is 105 Hz/-90° (±25 % amplitude) (Representative values for LSVHG-06-900). Thus, the valves ensure the achievement of unprecedented high response.

●Excellent contamination resistance

As is the case with the direct type linear servo valves, the permissible level of fluid contamination for these valves is up to NAS 1638 class 10.

Graphic Symbols



Note) The symbols above indicate the spool types "2" and "2P". The graphic symbol of the spool type "40" is shown on the right (external pilot/internal drain type).

■ Model Number Designation

F—	LSVHG	—06	—900	—2P	—E	T	—R	—A	—10
Fluid Type	Series Number	Valve Size	Rated Flow @ΔP = 7 MPa	Spool Type	Pilot Connection	Drain Connection	Cable Departure Direction	Fail-safe Function	Design Number
F : Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**LSVHG :** Two Stage Type High Speed Linear Servo Valves	**04**	**750 :** 750 L/min	**2 :** 10% Overlap **40 :** Open Center A, B & T **2P :** Zero Lap (Dual Flow Gain)	**None :** Internal Pilot **E :** External Pilot	**None :** External Drain **T :** Internal Drain	(Viewed from the linear motor side) **None :** Upper (Standard) **R :** Right **L :** Left	**None :** P→B→A→T Position Valve Opening: Full **A :** P→A→B→T Position Valve Opening: Full	**10**
		06	**900 :** 900 L/min **1300 :** 1300 L/min						
		10	**3800 :** 3800 L/min						**20**

■ Exclusive Amplifiers

To ensure stable performance, it is recommended to use Yuken's AMLS series linear servo amplifiers.

Valve Model Numbers	Amplifier Model
LSVHG-04-750	AMLS-C2-D＊-＊-10
LSVHG-06-900	AMLS-C-D＊-＊-10
LSVHG-06-1300 LSVHG-10-3800	AMLS-D-D＊-＊-10

■ Accessories

Model Numbers	Mounting Bolt	Qty.	Bolt Tightening Torque
LSVHG-04	Hex. Soc. Head Cap Screw:M 6 ×55L	2	12.9 - 15.9 Nm
	Hex. Soc. Head Cap Screw:M10×60L	4	60.6 - 74.1 Nm
LSVHG-06	Hex. Soc. Head Cap Screw:M12×85L	6	104 - 127 Nm
LSVHG-10	Hex. Soc. Head Cap Screw:M20×90L	6	494 - 603 Nm

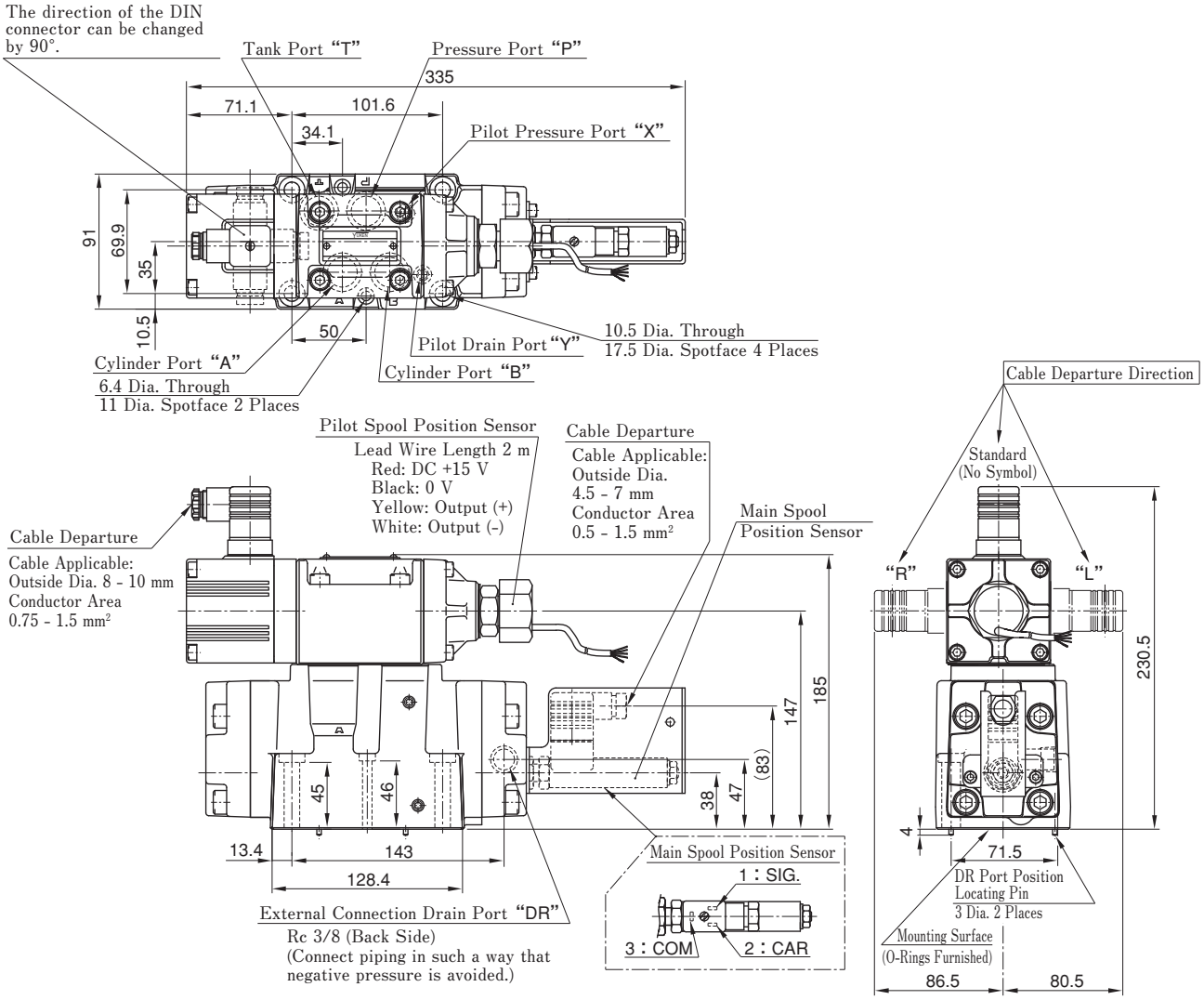
Specifications

The specifications below are for use with a 48 V DC type exclusive amplifier; for use with a 24 V DC type amplifier, see the values in parentheses.

Descriptions \ Model Numbers			LSVHG-04-750			LSVHG-06-900			LSVHG-06-1300			LSVHG-10-3800		
Rated Flow @ ΔP = 7 MPa (4-Way Valve)		L/min	750			900			1300			3800		
Rated Flow @ ΔP' = 0.5 MPa (per Land)		L/min	283			340			490			1440		
Max. Operating Pressure		MPa	35			35			31.5			35		
Proof Pres. at Return Port	External Drain	MPa	31.5			35			25			28		
	Internal Drain (1)	MPa	31.5			35			25			28		
DR Port Permissible Back Pressure (2)		MPa	0.05											
Pilot Pressure (3)		MPa	1.5 - 35									1.5 - 25		
Pilot Flow Rate (4)		L/min	27 (22) or more			30 (24) or more			34 (27) or more			32 (27) or more		
Pilot Valve Max. Leakage	Ps=Pp=14 MPa 32 mm²/s	L/min	1.7											
Main Valve Max. Leakage	Spool Type		-2-	-40-	-2P-	-2-	-40-	-2P-	-2-	-40-	-2P-	-2-	-40-	-2P-
	Ps=Pp=14 MPa 32 mm²/s	L/min	0.8	1.6	6.8	0.9	1.8	7	1	2	8	3	6	10
Hysteresis		%	0.1 or less											
Step Response (0 <=> 100 %, Typical) (5)		ms	8 (10)			8 (10)			10 (13)			15 (18)		
Frequency Response (±25 % Amplitude, Typical) (5)	Gain: -3 dB	Hz	150 (140)			160 (130)			150 (110)			100 (60)		
	Phase: -90°	Hz	110 (100)			105 (100)			100 (100)			85 (75)		
Vibration Proof (6)			Frequency: 10 - 60 Hz, Amplitude: 4 mm, Acceleration: 7.8 - 282 m/s² Frequency: 61 - 2000 Hz, Amplitude: 4 - 0.0038 mm, Acceleration: 294 m/s²											
Protection			IP 64											
Ambient Temperature		℃	−15 - +60											
Spool Stroke to Stops		mm	±5			±5			±7			±7		
Spool End Area		cm²	7.1			8			8			11.3		
Polarity			See the description about I/O signal characteristics on page I-19											
Linear Motor Specification	Current	A	2 [Max. 6]											
	Coil Resistance	Ω	4.5											
Approx. Mass		kg	12			20			21			78		

Note) (1) Pressure at the return port should be at actual supply pressure or less.
(2) Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.
(3) Supply pressure for the pilot valve should be 1.5 to 35 MPa (1.5 to 25 MPa for LSVHG-10) and should also be 60 % of actual supply pressure or more.
(4) The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.
(5) This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.
(6) There are restrictions on the mounting position; refer to the instructions for details.

LSVHG-04



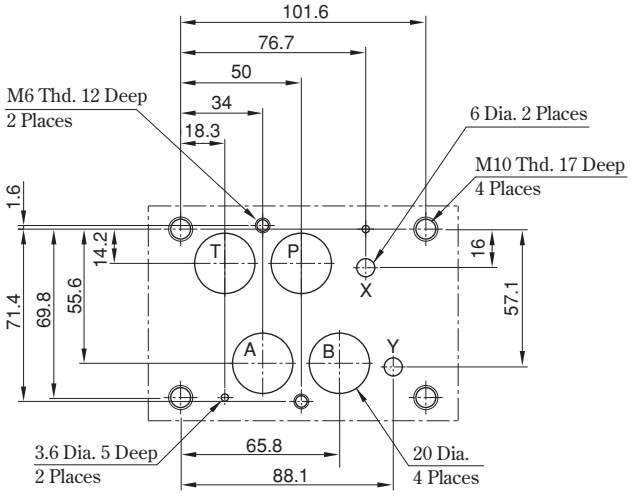
Note) Refer to the wiring diagram on page I-21 for detailed connection between the pilot valve DIN connector/position sensors (pilot and main spools) and the amplifier.

【Mounting Surface】

Prepare a mounting surface shown on the right. Basically, the dimensions of the mounting surface conform to the ISO standard, but the specifications for the ports P, A, B, and T are different as follows.

	ISO 4401-07-07-0-05	Mounting Surface for LSVHG-04
Dia. of Port P, A, B, T	17.5 Dia.	20 Dia.

The mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)

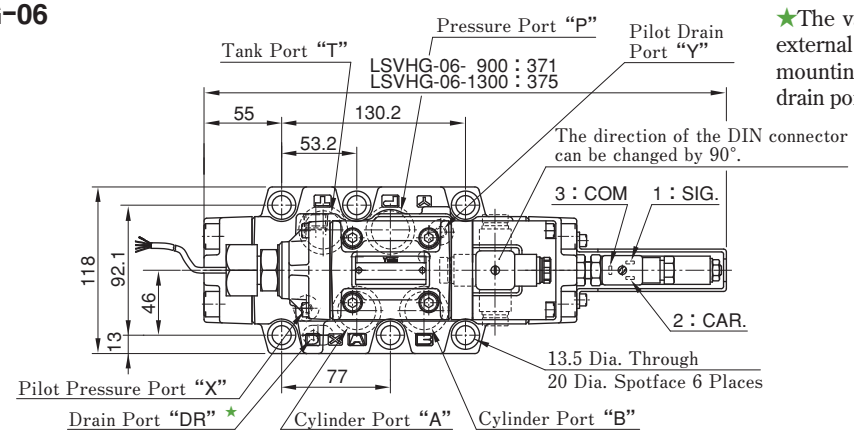


● O-Rings for the Ports

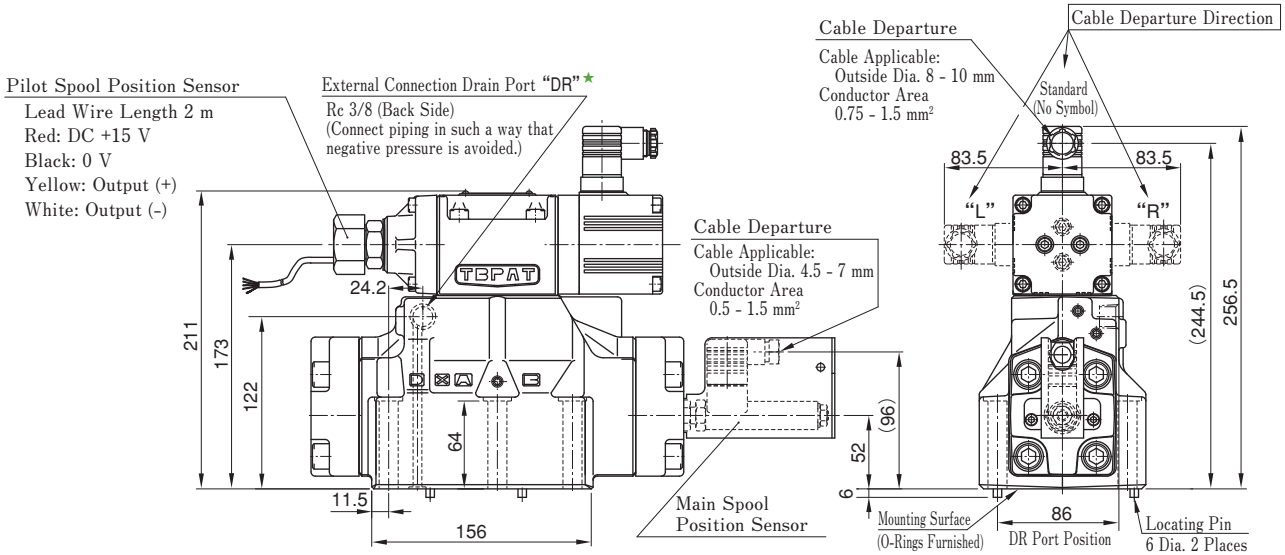
Port	O-Ring Size	Qty.
P, A, B, T	OR NBR-90 P22-N	4
X, Y	AS568-012 (NBR-90)	2

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

LSVHG-06



★The valve has two "DR" ports: one for external connection and the other on the mounting surface. Use either one of the drain ports.



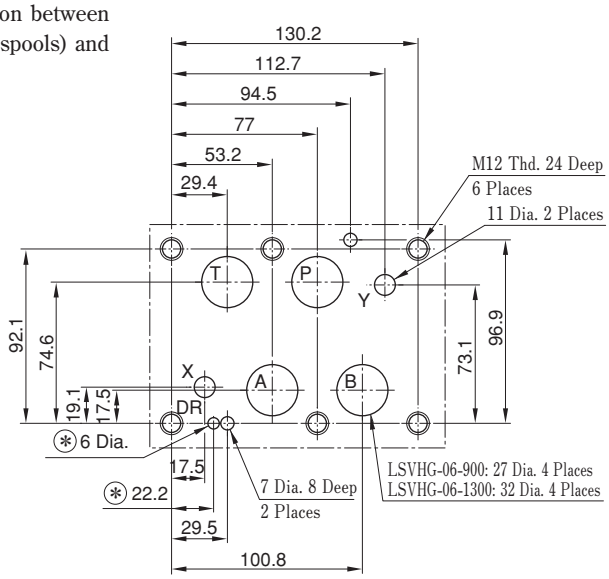
Note) Refer to the wiring diagram on page I-21 for detailed connection between the pilot valve DIN connector/position sensors (pilot and main spools) and the amplifier.

【Mounting Surface】

Prepare a mounting surface shown on the right. Basically, the dimensions of the mounting surface conform to the ISO standard, but the specifications for the ports P, A, B, and T are different as follows.

	ISO 4401-08-08-0-05	Mounting Surface for LSVHG-06-900	Mounting Surface for LSVHG-06-1300
Dia. of Port P, A, B, T	23.4 Dia.	27 Dia.	32 Dia.
Drain Port	None	Available (6 Dia.)	

The mounting surface should have a good machined finish. (1.6▽)



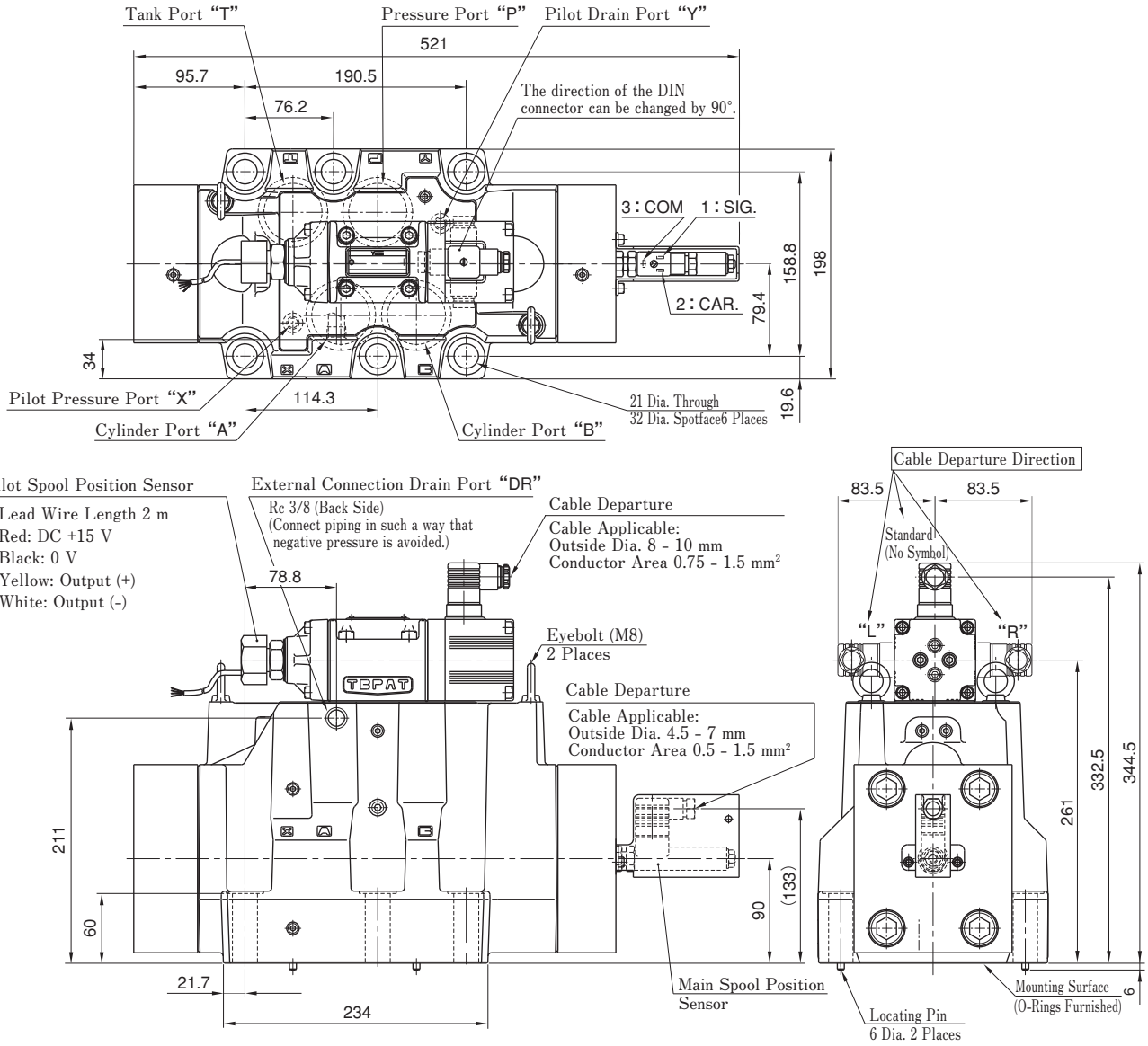
Note) ⊛: Not required if the external connection drain port is used.

● O-Rings for the Ports

Port	O-Ring Size		Qty.
	LSVHG-06-900	LSVHG-06-1300	
P, A, B, T	AS568-123 (NBR-90)	AS568-126 (NBR-90)	4
X, Y	OR NBR-90 P14-N		2
DR	AS568-016 (NBR-90)		1

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

LSVHG-10



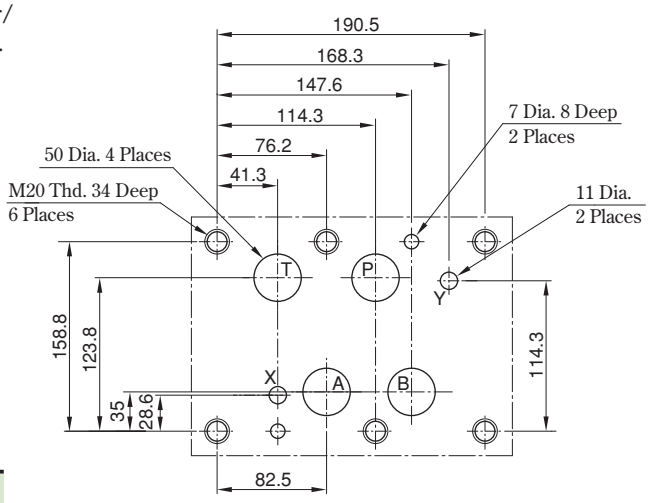
Note) Refer to the wiring diagram on page I-21 for detailed connection between the pilot valve DIN connector/ position sensors (pilot and main spools) and the amplifier.

【Mounting Surface】

Prepare a mounting surface shown on the right. Basically, the dimensions of the mounting surface conform to the ISO standard, but the specifications for the ports P, A, B, and T are different as follows.

	ISO 4401-08-09-0-05	Mounting Surface for LSVHG-10
Dia. of Port P, A, B, T	36 Dia.	50 Dia.

The mounting surface should have a good machined finish. (▽6)



● O-Rings for the Ports

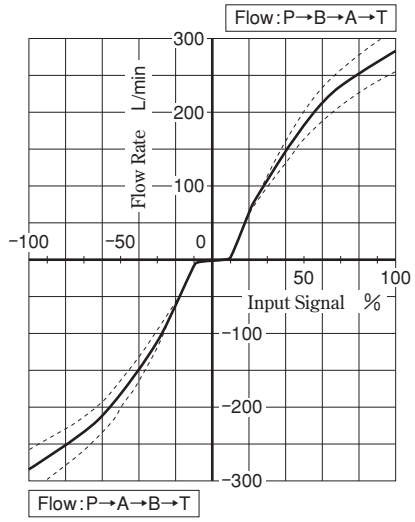
Port	O-Ring Size	Qty.
P, A, B, T	AS568-227 (NBR-90)	4
X, Y	AS568-015 (NBR-90)	2

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

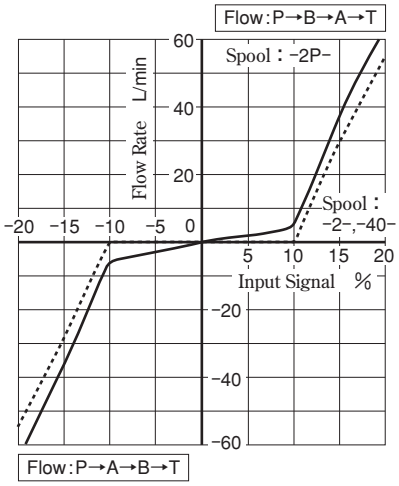
Characteristics of LSVHG-04-750 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference：1 MPa（Pressure Difference per Land：0.5 MPa）

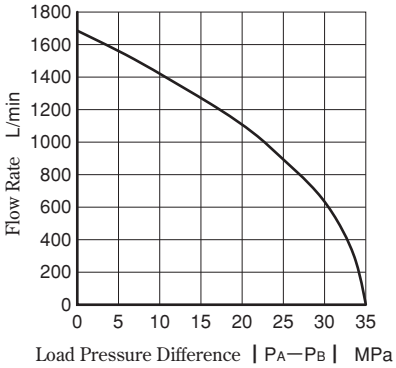


Around Null Position Input Signal−20 ⇔ +20 %



Load Flow Characteristics

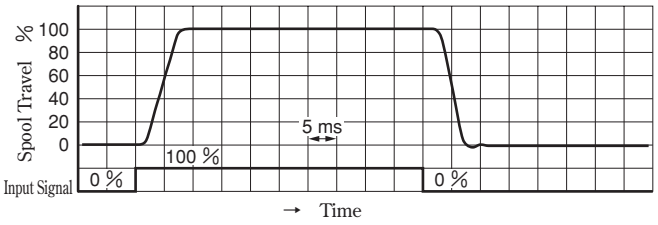
〈Conditions〉
●Input Signal：100 %
Note) Tolerance for Load Flow



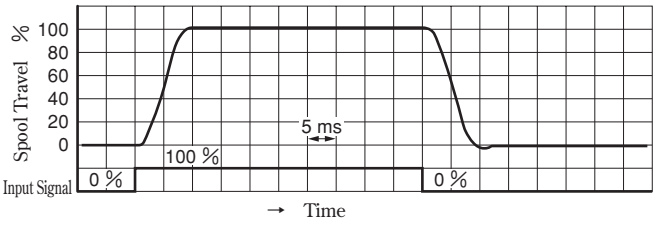
Step Response

〈Conditions〉 ●Input Signal：0 ⇔ 100 % ●Supply/Pilot Pressure：14 MPa

Amplifier: AMLS-C2-D48-∗-10 (Power Supply: 48 V DC)



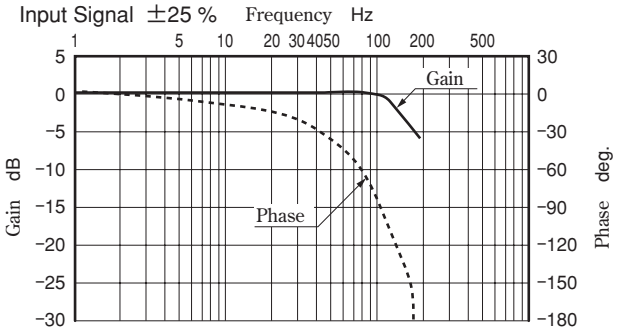
Amplifier: AMLS-C2-D24-∗-10 (Power Supply: 24 V DC)

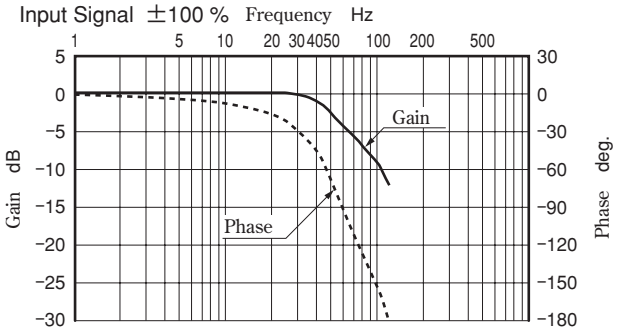


Frequency Response

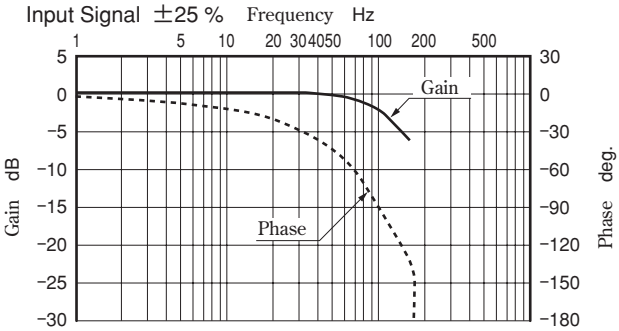
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure：14 MPa

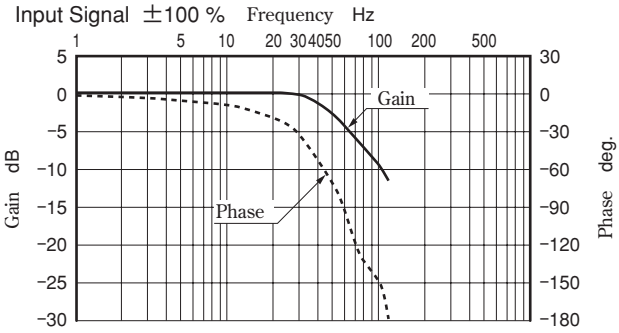
Amplifier: AMLS-C2-D48-∗-10 (Power Supply: 48 V DC)





Amplifier: AMLS-C2-D24-∗-10 (Power Supply: 24 V DC)

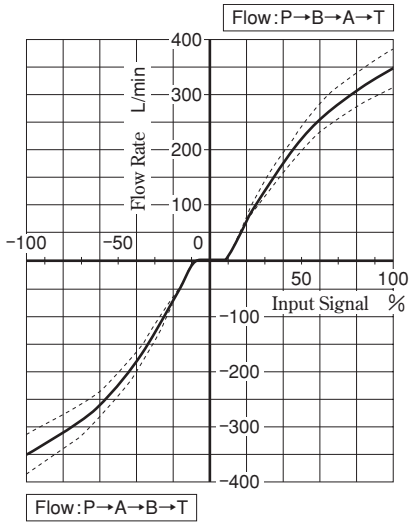




Characteristics of LSVHG-06-900 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

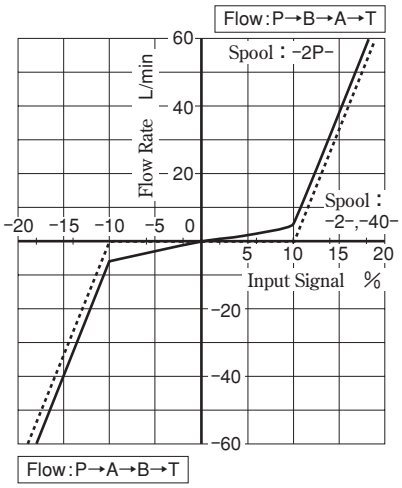
〈Conditions〉 ●Valve Pressure Difference：1 MPa（Pressure Difference per Land：0.5 MPa）

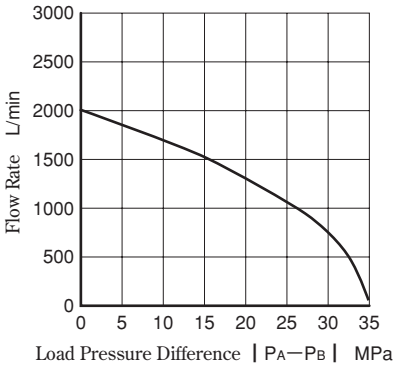


Load Flow Characteristics

〈Conditions〉
●Input Signal：100 %

Around Null Position Input Signal−20 ⇔ +20 % Note) Tolerance for Load Flow：±10 %

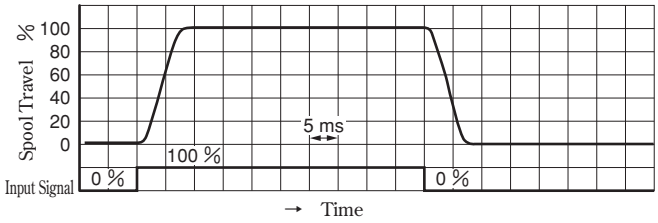




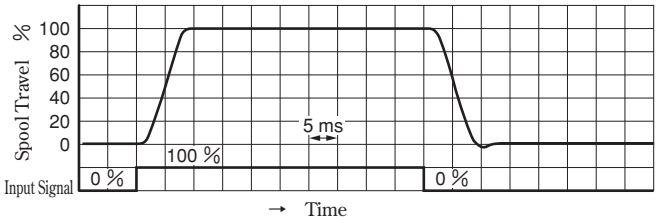
Step Response

〈Conditions〉 ●Input Signal：0 ⇔ 100 % ●Supply/Pilot Pressure：14 MPa

Amplifier：AMLS-C-D48-∗-10 (Power Supply: 48 V DC)



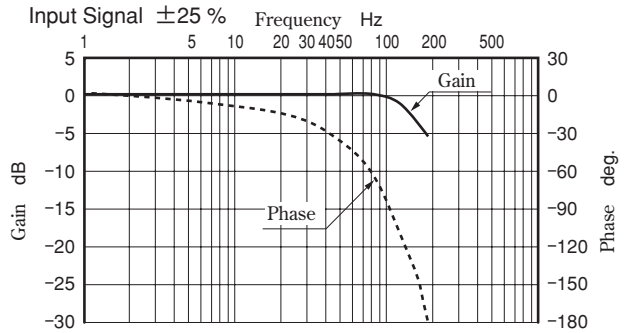
Amplifier: AMLS-C-D24-∗-10 (Power Supply: 24 V DC)

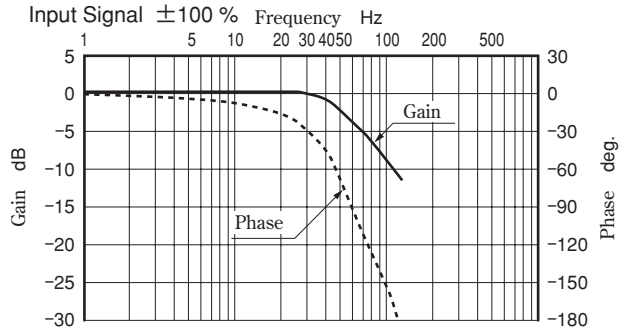


Frequency Response

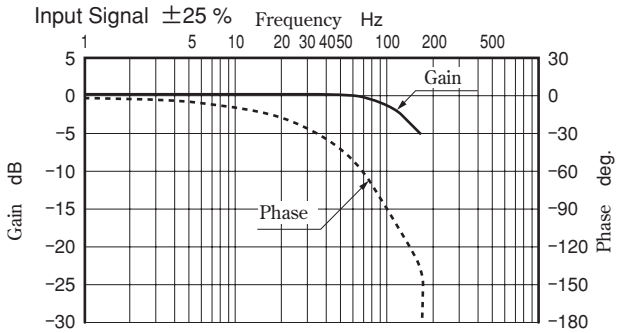
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure：14 MPa

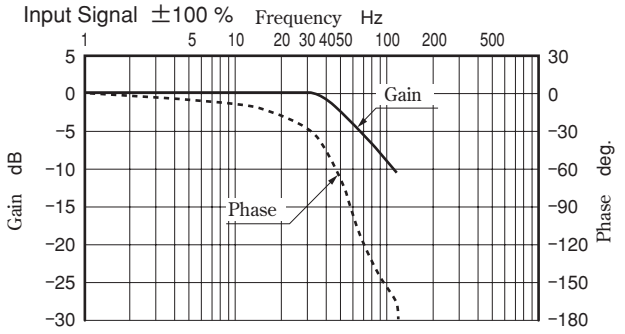
Amplifier：AMLS-C-D48-∗-10 (Power Supply: 48 V DC)





Amplifier：AMLS-C-D24-∗-10(Power Supply: 24 V DC)

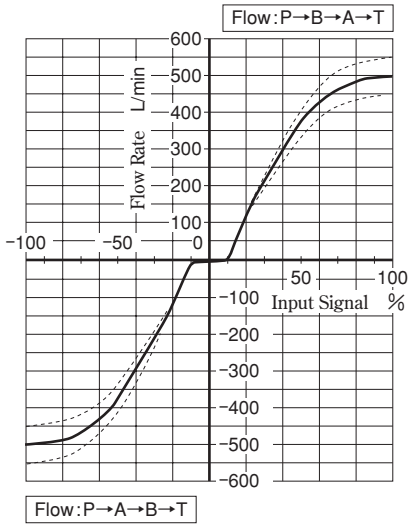




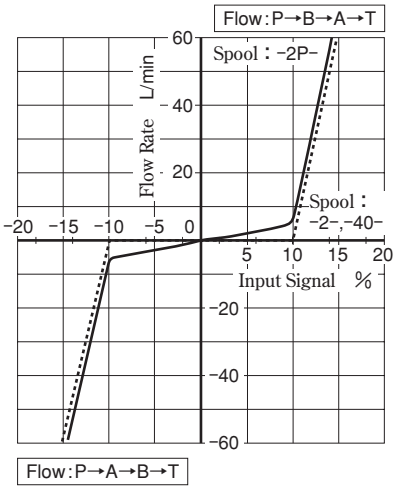
Characteristics of LSVHG-06-1300 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference:1 MPa (Pressure Difference per Land : 0.5 MPa)

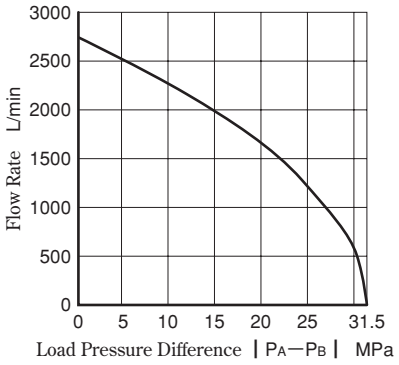


Around Null Position Input Signal −20 ⇔ +20 %



Load Flow Characteristics

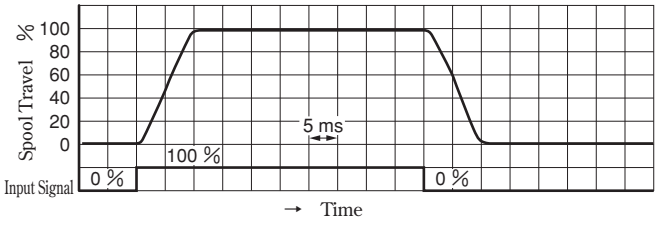
〈Conditions〉
●Input Signal : 100 %
Note) Tolerance for Load Flow : ±10 %



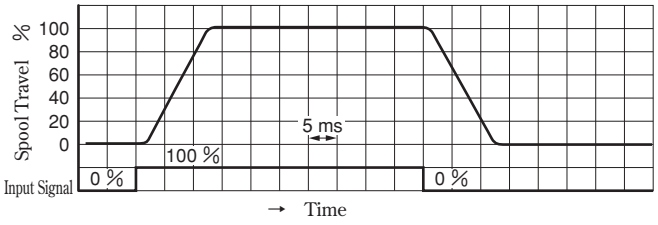
Step Response

〈Conditions〉 ●Input Signal : 0 ⇔ 100 % ●Supply/Pilot Pressure : 14 MPa

Amplifier : AMLS-D-D48-∗-10 (Power Supply: 48 V DC)



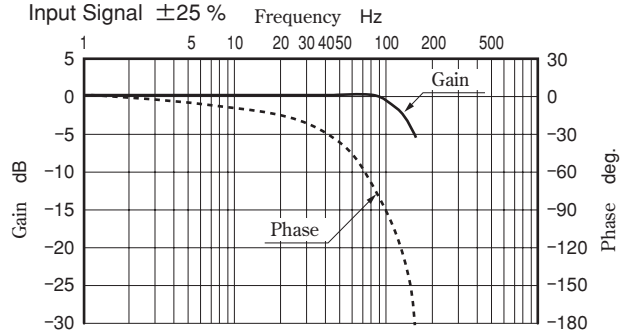
Amplifier : AMLS-D-D24-∗-10 (Power Supply: 24 V DC)



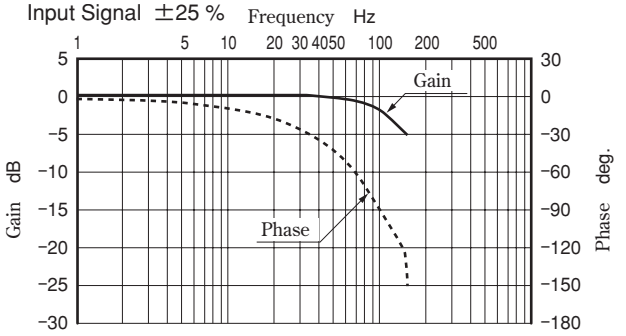
Frequency Response

〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure : 14 MPa

Amplifier : AMLS-D-D48-∗-10 (Power Supply: 48 V DC)



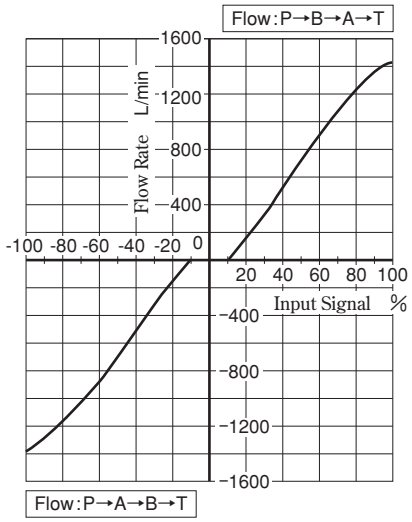
Amplifier : AMLS-D-D24-∗-10 (Power Supply: 24 V DC)



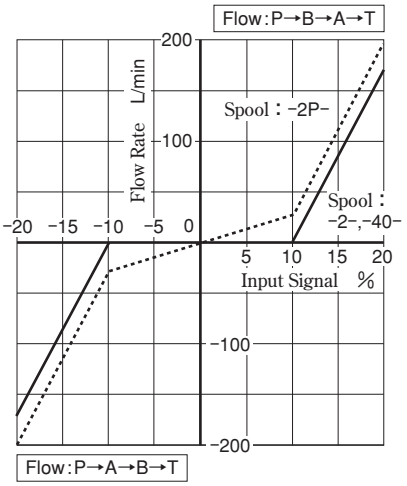
Characteristics of LSVHG-10-3800 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference：1 MPa（Pressure Difference per Land：0.5 MPa）

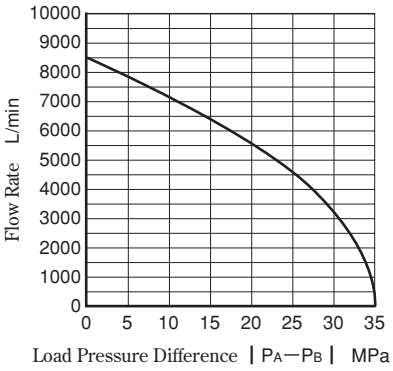


Around Null Position Input Signal−20 ⇔ +20 %



Load Flow Characteristics

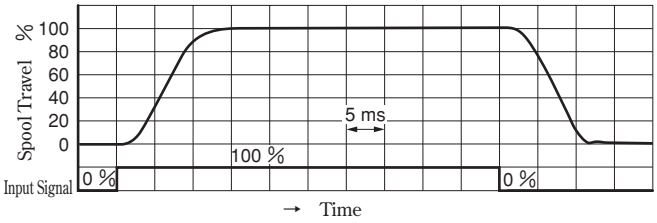
〈Conditions〉
●Input Signal：100 %
Note) Tolerance for Load Flow：±10 %



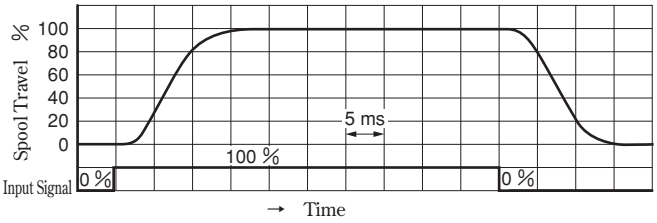
Step Response

〈Conditions〉 ●Input Signal：0 ⇔ 100 % ●Supply/Pilot Pressure：14 MPa

Amplifier: AMLS-D-D48-＊-10 (Power Supply: 48 V DC)



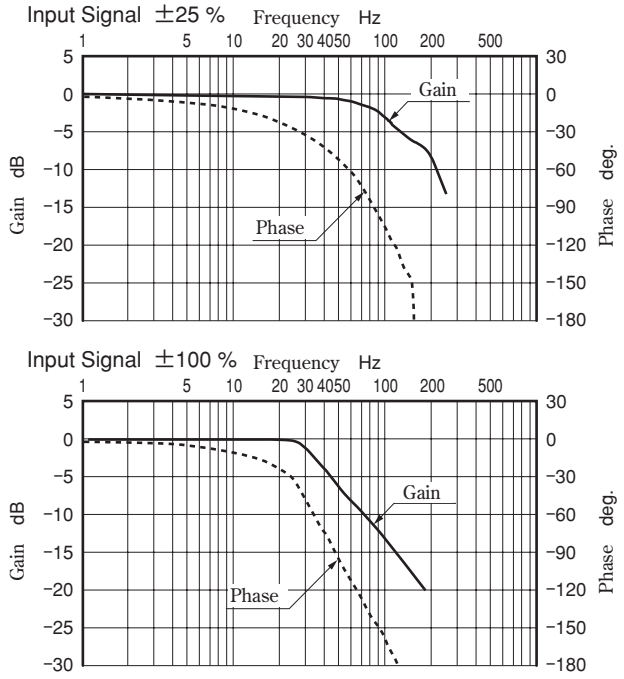
Amplifier: AMLS-D-D24-＊-10 (Power Supply: 24 V DC)



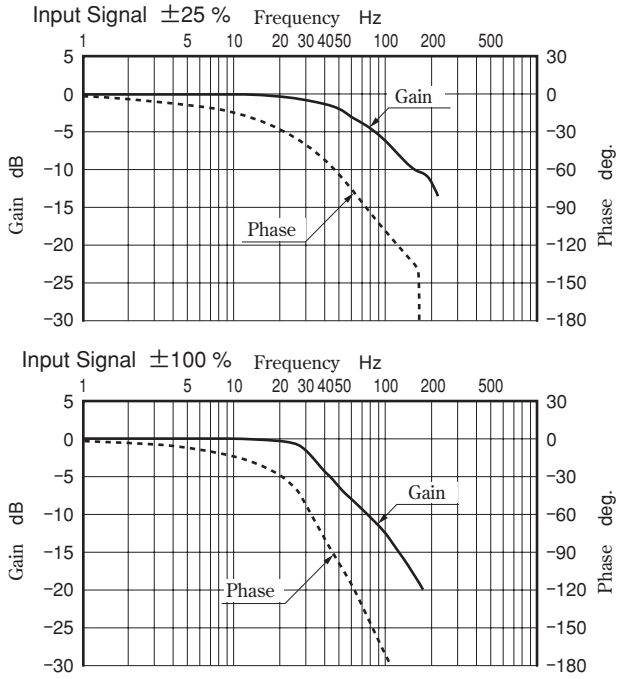
Frequency Response

〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure：14 MPa

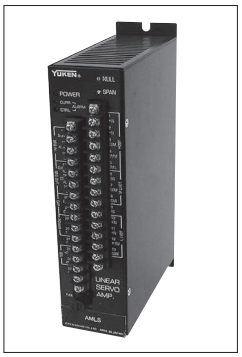
Amplifier: AMLS-D-D48-＊-10 (Power Supply: 48 V DC)



Amplifier: AMLS-D-D24-＊-10 (Power Supply: 24 V DC)



Linear Servo Amplifier



This amplifier is used to drive LSVG/LSVHG series high speed linear servo valves. With an optimal design for the servo valves, the amplifier can maximize the valve performance.

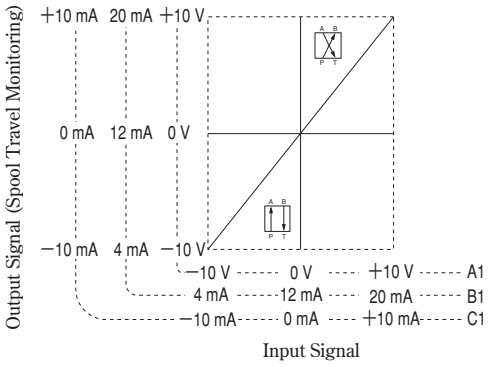
Specifications

Descriptions \ Model Numbers	AMLS-＊-D48-＊-10	AMLS-＊-D24-＊-10
Power Supply	48 V ± 2.4 V DC (200 VA or more)	24 V ± 1.2 V DC (100 VA or more)
Rated Output Current	Continuous ±2 A (4 A Peak)	Continuous ±2 A (3 A Peak)
Input/Output Signal	Output Signal = Spool Travel Monitoring A1：Voltage Signal ±10 V（Ri ＝ 100 kΩ、R_L ≧ 10 kΩ） B1：Current Signal 4 - 20 mA（Ri ＝ 200 Ω、R_L ＝ 100 - 500 Ω） C1：Current Signal ±10 mA（Ri ＝ 200 Ω、R_L ＝ 100 - 500 Ω）	
Control Input /Output Signal	a) Servo “ON” Input/Alarm Reset Input: Photocoupler Input Voltage: +15 V DC to +28 V DC, Input Impedance: 2.2 kΩ b) Overcurrent Output (CURR.AL.)/Deviation Alarm Output (CRTL.AL.): Photocoupler Output Voltage: Max. 50 V DC, Current: Max. 30 mA	
Ambient Temperature ℃	0 - +50	
Ambient Humidity	20 - 90 %Rh (No Condensation)	
Mass kg	1.8	

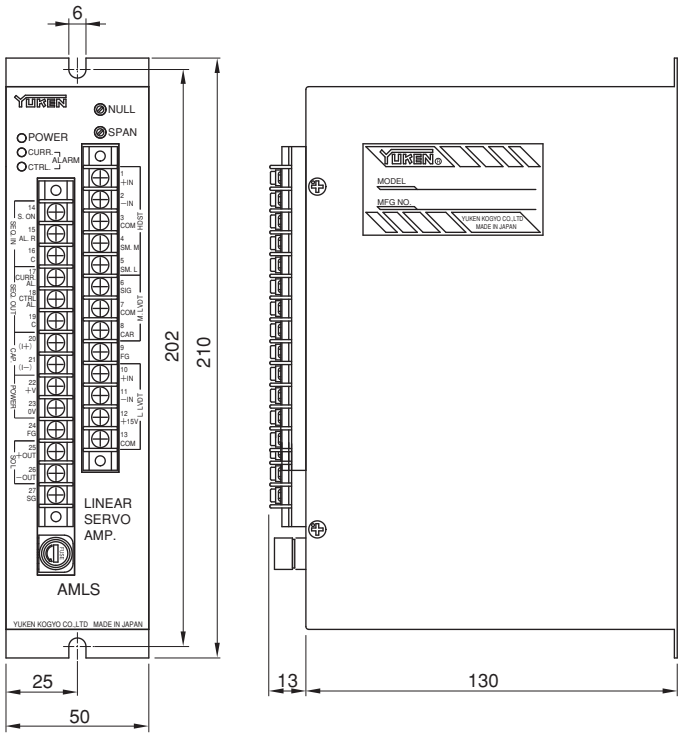
Model Number Designation

AMLS	—A	—D48	—A1	—10
Series Number	Applicable Valve Type	Supply Voltage	Input Signal/ Spool Travel Monitoring	Design Number
AMLS： Linear Servo Amplifier	**A** ：LSVG-03-4/10/20/40 **B** ：LSVG-03-60 **C** ：LSVHG-06-900 **C2**：LSVHG-04 **D** ：LSVHG-06-1300 LSVHG-10-3800	**D48**：DC 48 V **D24**：DC 24 V	**A1:** Voltage Signal ±10 V **B1:** Current Signal 4 - 20 mA **C1:** Current Signal ±10 mA	**10**

I/O Signal Characteristics



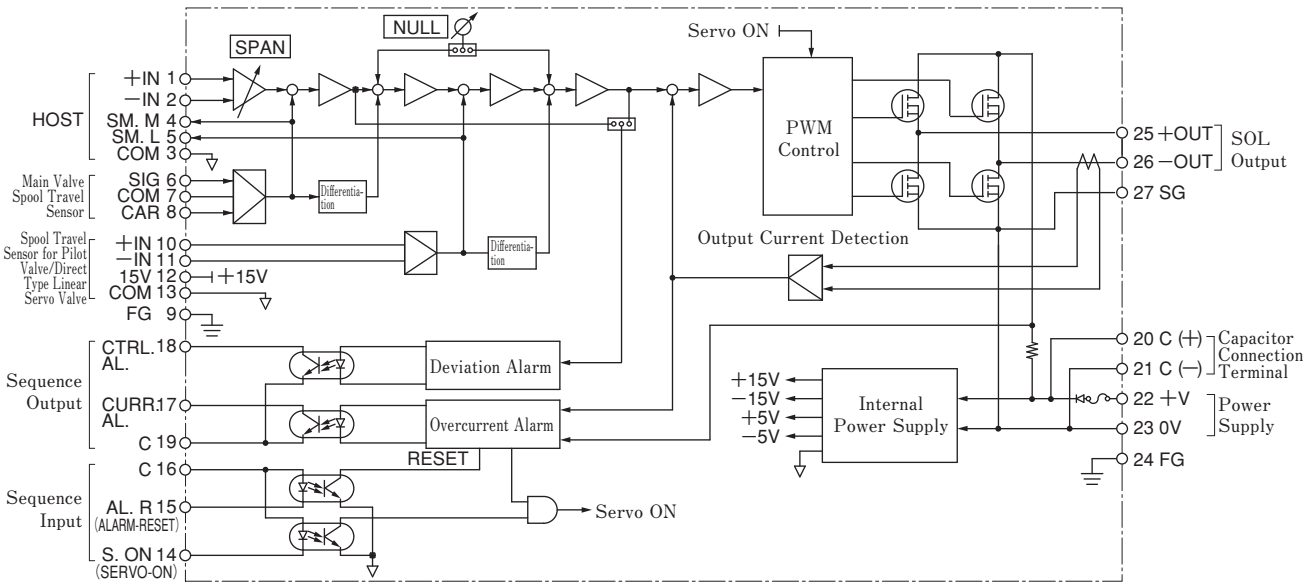
Appearance/Terminal Names



●Terminal Name

No.	Terminal Name		
1	Input Signal		+IN
2			−IN
3	Common		COM
4	Sensor Monitoring	Main Valve Spool	SM. M
5		Pilot Valve/Direct Type Linear Servo Valve	SM. L
6	Main Valve Spool Travel Sensor		SIG
7			COM
8			CAR
9	Frame Grounding		FG
10	Spool Travel Sensor for Pilot Valve/Direct Type Linear Servo Valve		+IN
11			−IN
12			+15V
13			COM
14	Sequence Input	Servo ON	S. ON
15		Alarm Reset	AL. R
16		Input Common	C
17	Sequence Output	Overcurrent Alarm	CURR. AL.
18		Deviation Alarm	CTRL AL.
19		Output Common	C
20	Capacitor Connection Terminal		Cap.(+)
21			Cap.(−)
22	Power Supply		+V
23			0V
24	Frame Grounding		FG
25	SOL Output		+OUT
26			−OUT
27	Signal Grounding		SG

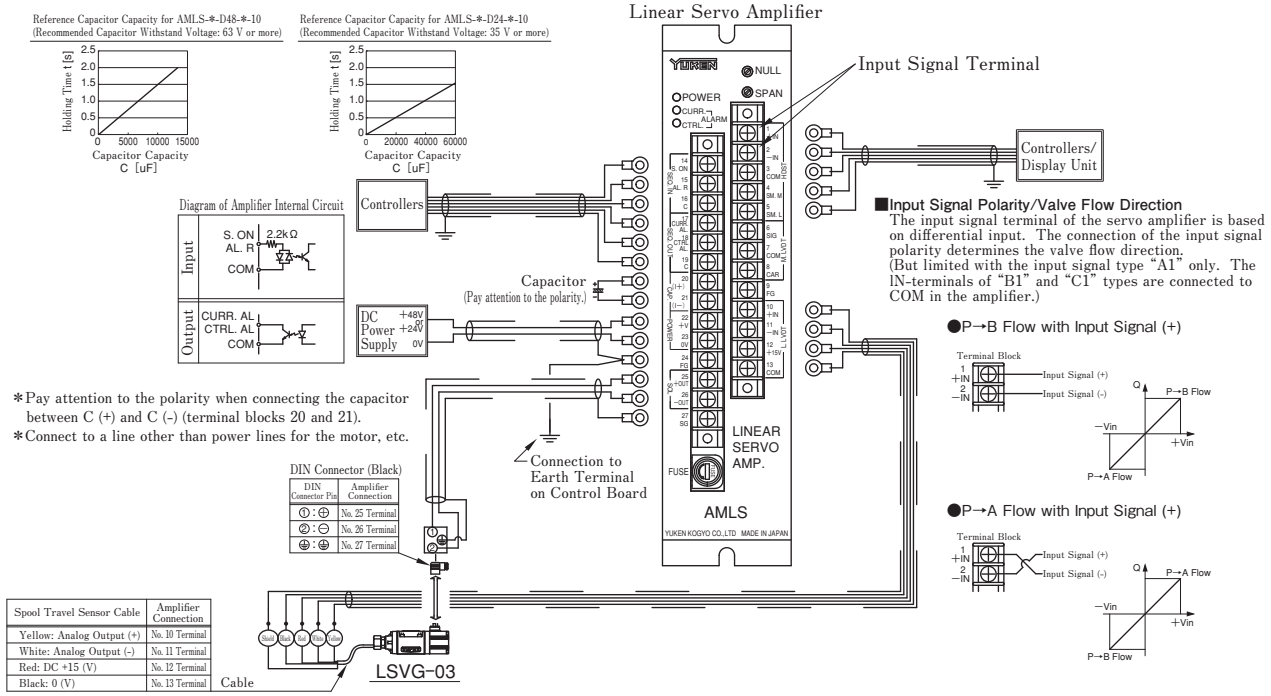
Block Diagram



Wire Connection Diagram

●AMLS-A,AMLS-B

＊To hold the valve spool at the neutral position for a few seconds upon power failure or after power-off, connect the capacitor between C (+) and C (-) (terminal blocks 20 and 21).



■Input Signal Polarity/Valve Flow Direction
The input signal terminal of the servo amplifier is based on differential input. The connection of the input signal polarity determines the valve flow direction.
(But limited with the input signal type "A1" only. The lN-terminals of "B1" and "C1" types are connected to COM in the amplifier.)

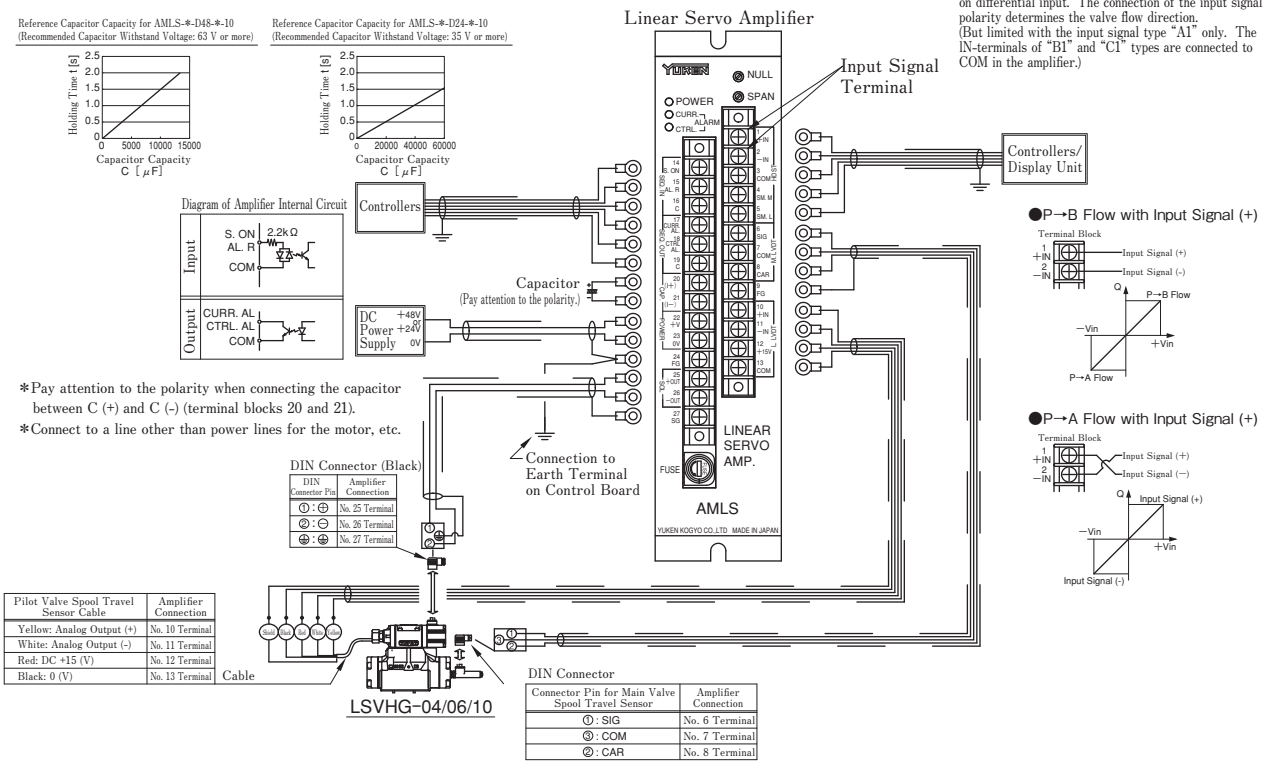
●P→B Flow with Input Signal (+)

●P→A Flow with Input Signal (+)

●AMLS-C, AMLS-C2, AMLS-D

＊To hold the valve spool at the neutral position for a few seconds upon power failure or after power-off, connect the capacitor between C (+) and C (-) (terminal blocks 20 and 21).

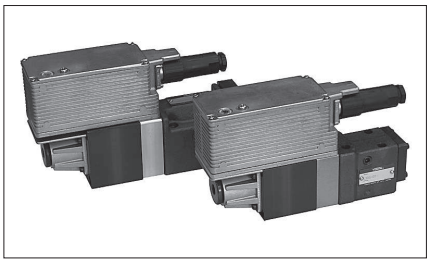
■Input Signal Polarity/Valve Flow Direction
The input signal terminal of the servo amplifier is based on differential input. The connection of the input signal polarity determines the valve flow direction.
(But limited with the input signal type "A1" only. The lN-terminals of "B1" and "C1" types are connected to COM in the amplifier.)

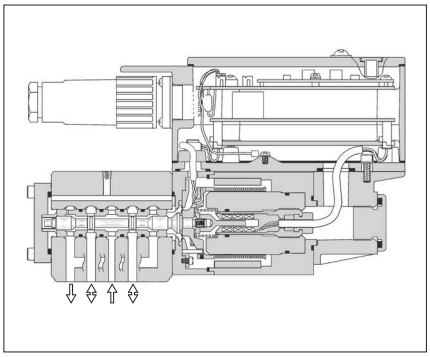


●P→B Flow with Input Signal (+)

●P→A Flow with Input Signal (+)

OBE type Direct Operated Linear Servo Valves





On-board electronics (OBE) type direct operated linear servo valves are based on high speed linear servo valves (LSVG) and OBE type linear servo valves (LSVHG-*EH), providing "high accuracy, easiness to use, and great usability".

●High accuracy

As is the case with the high speed linear servo valves, all of the OBE type direct operated linear servo valves have a low hysteresis of 0.1 % or less, realizing high accuracy. These valves allow the main unit to operate with much higher repeatability.

●High response characteristics

Compared to other equivalent models, these valves provide higher levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 3 ms (0 <=> 100 %), and the frequency response is 260 Hz/-3 dB (± 25 % amplitude).

[★ : Representative values for LSVG-03EH with the Y port (dry type)]

●Easiness to use

These valves can offer high accuracy for hydraulic control systems just with 24 V DC power supply and command signal input.

Six types of input signals in three input voltage/current ranges are available: 0 - ±10 V, 0 - ±10 mA, and 4 - 20 mA.

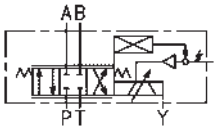
●Great usability

The small amplifier in the valves has a fault indicator lamp. This lamp indicates an error when valve failure causes any deviation between the spool position commanded by the signal and the actual spool position. It facilitates you to immediately troubleshoot the failure of the valves, if any.

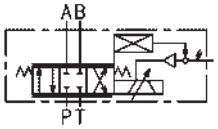
●Excellent contamination resistance

As is the case with the high speed linear servo valves, the OBE type direct operated linear servo valves have a simple pilot valve structure, exhibiting excellent contamination resistance. The permissible level of fluid contamination for these valves is up to NAS 1638 class 10.

Graphic Symbols



With Y Port (Dry Type)



Without Y Port (Wet Type)

■ Model Number Designation

F−	LSVG	−03	EH	−60	−W	A	−A	1	−10
Fluid Type	Series Number	Valve Size	Amp. Type	Rated Flow @ΔP=7MPa	Drain Port and Permissible Back Pres.	Fail-safe Function	Input Signal/Spool Travel Monitoring	Connector Type	Design Number
F : Special Seals for Phosphate Ester Type Fluid (Omit if not required)	LSVG : Direct Operated Linear Servo Valves	01	EH : OBE Type	4: 4 L/min	None: With Y Port (Permissible Back Pres.: 0.05 MPa) (Dry Type)	A: P→A→B→T Position	A: Voltage Signal ±10 V (P→B→A→T Flow with Input Signal (+))	1: 6 + PE Pole	10
				10: 10 L/min			B: Current Signal 4 - 20 mA (P→B→A→T Flow with Current Signal 12 - 20 mA)	2:11 + PE Pole - With "Enable" Function - With "Valve Ready" Function - With "Alarm Output" Function	
				20: 20 L/min		B: P→B→A→T Position	C: Current Signal ±10 mA (P→B→A→T Flow with Input Signal (+))		
				40: 40 L/min	W:Without Y Port★1 (Wet Type)	C:Neutral	D: Voltage Signal ±10 V (P→A→B→T Flow with Input Signal (+))		
		03		60: 60 L/min			E: Current Signal 4 - 20 mA (P→A→B→T Flow with Current Signal 12 - 20 mA)		10★2
							F: Current Signal ±10 mA (P→A→B→T Flow with Input Signal (+))		

★ 1. For the wet type, water-glycol fluids cannot be used.

★ 2. We prepare mounting bolt M6 specified application-designed product. Maximum pressure of this product is limited, for details please contact us.

Specifications

The values in parentheses in the specification table below are applicable to the models "LSVG-＊EH-＊-W＊-" (wet type).

Descriptions \ Model Numbers			LSVG-01EH-4-＊	LSVG-01EH-10-＊	LSVG-01EH-20-＊	LSVG-03EH-40-＊	LSVG-03EH-60-＊
Rated Flow at Δ P = 7 MPa (1)		L/min	4	10	20	40	60
Max. Operating Pressure		MPa	35				
Proof Pres. at Return Port		MPa	21 (7)			35 (7)	
Drain Port (Y Port) Permissible Back Pres. (2)		MPa	0.05 (No Y Port for Wet Type)				
Internal Leakage (Ps = 14 MPa, Max. Leakage Viscosity: 32 mm²/s)		L/min	0.4 or less	0.8 or less	1.2 or less	1.7 or less	
Hysteresis		%	0.1 or less				
Step Response (Typical) (3) [P2 = 14 MPa (0 ⇔ 100 %)]		ms	3 (3.5)				4 (4.5)
Frequency Response (± 25 % Amplitude) (Typical) (3)	Gain: -3 dB	Hz	240 (230)			260 (240)	250 (220)
	Phase: -90°	Hz	300 (270)			310 (310)	260 (220)
Vibration Proof		m/s²	100				
Protection			IP 65				
Ambient Temperature		℃	0 - + 50				
Spool Stroke to Stops		mm	± 0.5				± 0.75
Polarity			See the description about I/O signal characteristics on page I-24.				
Linear Motor Specification	Current	A	1.5 (Max. 3.2)				
	Coil Resistance	Ω	7 [at 20 ℃]				
Approx. Mass		kg	4.3			5.2	
Electric Connection			6 + PE/11 + PE Connector				

Note) (1) Use the valves so that the relationship between the valve pressure difference and the flow rate, as specified below in "Range of Flow Control", is met.
(2) Back pressure at the drain port (Y) should be 0.05 MPa or less and not be a negative pressure.
(3) This value is measured for each valve; it may vary depending on the actual circuit/operation conditions.

Accessories

Mounting Bolts

Model Numbers	Mounting Bolt	Qty.	Bolt Tightening Torque
LSVG-01EH	Hex. Soc. Head Cap Screw : M5 × 55 L	4	6.0 - 8.0 Nm
LSVG-03EH-＊-10	Hex. Soc. Head Cap Screw : M8 × 65 L	4	30.8 - 37.7 Nm

Connector

Model Numbers	Connector	Qty.	Remarks
LSVG-＊EH-＊-＊1	6 + PE Electrical Plug	1	Compatible with EN 175201 PART 804
LSVG-＊EH-＊-＊2	11 + PE Electrical Plug	1	

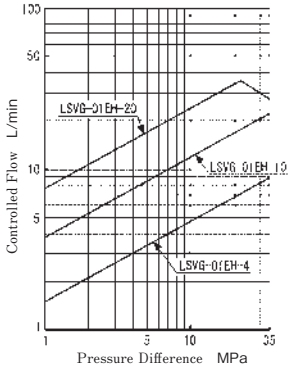
Cable with Connector (Separately Available)

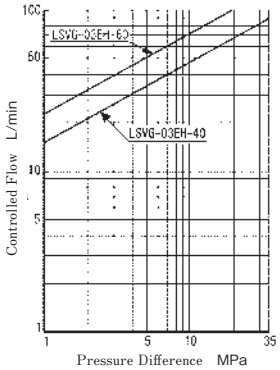
Model Numbers	Connector	Cable Model Numbers	Remarks
LSVG-＊EH-＊-＊1	6 + PE Electrical Plug	LSVC-6PE-＊-11	＊ Cable Length 03 : 3 m 05 : 5 m 10 : 10 m
LSVG-＊EH-＊-＊2	11 + PE Electrical Plug	LSVC-11PE-＊-11	

The cable with a connector is a cable assembly that includes the same connector as the one supplied with the valves.

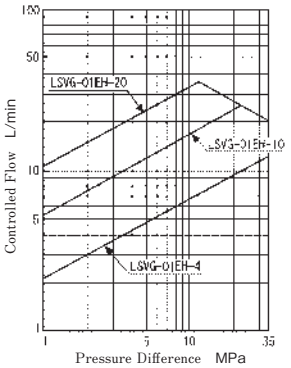
Range of Flow Control

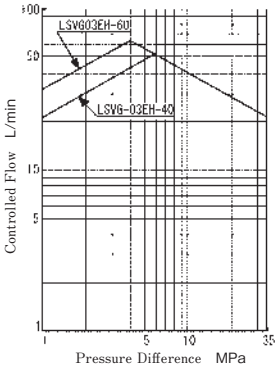
Control Method: 4-Way Valve





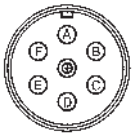
Control Method: 3-Way Valve





Electrical Specifications

6 + PE Connector



Pin \ Valve Model		LSVG-＊EH-＊-A1 LSVG-＊EH-＊-D1	LSVG-＊EH-＊-B1 LSVG-＊EH-＊-E1	LSVG-＊EH-＊-C1 LSVG-＊EH-＊-F1
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 100 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM(0 V)		
Pin D	Input (+) (Differential)★1	0 - ±10 V Ri=100 kΩ	4 - 20 mA Ri=200 Ω	0 - ±10 mA Ri=200 Ω
Pin E	Input (-) (Differential)★1			
Pin F	Spool Travel Monitoring	0 - ±10 V RL≧10 kΩ	4 - 20 mA RL=100 - 500 Ω★2	0 - ±10 mA RL=100 - 500 Ω★2
Pin ⏚	Protective Earth	—		

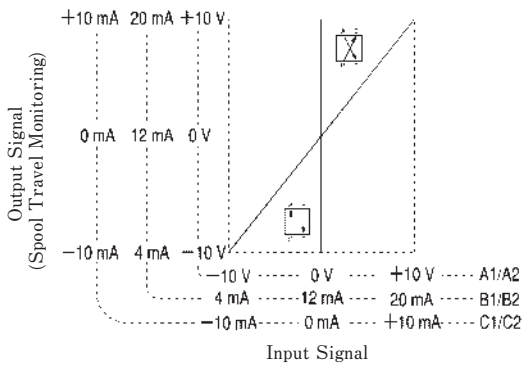
11 + PE Connector

Pin \ Valve Model		LSVG-＊EH-＊-A2 LSVG-＊EH-＊-D2	LSVG-＊EH-＊-B2 LSVG-＊EH-＊-E2	LSVG-＊EH-＊-C2 LSVG-＊EH-＊-F2
Pin 1	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 100 VA or more		
Pin 2		0 V		
Pin 3	Enable (Servo ON) Input	Input Current = 3 - 5 mA at 4.8 - 28 V DC		
Pin 4	Input (+) (Differential)★1	0 - ±10 V Ri=100 kΩ	4 - 20 mA Ri=200 Ω	0 - ±10 mA Ri=200 Ω
Pin 5	Input (-) (Differential)★1			
Pin 6	Spool Travel Monitoring	0 - ±10 V RL≧10 kΩ	4 - 20 mA RL=100 - 500 Ω ★2	0 - ±10 mA RL=100 - 500 Ω★2
Pin 7	Signal Common	COM (0 V)		
Pin 8	Valve Ready Output	Open Collector Output Voltage: Max. 30 V, Current: Max. 20 mA		
Pin 9	—	—		
Pin 10	—	—		
Pin 11	Alarm Output	Open Collector Output Voltage: Max. 30 V, Current: Max. 20 mA		
Pin ⏚	Protective Earth	—		

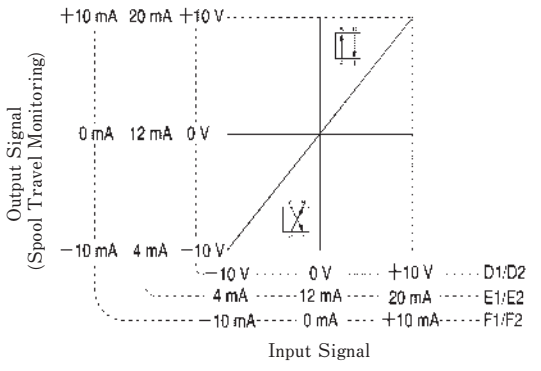
★1. Differential input signals can be used only for the valves with the voltage signal specifications of ±10 V (LSVG-＊EH-＊-A＊/D＊).
★2. The recommended load resistance is 200 Ω.

I/O Signal Characteristics

・LSVG-＊EH-＊-A＊/B＊/C＊

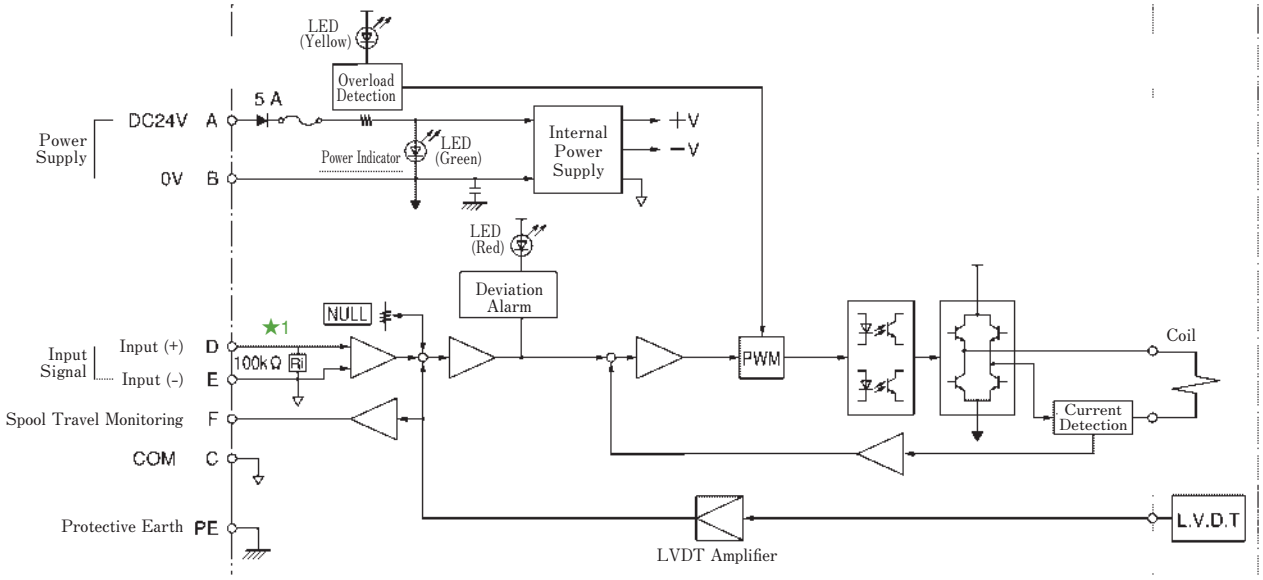


・LSVG-＊EH-＊-D＊/E＊/F＊

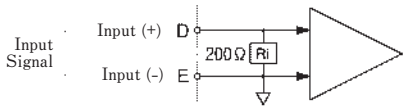


Block Diagram

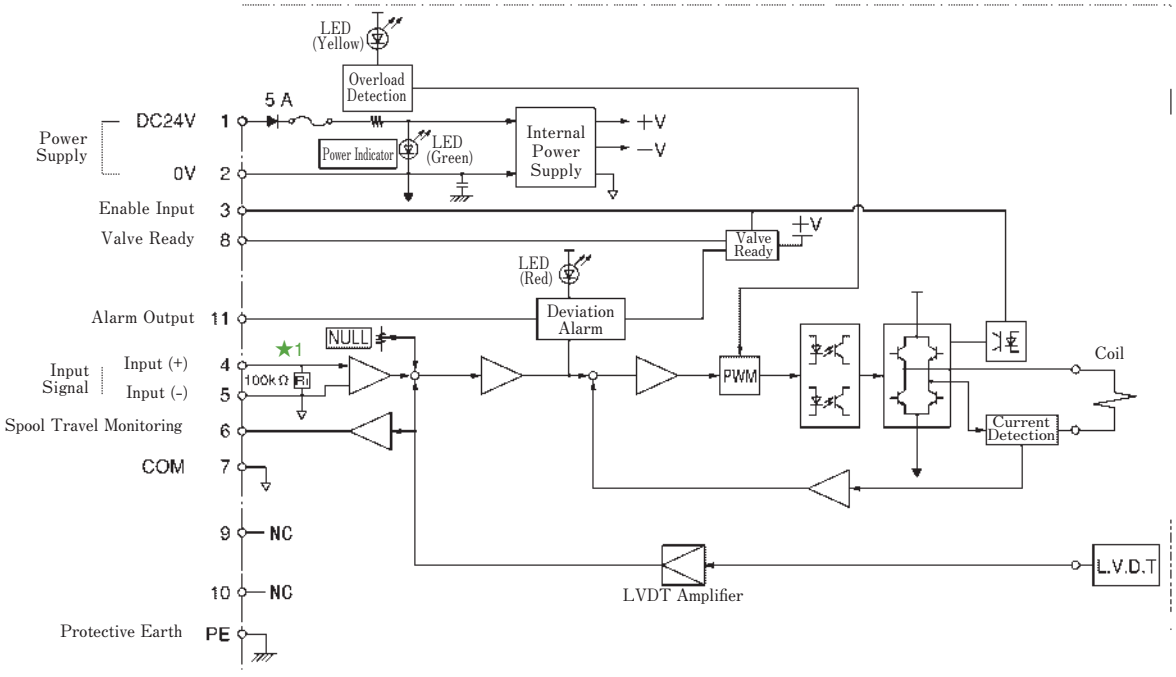
LSVG-＊EH-＊-＊＊-A1/B1/C1/D1/E1/F1（6 + PE Connector）



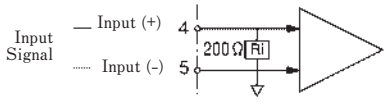
★1. The input stage for the models LSVG-＊EH-＊-＊-B1/C1/E1/F1 (current signal) is as follows.



LSVG-＊EH-＊-＊＊-A2/B2/C2/D2/E2/F2（11 + PE Connector）

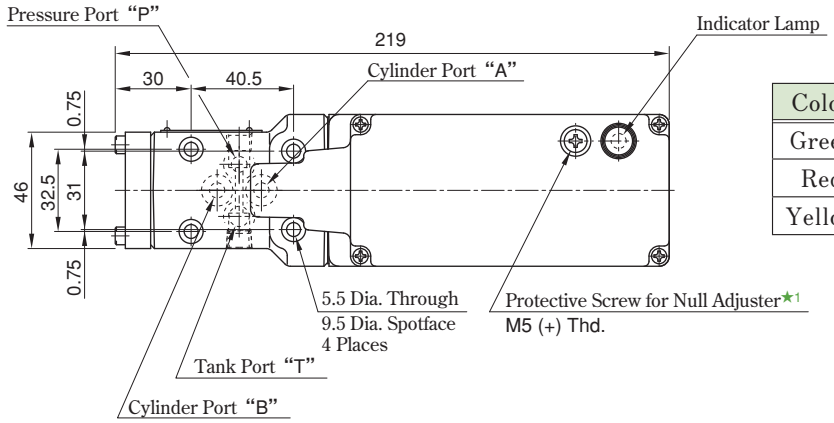


★1. The input stage for the models LSVG-＊EH-＊-＊-B2/C2/E2/F2 (current signal) is as follows.

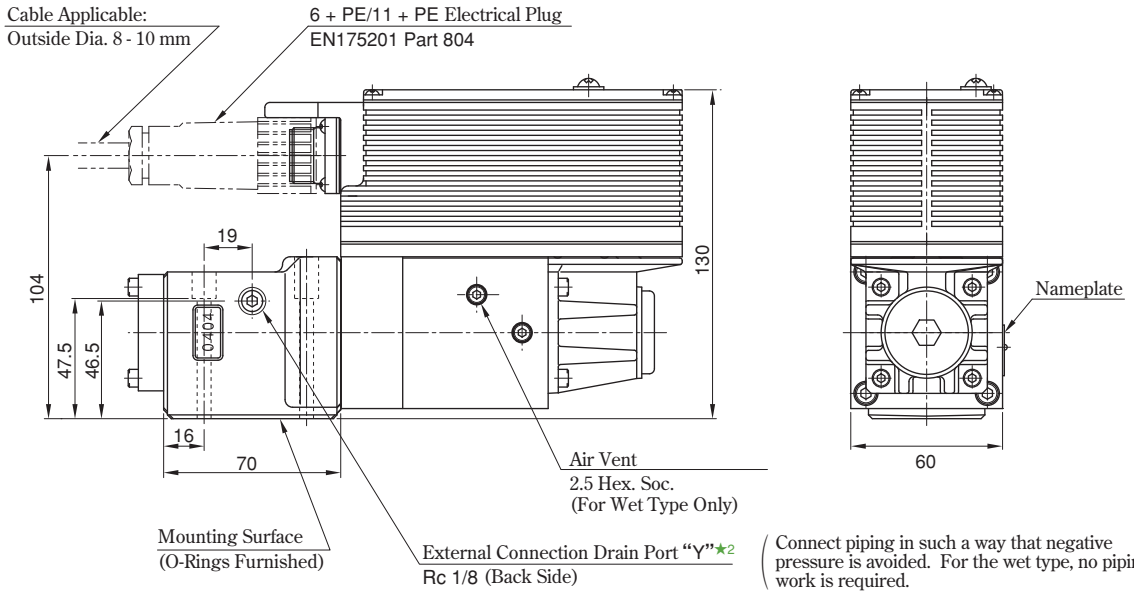


LSVG-01EH

Mounting Surface: Conforming to ISO 4401-03-02-0-05



Color	Indicator Lamp
Green	Power Supply
Red	Deviation Alarm
Yellow	Overload



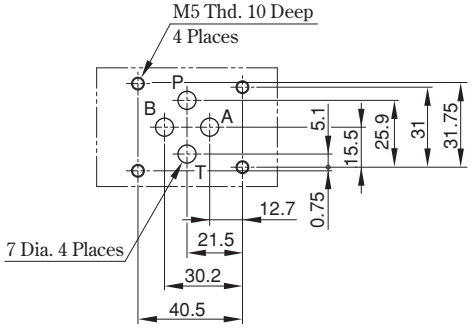
★1. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.
★2. For the dry type, the external connection drain port "Y" on the tank port side is usually plugged. To use the port on the tank port side, remove the hexagon socket head plug (5 Hex.) from the drain port on the tank port side and plug the port on the pressure port side.

● O-Rings for the Ports

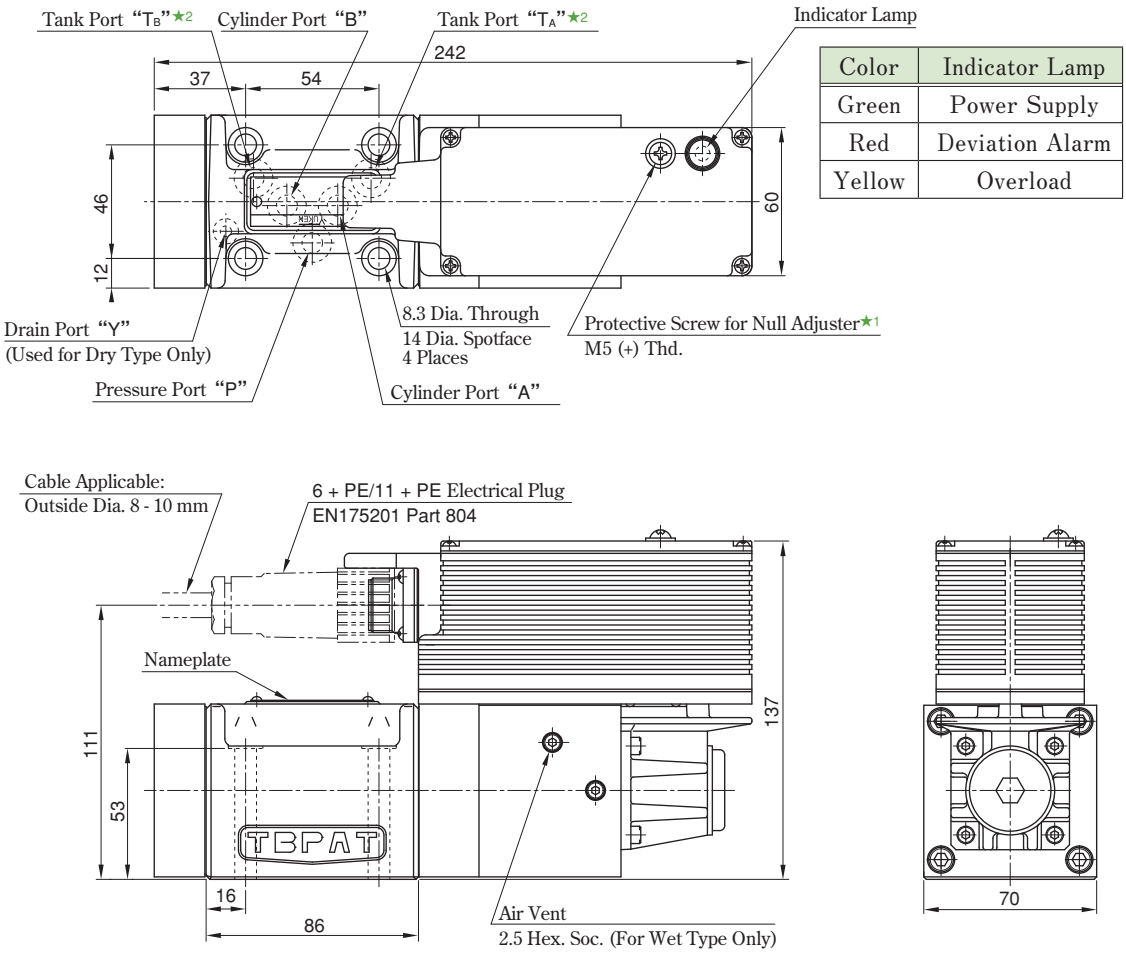
AS568-012 (NBR-90) : 4 pieces
O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

● Dimensions of Mounting Surface

Prepare a mounting surface shown below. Basically, the dimensions of the mounting surface conform to the ISO standard.
The mounting surface should have a good machined finish. ▽6.3



LSVG-03EH



Color	Indicator Lamp
Green	Power Supply
Red	Deviation Alarm
Yellow	Overload

★1. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

● O-Rings for the Ports

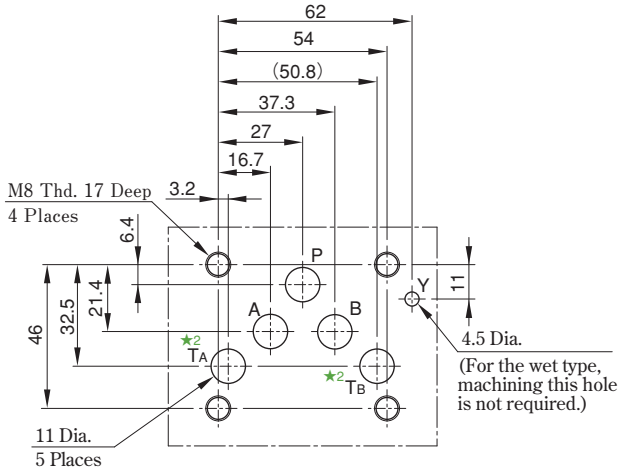
Port	O-Ring Size	Qty.
P, A, B, T	AS568-014 (NBR-90)	5
Y	OR NBR-90 P7-N	1

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

● Dimensions of Mounting Surface

Prepare a mounting surface shown on the right. Basically, the dimensions of the mounting surface conform to the ISO standard, but the specifications for the valve mounting screws and the drain port "Y" (for the dry type) are different as follows.

	ISO 4401-05-04-0-05	Mounting Surface for LSVG-03EH-＊-10
Valve Mounting Screw	M6	M8
Drain Port "Y" (For Dry Type)	Without "Y" Port	With "Y" Port

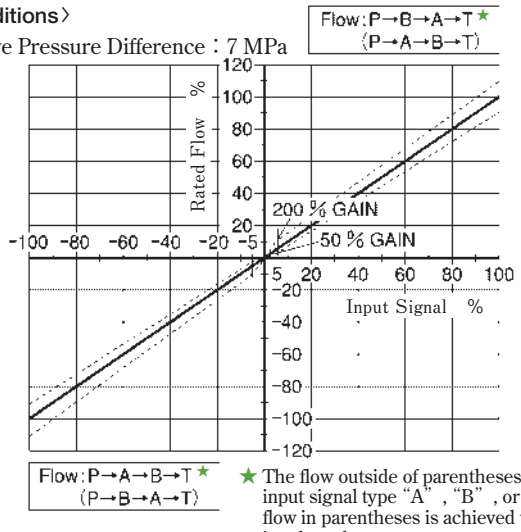


★2. There are two tank ports "TA" and "TB"; however, "TA" may be used alone.

Characteristics of LSVG-01EH-4/10/20 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

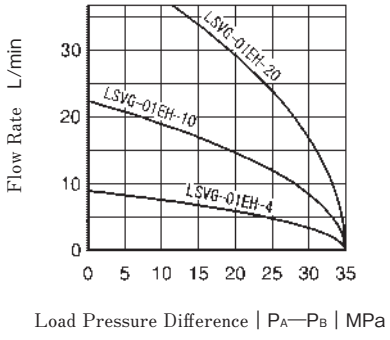
〈Conditions〉
●Valve Pressure Difference：7 MPa



★ The flow outside of parentheses is achieved when the input signal type "A" , "B" , or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Load Flow Characteristics

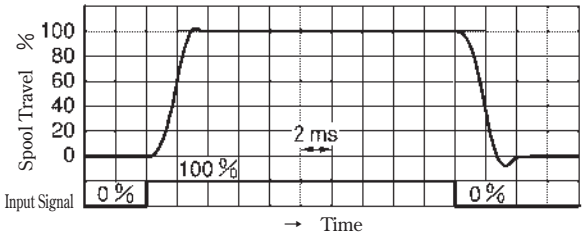
〈Conditions〉 ●Input Signal：100 %
Note) Tolerance for Load Flow：±10 %



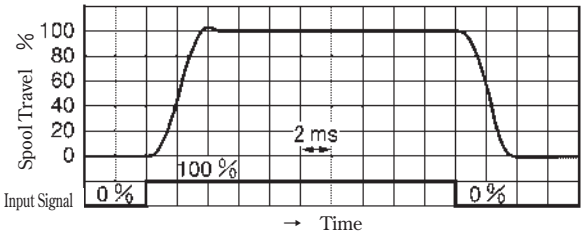
Step Response

〈Conditions〉 ●Input Amplitude：0 ⇔ 100 % ●Supply Pressure：14 MPa

● LSVG-01EH-4/10/20-∗-∗-10 (Dry Type)



● LSVG-01EH-4/10/20-W∗-∗-10 (Wet Type)

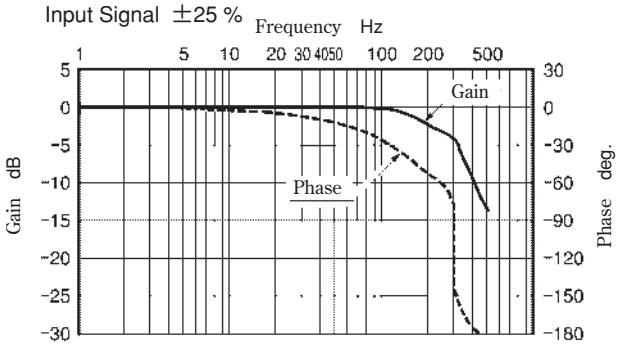


Frequency Response

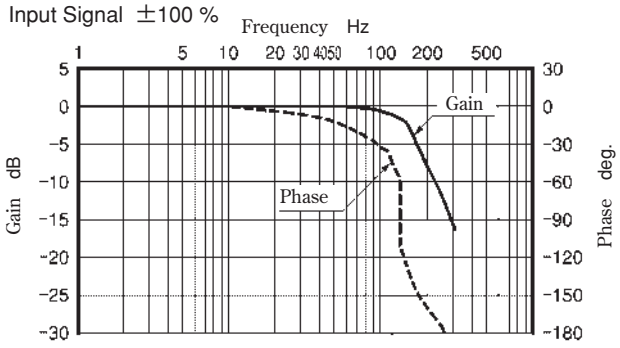
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply Pressure：14 MPa

● LSVG-01EH-4/10/20-∗-∗-10 (Dry Type)

Input Signal ±25 %

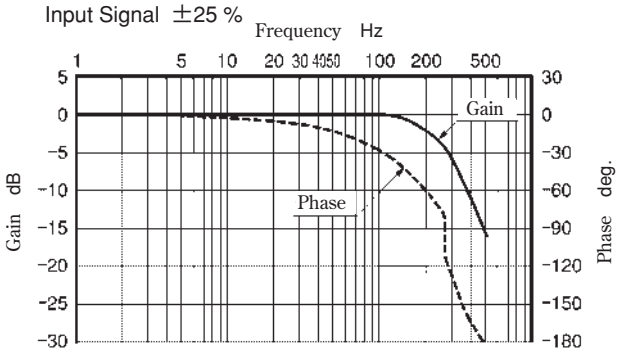


Input Signal ±100 %

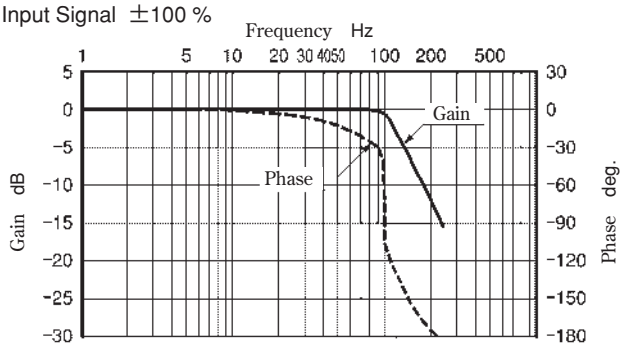


● LSVG-01EH-4/10/20-W∗-∗-10 (Wet Type)

Input Signal ±25 %



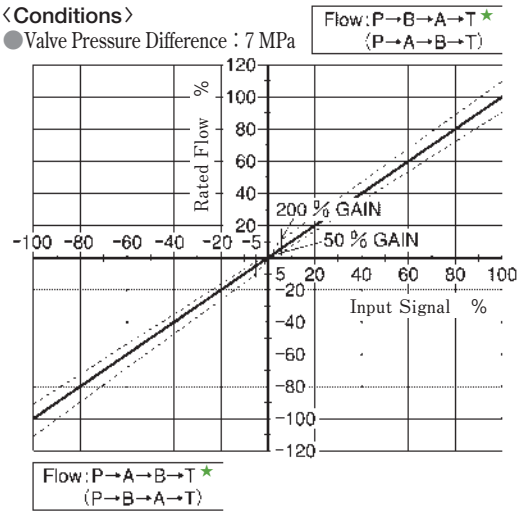
Input Signal ±100 %



Characteristics of LSVG-03EH-40/60 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

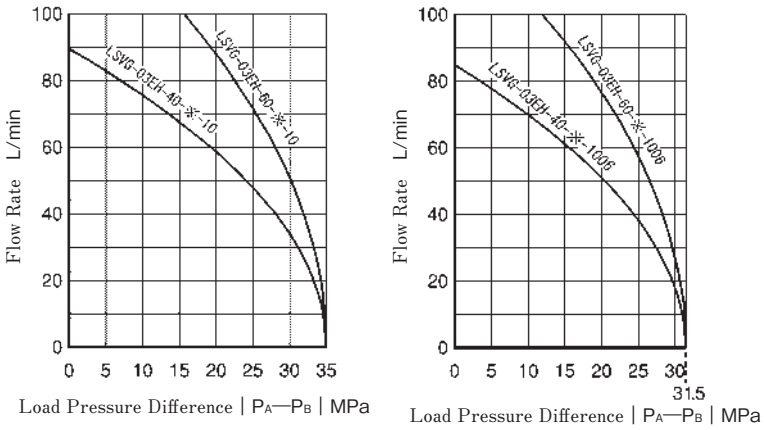
〈Conditions〉
●Valve Pressure Difference：7 MPa



★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Load Flow Characteristics

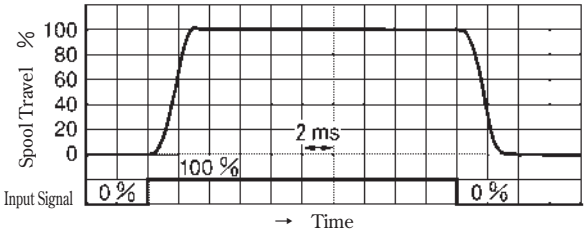
〈Conditions〉 ●Input Signal：100 %
Note) Tolerance for Load Flow：±10 %



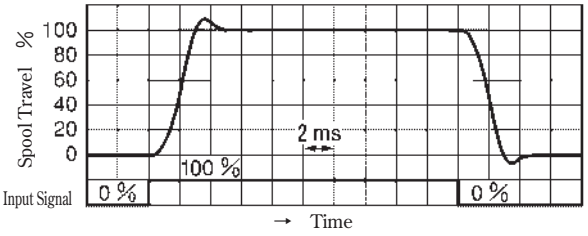
Step Response

〈Conditions〉 ●Input Amplitude：0 ⇔ 100 % ●Supply Pressure：14 MPa

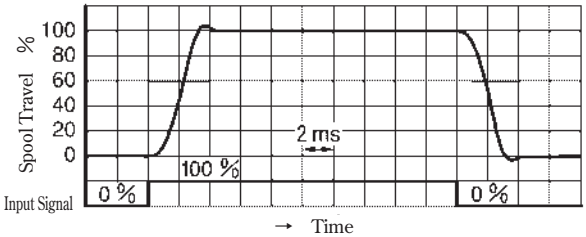
● LSVG-03EH-40-*-*-10 (Dry Type)



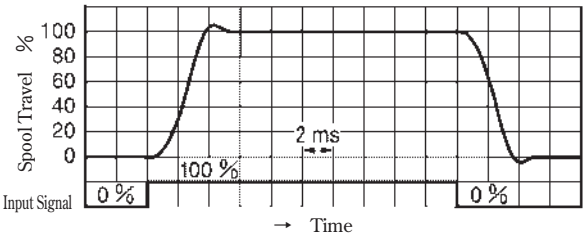
● LSVG-03EH-40-W*-*-10 (Wet Type)



● LSVG-03EH-60-*-*-10 (Dry Type)



● LSVG-03EH-60-W*-*-10 (Wet Type)

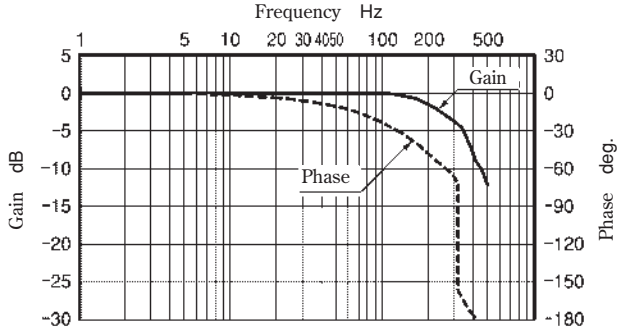


Frequency Response

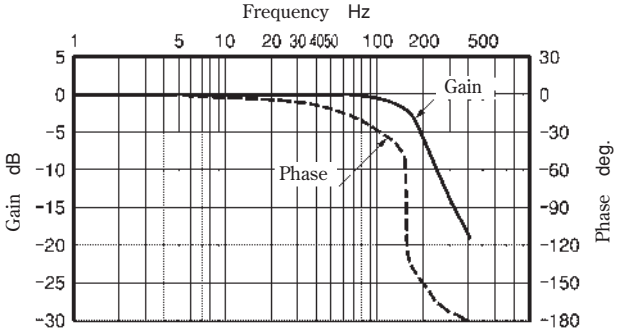
〈**Conditions**〉 ●Hydraulic Circuit: Port A/B Closed ●Supply Pressure：14 MPa

● LSVG-03EH-40-∗-∗-10 (Dry Type)

Input Signal ±25 %

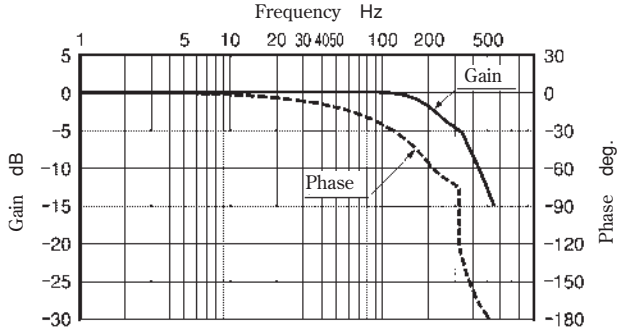


Input Signal ±100 %

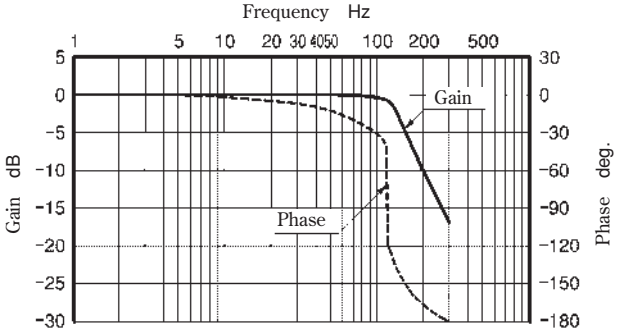


● LSVG-03EH-40-W∗-∗-10 (Wet Type)

Input Signal ±25 %

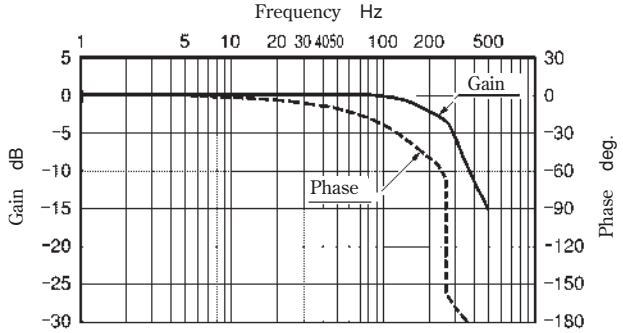


Input Signal ±100 %

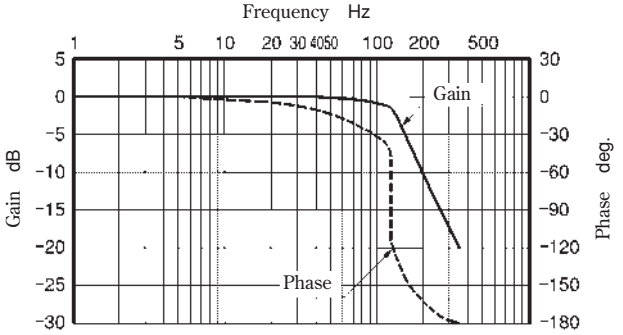


● LSVG-03EH-60-∗-∗-10 (Dry Type)

Input Signal ±25 %

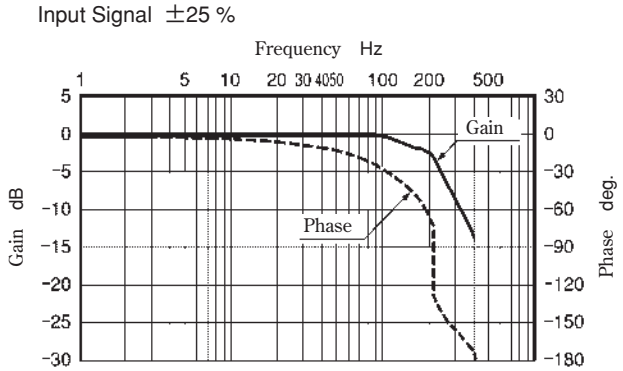


Input Signal ±100 %

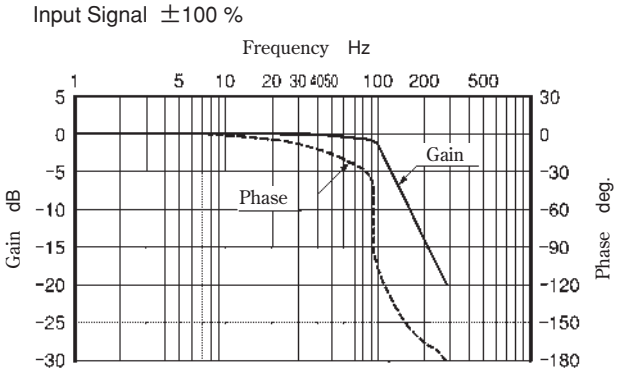


● LSVG-03EH-60-W∗-∗-10 (Wet Type)

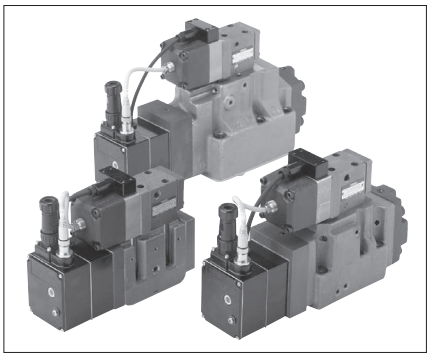
Input Signal ±25 %

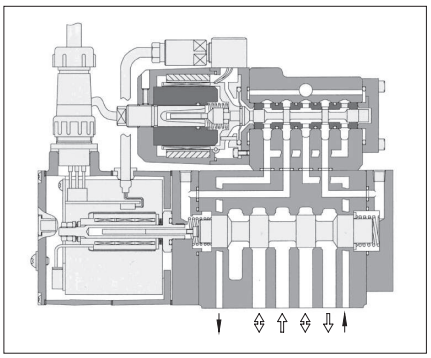


Input Signal ±100 %



OBE(On-Board Electronics) Type Linear Servo Valves (Std. Type)





On-board electronics (OBE) type linear servo valves have been developed based on two stage type high speed linear servo valves, but with a focus on downsizing the pilot valve. The integration of the exclusive amplifier and the linear servo valve in a compact package provides “high accuracy, easiness to use, and great usability”.

●High accuracy

As is the case with the high speed linear servo valves, all of the OBE type linear servo valves have a low hysteresis of 0.1 % or less, realizing high accuracy. These valves allow the main unit to operate with much higher repeatability.

●High response characteristics

Compared to other equivalent models, these valves provide higher levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 7 ms (0 <=> 100 %)★, and the frequency response is 125 Hz/-3 dB (± 25 % amplitude)★. (★ : Representative values for LSVHG-03EH)

●Easiness to use

These valves can offer high accuracy for hydraulic control systems just with 24 V DC power supply and command signal input.

Six types of input signals in three input voltage/current ranges are available: 0 - ±10 V, 0 - ±10 mA, and 4 - 20 mA.

●Great usability

The small amplifier in the valves has a fault indicator lamp. This lamp indicates an error when valve failure causes any deviation between the spool position commanded by the signal and the actual spool position. It facilitates you to immediately troubleshoot the failure of the valves, if any.

●Two types of pilot valves available

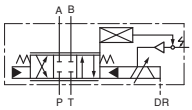
There are two types of pilot valves available: a dry type good in response characteristics and a wet type that eliminates the drain (DR) port to improve usability. They can be selected according to users’ purposes.

●Excellent contamination resistance

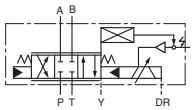
As is the case with the high speed linear servo valves, the OBE type linear servo valves have a simple pilot valve structure, exhibiting excellent contamination resistance. The permissible level of fluid contamination for these valves is up to NAS 1638 class 10.

Graphic Symbols

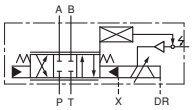
● Spool Types “2”, “2P”, and “2L”



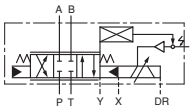
Int. Pilot - Int. Drain



Int. Pilot - Ext. Drain

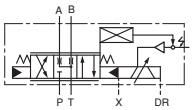


Ext. Pilot - Int. Drain

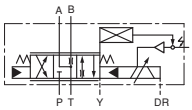


Ext. Pilot - Ext. Drain

● Spool Type “40”

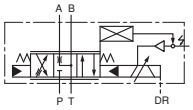


● Spool Type “4J”



The symbols above indicate the external pilot/internal drain type. The internal pilot/internal drain type is the same as that for the spool types “2”, “2P”, and “2L”.

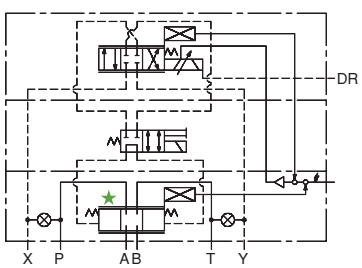
Input Signal/Spool Travel Monitoring “D”/“E”/“F”



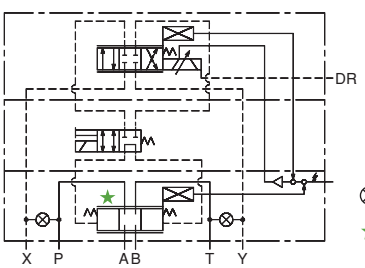
The pilot and drain types are the same as those for the input signal/spool travel monitoring “A”/“B”/“C”.

● Detailed Graphic Symbols (With Fail-safe Solenoid Operated Valve)

LSVHG-03/04EH-∗-∗EA/∗EB/∗EC



LSVHG-06/10EH-∗-∗EA/∗EB/∗EC



⊗ : Plugs for selecting the pilot and drain types

★ : Depending on the spool type.
(Same as the graphic symbols shown above)

Model Number Designation

F—	LSVHG	—06	EH	—900	—2P	—E	T	—W	A	—A	1	—20
Fluid Type	Series Number	Valve Size	Amp. Type	Rated Flow @ΔP = 7 MPa	Spool Type ★1 ★5	Pilot Type	Drain Type	DR Port and Permissible Back Pres.	Fail-safe Function ★1	Input Signal/Spool Travel Monitoring ★1	Connector Type	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	LSVHG: Two Stage Type Linear Servo Valves	03	EH: OBE Type	230: 230 L/min	2L	None: Internal Pilot E: External Pilot	None: External Drain T: Internal Drain	None: With DR Port (Permissible Back Pres.: 0.05 MPa) (Dry Type Pilot Valve) W: ★2 Without DR Port (Wet Type Pilot Valve)	None: P→B→A→T Position Valve Opening: Full A: P→A→B→T Position Valve Opening: Full	A: Voltage Signal ±10 V (P→B→A→T Flow with Input Signal (+)) B: Current Signal 4 - 20 mA (P→B→A→T Flow with Current Signal 12 - 20 mA) C: Current Signal ±10 mA (P→B→A→T Flow with Input Signal (+)) D: Voltage Signal ±10 V (P→A→B→T Flow with Input Signal (+)) E: Current Signal 4 - 20 mA (P→A→B→T Flow with Current Signal 12 - 20 mA) F: Current Signal ±10 mA (P→A→B→T Flow with Input Signal (+))	1: 6+PE Pole 2: ★3 11+PE Pole	20
				270: 270 L/min	2, 40, 2P							
				210: ★4 210 L/min	4J: Open Center A, B & T							
		04		750: 750 L/min	2, 40, 2P 2L: 2 % Overlap (Linear Flow Gain)				Applicable only when a fail-safe solenoid operated valve is mounted EA: With Solenoid Operated Valve P→A→B→T Position Valve Opening: 10% EB: With Solenoid Operated Valve P→B→A→T Position Valve Opening: 10% EC: With Solenoid Operated Valve Neutral Position			
				580: ★4 580 L/min	4J: Open Center A, B & T							
		06		900: 900 L/min 1300: 1300 L/min	2, 40, 2P 2L: 2 % Overlap (Linear Flow Gain)							
				820: ★4 820 L/min 1300: 1300 L/min	4J: Open Center A, B & T							
		10		3800: 3800 L/min	2, 40, 2P 2L: 2 % Overlap (Linear Flow Gain)				None: P→B→A→T Position Valve Opening: Full A: P→A→B→T Position Valve Opening: Full			

★1. The available combinations of the spool type, fail-safe function, and input signal/spool travel monitoring are limited. For details, see the chart on the right.
★2. The valves with the model number "W" (without DR port) cannot use water-glycol fluids.
★3. For the valves with the fail-safe function "EC" , select "2" only for the connector type.
★4. For the spool type "4J" , the rated flow is a value obtained with +100% input and P → A flow (input signal/spool travel monitoring "A" , "B" , and "C") or P → B flow ("D" , "E" , and "F").
★5. For the spool function in the neutral position, see the chart below.

Spool Type	Fail-safe Function	Input Signal/Spool Travel Monitoring
2	With Solenoid Operated Valve: EC	All (A, B, C, D, E, F)
40	Without Solenoid Operated Valve: None/A	
2L	With Solenoid Operated Valve: EA/EB	
2P	Without Solenoid Operated Valve: None/A	
4J	With Solenoid Operated Valve: EC	
	Without Solenoid Operated Valve: None	D, E, F
	Without Solenoid Operated Valve: A	A, B, C

Spool Function in Neutral Position

Spool Type	Function
2, 2P, 2L	
40	
4J	

Fail-safe Function of the Valves

With reference to the information given below, select the option for the fail-safe function according to the use of applications. The valves have a fail-safe function, but a separate safety circuit should be provided if the hydraulic actuator must be reliably held or stopped to ensure safety in the event of electric failure (power failure, power cable disconnection, etc.) or upon startup.

1) Electric System: OFF and Hydraulic System: ON (Power Failure/Power Cable Disconnection)

No.	Model Numbers	Fail-safe Function ★	
1	(F-) LSVHG-＊＊EH-＊-2/2P/2L (-E) (T) (-W)	P→B→A→T Position Valve Opening: Full	
2	(F-) LSVHG-＊＊EH-＊-2/2P/2L (-E) (T) (-W) A	P→A→B→T Position Valve Opening: Full	
3	(F-) LSVHG-＊＊EH-＊-4J (-E) (T) (-W)	P→B→A→T Position Valve Opening: Full	
4	(F-) LSVHG-＊＊EH-＊-4J (-E) (T) (-W) A	P→A→B→T Position Valve Opening: Full	
5	(F-) LSVHG-＊＊EH-＊-2/2P/2L (-E) (T) (-W) EA (With Fail-safe Solenoid Operated Valve)	P→A→B→T Position Valve Opening: 10 %	
6	(F-) LSVHG-＊＊EH-＊-2/2P/2L (-E) (T) (-W) EB (With Fail-safe Solenoid Operated Valve)	P→B→A→T Position Valve Opening: 10 %	
7	(F-) LSVHG-＊＊EH-＊-4J (-E) (T) (-W) EC-A＊/B＊/C＊ (With Fail-safe Solenoid Operated Valve)	A, B, T Connection (Neutral)	
8	(F-) LSVHG-＊＊EH-＊-4J (-E) (T) (-W) EC-D＊/E＊/F＊ (With Fail-safe Solenoid Operated Valve)	A, B, T Connection (Neutral)	

★The fail-safe activation time depends on the electric and hydraulic conditions.

2) Electric System: OFF and Hydraulic System: OFF (Startup)

For Models No. 1 and 2 in the table above, the fail-safe function holds the spool in the neutral position. For Models No. 5 and 6, the function is the same as that for "Electric System: OFF and Hydraulic System: ON". For Models No. 3, 4, 7, and 8, the function is based on A, B, T connection (neutral).

Specifications

LSVHG-＊EH-＊-2/40/2P/2L

The values in parentheses in the specification table below are applicable to the models "LSVHG-＊EH-＊-＊-＊＊-W＊-" (without DR port).

Descriptions \ Model Numbers				LSVHG−03EH−230−＊	LSVHG−03EH−270−＊			LSVHG−04EH−750−＊				LSVHG−06EH−900−＊				LSVHG−06EH−1300−＊				LSVHG−10EH−3800−＊			
Spool Type				2 L	2	40	2P	2	40	2P	2 L	2	40	2P	2 L	2	40	2P	2 L	2	40	2P	2 L
Rated Flow at ΔP = 7 MPa (4-Way Valve)			L/min	230	270			750				900				1300				3800			
Rated Flow at ΔP' = 0.5 MPa (per Land)			L/min	87	102			283				340				490				1440			
Max. Operating Pressure			MPa	31.5				35				35				31.5				35			
Proof Pres. at Return Port (1)	External Drain	T Port	MPa	21 (5)				31.5				35				25				28			
		Y Port	MPa	21 (7) (5)				21 (7)															
	Internal Drain	T & Y Ports	MPa	21 (7) (5)				21 (7)															
DR Port Permissible Back Pressure (2)			MPa	0.05 (The valves with the model number "W" have no DR port.)																			
Pilot Pressure (3)			MPa	1.5 - 21																			
Pilot Flow Rate (4)			L/min	9 (8) or more				20 (17) or more				22 (19) or more				23 (19) or more				28 (24) or more			
Pilot Valve Max. Leakage	Pres.: $P_S = P_P$ = 14 MPa Max. Leakage Viscosity: 32 mm²/s		L/min	0.8				1.2															
Main Valve Max. Leakage				1.6	0.5	1	5.6	0.8	1.6	6.8	2.5	0.9	1.8	7	2.5	1	2	8	2.5	3	6	10	8
Hysteresis			%	0.1 or less																			
Step Response (0 <=> 100 %, Typical) (6)			ms	8 (10)	7 (9)			11 (13)				11 (13)				15 (18)				18 (20)			
Frequency Response (±25 % Amplitude, Typical) (6)	Gain: -3 dB		Hz	120 (100)	125 (110)			100 (90)				100 (90)				75 (70)				60 (55)			
	Phase: -90°		Hz	110 (90)	110 (100)			90 (90)				90 (90)				70 (75)				70 (60)			
Vibration Proof (7)			m/s²	100																			
Protection				IP 65																			
Ambient Temperature			℃	0 - +50																			
Spool Stroke to Stops			mm	±4	±3.5			±5				±5				±7				±7			
Spool End Area			cm²	3				7				8				8				11.3			
Polarity				See the description about I/O signal characteristics on page I-36.																			
Linear Motor Specification	Current		A	Max. 2.1																			
	Coil Resistance		Ω	9.6 [at 20 ℃]																			
Approx. Mass (8)			kg	8.5 [11]				14 [16]				20 [24]				20 [24]				77			
Electric Connection				6 + PE/11 + PE Connector【EN175201 Part 804】																			

Note) (1) Pressure at the return port should be at actual supply pressure or less.
(2) Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.
(3) Supply pressure for the pilot valve should be 1.5 - 21 MPa and should also be 60 % of actual supply pressure or more.
(4) The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.
(5) To use an external pilot type valve with a supply pressure of 21 MPa or more, pressures at the T and Y ports should be 7 MPa or less.
(6) This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.
(7) There are restrictions on the mounting position; refer to the instructions for details.
(8) A value in brackets indicates the mass of each valve with a fail-safe solenoid operated valve.
(9) For the effective range of the fail-safe function, see page I-60.

Specifications

● LSVHG-∗EH-∗-4J-∗-A∗/B∗/C∗

The values in parentheses in the specification table below are applicable to the models "LSVHG-∗EH-∗-∗-∗∗EH-W∗-" (without DR port).

Descriptions \ Model Numbers				LSVHG-03EH-210 -4J-∗-A∗/B∗/C∗	LSVHG-04EH-580 -4J-∗-A∗/B∗/C∗	LSVHG-06EH-820 -4J-∗-A∗/B∗/C∗	LSVHG-06EH-1300 -4J-∗-A∗/B∗/C∗
Spool Type				4J: Open Center A, B & T P→B Flow: 10 % Overlap, A→T Flow: 50 % Underlap P→A Flow: 60 % Overlap, B→T Flow: 5 % Underlap			
Rated Flow (±10%)	ΔP = 3.5 MPa (per Land)		L/min	P→B Flow: 210 A→T Flow: 235 P→A Flow: 95 B→T Flow: 240	P→B Flow: 580 A→T Flow: 675 P→A Flow: 255 B→T Flow: 660	P→B Flow: 820 A→T Flow: 950 P→A Flow: 370 B→T Flow: 940	P→B Flow: 1300 A→T Flow: 1440 P→A Flow: 660 B→T Flow: 1375
	ΔP = 0.5 MPa (per Land)		L/min	P→B Flow: 79 A→T Flow: 89 P→A Flow: 36 B→T Flow: 91	P→B Flow: 219 A→T Flow: 255 P→A Flow: 96 B→T Flow: 249	P→B Flow: 310 A→T Flow: 359 P→A Flow: 140 B→T Flow: 355	P→B Flow: 491 A→T Flow: 544 P→A Flow: 249 B→T Flow: 520
Max. Operating Pressure			MPa	31.5	35	35	31.5
Proof Pres. at Return Port (1)	External Drain	T Port	MPa	21	31.5	35	25
		Y Port	MPa	21 (7)			
	Internal Drain	T & Y Ports	MPa	21 (7)			
DR Port Permissible Back Pressure (2)			MPa	0.05 or less (The valves with the model number "W" have no DR port.)			
Pilot Pressure (3)			MPa	1.5 - 21			
Pilot Flow Rate (4)			L/min	9 (8) or more	20 (17) or more	22 (19) or more	23 (19) or more
Pilot Valve Max. Leakage	Pres.: $P_S = P_P$ = 14 MPa Max. Leakage Viscosity: 32 mm²/s		L/min	0.8 or less	1.2 or less	1.2 or less	
Main Valve Max. Leakage			L/min	0.7 or less	1.1 or less	1.2 or less	
Hysteresis			%	0.1 or less			
Step Response (0 <=> 100 %) Pp = 14 MPa (Typical) (5)			ms	7 (9)	11 (13)	11 (13)	15 (18)
Frequency Response (±25 % Amplitude) Pp = 14 MPa (Typical) (5)			Hz	Gain = -3 dB: 125 (110) Phase = -90° : 110 (100)	Gain = -3 dB: 100 (90) Phase = -90° : 90 (90)	Gain = -3 dB: 100 (90) Phase = -90° : 90 (90)	Gain = -3 dB: 75 (70) Phase = -90° : 70 (75)
Vibration Proof			m/s²	100			
Protection				IP 65			
Ambient Temperature			℃	0 - +50			
Spool Stroke to Stops			mm	±3.5	±5	±5	±7
Spool End Area			cm²	3	7	8	8
Polarity				See the description about I/O signal characteristics on page I-36.			
Linear Motor Specification	Current		A	Max. 2.1			
	Coil Resistance		Ω	9.6 [at 20 ℃]			
Approx. Mass (6)			kg	8.5 〔11〕	14 〔16〕	20 〔24〕	
Electric Connection				6 + PE/11 + PE Connector【EN175201 Part 804】			

Note) (1) Pressure at the return port should be at actual supply pressure or less (to use an external pilot type valve with the size "03" at 21 MPa or more, pressures at the T and Y ports should be 7 MPa or less).
(2) Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.
(3) Supply pressure for the pilot valve should be 1.5 - 21 MPa and should also be 60 % of actual supply pressure or more.
(4) The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.
(5) This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.
(6) A value in brackets indicates the mass of each valve with a fail-safe solenoid operated valve.
(7) For the effective range of the fail-safe function, see page I-60.

Specifications

LSVHG-＊EH-＊-4J-＊-D＊/E＊/F＊

The values in parentheses in the specification table below are applicable to the models "LSVHG-＊EH-＊-＊-＊＊EH-W＊-" (without DR port).

Descriptions \ Model Numbers				LSVHG-03EH-210 -4J-＊-D＊/E＊/F＊	LSVHG-04EH-580 -4J-＊-D＊/E＊/F＊	LSVHG-06EH-820 -4J-＊-D＊/E＊/F＊	LSVHG-06EH-1300 -4J-＊-D＊/E＊/F＊
Spool Type				4J: Open Center A, B & T P→A Flow: 10 % Overlap, B→T Flow: 50 % Underlap P→B Flow: 60 % Overlap, A→T Flow: 5 % Underlap			
Rated Flow (±10%)	ΔP = 3.5 MPa (per Land)		L/min	P→A Flow: 210 B→T Flow: 235 P→B Flow: 95 A→T Flow: 240	P→A Flow: 580 B→T Flow: 675 P→B Flow: 255 A→T Flow: 660	P→A Flow: 820 B→T Flow: 950 P→B Flow: 370 A→T Flow: 940	P→A Flow: 1300 B→T Flow: 1440 P→B Flow: 660 A→T Flow: 1375
	ΔP = 0.5 MPa (per Land)		L/min	P→A Flow: 79 B→T Flow: 89 P→B Flow: 36 A→T Flow: 91	P→A Flow: 219 B→T Flow: 255 P→B Flow: 96 A→T Flow: 249	P→A Flow: 310 B→T Flow: 359 P→B Flow: 140 A→T Flow: 355	P→A Flow: 491 B→T Flow: 544 P→B Flow: 249 A→T Flow: 520
Max. Operating Pressure			MPa	31.5	35	35	31.5
Proof Pres. at Return Port (1)	External Drain	T Port	MPa	21	31.5	35	25
		Y Port	MPa	21 (7)			
	Internal Drain	T & Y Ports	MPa	21 (7)			
DR Port Permissible Back Pressure (2)			MPa	0.05 or less (The valves with the model number "W" have no DR port.)			
Pilot Pressure (3)			MPa	1.5 - 21			
Pilot Flow Rate (4)			L/min	9 (8) or more	20 (17) or more	22 (19) or more	23 (19) or more
Pilot Valve Max. Leakage	Pres.: PS = PP = 14 MPa Max. Leakage Viscosity: 32 mm²/s		L/min	0.8 or less	1.2 or less	1.2 or less	
Main Valve Max. Leakage				0.7 or less	1.1 or less	1.2 or less	
Hysteresis			%	0.1 or less			
Step Response (0 <=> 100 %) Pp = 14 MPa (Typical) (5)			ms	7 (9)	11 (13)	11 (13)	15 (18)
Frequency Response (± 25 % Amplitude) Pp = 14 MPa (Typical) (5)			Hz	Gain = -3 dB: 125 (110) Phase = -90° : 110 (100)	Gain = -3 dB: 100 (90) Phase = -90° : 90 (90)	Gain = -3 dB: 100 (90) Phase = -90° : 90 (90)	Gain = -3 dB: 75 (70) Phase = -90° : 70 (75)
Vibration Proof			m/s^2	100			
Protection				IP 65			
Ambient Temperature			℃	0 - +50			
Spool Stroke to Stops			mm	±3.5	±5	±5	±7
Spool End Area			cm^2	3	7	8	8
Polarity				See the description about I/O signal characteristics on page I-36.			
Linear Motor Specification	Current		A	Max. 2.1			
	Coil Resistance		Ω	9.6 [at 20 ℃]			
Approx. Mass (6)			kg	8.5〔11〕	14〔16〕	20〔24〕	
Electric Connection				6 + PE/11 + PE Connector【EN175201 Part 804】			

Note) (1) Pressure at the return port should be at actual supply pressure or less (to use an external pilot type valve with the size "03" at 21 MPa or more, pressures at the T and Y ports should be 7 MPa or less).
(2) Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.
(3) Supply pressure for the pilot valve should be 1.5 - 21 MPa and should also be 60 % of actual supply pressure or more.
(4) The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.
(5) This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.
(6) A value in brackets indicates the mass of each valve with a fail-safe solenoid operated valve.
(7) For the effective range of the fail-safe function, see page I-60.

Accessories

Mounting Bolts

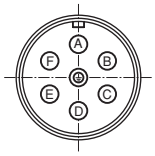
Model Numbers	Mounting Bolt	Qty.	Bolt Tightening Torque
LSVHG-03EH	Hex. Soc. Head Cap Screw : M6×35L	4	12.9 - 15.9 Nm
LSVHG-04EH	Hex. Soc. Head Cap Screw : M6×55L	2	12.9 - 15.9 Nm
	Hex. Soc. Head Cap Screw : M10×60L	4	60.6 - 74.1 Nm
LSVHG-06EH	Hex. Soc. Head Cap Screw : M12×85L	6	104 - 127 Nm
LSVHG-10EH	Hex. Soc. Head Cap Screw : M20×90L	6	493 - 603 Nm

Connector

Model Numbers	Connector	Qty.	Remarks
LSVHG-＊EH-＊-＊1	6 + PE Electrical Plug	1	Compatible with EN 175201 PART 804
LSVHG-＊EH-＊-＊2	11 + PE Electrical Plug	1	

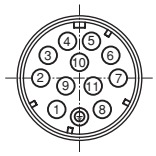
Electrical Specifications

●6 + PE Connector



Pin		Valve Model: LSVHG-＊EH-＊-A1 / LSVHG-＊EH-＊-D1	LSVHG-＊EH-＊-B1 / LSVHG-＊EH-＊-E1	LSVHG-＊EH-＊-C1 / LSVHG-＊EH-＊-F1
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 50 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM（0 V）		
Pin D	Input (+) (Differential)★1	0 - ±10 V Ri = 100 kΩ	4 - 20m A Ri = 200 Ω	0 - ±10 mA Ri = 200 Ω
Pin E	Input (-) (Differential)★1			
Pin F	Spool Travel Monitoring	0 - ±10 V RL ≧ 10 kΩ	4 - 20 mA RL = 100 - 500 Ω★2	0 - ±10 mA RL = 100 - 500 Ω★2
Pin ⏚	Protective Earth	—		

●11 + PE Connector

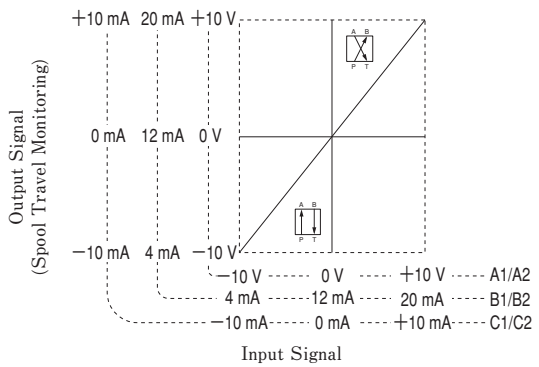


Pin		Valve Model: LSVHG-＊EH-＊-A2 / LSVHG-＊EH-＊-D2	LSVHG-＊EH-＊-B2 / LSVHG-＊EH-＊-E2	LSVHG-＊EH-＊-C2 / LSVHG-＊EH-＊-F2
Pin 1	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 50 VA or more		
Pin 2		0 V		
Pin 3	Enable (Servo ON) Input	Input Current = 3 - 5 mA at 4.8 - 28 V DC		
Pin 4	Input (+) (Differential)★1	0 - ±10 V Ri = 100 kΩ	4 - 20 mA Ri = 200 Ω	0 - ±10 mA Ri = 200 Ω
Pin 5	Input (-) (Differential) ★1			
Pin 6	Spool Travel Monitoring	0 - ±10 V RL ≧ 10 kΩ	4 - 20 mA RL = 100 - 500 Ω★2	0 - ±10 mA RL = 100 - 500 Ω★2
Pin 7	Signal Common	COM（0 V）		
Pin 8	Valve Ready Output	Open Collector Output Voltage: Max. 30 V, Current: Max. 20 mA		
Pin 9★3	Power Supply (For Solenoid Operated Valve)	24 V DC (21.6 - 26.4 V DC Included Ripple), 14 VA (Holding Current: 0.6 A)		
Pin 10★3		0 V		
Pin 11	Alarm Output	Open Collector Output Voltage: Max. 30 V, Current: Max. 20 mA		
Pin ⏚	Protective Earth	—		

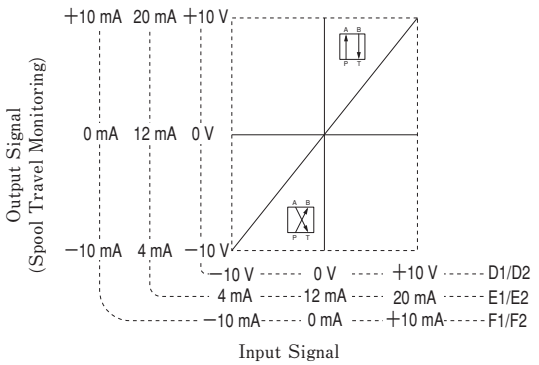
★1. Differential input signals can be used only for the valves with the voltage signal specifications of ±10 V (LSVHG-＊EH-A＊/D＊).
★2. The recommended load resistance is 200 Ω.
★3. Pins 9 and 10 are used only for the valves with a fail-safe solenoid operated valve. In this case, use a separate power source for the solenoid operated valve from the power source for the amplifier (Pins 1 and 2).

●I/O Signal Characteristics

・LSVHG-＊EH-＊-A＊/B＊/C＊

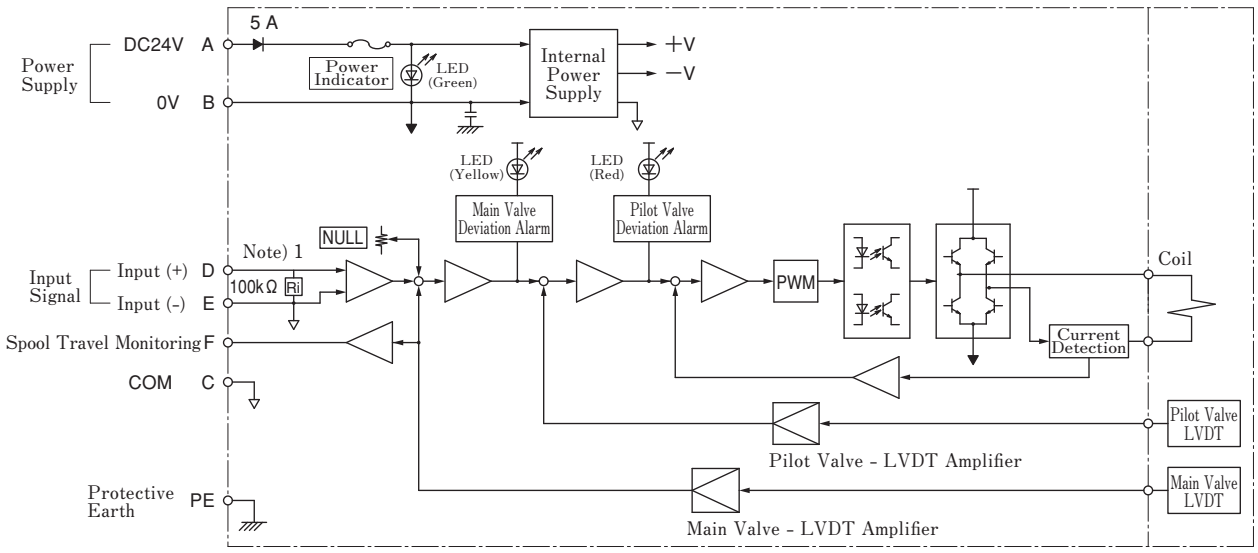


・LSVHG-＊EH-＊-D＊/E＊/F＊

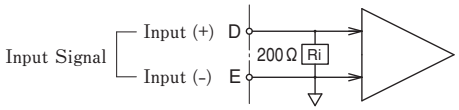


Block Diagram

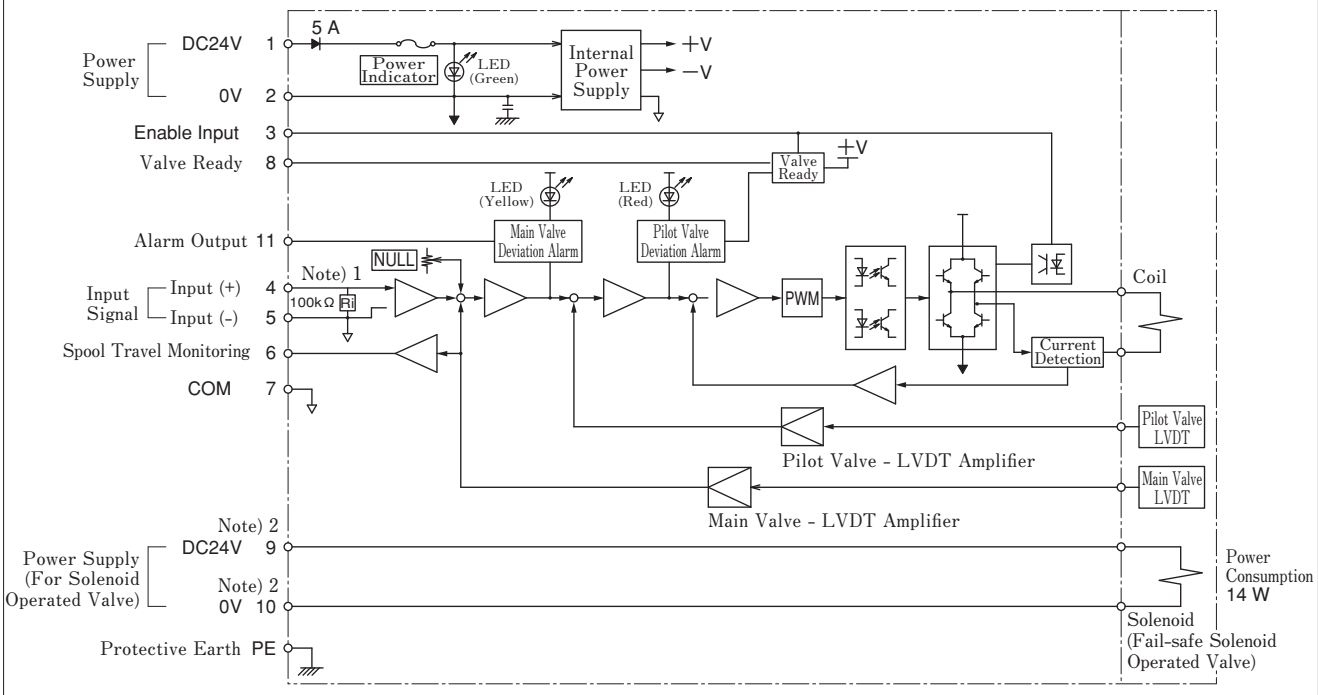
LSVHG-＊EH-＊-＊-A1/D1 (6 + PE Connector)



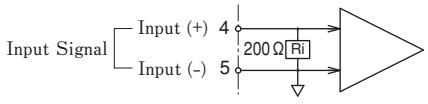
Note) 1. The input stage for the models LSVHS-＊EH-＊-＊-B1/C1/E1/F1 (current signal) is as follows.



LSVHG-＊EH-＊-＊-A2/D2 (11 + PE Connector)



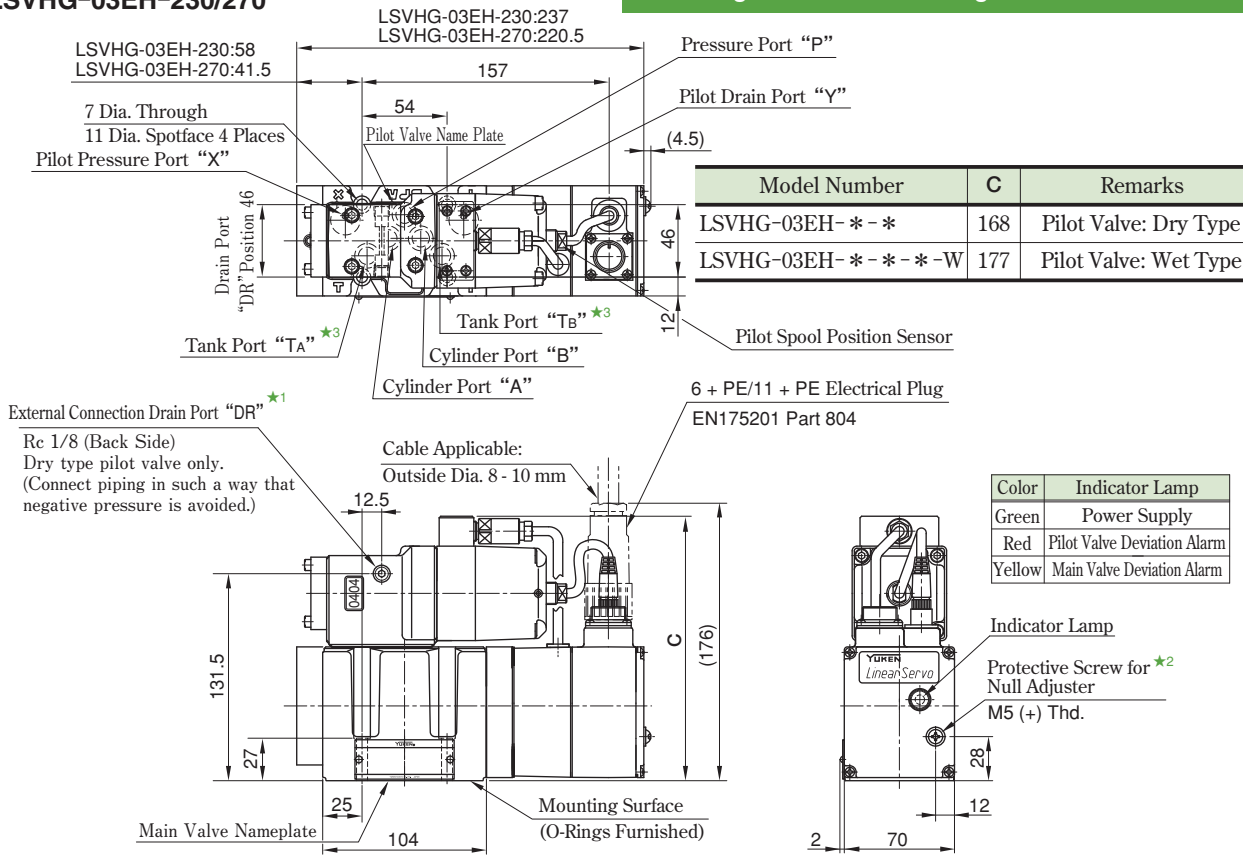
Note) 1. The input stage for the models LSVHG-＊EH-＊-＊-B2/C2/E2/F2 (current signal) is as follows.



2. Pins 9 and 10 are used only for the models LSVHG-＊EH-＊-＊-＊E＊ with a fail-safe solenoid operated valve.

LSVHG-03EH-230/270

Mounting Surface: Conforming to ISO 4401-05-05-0-05

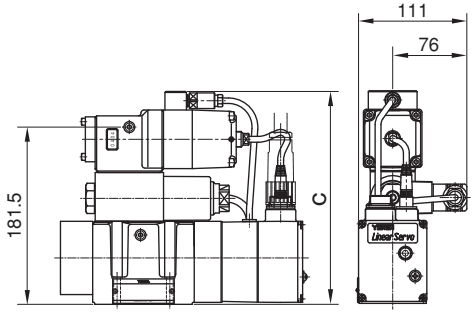


Model Number	C	Remarks
LSVHG-03EH-＊-＊	168	Pilot Valve: Dry Type
LSVHG-03EH-＊-＊-＊-W	177	Pilot Valve: Wet Type

Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

★1. The external connection drain port "DR" on the front side is usually plugged. To use the port on the front side, remove the hexagon socket head plug (5 Hex.) and plug the port on the back side.
★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

LSVHG-03EH-230/270-＊-＊EA/EB/EC
(With Fail-safe Solenoid Operated Valve)



Model Numbers	C	Remarks
LSVHG-03EH-＊-＊-E＊	218	Pilot Valve: Dry Type
LSVHG-03EH-＊-＊-WE＊	227	Pilot Valve: Wet Type

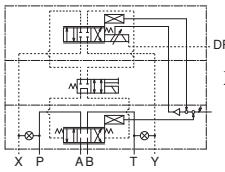
●For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

● O-Rings for the Ports

Port	O-Ring Size	Qty.
P, A, B, T	AS568-014 (NBR-90)	5
X, Y	AS568-016 (NBR-90)	2

O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

Detailed Graphic Symbol

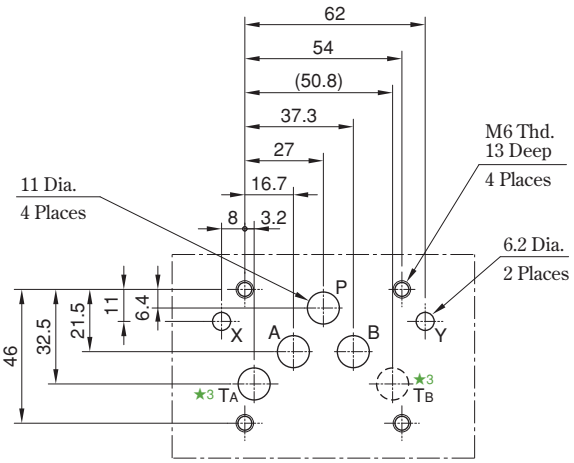


Note) The configuration in the shaded area varies with the selected spool type (corresponding to Graphic Symbols on page I-31).

⊗: Plugs for selecting the pilot and drain types

【Dimensions of Mounting Surface】

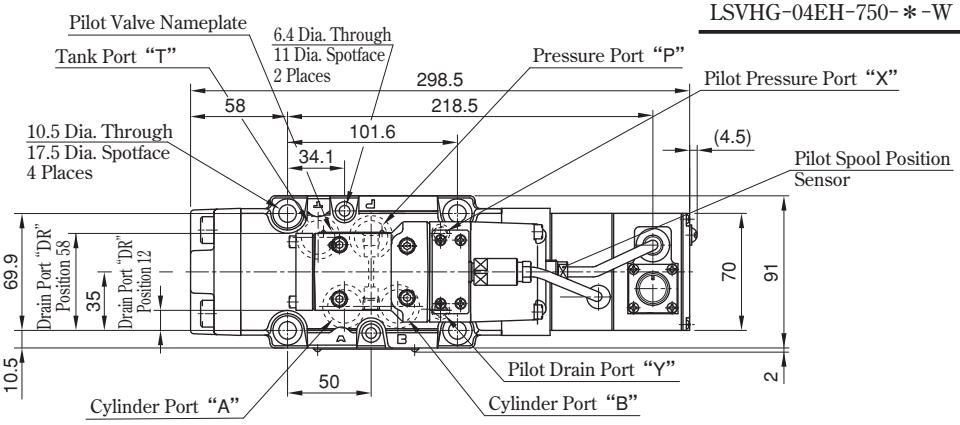
Prepare a mounting surface shown below. Basically, the dimensions of the mounting surface conform to ISO 4401-05-05-0-05. The mounting surface should have a good machined finish. (1.6▽)

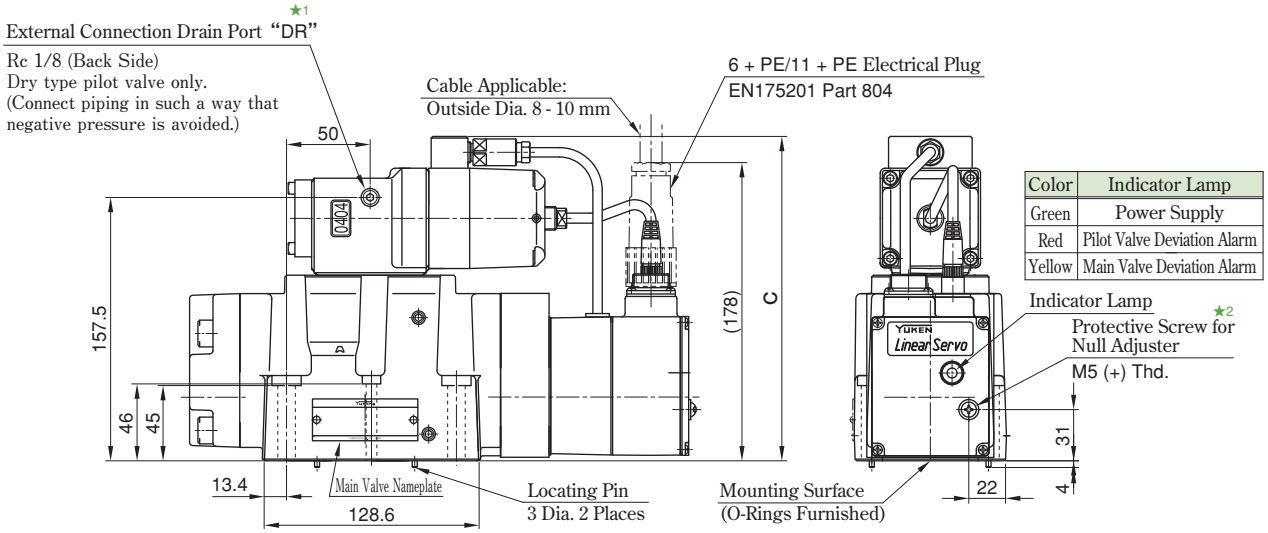


★3.There are two tank ports "TA" and "TB" ; however, "TA" may be used alone.

LSVHG-04EH-750

Model Numbers	C	Remarks
LSVHG-04EH-750-＊	194	Pilot Valve: Dry Type
LSVHG-04EH-750-＊-W	203	Pilot Valve: Wet Type

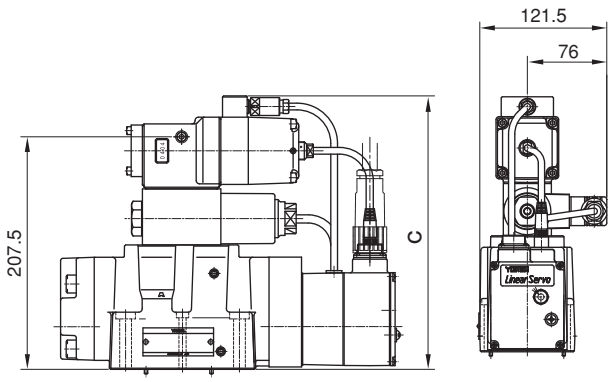




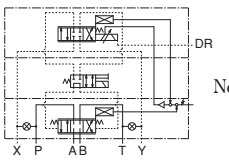
Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

★1. The external connection drain port "DR" on the front side is usually plugged. To use the port on the front side, remove the hexagon socket head plug (5 Hex.) and plug the port on the back side.
★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

LSVHG-04EH-750-＊-＊EA/EB/EC (With Fail-safe Solenoid Operated Valve)



Detailed Graphic Symbol



Note) The configuration in the shaded area varies with the selected spool type (corresponding to Graphic Symbols on page I-31).

⊗: Plugs for selecting the pilot and drain types

Model Numbers	C	Remarks
LSVHG-04EH-750-＊-E＊	244	Pilot Valve: Dry Type
LSVHG-04EH-750-＊-WE＊	253	Pilot Valve: Wet Type

●For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

● O-Rings for the Ports

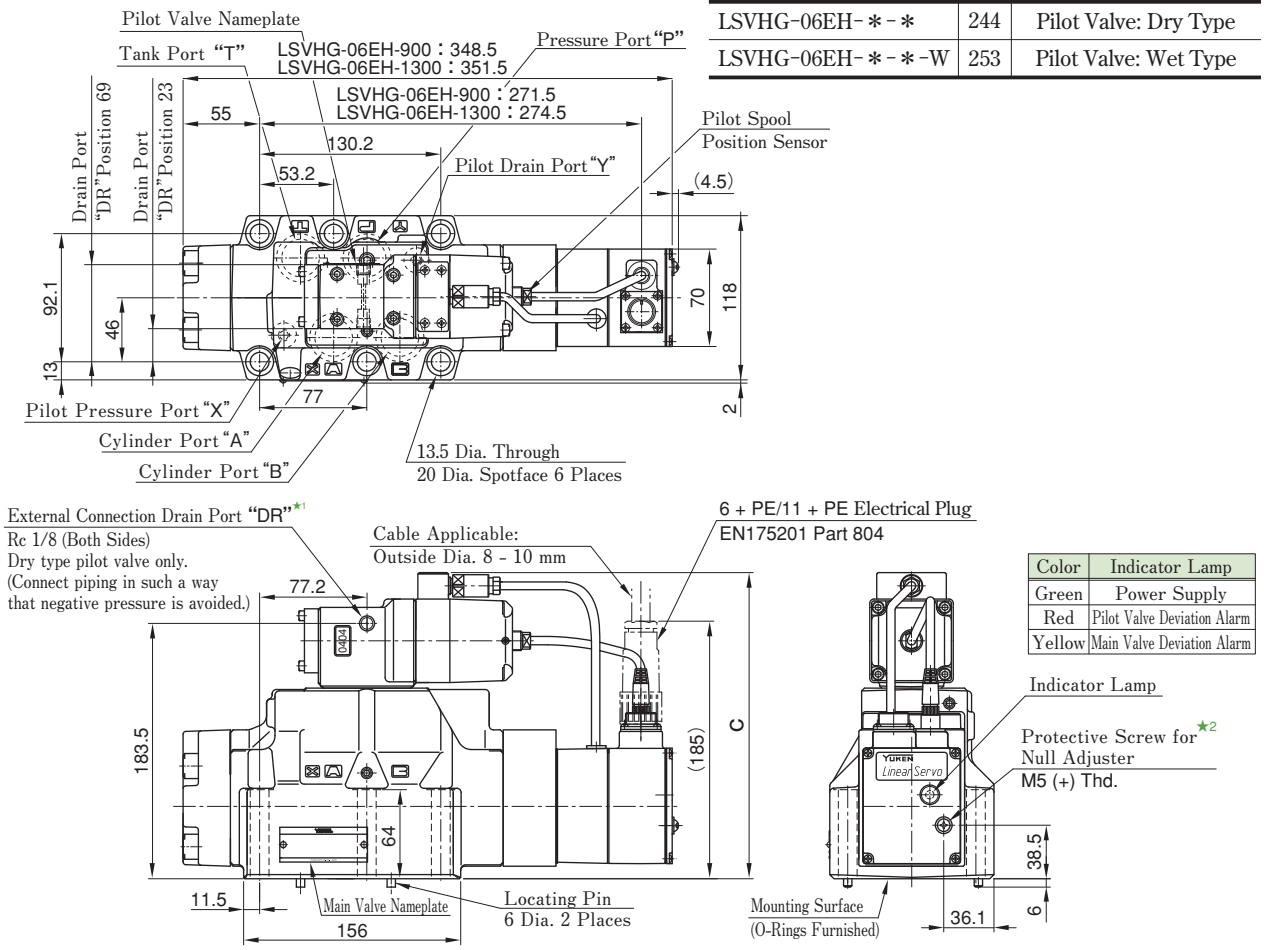
Port	O-Ring Size	Qty.
P, A, B, T	OR NBR-90 P22-N	4
X, Y	AS568-012 (NBR-90)	2

O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

【Dimensions of Mounting Surface】
The dimensions of the mounting surface are the same as those of the models LSVHG-04 (page I-12).

LSVHG-06EH-900/1300

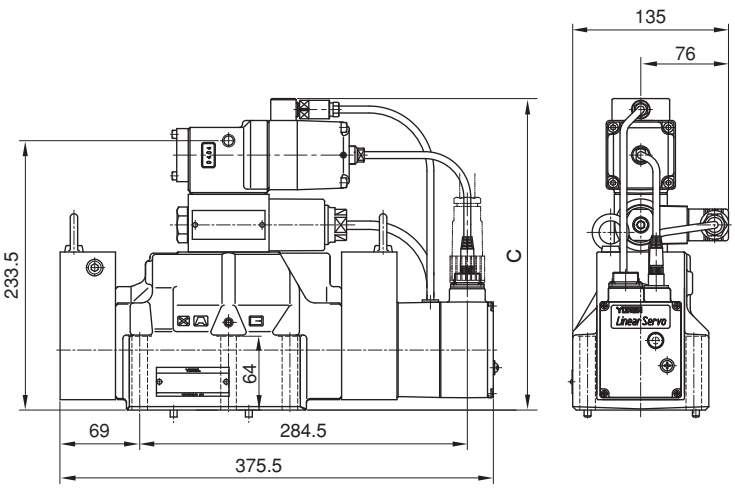
Model Numbers	C	Remarks
LSVHG-06EH-＊-＊	244	Pilot Valve: Dry Type
LSVHG-06EH-＊-＊-W	253	Pilot Valve: Wet Type



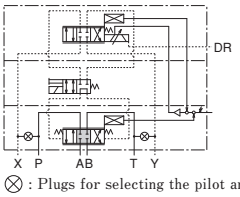
Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

★1. The external connection drain port "DR" on the back side is usually plugged. To use the port on the back side, remove the hexagon socket head plug (Hex. 5) and plug the port on the front side.
★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

LSVHG-06EH-900/1300-＊-＊EA/EB/EC (With Fail-safe Solenoid Operated Valve)



Detailed Graphic Symbol



⊗ : Plugs for selecting the pilot and drain types

Note) The configuration in the shaded area varies with the selected spool type (corresponding to Graphic Symbols on page I-31).

Model Numbers	C	Remarks
LSVHG-06EH-＊-＊-E＊	270	Pilot Valve: Dry Type
LSVHG-06EH-＊-＊-WE＊	279	Pilot Valve: Wet Type

●For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

● O-Rings for the Ports

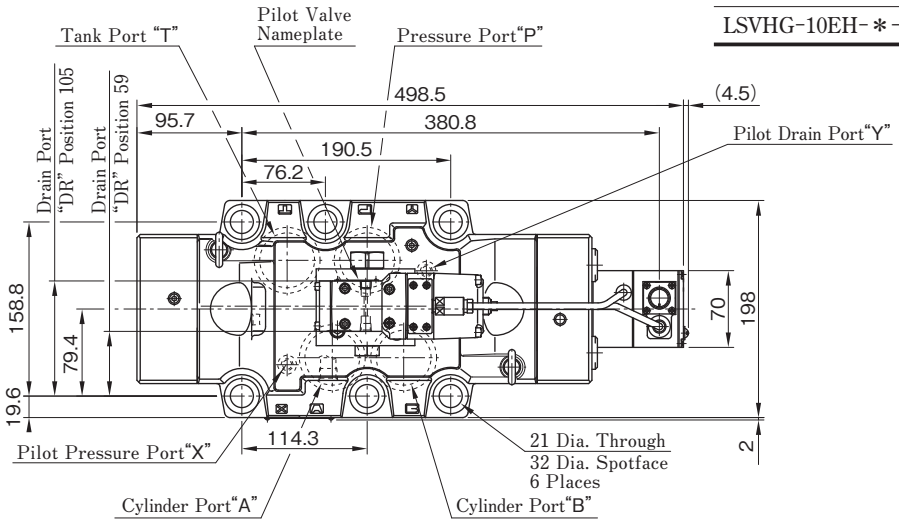
Port	O-Ring Size		Qty.
	LSVHG-06EH-900	LSVHG-06EH-1300	
P, A, B, T	AS568-123 (NBR-90)	AS568-126 (NBR-90)	4
X, Y	OR NBR-90 P14-N		2

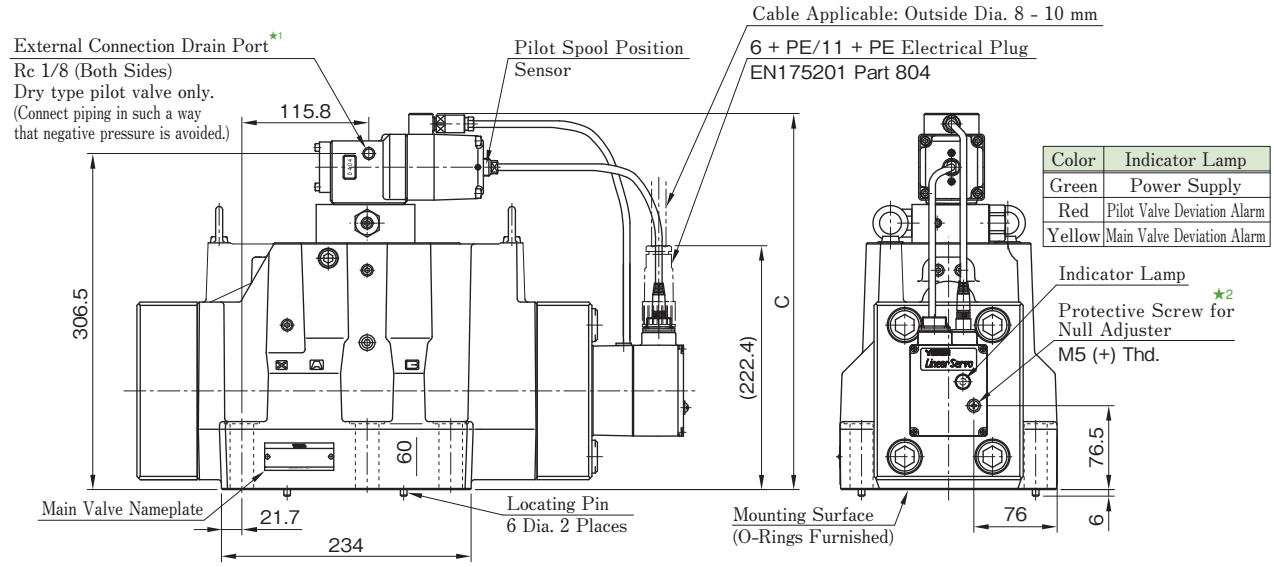
O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

【Dimensions of Mounting Surface】
The dimensions of the mounting surface are the same as those of the models LSVHG-06 (page I-13).

LSVHG-10EH-3800

Model Numbers	C	Remarks
LSVHG-10EH-＊-＊	343	Pilot Valve: Dry Type
LSVHG-10EH-＊-＊-W	352	Pilot Valve: Wet Type





Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

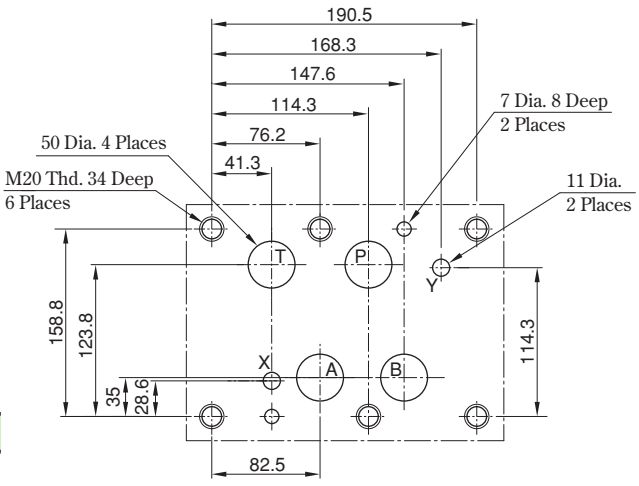
★1. The external connection drain port "DR" on the back side is usually plugged. To use the port on the back side, remove the hexagon socket head plug (Hex. 5) and plug the port on the front side.
★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

【Dimensions of Mounting Surface】

The dimention of the mounting surface can be fitted with ISO standard.
However, the hole dia. of P,A,B,T are different with those.
Please see mounting surface as shown right.

	ISO 4401-10-08-0-94	Mounting Surface for LSVHG-10EH
Hole dia. Of P,A,B,T port.	36 Dia.	50 Dia.

The mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)



● O-Rings for the Ports

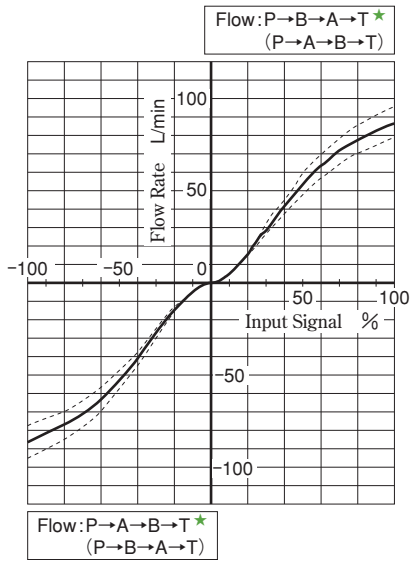
Port	O-Ring Size	Qty.
P, A, B, T	AS568-227 (NBR-90)	4
X, Y	AS568-015 (NBR-90)	2

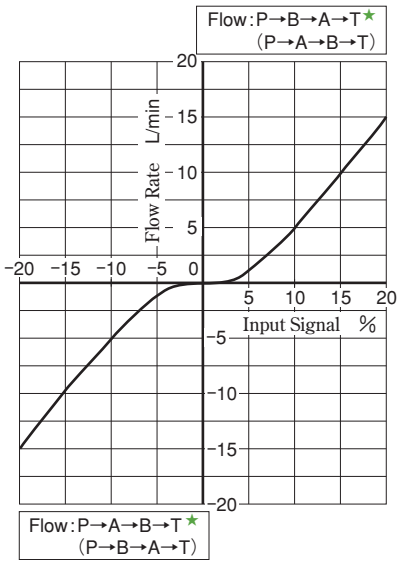
O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

Characteristics of LSVHG-03EH-230 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

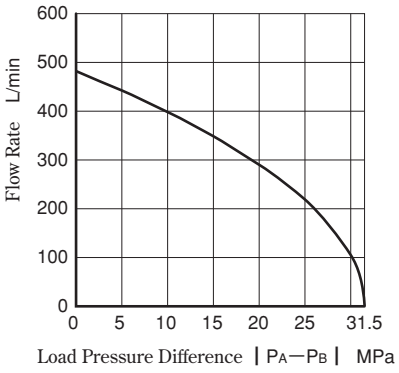
〈Conditions〉 ●Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)
Around Null Position Input Signal −20 ⇔ +20 %





Load Flow Characteristics

〈Conditions〉
●Input Signal : 100 %
Note) Tolerance for Load Flow : ±10 %

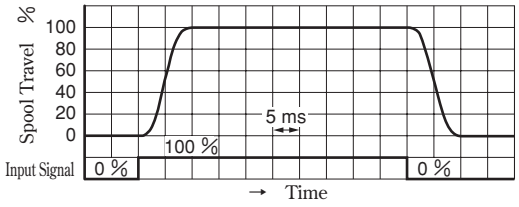


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

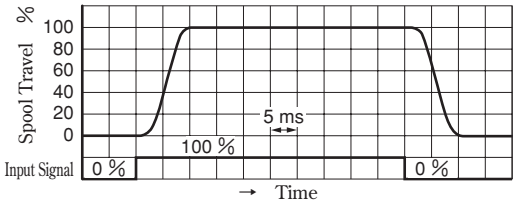
Step Response

〈Conditions〉 ●Input Signal : 0 ⇔ 100 % ●Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



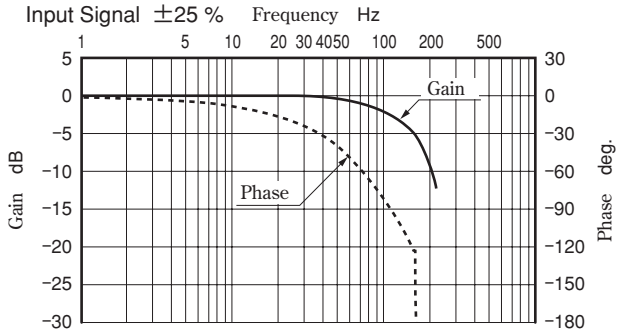
● Pilot Valve: Wet Type

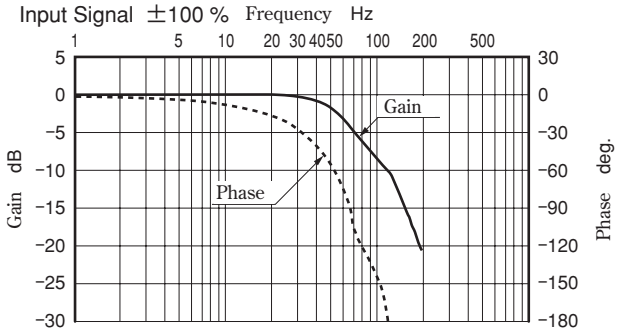


Frequency Response

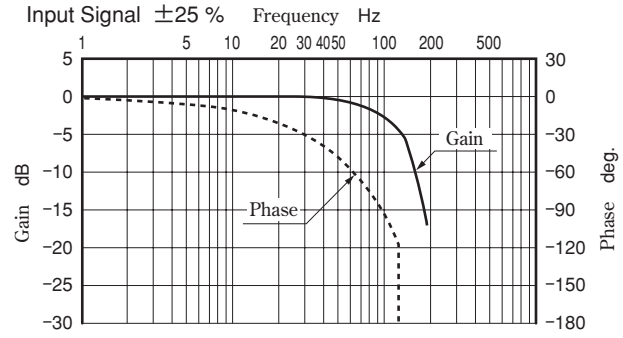
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure : 14 MPa

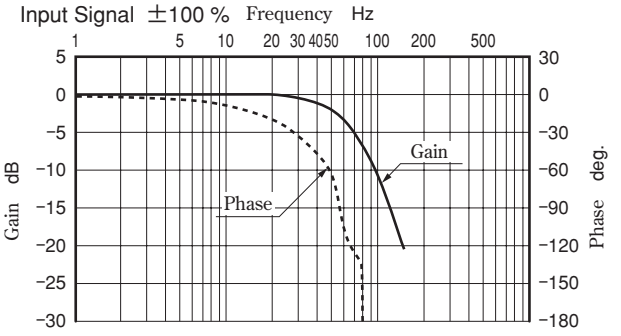
● Pilot Valve: Dry Type





● Pilot Valve: Wet Type



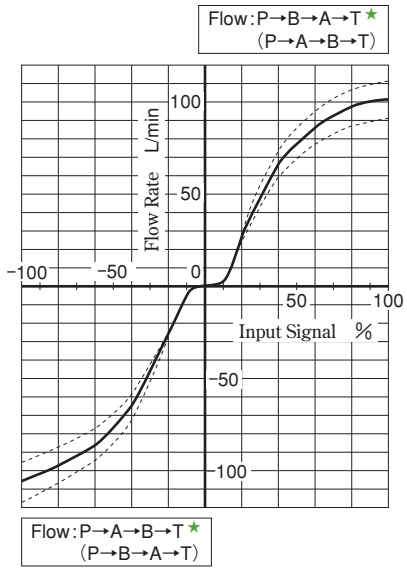


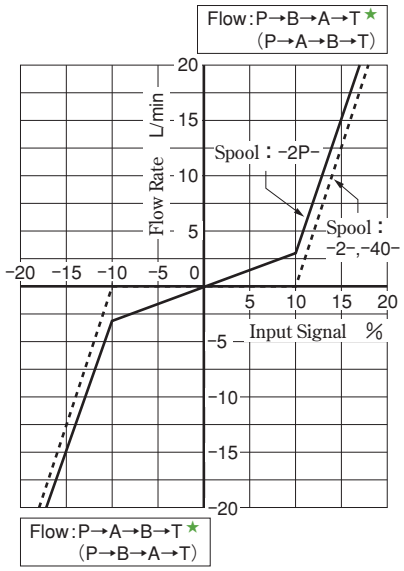
Characteristics of LSVHG-03EH-270-2/40/2P (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)

Around Null Position Input Signal −20 ⇔ +20 %



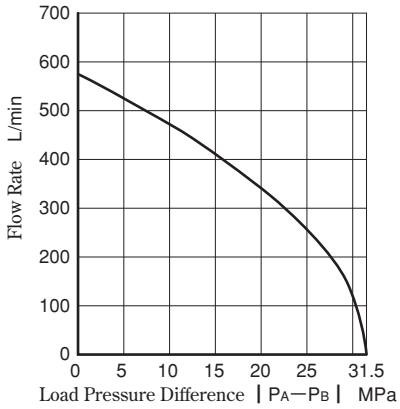


Load Flow Characteristics

〈Conditions〉

●Input Signal : 100 %

Note) Tolerance for Load Flow : ±10 %

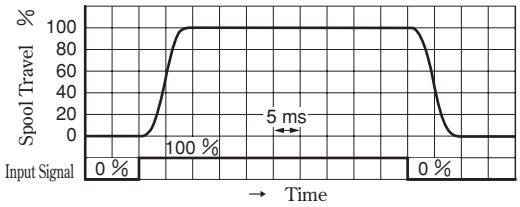


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

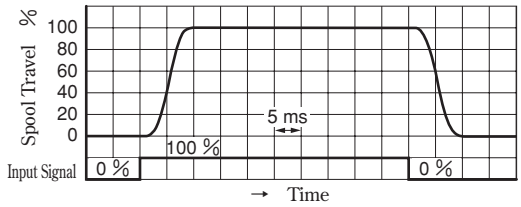
Step Response

〈Conditions〉 ●Input Signal : 0 ⇔ 100 % ●Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



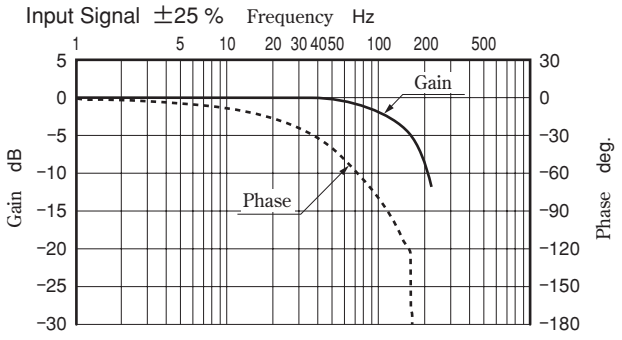
● Pilot Valve: Wet Type

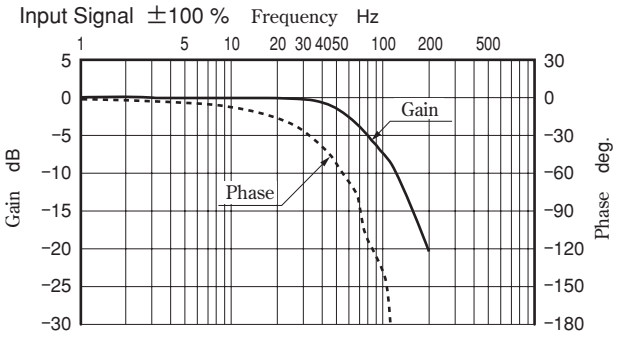


Frequency Response

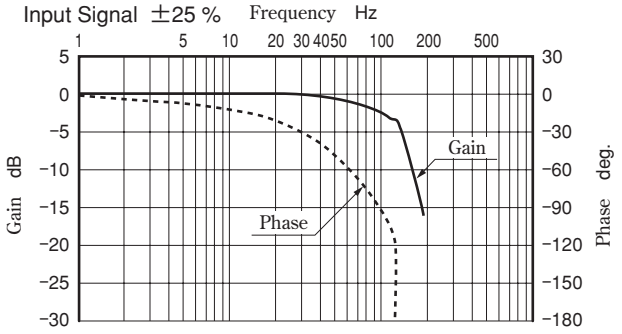
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure : 14 MPa

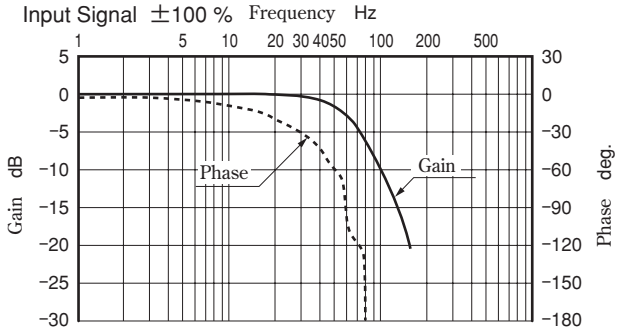
● Pilot Valve: Dry Type





● Pilot Valve: Wet Type

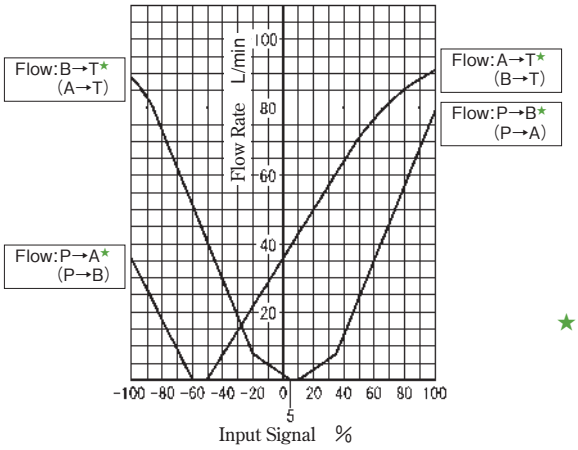




Characteristics of LSVHG-03EH-210-4J (Fluid Viscosity: 30 mm^2/s)

No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: ΔP = 0.5 MPa (per Land)

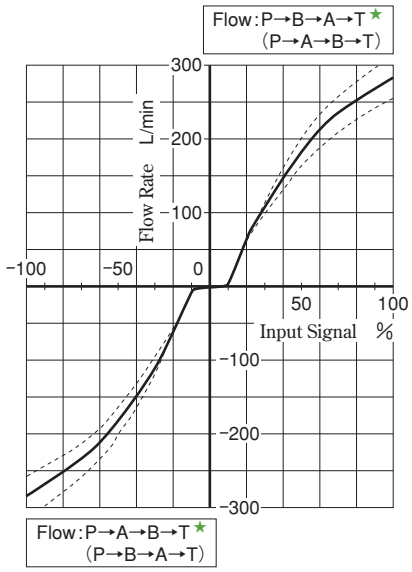


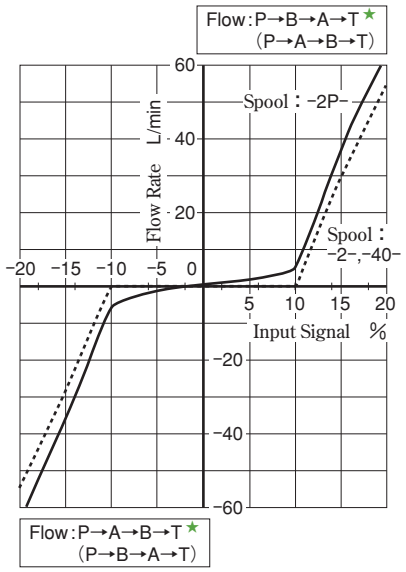
★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-04EH-750-2/40/2P (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

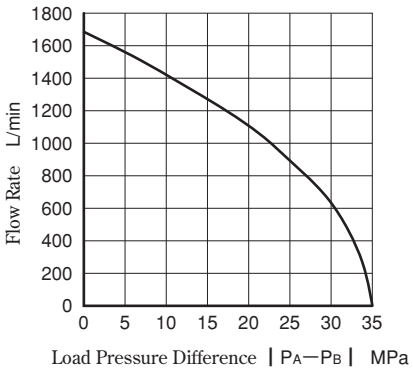
〈Conditions〉 ●Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)
Around Null Position Input Signal −20 ⇔ +20 %





Load Flow Characteristics

〈Conditions〉
●Input Signal : 100 %
Note) Tolerance for Load Flow : ±10 %

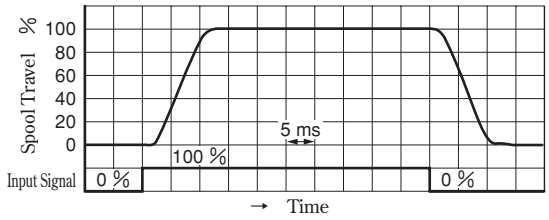


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

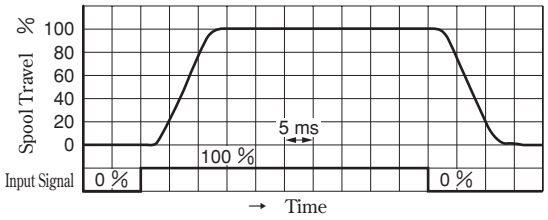
Step Response

〈Conditions〉 ●Input Signal : 0 ⇔ 100 % ●Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



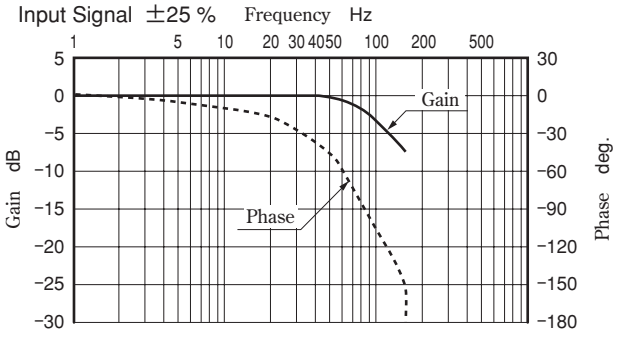
● Pilot Valve: Wet Type

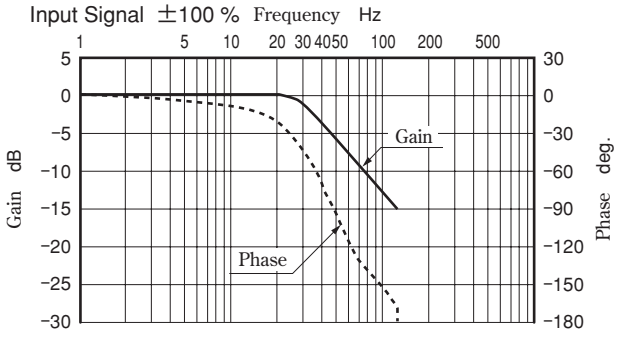


Frequency Response

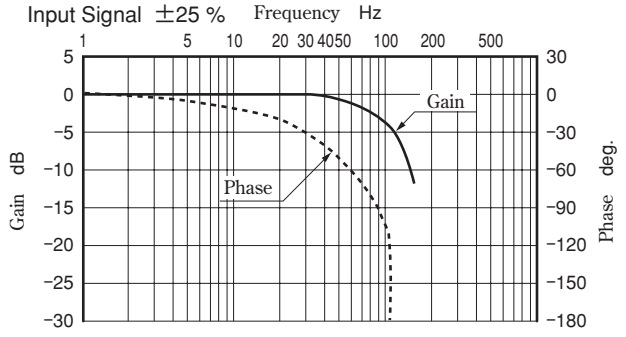
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure : 14 MPa

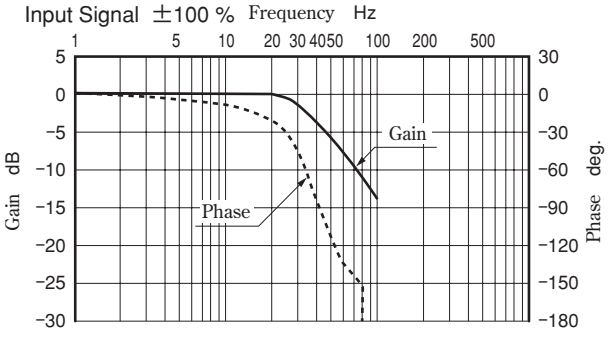
● Pilot Valve: Dry Type





● Pilot Valve: Wet Type





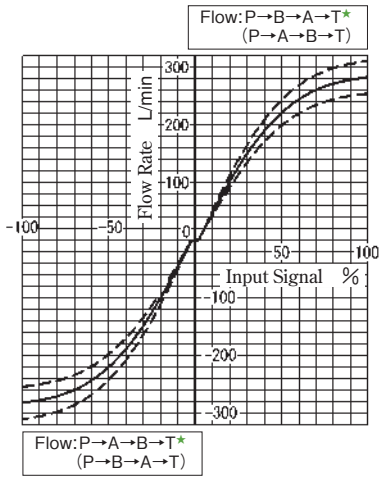
Characteristics of LSVHG-04EH-750-2L (Fluid Viscosity: 30 mm²/s)

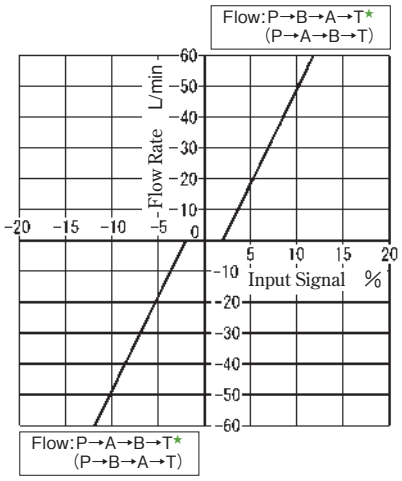
No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: ΔP = 1 MPa (4-Way Valve) (Pressure Difference per Land: 0.5 MPa)

The load flow characteristics, step response, and frequency response are the same as those of the spool types "2", "40", and "2P".

Around Null Position Input Signal −20 ⇔ +20 %



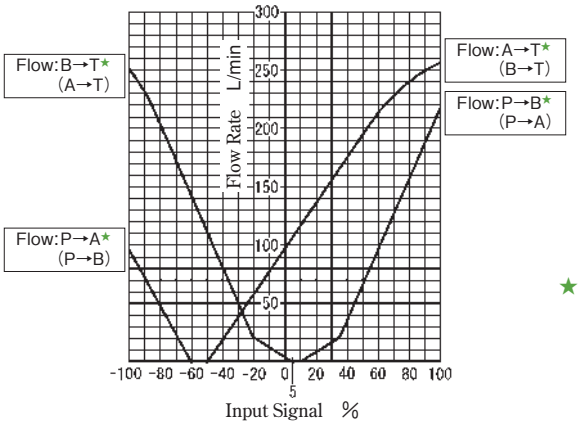


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-04EH-580-4J (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: ΔP = 0.5 MPa (per Land)

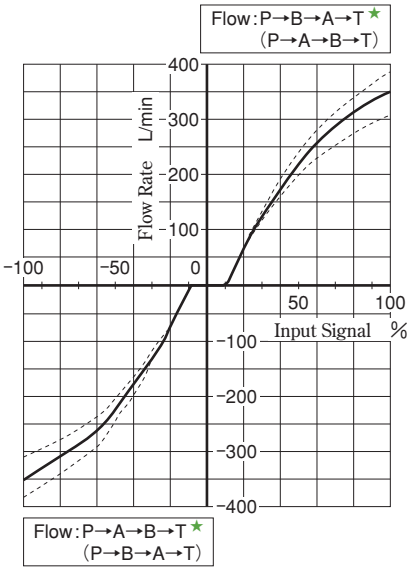


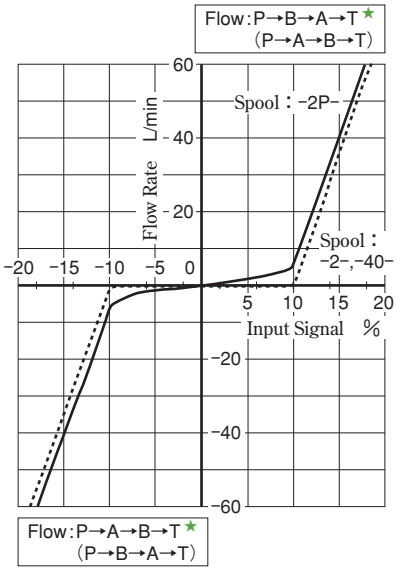
★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-06EH-900-2/40/2P (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

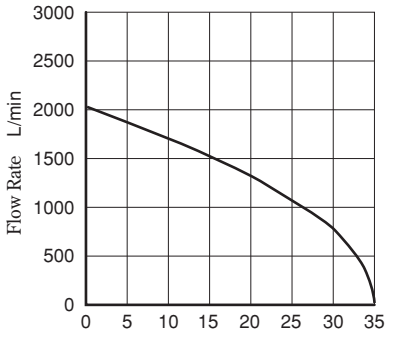
〈Conditions〉 ●Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)
Around Null Position Input Signal −20 ⇔ +20 %





Load Flow Characteristics

〈Conditions〉
●Input Signal : 100 %
Note) Tolerance for Load Flow : ±10 %

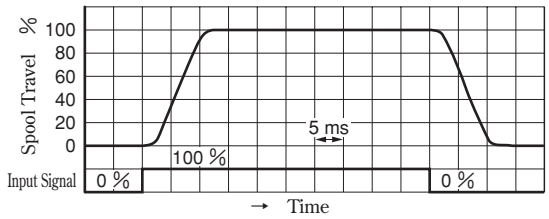


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

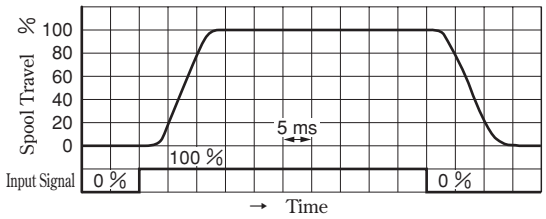
Step Response

〈Conditions〉 ●Input Signal : 0 ⇔ 100 % ●Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



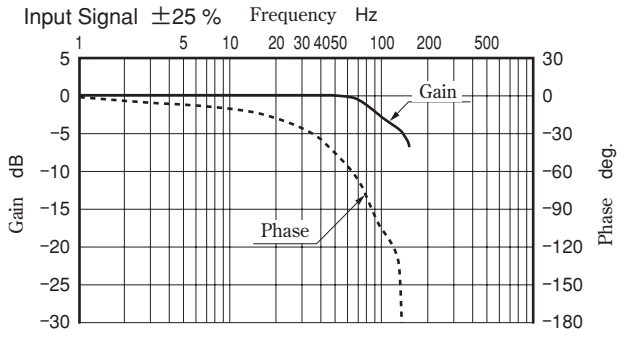
● Pilot Valve: Wet Type

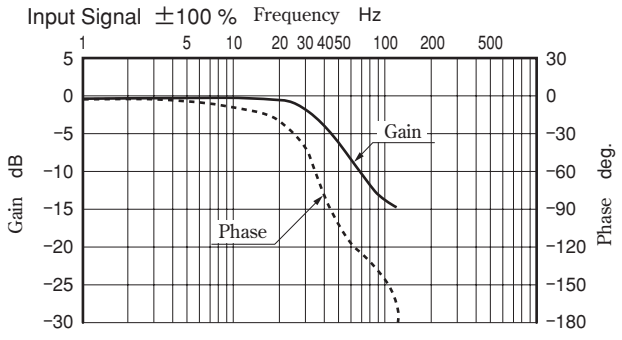


Frequency Response

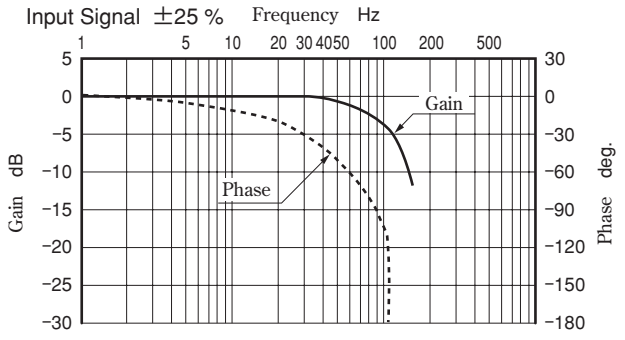
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure : 14 MPa

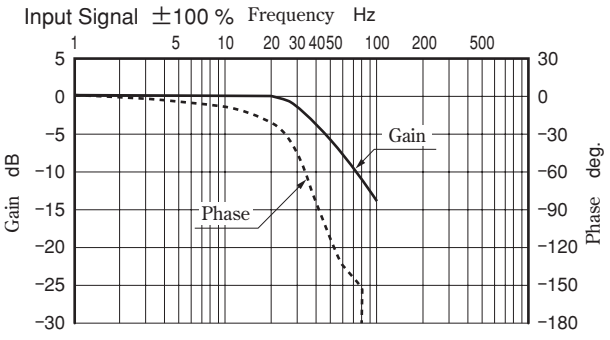
● Pilot Valve: Dry Type





● Pilot Valve: Wet Type

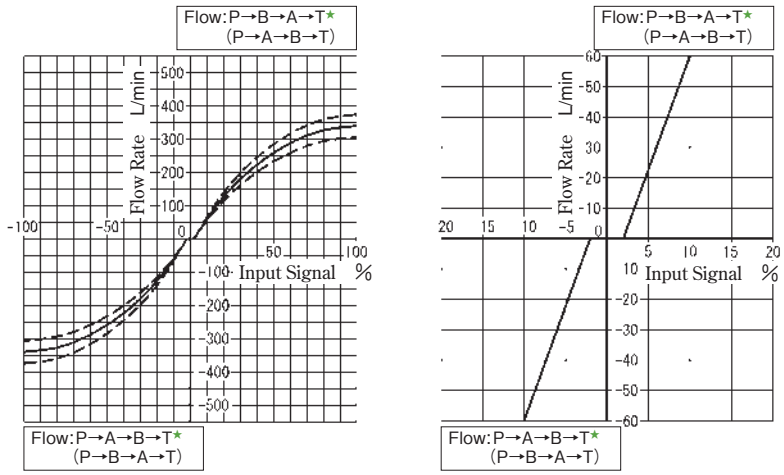




Characteristics of LSVHG-06EH-900-2L (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics 〈Conditions〉 ●Valve Pressure Difference: ΔP = 1 MPa (4-Way Valve) (Pressure Difference per Land: 0.5 MPa)

Around Null Position Input Signal −20 ⇔ +20 %



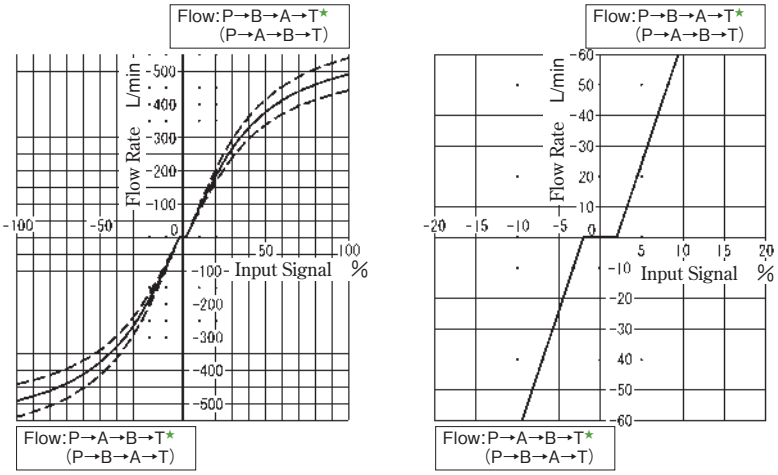
The load flow characteristics, step response, and frequency response are the same as those of the spool types "2", "40", and "2P".

★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-06EH-1300-2L (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics 〈Conditions〉 ●Valve Pressure Difference: ΔP = 1 MPa (4-Way Valve) (Pressure Difference per Land: 0.5 MPa)

Around Null Position Input Signal −20 ⇔ +20 %



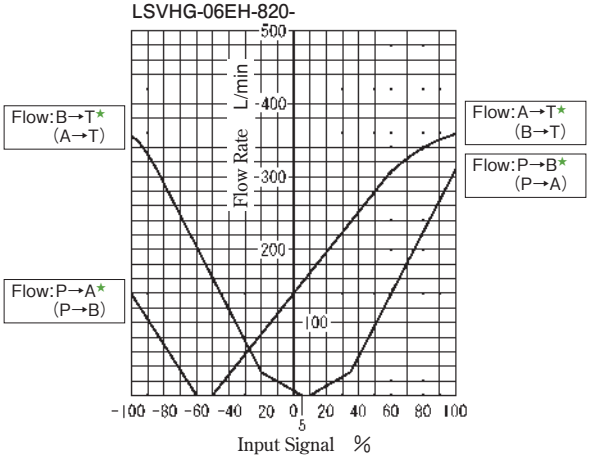
The load flow characteristics, step response, and frequency response are the same as those of the spool types "2", "40", and "2P".

★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

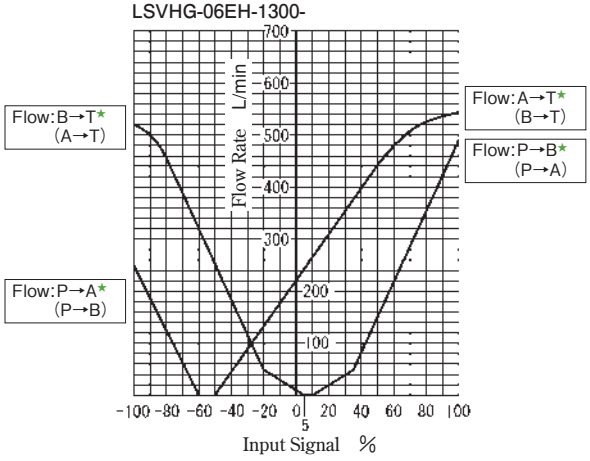
Characteristics of LSVHG-06EH-820/1300-4J (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics 〈Conditions〉 ●Valve Pressure Difference: ΔP = 0.5 MPa (per Land)

LSVHG-06EH-820-



LSVHG-06EH-1300-

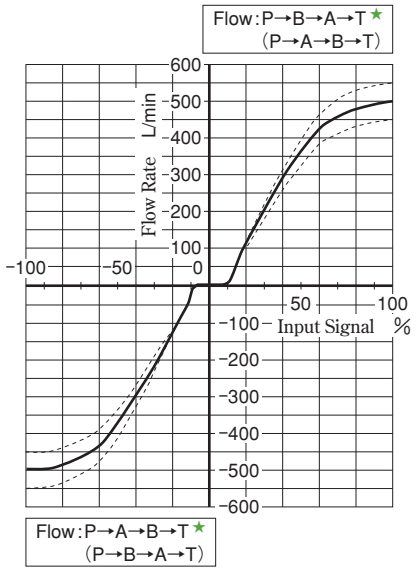


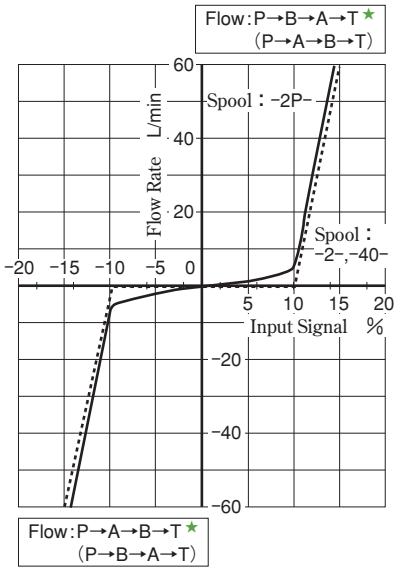
★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-06EH-1300-2/40/2P (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

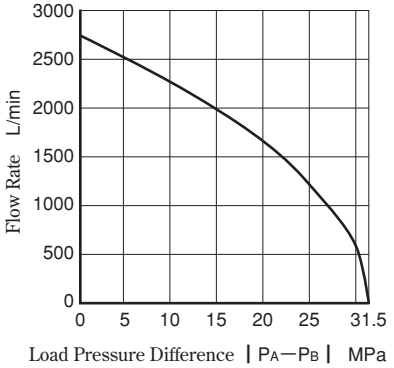
〈Conditions〉 ●Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)
Around Null Position Input Signal −20 ⇔ +20 %





Load Flow Characteristics

〈Conditions〉
●Input Signal：100 %
Note) Tolerance for Load Flow：±10 %

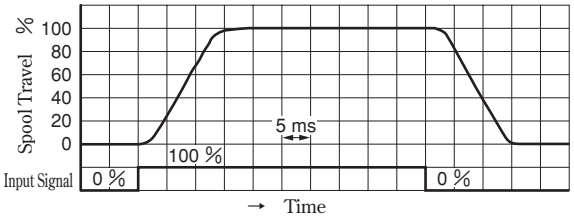


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

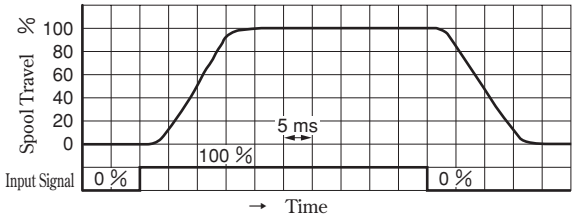
Step Response

〈Conditions〉 ●Input Signal：0 ⇔ 100 % ●Supply/Pilot Pressure：14 MPa

● Pilot Valve: Dry Type



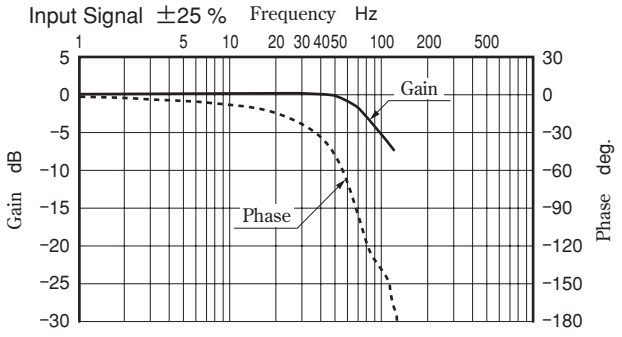
● Pilot Valve: Wet Type

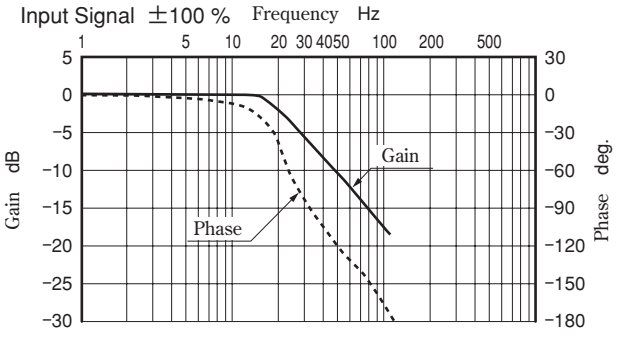


Frequency Response

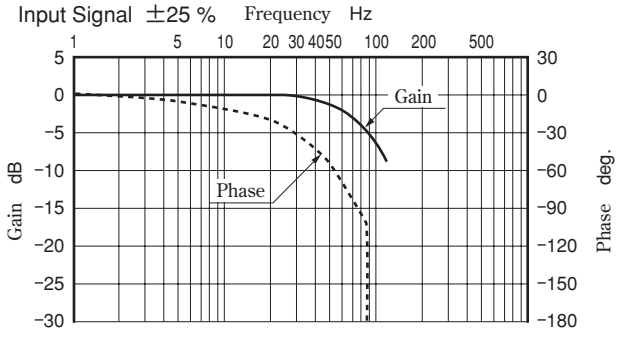
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure：14 MPa

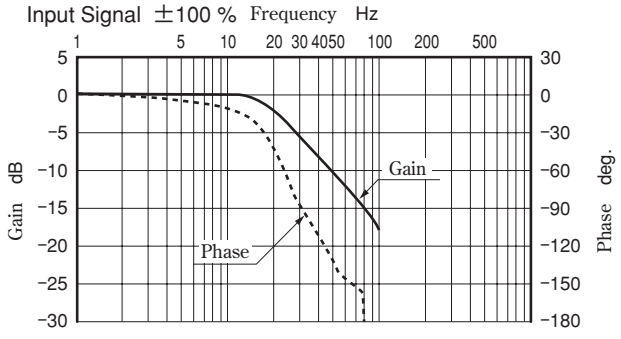
● Pilot Valve: Dry Type





● Pilot Valve: Wet Type

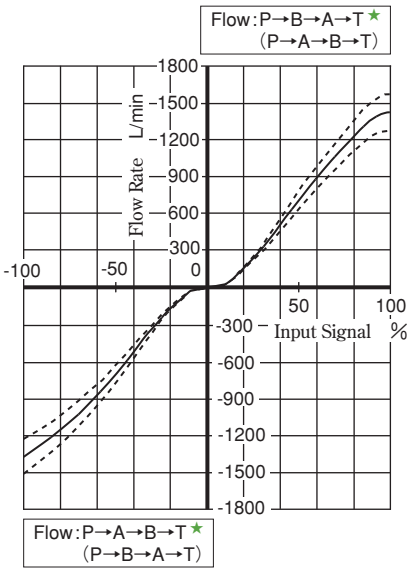


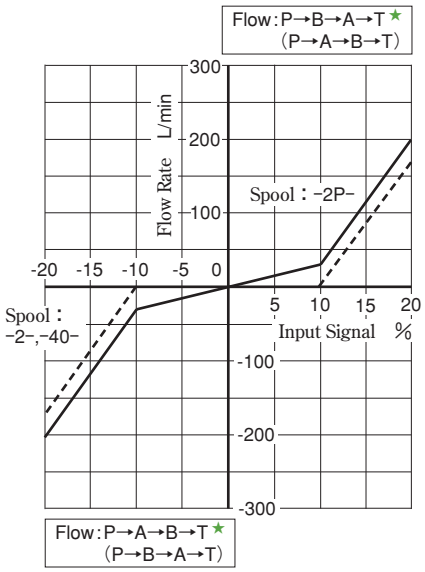


Characteristics of LSVHG-10EH-3800-2/40/2P (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

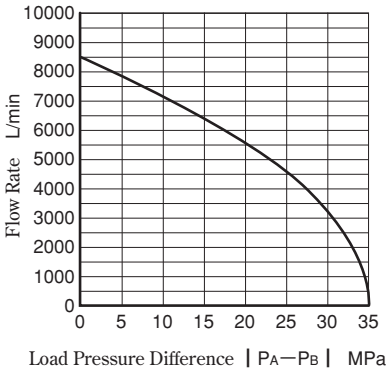
〈Conditions〉 ●Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)
Around Null Position Input Signal−20 ⇔ +20 %





Load Flow Characteristics

〈Conditions〉
●Input Signal：100 %
Note) Tolerance for Load Flow：±10 %

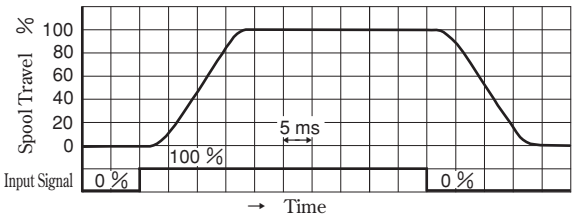


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

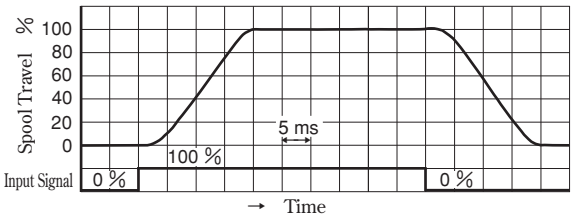
Step Response

〈Conditions〉 ●Input Signal：0 ⇔ 100 % ●Supply/Pilot Pressure：14 MPa

● Pilot Valve: Dry Type



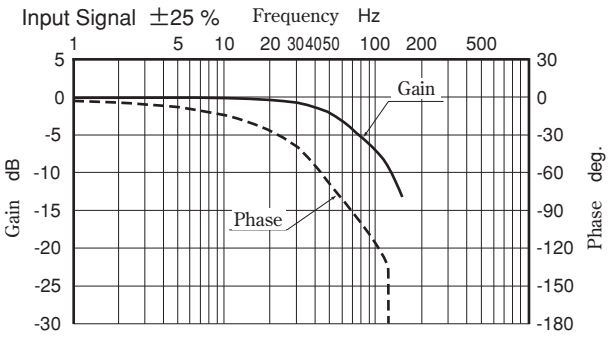
● Pilot Valve: Wet Type

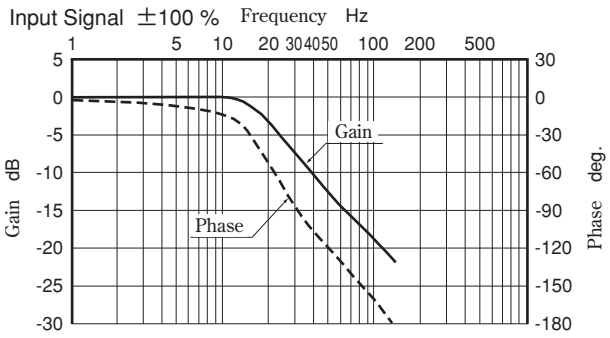


Frequency Response

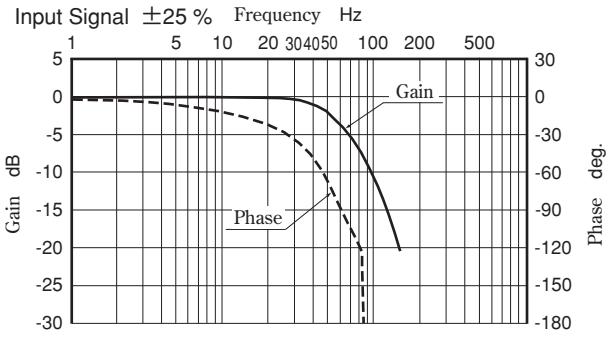
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure：14 MPa

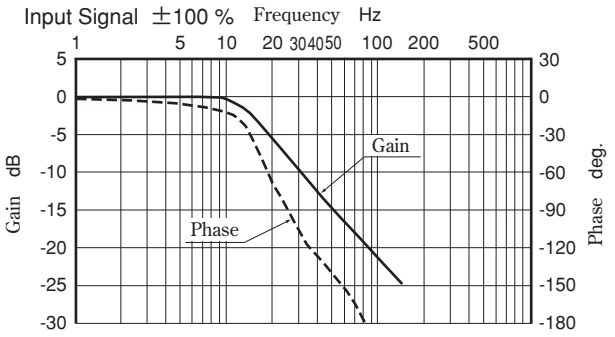
● Pilot Valve: Dry Type





● Pilot Valve: Wet Type



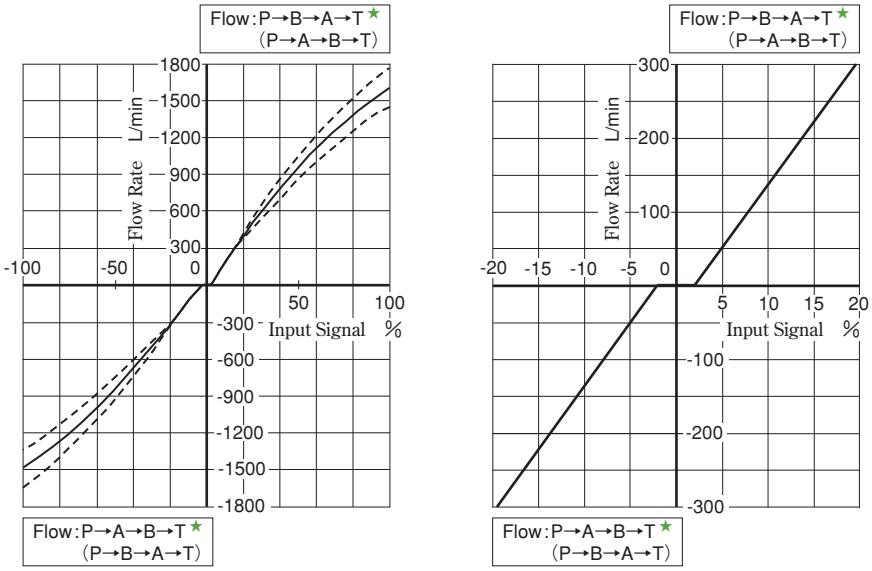


Characteristics of LSVHG-10EH-3800-2L (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: ΔP = 1 MPa (4-Way Valve) (Pressure Difference per Land: 0.5 MPa)

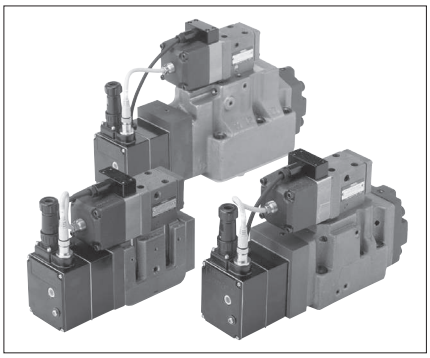
Around Null Position Input Signal −20 ⇔ +20 %

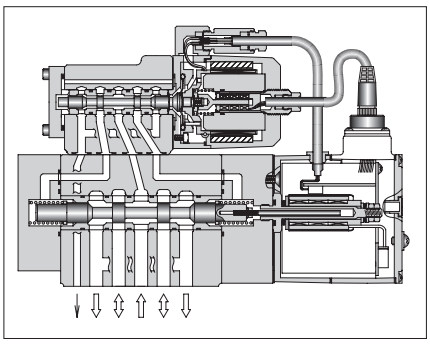


The load flow characteristics, step response, and frequency response are the same as those of the spool types "2", "40", and "2P".

★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

OBE (On-Board Electronics) type Linear Servo Valves (High Performance Type)





On-board electronics (OBE) type linear servo valves (high performance type) are produced for achieving higher accuracy and durability by incorporating a sleeve in the main stage of the OBE type linear servo valves (standard type), which have been well accepted for their "high accuracy, easiness to use, and great usability".
Since the spool and the sleeve are processed to fit well and properly keep 1% overlap between one another, they are suited to be used for a system requiring high accuracy and durability.

●High accuracy

As is the case with the standard type valves, all of the OBE type linear servo valves (high performance type) have a low hysteresis of 0.1 % or less, realizing high accuracy. These valves allow the main unit to operate with much higher repeatability.

●High response characteristics

Compared to other equivalent models, these valves provide higher levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 7 ms (0 <=> 100 %)★, and the frequency response is 110 Hz/-3 dB (± 25 % amplitude)★. (★ : Representative values for LSVHG-03EH-＊-S＊)

●Easiness to use

These valves can offer high accuracy for hydraulic control systems just with 24 V DC power supply and command signal input.
Six types of input signals in three input voltage/current ranges are available: 0 - ±10 V, 0 - ±10 mA, and 4 - 20 mA.

●Great usability

The small amplifier in the valves has a fault indicator lamp. This lamp indicates an error when valve failure causes any deviation between the spool position commanded by the signal and the actual spool position. It facilitates you to immediately troubleshoot the failure of the valves, if any.

●Excellent contamination resistance

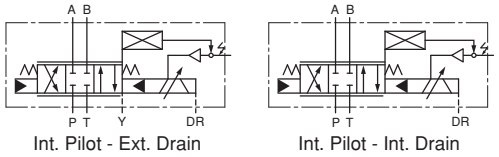
As is the case with the high speed linear servo valves, the OBE type linear servo valves have a simple pilot valve structure, exhibiting excellent contamination resistance. The permissible level of fluid contamination for these valves is up to NAS 1638 class 10.

●Two types of pilot valves available

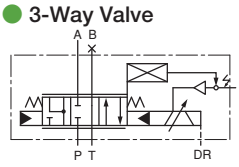
There are two types of pilot valves available: a dry type good in response characteristics and a wet type that eliminates the drain (DR) port to improve usability. They can be selected according to users' purposes.

Graphic Symbols

● 4-Way Valve



● 3-Way Valve



Note) The pilot/drain types are the same as those for the "4-Way Valve" shown above.

■ Model Number Designation

F—	LSVHG	—06	EH	—900	—S	4	—E	T	—W	A	—A	1	—20
Fluid Type	Series Number	Valve Size	Amp. Type	Rated Flow @ΔP = 7 MPa	Spool Type	Control Type	Pilot Type	Drain Type	DR Port and Permissible Back Pres.	Fail-safe Function	Input Signal/ Spool Travel Monitoring	Connector Type	Design Number
F : Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**LSVHG :** Two Stage Type Linear Servo Valves	**03**	**EH :** OBE Type	**60 :** 60 L/min **100 :** 100 L/min **160 :** 160 L/min	**S :** 1 % Overlap	**3 :** 3-Way Valve★1 (Port A is used.)	**None:** Internal Pilot	**None:** External Drain	**None:** With DR Port (Permissible Back Pres.: 0.05 MPa)	**None:** P→B→A→T Position Valve Opening: Full **A:** P→A→B→T Position Valve Opening: Full	**A:** Voltage Signal ± 10 V (P→B→A→T Flow with Input Signal (+)) **B:** Current Signal 4 - 20 mA (P→B→A→T Flow with Current Signal 12 - 20 mA) **C:** Current Signal ± 10 mA (P→B→A→T Flow with Input Signal (+)) **D:** Voltage Signal ± 10 V (P→A→B→T Flow with Input Signal (+)) **E:** Current Signal 4 - 20 mA (P→A→B→T Flow with Current Signal 12 - 20 mA) **F:** Current Signal ± 10 mA (P→A→B→T Flow with Input Signal (+))	**1:** 6+PE Pole **2:** 11+PE Pole	**20**
		04		**100 :** 100 L/min **200 :** 200 L/min **280 :** 280 L/min **450 :** 450 L/min						Applicable only when a fail-safe solenoid operated valve is mounted **EA:** With Solenoid Operated Valve P→A→B→T Position Valve Opening: 10 % **EB:** With Solenoid Operated Valve P→B→A→T Position Valve Opening: 10 %			
		06		**500 :** 500 L/min **900 :** 900 L/min		**4 :** 4-Way Valve	**E:** External Pilot	**T:** Internal Drain	**W:** Without DR Port★2 (Wet Type Pilot Valve)			**2:** 11+PE Pole	

★1. For the valves with a 3-way valve and a fail-safe solenoid operated valve, select "EB" for the fail-safe function type and "D", "E", or "F" for the input signal/spool travel monitoring type.
★2. The valves with the model number "W" (without DR port) cannot use water-glycol fluids.

Specifications

The values in parentheses in the specification table below are applicable to the models "LSVHG-∗EH-∗-S∗-∗∗-W∗-" (without DR port).

Descriptions \ Model Numbers				LSVHG-03EH-∗-S∗						LSVHG-04EH-∗-S∗								LSVHG-06EH-∗-S∗			
Spool Type				S4			S3			S4				S3				S4		S3	
Rated Flow @ ΔP = 7 MPa (4-Way Valve)			L/min	60	100	160	—	—	—	100	200	280	450	—	—	—	—	500	900	—	—
Rated Flow @ ΔP = 3.5 MPa (3-Way Valve)			L/min	—	—	—	60	100	160	—	—	—	—	100	200	280	450	—	—	500	900
Max. Operating Pressure			MPa	31.5						35								35			
Proof Pres. at Return Port (1)	External Drain	T Port	MPa	21						31.5								35			
		Y Port	MPa	21 (7) (7)						21 (7)								21 (7)			
	Internal Drain	T & Y Ports	MPa	21 (7) (7)						21 (7)								21 (7)			
DR Port Permissible Back Pressure (2)			MPa	0.05 (The valves with the model number "W" have no DR port.)																	
Pilot Pressure (3)			MPa	1.5 - 21																	
Pilot Flow Rate (4)			L/min	4 or more						6 or more								21 or more			
Pilot Valve Max. Leakage	Pres.: P_S = P_P = 14 MPa Fluid Viscosity: 32 mm²/s		L/min	0.4														1.2			
Main Valve Max. Leakage				0.6	1.1	2.1	0.3	0.6	1.1	0.9	1.7	2.5	5.0	0.5	0.9	1.3	2.5	1.9	4.8	1.0	2.4
Hysteresis			%	0.1 or less																	
Step Response (0 <=> 100 %, Typical) (5)			ms	7 (8)						11 (12)								12 (13)			
Frequency Response (±25 % Amplitude Typical) (6)	Gain: -3 dB		Hz	110 (80)						100 (80)								100 (80)			
	Phase: -90°		Hz	110 (90)						100 (90)								95 (90)			
Vibration Proof (6)			m/s²	100																	
Protection			—	IP 65																	
Ambient Temperature			℃	0 - +50																	
Spool Stroke to Stops			mm	±3.5						±3.5								±5			
Spool End Area			cm²	1.3						3.1								8			
Linear Motor Specification	Current		A	Max. 2.1																	
	Coil Resistance		Ω	9.6 [at 20 ℃]																	
Approx. Mass (8)			kg	8.5 [11]						14 [16]								20 [24]			
Mounting Surface				ISO 4401-05-05-0-05						ISO 4401-07-06-0-05								ISO 4401-08-07-0-05			
Electric Connection				6 + PE/11 + PE Connector (EN175201 Part 804)																	

Note) (1) Pressure at the return port should be at actual supply pressure or less.
(2) Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure. For the valves with the model number "W", no drain port connection is required.
(3) Supply pressure for the pilot valve should be 1.5 - 21 MPa and should also be 60% of actual supply pressure or more.
(4) The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.
(5) This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.
(6) There are restrictions on the mounting position; refer to the instructions for details.
(7) To use an external pilot type valve with a supply pressure of 21 MPa or more, pressures at the T and Y ports should be 7 MPa or less.
(8) A value in brackets indicates the mass of each valve with a fail-safe solenoid operated valve.
(9) For the effective range of the fail-safe function, see page I-60.

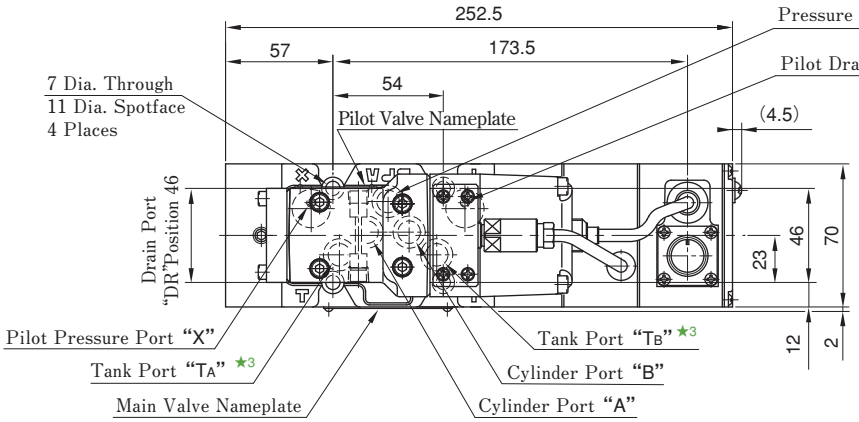
Accessories/Electrical Specifications/Block Diagram

These are the same as those of the standard type. See the relevant pages.

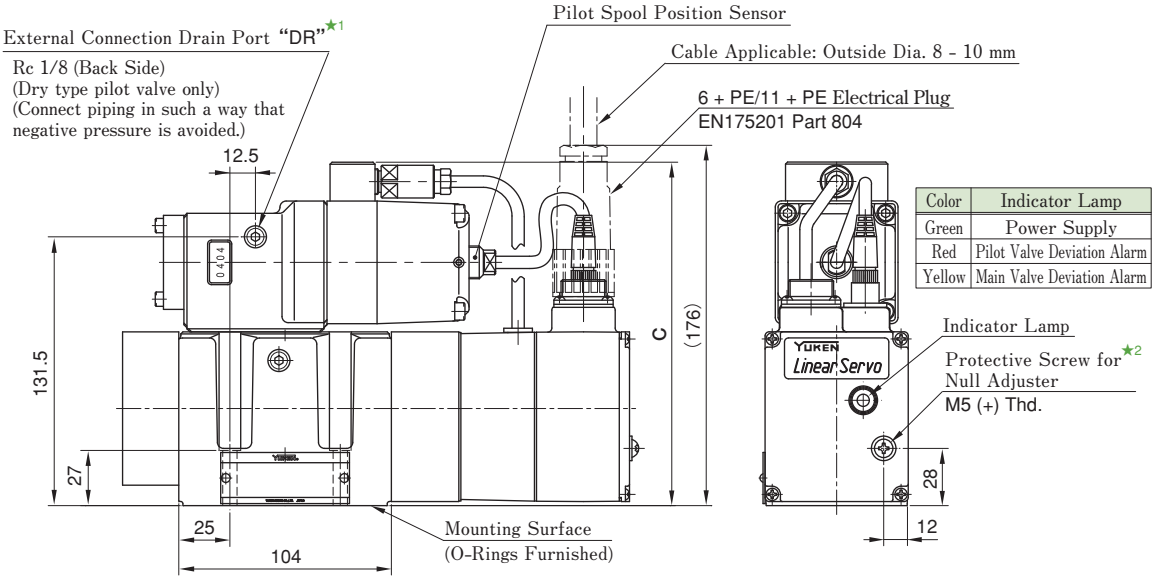
Item	Page for Reference
Accessories	I-35
Electrical Specifications	I-36
Block Diagram	I-37

LSVHG-03EH-60/100/160-S＊

Mounting Surface: Conforming to ISO 4401-05-05-0-05



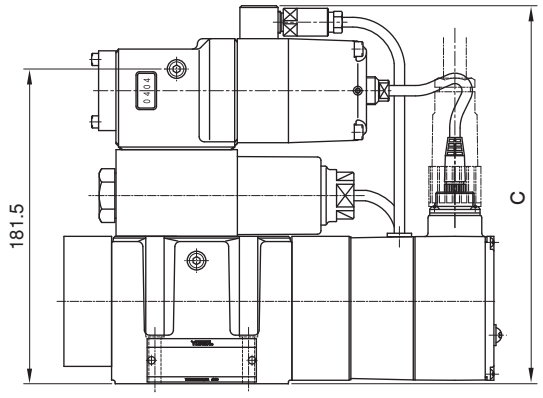
Model Numbers	C	Remarks
LSVHG-03EH-＊-S＊	168	Pilot Valve: Dry Type
LSVHG-03EH-＊-S＊-W	177	Pilot Valve: Wet Type

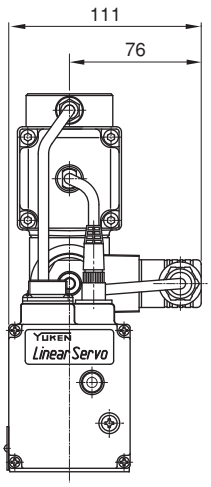


Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

★1. The external connection drain port "DR" on the front side is usually plugged. To use the port on the front side, remove the hexagon socket head plug (5 Hex.) and plug the port on the back side.
★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.
★3. There are two tank ports "TA" and "TB" ; however, "TA" may be used alone.

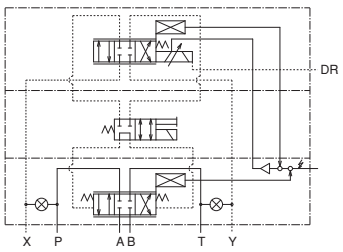
LSVHG-03EH-60/100/160-S＊-＊EA/EB (With Fail-safe Solenoid Operated Valve)





【Dimensions of Mounting Surface】
The dimensions of the mounting surface are the same as those of the models LSVHG-03EH (page I-38).

Detailed Graphic Symbol



⊗ : Plugs for selecting the pilot and drain types

● O-Rings for the Ports

Port	O-Ring Size	Qty.
P, A, B, T	AS568-014 (NBR-90)	5
X, Y	AS568-016 (NBR-90)	2

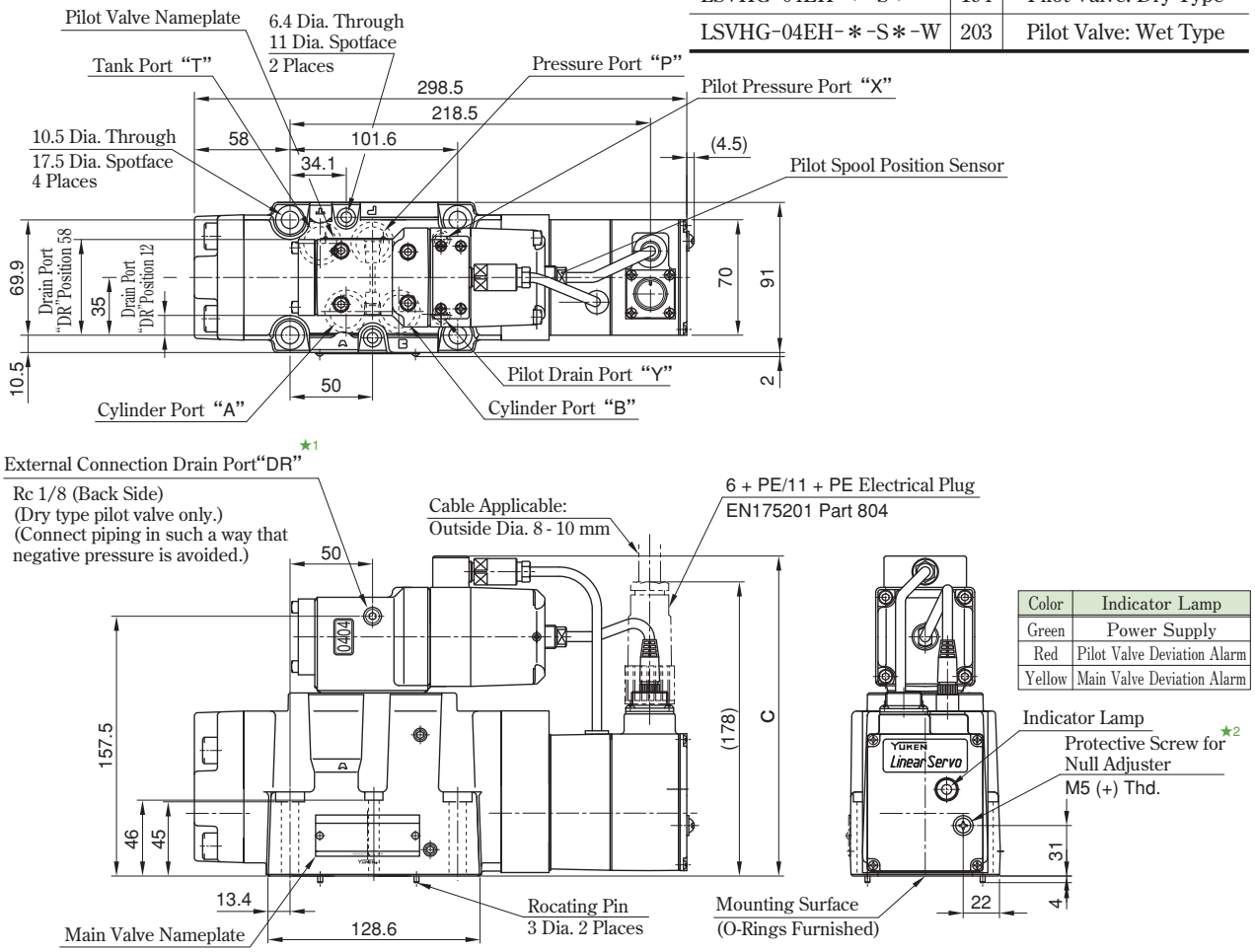
O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

Model Numbers	C	Remarks
LSVHG-03EH-＊-S＊-E＊	218	Pilot Valve: Dry Type
LSVHG-03EH-＊-S＊-WE＊	227	Pilot Valve: Wet Type

●For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

LSVHG-04EH-100/200/280/450-S＊

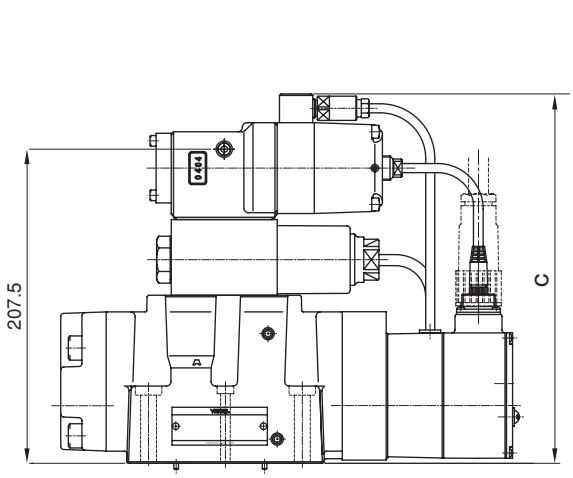
Model Numbers	C	Remarks
LSVHG-04EH-＊-S＊	194	Pilot Valve: Dry Type
LSVHG-04EH-＊-S＊-W	203	Pilot Valve: Wet Type



Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

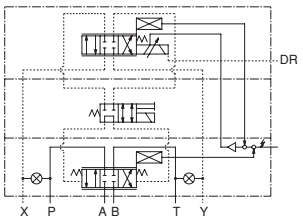
★1. The external connection drain port "DR" on the front side is usually plugged. To use the port on the front side, remove the hexagon socket head plug (5 Hex.) and plug the port on the back side.
★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

LSVHG-04EH-100/200/280/450-＊S-＊EA/EB (With Fail-safe Solenoid Operated Valve)



【Dimensions of Mounting Surface】
The dimensions of the mounting surface are the same as those of the models LSVHG-04 (page I-12).

Detailed Graphic Symbol



⊗: Plugs for selecting the pilot and drain types

● O-Rings for the Ports

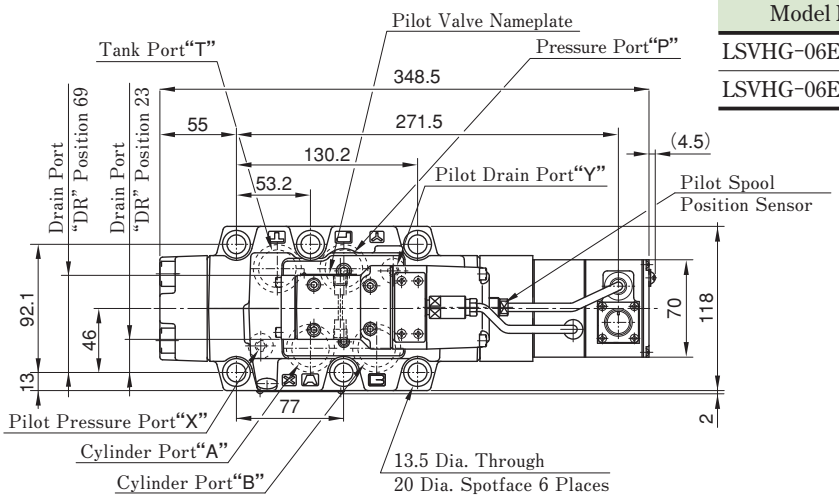
Port	O-Ring Size	Qty.
P, A, B, T	OR NBR-90 P22-N	4
X, Y	AS568-012 (NBR-90)	2

O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

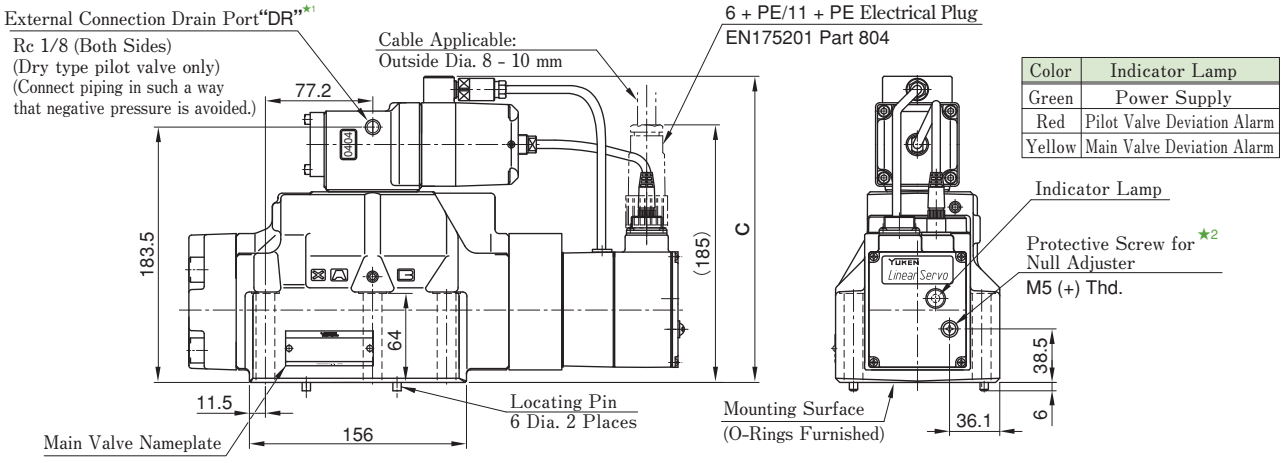
Model Numbers	C	Remarks
LSVHG-04EH-＊-S＊-E＊	244	Pilot Valve: Dry Type
LSVHG-04EH-＊-S＊-WE＊	253	Pilot Valve: Wet Type

●For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

LSVHG-06EH-500/900-S＊



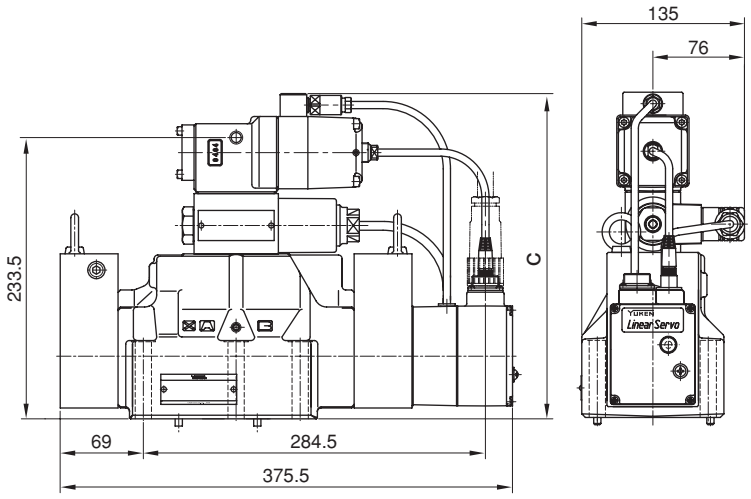
Model Numbers	C	Remarks
LSVHG-06EH-＊-S＊	220	Pilot Valve: Dry Type
LSVHG-06EH-＊-S＊-W	229	Pilot Valve: Wet Type



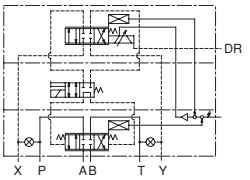
Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

★1. The external connection drain port "DR" on the back side is usually plugged. To use the port on the back side, remove the hexagon socket head plug (5 Hex.) and plug the port on the front side.
★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

LSVHG-06EH-500/900-＊S-＊EA/EB (With Fail-safe Solenoid Operated Valve)



Detailed Graphic Symbol



⊗: Plugs for selecting the pilot and drain types

Model Numbers	C	Remarks
LSVHG-06EH-＊-S＊-E＊	270	Pilot Valve: Dry Type
LSVHG-06EH-＊-S＊-WE＊	279	Pilot Valve: Wet Type

●For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

● O-Rings for the Ports

Port	O-Ring Size	Qty.
P, A, B, T	AS568-123 (NBR-90)	4
X, Y	OR NBR-90 P14-N	2

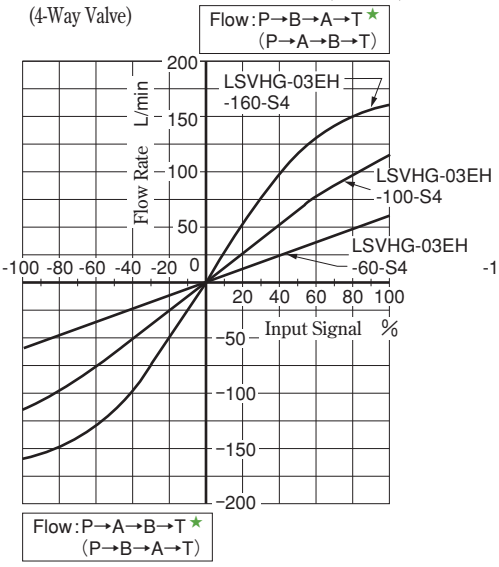
O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

【Dimensions of Mounting Surface】
The dimensions of the mounting surface are the same as those of the models LSVHG-06-900 (page I-13).

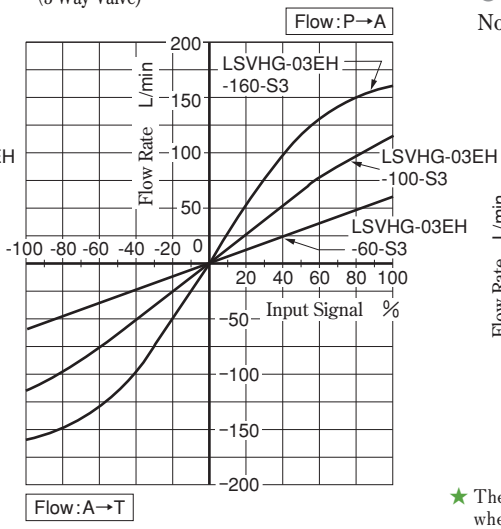
Characteristics of LSVHG-03EH-60/100/160-S＊ (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

Valve Pressure Difference: ΔP = 7 MPa (Constant)
(4-Way Valve)

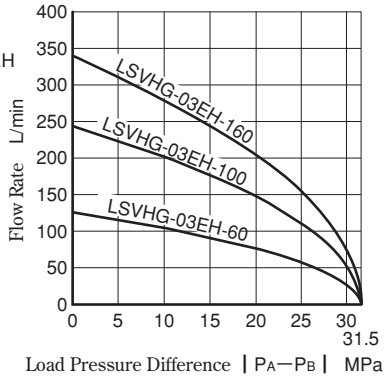


Valve Pressure Difference: ΔP = 3.5 MPa (Constant)
(3-Way Valve)



Load Flow Characteristics

〈Conditions〉
●Input Signal：100 %
Note) Tolerance for Load Flow：±10 %

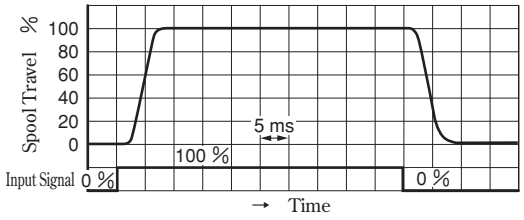


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

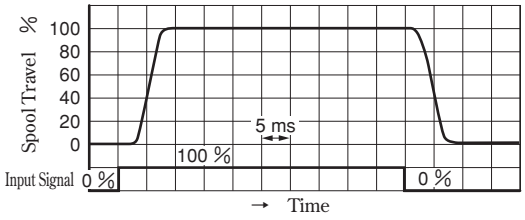
Step Response

〈Conditions〉 ●Input Signal：0 ⇔ 100 % ●Supply/Pilot Pressure：14 MPa

● Pilot Valve: Dry Type



● Pilot Valve: Wet Type

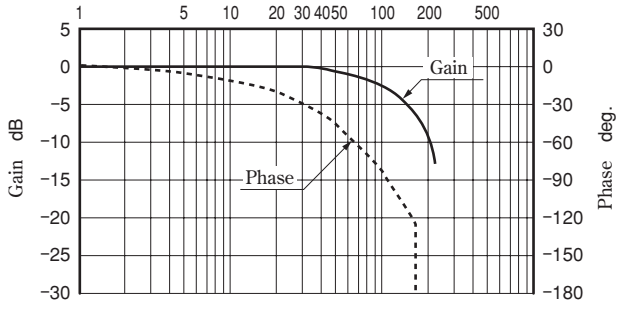


Frequency Response

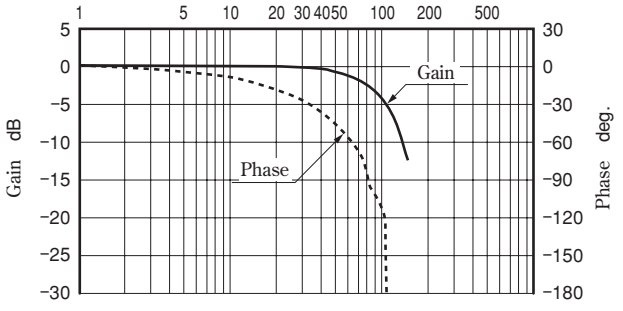
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure：14 MPa

● Pilot Valve: Dry Type

Input Signal ±25 % Frequency Hz

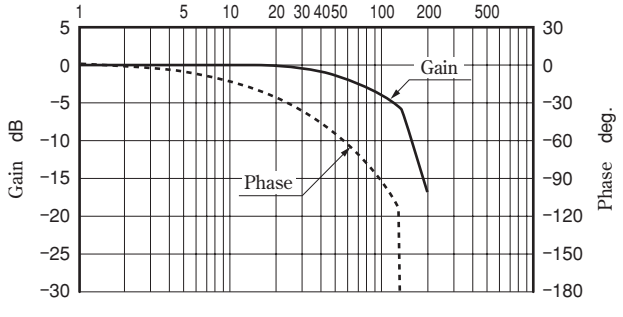


Input Signal ±100 % Frequency Hz

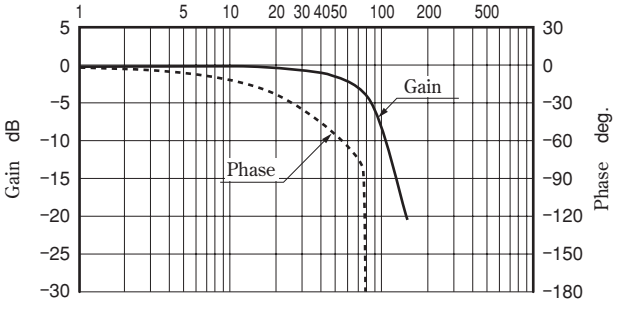


● Pilot Valve: Wet Type

Input Signal ±25 % Frequency Hz



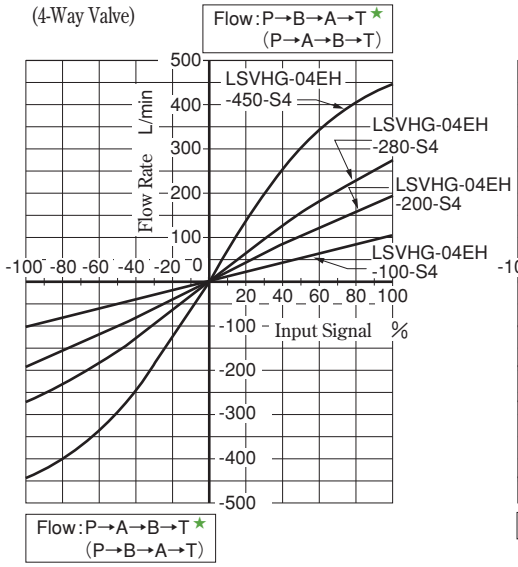
Input Signal ±100 % Frequency Hz



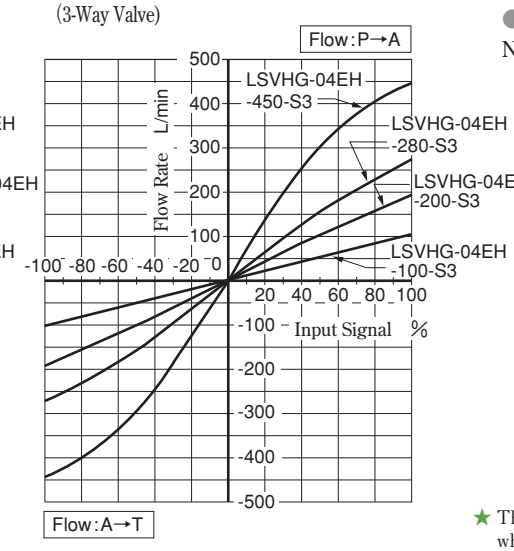
Characteristics of LSVHG-04EH-100/200/280/450-S ✻ (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

Valve Pressure Difference: ΔP = 7 MPa (Constant)
(4-Way Valve)

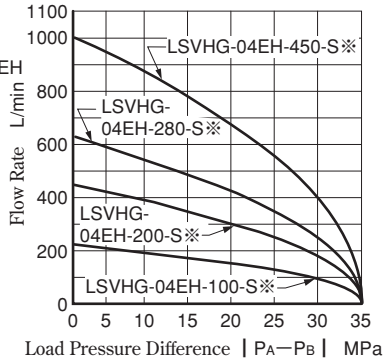


Valve Pressure Difference: ΔP = 3.5 MPa (Constant)
(3-Way Valve)



Load Flow Characteristics

〈Conditions〉
●Input Signal : 100 %
Note) Tolerance for Load Flow : ±10 %

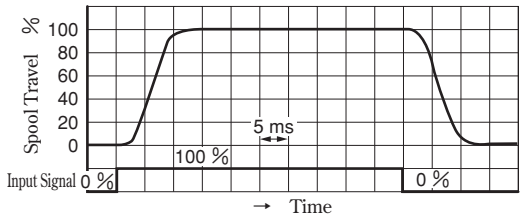


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

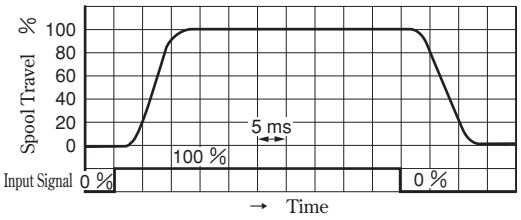
Step Response

〈Conditions〉 ●Input Signal : 0 ⇔ 100 % ●Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



● Pilot Valve: Wet Type

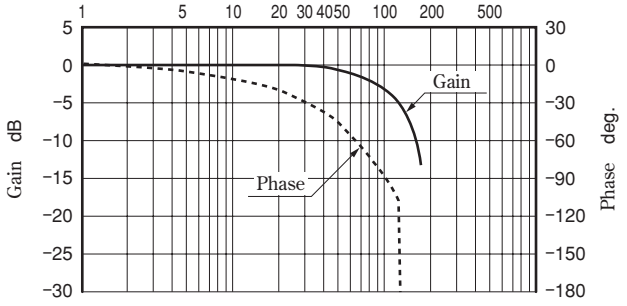


Frequency Response

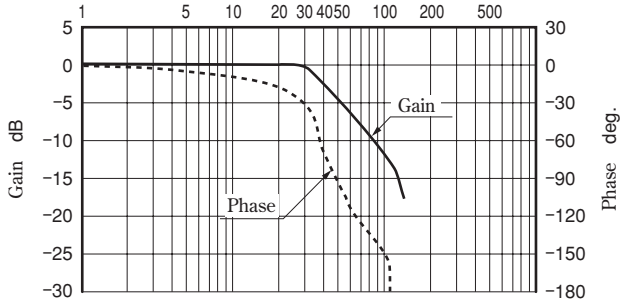
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type

Input Signal ±25 % Frequency Hz

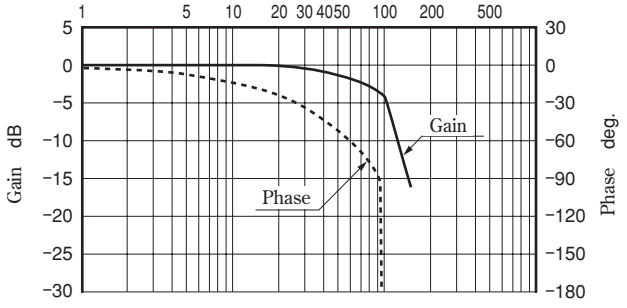


Input Signal ±100 % Frequency Hz

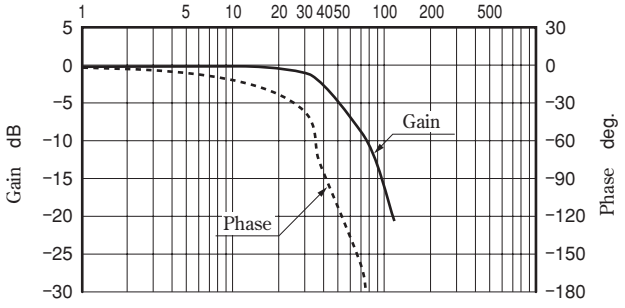


● Pilot Valve: Wet Type

Input Signal ±25 % Frequency Hz



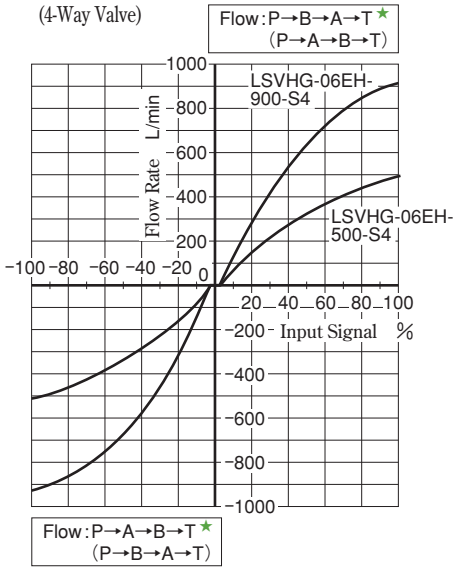
Input Signal ±100 % Frequency Hz



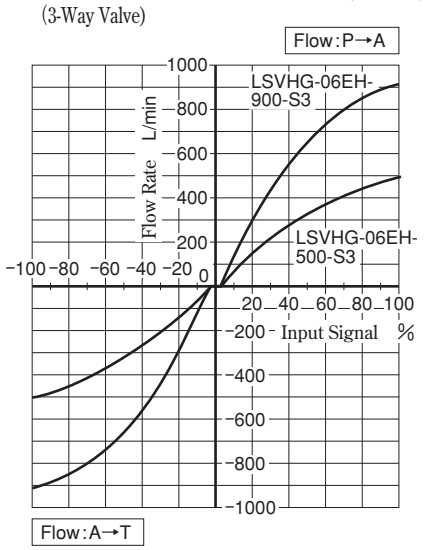
Characteristics of LSVHG-06EH-500/900-S＊ (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

Valve Pressure Difference: ΔP = 7 MPa (Constant)
(4-Way Valve)

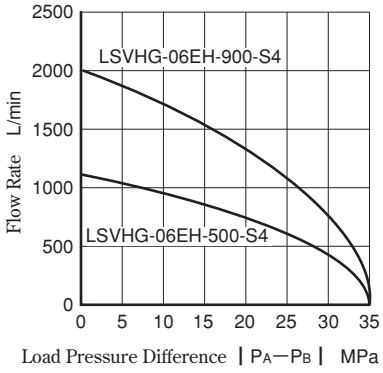


Valve Pressure Difference: ΔP = 3.5 MPa (Constant)
(3-Way Valve)



Load Flow Characteristics

〈Conditions〉
●Input Signal : 100 %
Note) Tolerance for Load Flow : ±10 %

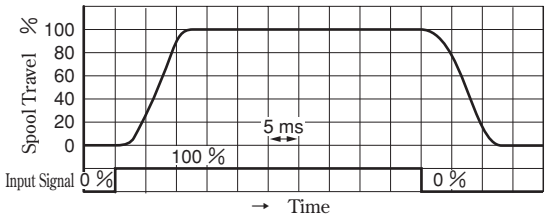


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

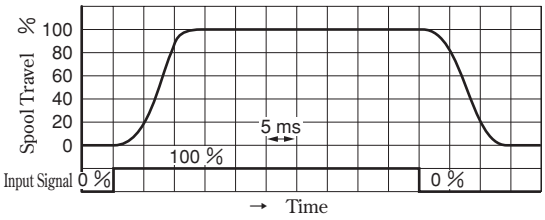
Step Response

〈Conditions〉 ●Input Signal : 0 ⇔ 100 % ●Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



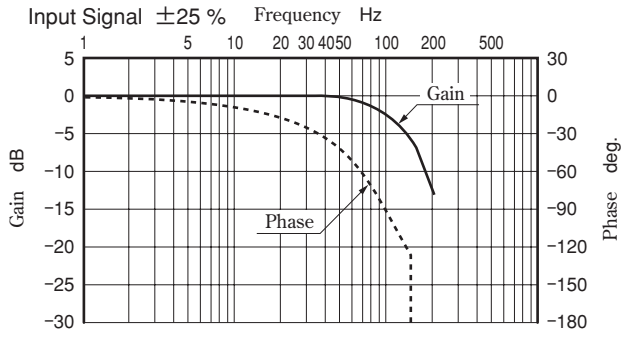
● Pilot Valve: Wet Type

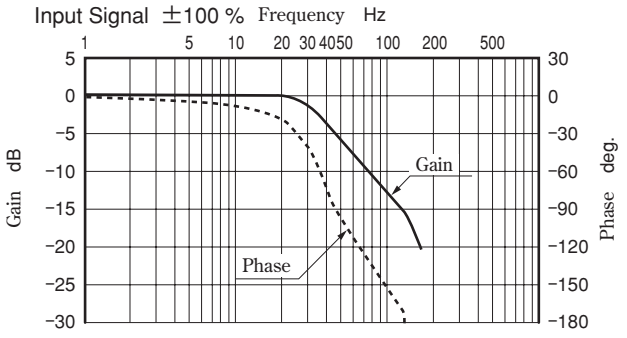


Frequency Response

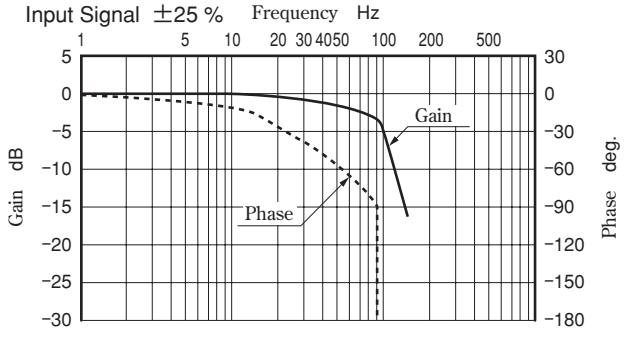
〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply/Pilot Pressure : 14 MPa

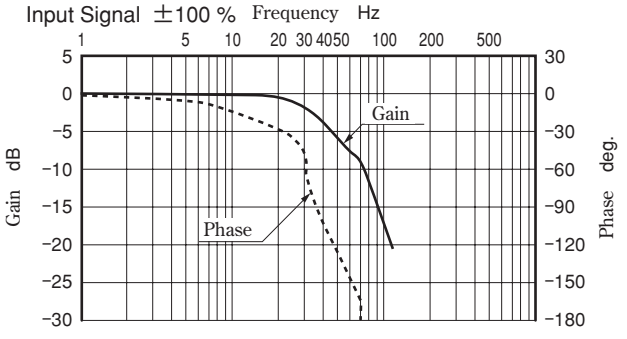
● Pilot Valve: Dry Type





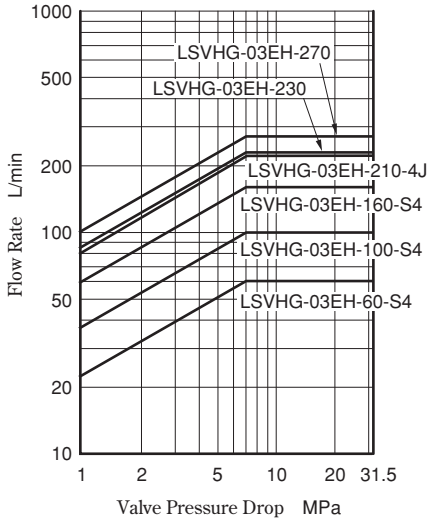
● Pilot Valve: Wet Type



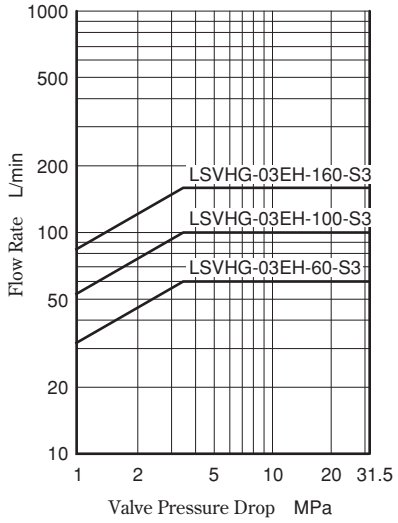


Effective Ranges of the Fail-safe Function for OBE (On-Board Electronics) Type Linear Servo Valves

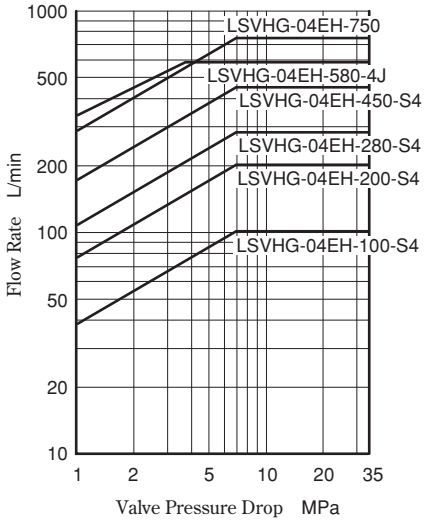
●LSVHG-03EH-230/270-
●LSVHG-03EH-210-4J-
●LSVHG-03EH-60/100/160-S4-



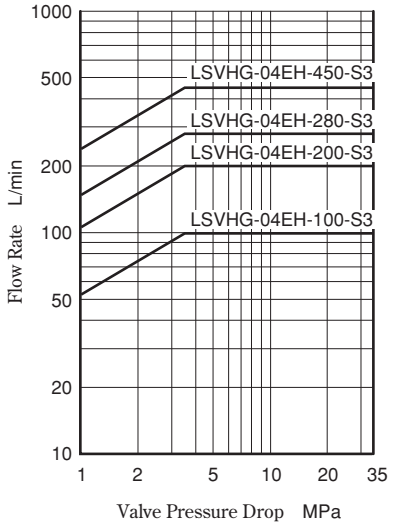
●LSVHG-03EH-60/100/160-S3-



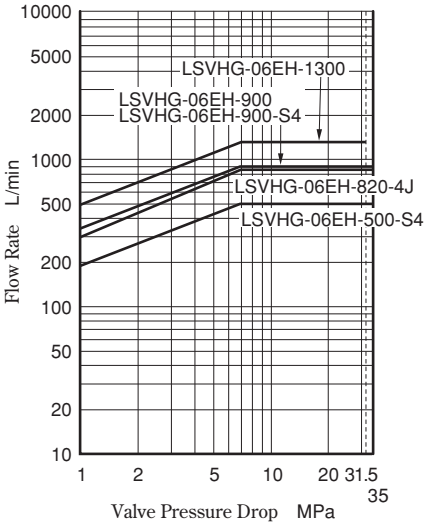
●LSVHG-04EH-750-
●LSVHG-04EH-580-4J-
●LSVHG-04EH-100/200/280/450-S4-



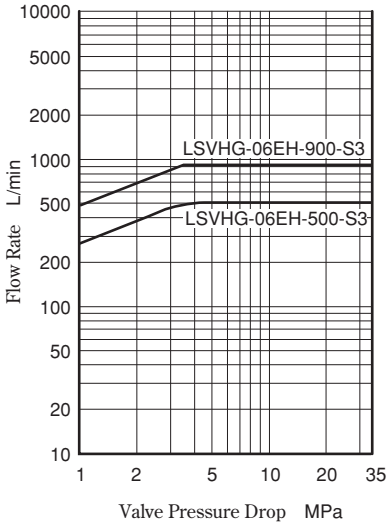
●LSVHG-04EH-100/200/280/450-S3-



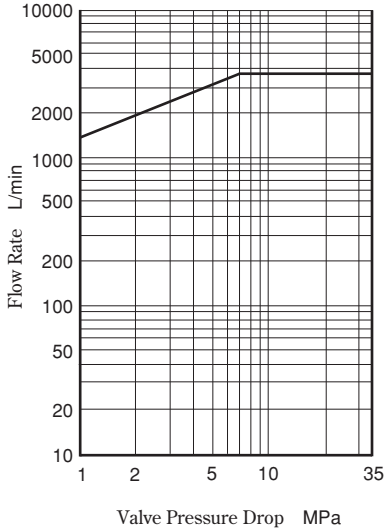
●LSVHG-06EH-900/1300
●LSVHG-06EH-820-4J-
●LSVHG-06EH-500/900-S4-



●LSVHG-06EH-500/900-S3-



●LSVHG-10EH-3800-



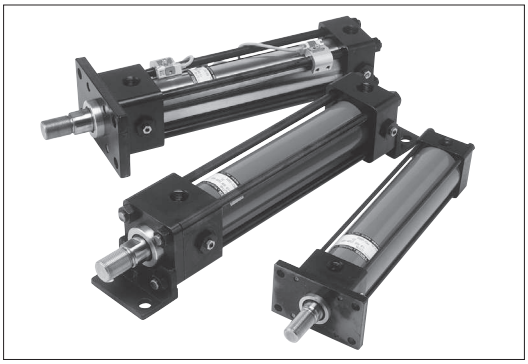
Servo Amplifiers & Controllers

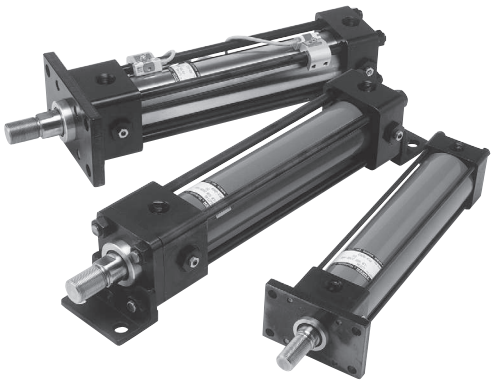
Name / Model Numbers & Appearance		Functions / Merits
Servo Controller SK1056-＊-＊-20		The analog controller including all functions the servo amplifiers configure servo systems required. This controller is equipped with some functions to display feedback signals,to switch open/close by extreme signals,to output alarm signals,etc.
Servo Amplifier AMS-＊-S-20		This amplifier is 2 input signal type(voltage input),also have auxiliary input(AUX) which can configure minor loop. Also can provide ±12V rated voltage to the outside,so can connect with configurators or detectors(ex.potentiometer) easily.

J

ACTUATORS

■ Standard Hydraulic Cylinders..... Page J-3

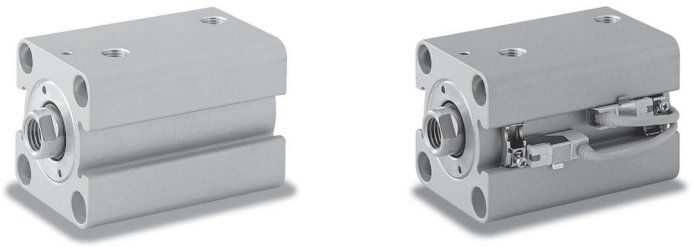




Standard Hydraulic Cylinders

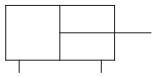
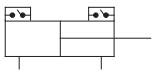
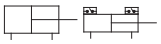
Mini Type Hydraulic Cylinders

Position Sensing Type Hydraulic Cylinders



"CBY14 Series" Compact Type Hydraulic Cylinders

Hydraulic Cylinders

Cylinder Type	Graphic Symbols	Nominal Pressure MPa	Cylinder Bore mm	Page
Standard Type		3.5	32, 40, 50, 63, 80, 100, 125, 160	J-8
		7 14	32, 40, 50, 63, 80, 100, 125, 140, 150, 160 180, 200, 220, 250	J-19
		21	40, 50, 63, 80, 100, 125, 140, 160	J-54
Compact Type 21 MPa Series		21	40, 50, 63, 80, 100, 125, 140, 160	J-41
Switch Set Type		3.5	32, 40, 50, 63, 80, 100	J-68
		7, 14	32, 40, 50, 63, 80, 100, 125	
Switch Set Compact Type 21 MPa Series		21	40, 50, 63, 80	
CBY14 Series Compact Type		14	32, 40, 50, 63, 80, 100	J-79
Mini Type		3.5, 7	20, 25, 30	J-88
Position Sensing Type		7, 14	50, 63, 80, 100, 125, 140, 150, 160, 180	J-89

Instructions

Hydraulic Fluids

Type of Hydraulic Fluids

The following Hydraulic Fluids can be used.
The specifications remain the same regardless of which oil is used.

Compatibility of Hydraulic fluid and Packing material

Packing Material	Hydraulic fluids				
	Petroleum Base Oils	Water-glycols	Phosphate esters	W/O Emulsion	O/W Emulsion
Nitrile Rubber	○	○	×	○	○
Fluoro Rubber (F-)	○	×	○	○	○
Hydrogenated Nitrile Rubber (6-)	○	◎	×	◎	◎

Note 1. The mark ◎ and ○ are allowed, × is not allowed.
Note 2. The mark ◎ is the recommended packing for anti-wear type.

Viscosity and Oil Temperature

Use hydraulic fluid within both viscosities of 20 to 400 ㎟/s and temperatures of -10 to +60°C.

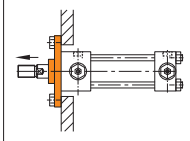
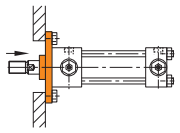
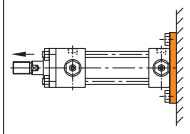
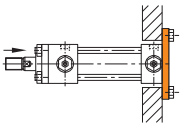
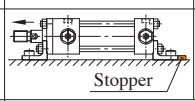
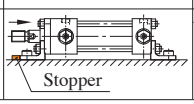
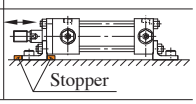
Control of Contamination

Since foreign matter in the hydraulic fluid interferes with the normal operation of the cylinder, always keep the hydraulic fluid clean (contamination level: within NAS 1638-12 class) and use a filter for pipelines of 25 μm or less.

Place of Installation

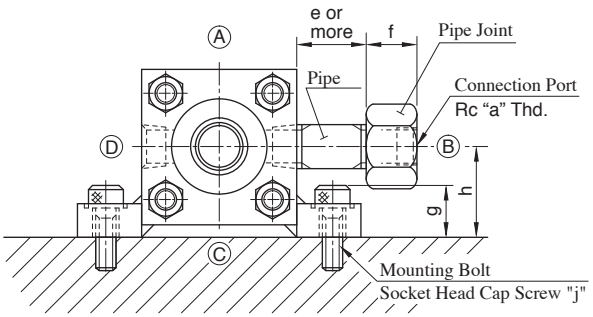
- Use indoors.
- For use in the following environments, please consult us separately.
  - Sand, dust, soil, chips, welding spatter, etc.
  - Rainwater, water, seawater, oil, chemicals, etc.
  - Direct sunlight, humidity, etc.
  - High and low temperature, freezing, etc.
  - High Magnetic Fields
  - Vibration

Installation

Mounting Type	Installation method		
	Push	Pull	Push and Pull
FA FC FE FY			Select one of the installation methods shown on the left based on either push or pull output, whichever is greater. If maximum output is required for both push and pull, please consult us separately.
FB FD FF			
LA LB			
CA CB	Avoid horizontal installation if the stroke is 1000 mm or more.		

Foot Mounting Side Lugs (LA Type) Piping Precautions

For LA type cylinders with bore diameters from 32 to 100, if the port is used with the direction of Ⓑ or Ⓓ, the piping joint may interfere with the cylinder installation bolts, making piping impossible. When using this type, follow the illustration below.



CJT 35

Cylinder Bore	a	e	f	g	h	j
32	1/4	20	30	16	27	M 8
40	3/8	25	30	18	31	M10
50	3/8	25	30	22	37	M10
63	3/8	26	30	22	38	M10
80	1/2	28	40	25	47	M12
100	1/2	34	40	34	57	M16

CJT 70/140

Cylinder Bore	a	e	f	g	h	j
32	3/8	26	30	24	35	M10
40	3/8	27	30	24	37.5	M10
50	1/2	33	40	29	45	M12
63	1/2	36	40	35	50	M16
80	3/4	40	42	41	60	M16
100	3/4	46	42	47	71	M20

CJT 210C

Cylinder Bore	a	e	f	g	h	j
40	3/8	29	30	25	41	M10
50	1/2	33	40	32	51	M12
63	1/2	38	40	41	56	M16
80	3/4	38	42	46	70	M16
100	3/4	48	42	55	80	M20

CJT 210

Cylinder Bore	a	e	f	g	h	j
40	3/8	28.5	30	29	47	M10
50	1/2	32.5	40	36	61	M12
63	1/2	41	40	51	69	M16
80	3/4	48.5	42	61	85	M20
100	3/4	62.5	42	74	95	M24

When using a bite type joint, refer to the above figure and select a long type.

Air Bleeding

Feed low-pressure oil into the cylinder (to the extent that the cylinder moves at a low speed of 10 mm/s), loosen the air vent valve one or two turns counterclockwise to bleed air. Repeat the procedure until all the air is removed.

⚠ WARNING

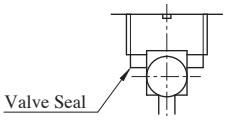
Do not loosen the air vent valve more than the specified lift during the air bleed operation.
Doing so may result in a serious accident due to valve parts ejecting or oil spewing out.

⚠ WARNING

Cylinders should be completely purged of air at low pressure.
Failure to do so may result in injury due to unexpected movement of the cylinder.

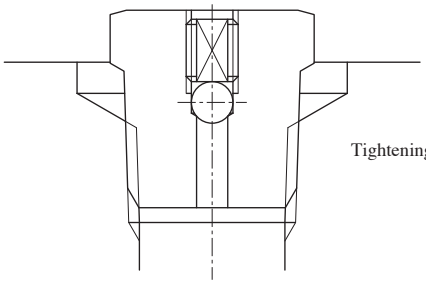
After venting, tighten the air vent valve to the specified torque and confirm that there are no oil leaks.

● CJT 35 : Cylinder Bore 32 to 160



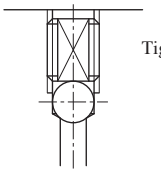
Tightening Torque : 8 - 10 Nm

● CJT 70/140 : Cylinder Bore 125 or more



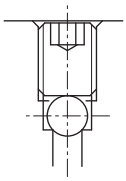
Tightening Torque : 3 - 5 Nm

● CJT 70/140 : Cylinder Bore 32 to 100



Tightening Torque : 3 - 5 Nm

● CJT 210C/210

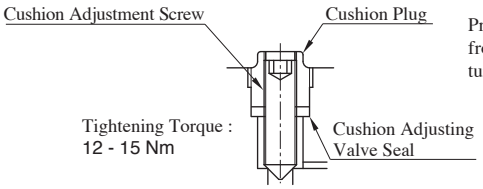


Tightening Torque : 3 - 5 Nm

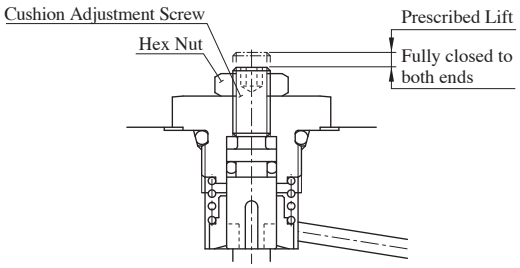
Cushion Adjusting Valve

The cushion adjusting valve is not adjusted at the time of shipment, so be sure to adjust it.

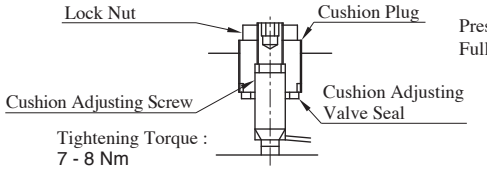
CJT 35



CJT 70/140



CJT 210C/210



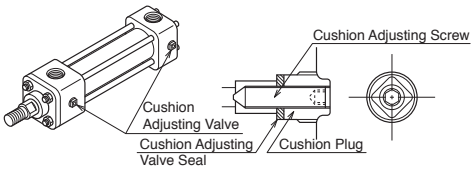
⚠ WARNING 1

Do not loosen the Cushion Adjusting Valve more than the specified lift for cushion adjustment work.
Doing so may cause valve parts to pop out or oil to spray out, which could result in a serious accident.

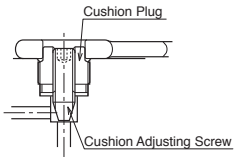
⚠ WARNING 2

When adjusting the cushion, start with a low speed (50 mm/s or less) and gradually increase the speed.
If the speed is increased from the beginning, abnormal surge pressure may be generated, resulting in a serious accident due to damage to the cylinder or machine.

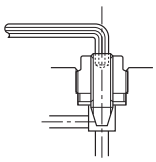
CJT 35 Cushion Adjusting Valve Adjustment Method



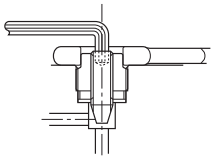
①Loosen the cushion plug 1/4 turn with a wrench or similar tool.



②Turn only the cushion adjusting screw with a hexagonal bar wrench.
Clockwise⇒Slowing down the cushioning process
Counterclockwise⇒Speeds up the cushioning process



③After adjustment the cushion adjusting screw, fix the cushion adjusting screw with a hexagonal bar wrench to prevent it from moving and tighten the cushion plug.
(Tightening torque: 12 to 15 Nm)



CJT 70/140/210C/210 Cushion Adjusting Valve Adjustment Method

(1) Cushion adjustment should be made by turning the hex nut or lock nut counterclockwise approximately 1/4 turn and then adjusting the cushion to the movement of the machine. Turning the cushion adjusting screw clockwise will slow down the cushioning process. Turning it counterclockwise speeds up the cushioning process.

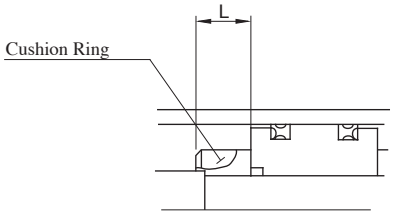
(2) After adjustment, be sure to tighten the hexagon nut or lock nut.

Cushion

The cushion ring has a special orifice finish that provides a smooth cushioning effect.
Note, however, that the cushioning effect will weaken if the cushioning ring is not used at the end of the stroke and is stopped more than *mm before the end of the stroke.
In such cases, a cushion ring with a parallel part (ℓ -dimension) long is also available.

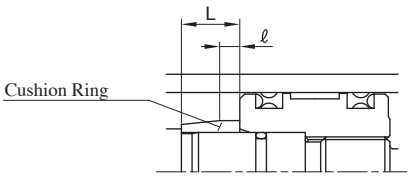
Series Number	*
CJT 35/70/140	3
CJT 210C/210	5

CJT 35



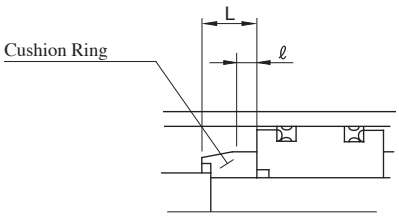
Cylinder Bore mm	Cushion Ring Length L mm
32 - 63	16
80 - 125	20
160	23

CJT 210C/210



Cylinder Bore mm	Cushion Ring Length L mm	Cushion Ring Parallel Part Length ℓ mm
40	26	10
50, 63	28	10
80, 100	30	12
125 - 160	33	15

CJT 70/140



Cylinder Bore mm	Cushion Ring Length L mm	Cushion Ring Parallel Part Length ℓ mm
32, 40	23	13
50, 63	25	13
80 - 220	30	13
250	35	8

Definition of Terms

The definitions of pressure terms used in this catalog are as follows

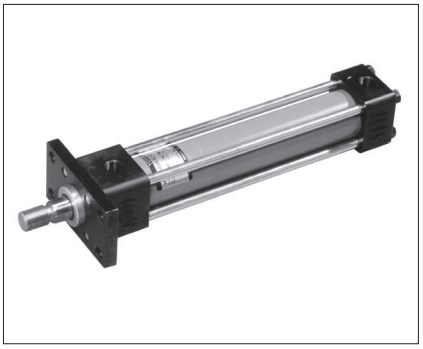
- Nominal Pressure.....This is the maximum value of the set pressure in a hydraulic circuit using a cylinder. When fixed displacement pump is used as the hydraulic pressure source, this refers to the pressure setting of the pressure control valve (relief valve or pressure reducing valve), and when a variable displacement pump is used, this refers to the full cutoff pressure.
- Maximum Allowable Pressure.....The maximum pressure at which a temporary pressure increase, including surge pressure, can be used for strength.
- Proof Test Pressure.....The pressure test pressure that must be withstood without causing a loss of performance when returned to nominal pressure.

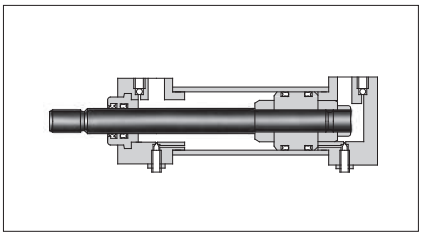
Maintenance and storage precautions

Seals may need to be replaced when the product is used after prolonged storage.

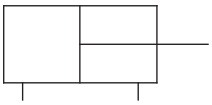
"CJT 3.5 MPa" Series Hydraulic Cylinders

YUKEN's "CJT 3.5 MPa" Series Hydraulic Cylinders are provided with many mounting types so that they can be used for wide use of general purpose industrial machines such as machine tools.
Moreover, Switch-Set "CJT" Series Hydraulic Cylinders with a proximity switch which facilitates detecting a position with a slide proximity switch on the cylinder body is also available.
(Refer to page J-69 for details.)





Graphic Symbol



Specifications

Model Numbers			CJT35–＊＊＊＊＊–＊＊＊–30
Cylinder Bore mm			32, 40, 50, 63, 80 100, 125, 160
Mounting Type			SD, LA, LB, FA, FB, CA, CB, TA, TC
Nominal Pressure ★1			3.5 MPa
Maximum Allowable Pressure ★1			4.5 MPa
Proof Test Pressure ★1			5.0 MPa
Minimum Working Pressure			0.2 MPa
Operating Maximum Speed			300 mm/s
Operating Minimum Speed			8 mm/s
Maximum Stroke ★2 mm	Cylinder Bore	32	1000
		40	1000
		50, 63	1200
		80	1600
		100	1600
		125, 160	1800
Tolerance of Stroke			Refer to the table "Tolerance of Stroke" ★3
Tolerance of Thread			JIS B 0211–6g(JIS grade 2 or equivalence)
Ambient Temperature Range			–10 - +80°C
Applicable Standard			Compliant with former JIS B8354

★1. See page J-7 for definition of pressure terms.
★2. May be limited to even lower value in accordance with the buckling strength.
Refer to page J-10 for strokes above buckling strength.

★3. Tolerance of Stroke

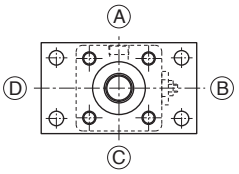
Stroke mm		Tolerance mm
	100 or less	$^{+0.8}_{0}$
More than	100 to 250	$^{+1.0}_{0}$
More than	250 to 630	$^{+1.25}_{0}$
More than	630 to 1000	$^{+1.4}_{0}$
More than	1000 to 1600	$^{+1.6}_{0}$
More than	1600 to 2000	$^{+1.8}_{0}$

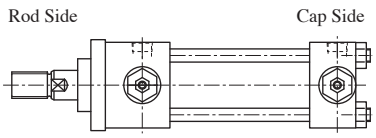
Model Number Designation

F−	CJT35	−LB	32	S	100	B	−A	B	D	−K	−30
Packing Material	Series Number	Mounting Type	Cylinder Bore mm	Rod Size	Cylinder Stroke mm	Cushion Type	Port Position ★1	Cushion Adj. Valve Position ★1	Air Vent Valve Position ★1	Options ★2	Design Number
None : Nitrile Rubber (standard) F : Fluoro Rubber 6 : Hydrogenated Nitrile Rubber	CJT35 : 3.5 MPa Series Standard Cylinder	SD, LA LB, FA FB, CA CB, TA TC	32, 40 50, 63 80, 100 125, 160	S : Special	Cylinder Stroke	B : With Cushion on Both ends R : With Cushion on the Rod side H : With Cushion on the Cap side N : Without Cushion	(Viewed from Rod End) A : Upper (Standard) B : Right C : Under D : Left	B : Right (Standard) A : Upper C : Under D : Left N : No Cushion adj. valve (Standard)	D : Left (Standard) A : Upper B : Right C : Under	F : With Dust Cover (Material: Nylon Tarpaulin, Heat resistant up to 80°C) G : With Dust Cover (Material: Chloroprene , Heat resistant up to 130°C) H : With Dust Cover (Material: Conex, Heat resistant up to 200°C) K : With Lock Nut (Std.) L : With T-End (Rod End Eye) M : With Y-End (Rod End Clevis)	30

★1. As for each direction of port, cushion adj. valve & air vent valve, please select from ⒶⒷⒸⒹ viewed from rod end(see the figure on the right).
<Standard directions>
Port : Ⓐ, Cusion Adjusting Valve : Ⓑ, Air Vent Valve : Ⓓ
Note : The direction of port and cushion adj.valve is not available to be the same direction. However, the other combinations are available.

★2. Using the options in combination is available.
Please specify the option code in the alphabet.
Ex. FKL





Mounting Type

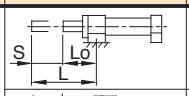
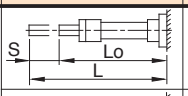
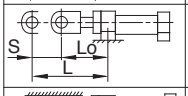
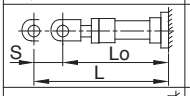
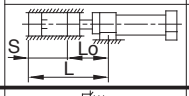
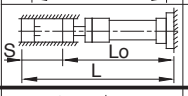
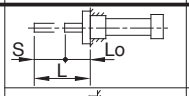
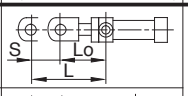
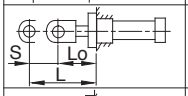
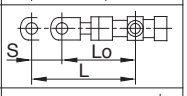
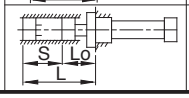
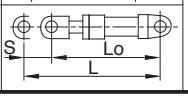
Code	Name	Illustration of Mounting Type	Code	Name	Illustration of Mounting Type
SD	Basic Type		CA	Cap Detachable Eye	
LA	Foot Mounting Side Lugs		CB	Cap Detachable Clevis	
LB	Foot Mounting Side End Angles		TA	Rod Trunnion	
FA	Rod Rectangular Flange		TC	Intermediate Trunnion	
FB	Cap Rectangular Flange				

Maximum stroke limited by buckling strength

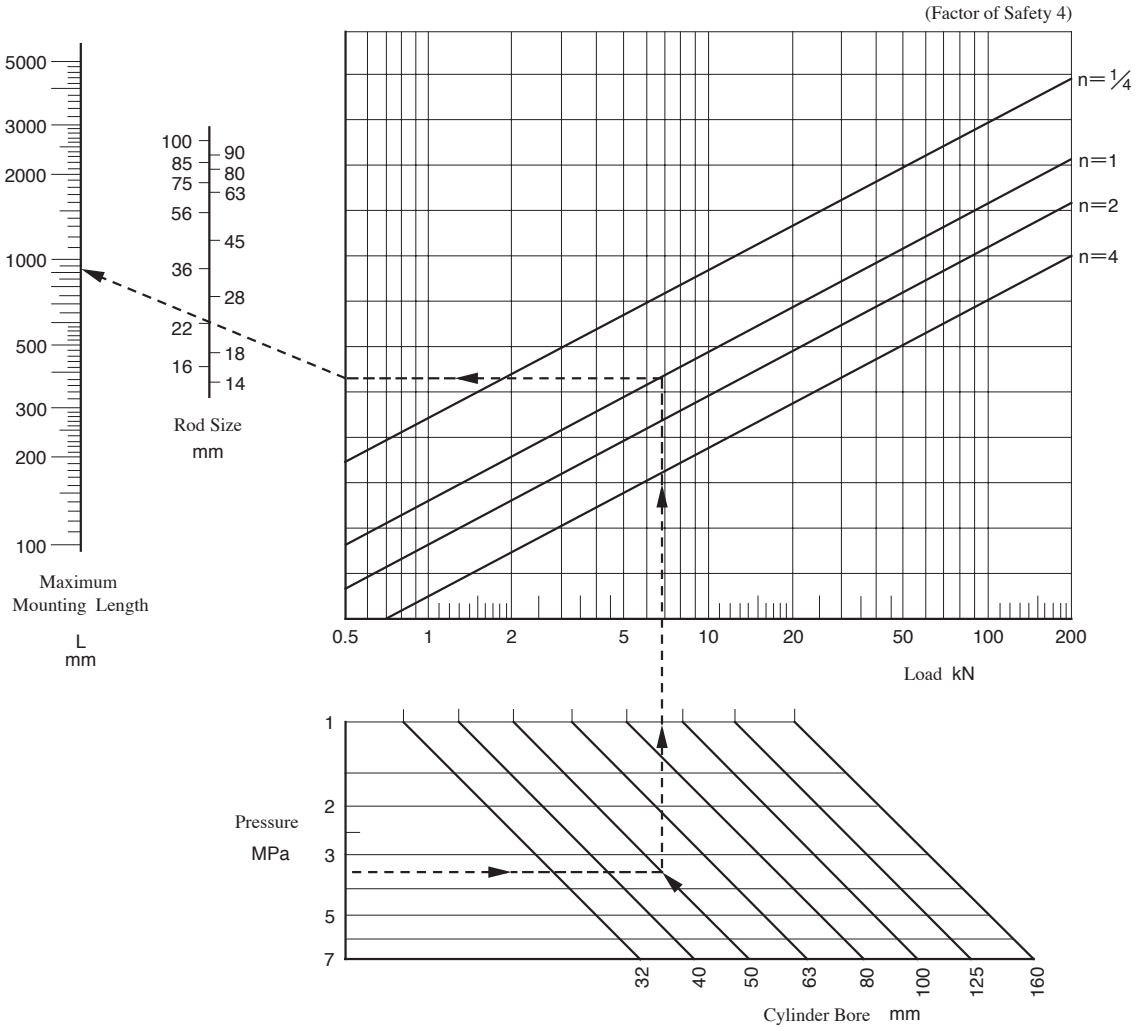
Calculation of Maximum Stroke

1. Calculate rod end coefficient n from the table on the right.
2. Calculate the maximum installation length L by applying various values such as cylinder bore, rod size, pressure, and rod end coefficient to the figure below.
3. Refer to the external dimensions and calculate the mounting length Lo when retracted.
   Use the formula S=L–Lo and calculate the maximum stroke S.
   (Example) Cylinder bore 50 mm, rod size 22 mm, mounting type TA (rod trunnion type) standard cylinder operated at 3.5 MPa pressure. Calculate the maximum stroke. Assume that the lock nut for rod end attachment is not used.

   From the table on the right n=1
   From the figure below L≒930
   From Dimensional Drawing (J-16) and Rod End Attachment (J-17)
   Lo= (44+64)=108
   therefore S=L–Lo=930–108
   hence S≒822 mm

Mounting Type	Type	Rod End Coefficient n	Mounting Type	Type	Rod End Coefficient n
LA		1/4	FB		1/4
		2			2
LB		4			4
FA		1/4	TA		1
		2	TC		
		4	CA CB		

S=L–Lo
S : Stroke mm
L : Mounting Length at extension mm
Lo : Mounting Length at contraction mm
Note: For Lo dimensions, refer to dimensional drawing and add the dimensions of rod end attachment.



Syllabus Table

Rod Size Code	Cylinder Bore mm	Rod Size mm	Push/Pull	Pressurized Area cm^2	Output kN		Velocity by a unit flow rate 10L/min mm/s	Flow rate by a unit velocity 10mm/s L/min
					1MPa	3.5MPa		
S	32	16	Push	8.0	0.8	2.81	208	0.5
			Pull	6.0	0.6	2.11	277	0.4
	40	16	Push	12.6	1.26	4.40	132	0.8
			Pull	10.6	1.06	3.69	157	0.6
	50	22	Push	19.6	1.96	6.87	85	1.2
			Pull	15.8	1.58	5.54	105	0.9
	63	22	Push	31.2	3.12	10.91	53	1.9
			Pull	27.4	2.74	9.58	61	1.6
	80	28	Push	50.3	5.03	17.59	33	3.0
			Pull	44.1	4.41	15.44	38	2.6
	100	36	Push	78.5	7.85	27.49	21	4.7
			Pull	68.4	6.84	23.93	24	4.1
	125	45	Push	122.7	12.27	42.95	14	7.4
			Pull	106.8	10.68	37.38	16	6.4
	160	56	Push	201.0	20.10	70.37	8.3	12.1
			Pull	176.4	17.64	61.75	9.4	10.6

Mass Table

Approx. Mass may be obtained from the formula below.

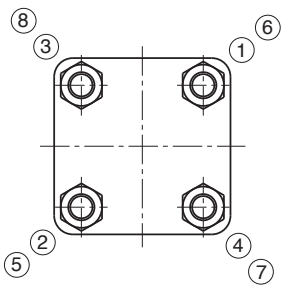
Mass=Ⓐ+[Ⓑ×Stroke(mm)/100]+Ⓒ+Ⓓ

Cylinder Bore mm	ⒶBasic Mass SD type	ⒷAdditional Mass By A Unit Stroke 100mm	ⒸBasic Mass(Each Mounting)								ⒹAdditional Mass		
			LA	LB	FA	FB	CA	CB	TA	TC	T-End (Rod End Eye) L	Y-End (Rod End Clevis) M	Lock Nut (Std.) K
32	1.17	0.41	0.12	0.19	0.17	0.24	0.12	0.12	0.05	0.3	0.15	0.20	0.02
40	1.77	0.45	0.19	0.23	0.25	0.32	0.18	0.15	0.19	0.48	0.16	0.34	0.02
50	2.56	0.78	0.28	0.36	0.41	0.50	0.26	0.30	0.19	0.56	0.22	0.35	0.03
63	3.98	0.94	0.29	0.46	0.56	0.64	0.40	0.36	0.19	0.70	0.22	0.35	0.03
80	7.55	1.22	0.66	0.86	1.40	1.56	1.02	0.82	0.19	1.15	0.78	1.01	0.1
100	11.4	2.00	0.96	1.60	1.96	2.25	1.28	1.38	0.41	3.10	1.30	1.76	0.3
125	15.6	3.30	1.42	2.24	3.78	4.24	4.24	4.42	0.58	4.80	3.19	4.36	0.5
160	35.0	4.90	2.60	5.68	7.76	8.78	8.05	8.91	1.13	6.10	4.29	5.82	1.1

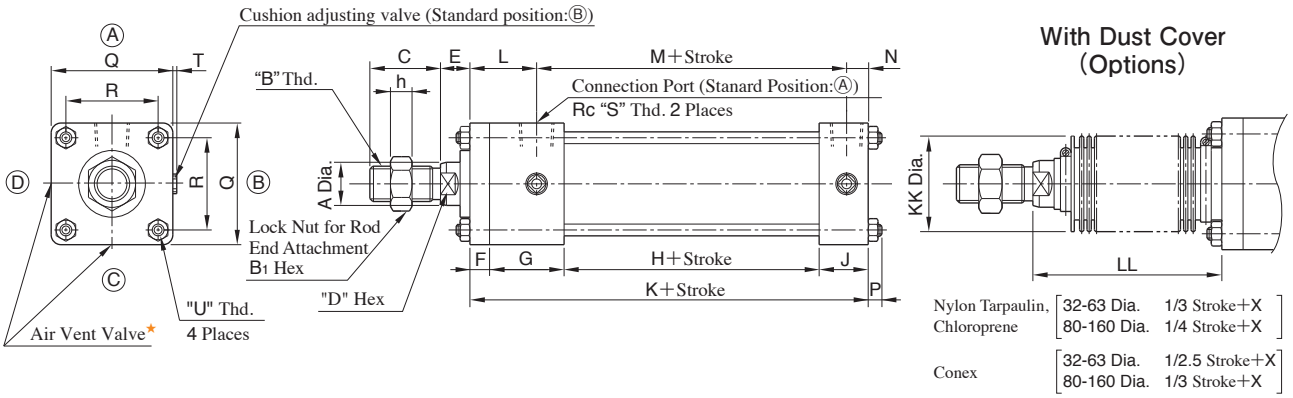
Tie Rod Tightening

When tightening tie rods, do not tighten only one tie rod tightly at a time, but gradually tighten the tie rods in the order of the numbers shown in the figure on the right. Note that one-sided tightening of tie rods may cause operation failure or chattering.

Bore mm	32	40	50	63	80	100	125	160
Tightening Torque Nm	4.1	4.1	4.1	10	21	35	87	180



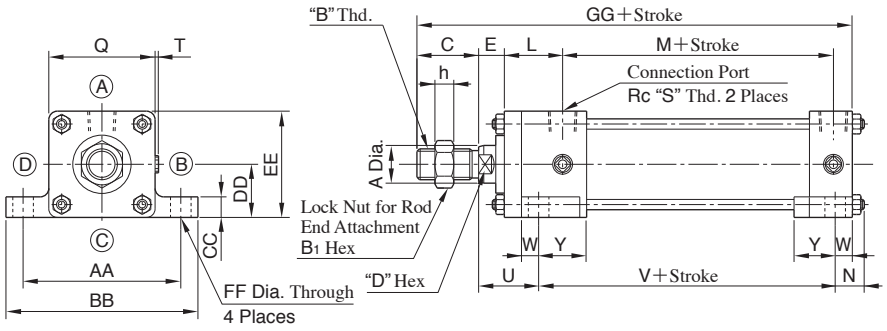
SD : Basic Type



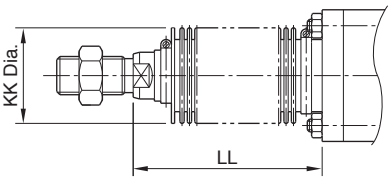
★The air vent valve can provided at the remaining two of the four locations in position Ⓐ,Ⓑ,Ⓒ,Ⓓ, that are not designated as port and cushion adjusting valve positions.
(Port direction: Ⓐ, cushion adjusting valve direction : Ⓒ and Ⓓ for standard Ⓑ)

Cylinder Bore	A	B	B_1	C	D	E	F	G	H	h	J	K	L	M	N	P	Q	R	S	T	U	KK	X
32	16	M12×1.25	19	24	13	15	10	38	30	7	25	103	34	58	11	7	44	33	1/4	Max. 5	M6×1	36	50
40	16	M12×1.25	19	24	13	15	10	38	30	7	25	103	34	58	11	7	50	37	3/8	Max. 5	M6×1	40	50
50	22	M18×1.5	24	36	19	15	10	38	30	11	25	103	34	58	11	7	62	47	3/8	Max. 5	M6×1	45	55
63	22	M18×1.5	24	36	19	15	10	38	33	11	25	106	34	61	11	9	76	56	3/8	Max. 5	M8×1.25	45	55
80	28	M24×2	32	48	24	19	16	45	31	14	32	124	43	67	14	10	94	70	1/2	Max. 5	M10×1.25	60	65
100	36	M30×2	41	60	30	23	16	45	31	17	32	124	43	67	14	12	114	89	1/2	Max. 5	M12×1.5	71	65
125	45	M42×2	60	84	41	25	20	45	37	22	32	134	47	73	14	16	138	110	1/2	Max. 5	M16×1.5	80	65
160	56	M48×2	70	96	50	29	25	50	42	26	38	155	54	84	17	19	176	142	3/4	Max. 5	M20×1.5	100	70

LA : Foot Mounting Side Lugs



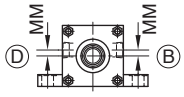
With Dust Cover (Options)



Nylon Tarpaulin, Chloroprene	32-63 Dia.	1/3 Stroke+X
	80-160 Dia.	1/4 Stroke+X
Conex	32-63 Dia.	1/2.5 Stroke+X
	80-160 Dia.	1/3 Stroke+X

Notes:1. The socket head cap screw shall be used as a mounting bolt.

2. As for cylinder bore 32-100, in case the port direction is Ⓑ or Ⓓ, pipe fittings may interference with cylinder mounting bolts. And as for cylinder bore 32-100, the port positions are as shown on the right(MM dimensions). Refer to instructions on page J-4 for details.

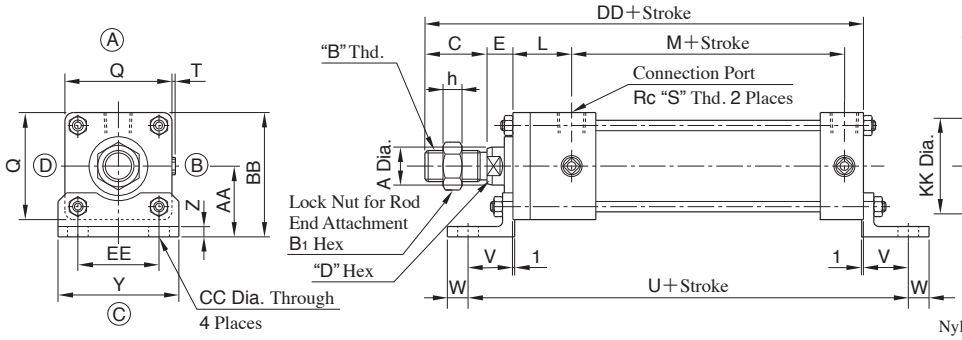


mm

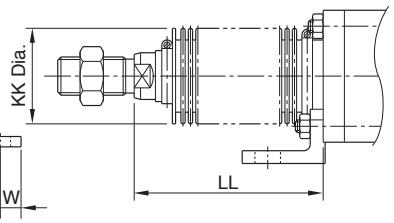
Cylinder Bore	32	40	50
MM	5	6	6

Cylinder Bore	A	B	B_1	C	D	E	h	L	M	N	Q	S	T	U	V	W	Y	AA	BB	CC	DD	EE	FF	GG	KK	X
32	16	M12×1.25	19	24	13	15	7	34	58	17	44	1/4	Max.5	35	73	10	18	69	84	8	22 $^{-0.300}_{-0.384}$	44	9	142	36	50
40	16	M12×1.25	19	24	13	15	7	34	58	17	50	3/8	Max.5	35	73	10	24	80	100	8	25 $^{-0.300}_{-0.384}$	50	12	142	40	50
50	22	M18×1.5	24	36	19	15	11	34	58	17	62	3/8	Max.5	35	73	10	24	92	112	12	31 $^{-0.310}_{-0.410}$	62	12	154	45	55
63	22	M18×1.5	24	36	19	15	11	34	61	19	76	3/8	Max.5	35	76	10	24	108	128	12	38 $^{-0.300}_{-0.410}$	76	12	157	45	55
80	28	M24×2	32	48	24	19	14	43	67	23	94	1/2	Max.5	48	82	13	32	128	150	19	47 $^{-0.320}_{-0.420}$	94	14	191	60	65
100	36	M30×2	41	60	30	23	17	43	67	30	114	1/2	Max.5	57	72	18	27	154	182	24	57 $^{-0.340}_{-0.460}$	114	18	207	71	65
125	45	M42×2	60	84	41	25	22	47	73	38	138	1/2	Max.5	67	70	22	23	189	224	29	69 $^{-0.360}_{-0.480}$	138	22	243	80	65
160	56	M48×2	70	96	50	29	26	54	84	43	176	3/4	Max.5	78	82	24	26	236	278	42	89 $^{-0.380}_{-0.520}$	178	26	280	100	70

LB : Foot Mounting Side End Angles



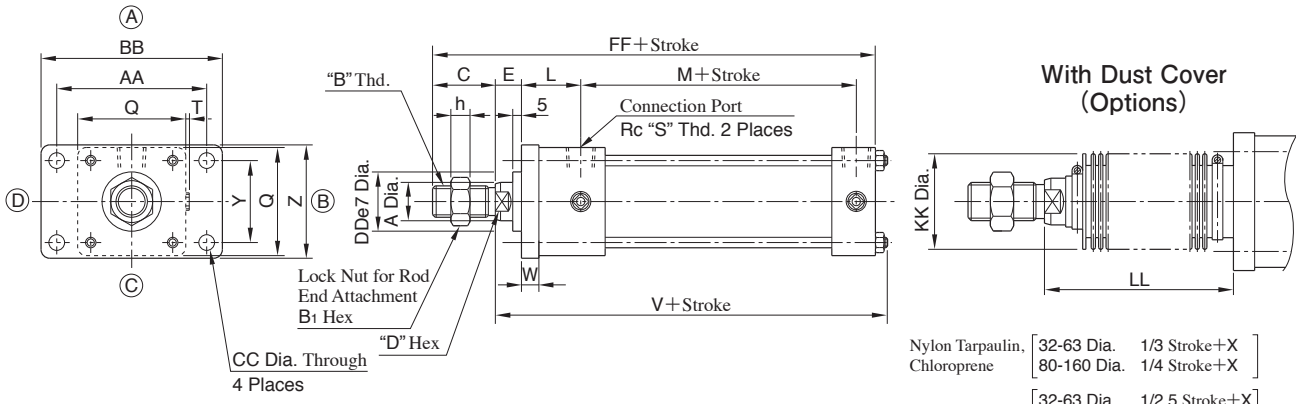
With Dust Cover (Options)



Nylon Tarpaulin, Chloroprene	32-63 Dia.	1/3 Stroke+X
	80-160 Dia.	1/4 Stroke+X
Conex	32-63 Dia.	1/2.5 Stroke+X
	80-160 Dia.	1/3 Stroke+X

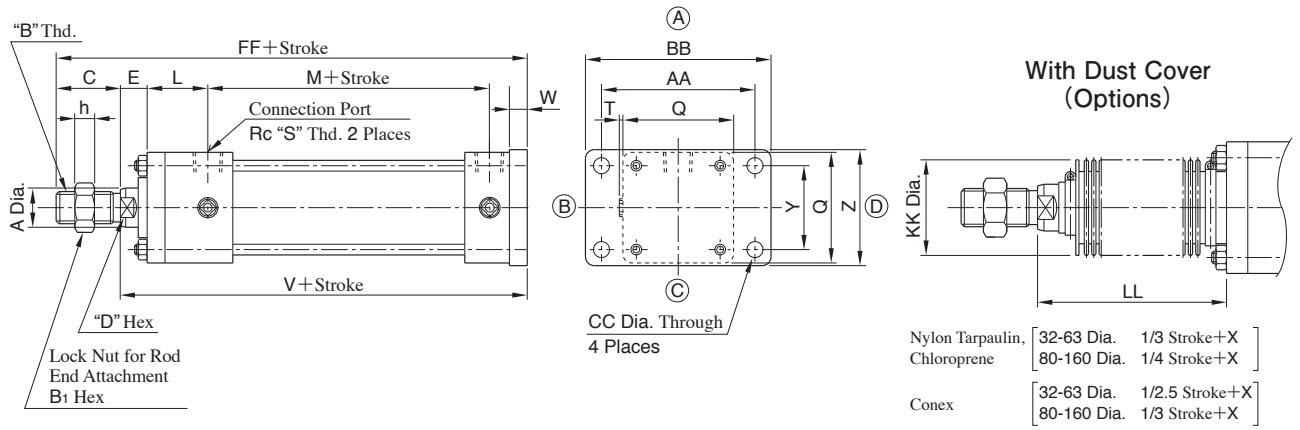
Cylinder Bore	A	B	B_1	C	D	E	h	L	M	Q	S	T	U	V	W	Y	Z	AA	BB	CC	DD	EE	KK	X
32	16	M12×1.25	19	24	13	15	7	34	58	44	1/4	Max.5	149	23	10	54	5	33	55	9	142	33	36	50
40	16	M12×1.25	19	24	13	15	7	34	58	50	3/8	Max.5	153	25	12	60	5	35	60	12	142	37	40	50
50	22	M18×1.5	24	36	19	15	11	34	58	62	3/8	Max.5	155	26	12	70	6	41	72	12	154	47	45	55
63	22	M18×1.5	24	36	19	15	11	34	61	76	3/8	Max.5	162	28	12	80	6	48	86	12	157	56	45	55
80	28	M24×2	32	48	24	19	14	43	67	94	1/2	Max.5	192	34	14	97	8	59	106	14	191	70	60	65
100	36	M30×2	41	60	30	23	17	43	67	114	1/2	Max.5	204	40	18	120	9	70	127	18	207	89	71	65
125	45	M42×2	60	84	41	25	22	47	73	138	1/2	Max.5	228	47	22	138	10	86	155	22	243	95	80	65
160	56	M48×2	70	96	50	29	26	54	84	176	3/4	Max.5	271	58	26	178	15	111	200	26	280	128	100	70

FA : Rod Rectangular Flange



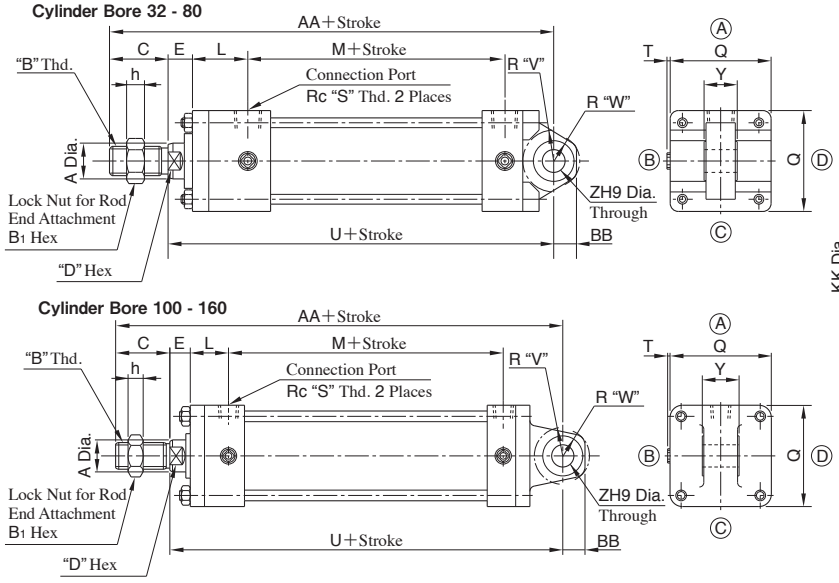
Cylinder Bore	A	B	B_1	C	D	E	h	L	M	Q	S	T	V	W	Y	Z	AA	BB	CC	DD	FF	KK	X
32	16	M12×1.25	19	24	13	15	7	34	58	44	1/4	Max.5	125	10	33	47	58	72	7	30	142	36	50
40	16	M12×1.25	19	24	13	15	7	34	58	50	3/8	Max.5	125	10	36	52	70	84	7	30	142	40	50
50	22	M18×1.5	24	36	19	15	11	34	58	62	3/8	Max.5	125	10	47	65	86	104	9	34	154	45	55
63	22	M18×1.5	24	36	19	15	11	34	61	76	3/8	Max.5	130	10	56	76	98	116	9	34	157	45	55
80	28	M24×2	32	48	24	19	14	43	67	94	1/2	Max.5	153	16	70	95	119	143	12	42	191	60	65
100	36	M30×2	41	60	30	23	17	43	67	114	1/2	Max.5	159	16	84	115	140	166	14	50	207	71	65
125	45	M42×2	60	84	41	25	22	47	73	138	1/2	Max.5	175	20	110	138	176	212	18	60	243	80	65
160	56	M48×2	70	96	50	29	26	54	84	176	3/4	Max.5	203	25	142	178	225	225	22	72	280	100	70

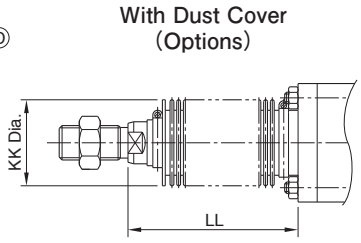
FB : Cap Rectangular Flange



Cylinder Bore	A	B	B_1	C	D	E	h	L	M	Q	S	T	V	W	Y	Z	AA	BB	CC	FF	KK	X
32	16	M12×1.25	19	24	13	15	7	34	58	44	1/4	Max.5	128	10	33	47	58	72	7	152	36	50
40	16	M12×1.25	19	24	13	15	7	34	58	50	3/8	Max.5	128	10	36	52	70	84	7	152	40	50
50	22	M18×1.5	24	36	19	15	11	34	58	62	3/8	Max.5	128	10	47	65	86	104	9	164	45	55
63	22	M18×1.5	24	36	19	15	11	34	61	76	3/8	Max.5	131	10	56	76	98	116	9	167	45	55
80	28	M24×2	32	48	24	19	14	43	67	94	1/2	Max.5	159	16	70	95	119	143	12	207	60	65
100	36	M30×2	41	60	30	23	17	43	67	114	1/2	Max.5	163	16	84	115	140	166	14	223	71	65
125	45	M42×2	60	84	41	25	22	47	73	138	1/2	Max.5	179	20	110	138	176	212	18	263	80	65
160	56	M48×2	70	96	50	29	26	54	84	176	3/4	Max.5	209	25	142	178	225	225	22	305	100	70

CA : Cap Detachable Eye

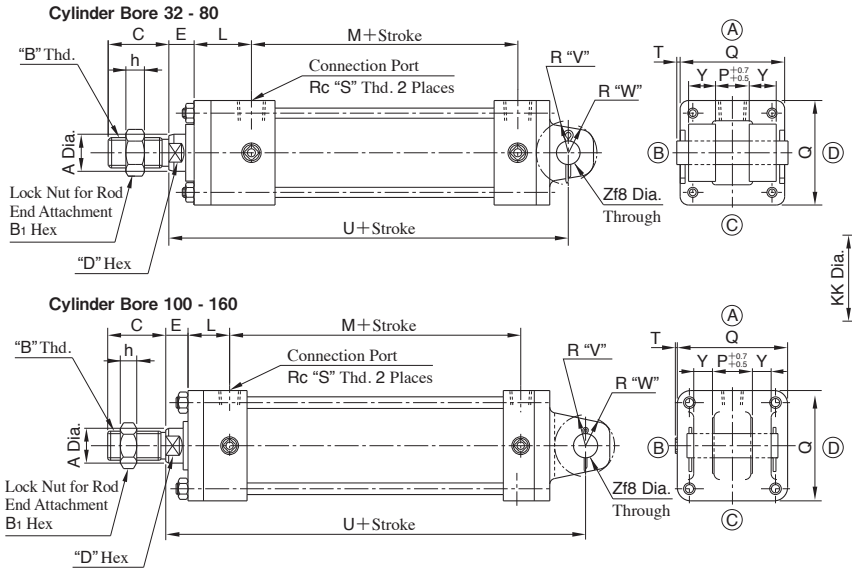


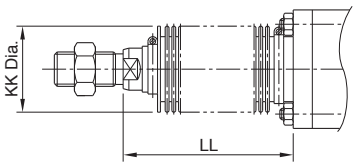


Nylon Tarpaulin, Chloroprene	32-63 Dia.	1/3 Stroke+X
	80-160 Dia.	1/4 Stroke+X
Conex	32-63 Dia.	1/2.5 Stroke+X
	80-160 Dia.	1/3 Stroke+X

Cylinder Bore	A	B	B_1	C	D	E	h	L	M	Q	S	T	U	V	W	Y	Z	AA	BB	KK	X
32	16	M12×1.25	19	24	13	15	7	34	58	44	1/4	Max.5	137	17	14	$16^{\ 0}_{-0.070}$	12	161	12	36	50
40	16	M12×1.25	19	24	13	15	7	34	58	50	3/8	Max.5	137	17	16	$20^{\ 0}_{-0.084}$	14	161	14	40	50
50	22	M18×1.5	24	36	19	15	11	34	58	62	3/8	Max.5	137	19	16	$20^{\ 0}_{-0.084}$	14	173	14	45	55
63	22	M18×1.5	24	36	19	15	11	34	61	76	3/8	Max.5	140	19	16	$20^{\ 0}_{-0.084}$	14	176	14	45	55
80	28	M24×2	32	48	24	19	14	43	67	94	1/2	Max.5	175	26	22	$32^{\ 0}_{-0.100}$	20	223	20	60	65
100	36	M30×2	41	60	30	23	17	43	67	114	1/2	Max.5	200	32	30	$40^{\ 0}_{-0.100}$	25	260	25	71	65
125	45	M42×2	60	84	41	25	22	47	73	138	1/2	Max.5	226	42	36	$45^{\ 0}_{-0.100}$	32	310	32	80	65
160	56	M48×2	70	96	50	29	26	54	84	176	3/4	Max.5	261	45	42	$50^{\ 0}_{-0.100}$	36	357	36	100	70

CB : Cap Detachable Clevis

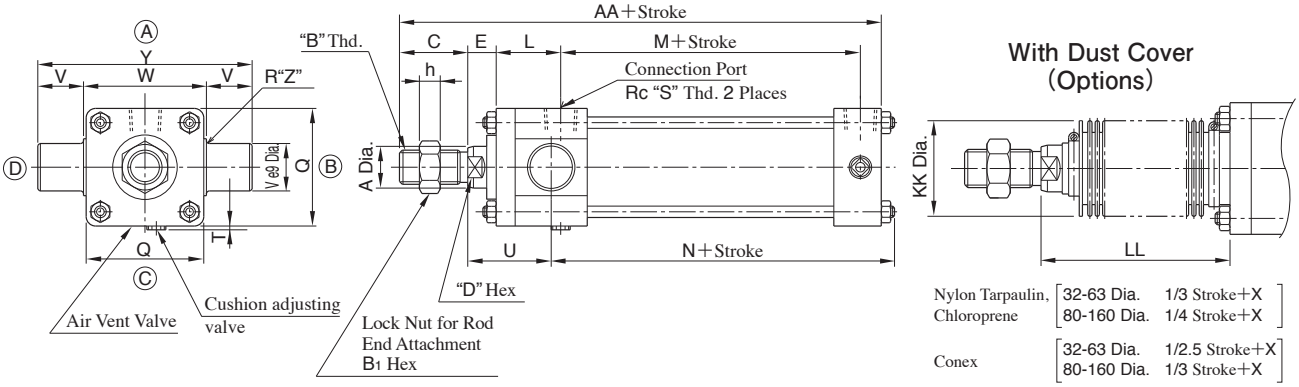




Nylon Tarpaulin, Chloroprene	32-63 Dia.	1/3 Stroke+X
	80-160 Dia.	1/4 Stroke+X
Conex	32-63 Dia.	1/2.5 Stroke+X
	80-160 Dia.	1/3 Stroke+X

Cylinder Bore	A	B	B_1	C	D	E	h	L	M	P	Q	S	T	U	V	W	Y	Z	KK	X
32	16	M12×1.25	19	24	13	15	7	34	58	16	44	1/4	Max.5	137	18	15	8	12	36	50
40	16	M12×1.25	19	24	13	15	7	34	58	20	50	3/8	Max.5	137	18	15	12	14	40	50
50	22	M18×1.5	24	36	19	15	11	34	58	20	62	3/8	Max.5	137	19	17	16	14	45	55
63	22	M18×1.5	24	36	19	15	11	34	61	20	76	3/8	Max.5	140	19	17	16	14	45	55
80	28	M24×2	32	48	24	19	14	43	67	32	94	1/2	Max.5	175	32	23	16	20	60	65
100	36	M30×2	41	60	30	23	17	43	67	40	114	1/2	Max.5	200	32	30	20	25	71	65
125	45	M42×2	60	84	41	25	22	47	73	45	138	1/2	Max.5	226	42	36	22.5	32	80	65
160	56	M48×2	70	96	50	29	26	54	84	50	176	3/4	Max.5	261	45	42	25	36	100	70

TA : Rod Trunnion



Nylon Tarpaulin, Chloroprene	32-63 Dia.	1/3 Stroke+X
	80-160 Dia.	1/4 Stroke+X
Conex	32-63 Dia.	1/2.5 Stroke+X
	80-160 Dia.	1/3 Stroke+X

Positions of port at the rod side, cushion adjusting valve and air vent valve are only available below:

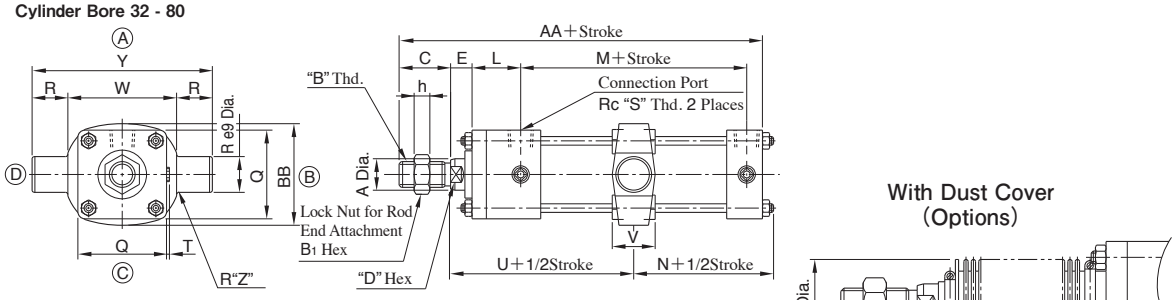
●Port position:Ⓐ Cushion adjusting valve position:Ⓒ Air vent valve position:Ⓒ

Please specify the positions (Ⓐ,Ⓑ,Ⓒ,Ⓓ) at cap cover side only.

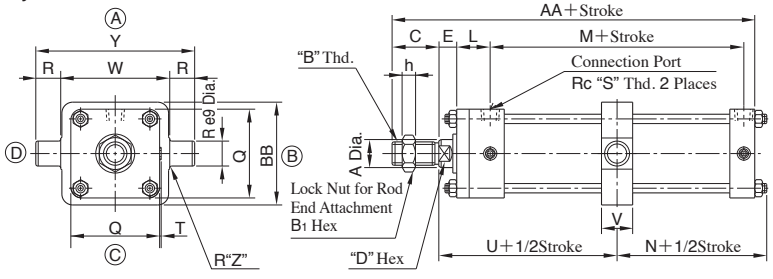
Cylinder Bore	A	B	B1	C	D	E	h	L	M	N	Q	S	T	U	V	W	Y	Z	AA	KK	X
32	16	M12×1.25	19	24	13	15	7	34	58	81	44	1/4	Max.5	44	16	44	76	1	142	36	50
40	16	M12×1.25	19	24	13	15	7	34	58	81	50	3/8	Max.5	44	25	50	100	1.6	142	40	50
50	22	M18×1.5	24	36	19	15	11	34	58	81	62	3/8	Max.5	44	25	63	113	1.6	154	45	55
63	22	M18×1.5	24	36	19	15	11	34	61	86	76	3/8	Max.5	44	25	76	126	1.6	157	45	55
80	28	M24×2	32	48	24	19	14	43	67	96	94	1/2	Max.5	57	25	95	145	1.6	191	60	65
100	36	M30×2	41	60	30	23	17	43	67	98	114	1/2	Max.5	61	32	114	178	2.5	207	71	65
125	45	M42×2	60	84	41	25	22	47	73	108	138	1/2	Max.5	67	36	144	216	2.5	243	80	65
160	56	M48×2	70	96	50	29	26	54	84	124	176	3/4	Max.5	79	45	184	274	3	280	100	70

TC : Intermediate Trunnion

Cylinder Bore 32 - 80



Cylinder Bore 100 - 160



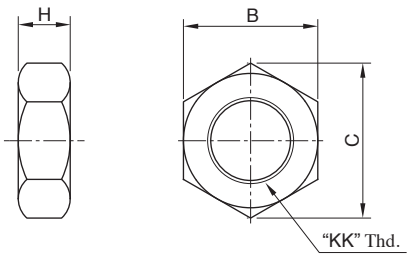
Nylon Tarpaulin, Chloroprene	32-63 Dia.	1/3 Stroke+X
	80-160 Dia.	1/4 Stroke+X
Conex	32-63 Dia.	1/2.5 Stroke+X
	80-160 Dia.	1/3 Stroke+X

Cylinder Bore	A	B	B1	C	D	E	h	L	M	N	Q	R	S	T	U	V	W	Y	Z	AA	BB	KK	X
32	16	M12×1.25	19	24	13	15	7	34	58	47	44	16	1/4	Max.5	78	30	55	87	1	142	52	36	50
40	16	M12×1.25	19	24	13	15	7	34	58	47	50	25	3/8	Max.5	78	30	63	113	1.6	142	59	40	50
50	22	M18×1.5	24	36	19	15	11	34	58	47	62	25	3/8	Max.5	78	30	76	126	1.6	154	71	45	55
63	22	M18×1.5	24	36	19	15	11	34	61	50.5	76	25	3/8	Max.5	79.5	30	88	138	1.6	157	86	45	55
80	28	M24×2	32	48	24	19	14	43	67	57.7	94	25	1/2	Max.5	95.5	35	114	164	1.6	191	104	60	65
100	36	M30×2	41	60	30	23	17	43	67	59.5	114	32	1/2	Max.5	99.5	40	140	204	2.5	207	132	71	65
125	45	M42×2	60	84	41	25	22	47	73	66.5	138	36	1/2	Max.5	108.5	53	166	238	2.5	243	160	80	65
160	56	M48×2	70	96	50	29	26	54	84	78	176	45	3/4	Max.5	125	58	214	304	3	280	208	100	70

Options

Lock Nut

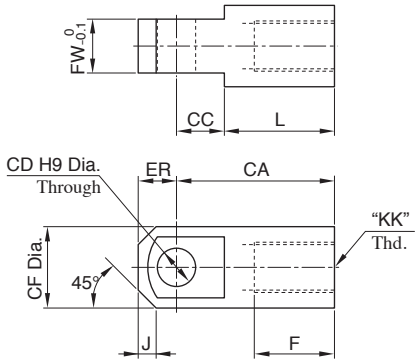
Option Code : K



KK	H	B	C
M12×1.25	7	19	21.9
M18×1.5	11	27	31.2
M24×2	14	36	41.6
M30×2	17	46	53.1
M42×2	22	65	75
M48×2	26	75	86.5

Rod End Attachment

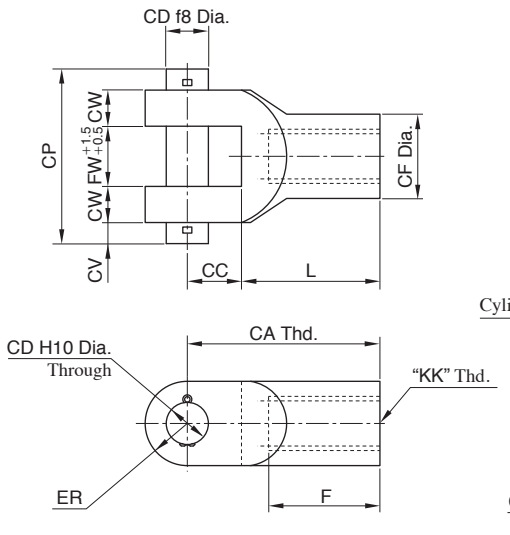
T-End (Rod End Eye) Option Code : L



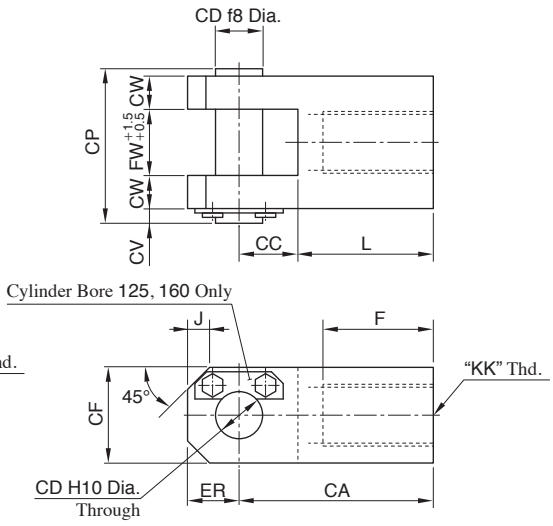
Cylinder Bore	KK	F	CA	CC	CD	CF	ER	FW	J	L
32	M12×1.25	25	55	20	12	24	R12	16	–	35
40	M12×1.25	25	60	20	14	24	R12	20	–	40
50	M18×1.5	37	64	18	14	28	R14	20	–	46
63										
80	M24×2	49	100	30	20	38	R19	32	–	70
100	M30×2	61	110	37	25	48	R24	40	–	73
125	M42×2	67	132	40	32	70	32	45	15	92
160	M48×2	78	150	45	36	79	36	50	19	105

Y-End (Rod End Clevis) Option Code : M

●Cylinder Bore 32 - 100



●Cylinder Bore 125, 160

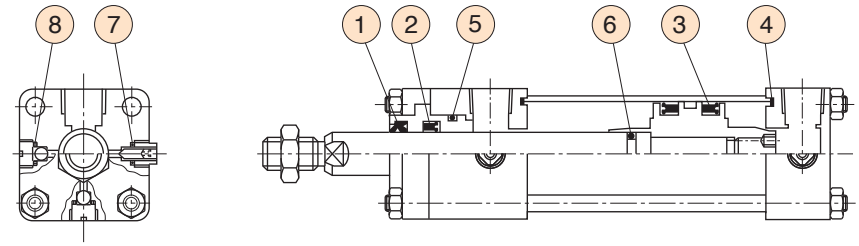


Cylinder Bore	KK	F	CA	CC	CD	CF	CW	ER	FW	CV	CP	J	L
32	M12×1.25	25	55	20	12	24	8	R12	16	7	46	–	35
40	M12×1.25	25	60	20	14	24	12	R12	20	7	58	–	40
50	M18×1.5	37	64	18	14	28	12	R14	20	7	58	–	46
63													
80	M24×2	49	100	28	20	38	16	R19	32	7	78	–	72
100	M30×2	61	110	35	25	48	20	R24	40	7	94	–	75
125	M42×2	75	132	40	32	65	22.5	35	45	10	105	15	92
160	M48×2	86	150	45	36	70	25	40	50	10	115	15	105

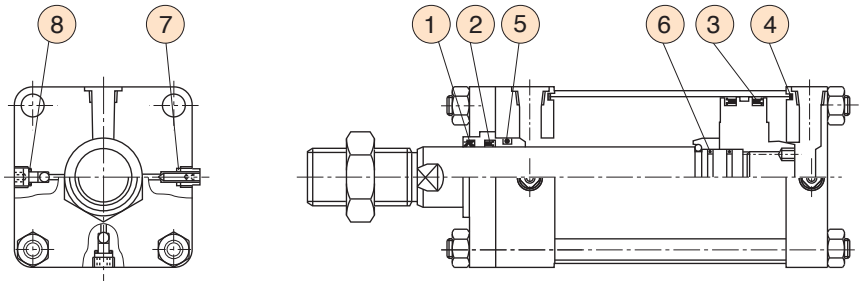
List of Seals

CJT 35

Cylinder Bore 32 - 100



Cylinder Bore 125 - 160



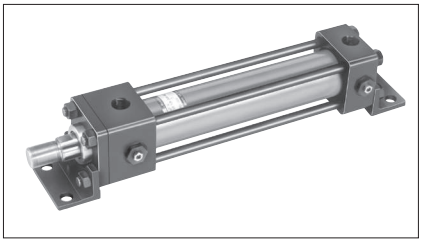
Item / Cylinder Bore	Model Numbers for Seal Kit ★1	① Dust Seal	② Rod Packing	③ Piston Packing	④ Packing for Cover	⑤ O-Ring for Bush ★2	⑥ O-Ring for Piston ★2	⑦ Cushion Valve Seal	⑧ Check Valve Seal
Q'ty		1	1	2	2	1	2	2	4
32	KS-CJT35- 32S-30	DHS-16	UHR-16	RHP-32	TX- 32	G25	S10	TF- 8	CR- 8
40	KS-CJT35- 40S-30	DHS-16	UHR-16	RHP-40	TX- 40	G25	P12	TF- 8	CR- 8
50	KS-CJT35- 50S-30	DHS-22	UHR-22	RHP-50	TX- 50	G35	P18	TF- 8	CR- 8
63	KS-CJT35- 63S-30	DHS-22	UHR-22	RHP-63	TX- 63	G35	P18	TF-12	CR-12
80	KS-CJT35- 80S-30	DHS-28	UHR-28A	RHP-80A	TX- 80	P36	P22A	TF-12	CR-12
100	KS-CJT35-100S-30	DHS-36	UHR-36	RHP-100A	TX-100	P46	G30	TF-14	CR-14
125	KS-CJT35-125S-30	DHS-45	UHR-45A	RHP-125A	TX-125	G55	G40	TF-14	CR-14
160	KS-CJT35-160S-30	DHS-56	UHR-56	RHP-160	TX-160	G65	G50	TF-14	CR-18

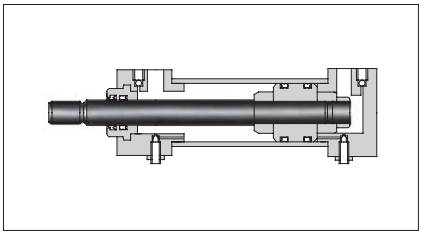
★1. Please specify the seal kit numbers above when ordering the seals.
★2. O-ring is OR NBR-70-1 P(G)**-N. Reference The O-ring code "S" for the cylinder bore 32 is a special standard.
★3. Material of standard packing is Nitrile Rubber. About Fluoro Rubber and Hydrogenated Nitrile Rubber, please specify "F-" in addition to the model of seal kit after "KS".
Fluorine Rubber : F- Hydrogenated Nitrile Rubber : 6-
Note: The packing code changes without notice.

"CJT 7/14 MPa" Series Hydraulic Cylinders

YUKEN's "CJT 7/14 MPa" Series Hydraulic Cylinders are provided with many mounting types so that they can be used for wide use of general purpose industrial machines such as machine tools.
In particular, the cushion mechanism has been improved to achieve smoother stopping characteristics with fewer shocks.
Moreover, Switch-Set "CJT" Series Hydraulic Cylinders with a proximity switch which facilitates detecting a position with a slide proximity switch on the cylinder body is also available.(Refer to page J-69 for details)

- Various mounting types.
- Excellent ability in low speed and high-precision operation.
- Gentle stop characterisitics obtained with a smooth cushion effect.

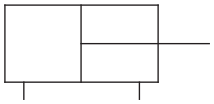




Specifications

Descriptions \ Series Number				CJT70	CJT140
Cylinder Bore mm				32, 40, 50, 63, 80, 100, 125, 140, 150, 160, 180, 200, 220, 250	
Mounting Type				SD, LA, LB, FA, FB, FC, FD, FE, FF, FY, CA, CB, TA, TC	SD, LA, LB, FC, FD, FE, FF, FY, CA, CB, TA, TC
Nominal Pressure ★1 MPa				7	14 ★4
Maximum Allowable Pressure ★1 MPa	Cap Side			9	18
	Rod Side	Rod Size	A	15	18
			B	13.5	18
			C	11	14
Proof Test Pressure ★1 MPa				10.5	21
Minimum Working Pressure				0.3 MPa. or less	
Operating Maximum Speed mm/s	Cylinder Bore		32 - 63	400	
			80 - 125	300	
			140 - 250	200	
Operating Minimum Speed mm/s				8	
Maximum Stroke ★2 mm	Cylinder Bore		32	1000	
			40,50	1200	
			63,80	1600	
			100 - 250	2000	
Tolerance of Stroke				Refer to the table "Tolerance of Stroke" ★3	
Tolerance of Thread				JIS B 0211–6g (JIS grade 2 or equivalence)	
Ambient Temperature Range				–10 - +80℃	
Mass kg				Refer to Page J-22	
Applicable Standard				Compliant with former JIS B8354	

Graphic Symbol



TC Type Mounting Minimum Stroke Fabrication Range

Cylinder Bore mm	Minimum Stroke mm
32, 40, 50	15
63	20
80	25
100, 125	15
140 - 250	0

★1. Refer to page J-7 for definitions of pressure terms.
★2. May be limited to even lower value in accordance with the buckling strength. Refer to page J-23 for strokes above buckling strength.
★3. Tolerance of Stroke

Stroke mm	Tolerance mm
100 or less	+0.8 0
More than 100 to 250	+1.0 0
More than 250 to 630	+1.25 0
More than 630 to 1000	+1.4 0
More than 1000 to 1600	+1.6 0
More than 1600 to 2000	+1.8 0

★4. In case of the double rod type cylinder, the nominal pressure is limited by the cylinder bore size.

Cylinder Bore	Nominal Pressure MPa	
	Double Rod Main Cover Side	Double Rod Driven Cover Side
32 - 125	14	14
140 - 250	14	7

Model Number Designation

F−	CJT140	−LA	125	B	100	B	−A	B	D	−E	−20
Packing Material	Series Number	Mounting Type	Cylinder Bore mm	Rod Size	Cylinder Stroke mm	Cushion Type	Port Position ★2	Cushion Adj. Valve Position ★2	Air Vent Valve Position ★2	Options ★1	Design Number
None : Nitrile Rubber (standard) F : Fluoro Rubber	CJT70 : 7MPa Series Standard Cylinder	SD, LA, LB, FA, FB, FC, FD, FE, FF, FY, CA, CB, TA★4, TC	40, 50, 63, 80, 100, 125, 140, 150, 160, 180, 200, 220, 250	A : Rod A (Super Strong)	Cylinder Stroke	B : ★3 With Cushion on Both ends R : ★3 With Cushion on the Rod side H : With Cushion on the Cap side N : Without Cushion	(Viewed from Rod End) A : Upper (Standard) B : Right C : Under D : Left	B : Right (Standard) A : Upper C : Under D : Left N : No Cushion adj. valve (Standard)	D : Left (Standard) A : Upper B : Right C : Under	Please consult us separately for options for Rod A. E : Long Rod End Thread F : With Dust Cover (Material: Nylon Tarpaulin, Heat resistant up to 80°C) G : With Dust Cover (Material: Chloroprene , Heat resistant up to 130°C) H : With Dust Cover (Material: Sylicon Glass, Heat resistant up to 250°C) K : With Lock Nut (E:Used in combination with long rod end thread) L : With T-End (Rod End Eye) M : With Y-End (Rod End Clevis) N : Double Rod	20
	CJT140 : 14MPa Series Standard Cylinder	SD, LA, LB, FC, FD, FE, FF, FY, CA, CB, TA★4, TC	32, 40, 50, 63, 80, 100, 125, 140, 150, 160, 180, 200, 220, 250	B : Rod B (Strong) C : Rod C (Standard)							

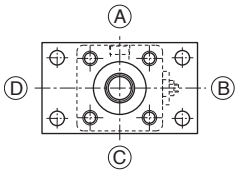
★1. Using the options in combination is available.
Please specify the option code in the alphabet.
Ex.: EKL
However, in case of the double rod type, the options E, F, G, H and K are attached to the both ends. The options L and M are attached at one end only.
Please consult the details about cylinder bore 180 or larger the options L and M with us. (This is a special design products)

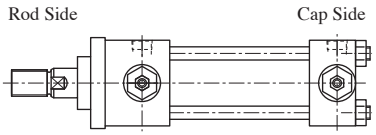
★2. As for each direction of port, cushion adj. valve and air vent valve, please select from ⒶⒷⒸⒹ viewed from rod end (see the figure on the right).
<Standard directions>
Port: Ⓐ,Cushion adj. valve: Ⓑ, Air vent valve: Ⓓ
Note: The direction of port and cushion adj. valve is not available to be the same direction. However, the other combinations are available.

★3. Cushion type "B" and "R" are not available for rod size A with cylinder bore 40, 50, 63.

★4. Mounting Type TA （Rod Trunnion） cylinder bore 180-250 cannot be selected.

★5. Phosphate ester type fluids are also supported. When phosphate ester type are used, prefix "F-" to the model number because the special seals (fluororubber) are required to used.





Mounting Type

Code	Name	Illustration of Mounting Type	Code	Name	Illustration of Mounting Type
SD	Basic Type		FD	Cap Square Flange	
LA	Foot Mounting Side Lugs		CA	Cap Detachable Eye	
LB	Foot Mounting Side End Angles		CB	Cap Detachable Clevis	
FA FE FY	Rod Rectangular Flange		TA	Rod Trunnion	
FB FF	Cap Rectangular Flange		TC	Intermediate Trunnion	
FC	Rod Square Flange				

Syllabus Table

Push (Cap Side Pressure)

Cylinder Bore mm	Pressurised Area cm^2	Output kN					Velocity by a unit flow rate 10L/min mm/s	Flow rate by a unit velocity 10mm/s L/min
		1 MPa	3 MPa	7 MPa	10.5 MPa	14 MPa		
32	8.0	0.80	2.41	5.63	8.44	11.26	208	0.5
40	12.6	1.26	3.77	8.79	13.19	17.58	132	0.8
50	19.6	1.96	5.89	13.74	20.61	27.48	85	1.2
63	31.2	3.12	9.35	21.81	32.71	43.62	53	1.9
80	50.3	5.03	15.07	35.17	52.75	70.34	33	3.0
100	78.5	7.85	23.55	54.95	82.43	109.90	21	4.7
125	122.7	12.27	36.80	85.86	128.79	171.72	14	7.4
140	153.9	15.39	46.16	107.70	161.55	215.40	10.8	9.2
150	176.7	17.67	53.01	123.70	185.55	247.40	9.4	10.6
160	201.0	20.10	60.29	140.67	211.01	281.34	8.3	12.1
180	254.3	25.43	76.30	178.04	267.06	356.08	6.6	15.3
200	314.0	31.40	94.20	219.80	329.70	439.60	5.3	18.8
220	379.9	37.99	113.98	265.96	398.94	531.92	4.4	22.8
250	490.6	49.06	147.19	343.44	515.16	686.88	3.4	29.4

Pull (Rod Side Pressure)

Cylinder Bore mm	Rod Size Code	Rod Size mm	Pressurised Area cm^2	Output kN					Velocity by a unit flow rate 10L/min mm/s	Flow rate by a unit velocity 10mm/s L/min
				1 MPa	3 MPa	7 MPa	10.5 MPa	14 MPa		
32	B	18	5.5	0.55	1.65	3.85	5.78	7.70	303	0.3
	C	14	6.5	0.65	1.95	4.55	6.83	9.10	256	0.4
40	A	28	6.4	0.64	1.92	4.48	6.72	8.96	260.5	0.4
	B	22	8.8	0.88	2.63	6.13	9.20	12.27	189	0.5
	C	18	10.0	1.00	3.00	7.00	10.50	14.00	167	0.6
50	A	36	9.4	0.94	2.82	6.58	9.87	13.16	177.3	0.6
	B	28	13.5	1.35	4.04	9.43	14.14	18.86	123	0.8
	C	22	15.8	1.58	4.75	11.08	16.62	22.16	105	0.9
63	A	45	15.3	1.53	4.59	10.71	16.07	21.42	109	0.9
	B	36	21.0	2.10	6.29	14.69	22.03	29.38	79	1.3
	C	28	25.0	2.50	7.50	17.50	26.25	35.00	67	1.5
80	A	56	25.7	2.57	7.71	17.99	26.99	35.98	64.9	1.5
	B	45	34.3	3.43	10.30	24.04	36.06	48.08	49	2.1
	C	36	40.1	4.01	12.02	28.05	42.07	56.09	42	2.4
100	A	70	40.0	4.00	12.00	28.00	42.00	56.00	41.7	2.4
	B	56	53.9	5.39	16.17	37.72	56.58	75.44	31	3.2
	C	45	62.6	6.26	18.78	43.82	65.73	87.65	27	3.8
125	A	90	59.1	5.91	17.73	41.37	62.06	82.74	28.2	3.5
	B	70	84.2	8.42	25.26	58.93	88.40	117.87	20	5.1
	C	56	98.0	9.80	29.41	68.63	102.94	137.25	17	5.9
140	A	100	75.4	7.54	22.62	52.78	79.17	105.56	22.1	4.5
	B	80	103.6	10.36	31.09	72.53	108.80	145.07	16	6.2
	C	63	122.7	12.27	36.81	85.89	128.84	171.78	14	7.4
150	A	106	88.5	8.85	26.55	61.95	92.93	123.90	18.8	5.3
	B	85	120.0	12.00	35.99	83.98	125.97	167.96	13.9	7.2
	C	67	141.5	14.15	42.44	99.02	148.53	198.04	11.8	8.5
160	A	110	106.0	10.60	31.80	74.20	111.30	148.40	15.7	6.4
	B	90	137.4	13.74	41.21	96.16	144.24	192.33	12	8.2
	C	70	162.5	16.25	48.75	113.75	170.62	227.49	10.3	9.8
180	A	125	131.6	13.16	39.48	92.12	138.18	184.24	12.7	7.9
	B	100	175.8	17.58	52.75	123.09	184.63	246.18	9.5	10.5
	C	80	204.1	20.41	61.23	142.87	214.31	285.74	8.2	12.2
200	A	140	160.1	16.01	48.03	112.07	168.11	224.12	10.4	9.6
	B	110	219.0	21.90	65.70	153.31	229.97	306.62	7.6	13.1
	C	90	250.4	25.04	75.12	175.29	262.94	350.58	6.7	15.0
220	A	160	178.9	17.89	53.67	125.23	187.85	250.46	9.3	10.7
	B	125	257.3	25.73	77.19	180.10	270.15	360.20	6.5	15.4
	C	100	301.4	30.14	90.43	211.01	316.51	422.02	5.5	18.1
250	A	180	236.3	23.63	70.89	165.41	248.12	330.82	7.1	14.2
	B	140	336.8	33.68	101.03	235.74	353.60	471.47	4.9	20.2
	C	110	395.6	39.56	118.69	276.95	415.42	553.90	4.2	23.7

Mass Table

Approx. Mass may be obtained from the formula below.

$$〔\text{Mass}〕 = 〔\text{Basic Mass}〕 + \left\{\text{Additional Mass By A Unit Stroke 100mm} \times \frac{\text{Stroke (mm)}}{100}\right\}$$

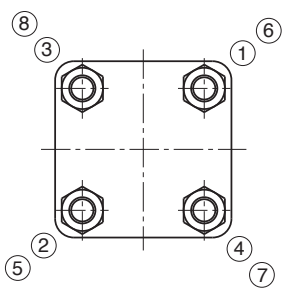
Basic mass by mounting type and additional mass by a unit stroke 100 mm

Cylinder Bore	Rod Size Code	Basic Mass kg													Additional Mass By A Unit Stroke 100mm kg
		SD	LA	LB	FA	FB	FC	FD	FE·FY	FF	CA	CB	TA	TC	
32	B	3.3	3.8	3.9	3.5	3.8	3.9	4.2	3.5	3.8	3.9	4.0	3.4	3.8	0.8
	C	3.2	3.7	3.8	3.4	3.7	3.8	4.1	3.3	3.6	3.8	3.9	3.3	3.7	0.7
40	A	4.4	4.8	4.9	4.7	5.0	5.2	5.4	4.8	5.2	5.0	5.1	4.5	5.0	1.1
	B	4.2	4.6	4.7	4.5	4.8	5.0	5.2	4.6	5.0	4.8	4.9	4.3	4.8	1.0
	C	4.1	4.5	4.6	4.4	4.7	4.9	5.1	4.5	4.9	4.7	4.8	4.2	4.7	0.9
50	A	7.3	8.1	8.1	7.8	8.4	8.7	9.3	8.3	8.9	8.3	8.5	7.4	8.3	1.7
	B	6.8	7.6	7.6	7.3	7.9	8.2	8.8	7.8	8.4	7.8	8.0	6.9	7.8	1.3
	C	6.7	7.5	7.5	7.2	7.8	8.1	8.7	7.7	8.3	7.7	7.9	6.8	7.7	1.2
63	A	10.8	11.7	12.4	11.4	12.5	12.7	13.8	12.1	13.1	13.0	13.7	11.2	12.6	2.4
	B	10.0	10.9	11.6	10.6	11.7	11.9	13.0	11.3	12.3	12.2	12.9	10.4	11.8	1.9
	C	9.9	10.8	11.5	10.5	11.6	11.8	12.9	11.2	12.2	12.1	12.8	10.3	11.7	1.6
80	A	17.0	17.8	19.1	18.0	19.8	19.9	21.6	19.0	20.7	19.8	20.7	17.4	19.2	3.6
	B	15.6	16.4	17.7	16.6	18.4	18.5	20.2	17.6	19.3	18.4	19.3	16.0	17.8	2.9
	C	15.2	16.0	17.3	16.2	18.0	18.1	19.8	17.2	18.9	18.0	18.9	15.6	17.4	2.4
100	A	28.8	30.0	32.1	30.4	33.4	33.3	36.3	32.2	35.6	34.4	35.9	29.6	33.5	5.6
	B	26.1	27.3	29.4	27.7	30.7	30.6	33.6	29.5	32.9	31.7	33.2	26.9	30.8	4.4
	C	25.7	26.9	29.0	27.3	30.3	30.2	33.2	29.1	32.5	31.3	32.8	26.5	30.4	3.8
125	A	53.4	55.5	62.5	55.9	61.3	60.7	66.0	59.1	64.4	63.4	66.4	54.0	60.5	8.9
	B	47.6	49.7	56.7	50.1	55.5	54.9	60.2	53.3	58.6	57.6	60.6	48.2	54.7	7.8
	C	47.2	49.3	56.3	49.7	55.1	54.5	59.8	52.9	58.2	57.2	60.2	47.8	54.3	6.6
140	A	70.5	73.5	83.5	73.6	81.8	80.7	87.0	78.4	85.6	85.6	91.7	72.4	81.2	11.7
	B	63.0	66.0	76.0	66.1	74.3	73.2	79.5	70.9	78.1	78.1	84.2	64.9	73.7	10.4
	C	60.4	63.4	73.4	63.5	71.7	70.6	76.9	68.3	75.5	75.5	81.6	62.3	71.1	8.9
150	A	82.6	89.1	101.0	88.7	97.4	97.0	105.0	94.6	103.0	99.8	104.5	88.9	96.6	12.7
	B	73.7	80.2	92.1	79.8	88.5	88.1	96.1	85.7	94.1	90.9	95.6	80.0	87.7	11.2
	C	70.1	76.6	88.5	76.2	84.9	84.5	92.5	82.1	90.5	87.3	92.0	76.4	84.1	9.6
160	A	98.4	102.6	115.2	103.5	114.7	113.0	124.2	109.0	120.2	120.9	129.8	100.7	114.7	13.9
	B	89.4	93.6	106.2	94.5	105.7	104.0	115.2	100.0	111.2	111.9	120.8	91.7	105.7	12.5
	C	86.1	90.3	102.9	91.2	102.4	100.7	111.9	96.7	107.9	108.6	117.5	88.4	102.4	10.6
180	A	126.1	141.8	159.1	142.6	156.9	155.0	169.2	151.4	165.7	164.4	179.4	–	153.0	19.1
	B	111.7	127.4	144.7	128.2	142.5	140.6	154.8	137.0	151.3	150.0	165.0	–	138.6	17.9
	C	106.7	122.4	139.7	123.2	137.5	135.6	149.8	132.0	146.3	145.0	160.0	–	133.6	15.7
200	A	162.1	170.7	199.0	172.3	192.2	190.5	210.4	184.3	204.2	209.2	228.6	–	178.0	23.3
	B	141.5	150.1	178.4	151.7	171.6	169.9	189.8	163.7	183.6	188.6	208.0	–	157.4	21.7
	C	136.4	145.0	173.3	146.6	166.5	164.8	184.7	158.6	178.5	183.5	202.9	–	152.3	19.0
220	A	238.0	247.2	295.0	252.3	279.7	276.4	303.8	270.8	298.2	297.7	322.7	–	273.9	33.8
	B	208.4	217.6	265.4	222.7	250.1	246.8	274.2	241.2	268.6	268.1	293.1	–	244.3	26.4
	C	198.5	207.7	255.5	212.8	240.2	236.9	264.3	231.3	258.7	258.2	283.2	–	234.4	23.0
250	A	335.7	349.1	416.2	353.2	390.7	385.6	422.8	376.9	415.1	409.4	435.0	–	373.0	40.8
	B	291.2	304.6	371.7	308.7	346.2	341.1	378.3	332.4	370.6	364.9	390.5	–	328.5	32.8
	C	280.8	294.2	361.3	298.3	335.8	330.7	367.9	322.0	360.2	354.5	380.1	–	318.1	28.4

Tie Rod Tightening

When tightening tie rods, do not tighten only one tie rod tightly at a time, but gradually tighten the tie rods in the order of the numbers shown in the figure on the right. Note that one-sided tightening of tie rods may cause operation failure or chattering.

Bore mm	32	40	50	63	80	100	125
Tightening Torque Nm	18	35	62	100	150	300	550
Bore mm	140	150	160	180	200	220	250
Tightening Torque Nm	800	800	1100	1100	1400	2400	3000

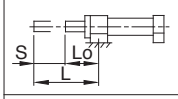
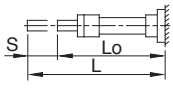
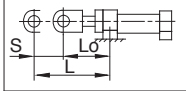
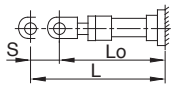
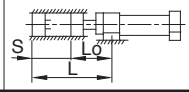
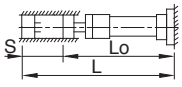
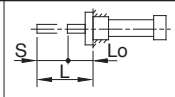
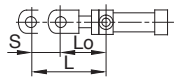
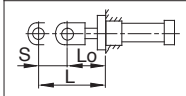
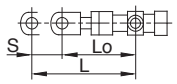
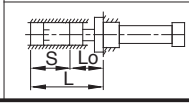
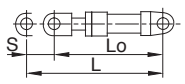


Maximum stroke limited by buckling strength

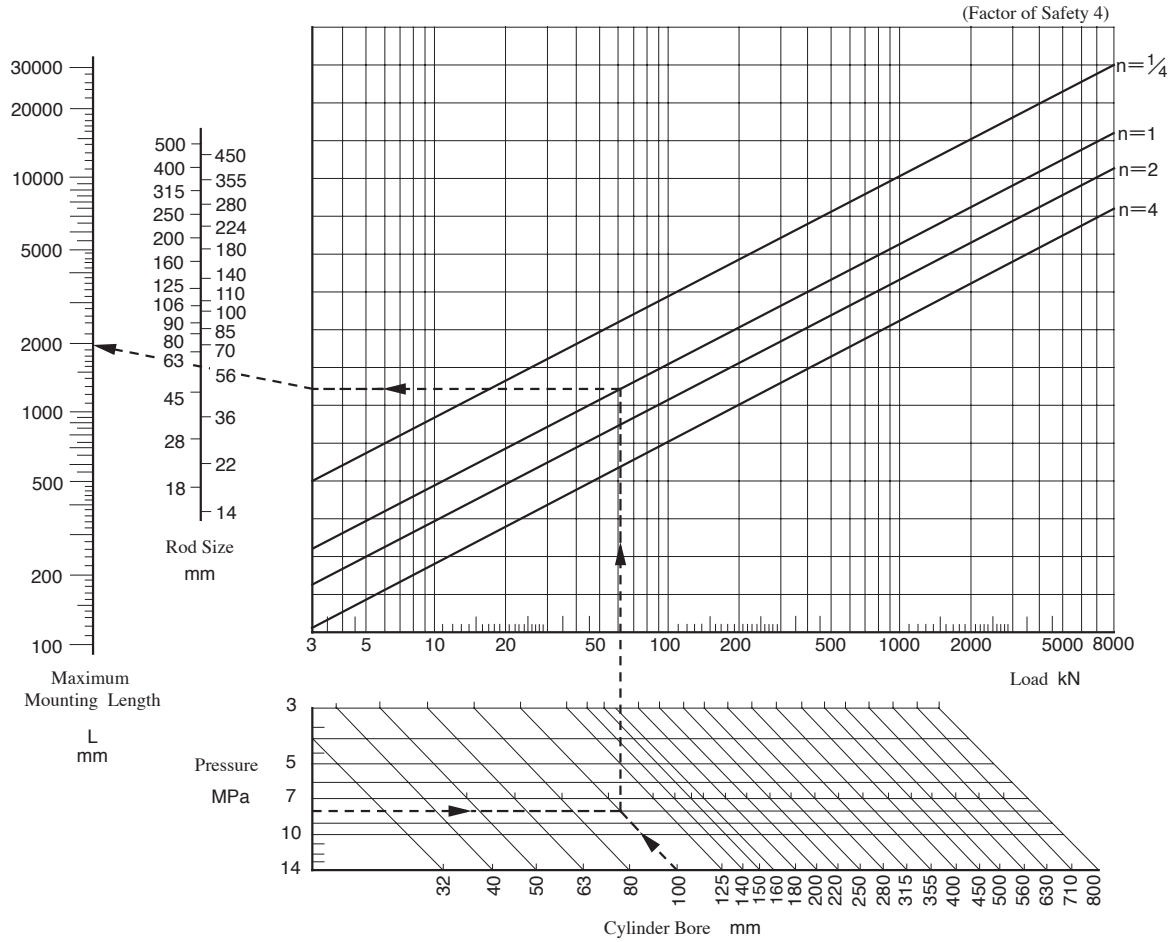
Calculation of Maximum Stroke

1. Calculate rod end coefficient n from the table on the right.
2. Calculate the maximum installation length L by applying various values such as cylinder bore, rod size, pressure, and rod end coefficient to the figure below.
3. Refer to the external dimensions and calculate the mounting length Lo when retracted.
   Use the formula S=L–Lo and calculate the maximum stroke S.
   (Example) Cylinder bore 100 mm, rod size 56 mm, mounting type TC (intermediate trunnion type) standard cylinder operated at 8 MPa pressure. Calculate the maximum stroke.

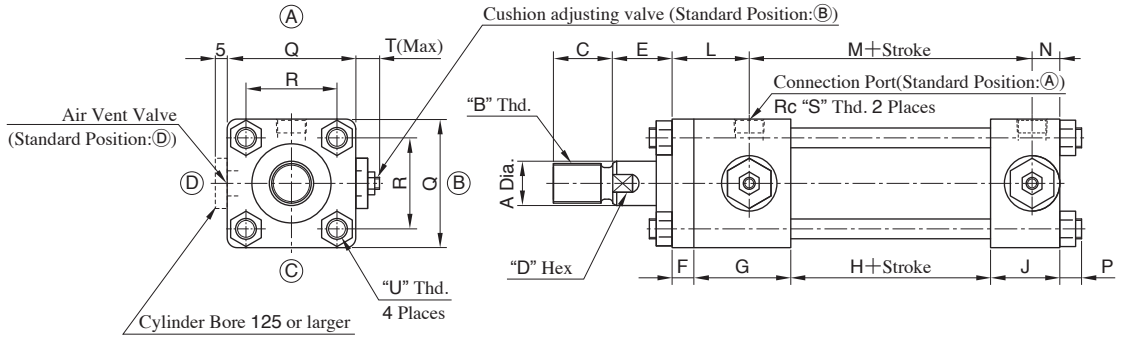
   From the table on the right n=1
   From the figure below L≒1980
   From Dimensional Drawing (J-37) and Rod End Attachment (J-38)
   $Lo=(156+145)+\frac{S}{2}$
   therefore $S=L-Lo=1980-[(156+145)+\frac{S}{2}]$
   hence S≒1120 mm

Mounting Type	Type	Rod End Coefficient n	Mounting Type	Type	Rod End Coefficient n
LA		1/4	FB		1/4
LB		2	FD		2
		4	FF		4
FA		1/4	TA		1
FC FE		2	TC		
FY		4	CA CB		

S=L–Lo
S : Stroke mm
L : Mounting Length at extension mm
Lo : Mounting Length at contraction mm
Note: For Lo dimensions, refer to dimensional drawing and add the dimensions of rod end attachment.



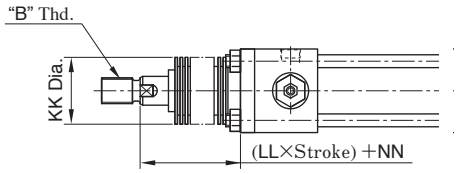
SD : Basic Type.....Nominal Pressure 7・14 MPa



Options

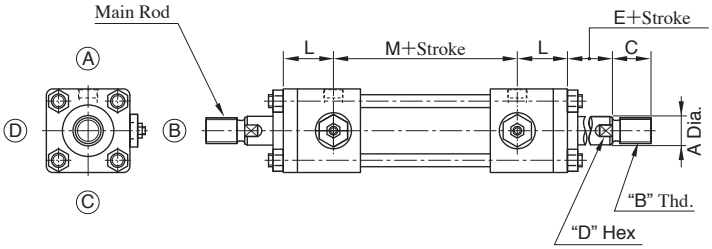
With Dust Cover

Type F: Material: Nylon Tarpaulin, heat resistant up to 80°C
Type G: Material: Chloroprene, heat resistant up to 130°C
Type H: Material:Silicon Glass,heat resistant up to 250°C



Note : FE type & the other mounting type has difference in dimension "NN".

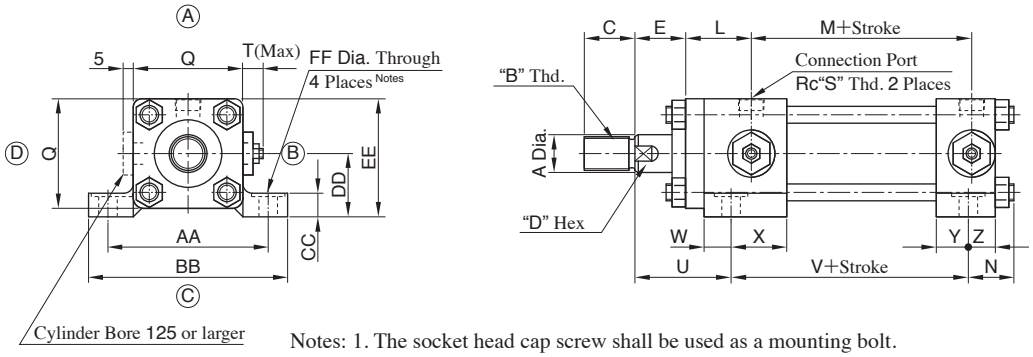
Double Rod Type "N"



Cylinder Bore	A Rod Size			B Rod Size			C★1 Rod Size			D Rod Size			KK Rod Size		E	F	G	H	J	L	M	N	P	Q	R	S	T	U	★2 LL	★3 NN
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"B"	"C"																
32	–	18	14	–	M16×1.5	M12×1.25	–	25 (32)	18 (24)	–	14	12	46	46	30	11	49	46	35	39	88	14	9	58	40	3/8	12	M8×1.0		45 (45)
40	28	22	18	M24×1.5	M20×1.5	M16×1.5	35 (48)	30 (40)	25 (32)	24	19	14	52	48	30	11	49	46	35	39	88	14	11	65	45	3/8	12	M10×1.25	1/3.5	45 (43)
50	36	28	22	M30×1.5	M24×1.5	M20×1.5	45 (60)	35 (48)	30 (40)	30	24	19	59	52	30	13	56	46	40	44	96	15	13	80	55	1/2	12	M12×1.25		45 (40)
63	45	36	28	M39×1.5	M30×1.5	M24×1.5	60 (78)	45 (60)	35 (48)	41	30	24	69	59	35	15	44	70	34	42	104	17	14.5	94	65	1/2	12	M14×1.5		55 (50)
80	56	45	36	M48×1.5	M39×1.5	M30×1.5	75 (96)	60 (78)	45 (60)	50	41	30	81	69	35	18	50	78	38	48	118	18	16.5	110	82	3/4	12	M16×1.5	1/4	55 (49)
100	70	56	45	M64×2.0	M48×1.5	M39×1.5	95 (128)	75 (96)	60 (78)	65	50	41	100	81	40	20	57	74	41	54	120	18	19.5	138	103	3/4	12	M20×1.5		55 (47)
125	90	70	56	M80×2.0	M64×2.0	M48×1.5	120 (140)	95 (128)	75 (96)	85	65	50	118	100	45	24	67	78	51	63	134	23	23	168	125	1	15	M24×1.5		65 (56)
140	100	80	63	M95×2.0	M72×2.0	M56×2.0	140 (165)	110 (128)	80 (112)	95	75	55	129	106	50	26	67	86	51	65	142	23	25	188	141	1	15	M27×1.5		65 (54)
150	106	85	67	M100×2.0	M76×2.0	M60×2.0	150 (175)	115 (128)	85 (120)	100	80	60	135	112	50	28	67	91	54	67	147	26	25	196	148	1	15	M27×1.5		65 (54)
160	110	90	70	M100×2.0	M80×2.0	M64×2.0	150 (175)	120 (140)	95 (128)	105	85	65	140	118	55	31	65	98	59	66	158	29	28.5	215	160	1	15	M30×1.5	1/5	65 (55)
180	125	100	80	M120×2.0	M95×2.0	M72×2.0	180 (210)	140 (165)	110 (128)	120	95	75	151	129	55	33	75	106	61	75	172	28	27	235	182	1 1/4	15	M30×1.5		65 (52)
200	140	110	90	M130×2.0	M100×2.0	M80×2.0	195 (225)	150 (175)	120 (140)	135	105	85	170	140	55	37	85	110	69	85	184	32	29	262	200	1 1/2	15	M33×1.5		65 (51)
220	160	125	100	M150×2.0	M120×2.0	M95×2.0	225 (260)	180 (210)	140 (175)	155	120	95	183	151	60	41	85	110	69	89	184	32	34	292	225	1 1/2	15	M39×1.5	1/6	80 (63)
250	180	140	110	M170×2.0	M130×2.0	M100×2.0	255 (295)	195 (225)	150 (175)	175	135	105	205	170	65	46	105	110	85	106	200	40	37	325	250	2	15	M42×1.5		80 (61)

★1. Only long rod end thread type : the dimension "C" is the value in parentheses.
★2. If the calculated value of LL x stroke has a fraction less than a whole number, correct (round up) to the nearest 0.5 mm.
★3. NN dimensions are in parentheses only when Mounting Type is FE type.

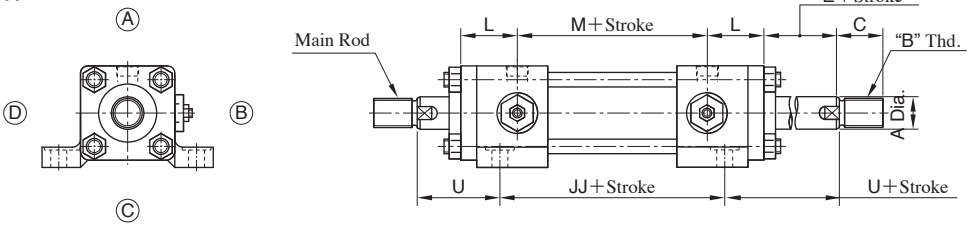
LA : Foot Mounting Side Lugs.....Nominal Pressure 7 · 14 MPa



Notes: 1. The socket head cap screw shall be used as a mounting bolt.
2. As for cylinder bore 32-100, in case the port direction is "B" or "D", pipe fittings may interference with cylinder mounting bolts. See instructions on page J-4 for details.

Options

Double Rod Type "N"



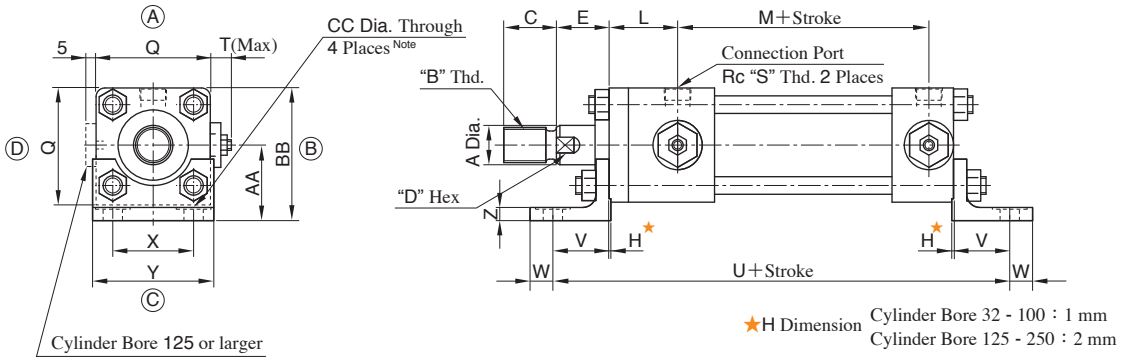
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			E	L	M	N	Q	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	JJ
	Rod Size			Rod Size			Rod Size			Rod Size																						
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"																				
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	30	39	88	25	58	3/8	12	57	98	16	33	19	16	88	109	14	35 ± 0.15	64	11	112
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	30	39	88	27	65	3/8	12	57	98	16	33	19	16	95	118	14	37.5 ± 0.15	70	11	112
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	30	44	96	30	80	1/2	12	60	108	17	39	23	17	115	145	17	45 ± 0.15	85	14	124
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	35	42	104	35	94	1/2	12	71	106	21	23	13	21	132	165	19	50 ± 0.15	97	18	116
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	35	48	118	37	110	3/4	12	74	124	21	29	17	21	155	190	25	60 ± 0.25	115	18	136
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	40	54	120	44	138	3/4	12	85	122	25	32	16	25	190	230	27	71 ± 0.25	140	22	138
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	45	63	134	53	168	1	15	99	136	30	37	21	30	224	272	32	85 ± 0.25	169	26	152
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	50	65	142	55	188	1	15	106	144	30	37	21	30	250	300	35	95 ± 0.25	189	26	160
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	50	67	147	58	196	1	15	111	146	33	34	21	33	270	320	37	106 ± 0.25	204	30	159
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	55	66	158	64	215	1	15	122	150	36	29	23	36	285	345	42	112 ± 0.25	219.5	33	156
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	55	75	172	62	235	1 1/4	15	123	172	35	40	26	35	315	375	47	125 ± 0.25	242.5	33	186
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	55	85	184	68	262	1 1/2	15	131	186	39	46	30	39	355	425	52	140 ± 0.25	271	36	202
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	60	89	184	73	292	1 1/2	15	140	186	39	46	30	39	395	475	52	150 ± 0.25	296	42	202
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	65	106	200	84	325	2	15	158	206	47	58	38	47	425	515	57	170 ± 0.25	332.5	45	226

★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

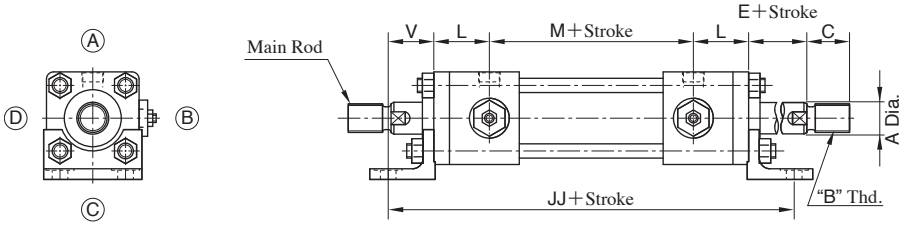
LB : Foot Mounting Side End Angles.....Nominal Pressure 7・14 MPa



Note: The socket head cap screw shall be used as a mounting bolt.

Options

Double Rod Type "N"



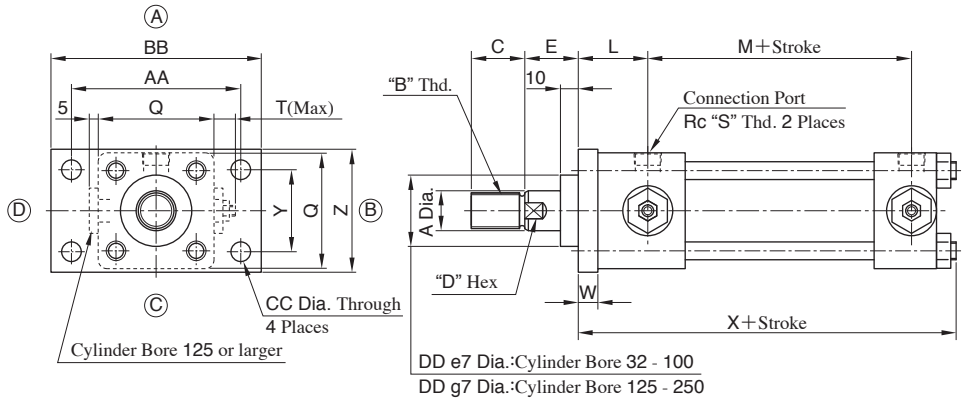
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C ★1			D			E	L	M	Q	S	T	U	V	W	X	Y	Z	AA	BB	CC	JJ
	Rod Size			Rod Size			Rod Size			Rod Size																		
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"																
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	30	39	88	58	3/8	12	205	32	13	40	63	7.5	40 ± 0.15	69	11	230
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	30	39	88	65	3/8	12	205	32	13	46	69	7.5	43 ± 0.15	75.5	11	230
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	30	44	96	80	1/2	12	225	35	15	58	85	7.5	50 ± 0.15	90	14	254
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	35	42	104	94	1/2	12	247	42	18	65	98	11.5	60 ± 0.15	107	18	272
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	35	48	118	110	3/4	12	284	50	20	87	118	11.5	72 ± 0.25	127	18	314
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	40	54	120	138	3/4	12	302	55	23	109	150	12.5	85 ± 0.25	154	22	338
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	45	63	134	168	1	15	352	66	29	130	175	14.5	105 ± 0.25	189	26	397
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	50	65	142	188	1	15	370	70	30	145	195	17.5	115 ± 0.25	209	26	412
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	50	67	147	196	1	15	390	75	30	155	210	17.5	123 ± 0.25	221	30	431
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	55	66	158	215	1	15	403	75	35	170	225	17.5	132 ± 0.25	239.5	33	440
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	55	75	172	235	1 1/4	15	445	85	40	185	243	19.5	148 ± 0.25	265.5	33	492
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	55	85	184	262	1 1/2	15	497	98	40	206	272	24.5	165 ± 0.25	296	36	550
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	60	89	184	292	1 1/2	15	535	115	45	230	310	29.5	185 ± 0.25	331	42	592
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	65	106	200	325	2	15	606	130	50	250	335	34.5	208 ± 0.25	370.5	45	672

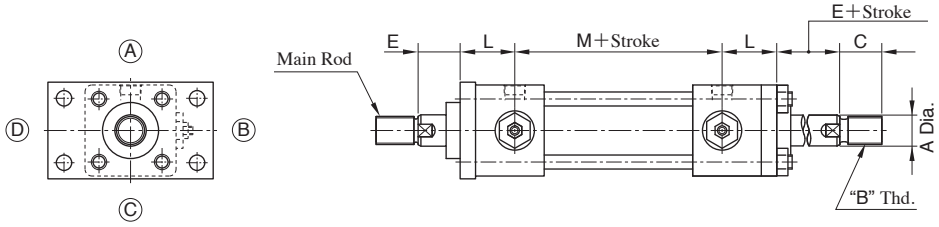
★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

FA : Rod Rectangular Flange.....Nominal Pressure 7 MPa



Options

Double Rod Type "N"



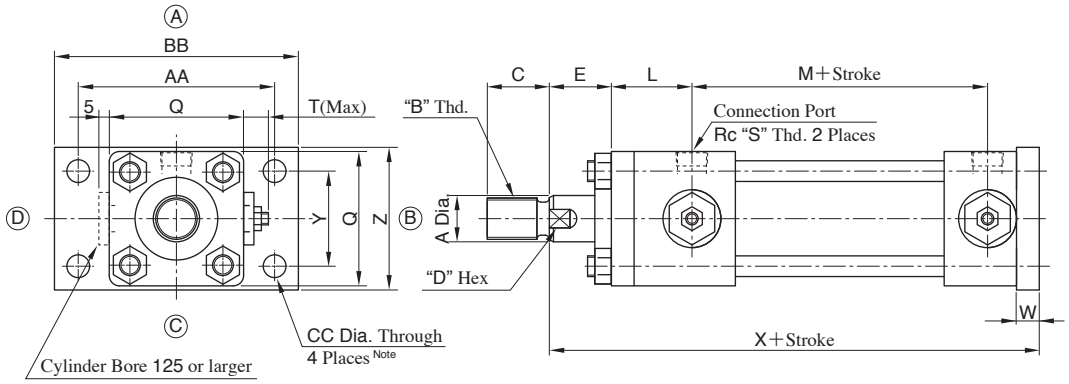
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C ★1			D			DD			E	L	M	Q	S	T	W	X	Y	Z	AA	BB	CC
	Rod Size			Rod Size			Rod Size			Rod Size			Rod Size															
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"													
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	–	34	34	30	39	88	58	3/8	12	11	150	40	63	88	109	11
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	46	40	36	30	39	88	65	3/8	12	11	152	46	69	95	118	11
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	55	46	40	30	44	96	80	1/2	12	13	168	58	85	115	145	14
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	65	55	46	35	42	104	94	1/2	12	15	177.5	65	98	132	165	18
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	80	65	55	35	48	118	110	3/4	12	18	200.5	87	118	155	190	18
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	95	80	65	40	54	120	138	3/4	12	20	211.5	109	150	190	230	22
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	115	95	80	45	63	134	168	1	15	24	243	130	175	224	272	26
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	125	105	85	50	65	142	188	1	15	26	255	145	195	250	300	26
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	135	110	90	50	67	147	196	1	15	28	265	155	210	270	320	30
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	140	115	95	55	66	158	215	1	15	31	281.5	170	225	285	345	33
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	150	125	105	55	75	172	235	1 1/4	15	33	302	185	243	315	375	33
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	170	140	115	55	85	184	262	1 1/2	15	37	330	206	272	355	425	36
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	195	150	125	60	89	184	292	1 1/2	15	41	339	230	310	395	475	42
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	215	170	140	65	106	200	325	2	15	46	383	250	335	425	515	45

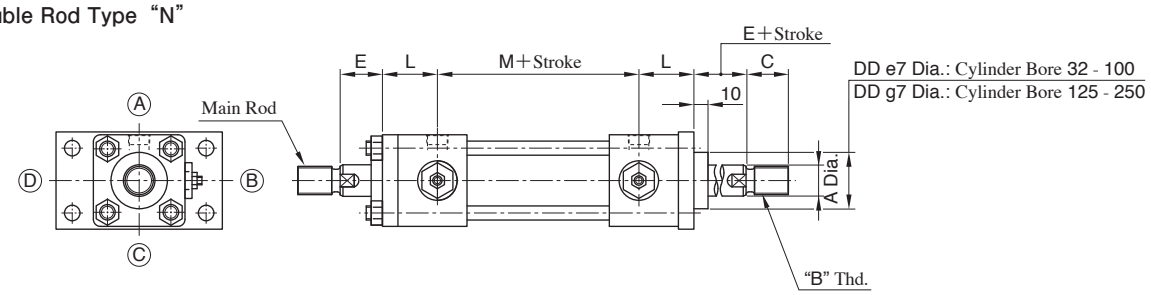
★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

FB : Cap Rectangular Flange.....Nominal Pressure 7 MPa



Options

Double Rod Type "N"



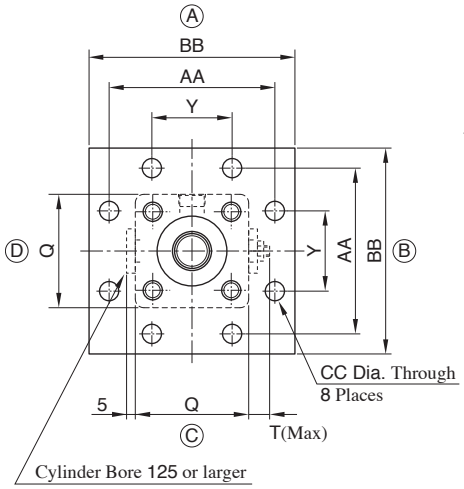
With Dust Cover:

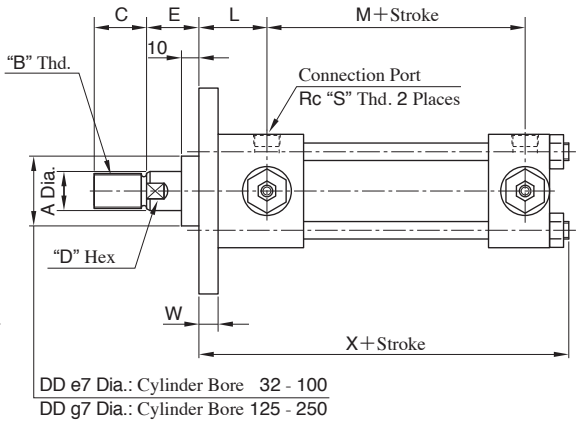
Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			DD			E	L	M	Q	S	T	W	X	Y	Z	AA	BB	CC
	Rod Size			Rod Size			Rod Size			Rod Size			Rod Size															
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"													
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	–	34	34	30	39	88	58	3/8	12	11	182	40	63	88	109	11
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	46	40	36	30	39	88	65	3/8	12	11	182	46	69	95	118	11
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	55	46	40	30	44	96	80	1/2	12	13	198	58	85	115	145	14
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	65	55	46	35	42	104	94	1/2	12	15	213	65	98	132	165	18
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	80	65	55	35	48	118	110	3/4	12	18	237	87	118	155	190	18
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	95	80	65	40	54	120	138	3/4	12	20	252	109	150	190	230	22
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	115	95	80	45	63	134	168	1	15	24	289	130	175	224	272	26
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	125	105	85	50	65	142	188	1	15	26	306	145	195	250	300	26
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	135	110	90	50	67	147	196	1	15	28	318	155	210	270	320	30
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	140	115	95	55	66	158	215	1	15	31	339	170	225	285	345	33
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	150	125	105	55	75	172	235	1 1/4	15	33	363	185	243	315	375	33
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	170	140	115	55	85	184	262	1 1/2	15	37	393	206	272	355	425	36
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	195	150	125	60	89	184	292	1 1/2	15	41	406	230	310	395	475	42
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	215	170	140	65	106	200	325	2	15	46	457	250	335	425	515	45

★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

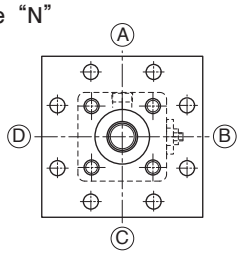
FC : Rod Square Flange.....Nominal Pressure 7・14 MPa

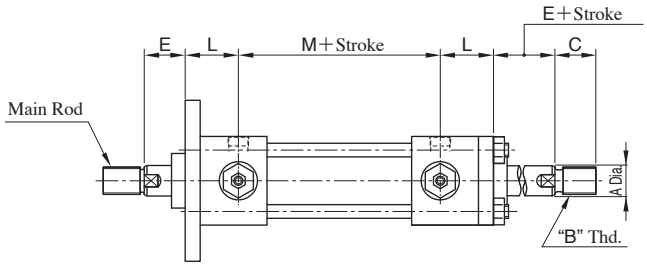




Options

Double Rod Type "N"





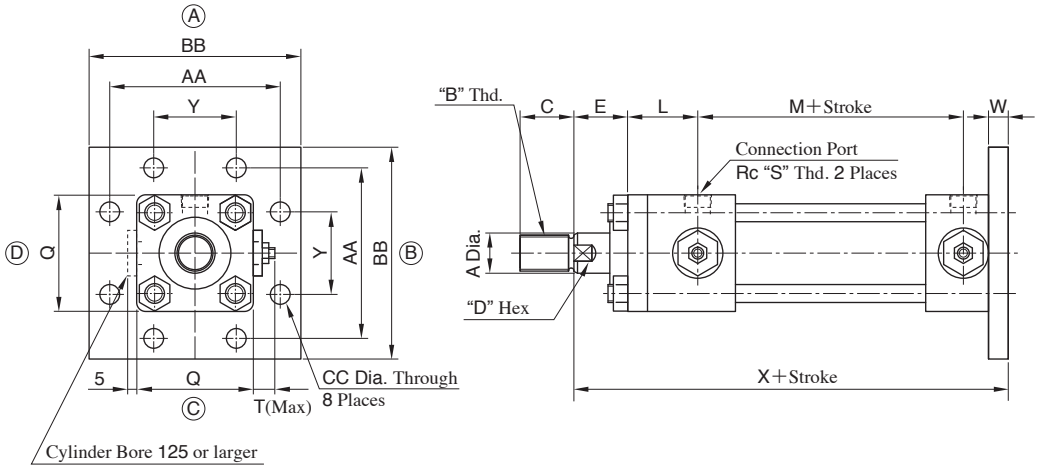
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			DD			E	L	M	Q	S	T	W	X	Y	AA	BB	CC
	Rod Size			Rod Size			Rod Size			Rod Size			Rod Size															
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"												
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	–	34	34	30	39	88	58	3/8	12	11	150	40	88	109	11
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	46	40	36	30	39	88	65	3/8	12	11	152	46	95	118	11
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	55	46	40	30	44	96	80	1/2	12	13	168	58	115	145	14
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	65	55	46	35	42	104	94	1/2	12	15	177.5	65	132	165	18
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	80	65	55	35	48	118	110	3/4	12	18	200.5	87	155	190	18
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	95	80	65	40	54	120	138	3/4	12	20	211.5	109	190	230	22
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	115	95	80	45	63	134	168	1	15	24	243	130	224	272	26
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	125	105	85	50	65	142	188	1	15	26	255	145	250	300	26
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	135	110	90	50	67	147	196	1	15	28	265	155	270	320	30
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	140	115	95	55	66	158	215	1	15	31	281.5	170	285	345	33
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	150	125	105	55	75	172	235	1 1/4	15	33	302	185	315	375	33
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	170	140	115	55	85	184	262	1 1/2	15	37	330	206	355	425	36
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	195	150	125	60	89	184	292	1 1/2	15	41	339	230	395	475	42
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	215	170	140	65	106	200	325	2	15	46	383	250	425	515	45

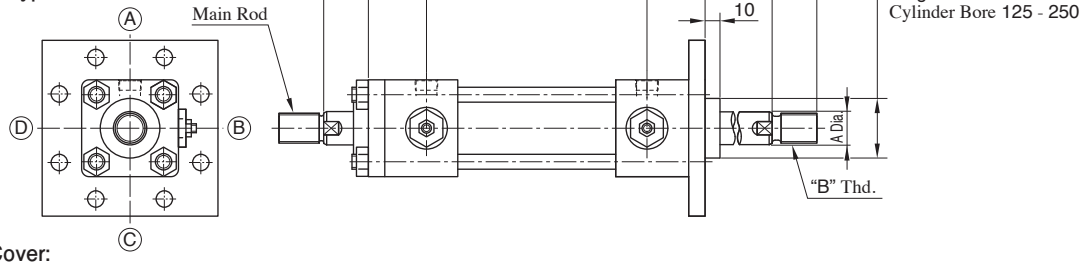
★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

FD : Cap Square Flange.....Nominal Pressure 7・14 MPa



Options

Double Rod Type "N"



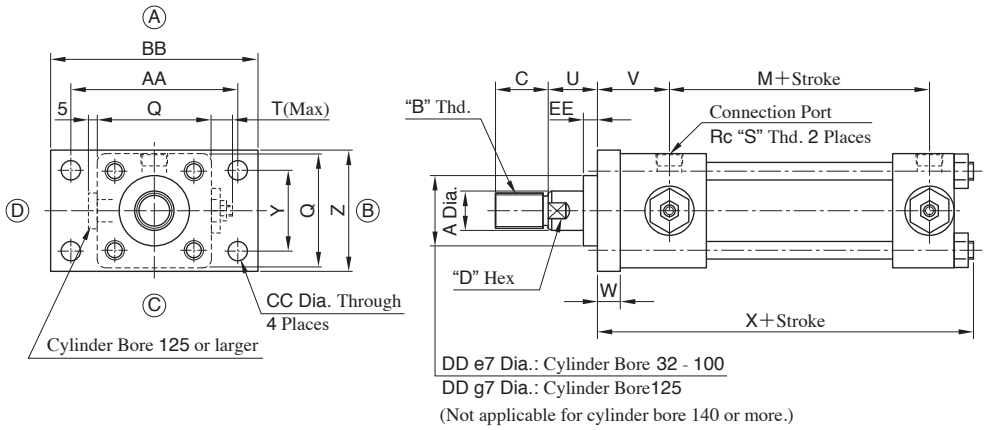
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			DD			E	L	M	Q	S	T	W	X	Y	AA	BB	CC
	Rod Size			Rod Size			Rod Size			Rod Size			Rod Size														
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"												
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	–	34	34	30	39	88	58	3/8	12	11	182	40	88	109	11
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	46	40	36	30	39	88	65	3/8	12	11	182	46	95	118	11
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	55	46	40	30	44	96	80	1/2	12	13	198	58	115	145	14
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	65	55	46	35	42	104	94	1/2	12	15	213	65	132	165	18
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	80	65	55	35	48	118	110	3/4	12	18	237	87	155	190	18
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	95	80	65	40	54	120	138	3/4	12	20	252	109	190	230	22
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	115	95	80	45	63	134	168	1	15	24	289	130	224	272	26
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	125	105	85	50	65	142	188	1	15	26	306	145	250	300	26
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	135	110	90	50	67	147	196	1	15	28	318	155	270	320	30
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	140	115	95	55	66	158	215	1	15	31	339	170	285	345	33
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	150	125	105	55	75	172	235	1 1/4	15	33	363	185	315	375	33
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	170	140	115	55	85	184	262	1 1/2	15	37	393	206	355	425	36
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	195	150	125	60	89	184	292	1 1/2	15	41	406	230	395	475	42
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	215	170	140	65	106	200	325	2	15	46	457	250	425	515	45

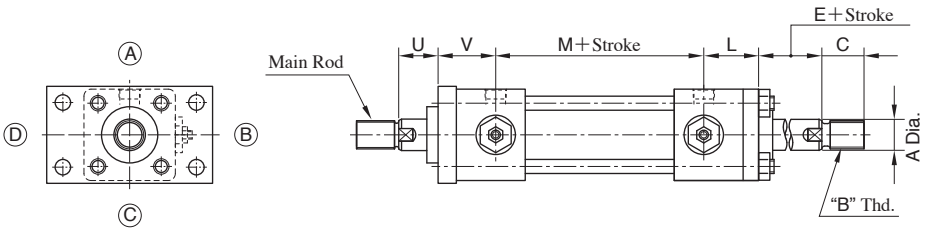
★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

FE : Rod Rectangular Flange.....Nominal Pressure 7・14 MPa



Options

Double Rod Type "N"



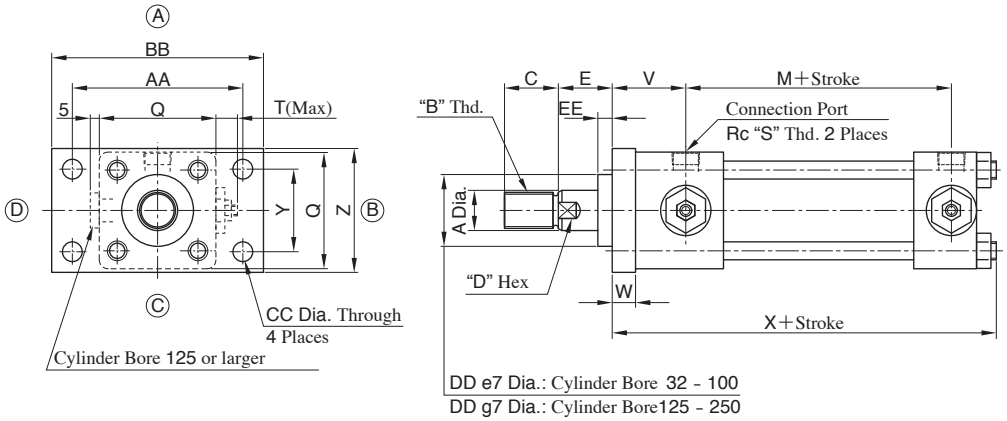
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			DD			E	L	M	Q	S	T	U	V	W	X	Y	Z	AA	BB	CC	EE
	Rod Size			Rod Size			Rod Size			Rod Size			Rod Size																		
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"																
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	–	34	34	30	39	88	58	3/8	12	28	41	13	152	40	63	88	109	11	8
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	46	40	36	30	39	88	65	3/8	12	28	41	13	154	46	69	95	118	11	8
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	55	46	40	30	44	96	80	1/2	12	25	49	18	173	58	85	115	145	14	5
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	65	55	46	35	42	104	94	1/2	12	30	47	20	182.5	65	98	132	165	18	5
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	80	65	55	35	48	118	110	3/4	12	29	54	24	206.5	87	118	155	190	18	4
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	95	80	65	40	54	120	138	3/4	12	32	62	28	219.5	109	150	190	230	22	2
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	115	95	80	45	63	134	168	1	15	36	72	33	252	130	175	224	272	26	1
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	–	–	–	50	65	142	188	1	15	39	76	37	266	145	195	250	300	26	–
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	–	–	–	50	67	147	196	1	15	39	78	39	276	155	210	270	320	30	–
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	–	–	–	55	66	158	215	1	15	45	76	41	291.5	170	225	285	345	33	–
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	–	–	–	55	75	172	235	1 1/4	15	42	88	46	315	185	243	315	375	33	–
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	–	–	–	55	85	184	262	1 1/2	15	41	99	51	344	206	272	355	425	36	–
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	–	–	–	60	89	184	292	1 1/2	15	43	106	58	356	230	310	395	475	42	–
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	–	–	–	65	106	200	325	2	15	46	125	65	402	250	335	425	515	45	–

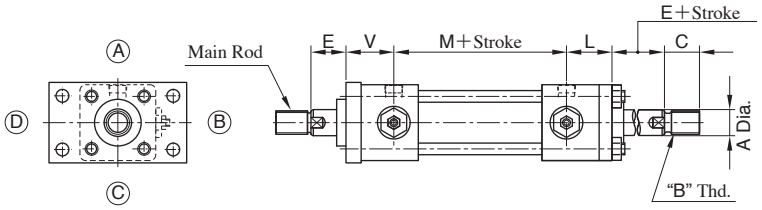
★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

FY : Rod Rectangular Flange.....Nominal Pressure 7・14 MPa



Options

Double Rod Type "N"



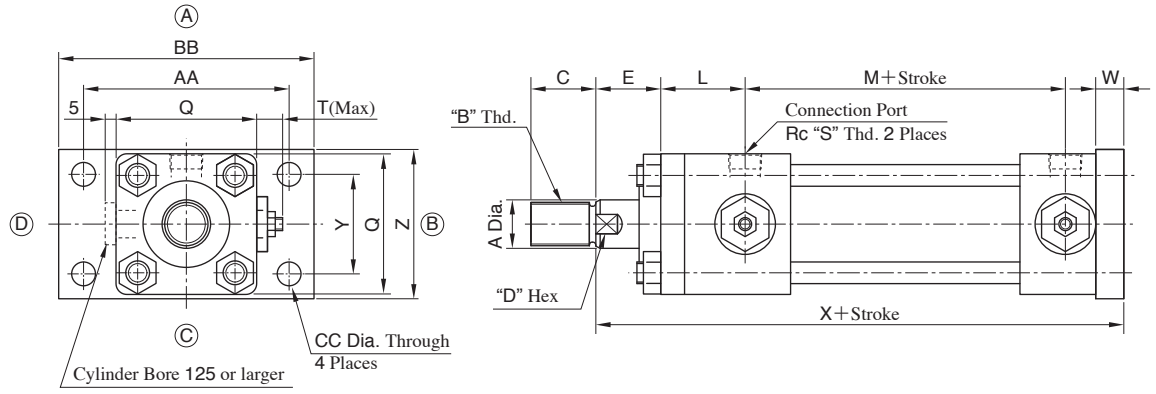
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			DD			E	L	M	Q	S	T	V	W	X	Y	Z	AA	BB	CC	EE
	Rod Size			Rod Size			Rod Size			Rod Size			Rod Size																	
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"															
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	–	34	34	30	39	88	58	3/8	12	41	13	152	40	63	88	109	11	8
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	46	40	36	30	39	88	65	3/8	12	41	13	154	46	69	95	118	11	8
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	55	46	40	30	44	96	80	1/2	12	49	18	173	58	85	115	145	14	10
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	65	55	46	35	42	104	94	1/2	12	47	20	182.5	65	98	132	165	18	10
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	80	65	55	35	48	118	110	3/4	12	54	24	206.5	87	118	155	190	18	10
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	95	80	65	40	54	120	138	3/4	12	62	28	219.5	109	150	190	230	22	10
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	115	95	80	45	63	134	168	1	15	72	33	252	130	175	224	272	26	10
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	125	105	85	50	65	142	188	1	15	76	37	266	145	195	250	300	26	10
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	135	110	90	50	67	147	196	1	15	78	39	276	155	210	270	320	30	10
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	140	115	95	55	66	158	215	1	15	76	41	291.5	170	225	285	345	33	10
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	150	125	105	55	75	172	235	1 1/4	15	88	46	315	185	243	315	375	33	10
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	170	140	115	55	85	184	262	1 1/2	15	99	51	344	206	272	355	425	36	10
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	195	150	125	60	89	184	292	1 1/2	15	106	58	356	230	310	395	475	42	10
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	215	170	140	65	106	200	325	2	15	125	65	402	250	335	425	515	45	10

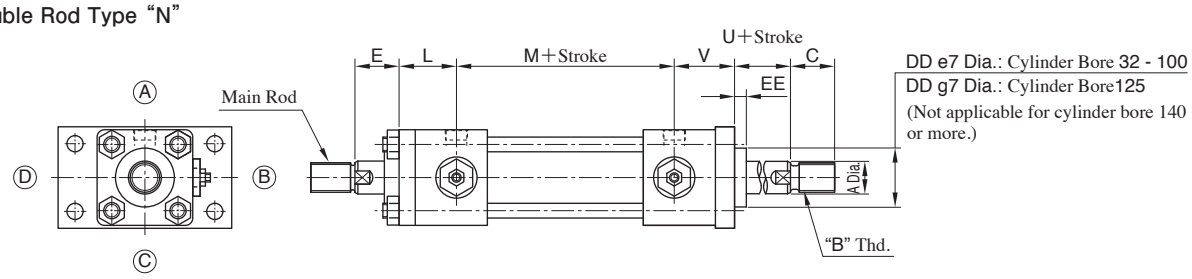
★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

FF : Cap Rectangular Flange.....Nominal Pressure 7・14 MPa



Options

Double Rod Type "N"



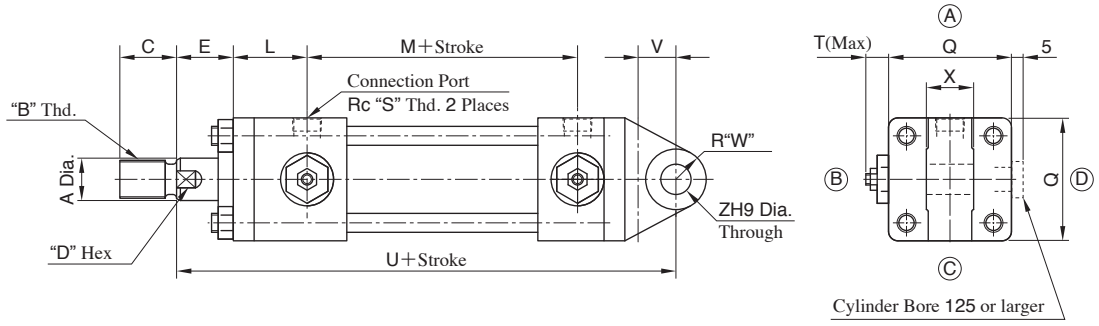
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			DD		E	L	M	Q	S	T	U	V	W	X	Y	Z	AA	BB	CC	EE
	Rod Size			Rod Size			Rod Size			Rod Size			Rod Size																	
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"B"	"C"																
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	34	34	30	39	88	58	3/8	12	28	41	13	184	40	63	88	109	11	8
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	40	36	30	39	88	65	3/8	12	28	41	13	184	46	69	95	118	11	8
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	46	40	30	44	96	80	1/2	12	25	49	18	203	58	85	115	145	14	5
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	55	46	35	42	104	94	1/2	12	30	47	20	218	65	98	132	165	18	5
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	65	55	35	48	118	110	3/4	12	29	54	24	243	87	118	155	190	18	4
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	80	65	40	54	120	138	3/4	12	32	62	28	260	109	150	190	230	22	2
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	95	80	45	63	134	168	1	15	36	72	33	298	130	175	224	272	26	1
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	–	–	50	65	142	188	1	15	39	76	37	317	145	195	250	300	26	–
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	–	–	50	67	147	196	1	15	39	78	39	329	155	210	270	320	30	–
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	–	–	55	66	158	215	1	15	45	76	41	349	170	225	285	345	33	–
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	–	–	55	75	172	235	1 1/4	15	42	88	46	376	185	243	315	375	33	–
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	–	–	55	85	184	262	1 1/2	15	41	99	51	407	206	272	355	425	36	–
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	–	–	60	89	184	292	1 1/2	15	43	106	58	423	230	310	395	475	42	–
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	–	–	65	106	200	325	2	15	46	125	65	476	250	335	425	515	45	–

★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

CA : Cap Detachable Eye.....Nominal Pressure 7 · 14 MPa



Options

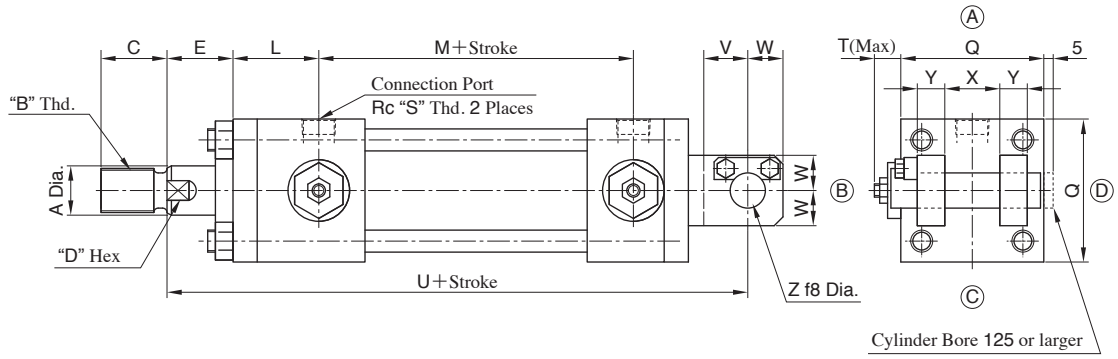
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			E	L	M	Q	S	T	U	V	W	X	Z
	Rod Size			Rod Size			Rod Size			Rod Size													
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"											
32	–	18	14	–	M16×1.5	M12×1.25	–	25 (32)	18 (24)	–	14	12	30	39	88	58	3/8	12	209	20	16	$25^{-0.1}_{-0.4}$	16
40	28	22	18	M24×1.5	M20×1.5	M16×1.5	35 (48)	30 (40)	25 (32)	24	19	14	30	39	88	65	3/8	12	209	20	16	$25^{-0.1}_{-0.4}$	16
50	36	28	22	M30×1.5	M24×1.5	M20×1.5	45 (60)	35 (48)	30 (40)	30	24	19	30	44	96	80	1/2	12	230	25	20	$31.5^{-0.1}_{-0.4}$	20
63	45	36	28	M39×1.5	M30×1.5	M24×1.5	60 (78)	45 (60)	35 (48)	41	30	24	35	42	104	94	1/2	12	261	40	31.5	$40^{-0.1}_{-0.4}$	31.5
80	56	45	36	M48×1.5	M39×1.5	M30×1.5	75 (96)	60 (78)	45 (60)	50	41	30	35	48	118	110	3/4	12	291	40	31.5	$40^{-0.1}_{-0.4}$	31.5
100	70	56	45	M64×2.0	M48×1.5	M39×1.5	95 (128)	75 (96)	60 (78)	65	50	41	40	54	120	138	3/4	12	316	50	40	$50^{-0.1}_{-0.4}$	40
125	90	70	56	M80×2.0	M64×2.0	M48×1.5	120 (140)	95 (128)	75 (96)	85	65	50	45	63	134	168	1	15	365	62	55	$63^{-0.1}_{-0.4}$	50
140	100	80	63	M95×2.0	M72×2.0	M56×2.0	140 (165)	110 (128)	80 (112)	95	75	55	50	65	142	188	1	15	400	79	65	$80^{-0.1}_{-0.6}$	63
150	106	85	67	M100×2.0	M76×2.0	M60×2.0	150 (175)	115 (128)	85 (120)	100	80	60	50	67	147	196	1	15	412	82	65	$80^{-0.1}_{-0.6}$	63
160	110	90	70	M100×2.0	M80×2.0	M64×2.0	150 (175)	120 (140)	95 (128)	105	85	65	55	66	158	215	1	15	445	89	75	$80^{-0.1}_{-0.6}$	71
180	125	100	80	M120×2.0	M95×2.0	M72×2.0	180 (210)	140 (165)	110 (128)	120	95	75	55	75	172	235	1 1/4	15	480	100	80	$100^{-0.1}_{-0.6}$	80
200	140	110	90	M130×2.0	M100×2.0	M80×2.0	195 (225)	150 (175)	120 (140)	135	105	85	55	85	184	262	1 1/2	15	526	115	90	$125^{-0.1}_{-0.6}$	90
220	160	125	100	M150×2.0	M120×2.0	M95×2.0	225 (260)	180 (210)	140 (175)	155	120	95	60	89	184	292	1 1/2	15	550	125	100	$125^{-0.1}_{-0.6}$	100
250	180	140	110	M170×2.0	M130×2.0	M100×2.0	255 (295)	195 (225)	150 (175)	175	135	105	65	106	200	325	2	15	596	125	110	$125^{-0.1}_{-0.6}$	100

★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

CB : Cap Detachable Clevis.....Nominal Pressure 7 · 14 MPa



Option

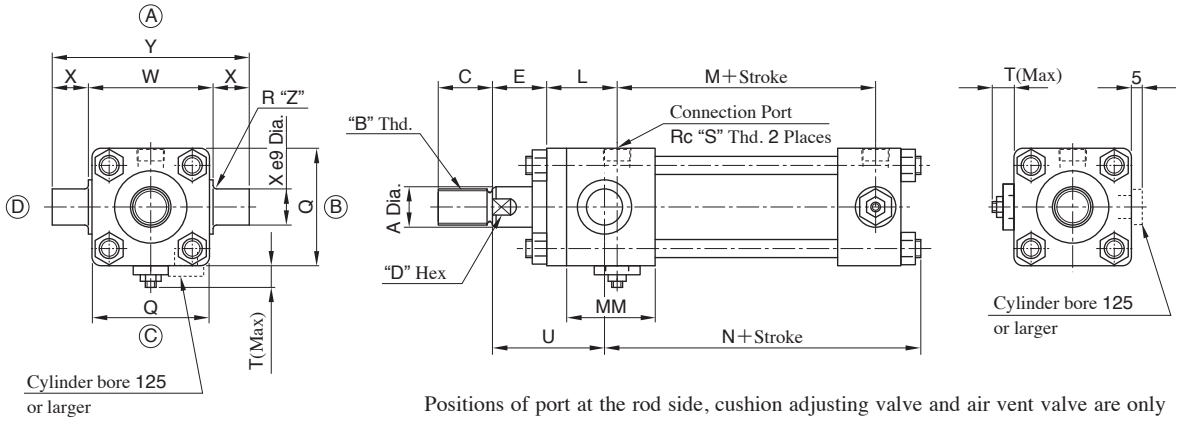
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			E	L	M	Q	S	T	U	V	W	X	Y	Z
	Rod Size			Rod Size			Rod Size			Rod Size														
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"												
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	30	39	88	58	3/8	12	209	20	16	25 +0.4 +0.1	12.5	16
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	30	39	88	65	3/8	12	209	20	16	25 +0.4 +0.1	12.5	16
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	30	44	96	80	1/2	12	230	25	20	31.5 +0.4 +0.1	16	20
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	35	42	104	94	1/2	12	261	40	30	40 +0.4 +0.1	20	31.5
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	35	48	118	110	3/4	12	291	40	30	40 +0.4 +0.1	20	31.5
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	40	54	120	138	3/4	12	316	50	40	50 +0.4 +0.1	25	40
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	45	63	134	168	1	15	365	62	50	63 +0.4 +0.1	31.5	50
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	50	65	142	188	1	15	400	79	65	80 +0.6 +0.1	40	63
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	50	67	147	196	1	15	412	82	65	80 +0.6 +0.1	40	63
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	55	66	158	215	1	15	445	89	75	80 +0.6 +0.1	40	71
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	55	75	172	235	1 1/4	15	480	100	80	100 +0.6 +0.1	50	80
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	55	85	184	262	1 1/2	15	526	115	90	125 +0.6 +0.1	63	90
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	60	89	184	292	1 1/2	15	550	125	100	125 +0.6 +0.1	63	100
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	65	106	200	325	2	15	596	125	110	125 +0.6 +0.1	63	100

★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

TA：Rod Trunnion.....Nominal Pressure 7・14 MPa



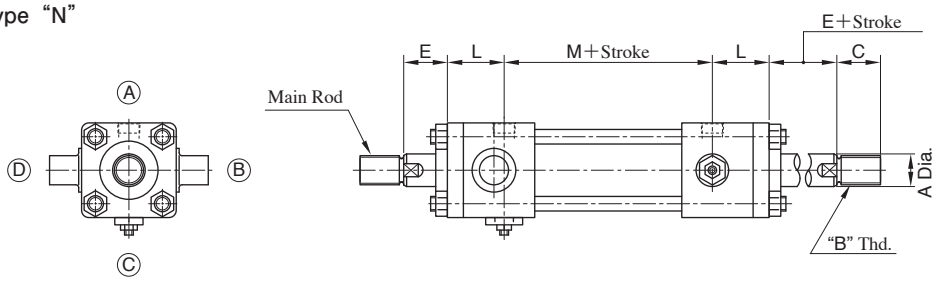
Positions of port at the rod side, cushion adjusting valve and air vent valve are only available below.

- Port position:Ⓐ
- Cushion adjusting valve position:Ⓒ
- Air vent valve position:Ⓒ

Please specify the positions (Ⓐ,Ⓑ,Ⓒ,Ⓓ) at cap cover side only.

Options

Double Rod Type "N"



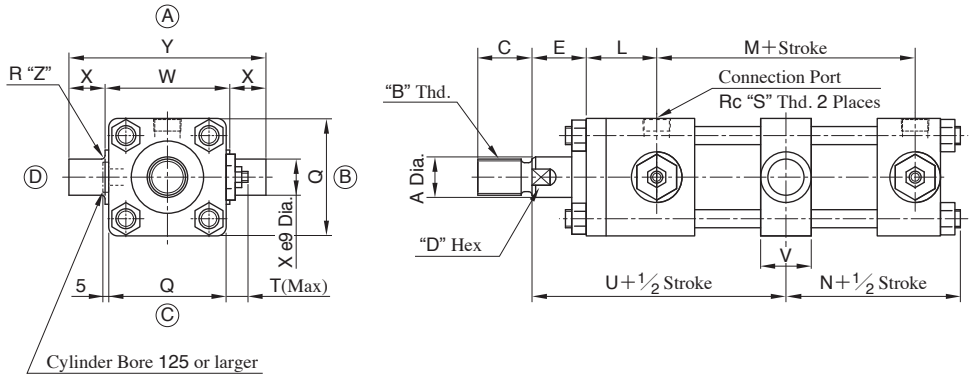
With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

Cylinder Bore	A			B			C★1			D			E	L	M	N	Q	S	T	U	W	X	Y	Z	MM
	Rod Size			Rod Size			Rod Size			Rod Size															
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"													
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	30	39	88	118	58	3/8	12	62	58 $^{0}_{-0.3}$	20	98	2	49
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	30	39	88	120	65	3/8	12	62	69 $^{0}_{-0.3}$	20	109	2	49
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	30	44	96	132	80	1/2	12	66	85 $^{0}_{-0.35}$	25	135	2.5	56
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	35	42	104	138	94	1/2	12	74	98 $^{0}_{-0.35}$	31.5	161	2.5	44
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	35	48	118	153	110	3/4	12	82	118 $^{0}_{-0.35}$	31.5	181	2.5	50
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	40	54	120	162	138	3/4	12	89	145 $^{0}_{-0.4}$	40	225	3	57
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	45	63	134	185	168	1	15	103	175 $^{0}_{-0.4}$	50	275	3	67
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	50	65	142	193	188	1	15	112	195 $^{0}_{-0.46}$	63	321	4	74
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	50	67	147	203	196	1	15	112	206 $^{0}_{-0.46}$	63	332	4	74
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	55	66	158	210	215	1	15	126	218 $^{0}_{-0.46}$	71	360	4	81

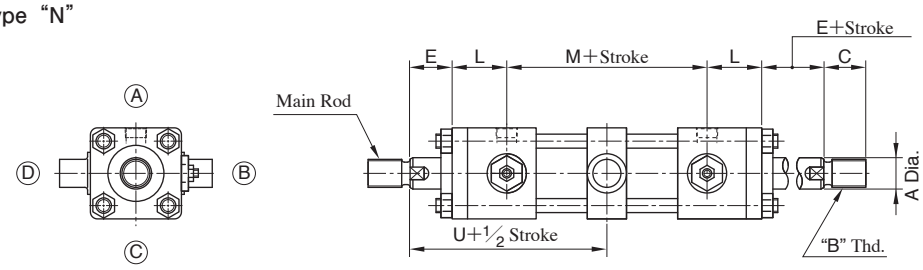
★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

TC : Intermediate Trunnion.....Nominal Pressure 7・14 MPa



Options

Double Rod Type "N"



With Dust Cover:

Refer to SD type page J-24 for dimensions of dust cover.

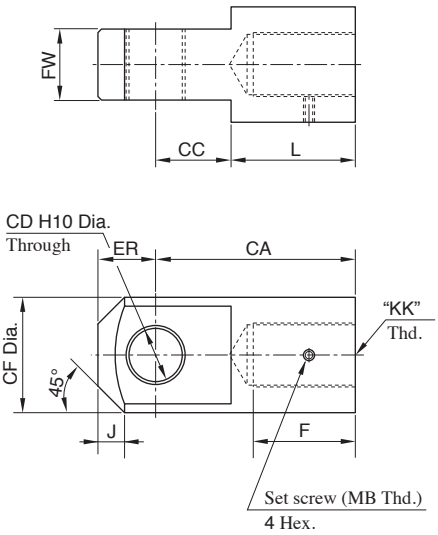
Cylinder Bore	A			B			C★1			D			E	L	M	N	Q	S	T	U	V	W	X	Y	Z
	Rod Size			Rod Size			Rod Size			Rod Size															
	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"													
32	–	18	14	–	M16 × 1.5	M12 × 1.25	–	25 (32)	18 (24)	–	14	12	30	39	88	67	58	3/8	12	113	30	$58^{0}_{-0.3}$	20	98	2
40	28	22	18	M24 × 1.5	M20 × 1.5	M16 × 1.5	35 (48)	30 (40)	25 (32)	24	19	14	30	39	88	69	65	3/8	12	113	30	$69^{0}_{-0.3}$	20	109	2
50	36	28	22	M30 × 1.5	M24 × 1.5	M20 × 1.5	45 (60)	35 (48)	30 (40)	30	24	19	30	44	96	77	80	1/2	12	121	38	$85^{0}_{-0.35}$	25	135	2.5
63	45	36	28	M39 × 1.5	M30 × 1.5	M24 × 1.5	60 (78)	45 (60)	35 (48)	41	30	24	35	42	104	80	94	1/2	12	132	45	$98^{0}_{-0.35}$	31.5	161	2.5
80	56	45	36	M48 × 1.5	M39 × 1.5	M30 × 1.5	75 (96)	60 (78)	45 (60)	50	41	30	35	48	118	89	110	3/4	12	146	45	$118^{0}_{-0.35}$	31.5	181	2.5
100	70	56	45	M64 × 2.0	M48 × 1.5	M39 × 1.5	95 (128)	75 (96)	60 (78)	65	50	41	40	54	120	95	138	3/4	12	156	57	$145^{0}_{-0.4}$	40	225	3
125	90	70	56	M80 × 2.0	M64 × 2.0	M48 × 1.5	120 (140)	95 (128)	75 (96)	85	65	50	45	63	134	111	168	1	15	177	58	$175^{0}_{-0.4}$	50	275	3
140	100	80	63	M95 × 2.0	M72 × 2.0	M56 × 2.0	140 (165)	110 (128)	80 (112)	95	75	55	50	65	142	117	188	1	15	188	78	$195^{0}_{-0.46}$	63	321	4
150	106	85	67	M100 × 2.0	M76 × 2.0	M60 × 2.0	150 (175)	115 (128)	85 (120)	100	80	60	50	67	147	121	196	1	15	194	78	$206^{0}_{-0.46}$	63	332	4
160	110	90	70	M100 × 2.0	M80 × 2.0	M64 × 2.0	150 (175)	120 (140)	95 (128)	105	85	65	55	66	158	129	215	1	15	207	88	$218^{0}_{-0.46}$	71	360	4
180	125	100	80	M120 × 2.0	M95 × 2.0	M72 × 2.0	180 (210)	140 (165)	110 (128)	120	95	75	55	75	172	141	235	1¼	15	216	98	$243^{0}_{-0.46}$	80	403	4
200	140	110	90	M130 × 2.0	M100 × 2.0	M80 × 2.0	195 (225)	150 (175)	120 (140)	135	105	85	55	85	184	153	262	1½	15	232	108	$272^{0}_{-0.52}$	90	452	5
220	160	125	100	M150 × 2.0	M120 × 2.0	M95 × 2.0	225 (260)	180 (210)	140 (175)	155	120	95	60	89	184	158	292	1½	15	241	117	$300^{0}_{-0.52}$	100	500	5
250	180	140	110	M170 × 2.0	M130 × 2.0	M100 × 2.0	255 (295)	195 (225)	150 (175)	175	135	105	65	106	200	177	325	2	15	271	117	$335^{0}_{-0.57}$	100	535	5

★1. Only long rod end thread type : the dimension "C" is the value in parentheses.

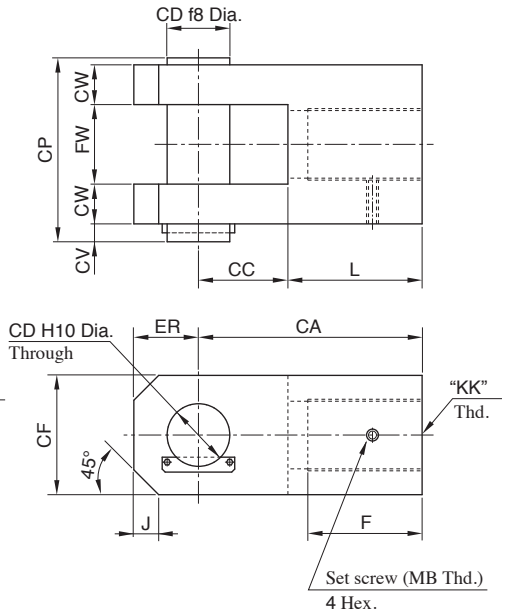
Options

Rod End Attachment

T-End (Rod End Eye) : Option Code "L"



Y-End (Rod End Clevis) : Option Code "M"



Approx.Mass kg

Cylinder Bore		Rod End Attachment T-End (L)	Rod End Attachment Y-End (M)
32	B	0.5	0.6
	C	0.5	0.6
40	B	0.4	0.5
	C	0.5	0.6
50	B	0.9	1.0
	C	0.9	1.1
63	B	2.4	3.4
	C	2.5	3.5
80	B	2.1	3.1
	C	2.4	3.4
100	B	4.2	7.0
	C	4.8	7.5
125	B	8.4	13.4
	C	9.8	14.8
140	B	19.0	26.4
	C	21.1	28.5
150	B	16.8	24.2
	C	19.7	27.1
160	B	22.4	32.1
	C	24.8	34.5

Option Code "L"

Cylinder Bore	Rod Size	KK	F	CA	CC	CD	CF	ER	FW	J	L
32	B	M16×1.5	34	60	23	16	39	20	$25^{-0.1}_{-0.4}$	8	37
	C	M12×1.25	27								
40	B	M20×1.5	39	60	23	16	39	20	$25^{-0.1}_{-0.4}$	8	37
	C	M16×1.5	34								
50	B	M24×1.5	44	70	28	20	49	25	$31.5^{-0.1}_{-0.4}$	10	42
	C	M20×1.5	39								
63	B	M30×1.5	50	115	43	31.5	62	35	$40^{-0.1}_{-0.4}$	15	72
	C	M24×1.5	44								
80	B	M39×1.5	65	115	43	31.5	62	35	$40^{-0.1}_{-0.4}$	15	72
	C	M30×1.5	50								
100	B	M48×1.5	80	145	55	40	79	40	$50^{-0.1}_{-0.4}$	20	90
	C	M39×1.5	65								
125	B	M64×2.0	100	180	65	50	100	50	$63^{-0.1}_{-0.4}$	25	115
	C	M48×1.5	80								
140	B	M72×2.0	115	225	85	63	130	65	$80^{-0.1}_{-0.6}$	30	140
	C	M56×2.0	85								
150	B	M76×2.0	120	225	85	63	130	65	$80^{-0.1}_{-0.6}$	30	140
	C	M60×2.0	90								
160	B	M80×2.0	125	240	90	71	140	70	$80^{-0.1}_{-0.6}$	35	150
	C	M64×2.0	100								

Option Code "M"

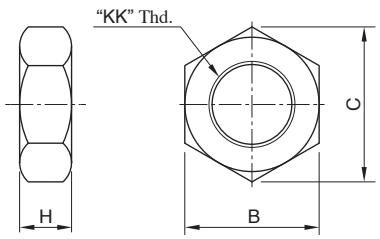
Cylinder Bore	Rod Size	KK	F	CA	CC	CD	CF	ER	CW	FW	CV	CP	J	L
32	B	M16×1.5	33	60	27	16	32	16	12.5	$25^{+0.4}_{+0.1}$	12	68	4	33
	C	M12×1.25	33											
40	B	M20×1.5	33	60	27	16	32	16	12.5	$25^{+0.4}_{+0.1}$	12	68	4	33
	C	M16×1.5	33											
50	B	M24×1.5	38	70	32	20	40	20	16	$31.5^{+0.4}_{+0.1}$	12	80	10	38
	C	M20×1.5	38											
63	B	M30×1.5	50	115	50	31.5	60	30	20	$40^{+0.4}_{+0.1}$	12	98	12	65
	C	M24×1.5	40											
80	B	M39×1.5	65	115	50	31.5	60	30	20	$40^{+0.4}_{+0.1}$	12	98	12	65
	C	M30×1.5	50											
100	B	M48×1.5	85	145	60	40	80	40	25	$50^{+0.4}_{+0.1}$	18	125	15	85
	C	M39×1.5	65											
125	B	M64×2.0	100	180	70	50	100	50	31.5	$63^{+0.4}_{+0.1}$	18	150	20	110
	C	M48×1.5	80											
140	B	M72×2.0	115	225	90	63	120	65	40	$80^{+0.6}_{+0.1}$	18	185	25	135
	C	M56×2.0	85											
150	B	M76×2.0	120	225	90	63	120	65	40	$80^{+0.6}_{+0.1}$	18	185	25	135
	C	M60×2.0	90											
160	B	M80×2.0	125	240	100	71	140	70	40	$80^{+0.6}_{+0.1}$	18	185	30	140
	C	M64×2.0	100											

★ Please consult us separately for cylinder bore 180 or larger. (special design products)

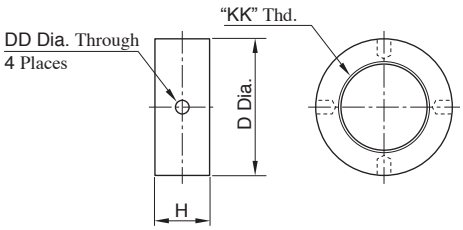
Options

Lock Nut : Option Code "K"

M12 - M95



M100 - M130

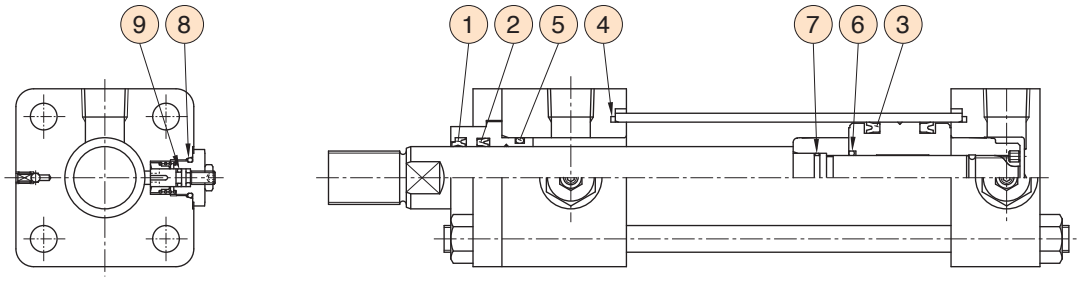


KK	H	B	C	Approx.Mass kg	KK	H	B	C	Approx.Mass kg
M12×1.25	7	19	21.9	0.02	M56×2	30	80	92.4	0.77
M16×1.5	10	22	25.4	0.02	M60×2	33	85	98.1	0.94
M20×1.5	12	27	31.2	0.03	M64×2	35	90	104	1.10
M24×1.5	14	32	37	0.05	M72×2	38	100	115	1.44
M30×1.5	17	41	47.3	0.11	M76×2	40	105	121	1.65
M39×1.5	20	55	63.5	0.24	M80×2	43	110	127	1.93
M48×1.5	26	70	80.8	0.52	M95×2	47	130	150	2.90

KK	H	D	DD	Z	Approx.Mass kg
M100×2	60	150	15	18	4.9
M120×2	72	180	15	18	8.9
M130×2	78	200	20	25	11.9

List for Seals

CJT_{140}^{70} - * 32 - 50

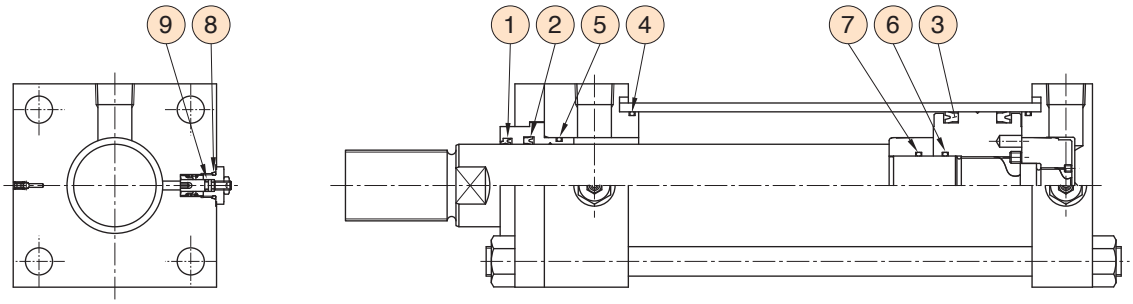


Cylinder Bore	Rod Size	Model Numbers for Seal Kit ★1	① Dust Seal	② Rod Packing	③ Piston Packing	④ Packing for Cover ★3	⑤ O-Ring for Bush	⑥ O-Ring for Piston	⑦ O-Ring for Cushion Ring ★4	⑧ O-Ring for Plug	⑨ O-Ring for Slide Rod (OR NBR-70-1 P5-N)
		Q'ty	1	1	2	2	(OR NBR-90 P(G) * *-N) 1	1	1	2	2
32	B	KS-CJT32B-20	SDR-18	SKY-18	SKY-24	GR-32	P21	P12	S12	P14	P5
	C	KS-CJT32C-20	SDR-14	SKY-14							
40	A	KS-CJT40A-20	SDR-28	SKY-28	SKY-30	GR-40	G30	P16	—	P14	P5
	B	KS-CJT40B-20	SDR-22	SKY-22			G25		S16		
	C	KS-CJT40C-20	SDR-18	SKY-18							
50	A	KS-CJT50A-20	SDR-36	SKY-36	SKY-40	GR-50	G40	P20	—	P14	P5
	B	KS-CJT50B-20	SDR-28	SKY-28			G30		S20		
	C	KS-CJT50C-20	SDR-22	SKY-22							

★1. Please specify the seal kit numbers above when ordering the seals.
★2. Material of standard packings is Nitrile-Rubber. Please select Fluoro-Rubber packing material if Phosphate Esters oil is used. Please specify "F-" in addition to the model of seal kit after "KS".
★3. Packing code "GR" of item No.4 is square O-ring.
★4. O-ring code "S" of item No.7 is special O-ring.
Note : The packing code changes without notice.

List of Seals

CJT $^{70}_{140}$ - * 63 - 250



Cylinder Bore	Rod Size	★1 Model Numbers for Seal Kit	① Dust Seal	② Rod Packing	③ Piston Packing	④ Packing for Cover	⑤ O-Ring for Bush	⑥ O-Ring for Piston	⑦ O-Ring for Cushion Ring	⑧ O-Ring for Plug	⑨ O-Ring for Slide Rod (OR NBR-70-1 P**-N
		Q'ty	1	1	2	2	1	1	1	★3	★3
63	A	KS-CJT 63A-20	SDR- 45	SKY- 45A	SKY- 53	G 55	G 50	G25	–	P14	P5
	B	KS-CJT 63B-20	SDR- 36	SKY- 36			G 40		G25		
	C	KS-CJT 63C-20	SDR- 28	SKY- 28							
80	A	KS-CJT 80A-20	SDR- 56	SKY- 56	SKY- 71	G 75	G 60	P31	–	P14	P5
	B	KS-CJT 80B-20	SDR- 45	SKY- 45A			G 50		P31		
	C	KS-CJT 80C-20	SDR- 36	SKY- 36							
100	A	KS-CJT100A-20	SDR- 70	SKY- 70	SKY- 85	G 95	G 75	G40	–	P14	P5
	B	KS-CJT100B-20	SDR- 56	SKY- 56			G 60		G40		
	C	KS-CJT100C-20	SDR- 45	SKY- 45A							
125	A	KS-CJT125A-20	SDR- 90	SKY- 90	SKY-112A	G120	G 95	G50	G50	P18, P14	P7, P5
	B	KS-CJT125B-20	SDR- 70	SKY- 70			G 75			P18	P7
	C	KS-CJT125C-20	SDR- 56	SKY- 56							
140	A	KS-CJT140A-20	SDR-100	SKY-100	SKY-125	G135	G110	G50	–	P18, P14	P7, P5
	B	KS-CJT140B-20	SDR- 80	SKY- 80			G 85			P18	P7
	C	KS-CJT140C-20	SDR- 63	SKY- 63							
150	A	KS-CJT150A-20	SDR-106	SKY-106	SKY-136	G145	G115	G55	–	P18, P14	P7, P5
	B	KS-CJT150B-20	SDR- 85	SKY- 85			G 90			P18	P7
	C	KS-CJT150C-20	SDR- 67	SKY- 67							
160	A	KS-CJT160A-20	SDR-110	SKY-110	SKY-145	G150	G125	G60	–	P18, P14	P7, P5
	B	KS-CJT160B-20	SDR- 90	SKY- 90			G 95			P18	P7
	C	KS-CJT160C-20	SDR- 70	SKY- 70							
180	A	KS-CJT180A-20	SDR-125	SKY-125	SKY-165	G170	G140	G70	–	P18	P7
	B	KS-CJT180B-20	SDR-100	SKY-100			G110				
	C	KS-CJT180C-20	SDR- 80	SKY- 80							
200	A	KS-CJT200A-20	SDR-140	SKY-140	SKY-180	G190	G155	G75	–	P18	P7
	B	KS-CJT200B-20	SDR-110	SKY-110			G125				
	C	KS-CJT200C-20	SDR- 90	SKY- 90							
220	A	KS-CJT220A-20	SDR-160	SKY-160	SKY-200	G210	G175	G85	–	P18	P7
	B	KS-CJT220B-20	SDR-125	SKY-125			G140				
	C	KS-CJT220C-20	SDR-100	SKY-100							
250	A	KS-CJT250A-20	SDR-180	SKY-180	SKY-230	G240	G195	G95	–	P18	P7
	B	KS-CJT250B-20	SDR-140	SKY-140			G155				
	C	KS-CJT250C-20	SDR-110	SKY-110							

★1. Please specify the seal kit numbers above when ordering the seals.

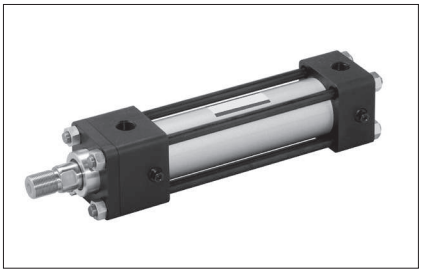
★2. Material of standard packings is Nitrile-Rubber. Please select Fluoro-Rubber packing material if Phosphate Esters oil is used. Please specify "F-" in addition to the model of seal kit after "KS".

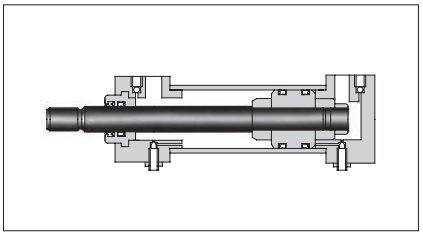
★3. There are 2 O-Rings.
The large O-Rings (1 each) / Cap Side, The small O-Rings (1 each) / Rod Side.

Note : The packing code changes without notice.

"CJT 21 MPa" Series Compact Type Hydraulic Cylinders

YUKEN's "CJT 21 MPa" Series Compact Type Hydraulic Cylinders are higher nominal pressure for use in a wide range of general-purpose industrial machinery.
Compared to the conventional "CJT 21 MPa" Series Hydraulic Cylinders, the smaller outer dimensions allow for more compact equipment.
Moreover, Switch-Set "CJT" Series Hydraulic Cylinders with a proximity switch which facilitates detecting a position with a slide proximity switch on the cylinder body is also available.
(Refer to page J-69 for details)



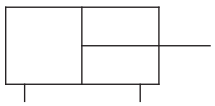


Specifications

Model Numbers			CJT210C–＊＊＊＊＊–＊＊＊＊–＊–20
Cylinder Bore		mm	40, 50, 63, 80, 100, 125, 140, 160
Mounting Type			SD, LA, FA, FB, CA, TC
Nominal Pressure ★1			21 MPa
Maximum Allowable Pressure ★1	Cap Side Rod A,B		26.5 MPa
	Rod Side Rod A		26.5 MPa
	Rod Side Rod B		24.5 MPa
Proof Test Pressure ★1			31.5 MPa
Minimum Working Pressure	Rod Side Rod A		0.6 MPa or less
	Rod Side Rod B		0.45 MPa or less
	Cap Side Rod A,B		0.3 MPa or less
Operating Maximum Speed			Cylinder Bore 40 - 63 400 mm/s Cylinder Bore 80 - 125 300 mm/s Cylinder Bore 140, 160 200 mm/s
Operating Minimum Speed			8 mm/s
Maximum Stroke ★2 mm	Cylinder Bore	40	1600
		50 - 160	2000
Tolerance of Stroke			Refer to the table "Tolerance of Stroke" ★3
Tolerance of Thread			JIS B 0211–6g (JIS grade 2 or equivalence)
Ambient Temperature Range			–10 - +80°C
Applicable Standard			Compliant with former JIS B8354

★1. Refer to page J-7 for definition of pressure terms.
★2. May be limited to even lower value in accordance with the buckling strength.
Refer to page J-44 for strokes above buckling strength.

Graphic Symbol



●Intermediate Trunnion (TC Type) Minimum Stroke Fabrication Range

Cylinder Bore mm	Minimum Stroke mm	
	Rod A	Rod B
80	28	14
100	33	21
125	48	34
140	52	38
160	55	41

★3. Tolerance of Stroke

Stroke mm		Tolerance mm
	100 or less	$^{+0.8}_{0}$
More Than	100 to 250	$^{+1.0}_{0}$
More Than	250 to 630	$^{+1.25}_{0}$
More Than	630 to 1000	$^{+1.4}_{0}$
More Than	1000 to 1600	$^{+1.6}_{0}$
More Than	1600 to 2000	$^{+1.8}_{0}$

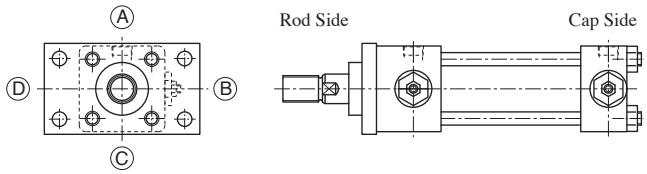
Model Number Designation

F−	CJT210C	−LA	50	B	100	B	−A	B	D	−F	−20
Packing Material	Series Number	Mounting Type	Cylinder Bore mm	Rod Size	Cylinder Stroke mm	Cushion Type	Port Position ★2	Cushion Adj. Valve Position ★2	Air Vent Valve Position ★2	Options ★1	Design Number
None : Nitrile Rubber (Standard) F : Fluoro Rubber 6 : Hydrogenated Nitrile Rubber	CJT210C : 21MPa Series Compact Type Standard Cylinder	SD,LA FA,FB CA,TC	40, 50, 63, 80, 100, 125, 140, 160	A : Rod A B : Rod B	Cylinder Stroke	B : With Cushion on Both ends R : With Cushion on the Rod side H : With Cushion on the Cap side N : Without Cushion	(Viewed from Rod End) A : Upper (Standard) B : Right C : Under D : Left	B : Right (Standard) A : Upper C : Under D : Left N : No Cushion adj. valve (Standard)	D : Left (Standard) A : Upper B : Right C : Under	E : With Long Rod End Thread F : With Dust Cover (Material: Nylon Tarpaulin, Heat resistant up to 80°C) G : With Dust Cover (Material: Chloroprene , Heat resistant up to 130°C) H : With Dust Cover (Material: Conex, Heat resistant up to 200°C) K : With Lock Nut (E : Used in combination with long rod end thread) L : With T-End ★3 (Rod End Eye) M : With Y-End ★3 (Rod End Clevis)	20

★1. Using the options in combination is available.
Please specify the option code in the alphabet.
Ex.: EKL

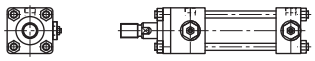
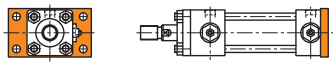
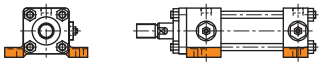
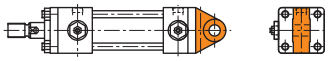
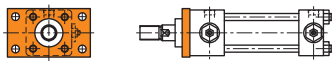
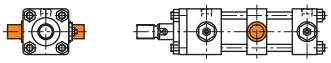
★2. As for each direction of port, cushion adj.valve and air vent valve, please select from ⒶⒷⒸⒹ viewed from rod end(see the figure on the below).
<Standard directions>
Port: Ⓐ, Cushion adj.valve: Ⓑ, Air vent valve: Ⓓ
The arrangement of the air vent valve and cushion adj. valve is shown in the table below.

Port Position	Cushion Adj. Valve Position	Air Vent Valve Position
A, B, C, D	Except port side	Except port side and cushion adjusting valve side



★3. Rod end attachment is for rod size B only. If rod end attachment is used with rod size A, the thread dimensions will be those of rod size B. Moreover, the rod end attachment with lock nut and without lock nut have different fixing method.
①With Lock Nut
Lock the rod end attachment with a lock nut since a set screw for fixing is not included.
②Without Lock Nut
Locked by set screw for fixing. Rod threads have pointings (drill holes). Please consult us separately for without pointing.

Mounting Type

Code	Name	Illustration of Mounting Type	Code	Name	Illustration of Mounting Type
SD	Basic Type		FB	Cap Rectangular Flange	
LA	Foot Mounting Side Lugs		CA	Cap Detachable Eye	
FA	Rod Rectangular Flange		TC	Intermediate Trunnion	

Syllabus Table

Push (Cap Side Pressure)

Cylinder Bore mm	Pressurized Area cm²	Output kN				Velocity by a unit flow rate 10L/min mm/s	Flow rate by a unit velocity 10mm/s L/min
		1 MPa	7 MPa	14 MPa	21 MPa		
40	12.6	1.26	8.79	17.58	26.37	132	0.8
50	19.6	1.96	13.74	27.48	41.20	85	1.2
63	31.2	3.12	21.81	43.62	65.41	53	1.9
80	50.3	5.03	35.17	70.34	105.50	33	3.0
100	78.5	7.85	54.95	109.90	164.85	21	4.7
125	122.7	12.27	85.86	171.72	257.46	14	7.4
140	153.9	15.39	107.70	215.40	322.98	10.8	9.2
160	201.0	20.10	140.67	281.34	421.89	8.3	12.1

Pull (Rod Side Pressure)

Cylinder Bore mm	Rod Size Code	Rod Size mm	Pressurized Area cm²	Output kN				Velocity by a unit flow rate 10L/min mm/s	Flow rate by a unit velocity 10mm/s L/min
				1 MPa	7 MPa	14 MPa	21 MPa		
40	A	28	6.4	0.64	4.46	8.92	13.37	260.5	0.4
	B	22	8.8	0.88	6.13	12.27	18.39	189	0.5
50	A	36	9.4	0.94	6.55	13.10	19.64	177.3	0.6
	B	28	13.5	1.35	8.43	18.86	28.28	123	0.8
63	A	45	15.3	1.53	10.66	21.32	31.97	109	0.9
	B	36	21.0	2.10	14.69	29.38	44.05	79	1.3
80	A	56	25.7	2.57	17.90	35.80	53.71	64.9	1.5
	B	45	34.3	3.43	24.04	48.08	72.11	49	2.1
100	A	70	40.0	4.00	27.86	55.73	83.59	41.7	2.4
	B	56	53.9	5.39	37.72	75.44	113.14	31	3.2
125	A	90	59.1	5.91	41.24	82.34	123.50	28.2	3.5
	B	70	84.2	8.42	58.39	117.87	176.79	20	5.1
140	A	100	75.4	7.54	52.52	105.05	157.57	22.1	4.5
	B	80	103.6	10.36	72.53	145.07	217.56	16	6.2
160	A	110	106.0	10.60	73.84	147.68	221.51	15.7	6.4
	B	90	137.4	13.74	96.16	192.33	288.33	12	8.2

Mass Table

Approx. Mass may be obtained from the formula below.

Mass=Ⓐ+[Ⓑ×Stroke(mm)/100]+Ⓒ+Ⓓ

Cylinder Bore mm	Rod Size Code	ⒶBasic Mass SD type	ⒷAdditional Mass By A Unit Stroke 100mm	ⒸBasic Mass(Each Mounting)							ⒹAdditional Mass		
				LA	FA	FB	CA	CB	TA	TC	T-End (Rod End Eye) L	Y-End (Rod End Clevis) M	Lock Nut K
40	A	4.2	1.2	0.60	0.59	0.88	0.43	0.83	0.18	0.62	—	—	0.18
	B	4.1	1.1	0.59	0.49	0.88	0.42	0.60	0.18	0.62	0.74	1.17	0.12
50	A	7.3	1.9	0.97	1.11	1.69	0.82	1.56	0.28	1.02	—	—	0.36
	B	7.0	1.6	0.97	0.99	1.69	0.80	1.13	0.28	1.02	1.67	2.30	0.18
63	A	11.0	2.8	1.42	1.66	2.68	1.44	2.80	0.62	1.64	—	—	0.81
	B	10.5	2.4	1.42	1.51	2.67	1.40	2.00	0.62	1.64	2.51	3.97	0.36
80	A	18.1	4.3	2.27	2.57	4.29	4.10	4.98	1.29	3.07	—	—	1.48
	B	17.4	3.6	2.25	2.12	4.18	4.08	4.96	1.29	3.07	3.77	6.54	0.81
100	A	28.2	6.5	3.22	4.91	8.18	7.83	9.39	3.22	6.24	—	—	3.10
	B	26.0	5.4	3.21	4.41	8.01	7.86	9.42	3.25	6.24	7.47	12.62	1.48
125	A	51.2	10.3	5.66	7.96	13.52	14.47	17.74	4.96	12.70	—	—	5.80
	B	47.4	8.4	5.56	6.82	13.13	14.55	17.82	4.96	12.70	12.41	22.96	3.10
140	A	73.0	13.1	6.93	8.67	18.01	20.34	24.63	7.64	18.26	—	—	9.60
	B	67.6	10.9	6.93	7.08	17.53	20.45	24.74	7.60	18.26	19.17	33.75	4.42
160	A	100.7	16.6	9.95	13.04	26.79	29.30	35.85	17.49	22.91	—	—	11.14
	B	95.4	14.1	9.95	10.86	26.22	29.49	36.04	17.28	22.91	26.97	46.72	5.80

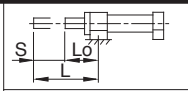
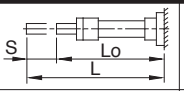
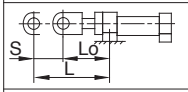
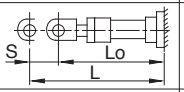
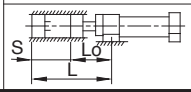
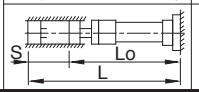
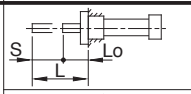
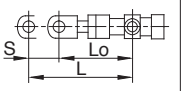
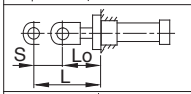
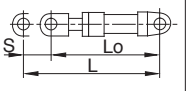
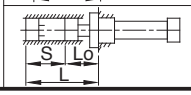
Maximum stroke limited by buckling strength

Calculation of Maximum Stroke

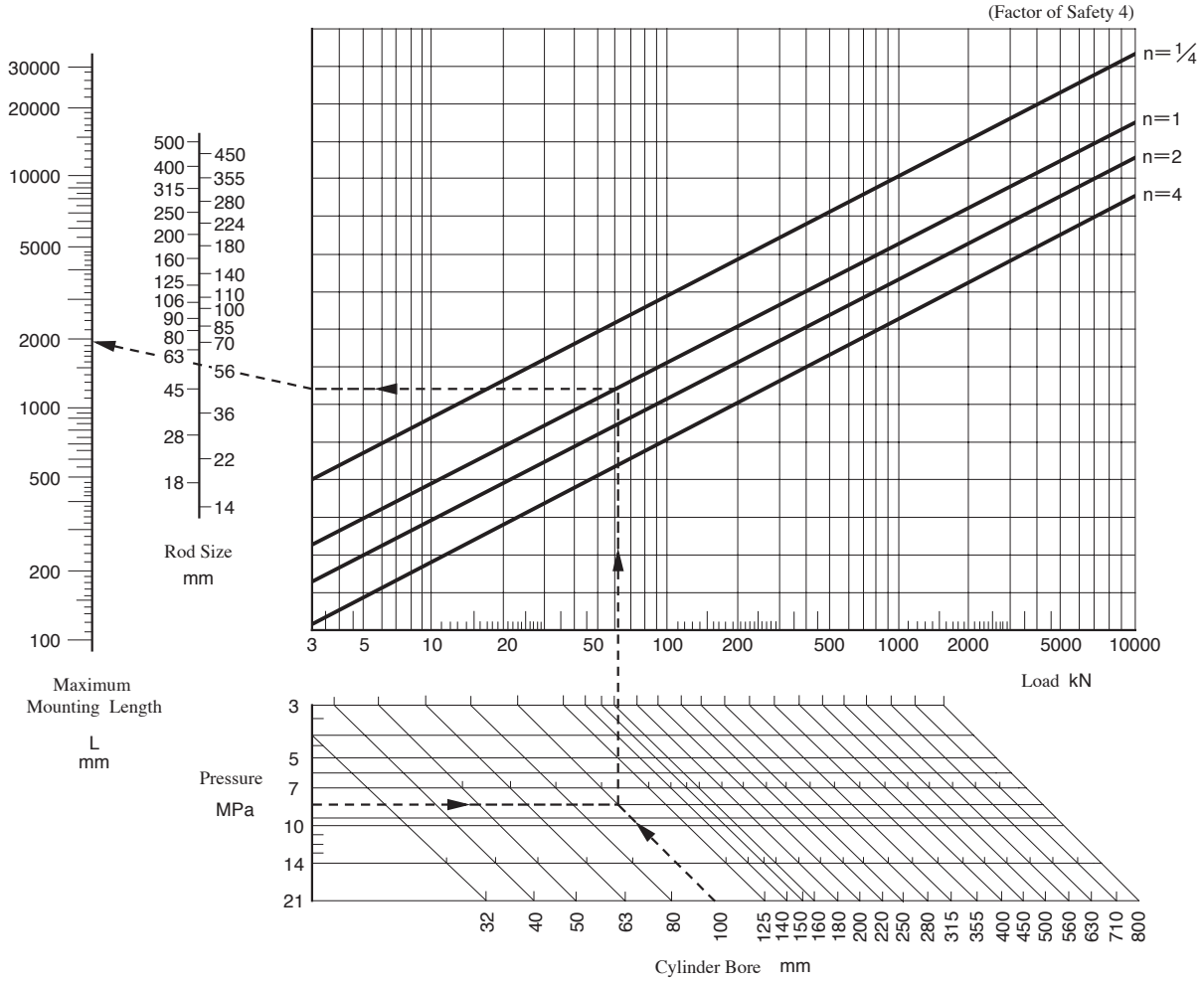
1. Calculate rod end coefficient n from the table on the right.
2. Calculate the maximum installation length L by applying various values such as cylinder bore, rod size, pressure, and rod end coefficient to the figure below.
3. Refer to the external dimensions and calculate the mounting length Lo when retracted.
   Use the formula S=L–Lo and calculate the maximum stroke S.

(Example) Cylinder bore 100 mm, rod size 56 mm, mounting type TC (intermediate trunnion type) standard cylinder operated at 8 MPa pressure. Calculate the maximum stroke. The rod end attachment dimension when calculating the installation length Lo shall be 135 mm.

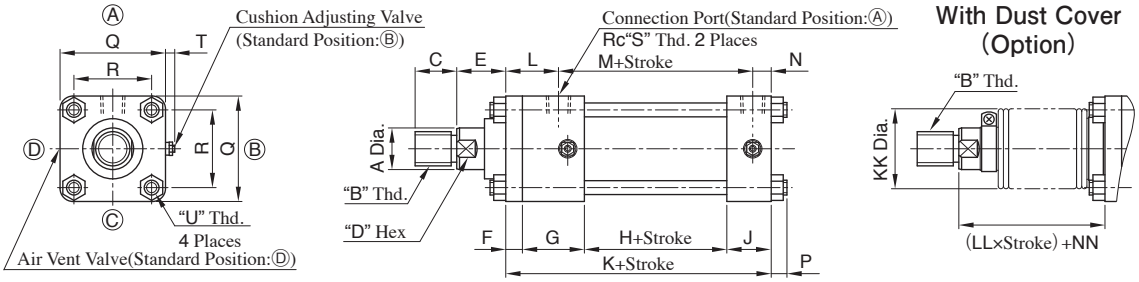
■ From the table on the right n=1
From the figure below L≒1980
From Dimensional Drawing (J-47) and Rod End Attachment (J-48)
$Lo=(180+135)+\frac{S}{2}$
therefore $S=L-Lo=1980-[(180+135)+\frac{S}{2}]$
hence S≒1110 mm

Mounting Type	Type	Rod End Coefficient n	Mounting Type	Type	Rod End Coefficient n
LA		1/4	FB		1/4
		2			2
		4			4
FA		1/4	TC		1
		2	CA		
		4			

S=L–Lo
S : Stroke mm
L : Mounting Length at extension mm
Lo : Mounting Length at contraction mm
Note: For Lo dimensions, refer to dimensional drawing and add the dimensions of rod end attachment.



SD : Basic Type

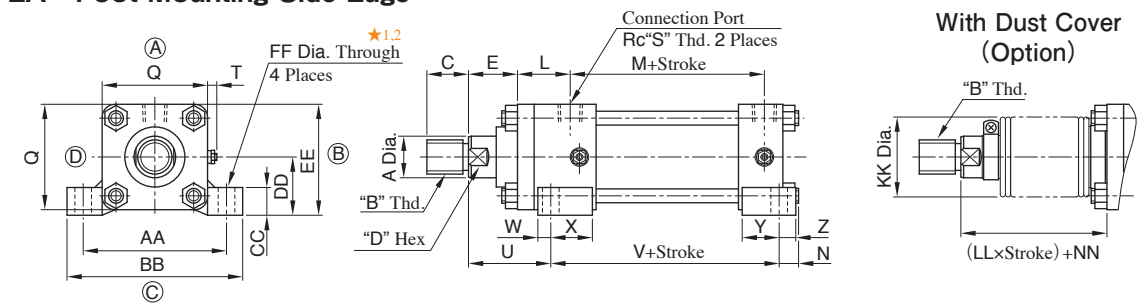


★1. Rod size (A Dia.) 90 or larger has two holes for a pin spanner. Cylinder bore 160 the rod B has a rod size 90, but it is hex.
★2. Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	Rod B							Rod A							E	G	H	J	M
	A	B	C★2	D	F	K	L	A	B	C★2	D	F	K	L					
40	22	M20×1.5	25 (45)	19	11	145	38	28	M 24×1.5	30 (50)	24	11	145	38	32	50	48	36	94
50	28	M24×1.5	30 (50)	24	13	162	42	36	M 30×1.5	35 (60)	30	13	162	42	36	56	48	45	102
63	36	M30×1.5	35 (60)	30	15	171	47	45	M 39×1.5	45 (80)	41	15	171	47	43	59	52	45	106
80	45	M39×1.5	45 (80)	41	18	187	57	56	M 48×1.5	55 (95)	50	18	187	57	48	67	54	48	110
100	56	M48×1.5	55 (95)	50	20	192	58	70	M 64×2	75 (125)	65	22	194	60	53	66	60	46	116
125	70	M64×2	75 (125)	65	24	228	73	90	M 80×2	90 (155)	12 Dia.★1	24	228	73	60	82	64	58	130
140	80	M72×2	80 (140)	75	32	244	81	100	M 95×2	105 (185)	12 Dia.★1	32	244	81	60	82	72	58	138
160	90	M80×2	90 (155)	85★1	37	267	86	110	M100×2	110 (190)	15 Dia.★1	37	267	86	60	87	80	63	156

Cylinder Bore	N	P	Q	R	S	T	U	Rod B				Rod A			
								KK	LL Nylon Tarpaulin, Chloroprene	LL Conex	NN	KK	LL Nylon Tarpaulin, Chloroprene	LL Conex	NN
40	13	11	65	45	3/8	Max.13	M10×1.25	50	1/3.5	1/2.5	45	63	1/3.5	1/2.5	45
50	18	13	80	56	1/2	Max.13	M12×1.25	63			45	71	1/4	1/3	55
63	18	14	94	68	1/2	Max.13	M14×1.5	71	1/4	1/3	55	80	1/4	1/3	55
80	20	16	114	84	3/4	Max.13	M16×1.5	80			55	100	1/4	1/3	55
100	18	18	135	102	3/4	Max.13	M18×1.5	100			55	125	1/5	1/3.5	65
125	25	21	165	125	1	Max.13	M22×1.5	125	1/5	1/3.5	65	140	1/5	1/4	65
140	25	25	192	144	1	Max.13	M27×2	125			65	160			65
160	25	27	218	164	1	Max.13	M30×2	140		1/4	65	180			65

LA : Foot Mounting Side Lugs

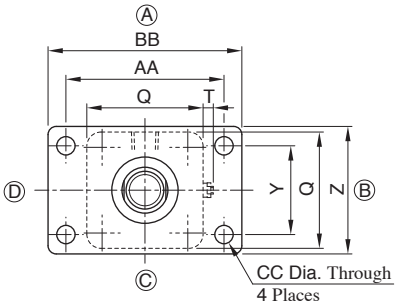


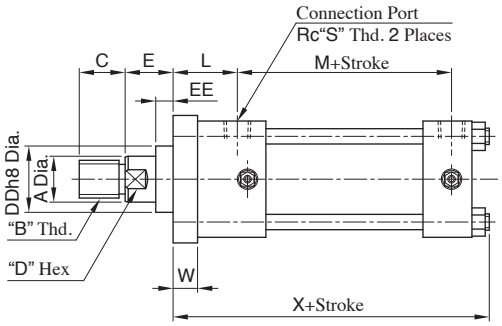
★1. The socket head cap screw shall be used as a mounting bolt.
★2. As for cylinder bore size 40-100, in case the port direction is Ⓑ or Ⓓ, pipe fittings may interference with cylinder mounting bolts. See Instructions on page J-4 for details.
★3. Rod size (A Dia.) 90 or larger has two holes for a pin spanner. Cylinder bore 160 the rod B has a rod size 90, but it is hex.
★4. Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	Rod B						Rod A						M	N	Q	S	T	U	V	W	X
	A	B	C★4	D	E	L	A	B	C★4	D	E	L									
40	22	M20×1.5	25 (45)	19	35	38	28	M 24×1.5	30 (50)	24	35	38	94	27	65	3/8	Max.13	59	105	13	37
50	28	M24×1.5	30 (50)	24	36	42	36	M 30×1.5	35 (60)	30	36	42	102	31	80	1/2	Max.13	67	113	18	32
63	36	M30×1.5	35 (60)	30	43	47	45	M 39×1.5	45 (80)	41	43	47	106	29	94	1/2	Max.13	76	123	18	32
80	45	M39×1.5	45 (80)	41	51	57	56	M 48×1.5	55 (95)	50	51	57	110	24	114	3/4	Max.13	87	143	18	47
100	56	M48×1.5	55 (95)	50	60	58	70	M 64×2	75 (125)	65	58	60	116	22	135	3/4	Max.13	98	150	18	48
125	70	M64×2	75 (125)	65	65	73	90	M 80×2	90 (155)	12 Dia.★3	65	73	130	29	165	1	Max.13	112	173	23	59
140	80	M72×2	80 (140)	75	60	81	100	M 95×2	105 (185)	12 Dia.★3	60	81	138	26	192	1	Max.13	120	183	28	54
160	90	M80×2	90 (155)	85★3	60	86	110	M100×2	110 (190)	15 Dia.★3	60	86	156	25	218	1	Max.13	127	202	30	57

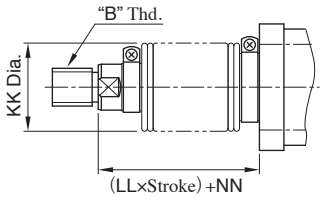
Cylinder Bore	Y	Z	AA	BB	CC	DD	EE	FF	Rod B				Rod A			
									KK	LL Nylon Tarpaulin, Chloroprene	LL Conex	NN	KK	LL Nylon Tarpaulin, Chloroprene	LL Conex	NN
40	16	16	98	122	15	36±0.15	68.5	11	50	1/3.5	1/2.5	48	63	1/3.5	1/2.5	48
50	27	18	115	145	20	45±0.15	85	14	63			45	71	1/4	1/3	55
63	35	15	136	169	25	50±0.15	97	18	71	1/4	1/3	55	80			55
80	40	18	155	190	30	60±0.25	117	18	80			58	100			58
100	42	18	190	230	35	70±0.25	137.5	22	100			62	125	1/5	1/3.5	70
125	50	23	224	272	45	85±0.25	167.5	26	125	1/5	1/3.5	70	140			70
140	57	28	262	320	45	100±0.25	196	30	125			65	160		1/4	65
160	65	30	294	356	55	115±0.25	224	33	140		1/4	65	180			65

FA : Rod Rectangular Flange





With Dust Cover (Option)

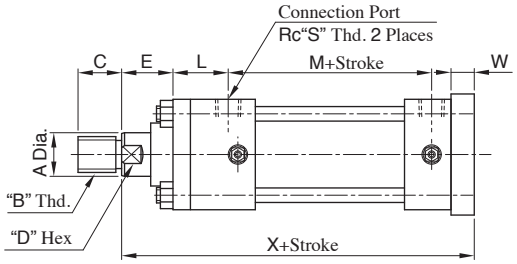


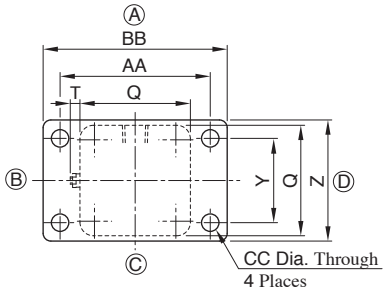
★1. Rod size (A Dia.) 90 or larger has two holes for a pin spanner. Cylinder bore 160 the rod B has a rod size 90, but it is hex.
★2. Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	Rod B								Rod A								L	M	Q
	A	B	C★2	D	E	DD	EE	Z	A	B	C★2	D	E	DD	EE	Z			
40	22	M20×1.5	25 (45)	19	28	40	12	73	28	M 24×1.5	30 (50)	24	28	43	11	80	42	94	65
50	28	M24×1.5	30 (50)	24	29	46	9	85	36	M 30×1.5	35 (60)	30	29	55	8	92	49	102	80
63	36	M30×1.5	35 (60)	30	34	55	6	98	45	M 39×1.5	45 (80)	41	34	65	10	105	56	106	94
80	45	M39×1.5	45 (80)	41	42	65	12	125	56	M 48×1.5	55 (95)	50	42	80	13	140	63	110	114
100	56	M48×1.5	55 (95)	50	44	80	6	150	70	M 64×2	75 (125)	65	44	95	12	165	69	116	135
125	70	M64×2	75 (125)	65	47	95	6	175	90	M 80×2	90 (155)	12 Dia.★1	47	120	15	195	86	130	165
140	80	M72×2	80 (140)	75	51	105	6	195	100	M 95×2	105 (185)	12 Dia.★1	51	130	15	215	90	138	192
160	90	M80×2	90 (155)	85★1	51	120	6	225	110	M100×2	110 (190)	15 Dia.★1	51	140	15	245	95	156	218

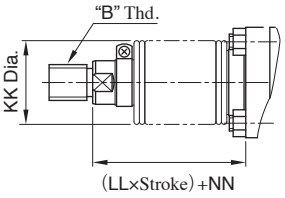
Cylinder Bore	S	T	W	X	Y	AA	BB	CC	Rod B				Rod A			
									KK	LL		NN	KK	LL		NN
										Nylon Tarpaulin, Chloroprene	Conex			Nylon Tarpaulin, Chloroprene	Conex	
40	3/8	Max.13	15	160	46	95	118	11	50	1/3.5	1/2.5	45	63	1/3.5	1/2.5	45
50	1/2	Max.13	20	182	58	115	145	14	63			45	71	1/4	1/3	55
63	1/2	Max.13	24	194	65	132	165	18	71	1/4	1/3	55	80			55
80	3/4	Max.13	24	209	87	155	190	18	80			55	100			55
100	3/4	Max.13	31	221	109	190	230	22	100			55	125	1/5	1/3.5	65
125	1	Max.13	37	262	130	224	272	26	125	1/5	1/3.5	65	140		1/4	65
140	1	Max.13	41	278	145	250	300	30	125			65	160			65
160	1	Max.13	46	303	170	285	345	33	140		1/4	65	180			65

FB : Cap Rectangular Flange





With Dust Cover (Option)

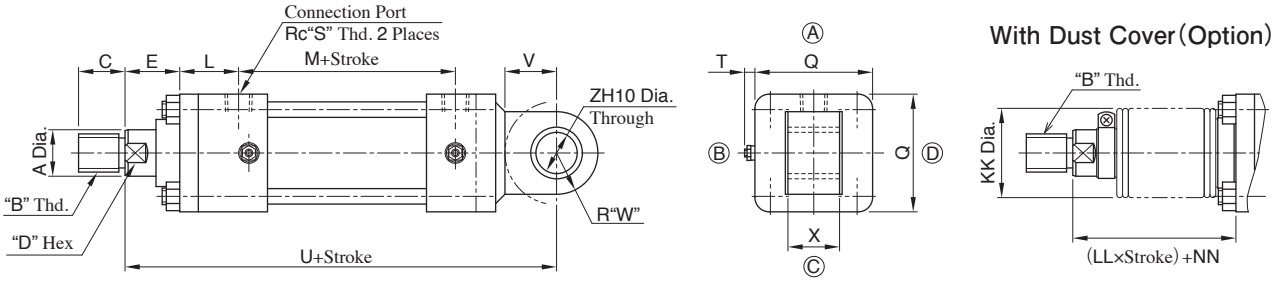


★1. Rod size (A Dia.) 90 or larger has two holes for a pin spanner. Cylinder bore 160 the rod B has a rod size 90, but it is hex.
★2. Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	Rod B						Rod A						M	Q	S	T	W	X	Y	Z
	A	B	C★2	D	E	L	A	B	C★2	D	E	L								
40	22	M20×1.5	25 (45)	19	34	38	28	M 24×1.5	30 (50)	24	34	38	94	65	3/8	Max.13	15	194	46	73
50	28	M24×1.5	30 (50)	24	36	42	36	M 30×1.5	35 (60)	30	36	42	102	80	1/2	Max.13	20	218	58	85
63	36	M30×1.5	35 (60)	30	46	47	45	M 39×1.5	45 (80)	41	46	47	106	94	1/2	Max.13	24	241	65	98
80	45	M39×1.5	45 (80)	41	63	57	56	M 48×1.5	55 (95)	50	63	57	110	114	3/4	Max.13	24	274	87	125
100	56	M48×1.5	55 (95)	50	74	58	70	M 64×2	75 (125)	65	72	60	116	135	3/4	Max.13	31	297	109	150
125	70	M64×2	75 (125)	65	80	73	90	M 80×2	90 (155)	12 Dia.★1	80	73	130	165	1	Max.13	37	345	130	175
140	80	M72×2	80 (140)	75	82	81	100	M 95×2	105 (185)	12 Dia.★1	82	81	138	192	1	Max.13	41	367	145	195
160	90	M80×2	90 (155)	85★1	83	86	110	M100×2	110 (190)	15 Dia.★1	83	86	156	218	1	Max.13	46	396	170	225

Cylinder Bore	AA	BB	CC	Rod B				Rod A			
				KK	LL		NN	KK	LL		NN
					Nylon Tarpaulin, Chloroprene	Conex			Nylon Tarpaulin, Chloroprene	Conex	
40	95	118	11	50	1/3.5	1/2.5	47	63	1/3.5	1/2.5	47
50	115	145	14	63			45	71	1/4	1/3	55
63	132	165	18	71	1/4	1/3	58	80			58
80	155	190	18	80			70	100			70
100	190	230	22	100			76	125	1/5	1/3.5	84
125	224	272	26	125	1/5	1/3.5	85	140		1/4	85
140	250	300	30	125			87	160			87
160	285	345	33	140		1/4	88	180			88

CA : Cap Detachable Eye

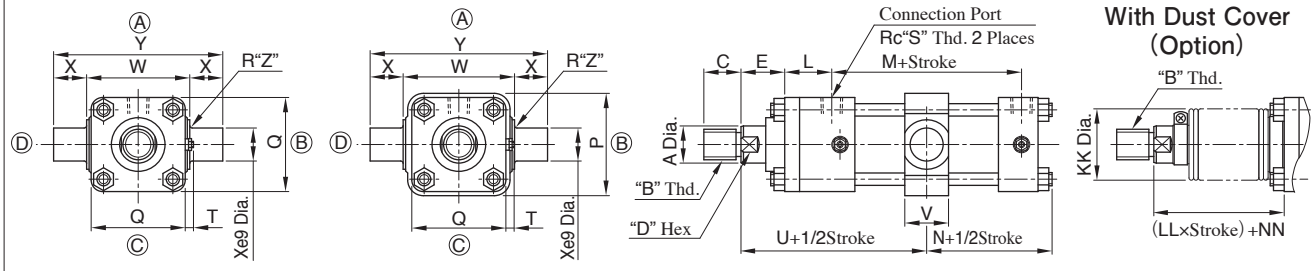


★1. Rod size (A Dia.) 90 or larger has two holes for a pin spanner. Cylinder bore 160 the rod B has a rod size 90, but it is hex.
★2. Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	Rod B						Rod A						M	Q	S	T	U	V	W
	A	B	C★2	D	E	L	A	B	C★2	D	E	L							
40	22	M20×1.5	25 (45)	19	38	38	28	M 24×1.5	30 (50)	24	38	38	94	65	3/8	Max.13	214	25	25
50	28	M24×1.5	30 (50)	24	42	42	36	M 30×1.5	35 (60)	30	42	42	102	80	1/2	Max.13	242	32	30
63	36	M30×1.5	35 (60)	30	53	47	45	M 39×1.5	45 (80)	41	53	47	106	94	1/2	Max.13	271	40	35
80	45	M39×1.5	45 (80)	41	51	57	56	M 48×1.5	55 (95)	50	51	57	110	114	3/4	Max.13	316	50	40
100	56	M48×1.5	55 (95)	50	56	58	70	M 64×2	75 (125)	65	54	60	116	135	3/4	Max.13	345	63	50
125	70	M64×2	75 (125)	65	56	73	90	M 80×2	90 (155)	12 Dia.★1	56	73	130	165	1	Max.13	398	71	63
140	80	M72×2	80 (140)	75	55	81	100	M 95×2	105 (185)	12 Dia.★1	55	81	138	192	1	Max.13	425	80	70
160	90	M80×2	90 (155)	85★1	52	86	110	M100×2	110 (190)	15 Dia.★1	52	86	156	218	1	Max.13	460	90	80

Cylinder Bore	X	Z	Rod B				Rod A			
			KK	LL Nylon Tarpaulin, Chloroprene	LL Conex	NN	KK	LL Nylon Tarpaulin, Chloroprene	LL Conex	NN
40	25 $^{-0.1}_{-0.4}$	20	50	1/3.5	1/2.5	51	63	1/3.5	1/2.5	51
50	32 $^{-0.1}_{-0.4}$	25	63			51	71	1/4	1/3	61
63	40 $^{-0.1}_{-0.4}$	32	71	1/4	1/3	65	80			65
80	50 $^{-0.1}_{-0.4}$	40	80			58	100			58
100	63 $^{-0.1}_{-0.4}$	50	100			58	125	1/5	1/3.5	66
125	80 $^{-0.1}_{-0.6}$	63	125	1/5	1/3.5	61	140		1/4	61
140	90 $^{-0.1}_{-0.6}$	70	125			60	160			60
160	100 $^{-0.1}_{-0.6}$	80	140		1/4	57	180			57

TC : Intermediate Trunnion



Cylinder Bore 40 - 80 Cylinder Bore 100 - 160

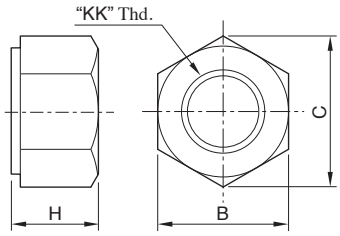
★1. Rod size (A Dia.) 90 or larger has two holes for a pin spanner. Cylinder bore 160 the rod B has a rod size 90, but it is hex.
★2. Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	Rod B							Rod A							M	P	Q	S	T	U	V
	A	B	C★2	D	E	L	N	A	B	C★2	D	E	L	N							
40	22	M20×1.5	25 (45)	19	32	38	71	28	M 24×1.5	30 (50)	24	32	38	71	94	—	65	3/8	Max.13	117	33
50	28	M24×1.5	30 (50)	24	36	42	82	36	M 30×1.5	35 (60)	30	36	42	82	102	—	80	1/2	Max.13	129	33
63	36	M30×1.5	35 (60)	30	43	47	83.5	45	M 39×1.5	45 (80)	41	43	47	83.5	106	—	94	1/2	Max.13	144.5	43
80	45	M39×1.5	45 (80)	41	41	57	76.5	56	M 48×1.5	55 (95)	50	48	57	83.5	110	—	114	3/4	Max.13	167.5	53
100	56	M48×1.5	55 (95)	50	49	58	79	70	M 64×2	75 (125)	65	53	60	85	116	146	135	3/4	Max.13	180	63
125	70	M64×2	75 (125)	65	53	73	94	90	M 80×2	90 (155)	12 Dia.★1	60	73	101	130	185	165	1	Max.13	208	78
140	80	M72×2	80 (140)	75	53	81	101	100	M 95×2	105 (185)	12 Dia.★1	60	81	108	138	210	192	1	Max.13	221	88
160	90	M80×2	90 (155)	85★1	53	86	111.5	110	M100×2	110 (190)	15 Dia.★1	60	86	118.5	156	230	218	1	Max.13	235.5	98

Cylinder Bore	W	X	Y	Z	Rod B				Rod A			
					KK	LL Nylon Tarpaulin, Chloroprene	LL Conex	NN	KK	LL Nylon Tarpaulin, Chloroprene	LL Conex	NN
40	73 $^{0}_{-0.3}$	20	110	2.5	50	1/3.5	1/2.5	45	63	1/3.5	1/2.5	45
50	85 $^{0}_{-0.35}$	25	135	2.5	63			45	71	1/4	1/3	55
63	100 $^{0}_{-0.35}$	32	164	2.5	71	1/4	1/3	55	80			55
80	125 $^{0}_{-0.4}$	40	205	3	80			48	100			55
100	155 $^{0}_{-0.4}$	50	255	3	100			51	125	1/5	1/3.5	65
125	195 $^{0}_{-0.46}$	63	321	4	125	1/5	1/3.5	58	140		1/4	65
140	220 $^{0}_{-0.46}$	70	360	4	125			58	160			65
160	240 $^{0}_{-0.46}$	80	400	4	140		1/4	58	180			65

Options

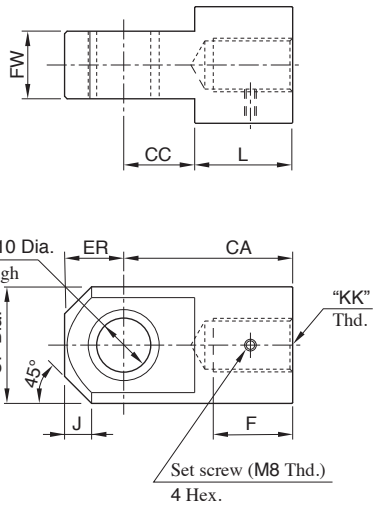
Lock Nut : Option Code "K"



KK	H	B	C
M20×1.5	18	30	34.6
M24×1.5	20	36	41.6
M30×1.5	25	46	53.1
M39×1.5	32	60	69.3
M48×1.5	38	75	86.6
M64×2	51	95	109.7
M72×2	58	105	121.2
M80×2	64	115	132.8

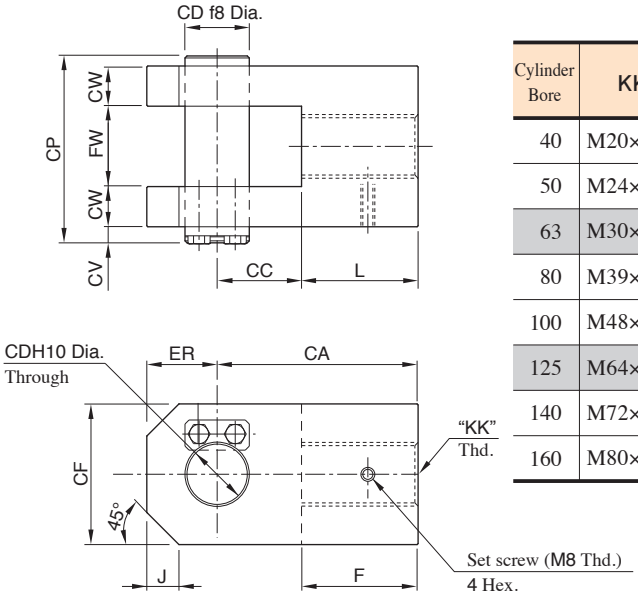
Rod End Attachment

T-End (Rod End Eye) : Option Code "L"



Cylinder Bore	KK	F	CA	CC	CD	CF	ER	FW	J	L
40	M20×1.5	32	70	27	20	45	22.5	$25^{-0.1}_{-0.4}$	8	43
50	M24×1.5	35	80	34	25	55	30	$32^{-0.1}_{-0.4}$	15	46
63	M30×1.5	40	95	42	32	70	35	$40^{-0.1}_{-0.4}$	16	53
80	M39×1.5	53	110	52	40	80	40	$50^{-0.1}_{-0.4}$	15	58
100	M48×1.5	62	135	65	50	98	50	$63^{-0.1}_{-0.4}$	20	70
125	M64×2	80	160	75	63	118	63	$80^{-0.1}_{-0.6}$	30	85
140	M72×2	87	180	82	70	138	70	$90^{-0.1}_{-0.6}$	35	98
160	M80×2	96	195	94	80	158	80	$100^{-0.1}_{-0.6}$	40	101

Y-End (Rod End Clevis) : Option Code "M"

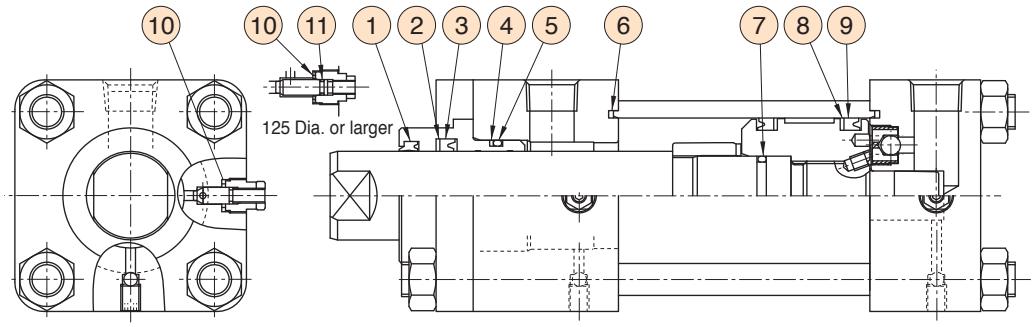


Cylinder Bore	KK	F	CA	CC	CD	CF	ER	FW	CW	CV	CP	J	L
40	M20×1.5	43	70	27	20	45	22.5	$25^{+0.4}_{+0.1}$	12.5	8	63	8	43
50	M24×1.5	46	80	34	25	60	30	$32^{+0.4}_{+0.1}$	16	8	77	15	46
63	M30×1.5	53	95	42	32	70	35	$40^{+0.4}_{+0.1}$	20	8	93	16	53
80	M39×1.5	58	110	52	40	80	40	$50^{+0.4}_{+0.1}$	25	12	117	15	58
100	M48×1.5	70	135	65	50	100	50	$63^{+0.4}_{+0.1}$	31.5	12	143	20	70
125	M64×2	85	160	75	63	120	63	$80^{+0.6}_{+0.1}$	40	18	183	30	85
140	M72×2	98	180	82	70	140	70	$80^{+0.6}_{+0.1}$	45	18	203	35	98
160	M80×2	101	195	94	80	160	80	$100^{+0.6}_{+0.1}$	50	24	230	40	101

★Rod End Attachment thread size "KK" is available only for rod size B.
When used with rod size A, change to rod size B thread diameter.

List of Seals

CJT 210C



Cylinder Bore	Model Numbers for Seal Kit ★1	Rod B					Rod A				
		Dust Seal ①	Backup Ring for Rod Packing ②	Rod Packing ③	Backup Ring for Bush ④	O-Ring ★2 for Bush ⑤	Dust Seal ①	Backup Ring for Rod Packing ②	Rod Packing ③	Backup Ring for Bush ④	O-Ring ★2 for Bush ⑤
40	KS-CJT210C-40✻-20	LBH-22	22×30×1	IUH-22A	BUR-G25	G25	LBH-28	28×35.5×1	IUH-28	BUR-G31 ★3	G30
50	KS-CJT210C-50✻-20	LBH-28	28×35.5×1	IUH-28	BUR-G31 ★3	G30	LBH-36	36×46×1.5	IUH-36	BUR-G40	G40
63	KS-CJT210C-63✻-20	LBH-36	36×46×1.5	IUH-36	BUR-G40	G40	LBH-45	45×56×1.5	IUH-45A	BUR-G55	G55
80	KS-CJT210C-80✻-20	LBH-45	45×56×1.5	IUH-45A	BUR-G55	G55	LBH-56	56×66×1.5	IUH-56	BUR-G65	G65
100	KS-CJT210C-100✻-20	LBH-56	56×66×1.5	IUH-56	BUR-G65	G65	LBH-70	70×80×1.5	IUH-70	BUR-G80	G80
125	KS-CJT210C-125✻-20	LBH-70	70×80×1.5	IUH-70	BUR-G80	G80	LBH-90	90×105×2	IUH-90	BUR-G100	G100
140	KS-CJT210C-140✻-20	LBH-80	80×90×1.5	IUH-80	BUR-G90	G90	LBH-100	100×115×2	IUH-100	BUR-G110	G110
160	KS-CJT210C-160✻-20	LBH-90	90×105×2	IUH-90	BUR-G100	G100	LBH-110	110×125×2	IUH-110	BUR-G125	G125

Cylinder Bore	Model Numbers for Seal Kit ★1	Cover Seal ⑥	O-Ring for Piston ★2 ⑦	Backup Ring for Piston Packing ⑧	Piston Packing ⑨	Cushion Valve Seal ⑩	O-Ring for Cushion ★2 ⑪
40	KS-CJT210C-40✻-20	TT-40	P16	40×30×1.5	OUHR-40	CX-12H	—
50	KS-CJT210C-50✻-20	TT-50	P21	50×40×1.5	OUHR-50	CX-12H	—
63	KS-CJT210C-63✻-20	TT-63	G25	63×53×1.5	OUHR-63	CX-12H	—
80	KS-CJT210C-80✻-20	TT-80	G35	80×71×2	OUHR-80A	CX-14H	—
100	KS-CJT210C-100✻-20	TT-100	G45	100×85×3	OUHR-100	CX-14H	—
125	KS-CJT210C-125✻-20	TT-125	G55	125×112×3	OUHR-125	CR-18H	S7
140	KS-CJT210C-140✻-20	TT-140	G65	140×125×3	OUHR-140	CR-18H	S7
160	KS-CJT210C-160✻-20	TT-160	G75	160×145×3	OUHR-160	CR-18H	S7

Item	Q'ty
①	1
②	1
③	1
④	1
⑤	1
⑥	2
⑦	1
⑧	2
⑨	2
⑩	2
⑪	2

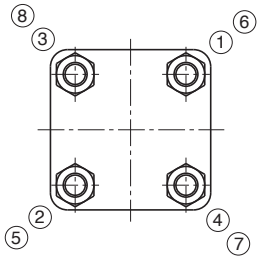
★1. Please indicate rod size A or B in * of the seal kit numbers.
★2. O-rings are the following standards.

Model Numbers	Standard
⑤O-Ring for Bush	OR NBR-70-1 P(G)✻✻-N
⑦O-Ring for Piston	OR NBR-90 P(G)✻✻-N
⑪O-Ring for Cushion	Special Standard

★3. Backup rings are made to our standard.
★4. Material of standard packings is Nitrile Rubber. For Fluorocarbon Rubber and Hydrogenated Nitrile Rubber materials, specify the following code after "KS-".
Fluoro rubber: F-, Hydrogenated nitrile rubber: 6-
Note : The packing code changes without notice.

Tie Rod Tightening

When tightening tie rods, do not tighten only one tie rod tightly at a time, but gradually tighten the tie rods in the order of the numbers shown in the figure on the right. Note that one-sided tightening of tie rods may cause operation failure or chattering.



Mounting Type (SD·LA·FA·FB·CA)

Bore mm	40	50	63	80	100	125	140	160
Tightening Torque Nm	41	70	120	170	280	500	880	1100

Mounting Type (TC)

Bore mm	Rod Size	40	50	63	80	100	125	140	160
Tightening Torque Nm	A	41	70	120	200	330	600	1050	1300
	B	41	70	120	170	280	500	880	1100

Interchangeability in Installation between Current and New Design

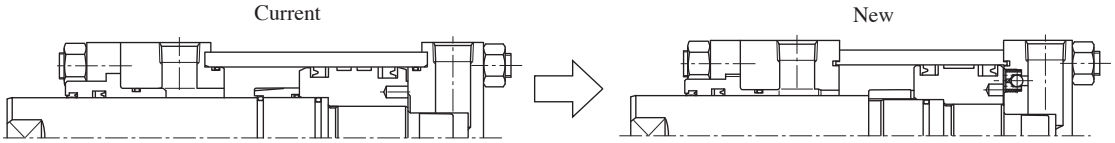
YUKEN's "CJT 21 MPa" series compact type hydraulic cylinders has undergone the following model changes to make it more compact and lightweight, contributing to space saving.

Major Changes

①Overall length shortened

②Structural Change

- The cushion structure has been changed for more stable cushioning performance.
- The conventional structure with a check valve on the outer surface of the cover has been eliminated, and a cushion ring that doubles as a check valve has been adopted on the rod side.
  A check valve directly connected to the bottom hole of the port is used on the cap side.
- An air vent valve is installed separately from the check valve to prevent the check valve from being exposed to the outside surface.
- All cushion adjusting valves have been commonized.
- Basically, internal parts of current and new products are not interchangeable.



Design Number

Series Number	Change Detail
CJT210C	10 Design to 20 Design

Interchangeability in Installation

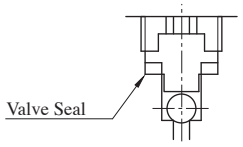
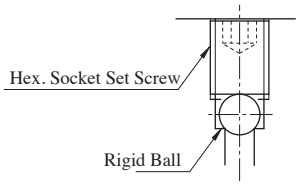
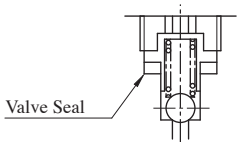
The distance between ports and the total length have been changed, but there is no change in the basic installation.

Series Number	Change of port-to-port distance
CJT210C	Pages J-52 to J-53, dimemsion M.

Please consult us separately for dimensions in "CA" and "TC" Type.

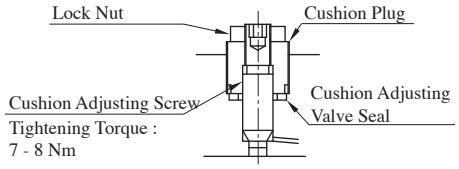
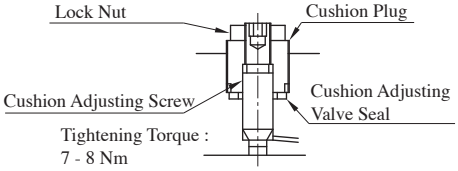
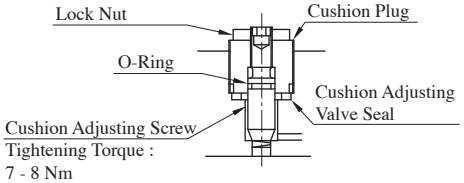
Air Vent Valve

Shape has been changed and unified.

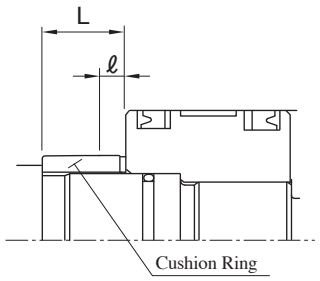
Current	New
Cylinder Bore 40 - 125  Tightening Torque : 8 - 10 Nm	 Tightening Torque : 3 - 5 Nm
Cylinder Bore 140,160  Tightening Torque : 8 - 10 Nm	

Cushion Adjusting Valve

Unify the shape with current design cylinder bore 40-80.

Current	New
Cylinder Bore 40 - 80  Prescribed lift: from fully closed to end of stroke.	 Prescribed lift: from fully closed to end of stroke.
Cylinder Bore 100 - 160  Prescribed lift: from fully closed to end of stroke.	

Cushion



Cushion Length

Cylinder Bore mm	Current		New	
	Cushion Ring Length L mm	Cushion Ring Parallel Part Length ℓ mm	Cushion Ring Length L mm	Cushion Ring Parallel Part Length ℓ mm
40	25	7	26	10
50	25	7	28	10
63	25	7	28	10
80	30	8	30	12
100	30	8	30	12
125	30	8	33	15
140	30	12	33	15
160	30	12	33	15

Note : The cushioning effect will weaken if the cushion ring is not used at the end of the stroke and is stopped more than 5mm before the end of the stroke.

Specifications

The new and current are identical except for the following.

Cylinder Bore mm	Maximum Stroke	
	Current mm	New mm
40	1500	1600

Model Number Designation

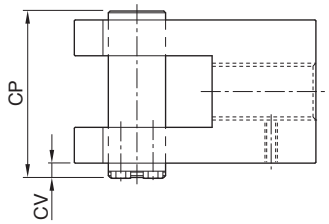
The notes have been changed along with the model numbers. Refer to page J-42 for the changed notes.

Mass Table

Mass has been changed in general. Refer to page J-43 for changed mass.

Option

Y-End(Rod End Clevis) : Option Code "M"



Cylinder Bore	Current		New	
	CV	CP	CV	CP
160	24	230	18	223

List of Seals

Seals have been changed and deleted. Refer to page J-49 for changes.

①Change: Tail end of Model Numbers

②Change: Cover Seal

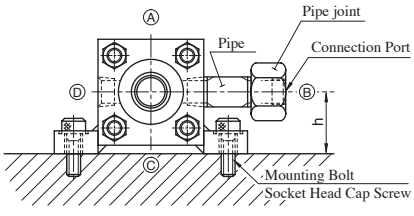
Current	New
O-Ring for cover, Back Up Ring for cover	Cover Seal

③Delete: O-Ring for cushion ring and Back Up Ring for cushion ring

④Change: O-Ring dimension for cushion(partial)

⑤Delete: Check Valve Seal

Foot Mounting Side Lugs (LA Type) Piping Precautions

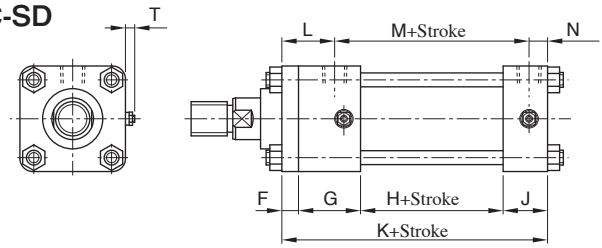


Cylinder Bore	h	
	Current	New
40	36	41
50	45	51
63	56	56
80	60	70
100	80	80

Dimensions

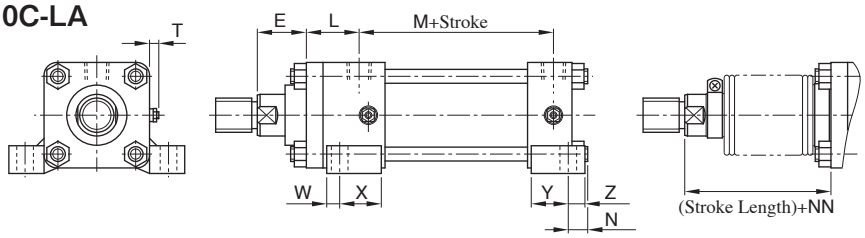
The new and current are identical except for the following dimensions.

CJT210C-SD



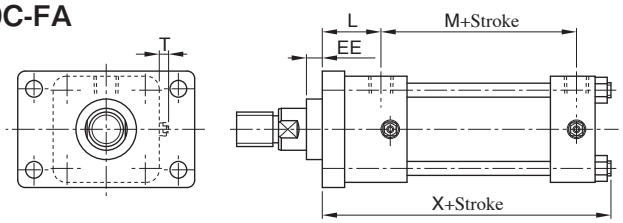
Cylinder Bore	Current									New								
	F Rod A	G	H	J	K	M	N	L	T	F Rod A	G	H	J	K	M	N	L	T
40	11	43	62	31	147	94	15	38	Max.10	11	50	48	36	145	94	13	38	Max.13
50	13	47	66	36	162	102	18	42	Max.10	13	56	48	45	162	102	18	42	Max.13
63	15	50	73	36	174	109	18	47	Max.10	15	59	52	45	171	106	18	47	Max.13
80	18	60	83	41	202	125	20	57	Max.10	18	67	54	48	187	110	20	57	Max.13
100	22	60	90	41	213	132	20	61	Max.11	20	66	60	46	192	116	18	Rod B 58 Rod A 60	Max.13
125	24	75	98	51	248	150	25	73	Max.11	24	82	64	58	228	130	25	73	Max.13
140	32	75	108	51	266	160	25	81	Max.13	32	82	72	58	244	138	25	81	Max.13
160	37	106	127	51	290	179	25	86	Max.13	37	87	80	63	267	156	25	86	Max.13

CJT210C-LA



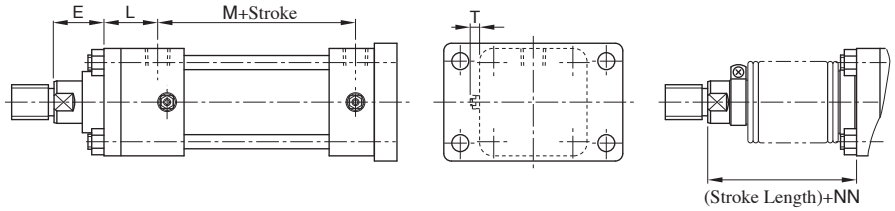
Cylinder Bore	Current										New									
	E	L	M	N	T	W	X	Y	Z	NN	E	L	M	N	T	W	X	Y	Z	NN
40	32	38	94	26	Max.10	16	27	16	15	45	35	38	94	27	Max.13	13	37	16	16	48
50	36	42	102	31	Max.10	18	29	18	18	45	36	42	102	31	Max.13	18	32	27	18	55
63	43	47	109	32	Max.10	18	32	18	18	55	43	47	106	29	Max.13	18	32	35	15	55
80	48	57	125	36	Max.10	21	39	21	20	55	51	57	110	24	Max.13	18	47	40	18	58
100	53	61	132	36	Max.11	23	37	23	18	55	Rod B 60 Rod A 58	Rod B 58 Rod A 60	116	22	Max.13	18	48	42	18	Rod B 62 Rod A 70
125	60	73	150	44	Max.11	28	47	28	23	65	65	73	130	29	Max.13	23	59	50	23	70
140	60	81	160	53	Max.13	28	47	28	28	65	60	81	138	26	Max.13	28	54	57	28	65
160	60	86	179	57	Max.13	30	45	30	30	65	60	86	156	25	Max.13	30	57	65	30	65

CJT210C-FA



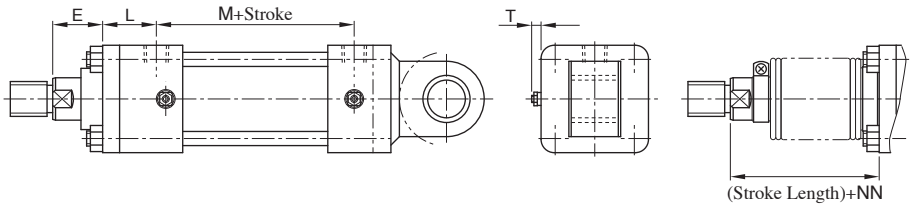
Cylinder Bore	Current						New					
	L	M	T	X	EE		L	M	T	X	EE	
					Rod B	Rod A					Rod B	Rod A
40	42	94	Max.10	162	7	11	42	94	Max.13	160	12	11
50	49	102	Max.10	182	6	8	49	102	Max.13	182	9	8
63	56	109	Max.10	197	6	10	56	106	Max.13	194	6	10
80	63	125	Max.10	224	6	13	63	110	Max.13	209	12	13
100	70	132	Max.11	240	6	10	69	116	Max.13	221	6	12
125	86	150	Max.11	282	6	15	86	130	Max.13	262	6	15
140	90	160	Max.13	300	6	15	90	138	Max.13	278	6	15
160	95	179	Max.13	326	6	15	95	156	Max.13	303	6	15

CJT210C-FB



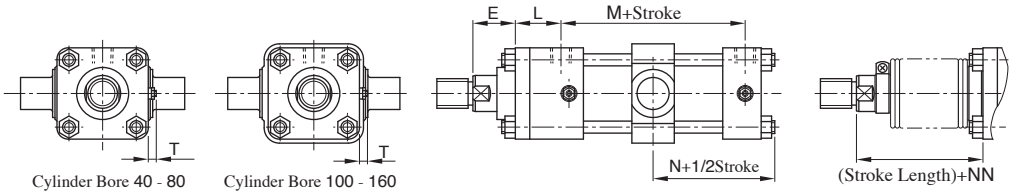
Cylinder Bore	Current						New					
	E	L	M	T	NN		E	L	M	T	NN	
					Rod B	Rod A					Rod B	Rod A
40	32	38	94	Max.10	45	45	34	38	94	Max.13	47	47
50	36	42	102	Max.10	45	55	36	42	102	Max.13	45	55
63	43	47	109	Max.10	55	55	46	47	106	Max.13	58	58
80	48	57	125	Max.10	55	55	63	57	110	Max.13	70	70
100	53	61	132	Max.11	55	65	Rod B 74 Rod A 72	Rod B 58 Rod A 60	116	Max.13	76	84
125	60	73	150	Max.11	65	65	80	73	130	Max.13	85	85
140	60	81	160	Max.13	65	65	82	81	138	Max.13	87	87
160	60	86	179	Max.13	65	65	83	86	156	Max.13	88	88

CJT210C-CA



Cylinder Bore	Current						New					
	E	L	M	T	NN		E	L	M	T	NN	
					Rod B	Rod A					Rod B	Rod A
40	32	38	94	Max.10	45	45	38	38	94	Max.13	51	51
50	36	42	102	Max.10	45	55	42	42	102	Max.13	51	61
63	43	47	109	Max.10	55	55	53	47	106	Max.13	65	65
80	48	57	125	Max.10	55	55	51	57	110	Max.13	58	58
100	53	61	132	Max.11	55	65	Rod B 56 Rod A 54	Rod B 58 Rod A 60	116	Max.13	58	66
125	60	73	150	Max.11	65	65	56	73	130	Max.13	61	61
140	60	81	160	Max.13	65	65	55	81	138	Max.13	60	60
160	60	86	179	Max.13	65	65	52	86	156	Max.13	57	57

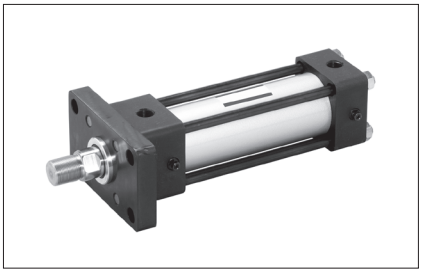
CJT210C-TC

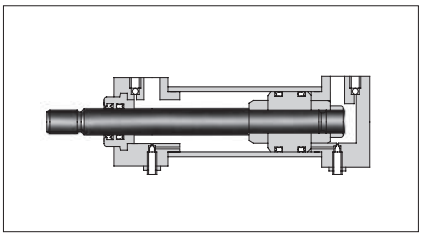


Cylinder Bore	Current						New						
	E	L	M	T	N	NN	E	L	M	T	N		NN
	Rod B					Rod B	Rod B				Rod B	Rod A	Rod B
40	32	38	94	Max.10	73	45	32	38	94	Max.13	71	71	45
50	36	42	102	Max.10	82	45	36	42	102	Max.13	82	82	45
63	43	47	109	Max.10	86.5	55	43	47	106	Max.13	83.5	83.5	55
80	48	57	125	Max.10	98.5	55	41	57	110	Max.13	76.5	83.5	48
100	53	61	132	Max.11	104	55	49	Rod B 58 Rod A 60	116	Max.13	79	85	51
125	60	73	150	Max.11	121	65	53	73	130	Max.13	94	101	58
140	60	81	160	Max.13	130	65	53	81	138	Max.13	101	108	58
160	60	86	179	Max.13	141.5	65	53	86	156	Max.13	111.5	118.5	58

"CJT 21 MPa" Series Hydraulic Cylinders

YUKEN's "CJT 21 MPa" Series Hydraulic Cylinders are higher nominal pressure for use in a wide range of general-purpose industrial machinery.





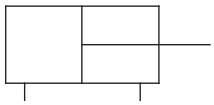
Specifications

Model Numbers		CJT210–＊＊＊＊＊–＊＊＊–＊–30
Cylinder Bore mm		40, 50, 63, 80, 100, 125, 140, 160
Mounting Type		LA, FA, FB, CA, TC★3
Nominal Pressure★1		21 MPa
Maximum Allowable Pressure★1	Cap Side	24.5 MPa
	Rod Side	26.5 MPa
Proof Test Pressure★1		31.5 MPa
Minimum Working Pressure		Rod Side 0.45 MPa Cap Side 0.3 MPa
Operating Maximum Speed		Cylinder Bore 40 - 63 400 mm/s Cylinder Bore 80 - 125 300 mm/s Cylinder Bore 140, 160 200 mm/s
Operating Minimum Speed		8 mm/s
Maximum Stroke★2 mm	Cylinder Bore 40	1600
	Cylinder Bore 50 - 160	2000
Tolerance of Stroke		Refer to the table "Tolerance of Stroke"★4
Tolerance of Thread		JIS B 0211–6g (JIS grade 2 or equivalence)
Ambient Temperature Range		–10 - +80℃
Applicable Standard		Compliant with former JIS B8354

★1. Refer to page J-7 for definition of pressure terms.
★2. May be limited to even lower value in accordance with the buckling strength. Refer to page J-57 for strokes above buckling strength.
★3. Mounting Type SD(basic) is not available. If SD type is required, please select from "CJT 21MPa" series compact type (page J-41)
★4. Tolerance of Stroke

Stroke mm	Tolerance mm
100 or less	$+^{0.8}_{0}$
More Than 100 to 250	$+^{1.0}_{0}$
More Than 250 to 630	$+^{1.25}_{0}$
More Than 630 to 1000	$+^{1.4}_{0}$
More Than 1000 to 1600	$+^{1.6}_{0}$
More Than 1600 to 2000	$+^{1.8}_{0}$

Graphic Symbol



Intermediate Trunnion (TC Type) Minimum Stroke Fabrication Range

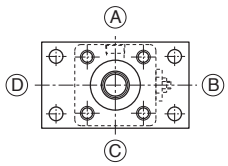
Cylinder Bore mm	Minimum Stroke mm
63	15
80	31
100	39
125	34
140	32
160	54

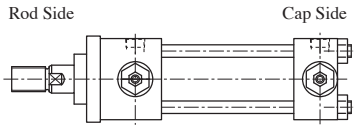
Model Number Designation

F−	CJT210	−LA	50	B	100	B	−A	B	D	−F	−30
Packing Material	Series Number	Mounting Type	Cylinder Bore mm	Rod Size	Cylinder Stroke mm	Cushion Type	Port Position ★2	Cushion Adj. Valve Position ★2	Air Vent Valve Position ★2	Options ★1	Design Number
None : Nitrile Rubber (Standard) F : Fluoro Rubber 6 : Hydrogenated Nitrile Rubber	CJT210 : 21MPa Series Standard Cylinder	LA, FA, FB, CA, TC	40, 50, 63, 80, 100, 125, 140, 160	B : Rod B (Strong)	Cylinder Stroke	B : With Cushion on Both ends R : With Cushion on the Rod side H : With Cushion on the Cap side N : Without Cushion	(Viewed from Rod End) A : Upper (Standard) B : Right C : Under D : Left	B : Right (Standard) A : Upper C : Under D : Left N : No Cushion adj. valve (Standard)	D : Left (Standard) A : Upper B : Right C : Under	E : With Long Rod End Thread F : With Dust Cover (Material: Nylon Tarpaulin, Heat resistant up to 80°C) G : With Dust Cover (Material: Chloroprene , Heat resistant up to 130°C) H : With Dust Cover (Material: Conex, Heat resistant up to 200°C) K : With Lock Nut (E : Used in combination with long rod end thread) L : With T-End ★4 (Rod End Eye) M : With Y-End ★4 (Rod End Clevis)	30

★1. Using the options in combination is available.
Please specify the option code in the alphabet.
Ex.: EKL

★2. As for each direction of port, cushion adjustable valve and air vent valve, please select from ⒶⒷⒸⒹ viewed from rod end (see the figure on the below).
However, the direction of port, cushion adjusting valve, and air vent valve are subject to the restrictions in the table below.





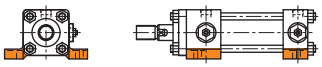
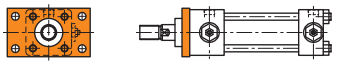
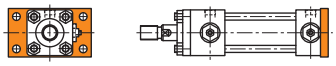
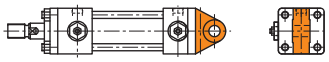
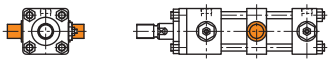
Port Position	Cushion Adjusting Valve Position	Air Vent Valve Position
A, B, C, D	Except port position	Except port position and cushion adjusting valve position

★3. Material of standard packings is Nitrile Rubber.
F: Fluoro rubber, 6: Hydrogenated nitrile rubber are also available.

★4. Rod end attachment are fixed differently with and without lock nuts.
①With Lock Nut
Lock the rod end attachment with a lock nut since a set screw for fixing is not included.
②Without Lock Nut
Locked by set screw for fixing. Rod threads have pointings (drill holes). Please consult us separately for without pointing.

★5. Mounting Type SD is not available for CJT210. If SD type is required, please select from "CJT 21MPa" series compact type.

Mounting Type

Code	Name	Illustration of Mounting Type
LA	Foot Mounting Side Lugs	
FA	Rod Rectangular Flange	
FB	Cap Rectangular Flange	
CA	Cap Detachable Eye	
TC	Intermediate Trunnion	

Syllabus Table

Rod Size Code	Cylinder Bore mm	Rod Size mm	Push/ Pull	Pressurized Area cm^2	Output kN 1 MPa	7 MPa	14 MPa	21 MPa	Velocity by a unit flow rate 10L/min mm/s	Flow rate by a unit velocity 10mm/s L/min
B	40	22	Push Pull	12.6 8.8	1.26 0.88	8.79 6.13	17.58 12.27	26.37 18.39	132 189	0.8 0.5
	50	28	Push Pull	19.6 13.5	1.96 1.35	13.74 9.43	27.48 18.86	41.20 28.28	85 123	1.2 0.8
	63	36	Push Pull	31.2 21.0	3.12 2.10	21.81 14.69	43.62 29.38	65.41 44.05	53 79	1.9 1.3
	80	45	Push Pull	50.3 34.3	5.03 3.43	35.17 24.04	70.34 48.08	105.50 72.11	33 49	3.0 2.1
	100	56	Push Pull	78.5 53.9	7.85 5.39	54.95 37.72	109.90 75.44	164.85 113.14	21 31	4.7 3.2
	125	70	Push Pull	122.7 84.2	12.27 8.42	85.86 58.93	171.72 117.87	257.46 176.79	14 20	7.4 5.1
	140	80	Push Pull	153.9 103.6	15.39 10.36	107.70 72.53	215.40 145.07	322.98 217.56	10.8 16	9.2 6.2
	160	90	Push Pull	201.0 137.4	20.10 13.74	140.67 96.16	281.34 192.33	421.89 288.33	8.3 12	12.1 8.2

Mass Table

Approx. Mass may be obtained from the formula below.

Mass=Ⓐ+[Ⓑ×Stroke(mm)/100]+Ⓒ+Ⓓ

Cylinder Bore mm	ⒶBasic Mass	ⒷAdditional Mass By A Unit Stroke 100mm	ⒸBasic Mass(Each Mounting) LA	FA	FB	CA	CB	TA	TC	ⒹAdditional Mass T-End (Rod End Eye) L	Y-End (Rod End Clevis) M	Lock Nut K
40	4.13	1.05	0.80	0.59	1.00	0.56	0.77	0.32	0.74	1.0	1.2	0.03
50	7.04	1.57	1.24	1.04	1.78	0.93	1.28	0.34	1.04	1.4	2.2	0.05
63	10.46	2.40	2.51	1.91	3.15	1.45	2.18	0.70	1.71	2.2	3.7	0.11
80	17.35	3.63	3.99	3.16	5.35	4.17	5.04	1.34	2.99	4.2	7.7	0.24
100	26.04	5.39	5.40	6.12	9.97	7.95	9.51	3.76	6.79	8.0	14.6	0.52
125	47.40	8.38	9.84	12.99	19.59	15.46	18.57	5.42	13.25	20.8	31.7	1.10
140	67.60	10.87	7.85	11.30	21.95	21.30	25.02	8.03	18.75	24.4	38.4	1.44
160	95.44	14.10	11.29	15.42	31.28	31.43	37.60	18.86	24.28	38.9	57.0	1.93

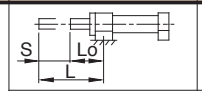
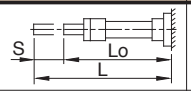
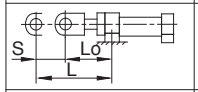
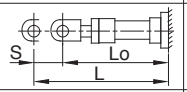
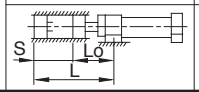
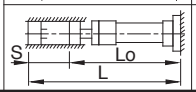
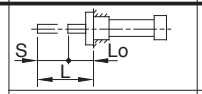
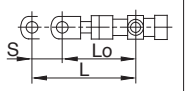
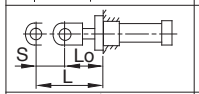
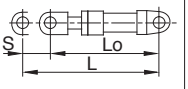
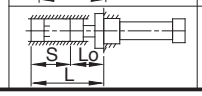
Maximum stroke limited by buckling strength

Calculation of Maximum Stroke

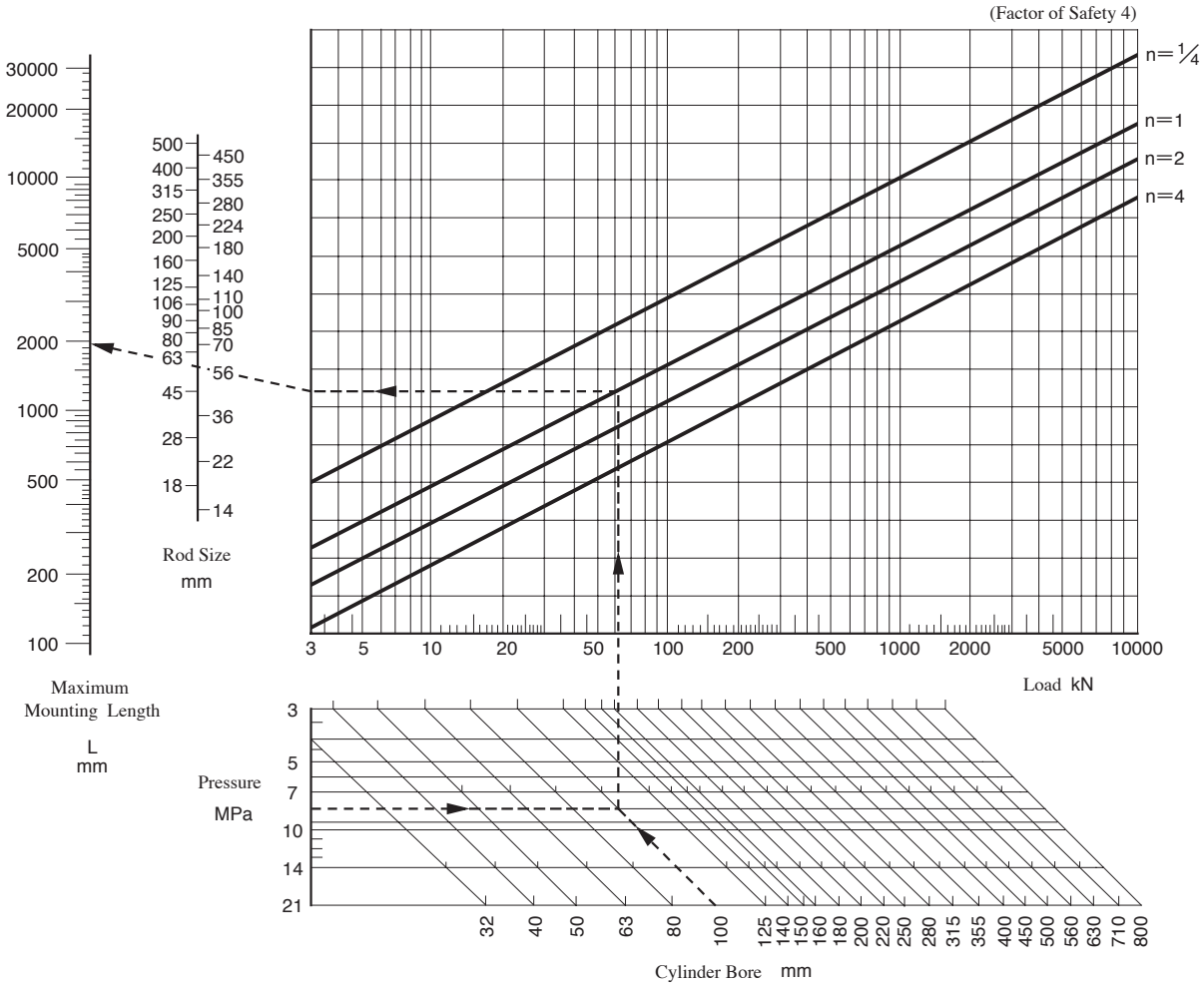
1. Calculate rod end coefficient n from the table on the right.
2. Calculate the maximum installation length L by applying various values such as cylinder bore, rod size, pressure, and rod end coefficient to the figure below.
3. Refer to the external dimensions and calculate the mounting length Lo when retracted.
   Use the formula S=L–Lo and calculate the maximum stroke S.

(Example) Cylinder bore 100 mm, rod size 56 mm, mounting type TC (intermediate trunnion type) standard cylinder operated at 8 MPa pressure. Calculate the maximum stroke. The rod end attachment dimension when calculating the installation length Lo shall be 180 mm.

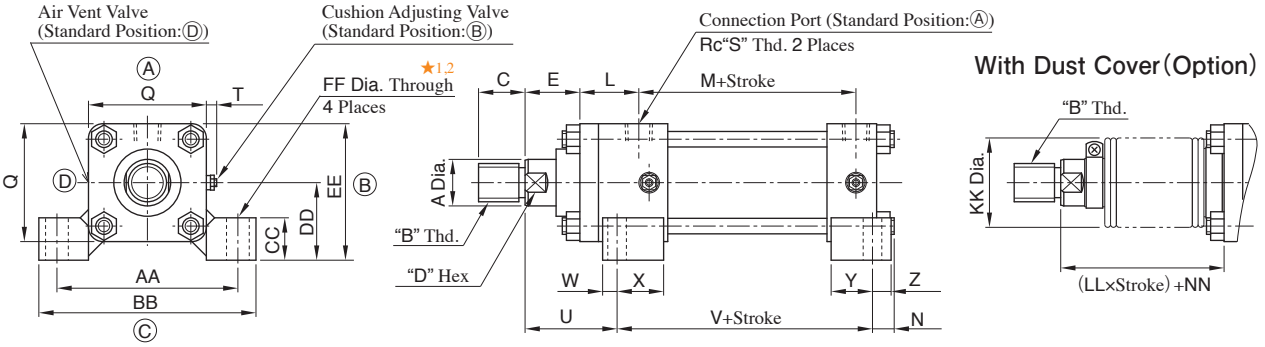
■ From the table on the right n=1
From the figure below L≒1980
From Dimensional Drawing (J-60) and Rod End Attachment (J-61)
$Lo=(181+180)+\frac{S}{2}$
therefore $S=L-Lo=1980-[(181+180)+\frac{S}{2}]$
hence S≒1080 mm

Mounting Type	Type	Rod End Coefficient n	Mounting Type	Type	Rod End Coefficient n
LA		1/4	FB		1/4
		2			2
		4			4
FA		1/4	TC		1
		2	CA		
		4			

S=L–Lo
S : Stroke mm
L : Mounting Length at extension mm
Lo : Mounting Length at contraction mm
Note: For Lo dimensions, refer to dimensional drawing and add the dimensions of rod end attachment.



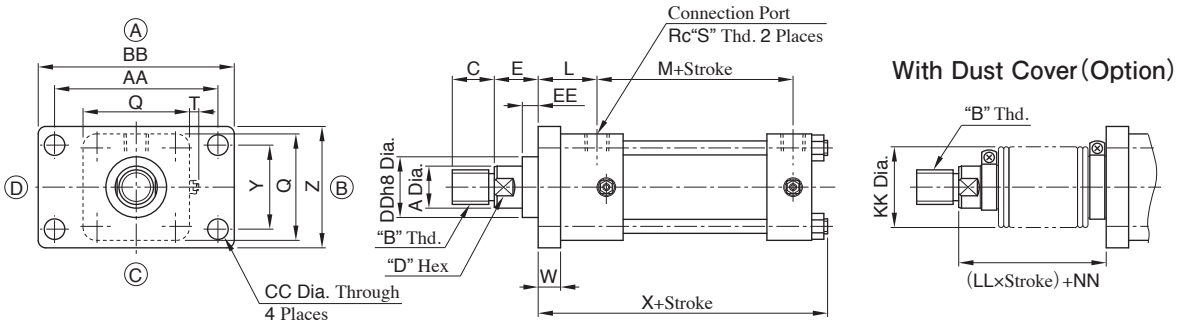
LA : Foot Mounting Side Lugs



★1. The socket head cap screw shall be used as a mounting bolt.
★2. As for cylinder bore size 40-100, in case the port direction is Ⓑ or Ⓓ, pipe fittings may interference with cylinder mounting bolts. Refer to instructions on page J-4 for details.
★3. Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	A	B	C★3	D	E	L	M	N	Q	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	KK	LL		NN
																									Nylon Tarpaulin, Chloroprene	Conex	
40	22	M20×1.5	25 (45)	19	36	38	94	22	65	3/8	Max.13	59	111	12	38	25	11	98	122	19	42±0.15	74.5	11	50	1/3.5	1/2.5	53
50	28	M24×1.5	30 (50)	24	36	42	102	28	80	1/2	Max.13	63	120	14	36	30	15	118	145	24	55±0.15	95	14	63			56
63	36	M30×1.5	35 (60)	30	38	47	106	20	94	1/2	Max.13	71	132	18	41	39	18	140	175	35	63±0.15	110	18	71	1/4	1/3	64
80	45	M39×1.5	45 (80)	41	44	57	110	15	114	3/4	Max.13	80	152	18	49	49	18	175	210	41	75±0.25	132	22	80			64
100	56	M48×1.5	55 (95)	50	46	58	116	5	135	3/4	Max.13	89	162	23	43	59	23	215	260	40	85±0.25	152.5	26	100			66
125	70	M64×2	75 (125)	65	54	73	130	15	165	1	Max.13	106	182	28	54	64	28	270	330	47	105±0.25	187.5	33	125	1/5	1/3.5	78
140	80	M72×2	80 (140)	75	54	81	138	22	192	1	Max.13	114	187	28	54	61	28	280	335	45	112±0.25	208	33	125			74
160	90	M80×2	90 (155)	85	59	86	156	14	218	1	Max.13	127	212	31	56	76	31	315	375	50	125±0.25	234	36	140		1/4	74

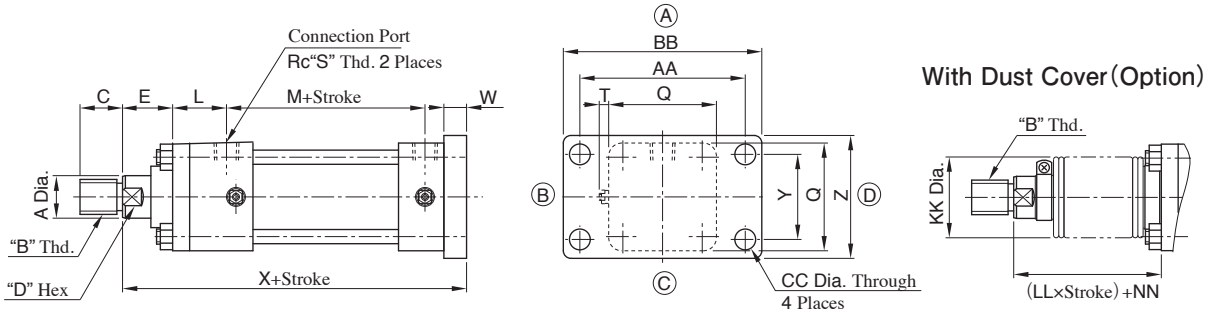
FA : Rod Rectangular Flange



★ Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	A	B	C★	D	E	L	M	Q	S	T	W	X	Y	Z	AA	BB	CC	DD	EE	KK	LL		NN
																					Nylon Tarpaulin, Chloroprene	Conex	
40	22	M20×1.5	25 (45)	19	28	43	94	65	3/8	Max.13	16	161	50	73	98	122	11	40	11	50	1/3.5	1/2.5	45
50	28	M24×1.5	30 (50)	24	25	49	102	80	1/2	Max.13	20	182	60	88	118	145	14	46	9	63			45
63	36	M30×1.5	35 (60)	30	29	56	106	94	1/2	Max.13	24	194	73	106	140	175	18	55	6	71	1/4	1/3	55
80	45	M39×1.5	45 (80)	41	35	66	110	114	3/4	Max.13	27	212	90	130	175	210	22	65	9	80			55
100	56	M48×1.5	55 (95)	50	35	69	116	135	3/4	Max.13	31	221	115	165	215	260	26	80	6	100			55
125	70	M64×2	75 (125)	65	41	88	130	165	1	Max.13	39	264	145	205	270	330	33	95	4	125	1/5	1/3.5	65
140	80	M72×2	80 (140)	75	45	90	138	192	1	Max.13	41	278	160	218	280	335	33	105	6	125			65
160	90	M80×2	90 (155)	85	50	95	156	218	1	Max.13	46	303	180	243	315	375	36	120	6	140		1/4	65

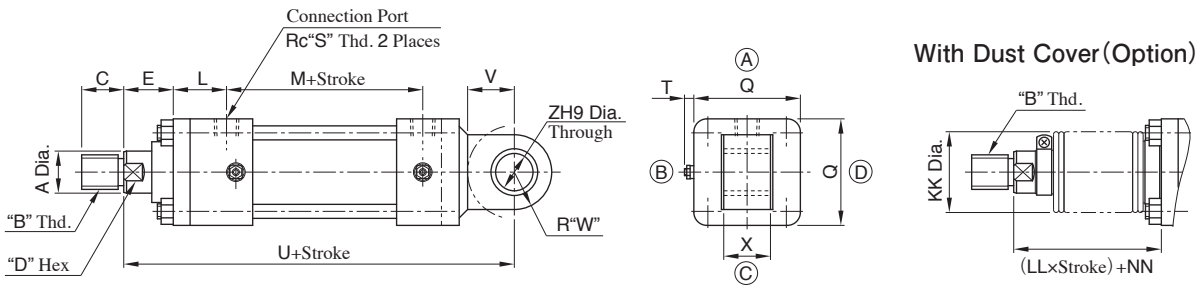
FB : Cap Rectangular Flange



★ Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	A	B	C★	D	E	L	M	Q	S	T	W	X	Y	Z	AA	BB	CC	KK	LL		NN
																			Nylon Tarpaulin, Chloroprene	Conex	
40	22	M20×1.5	25 (45)	19	40	38	94	65	3/8	Max.13	16	201	50	73	98	122	11	50	1/3.5	1/2.5	57
50	28	M24×1.5	30 (50)	24	40	42	102	80	1/2	Max.13	20	222	60	88	118	145	14	63			60
63	36	M30×1.5	35 (60)	30	51	47	106	94	1/2	Max.13	24	246	73	106	140	175	18	71	1/4	1/3	77
80	45	M39×1.5	45 (80)	41	63	57	110	114	3/4	Max.13	27	277	90	130	175	210	22	80			83
100	56	M48×1.5	55 (95)	50	78	58	116	135	3/4	Max.13	31	301	115	165	215	260	26	100			98
125	70	M64×2	75 (125)	65	82	73	130	165	1	Max.13	39	349	145	205	270	330	33	125	1/5	1/3.5	106
140	80	M72×2	80 (140)	75	81	81	138	192	1	Max.13	41	366	160	218	280	335	33	125			101
160	90	M80×2	90 (155)	85	92	86	156	218	1	Max.13	46	405	180	243	315	375	36	140		1/4	107

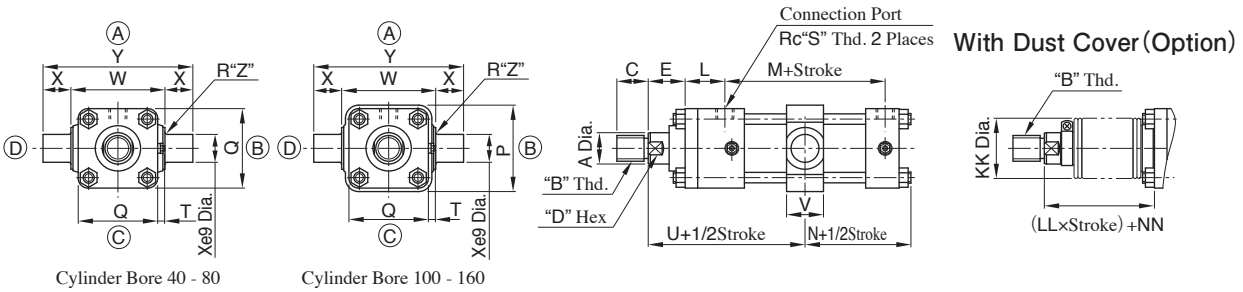
CA : Cap Detachable Eye



★ Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	A	B	C★	D	E	L	M	Q	S	T	U	V	W	X	Z	KK	LL		NN
																	Nylon Tarpaulin, Chloroprene	Conex	
40	22	M20×1.5	25 (45)	19	45	38	94	65	3/8	Max.13	221	25	25	$32^{-0.1}_{-0.4}$	20	50	1/3.5	1/2.5	62
50	28	M24×1.5	30 (50)	24	47	42	102	80	1/2	Max.13	247	32	30	$36^{-0.1}_{-0.4}$	25	63			67
63	36	M30×1.5	35 (60)	30	59	47	106	94	1/2	Max.13	277	40	35	$40^{-0.1}_{-0.4}$	31.5	71	1/4	1/3	85
80	45	M39×1.5	45 (80)	41	58	57	110	114	3/4	Max.13	323	50	40	$50^{-0.1}_{-0.4}$	40	80			78
100	56	M48×1.5	55 (95)	50	61	58	116	135	3/4	Max.13	350	63	50	$63^{-0.1}_{-0.4}$	50	100			81
125	70	M64×2	75 (125)	65	67	73	130	165	1	Max.13	417	79	63	$80^{-0.1}_{-0.6}$	63	125	1/5	1/3.5	91
140	80	M72×2	80 (140)	75	57	81	138	192	1	Max.13	440	89	71	$80^{-0.1}_{-0.6}$	71	125			77
160	90	M80×2	90 (155)	85	66	86	156	218	1	Max.13	484	100	80	$100^{-0.1}_{-0.6}$	80	140		1/4	81

TC : Intermediate Trunnion

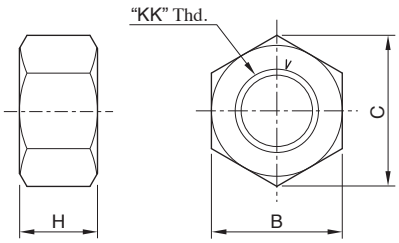


★ Long rod end thread type : the dimension "C" is the value marked in parentheses.

Cylinder Bore	A	B	C★	D	E	L	M	N	P	Q	S	T	U	V	W	X	Y	Z	KK	LL		NN
																				Nylon Tarpaulin, Chloroprene	Conex	
40	22	M20×1.5	25 (45)	19	30	38	94	64	—	65	3/8	Max.13	122	33	$73_{-0.3}^{0}$	25	123	2.5	50	1/3.5	1/2.5	47
50	28	M24×1.5	30 (50)	24	33	42	102	77	—	80	1/2	Max.13	131	33	$88_{-0.35}^{0}$	25	138	2.5	63			53
63	36	M30×1.5	35 (60)	30	36	47	106	73	—	94	1/2	Max.13	148	43	$106_{-0.35}^{0}$	31.5	169	2.5	71	1/4	1/3	62
80	45	M39×1.5	45 (80)	41	41	57	110	75	—	114	3/4	Max.13	169	53	$128_{-0.4}^{0}$	40	208	3	80			61
100	56	M48×1.5	55 (95)	50	47	58	116	76	146	135	3/4	Max.13	181	63	$170_{-0.4}^{0}$	50	270	3	100			67
125	70	M64×2	75 (125)	65	60	73	130	101	185	165	1	Max.13	208	78	$205_{-0.46}^{0}$	63	331	4	125	1/5	1/3.5	84
140	80	M72×2	80 (140)	75	60	81	138	111	210	192	1	Max.13	218	88	$225_{-0.46}^{0}$	71	367	4	125			80
160	90	M80×2	90 (155)	85	60	86	156	112	230	218	1	Max.13	242	98	$255_{-0.52}^{0}$	80	415	4	140		1/4	75

Options

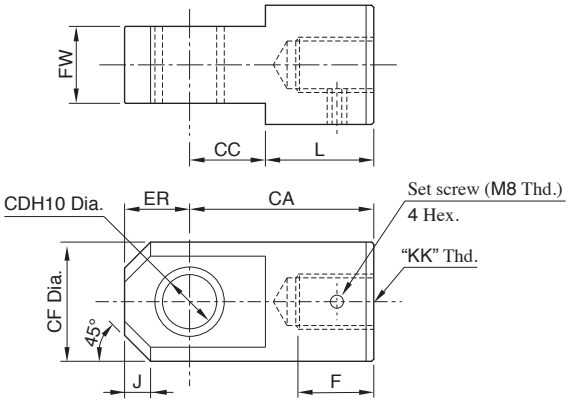
Lock Nut : Option Code "K"



KK	H	B	C
M20×1.5	12	27	31.2
M24×1.5	14	32	37.0
M30×1.5	17	41	47.3
M39×1.5	20	55	63.5
M48×1.5	26	70	80.8
M64×2	35	90	104
M72×2	38	100	115
M80×2	43	110	127

Rod End Attachment

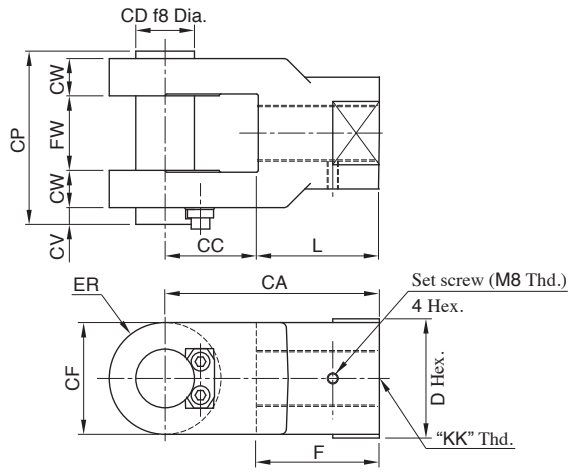
T-End (Rod End Eye) : Option Code "L"



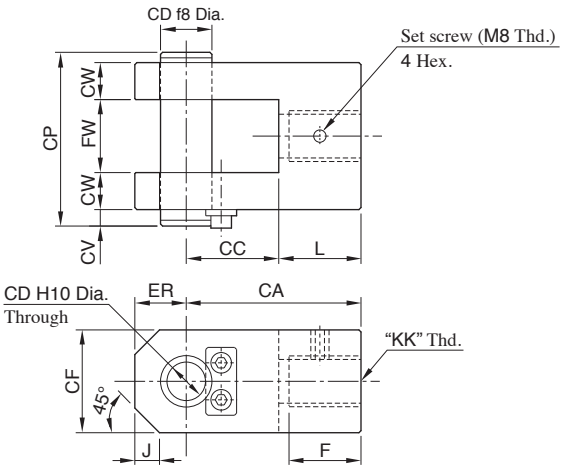
Cylinder Bore	KK	F	CA	CC	CD	CF	ER	FW	J	L
40	M20×1.5	32	70	28	20	49	25	$31.5^{-0.1}_{-0.4}$	10	42
50	M24×1.5	35	85	35	25	55	30	$35.5^{-0.1}_{-0.4}$	12	50
63	M30×1.5	47	115	43	31.5	62	35	$40^{-0.1}_{-0.4}$	15	72
80	M39×1.5	62	145	55	40	79	40	$50^{-0.1}_{-0.4}$	20	90
100	M48×1.5	77	180	65	50	100	50	$63^{-0.1}_{-0.4}$	30	115
125	M64×2	82	225	85	63	130	65	$80^{-0.1}_{-0.6}$	40	140
140	M72×2	97	240	90	71	140	70	$80^{-0.1}_{-0.6}$	45	150
160	M80×2	112	280	100	80	160	80	$100^{-0.1}_{-0.6}$	50	180

Y-End (Rod End Clevis) : Option Code "M"

Cylinder Bore 40, 63, 80



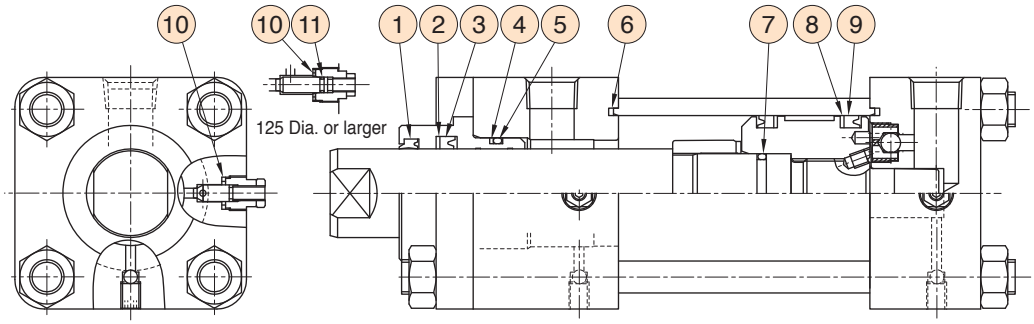
Cylinder Bore 50, 100 - 160



Cylinder Bore	KK	F	CA	CC	CD	CF	ER	FW	CW	CV	CP	D	J	L
40	M20×1.5	38	70	32	20	40	R20	$31.5^{+0.4}_{+0.1}$	16	8	76.5	41	–	38
50	M24×1.5	35	85	45	25	50	25	$35.5^{+0.4}_{+0.1}$	18	8	84.5	–	12	40
63	M30×1.5	65	115	50	31.5	60	R30	$40^{+0.4}_{+0.1}$	20	8	93	60	–	65
80	M39×1.5	85	145	60	40	80	R40	$50^{+0.4}_{+0.1}$	25	12	117	80	–	85
100	M48×1.5	77	180	70	50	100	50	$63^{+0.4}_{+0.1}$	31.5	12	143	–	30	110
125	M64×2	82	225	90	63	120	65	$80^{+0.6}_{+0.1}$	40	18	183	–	30	135
140	M72×2	97	240	100	71	140	70	$80^{+0.6}_{+0.1}$	40	18	183	–	40	140
160	M80×2	112	280	110	80	160	80	$100^{+0.6}_{+0.1}$	40	24	210	–	40	170

List of Seals

CJT 210



Cylinder Bore	Model Numbers for Seal Kit ★1	Dust Seal ①	Backup Ring for Rod Packing ②	Rod Packing ③	Backup Ring for Bush ④	O-Ring for Bush ★2 ⑤
40	KS-CJT210-40B-30	LBH-22	22×30×1	IUH-22A	BUR-G25	G25
50	KS-CJT210-50B-30	LBH-28	28×35.5×1	IUH-28	BUR-G31 ★3	G30
63	KS-CJT210-63B-30	LBH-36	36×46×1.5	IUH-36	BUR-G40	G40
80	KS-CJT210-80B-30	LBH-45	45×56×1.5	IUH-45A	BUR-G55	G55
100	KS-CJT210-100B-30	LBH-56	56×66×1.5	IUH-56	BUR-G65	G65
125	KS-CJT210-125B-30	LBH-70	70×80×1.5	IUH-70	BUR-G80	G80
140	KS-CJT210-140B-30	LBH-80	80×90×1.5	IUH-80	BUR-G90	G90
160	KS-CJT210-160B-30	LBH-90	90×105×2	IUH-90	BUR-G100	G100

Cylinder Bore	Model Numbers for Seal Kit ★1	Cover Seal ⑥	O-Ring for Piston ★2 ⑦	Backup Ring for Piston Packing ⑧	Piston Packing ⑨	Cushion Valve Seal ⑩	O-Ring for Cushion ★2 ⑪
40	KS-CJT210-40B-30	TT-40	P16	40×30×1.5	OUHR-40	CX-12H	—
50	KS-CJT210-50B-30	TT-50	P21	50×40×1.5	OUHR-50	CX-12H	—
63	KS-CJT210-63B-30	TT-63	G25	63×53×1.5	OUHR-63	CX-12H	—
80	KS-CJT210-80B-30	TT-80	G35	80×71×2	OUHR-80A	CX-14H	—
100	KS-CJT210-100B-30	TT-100	G45	100×85×3	OUHR-100	CX-14H	—
125	KS-CJT210-125B-30	TT-125	G55	125×112×3	OUHR-125	CR-18H	S7
140	KS-CJT210-140B-30	TT-140	G65	140×125×3	OUHR-140	CR-18H	S7
160	KS-CJT210-160B-30	TT-160	G75	160×145×3	OUHR-160	CR-18H	S7

Item	Q'ty
①	1
②	1
③	1
④	1
⑤	1
⑥	2
⑦	1
⑧	2
⑨	2
⑩	2
⑪	2

★1. Please specify the seal kit numbers above when ordering the seals.
★2. O-rings are the following standards.

Model Numbers	Standard
⑤O-Ring for Bush	OR NBR-70-1 P(G)**-N
⑦O-Ring for Piston	OR NBR-90 P(G)**-N
⑪O-Ring for Cushion	Special Standard

★3. Backup rings are made to our standard
★4. Material of standard packings is Nitrile Rubber. For Fluorocarbon Rubber and Hydrogenated Nitrile Rubber materials, specify the following code after "KS-".
Fluoro rubber: F-, Hydrogenated nitrile rubber: 6-
Note : The packing code changes without notice.

Tie Rod Tightening

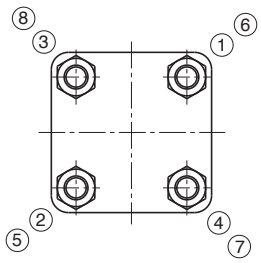
When tightening tie rods, do not tighten only one tie rod tightly at a time, but gradually tighten the tie rods in the order of the numbers shown in the figure on the right. Note that one-sided tightening of tie rods may cause operation failure or chattering.

Mounting Type (SD·LA·FA·FB·CA)

Bore mm	40	50	63	80	100	125	140	160
Tightening Torque Nm	41	70	120	170	280	500	880	1100

Mounting Type (TC)

Bore mm	Rod Size	40	50	63	80	100	125	140	160
Tightening Torque Nm	A	41	70	120	200	330	600	1050	1300
	B	41	70	120	170	280	500	880	1100



Installation between Current and New Design

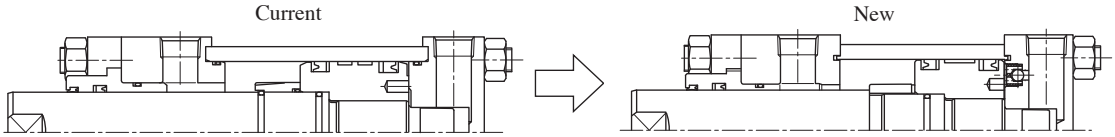
"CJT 21 MPa" Series Hydraulic Cylinders undergone the following model changes.

Major Changes

①Overall length shortened

②Structural Change

- The cushion structure has been changed for more stable cushioning performance.
- The conventional structure with a check valve on the outer surface of the cover has been eliminated, and a cushion ring that doubles as a check valve has been adopted on the rod side.
  A check valve directly connected to the bottom hole of the port is used on the cap side.
- An air vent valve is installed separately from the check valve to prevent the check valve from being exposed to the outside surface.
- All cushion adjusting valves have been commonized.
- Basically, internal parts of current and new products are not interchangeable.



Design Number

Series Number	Change Design
CJT210	20 Design to 30 Design

Mounting Type

Mounting type "SD" has been eliminated in the 30 design.
If mounting type "SD" is required, please select from "CJT 21MPa" series compact type.

Interchangeability in Installation

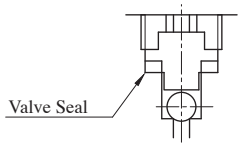
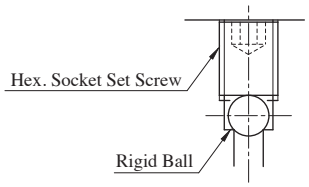
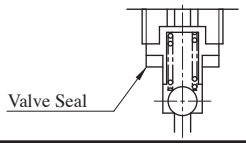
The distance between ports and the total length have been changed, but there is no change in the basic installation.

Series Number	Change of port-to-port distance.
CJT210	Pages J-65 to J-67, dimemsion M.

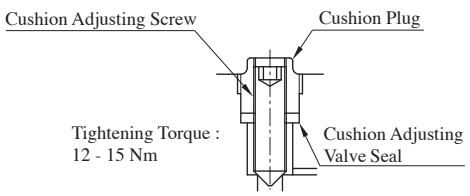
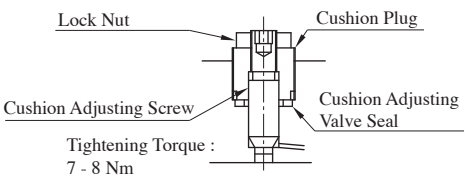
★Please consult us separately for dimensions in "CA" and "TC" Series.

Air Vent Valve

The shape has been changed and unified.

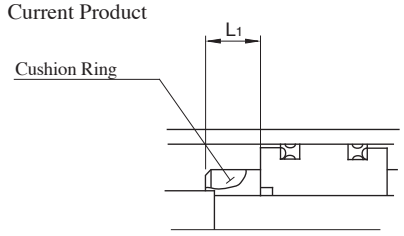
Current	New
Cylinder Bore 40 - 80  	 Tightening Torque：3 - 5 Nm
Cylinder Bore 100 - 160  	

Cushion Adjusting Valve

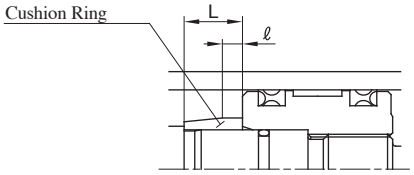
Current	New
 Prescribed lift: from fully closed to 3 turns.	 Prescribed lift: from fully closed to end of stroke.

Cushion

Current Product



New Product



Cushion Length

Cylinder Bore mm	Current	New	
	Cushion Ring Length L1 mm	Cushion Ring Length L mm	Cushion Ring Parallel Part Length ℓ mm
40	20	26	10
50	20	28	10
63	20	28	10
80	25	30	12
100	25	30	12
125	25	33	15
140	25	33	15
160	25	33	15

Note : The cushioning effect will weaken if the cushion ring is not used at the end of the stroke and is stopped more than 5mm before the end of the stroke.

Specifications

The new and current are identical except for the following.

Cylinder Bore mm	Maximum Stroke	
	Current mm	New mm
40	1500	1600

Model Number Designation

The notes have been changed along with the design numbers. Refer to page J-55 for the changed notes.

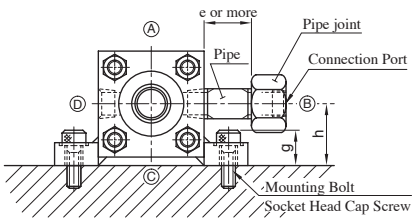
Mass Table

Mass has been changed in general. Refer to page J-56 for changed mass.

List of Seals

Seals have been added, changed and deleted. Refer to page J-62 for changes.

Foot Mounting Side Lugs (LA Type) Piping Precautions



Cylinder Bore	e		g		h	
	Current	New	Current	New	Current	New
40	26	28.5	25	29	42	47
50	30	32.5	32	36	55	61
63	38	41	41	51	63	69
80	43	48.5	50	61	75	85
100	50	62.5	59	74	85	95

Tie Rod Tightening

Current

Bore mm	40	50	63	80	100	125	140	160
Tightening Torque Nm	70	120	170	250	460	880	1100	1400

New

Mounting Type (SD・LA・FA・FB・CA)

Bore mm	40	50	63	80	100	125	140	160
Tightening Torque Nm	41	70	120	170	280	500	880	1100

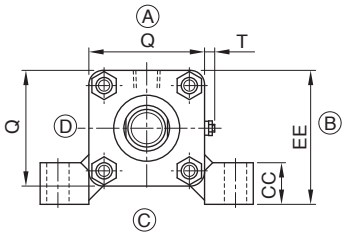
Mounting Type (TC)

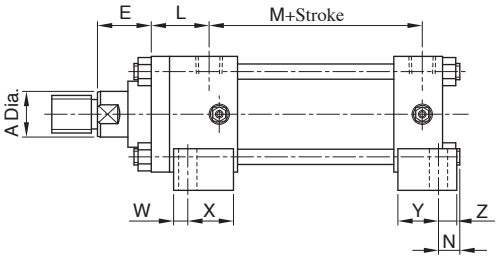
Bore mm	Rod Size	40	50	63	80	100	125	140	160
Tightening Torque Nm	A	41	70	120	200	330	600	1050	1300
	B	41	70	120	170	280	500	880	1100

Dimensions

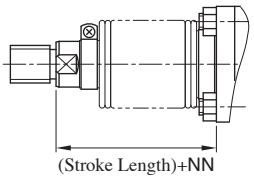
The new and current are identical except for the following dimension.

CJT210-LA



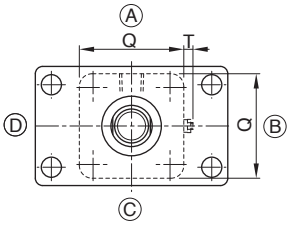


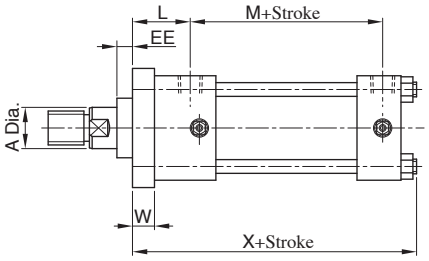
With Dust Cover (Option)



Cylinder Bore	Current														New												
	A	E	L	M	N	Q	T	W	X	Y	Z	CC	EE	NN	A	E	L	M	N	Q	T	W	X	Y	Z	CC	EE	NN
40	22.4	30	43	98	29	70	Max.6	16	31	16	16	15	77	47	22	36	38	94	22	65	Max.13	12	38	25	11	19	74.5	53
50	28	30	48	106	33	85	Max.6	18	34	18	19	20	97.5	50	28	36	42	102	28	80	Max.13	14	36	30	15	24	95	56
63	35.5	35	56	113	35	100	Max.6	18	39	18	19	25	113	61	36	38	47	106	20	94	Max.13	18	41	39	18	35	110	64
80	45	35	69	129	39	125	Max.6	21	46	21	21	30	137.5	55	45	44	57	110	15	114	Max.13	18	49	49	18	41	132	64
100	56	40	71	139	40	160	Max.6	23	44	23	24	35	165	60	56	46	58	116	5	135	Max.13	23	43	59	23	40	152.5	66
125	71	45	83	159	49	190	Max.6	28	49	28	29	45	200	69	70	54	73	130	15	165	Max.13	28	54	64	28	47	187.5	78
140	80	50	86	164	51	215	Max.6	28	49	28	29	45	219.5	70	80	54	81	138	22	192	Max.13	28	54	61	28	45	208	74
160	90	55	94	186	49	240	Max.6	31	49	31	31	50	245	70	90	59	86	156	14	218	Max.13	31	56	76	31	50	234	74

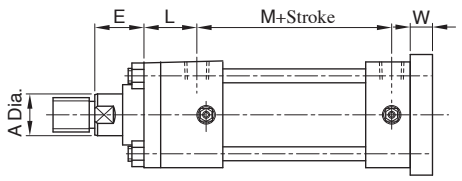
CJT210-FA

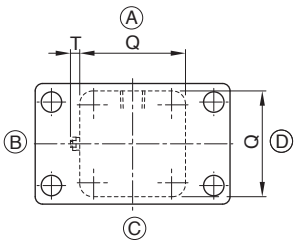




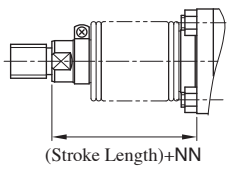
Cylinder Bore	Current								New							
	A	L	M	Q	T	W	X	EE	A	L	M	Q	T	W	X	EE
40	22.4	45	98	70	Max.6	15	171	9	22	43	94	65	Max.13	16	161	11
50	28	53	106	85	Max.6	20	191	9	28	49	102	80	Max.13	20	182	9
63	35.5	62	113	100	Max.6	24	209	9	36	56	106	94	Max.13	24	194	6
80	45	69	129	125	Max.6	24	236	9	45	66	110	114	Max.13	27	212	9
100	56	76	139	160	Max.6	31	256	9	56	69	116	135	Max.13	31	221	6
125	71	87	159	190	Max.6	37	296	9	70	88	130	165	Max.13	39	264	4
140	80	91	164	215	Max.6	41	307	9	80	90	138	192	Max.13	41	278	6
160	90	99	186	240	Max.6	46	338	9	90	95	156	218	Max.13	46	303	6

CJT210-FB



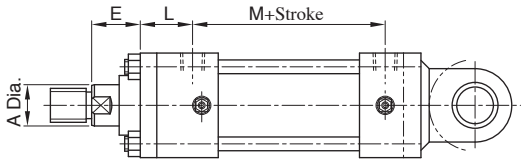


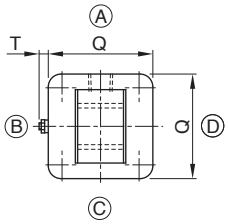
With Dust Cover (Option)



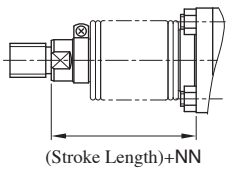
Cylinder Bore	Current								New							
	A	E	L	M	Q	T	W	NN	A	E	L	M	Q	T	W	NN
40	22.4	30	43	98	70	Max. 6	15	47	22	40	38	94	65	Max. 13	16	57
50	28	30	48	106	85	Max. 6	20	50	28	40	42	102	80	Max. 13	20	60
63	35.5	35	56	113	100	Max. 6	24	61	36	51	47	106	94	Max. 13	24	77
80	45	35	69	129	125	Max. 6	24	55	45	63	57	110	114	Max. 13	27	83
100	56	40	71	139	160	Max. 6	31	60	56	78	58	116	135	Max. 13	31	98
125	71	45	83	159	190	Max. 6	37	69	70	82	73	130	165	Max. 13	39	106
140	80	50	86	164	215	Max. 6	41	70	80	81	81	138	192	Max. 13	41	101
160	90	55	94	186	240	Max. 6	46	70	90	92	86	156	218	Max. 13	46	107

CJT210-CA



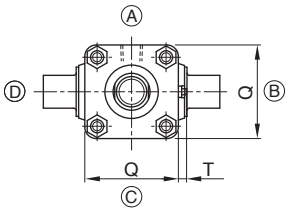


With Dust Cover (Option)

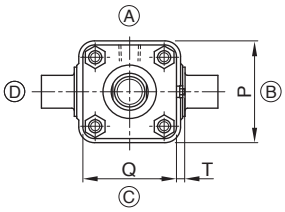


Cylinder Bore	Current							New						
	A	E	L	M	Q	T	NN	A	E	L	M	Q	T	NN
40	22.4	30	43	98	70	Max. 6	47	22	45	38	94	65	Max. 13	62
50	28	30	48	106	85	Max. 6	50	28	47	42	102	80	Max. 13	67
63	35.5	35	56	113	100	Max. 6	61	36	59	47	106	94	Max. 13	85
80	45	35	69	129	125	Max. 6	55	45	58	57	110	114	Max. 13	78
100	56	40	71	139	160	Max. 6	60	56	61	58	116	135	Max. 13	81
125	71	45	83	159	190	Max. 6	69	70	67	73	130	165	Max. 13	91
140	80	50	86	164	215	Max. 6	70	80	57	81	138	192	Max. 13	77
160	90	55	94	186	240	Max. 6	70	90	66	86	156	218	Max. 13	81

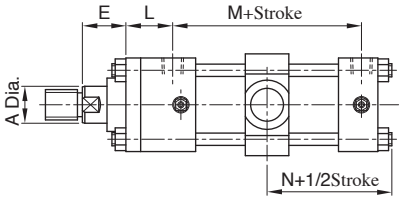
CJT210-TC

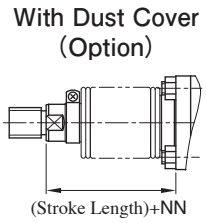


Cylinder Bore 40 - 80



Cylinder Bore 100 - 160





Cylinder Bore	Current									New								
	A	E	L	M	N	P	Q	T	NN	A	E	L	M	N	P	Q	T	NN
40	22.4	30	43	98	77	—	70	Max. 6	47	22	30	38	94	64	—	65	Max. 13	47
50	28	30	48	106	85	—	85	Max. 6	50	28	33	42	102	77	—	80	Max. 13	53
63	35.5	35	56	113	90	—	100	Max. 6	61	36	36	47	106	73	—	94	Max. 13	62
80	45	35	69	129	102	—	125	Max. 6	55	45	41	57	110	75	—	114	Max. 13	61
100	56	40	71	139	110	—	160	Max. 6	60	56	47	58	116	76	146	135	Max. 13	67
125	71	45	83	159	129	—	190	Max. 6	69	70	60	73	130	101	185	165	Max. 13	84
140	80	50	86	164	134	—	215	Max. 6	70	80	60	81	138	111	210	192	Max. 13	80
160	90	55	94	186	146	—	240	Max. 6	70	90	60	86	156	112	230	218	Max. 13	75

Instructions

- Do not use the proximity switch at voltages and currents that exceed its "Specifications" (see page J-71). If the voltage or current is too low, the operation indication light may not light up. Use within the range of "Specifications".

- Electrical Conduit Connection
  - When wiring to the proximity switch, be sure to turn off the power to the electrical circuit on the connection side before proceeding.
  - When wiring switches for DC, pay close attention to the polarity (color of lead wires and plus/minus terminal positions of connectors) and connect them correctly. If the wiring is reversed the operation indication light will not light.
  - When using a cabtyre cord for wiring to the connector type, use a JIS C 3306 VCTF 0.3 to 0.75 ㎟ 2-core, outer diameter 4 to 6 mm or less. For lead wires type, use cabtyre cords of 0.3 to 0.75 ㎟ or less.

- Cylinders with proximity switches use magnetic and electronic components, and should not be used at ambient temperatures above 70°C due to their temperature characteristics. Use hydraulic fluid within both viscosities of 20 to 400 ㎟/s and temperatures of -10 to +60°C.

- The proximity switch may malfunction in locations where there is a strong magnetic field or high current in the surrounding area (e.g., spot welders). In such cases Use an iron plate or other magnetic material to block the magnetism.

- When using multiple cylinders with proximity switches in close proximity, provide a distance of at least 30 mm between the switch and the other cylinders to avoid the influence of the magnet built into the piston.

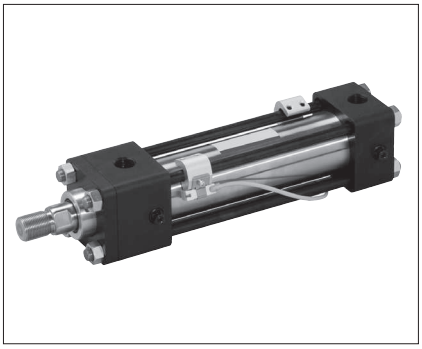
- Avoid use the proximity switch in locations where the cylinder body is buried in iron or magnetic chips, as this may cause the proximity switch to malfunction.

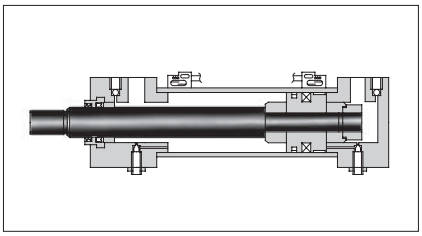
- Since a magnet is used in the cylinder piston section, it may be affected by iron powder in the hydraulic system. We recommend installing a micro-separator (Model No. MGB-260, etc.) in the hydraulic tank to remove such iron powder.

For other instructions, refer to "instructions" pages J-4 to J-7.

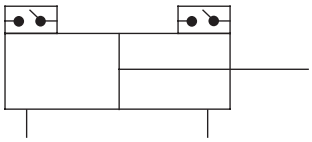
"CJT" Series Hydraulic Cylinders with Proximity Switch

- The detection position of the cylinder can be set arbitrarily and easily by adjusting the position of the slide type proximity switch on the cylinder body.
- The position sensing device attached to the machine body is no longer necessary, which reduces the man-hours required for design and assembly and also makes the equipment more compact.
- Proximity switches are available in lead wire and plug-in connector types, which can be selected according to the application. The lead wire type is available in 1.5 m (standard) and 5 m lead lengths.





Graphic Symbol



Specifications

Descriptions				CJT35L	CJT70L	CJT140L	CJT210CL
Cylinder Bore mm				32, 40, 50 63, 80, 100	32, 40, 50 63, 80, 100 125	32, 40, 50 63, 80, 100 125	40, 50, 63 80
Nominal Pressure★ MPa				3.5	7	14	21
Maximum Allowable Pressure★ MPa	Cap Side	Rod Side	Rod Size A	4.5	9	18	26.5
			B		15	18	26.5
			C		13.5	18	24.5
					11	14	–
Operating Maximum Speed mm/s				300 or less			
Ambient Temperature Range				–10 - +70°C			
Applicable Standard				Compliant with former JIS B8354			

★ Refer to page J-7 for definitions of pressure terms.

Note. The basic specifications of cylinders with proximity switch are the same as those of 3.5, 7,14 MPa series standard cylinder and 21 MPa series compact type cylinder. Please refer to page J-8 (C J T35), J-19 (CJT70/140) and J-41 (CJT210C).
Refer to the table below for the minimum stroke to which the proximity switch can be attached.

Minimum stroke to which the proximity switch can be attached

Series Number	Cylinder Bore mm	Except TC		TC Trunnion Position:Standard	
		Number Of Switches			
		1	2 ★1.2	1	2 ★2
CJT35L	32	25		55	105
	40				
	50				
	63	20			
	80				
	100			60	110
CJT70L CJT140L	32	20	30	50	110
	40				115
	50				
	63			60	125
	80				130
	100			65	135
	125			70	150
CJT210CL	40	20		50	130
	50	15	20		
	63	20		60	150
	80			70	170

★1. When two proximity switches other than the TC type are mounted, the switch mounting surface is different.
★2. For two or more switches, please consult us.

Model Number Designation

F−	CJT140L	−LA	80	B	100	B	−A	B	D	−E	−20
Packing Material	Series Number	Mounting Type	Cylinder Bore mm	Rod Size	Cylinder Stroke mm	Cushion Type	★2 Port Position	★2 Cushion Adj. Valve Position	★2 Air Vent Valve Position	Options★1	Design Number
None : Nitrile Rubber (Standard) F : Fluoro Rubber 6 : ★5 Hydrogenated Nitrile Rubber	CJT35L : 3.5 MPa Series Standard Cylinder with Proximity Switch	SD,LA LB,FA FB,CA CB,TA TC	32, 40 50, 63 80,100	S : Rod S (Special)	Cylinder Stroke	B : ★4 With Cushion on Both ends R : ★4 With Cushion on the Rod side H : With Cushion on the Cap side N : Without Cushion	(Viewed from Rod End) A : Upper (Standard) B : Right C : Under D : Left	B : Right (Standard) A : Upper C : Under D : Left N : No Cushion valve (Standard)	Two positions except for cushion and port	F : With Dust Cover (Material: Nylon Tarpaulin, Heat resistant up to 80°C) G : With Dust Cover (Material: Chloroprene, Heat resistant up to 130°C) H : With Dust Cover (Material: Conex, Heat resistant up to 200°C) K : With Lock Nut L : With T-End (Rod End Eye) M : With Y-End (Rod End Clevis) X＊＊ / Y＊＊ } Code of proximity switch★3	30
	CJT70L : 7 MPa Series Standard Cylinder with Proximity Switch	SD,LA LB,FA FB,FC FD,FE FF,FY CA,CB TA,TC	32, 40 50, 63 80,100 125	A : Rod A (Super Strong) B : Rod B (Strong) C : Rod C (Standard)						Please consult us separately for options for Rod A. E : With Long Rod End Thread F : With Dust Cover (Material: Nylon Tarpaulin, Heat resistant up to 80°C) G : With Dust Cover (Material: Chloroprene, Heat resistant up to 130°C) H : With Dust Cover (Material: Silicon Glass, Heat resistant up to 250°C) K : K:With Lock Nut (E : Used in combination with long rod end thread) L : With T-End (Rod End Eye) M : With Y-End (Rod End Clevis) N : Double Rod X＊＊ / Y＊＊ } Code and number of proximity switch★3	20
	CJT140L : 14 MPa Series Standard Cylinder with Proximity Switch	SD,LA LB,FC FD,FE FF,FY CA,CB TA,TC	32, 40 50, 63 80,100 125								
	CJT210CL : 21 MPa Series Compact Type Cylinder with Proximity Switch	SD,LA FA,FB CA,TC	40, 50 63, 80	A : Rod A B : Rod B					Two positions except for cushion and port	E : With Long Rod End Thread F : With Dust Cover (Material: Nylon Tarpaulin, Heat resistant up to 80°C) G : With Dust Cover (Material: Chloroprene, Heat resistant up to 130°C) H : With Dust Cover (Material: Conex, Heat resistant up to 200°C) K : With Lock Nut (E : Used in combination with long rod end thread) L : With T-End (Rod End Eye) M : With Y-End (Rod End Clevis) X＊＊ / Y＊＊ } Code and number of proximity switch★3	20

★1. Using the options in combination is available.
Please specify the option code in the alphabet.
ex. EGKLX52
However, in case of the double type, the options E,F,G,H and K are attached to the both ends. The options L and M are attached at one end only.

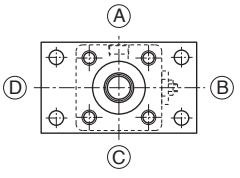
★3. Please refer to the next page for the code and quantity of proximity switches to be ordered. All switches are CE compliant.

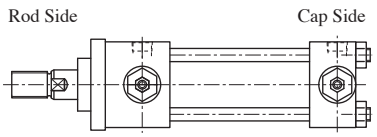
★4. Cushion type "B" and "R" are not available for CJT70L and CJT140L rod A series with cylinder bore 40, 50, and 63.

★5. 6 : Hydrogenated Nitrile Rubber is not available for CJT70L/140L.

★2. As for each direction of port & cushion adj. valve, air vent valve, please select from ⒶⒷⒸⒹ viewed from rod end(see the figure on the below). For standard directions, please see the Model Number Designation.

Note : <CJT35L, CJT210CL>
The direction of port, cushion adj. valve, and air vent valve are not available to be the same direction.
In addition, the direction of air vent valve is two sides except for the port and cushion adj. valve.
<CJT70/140L>
The direction of port and cushion valve are not available to be the same direction.However, port and air vent valve, and cushion adj. valve and air vent valve can be the same direction.





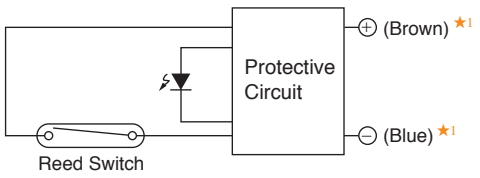
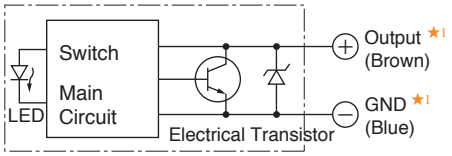
Proximity Switch Code and Number

X1 2
- Number of Switches
  - 1 : 1 Pc.
  - 2 : 2 Pcs.
  - 3 : 3 Pcs.
- Code of Switch (Refer to table on the right)

Code	Switch Type	Detalis	
X1	AX111CE	Contact Switch	Lead Wire 1.5m
X5	AX115CE		Lead Wire 5m
XA	AX11ACE		Plug-in Connector(AC)
XB	AX11BCE		Plug-in Connector(DC)
Y1	AX201CE	Contactless Switch	Lead Wire 1.5m
Y5	AX205CE		Lead Wire 5m

* Please refer to "Switch Specifications" below to determine the proximity switch format.

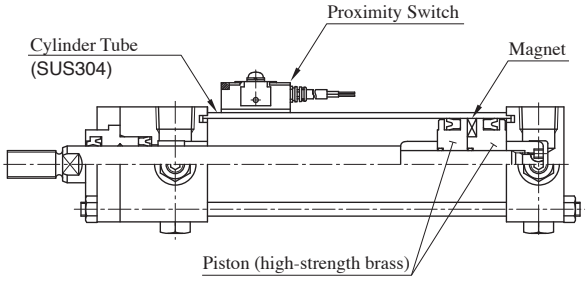
Switch Specifications

		Contact Switch				Contactless Switch	
Type	Lead Wire 1.5m	AX111CE	—	—	—	AX201CE	—
	Lead Wire 5m	—	AX115CE	—	—	—	AX205CE
	Plug-in Connector (AC)	—	—	AX11ACE★3	—	—	—
	Plug-in Connector (DC)	—	—	—	AX11BCE★3	—	—
Load Voltage Range		5 to 120 V AC	5 to 30 V DC	5 to 120 V AC	5 to 30 V DC	5 to 30V DC	
Load Current Range		5 to 20 mA AC	5 to 40 mA DC	5 to 20 mA AC	5 to 40 mA DC	5 to 40mA DC	
Maximum Switching Capacity		2 VA : AC	1.5 W : DC	2 VA	1.5 W	—	
Voltage Drop		TYP ; 2V (at 10mA) 3V以下				4 V or less	
Current Leakage		10μ A or less				0.1 mA or less	
Operating Time		1 ms or less				10 ms or less	
Repeatability		1 ms or less				10 ms or less	
Insulation Resistance		100 MΩ or more (between case and cord) at 500 V DC mega					
Voltage Proof		1500 V AC for 1 minute (between case and cord)					
Shock Proof		294 m/s^2 (Non-Repetitive)				490 m/s^2 (Non-Repetitive)	
Vibration Proof		±0.75mm amplitude, 10 to 55Hz (1 sweep, 1 minute) 2 hours in each direction X, Y, Z				±0.3mm amplitude, 10 to 200Hz (Log sweep, 1 hour) X, Y, Z directions	
Ambient Temperature		−10 - +70℃ (No freezing)					
Wiring Method		0.3 mm^2 2-core, outer diameter 4 mm oil-resistant cabtyre cord					
Protective Structure		IP67 (IEC standard), JIS C 0920 (dust and immersion proof)					
Contact Protection Circuit		Available					
Indicator Light		Light Emitting Diode(Red color lighting when switch is "ON".)					
Allowable Length of Wire★2		10 m : AC 100 m : DC				10 m	
Electrical Circuit							
Compatible Load		Compact Relay Programmable Controller					

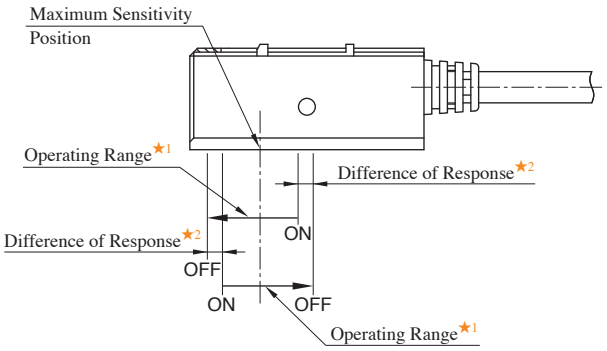
★1. In the case of DC power supply, pay attention to the polarity (color of the lead wires or position of the plus/minus terminals of the connector) and make sure that the wiring is correct.
★2. If the wiring length exceeds the allowable wiring length, please consult us.
★3. The connector used for the type with connector is NECA (Nippon Electric Control Equipment Industries Association standard) 4202 connector for FA sensors (M12 × 1).
★4. When using an inductive load (relay, etc.) without a contact protection circuit, be sure to attach a protection circuit to the load.

Structure and Operation

When the cylinder piston moves and is positioned below the proximity switch, the magnetic field generated by the magnet built into the piston activates the switch to detect the cylinder stroke position.



Operating Characteristics of Proximity Switch



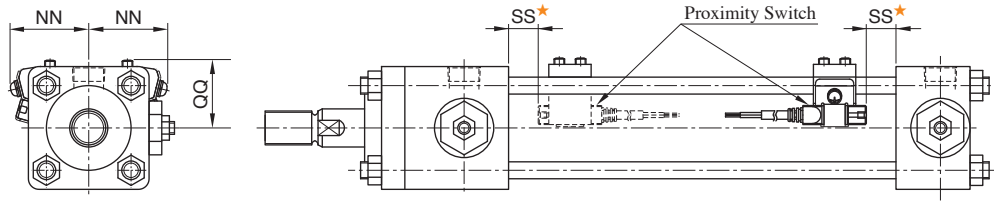
★1. Operating Range
The distance traveled by the piston in one direction from the time the switch turns ON to the time it turns OFF.

★2. Difference of Response
The distance traveled by the piston in one direction from the position where the switch turns ON to the position where the piston travels in the opposite direction to turn OFF. The switch characteristics are unstable in this region.

Series Number	Cylinder Bore mm	Contact Switch		Contactless Switch	
		Operating Range mm	Diff. of Response mm	Operating Range mm	Diff. of Response mm
CJT35L	32	5 - 10	1 or less	3 - 6	1 or less
	40				
	50				
	63	7 - 11		3 - 7	
	80				
	100	8 - 12		4 - 7	
CJT70L CJT140L	32	4 - 14	2 or less	3 - 8	1 or less
	40				
	50				
	63				
	80				
	100	11 - 18		4 - 10	
	125	5 - 15		6 - 13	
CJT210CL	40	4 - 14	2 or less	3 - 8	2 or less
	50				
	63				
	80				

Dimensions

Installation dimensions for cylinders with proximity switch are the same as for the "CJT" series hydraulic cylinders, so please refer to the appropriate page.
The dimensions of the proximity switch and the optimum installation position for stroke end position detection are as follows.

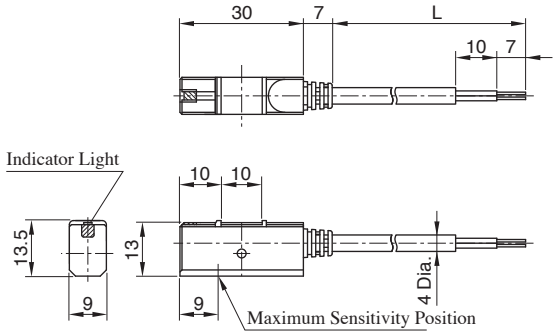


★The SS dimension is the optimum setting position for stroke end detection. The maximum sensitivity position of the switch is SS + 9 mm.

Series Number	Cylinder Bore mm	Piston Rod Size	NN	QQ	SS Contact/Contactless Switch	
					Rod Side	Cap Side
CJT35L	32	S	34	34	5	
	40		36	30	5	
	50		41	35	5	
	63		47	40	6	
	80		54	54	4	
	100		65	60	4	
CJT70L CJT140L	32	A·B·C Common	38	33	14	
	40		41	36	14	
	50		47	45	14	
	63		52	50	26	
	80		62	60	30	
	100		72	73	28	
	125		85	85	30	
CJT210CL	40	A·B Common	40	40	16	14
	50		46	46	17	13
	63		53	53	17	
	80		61	61	18	

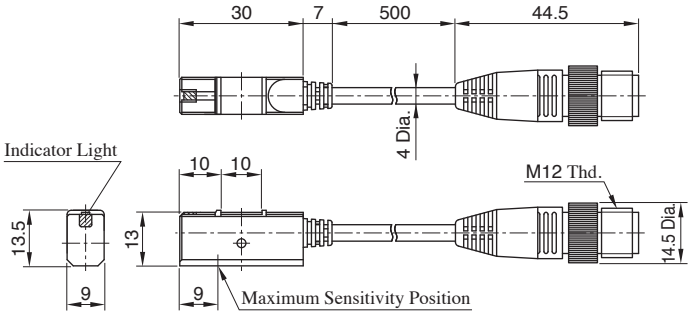
Dimensions of Proximity Switch

Lead Wire Type：AX111CE, AX115CE, AX201CE-1, AX205CE-1



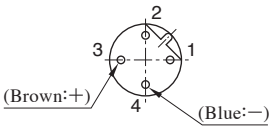
Switch Type	L
AX111CE AX201CE-1	1500
AX115CE AX205CE-1	5000

Plug-in Type：AX11ACE, AX11BCE

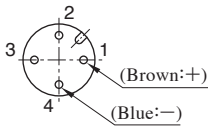


Connector Pin

AX11ACE (AC)



AX11BCE (DC)



Handling Proximity Switch

Method of setting and fixing the detection position

1. The switch can be mounted on any tie rod. Mounting the switch in the most suitable location according to the mounting space and wiring method of the cylinder.
2. Loosen the two set screws securing the bracket on which the switch is mounted with an Allen wrench, and move the switch along the tie rods.
   Refer to the table below for set screw sizes.
3. For position detection at the stroke end, adjust the position referring to the SS dimensions in the outline dimension drawing on the previous page.
   For position detection at the mid-stroke, adjust the position so that the switch indicator light starts to turn on at the desired position.
4. Press down lightly on the top surface of the switch with your finger and tighten the set screw while the cylinder tube is in contact with the detection surface of the switch. Refer to the table below for the proper tightening torque for the set screw.
   Note: If the tightening torque is not appropriate, the switch may be misaligned.

Set Screw Size and Correct Tightening Torque

Series Number	Cylinder Bore	Screw Size	Appropriate Tightening Torque Nm
CJT35L	32 - 80	M5 Thd.	1 - 2
CJT70L	32, 40	M5 Thd.	
CJT140L	50 - 125	M6 Thd.	2 - 3
CJT210CL	40	M5 Thd.	1 - 2
	50 - 80	M6 Thd.	2 - 3

How to Order Proximity Switch

1. When ordering a proximity switch ass'y including bracket, please specify according to the following.

Example：35－X1－40

- 40 — Cylinder Bore
- X1 — Switch Code (Refer to the table "Code and Type")
- 35 — Applicable Series
  - 35：CJT 35L
  - None：CJT 70L/CJT 140L
  - 210C：CJT 210CL

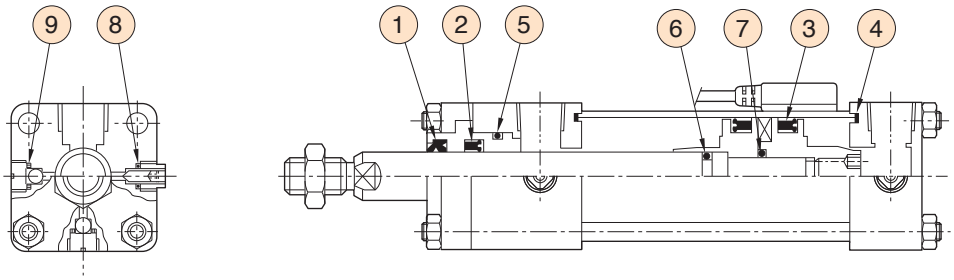
Code and Type

Switch Code	Switch Type	Details	
X1	AX111CE	Contact Type	Lead Wire 1.5 m
X5	AX115CE		Lead Wire 5 m
XA	AX11ACE		Plug-in Connector (AC)
XB	AX11BCE		Plug-in Connector (DC)
Y1	AX201CE	Contactless Type	Lead Wire 1.5 m
Y5	AX205CE		Lead Wire 5 m

2. When ordering a single proximity switch, use the switch code in the table above.
   Ex) Proximity Switch: X1

List of Seals

CJT35L

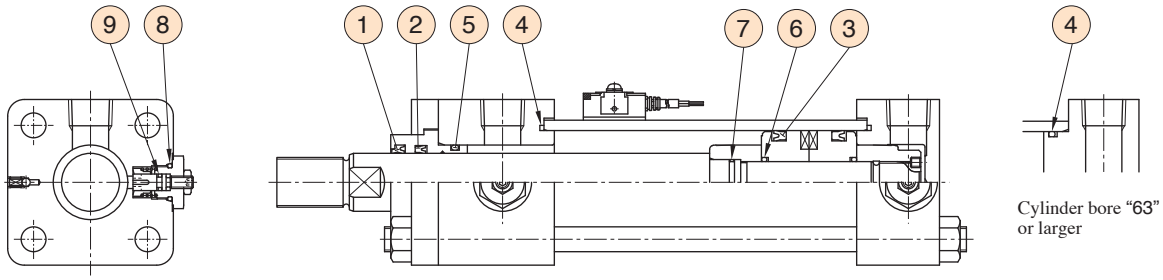


Item / Cylinder Bore	Model Numbers for Seal Kit ★1 / Q'ty	① Dust Seal	② Rod Packing	③ Piston Packing	④ Packing for Cover	⑤ O-Ring for Bush ★2	⑥ O-Ring A for Piston ★2	⑦ O-Ring B for Piston	⑧ Cushion Valve Seal	⑨ Check Valve Seal
	Q'ty	1	1	2	2	1	1	1	2	4
32	KS-CJT35- 32S-30	DHS-16	UHR-16	RHP-32	TX- 32	G25	S10	P12	TF- 8	CR- 8
40	KS-CJT35- 40S-30	DHS-16	UHR-16	RHP-40	TX- 40	G25	P12	P12	TF- 8	CR- 8
50	KS-CJT35- 50S-30	DHS-22	UHR-22	RHP-50	TX- 50	G35	P18	P18	TF- 8	CR- 8
63	KS-CJT35- 63S-30	DHS-22	UHR-22	RHP-63	TX- 63	G35	P18	P18	TF-12	CR-12
80	KS-CJT35- 80S-30	DHS-28	UHR-28A	RHP-80A	TX- 80	P36	P22A	P24	TF-12	CR-12
100	KS-CJT35-100S-30	DHS-36	UHR-36	RHP-100A	TX-100	P46	G30	G30	TF-14	CR-14

★1. Please specify the seal kit numbers above when ordering the seals.
★2. O-ring is OR NBR-70-1 P(G)＊＊-N. O-ring code "S" for item ⑥ and bore 32 is a special standard.
★3. Material of standard packings is Nitrile Rubber. For Fluorocarbon Rubber and Hydrogenated Nitrile Rubber materials, specify the following code after "KS-".
Fluoro rubber: F-, Hydrogenated nitrile rubber: 6-
Note : The packing code changes without notice.

List of Seals

CJT70L
CJT140L

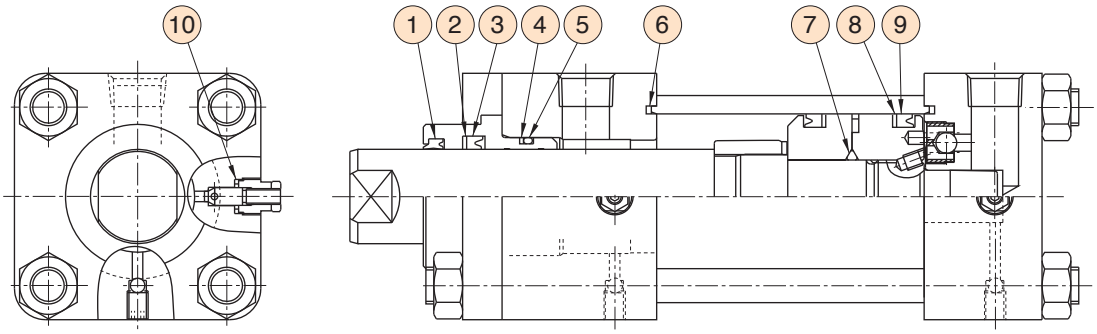


Cylinder Bore	Rod Size	★1 Model Numbers for Seal Kit	① Dust Seal	② Rod Packing	③ Piston Packing	④★3 Packing for Cover	⑤ O-Ring for Bush	⑥ O-Ring for Piston	⑦★4 O-Ring for Cushion Ring	⑧ O-Ring for Plug	⑨ O-Ring for Slide Rod (OR NBR-70-1 P＊＊-N
		Q'ty	1	1	2	2	1	2	1	★5	★5
			(OR NBR-90 P(G)＊＊-N)								
32	B	KS-CJTL 32B-20	SDR-18	SKY-18	SKY- 24	GR-32	P21	P12	S12	P14	P5
	C	KS-CJTL 32C-20	SDR-14	SKY-14							
40	A	KS-CJTL 40A-20	SDR-28	SKY-28	SKY- 30	GR-40	G30	P16	—	P14	P5
	B	KS-CJTL 40B-20	SDR-22	SKY-22			G25		S16		
	C	KS-CJTL 40C-20	SDR-18	SKY-18							
50	A	KS-CJTL 50A-20	SDR-36	SKY-36	SKY- 40	GR-50	G40	P20	—	P14	P5
	B	KS-CJTL 50B-20	SDR-28	SKY-28			G30		S20		
	C	KS-CJTL 50C-20	SDR-22	SKY-22							
63	A	KS-CJTL 63A-20	SDR-45	SKY-45A	SKY- 53	G 55	G50	G25	—	P14	P5
	B	KS-CJTL 63B-20	SDR-36	SKY-36			G40		G25		
	C	KS-CJTL 63C-20	SDR-28	SKY-28							
80	A	KS-CJTL 80A-20	SDR-56	SKY-56	SKY- 71	G 75	G60	P31	P31	P14	P5
	B	KS-CJTL 80B-20	SDR-45	SKY-45A			G50				
	C	KS-CJTL 80C-20	SDR-36	SKY-36							
100	A	KS-CJTL100A-20	SDR-70	SKY-70	SKY- 85	G 95	G75	G55	G40	P14	P5
	B	KS-CJTL100B-20	SDR-56	SKY-56			G60				
	C	KS-CJTL100C-20	SDR-45	SKY-45A							
125	A	KS-CJTL125A-20	SDR-90	SKY-90	SKY-112A	G120	G95	G80	G50	P18, P14	P7, P5
	B	KS-CJTL125B-20	SDR-70	SKY-70			G75			P18	P7
	C	KS-CJTL125C-20	SDR-56	SKY-56							

★1. Please specify the seal kit numbers above when ordering the seals.
★2. Material of standard packings is Nitrile-Rubber. Please select Fluoro-Rubber packing material if Phosphate Esters oil is used. Please specify "F-" in addition to the model of seal kit after "KS-" .
★3. Packing code "GR" of item No.4 is square O-ring.
★4. O-ring code "S" of item No.7 is special O-ring.
★5. There are 2 O-Rings.
The large O-Rings (1 each) / Cap Side, The small O-Rings (1 each) / Rod Side.
Note : The packing code changes without notice.

List of Seals

CJT210CL



Cylinder Bore	Model Numbers for Seal Kit ★1	Rod B					Rod A				
		Dust Seal ①	Backup Ring for Rod Packing ②	Rod Packing ③	Backup Ring for Bush ④	O-Ring for Bush ⑤ ★2	Dust Seal ①	Backup Ring for Rod Packing ②	Rod Packing ③	Backup Ring for Bush ④	O-Ring for Bush ⑤ ★2
40	KS-CJT210CL-40✻-20	LBH-22	22×30×1	IUH-22A	BUR-G25	G25	LBH-28	28×35.5×1	IUH-28	BUR-G31 ★3	G30
50	KS-CJT210CL-50✻-20	LBH-28	28×35.5×1	IUH-28	BUR-G31 ★3	G30	LBH-36	36×46×1.5	IUH-36	BUR-G40	G40
63	KS-CJT210CL-63✻-20	LBH-36	36×46×1.5	IUH-36	BUR-G40	G40	LBH-45	45×56×1.5	IUH-45A	BUR-G55	G55
80	KS-CJT210CL-80✻-20	LBH-45	45×56×1.5	IUH-45A	BUR-G55	G55	LBH-56	56×66×1.5	IUH-56	BUR-G65	G65

Cylinder Bore	Model Numbers for Seal Kit ★1	Cover Seal ⑥	O-Ring for Piston ⑦ ★2	Backup Ring for Piston Packing ⑧	Piston Packing ⑨	Cushion Valve Seal ⑩
40	KS-CJT210CL-40✻-20	TT-40	S16	40×30×1.5	OUHR-40	CX-12H
50	KS-CJT210CL-50✻-20	TT-50	P22	50×40×1.5	OUHR-50	CX-12H
63	KS-CJT210CL-63✻-20	TT-63	P28	63×53×1.5	OUHR-63	CX-12H
80	KS-CJT210CL-80✻-20	TT-80	P36	80×71×2	OUHR-80A	CX-14H

Item	Q'ty
①	1
②	1
③	1
④	1
⑤	1
⑥	2
⑦	1 ★4
⑧	2
⑨	2
⑩	2

★1. Please indicate rod size A or B in * of the seal kit numbers.

★2. O-rings are the following standards.

Model Numbers	Standard
⑤O-Ring for Bush	OR NBR-70-1 P(G)**-N
⑦O-Ring for Piston Bore 50 - 80	OR NBR-90 P(G)**-N
⑦O-Ring for Piston Bore 40	Special Standard

★3. This is a backup ring of our standard.

★4. Only cylinder bore 40 will be 2 pcs.

★5. Material of standard packings is Nitrile Rubber. For Fluorocarbon Rubber and Hydrogenated Nitrile Rubber materials, specify the following code after "KS-".
Fluoro rubber: F-, Hydrogenated nitrile rubber: 6-

Note : The packing code changes without notice.

Interchangeability in Installation between Current and New Design

"CJT 21 MPa" series compact type hydraulic cylinders with proximity switch has undergone the following model change to make it more compact and lightweight, contributing to space saving.

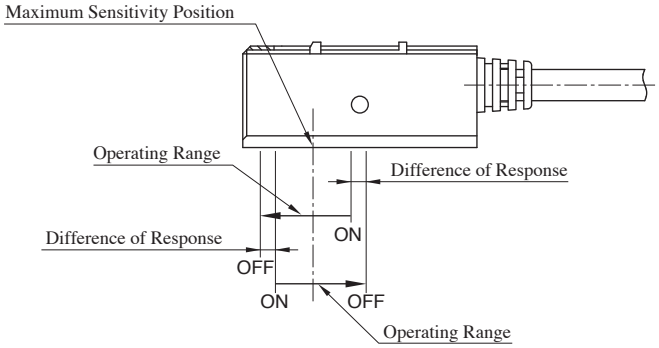
Design Number

Series Number	Change Detail
CJT210CL	10 Design to 20 Design

Proximity Switch

(1) Operating characteristics

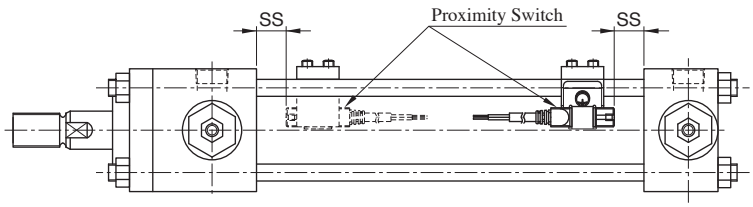
The same regardless of cylinder bore.



Cylinder Bore mm	Current Products				New Products			
	Contact Switch		Contactless Switch		Contact Switch		Contactless Switch	
	Operating Range mm	Diff. of Response mm	Operating Range mm	Diff. of Response mm	Operating Range mm	Diff. of Response mm	Operating Range mm	Diff. of Response mm
40	9	1 or less	4	1 or less	4 - 14	2 or less	3 - 8	2 or less
50	10		5					
63	11		5					
80	12		6					

(2)Dimensions

The stroke end detection setting position is the same regardless of the rod diameter and whether or not a contact switch is used.



Cylinder Bore mm	Piston Rod Size	Current				New	
		Contact Switch SS mm		Contactless Switch SS mm		Contact/Contactless Switch SS mm	
		Rod Side	Cap Side	Rod Side	Cap Side	Rod Side	Cap Side
40	A	21		23		16	14
	B			24	23		
50	A	23		25		17	13
	B						
63	A	26	27	28		17	
	B			29			
80	A	34	32	33		18	
	B	31		34	33		

Other Changes

Same as "CJT 21 MPa" series compact type hydraulic cylinder, refer to page J-50 to J-53.

Major Changes:Interchangeability in installation, air vent valve, cushion adjusting valve, cushion, specifications, mass table, options, list of seals, and dimensions.

Instructions

Instructions

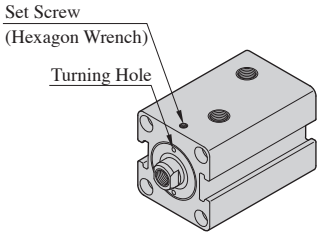
- When using the rod push side output, make sure that the screw is tightened to the rod end face so that no force is applied to the threaded part of the piston rod.
- Since a lateral load (eccentric load) cannot be applied to the piston rod, be careful when adjusting it at the time of mounting.
- When operating the cylinder for the first time, be sure to bleed air from the piping section. After venting, operate the cylinder with the pressure lowered and gradually increase the pressure up to the working pressure.
  Note: The CBY14 series does not have an air vent, so be sure to vent the air from the piping section.
- Use four socket head cap screws (JIS B1176, strength class 10.9 or higher) for mounting the cylinder.
- When mounting bolts are used, screw the bolts into the mounting member at least 80% of their thread diameter. Use a mounting material with a strength equivalent to SS400.
- When tightening mounting bolts with nuts, use steel nuts with a strength class of 6 or higher. (However, do not use a type 3 nut.)
- When fastening the cylinder body with mounting bolts, be sure to tighten them to the tightening torques shown in the table below.

Tightening Torque of Mounting Bolts

Cylinder Bore	Mounting Bolt Size	Tightening Torque Nm
32	M6×1	5.9
40	M8×1.25	14.0
50	M10×1.5	28.0
63	M12×1.75	49.0
80	M14×2	77.0
100	M16×2	120.0

- When tightening the piston rod end screws of double-acting double-rod type, be sure to use the hex. of the rod on the side to be tightened. Since the double-rod type piston rod is fastened with a screw, be careful not to apply a rotating force to the rod at both ends of the piston rod.

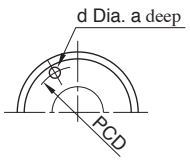
Disassembly and Assembly



- After removing the set screw, remove the bush from the cylinder body using the turning hole in the bush. When removing the jig etc. of the rod end screw, remove any burrs on the rod hex. with a file, etc., and remove the bush afterward.
- The piston rod and piston cannot be disassembled.
- When disassembling the cylinder, replace all seals (packings and gaskets).
- When assembling the cylinder, be careful not to allow dust, iron powder, or other foreign matter to enter the cylinder.
- There is a copper rod under the set screw to protect the bush threads. Remove it before tightening the bush.
- After tightening the bush, insert the copper rod included in the packing set and tighten the set screw.
- When using a cylinder with a switch (CBY14L or CBY14LN), refer to instructions on page J-85.

Replacement of Packing

- Piston packings, rod packings, dust seals, and O-rings for bush can be replaced.
- O-rings for piston rods are not replaceable because they have been designed to prevent loosening of the piston and rod.
- Bush turning hole dimensions



Cylinder Bore	a	d	PCD
32	5	4	32
40	7	4	38
50	8	5	46
63	9	5	58
80	10	8	70
100	12	10	85

"CBY14" Series Compact Type Hydraulic Cylinders

Compared to conventional cylinders, YUKEN's thin cylinder "CBY14 Series" is 1/3 the overall length, making it possible to mounting in places where conventional cylinders cannot be mounted due to lack of space.

●Economical selection is possible

Up to 16 MPa can be used by selecting the operating pressure and the number of times.

●Lightweight and compact design

The cylinder tube and cover are integrated into a single unit, allowing mounting in a small space, thus saving space. Also, it is a lightweight type using a special aluminum alloy for the main body.

●Wide Variety

A wide variety of models are available, including cylinder bore 32 to 100, mounting type, rod shape, and with switches. Select the one that best suits your application.

●Highly durable rod bush and piston

Rod bush and piston are made of a special copper alloy to anti-wear resistance.

●Easy Maintenance

Maintenance is extremely easy, as the packing can be replaced simply by loosening the rod bush without removing the main unit or piping.

Specifications

Descriptions \ Model Numbers	Single Rod Type CBY14＊-＊＊＊N＊＊＊	Double Rod Type CBY14＊N-＊＊＊N＊＊＊
Cylinder Bore mm	32, 40, 50, 63, 80, 100	
Mounting Type	SD, LD, FA, FB	SD, LD, FA
Rated Pressure ★1	Cylinder Bore 32, 40, 50 14MPa (fatigue endurance times 2.5×10^6) ★2 12MPa (fatigue endurance times 1.0×10^7) Cylinder Bore 63, 80, 100 14MPa (fatigue endurance times 9.0×10^5) ★2 10MPa (fatigue endurance times 1.0×10^7)	
Pressure Proof	20 MPa	
Minimum Working Pressure	0.3 MPa	
Operating Speed	8 - 100 mm／s	
Standard Stroke mm	Refer to next page "Model Number Designation"	
Tolerance of Stroke mm	0 - 0.8	
Tolerance of Thread	JIS B 0211-6 H／6 g	
Ambient Temperature Range (Ambient and Oil Temperature)	−10 - +70℃ (No Freezing)	

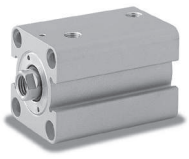
●Approx. Mass may be obtained from the formula below.
[Mass] = [Basic Mass] + [Additional Mass by a unit stroke 1mm×Stroke (mm)]
The basic mass and the additional mass per 1 mm stroke are shown in the external dimensional drawings, so please obtain them from the external dimensional drawing of the corresponding model numbers.

★1. For the relationship between rated pressure and fatigue endurance times, refer to the "Rated Pressure Diagram".

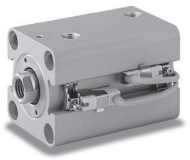
★2. Please consult us if you require a fatigue endurance times of 1.0 × 10^7 or higher at 14 MPa.

Double Acting Single Rod Cylinder

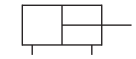
Graphic Symbols



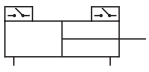
Basic Type CBY14



With Switch CBY14L



Basic Type



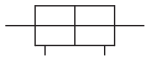
With Switch

Double Acting Double Rod Cylinder

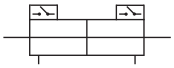
Graphic Symbols

Basic Type CBY14N

With Switch CBY14LN

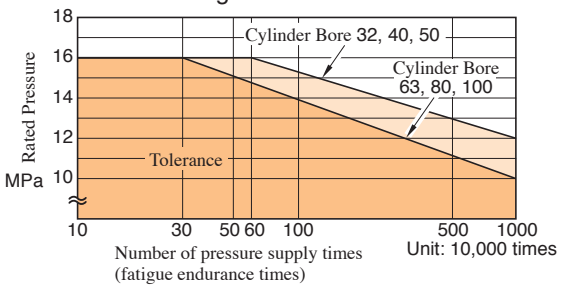


Basic Type



With Switch

Rated Pressure Diagram



How to read a diagram

●The horizontal axis is the number of times the pressure is supplied to the cylinder.

●The pressure that rises vertically and intersects the limit line of each bore is the pressure (rated pressure) that can be used up to that number of supply times. (Probability of breakdown: 1%)

Examination Methods

To calculate the rated pressure, a fatigue test is conducted with reference to JFPS 1014: 2002 (Japan Fluid Power Industry Association Standard) "Guidelines for Selection and Use of Hydraulic Cylinders Appendix 2 Strength Test Methods for Hydraulic Cylinders".

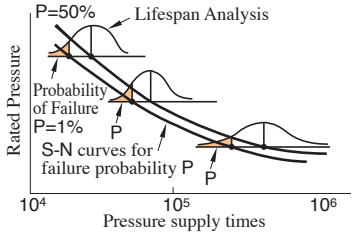
Specifically, pressure is repeatedly applied to dozens of supply cylinders, the number of times they break is measured, and statistically processed to obtain the rated pressure.

Determining Rated Pressure Methods

●Fatigue life is determined by substantive fatigue testing as described in the test methods and by statistically processing the data.

●The life distribution is obtained from actual fatigue test data, and the rating diagram is based on the value of 1% probability of fracture in the distribution.

Note: There is no point of 0% in the statistical method.



Model Number Designation

CBY14L	−6	SD	40	N	50	T	G	X1	2	− L
Series Number	Packing Material	Mounting Type	Cylinder Bore (mm)	Cushion Type	Stroke★8 (mm)	Thread★6	Port	Switch Code	Switch Quantity	Lock Nut
CBY14 : 14 MPa Double Acting Single Rod Type	**3** : Fluoro Rubber **6** : Hydrogenated Nitrile Rubber (Standard)	**SD** : Basic Type **LD** : Foot Mounting **FA** : Rod Flange **FB**★1 : Cap Flange	**32, 40, 50, 63, 80, 100**	**N** : Without Cushion	Cylinder Bore **32 - 80** : **5,10,15,20,25,30, 35,40,45,50,60, 70,80,90,100** Cylinder Bore **100** : **5,10,15,20,25, 30,35,40,45,50**	**None** : Internal Thread **T** : External Thread	**None** : Rc Thread **G** : ★2 G Thread	—	—	**None** : None **L** : 1 Lock Nut★4
CBY14L : 14 MPa Double Acting Single Rod Type (with switch)★5								10 ★3 codes	1, 2	
CBY14N : 14 MPa Double Acting Double Rod Type					**5,10,15,20,25, 30,35,40,45,50**			—	—	
CBY14LN : 14 MPa Double Acting Double Rod Type (with switch)★5								10 ★3 codes	1, 2	

★1. Mounting type FB : Cap flange type is not available for double acting double rod cylinder (CBY 14N/CBY14LN).
★2. Port G : G thread is available only for mounting type SD : basic type.
★3. For the switch code, select one of the 10 codes shown in the table below. All switches are CE compliant.
★4. When lock nuts are required on both sides of a double rod cylinder, please arrange one lock nut separately by referring to page J-86.
★5. Switches are not mounted on the cylinder body, but are shipped in the same package as the cylinder body.
★6. Lock nut "-L" is not available for internal thread. If you need a lock nut, please arrange it separately.
In the case of double acting double rod cylinder, both sides are of internal thread or external thread.
★7. Refer to "Specifications of Switch" on the next page to determine the switch type. For switch types other than those shown on the next page, please consult us separately.
★8. For arbitrary stroke, please consult us separately.

Switch Code	Switch Type	Details		Indicator Light
N1	AX101CE	Contact Type	Lead Wire 1.5m	Light Emitting Diode (Red color lighting when switch is "ON".)
N5	AX105CE		Lead Wire 5m	
X1	AX111CE		Lead Wire 1.5m	
X5	AX115CE		Lead Wire 5m	
XA	AX11ACE		Plug-in Connector(AC)	
XB	AX11BCE		Plug-in Connector(DC)	
Y1	AX201CE-1	Contactless Type	Lead Wire 1.5m	
Y5	AX205CE-1		Lead Wire 5m	
M1	AX211CE-1		Lead Wire 1.5m	Light Emitting Diode (2-lighting type Red/Green)
M5	AX215CE-1		Lead Wire 5m	

Specification of Switch(All switches are CE-compliant)

		Contact Switch						Contactless Switch			
Type	Lead Wire 1.5m	AX101CE	—	AX111CE	—	—	—	AX201CE	—	AX211CE	—
	Lead Wire 5m	—	AX105CE	—	AX115CE	—	—	—	AX205CE	—	AX215CE
	Plug-in Connector (AC)★3	—	—	—	—	AX11ACE	—	—	—	—	—
	Plug-in Connector (DC)★3	—	—	—	—	—	AX11BCE	—	—	—	—
Load Voltage Range		5 to 120 V AC 5 to 30 V DC				5 to 120 V AC	5 to 30 V DC	5 to 30 V DC			
Load Current Range		5 to 20 mA AC 5 to 40 mA DC				5 to 20 mA AC	5 to 40 mA DC	5 to 40 mA DC			
Maximum Switching Capacity		2 VA : AC 1.5W : DC				2 VA	1.5 W	–			
Voltage Drop		TYP ; 2 V (at 10 mA) 3 V or less						4 V or less			
Current Leakage		10μA or less						0.1 A or less			
Operating Time		1 ms or less						10 ms or less			
Repeatability		1 ms or less						10 ms or less			
Insulation Resistance		100 MΩ or more (between case and cord) at 500 V DC mega									
Voltage Proof		1500 V AC for 1 minute (between case and cord)									
Shock Proof		294 m／s^2 (Non-Repetitive)						490 m／s^2 (Non-Repetitive)			
Vibration Proof		±0.75mm amplitude, 10 to 55 Hz (1 sweep, 1 minute) 2 hours in each direction X, Y, Z						±0.3mm amplitude, 10 to 200 Hz (Log sweep, 1 hour) X, Y, Z directions			
Ambient Temperature		–10 - +70℃ (No Freezing)									
Wiring Method		0.3 mm^2 2-Core, outer diameter 4 mm oil-resistant cabtyre cord									
Protective Structure		IP67 (IEC standard), JIS C 0920 (dust and immersion proof)									
Contact Protection Circuit		Not available★4		Available							
Indicator Light		Light Emitting Diode (Red color lighting when switch is "ON".)						Light Emitting Diode (2-lighting type Red/ Green)			
Allowable Length of Wire★2		10 m : AC 100 m : DC						10 m			
Compatible Load		Compact Relay Programmable Controller									

★1. In the case of DC power supply, pay attention to the polarity (color of the lead wires or position of the plus/minus terminals of the connector) and make sure that the wiring is correct.
★2. If the wiring length exceeds the allowable wiring length, please consult us.
★3. The connector used for the type with connector is NECA (Nippon Electric Control Equipment Industries Association standard) 4202 connector for FA sensors (M12 x 1).
★4. When using an inductive load (relay, etc.) without a contact protection circuit, be sure to attach a protection circuit to the load.

Minimum Stroke for Switch Mounting

Unit : mm

1 switch mounted	2 switch mounted
5	10★1.2

Note: When using two contact switches on one side with 10 strokes, the switches may interfere with each other, so please adjust the switches.
★1. When using a contactless switch with 10 strokes, use two switch mounting slots.
★2. For two or more switches, please consult us separately.

Switch Additional Mass

Unit : kg

Lead Wire 1.5m	Lead Wire 5m	Plug-in Connecter
0.05	0.13	0.04

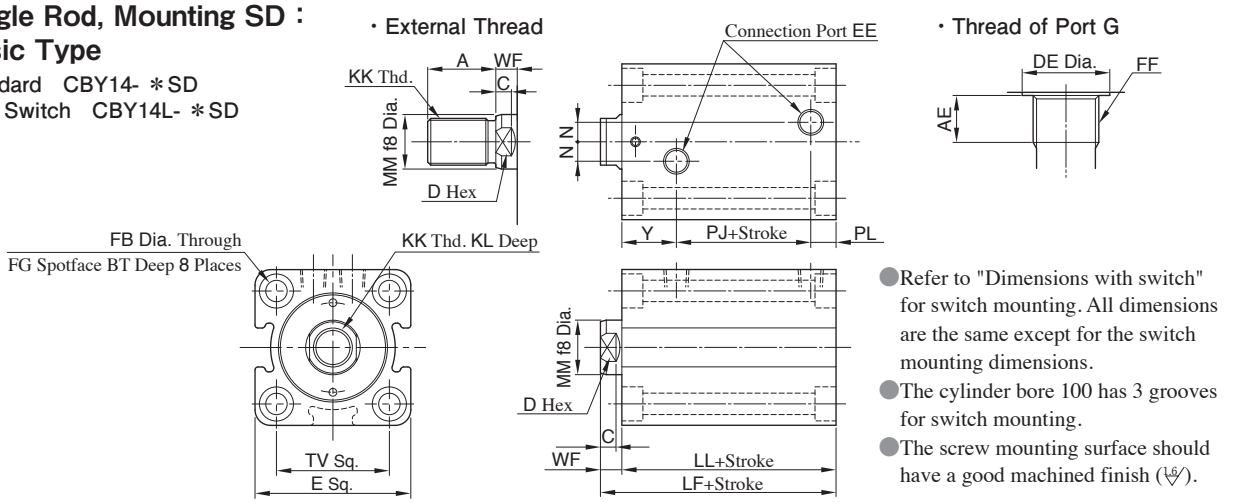
Compatibility of Hydraulic Fluid and Packing Material

Packing Material	Hydraulic Fluid				
	Petroleum Base Oil	Water-Glycols	Phosphate Esters	Water in Oil Emulsion	Oil in Water Emulsion
"3" Fluoro Rubber	○	×	○	○	○
"6" Hydrogenated Nitrile Rubber	○	◎	×	◎	◎

Note 1. The mark ◎ and ○ are allowed, × is not allowed.
2. The mark ◎ is the recommended packing for anti-wear.

Single Rod, Mounting SD : Basic Type

Standard CBY14- ＊SD
With Switch CBY14L- ＊SD



- Refer to "Dimensions with switch" for switch mounting. All dimensions are the same except for the switch mounting dimensions.
- The cylinder bore 100 has 3 grooves for switch mounting.
- The screw mounting surface should have a good machined finish (▽).

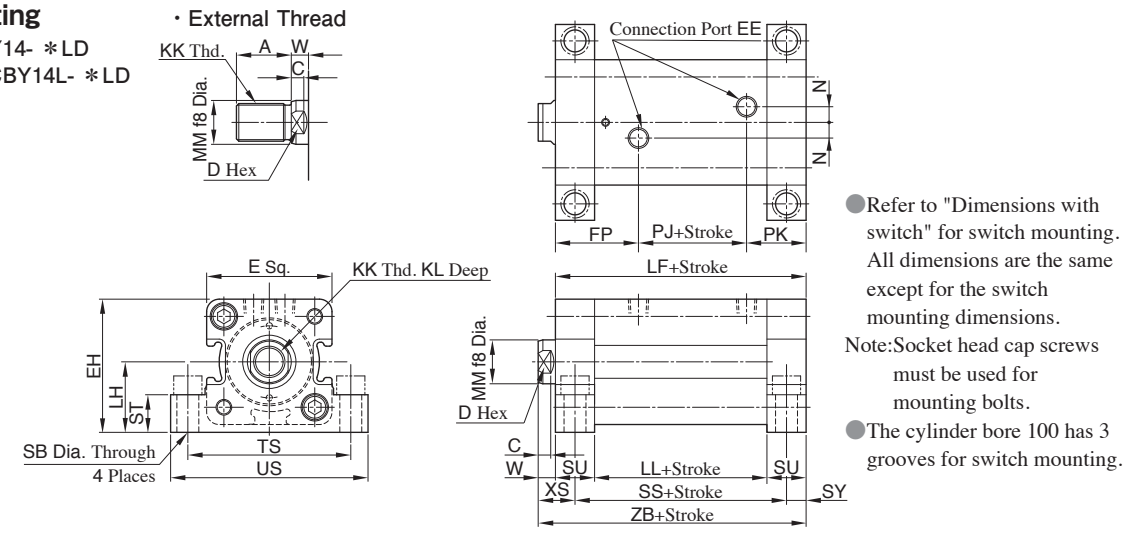
Bore	A	AE	BT	C	D	DE	E	EE	FB	FF	FG	KK		KL	LF	LL	MM	N		PJ		PL		TV	WF	Y		Mass kg		
												Internal Thread	External Thread					Rc Thd.	G Thd.	Rc Thd.	G Thd.	Rc Thd.	G Thd.			Rc Thd.	G Thd.	Basic Int. Thd.	Add. Unit St. 1 mm	Add. Ext. Thd.
32	25 (40)	8	6.5	7	14	17.2	62	Rc1/4	6.6	G1/8	11	M12x1.75	M16x1.5	15	64	54	18	10	10	14	14	12	12	47	10	28	28	0.64	0.009	0.05
40	30 (45)	8	8.6	7	19	17.2	70	Rc1/4	9	G1/8	14	M16x2	M20x1.5	20	65	55	22	10	10	16	16	12	12	52	10	27	27	0.85	0.011	0.10
50	35 (50)	12	10.8	8	24	21.5	80	Rc1/4	11	G1/4	17.5	M20x2.5	M24x1.5	24	71	60	28	10	14	19	13.5	13	18.5	58	11	28	28	1.28	0.015	0.18
63	45 (60)	12	13	9	30	21.5	94	Rc1/4	14	G1/4	20	M27x3	M30x1.5	33	80	67	36	10	16	24	20	13	17	69	13	30	30	2.00	0.021	0.40
80	60 (80)	12	15.2	14	41	21.5	114	Rc3/8	16	G1/4	23	M30x3.5	M39x1.5	36	95	78	45	15	19	25	24	18	18	86	17	35	36	3.72	0.031	0.76
100	75 (95)	12	17.5	22	50	25.5	138	Rc3/8	18	G3/8	26	M39x4	M48x1.5	45	122	96	56	15	18	26	26	28	28	106	26	42	42	7.03	0.046	1.50

Note: When using a lock nut, dimension A in parentheses is recommended (to be order-made). In this case, specify by adding a code at the end of the standard model numbers as shown in the example below.

Ex.) CBY14–6SD32N10T–L A00 (T) A–40
Standard Model Numbers
A length : indicated by the dimension in A- parentheses
Rod end special shape: Code A00 (T) is common to all bore diameters

Single Rod, Mounting LD : Foot Mounting

Standard CBY14- ＊LD
With Switch CBY14L- ＊LD



- Refer to "Dimensions with switch" for switch mounting. All dimensions are the same except for the switch mounting dimensions.

Note:Socket head cap screws must be used for mounting bolts.

- The cylinder bore 100 has 3 grooves for switch mounting.

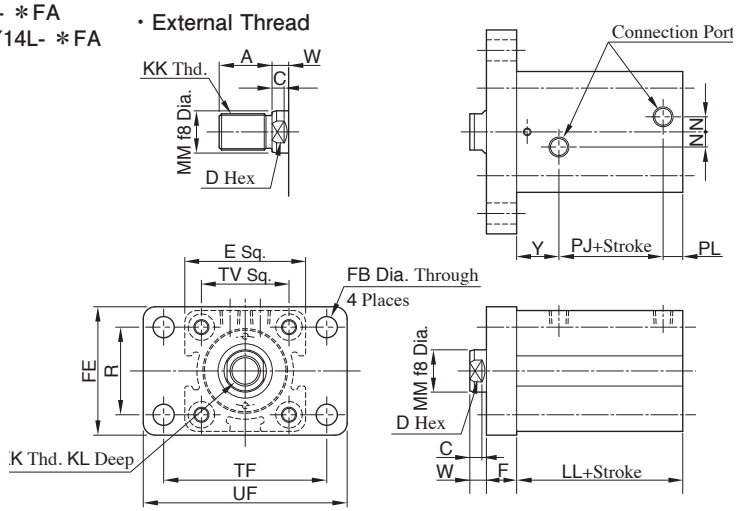
Bore	A	C	D	E	EE	EH	FP	KK		KL	LF	LH	LL	MM	N	PJ	PK	SB	SS	ST	SU	SY	TS	US	W	XS	ZB	Mass kg		
								Internal Thread	External Thread																			Basic Int. Thd.	Add. Unit St. 1 mm	Add. Ext. Thd.
32	25 (40)	7	14	62	Rc1/4	66	48	M12x1.75	M16x1.5	15	94	35±0.15	54	18	10	14	32	9	74	16	20	10	79	94	10	20	104	1.73	0.009	0.05
40	30 (45)	7	19	70	Rc1/4	72.5	47	M16x2	M20x1.5	20	95	37.5±0.15	55	22	10	16	32	11	75	20	20	10	90	108	10	20	105	2.27	0.011	0.10
50	35 (50)	8	24	80	Rc1/4	85	53	M20x2.5	M24x1.5	24	110	45±0.15	60	28	10	19	38	14	85	24	25	12.5	104	126	11	23.5	121	3.71	0.015	0.18
63	45 (60)	9	30	94	Rc1/4	97	55	M27x3	M30x1.5	33	117	50±0.15	67	36	10	24	38	16	92	30	25	12.5	121	146	13	25.5	130	5.30	0.021	0.40
80	60 (80)	14	41	114	Rc3/8	117	65	M30x3.5	M39x1.5	36	138	60±0.25	78	45	15	25	48	18	108	35	30	15	144	172	17	32	155	9.58	0.031	0.76
100	75 (95)	22	50	138	Rc3/8	140	77	M39x4	M48x1.5	45	166	71±0.25	96	56	15	26	63	22	131	43	35	17.5	174	208	26	43.5	192	17.02	0.046	1.50

Note: When using lock nuts, dimension A in parentheses is recommended (to be order-made). In this case, specify by adding a code to the end of the standard model numbers, referring to the "Basic Type" above.

Single Rod, Mounting FA : Rod Flange

Standard CBY14- ＊FA
With Switch CBY14L- ＊FA

・External Thread



- Refer to "Dimensions with switch" for switch mounting. All dimensions are the same except for the switch mounting dimensions.
- The cylinder bore 100 has 3 grooves for switch mounting.

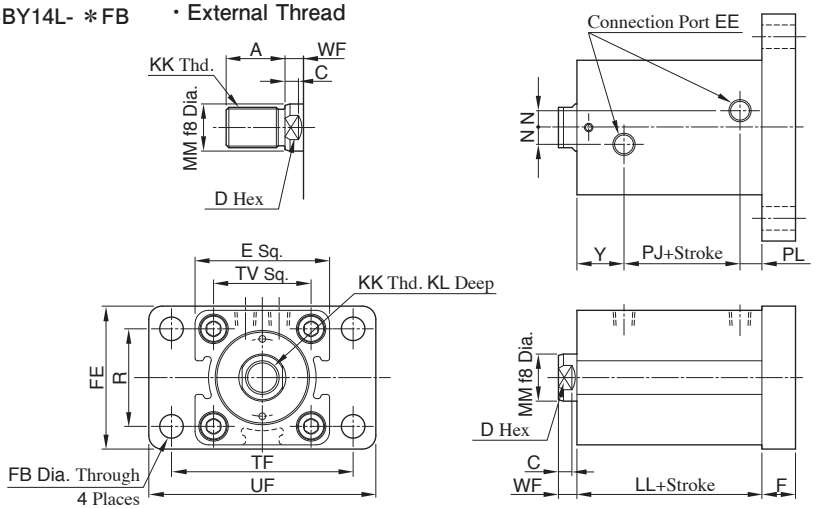
Bore	A	C	D	E	EE	F	FB	FE	KK		KL	LL	MM	N	PJ	PL	R	TF	TV	UF	W	Y	Mass kg		
									Internal Thread	External Thread													Basic Int. Thd.	Add. Unit St. 1 mm	Add. Ext. Thd.
32	25 (40)	7	14	62	Rc1/4	15	6.6	62	M12×1.75	M16×1.5	15	54	18	10	14	12	40	80	47	95	10	28	1.26	0.009	0.05
40	30 (45)	7	19	70	Rc1/4	20	11	70	M16×2	M20×1.5	20	55	22	10	16	12	46	96	52	118	10	27	2.01	0.011	0.10
50	35 (50)	8	24	80	Rc1/4	20	14	85	M20×2.5	M24×1.5	24	60	28	10	19	13	58	108	58	135	11	28	2.88	0.015	0.18
63	45 (60)	9	30	94	Rc1/4	20	14	98	M27×3	M30×1.5	33	67	36	10	24	13	65	124	69	150	13	30	4.02	0.021	0.40
80	60 (80)	14	41	114	Rc3/8	25	18	118	M30×3.5	M39×1.5	36	78	45	15	25	18	87	154	86	185	17	35	7.49	0.031	0.76
100	75 (95)	22	50	138	Rc3/8	30	22	150	M39×4	M48×1.5	45	96	56	15	26	28	109	190	106	230	26	42	14.26	0.046	1.50

Note: When using lock nuts, dimension A in parentheses is recommended (to be order-made). In this case, specify by adding a code to the end of the standard model numbers, referring to the "Basic Type" of the previous page.

Single Rod, Mounting FB : Cap Flange

Standard CBY14- ＊FB
With Switch CBY14L- ＊FB

・External Thread



- Refer to "Dimensions with switch" for switch mounting. All dimensions are the same except for the switch mounting dimensions.
- The cylinder bore 100 has 3 grooves for switch mounting.

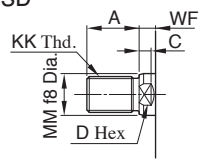
Bore	A	C	D	E	EE	F	FB	FE	KK		KL	LL	MM	N	PJ	PL	R	TF	TV	UF	WF	Y	Mass kg		
									Internal Thread	External Thread													Basic Int. Thd.	Add. Unit St. 1 mm	Add. Ext. Thd.
32	25 (40)	7	14	62	Rc1/4	15	6.6	62	M12×1.75	M16×1.5	15	54	18	10	14	12	40	80	47	95	10	28	1.26	0.009	0.05
40	30 (45)	7	19	70	Rc1/4	20	11	70	M16×2	M20×1.5	20	55	22	10	16	12	46	96	52	118	10	27	2.01	0.011	0.10
50	35 (50)	8	24	80	Rc1/4	20	14	85	M20×2.5	M24×1.5	24	60	28	10	19	13	58	108	58	135	11	28	2.88	0.015	0.18
63	45 (60)	9	30	94	Rc1/4	20	14	98	M27×3	M30×1.5	33	67	36	10	24	13	65	124	69	150	13	30	4.02	0.021	0.40
80	60 (80)	14	41	114	Rc3/8	25	18	118	M30×3.5	M39×1.5	36	78	45	15	25	18	87	154	86	185	17	35	7.49	0.031	0.76
100	75 (95)	22	50	138	Rc3/8	30	22	150	M39×4	M48×1.5	45	96	56	15	26	28	109	190	106	230	26	42	14.26	0.046	1.50

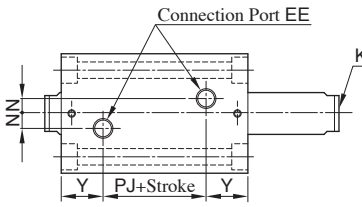
Note: When using lock nuts, dimension A in parentheses is recommended (to be order-made). In this case, specify by adding a code to the end of the standard model numbers, referring to the "Basic Type" of the previous page.

Double Rod, Mounting SD : Basic Type

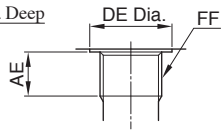
Standard CBY14N- ＊SD
With Switch CBY14LN- ＊SD

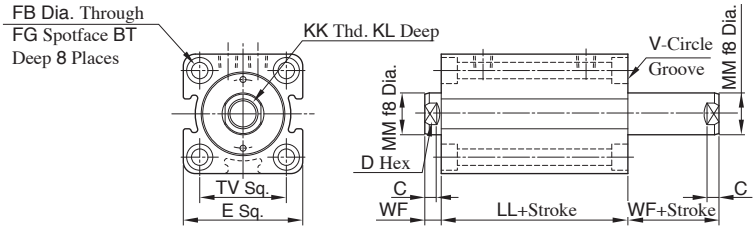
・External Thread





・Thread of Port G





- The end face without V-groove is the mounting surface.
- Refer to "Dimensions with switch" for switch mounting. All dimensions are the same except for the switch mounting dimensions.
- The cylinder bore 100 has 3 grooves for switch mounting.
- The screw mounting surface should have a good machined finish (▽).

Bore	A	AE	BT	C	D	DE	E	EE	FB	FF	FG	KK		KL	LL	MM	N		PJ		TV	WF	Y		Mass kg		
												Internal Thread	External Thread				Rc Thd.	G Thd.	Rc Thd.	G Thd.			Rc Thd.	G Thd.	Basic Int. Thd.	Add. Unit St. 1 mm	Add. Ext. Thd.
32	25 (40)	8	6.5	7	14	17.2	62	Rc1/4	6.6	G1/8	11	M12×1.75	M16×1.5	15	72	18	10	10	16	16	47	10	28	28	1.01	0.011	0.10
40	30 (45)	8	8.6	7	19	17.2	70	Rc1/4	9	G1/8	14	M16×2	M20×1.5	20	72	22	10	10	18	18	52	10	27	27	1.30	0.014	0.20
50	35 (50)	12	10.8	8	24	21.5	80	Rc1/4	11	G1/4	17.5	M20×2.5	M24×1.5	24	75	28	10	14	19	19	58	11	28	28	1.90	0.020	0.36
63	45 (60)	12	13	9	30	21.5	94	Rc1/4	14	G1/4	20	M27×3	M30×1.5	33	82	36	10	16	22	22	69	13	30	30	2.89	0.029	0.80
80	60 (80)	12	15.2	14	41	21.5	114	Rc3/8	16	G1/4	23	M30×3.5	M39×1.5	36	95	45	15	19	25	23	86	17	35	36	5.36	0.043	1.52
100	75 (95)	12	17.5	22	50	25.5	138	Rc3/8	18	G3/8	26	M39×4	M48×1.5	45	108	56	15	18	24	24	106	26	42	42	9.83	0.065	3.00

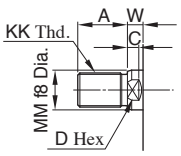
Note: When using a lock nut, dimension A in parentheses is recommended (to be order-made). In this case, specify by adding a code at the end of the standard model numbers as shown in the example below. In this case, dimension A is the specified dimension only on the mounting side. If both sides need to be specified dimensions, please consult us separately.

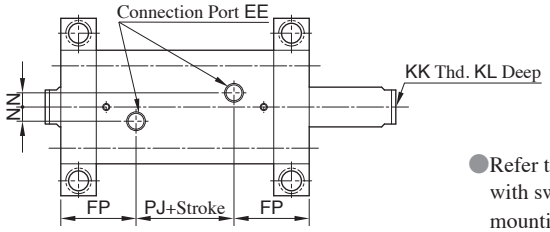
Ex.) CBY14N–6SD32N10T–L A00 (T) A–40
Standard Model Numbers
A length : indicated by the dimension in A- parentheses
Rod end special shape: code A00 (T) is common to all bore diameters

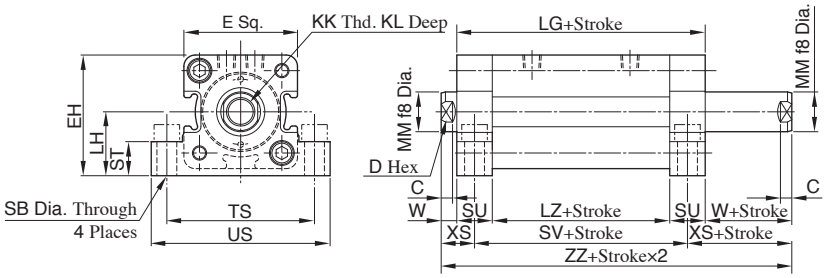
Double Rod, Mounting LD : Foot Mounting

Standard CBY14N- ＊LD
With Switch CBY14LN- ＊LD

・External Thread







- Refer to "Dimensions with switch" for switch mounting. All dimensions are the same except for the switch mounting dimensions.

Note : Socket head cap screws must be used for mounting bolts.

- The cylinder bore 100 has 3 grooves for switch mounting.

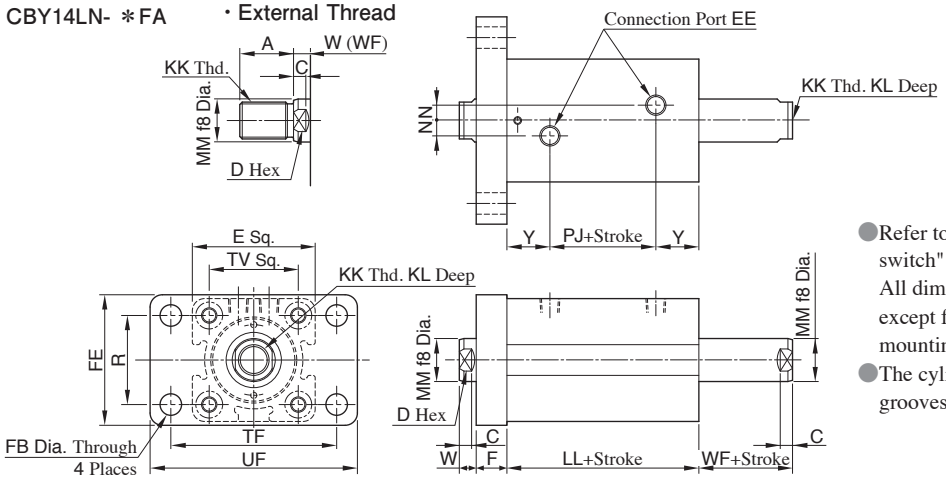
Bore	A	C	D	E	EE	EH	FP	KK		KL	LG	LH	LZ	MM	N	PJ	SB	ST	SU	SV	TS	US	W	XS	ZZ	Mass kg		
								Internal Thread	External Thread																	Basic Int. Thd.	Add. Unit St. 1 mm	Add. Ext. Thd.
32	25 (40)	7	14	62	Rc1/4	66	48	M12×1.75	M16×1.5	15	112	35±0.15	72	18	10	16	9	16	20	92	79	94	10	20	132	2.1	0.011	0.10
40	30 (45)	7	19	70	Rc1/4	72.5	47	M16×2	M20×1.5	20	112	37.5±0.15	72	22	10	18	11	20	20	92	90	108	10	20	132	2.72	0.014	0.20
50	35 (50)	8	24	80	Rc1/4	85	53	M20×2.5	M24×1.5	24	125	45±0.15	75	28	10	19	14	24	25	100	104	126	11	23.5	147	4.33	0.020	0.36
63	45 (60)	9	30	94	Rc1/4	97	55	M27×3	M30×1.5	33	132	50±0.15	82	36	10	22	16	30	25	107	121	146	13	25.5	158	6.19	0.029	0.80
80	60 (80)	14	41	114	Rc3/8	117	65	M30×3.5	M39×1.5	36	155	60±0.15	95	45	15	25	18	35	30	125	144	172	17	32	189	11.22	0.043	1.52
100	75 (95)	22	50	138	Rc3/8	140	77	M39×4	M48×1.5	45	178	71±0.15	108	56	15	24	22	43	35	143	174	208	26	43.5	230	19.82	0.065	3.00

Note: When using lock nuts, dimension A in parentheses is recommended (to be order-made). In this case, specify by adding a code to the end of the standard model numbers, referring to the "Basic Type" above.

Double Rod, Mounting FA : Rod Flange

Standrd CBY14N- ＊FA
With Switch CBY14LN- ＊FA

・External Thread



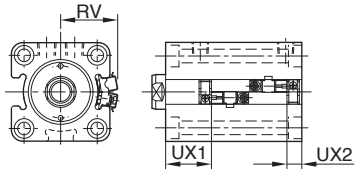
- Refer to "Dimensions with switch" for switch mounting. All dimensions are the same except for the switch mounting dimensions.
- The cylinder bore 100 has 3 grooves for switch mounting.

Bore	A	C	D	E	EE	F	FB	FE	KK		KL	LL	MM	N	PJ	R	TF	TV	UF	W	WF	Y	Mass kg		
									Internal Thread	External Thread													Basic Int. Thd.	Add. Unit St. 1 mm	Add. Ext. Thd.
32	25 (40)	7	14	62	Rc1/4	15	6.6	62	M12×1.75	M16×1.5	15	72	18	10	16	40	80	47	95	10	10	28	1.63	0.011	0.10
40	30 (45)	7	19	70	Rc1/4	20	11	70	M16×2	M20×1.5	20	72	22	10	18	46	96	52	118	10	10	27	2.46	0.014	0.20
50	35 (50)	8	24	80	Rc1/4	20	14	85	M20×2.5	M24×1.5	24	75	28	10	19	58	108	58	135	11	11	28	3.50	0.020	0.36
63	45 (60)	9	30	94	Rc1/4	20	14	98	M27×3	M30×1.5	33	82	36	10	22	65	124	69	150	13	13	30	4.91	0.029	0.80
80	60 (80)	14	41	114	Rc3/8	25	18	118	M30×3.5	M39×1.5	36	95	45	15	25	87	154	86	185	17	17	35	9.13	0.043	1.52
100	75 (95)	22	50	138	Rc3/8	30	22	150	M39×4	M48×1.5	45	108	56	15	24	109	190	106	230	26	26	42	17.06	0.065	3.00

Note: When using lock nuts, dimension A in parentheses is recommended (to be order-made). In this case, specify by adding a code to the end of the standard model numbers, referring to the "Basic Type" of the previous page.

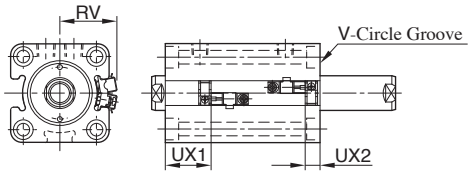
With Switch : CBY14L(N)

Single Rod



- The cylinder bore 100 has 3 grooves for switch mounting.

Double Rod



- The cylinder bore of 100 has 3 grooves for switch mounting.
- The one without V-circle groove on the end face is UX1.

Dimensions

Unit : mm

Code / Bore	RV	UX1		UX2	
		Single Rod	Double Rod	Single Rod	Double Rod
32	37	19	19	17	35
40	41	20	20	17	34
50	46	22	22	20	35
63	54	24	24	25	40
80	63	30	30	30	47
100	75	36	36	42	53

Operating Range and Diff. of Response

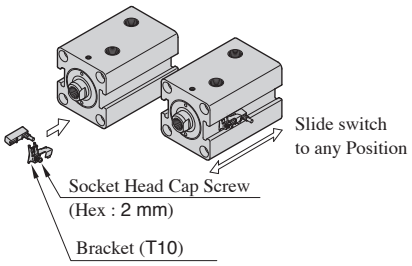
Unit : mm

Bore	Contact		Contactless	
	Operating range	Diff. of Response	Operating range	Diff. of Response
32	10 - 17	2 or less	4 - 8	1 or less
40				
50				
63				
80				
100	6 - 14	2 or less	6 - 9	1 or less

Note: UX dimensions are for reference only. For details, refer to minimum stroke for switch mounting on page J-81.

Adjust the Switch Detection Position

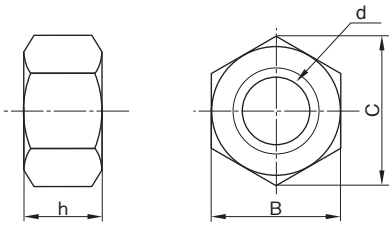
Tightening torque for bracket fixing screw : Approx. 0.4Nm



1. Loosen the bracket fixing screw and fit the bracket into the center of the switch.
2. With the switch and bracket combined, insert them into the switch mounting area of the cylinder body.
3. Slide the switch to the desired position. The detection is most stable when mounted in the center of the operating range.
4. For cylinder stroke end detection, install to UX dimension (optimum setting position).
5. Tighten the bracket fixing screw after sliding it to the detection position.

Note: Incorrect tightening torque may cause misalignment of the switch or damage to the switch itself.

Lock Nut



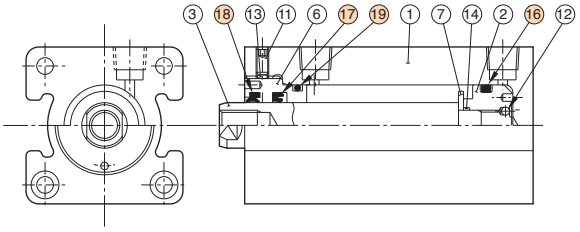
Dimensions

Bore	Parts Numbers	d	B	C	h
32	LNH-16F-H	M16×1.5	22	25.4	10
40	LNH-20F-H	M20×1.5	27	31.2	12
50	LNH-24F-H	M24×1.5	32	37.0	14
63	LNH-30F-H	M30×1.5	41	47.3	17
80	LNH-39F-H	M39×1.5	55	68.5	20
100	LNH-48F-H	M48×1.5	70	80.8	26

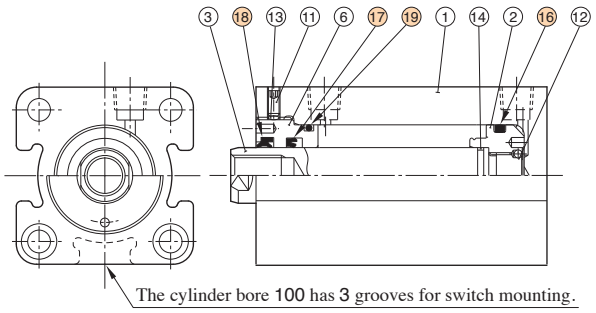
Structure Diagram／Packing List

Single Rod Standard Type：CBY14

●Bore 32

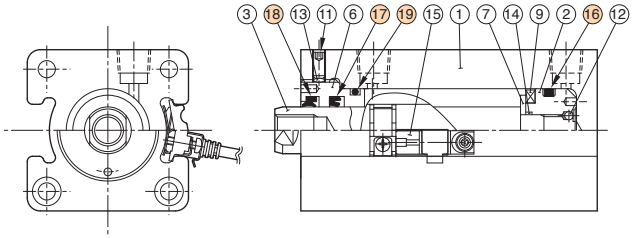


●Bore 40 - 100

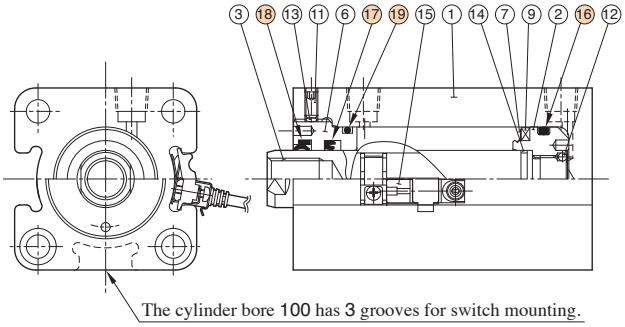


Single Rod with Switch Type：CBY14L

●Bore 32



●Bore 40 - 100



Packing Material “6” Hydrogenated Nitrile Rubber／CBY14（L）-6

Item	Name	Material	Q'ty	Parts Numbers					
				32	40	50	63	80	100
16	Piston Packing	Hydrogenated Nitrile Rubber	1	NCHY–32	NCHY–40	NCHY–50	NCHY–63	NCHY–80	NCHY–100
17	Rod Packing	Hydrogenated Nitrile Rubber	1	UHR–18	UHR–22	UHR–28A	UHR–36	UHR–45	UHR–56
18	Dust Seal	Hydrogenated Nitrile Rubber	1	DHS–18	DHS–22	DHS–28	DHS–36	DHS–45	DHS–56
19	O-Ring for Bush★	Hydrogenated Nitrile Rubber	1	G–25	G–35	G–45	G–58 (Special)	G–75	G–95

★O-ring is OR HNBR-90 G**-N. O-ring for cylinder bore 63 is a special size.

Packing Material “3” Fluoro Rubber／CBY14（L）-3

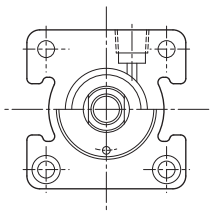
Item	Name	Material	Q'ty	Parts Numbers					
				32	40	50	63	80	100
16	Piston Packing	Fluoro Rubber	1	P–26	P–34	P–44	P–53	P–70	P–90
17	Rod Packing	Fluoro Rubber	1	UHR–18	UHR–22	UHR–28A	UHR–36	UHR–45	UHR–56
18	Dust Seal	Fluoro Rubber	1	DHS–18	DHS–22	DHS–28	DHS–36	DHS–45	DHS–56
19	O-Ring for Bush★	Fluoro Rubber	1	G–25	G–35	G–45	G–58 (Special)	G–75	G–95

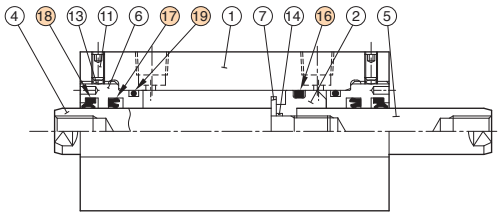
★O-ring is OR FKM-90 G＊＊-N. O-ring for cylinder bore 63 is a special size.

Structure Diagram／Packing List

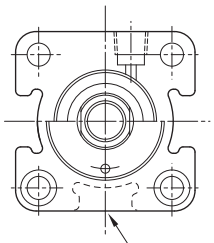
Double Rod Standard Type：CBY14N

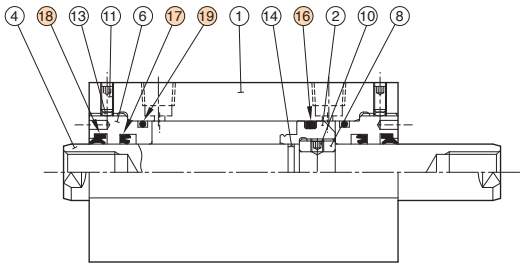
●Bore 32





●Bore 40 - 100

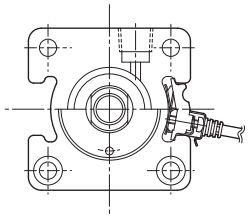


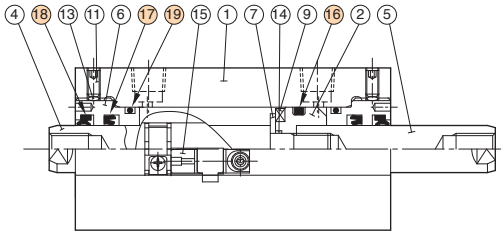


The cylinder bore 100 has 3 grooves for switch mounting.

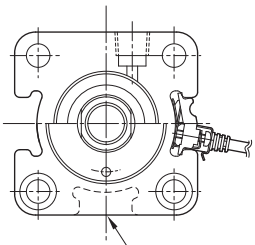
Double Rod with Switch Type：CBY14LN

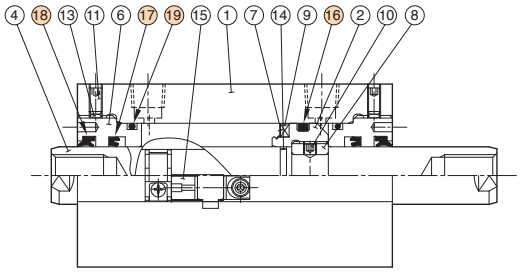
●Bore 32





●Bore 40 - 100





The cylinder bore 100 has 3 grooves for switch mounting.

Packing Material “6” Hydrogenated Nitrile Rubber／CBY14（L）N-6

Item	Name	Material	Q'ty	Parts Numbers					
				32	40	50	63	80	100
16	Piston Packing	Hydrogenated Nitrile Rubber	1	NCHY–32	NCHY–40	NCHY–50	NCHY–63	NCHY–80	NCHY–100
17	Rod Packing	Hydrogenated Nitrile Rubber	2	UHR–18	UHR–22	UHR–28A	UHR–36	UHR–45	UHR–56
18	Dust Seal	Hydrogenated Nitrile Rubber	2	DHS–18	DHS–22	DHS–28	DHS–36	DHS–45	DHS–56
19	O-Ring for Bush★	Hydrogenated Nitrile Rubber	2	G–25	G–35	G–45	G–58 (Special)	G–75	G–95

★O-ring is OR HNBR-90 G＊＊-N. O-ring for cylinder bore 63 is a special size.

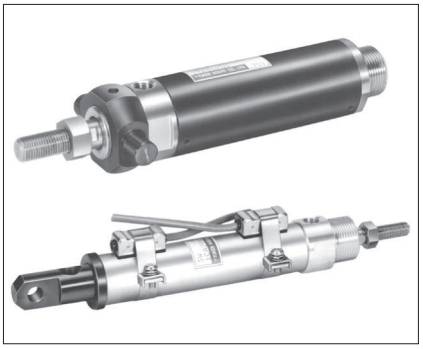
Packing Material “3” Fluoro Rubber／CBY14（L）N-3

Item	Name	Material	Q'ty	Parts Numbers					
				32	40	50	63	80	100
16	Piston Packing	Fluoro Rubber	1	P–26	P–34	P–44	P–53	P–70	P–90
17	Rod Packing	Fluoro Rubber	2	UHR–18	UHR–22	UHR–28A	UHR–36	UHR–45	UHR–56
18	Dust Seal	Fluoro Rubber	2	DHS–18	DHS–22	DHS–28	DHS–36	DHS–45	DHS–56
19	O-Ring for Bush★	Fluoro Rubber	2	G–25	G–35	G–45	G–58 (Special)	G–75	G–95

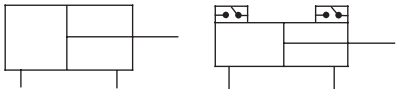
★O-ring is OR FKM-90 G＊＊-N. O-ring for cylinder bore 63 is a special size.

Mini Series Hydraulic Cylinders

The Mini Series Hydraulic Cylinders are hydraulic cylinders developed to meet the needs for miniaturization, such as for space-saving small machine tools and medical equipment. A wide range of mounting types and other variations are available to suit your application.



Graphic Symbols



Specifications

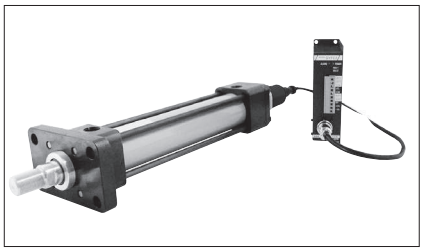
Descriptions \ Model Numbers		SW-1＊＊×＊ -＊＊-＊-＊-＊-＊-00	KM＊-＊＊＊＊×＊ -＊＊-＊-＊-＊-＊-01	KW-＊＊＊＊×＊ -＊＊-＊-＊-＊-＊-01
Cylinder Bore	mm	20, 25, 30		
Mounting Type		ST, LB, FA, CA, TA, TB		
Operating Maximum Pressure	MPa	3.5	7	
Allowable Surge Pressure★1	MPa	5.3	10.5	
Pressure Proof (inspection pressure)	MPa	5.3	10.5	
Minimum Working Pressure	MPa	0.3	0.3 or less★3	
Ambient Temperature (oil temperature)		–10 - +60	–10 - +80	–10 - +60
Operating Maximum Speed		300 mm/s		
Operating Minimum Speed		10 mm/s		
Maximum Cylinder Stroke★2		300 mm		

★1. The pressure generated in the cylinder due to load inertia should be within the above allowable surge pressure.
★2. It may be limited to even lower values from the buckling strength. Please consult us for details.
★3. The minimum working pressure for double rod types is 0.5 MPa or less.

——— Please consult us separately for details of Mini Series Hydraulic Cylinders. ———

"CJT70PS/140PS" Series Position Sensing Type Hydraulic Cylinders

Magnetostrictive mechanism provides highly accurate position detection.



High Accuracy

The magnetostrictive position sensor enables high-accuracy detection of absolute position. Industrial displacement sensors that apply the magnetostrictive phenomenon caused by the Wiedemann effect are used as position sensors.

Various Output Methods

Either analog or digital output can be selected to accommodate various outputs of machinery equipment.

Easy Replacement

The CJT70PS/140PS Series Position Sensing Type Hydraulic Cylinders are interchangeable with the CJT 70/140 Series standard hydraulic cylinders, allowing easy replaceable in machinery equipment. (Except for the mounting types SD/LA/LB)

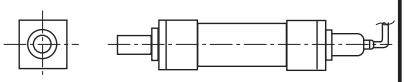
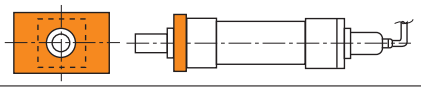
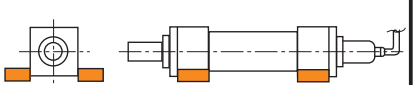
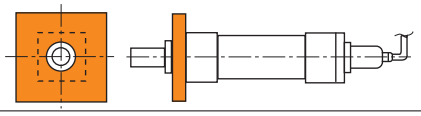
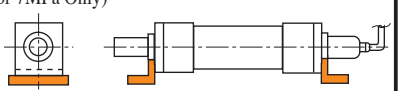
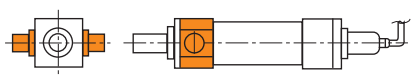
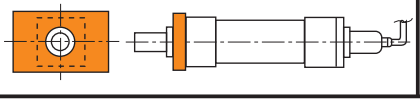
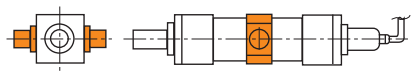
Amplifier built-in type is available

The GYcAT type has an amplifier built into the sensor head, so a high-accuracy analog output can be obtained simply by supplying a 24 V DC power supply.

Specifications

Model Numbers		CJT$^{140}_{70}$PS-＊＊＊＊N-＊N＊-＊＊＊-10	
Rod Size		B	C
Cylinder Bore	mm	50, 63, 80, 100, 125, 140, 150, 160, 180	100, 125, 140, 150, 160, 180
Nominal Pressure	MPa	7/14	
Maximum Stroke	mm	Bore 50 : 1200 Bore 100,125,140 : 1500	Bore 63,80 : 1300 Bore 150,160,180 : 2000
Minimum Stroke	mm	15	
Minimum Resolution		1 μm	
Linearity		0.01 %	
Repetitive Precision		0.001 %	
Applicable Standard		Compliant with former JIS B8354	

Mounting Type

Code	Name	Illustration of Mounting Type	Code	Name	Illustration of Mounting Type
SD	Basic Type		FY	Flange Type	
LA	Foot Mounting		FC		
LB	Foot Mounting	(For 7MPa Only) 	TA	Intermediate Trunnion	
FA	Flange Type	(For 7MPa Only) 	TC	Intermediate Trunnion	

Please consult us separately for details on position sensing type hydraulic cylinders.

K

STANDARD HYDRAULIC POWER UNITS/POWER PACKAGES

Type	Model Numbers	Max. Operating Pres. MPa	Reservoir Capacity L (1 2 5 10 20 50 100 200)	Geometric Displacement cm³/rev (1 2 5 10 20 50)	Page
Low Noise & Small Type Hydraulic Power Units **YP Pack**	YP10	7/16			K-3
	YP16	16			
	YP22				
	YP37				
Low Noise Type Hydraulic Power Units **YA Pack**	YA10	7/16			K-13
	YA16				
	YA22				
	YA37	7			
Small Type Hydraulic Power Units **YA-Light Pack**	YAL8	3.5/7			K-32
	YAL16				
Energy-Saving Hydraulic Power Units **YA-e Pack**	E-YA10	7/16			K-43
	E-YA16				
	E-YA22				
	E-YA37	7			
Energy-Saving Control System for Hydraulic Units	AMC-IV	—	——	——	K-48
Power Packages	PMR2	14			K-52
	PPF2	10.5			
IH Servo Drive Pack	YSD1	10.5			K-61
	YSD2	21			
	YSD3				

- Yuken provides various hydraulic units in accordance with the specifications.
- High efficiency energy-saving hydraulic power units equipped with PM motor are also available. For details, please contact us separately.

Hydraulic Fluids

Type of Fluids

Use petroleum base clean oils equivalent to ISO VG 32 or VG 46.

Recommended Viscosity and Oil Temperature

Use hydraulic fluids which satisfy the both recommended viscosity and oil temperature given in the table below.

Type		Viscosity	Oil Temperature
◦ YP Pack ◦ YA Pack ◦ IH Servo Drive Pack		20 - 400 mm^2/s	0 - 60 °C
◦ YA Series L Pack		20 - 400 mm^2/s	5 - 60 °C
◦ YA-e Pack		20 - 220 mm^2/s	5 - 60 °C
◦ Power Packages	PMR2	20 - 400 mm^2/s	0 - 70 °C
	PPF2	10 - 400 mm^2/s	

Control of Contamination

Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the equipments. Please maintain the degree of contamination below.

Type	Contamination Degree
YP Pack, YA Pack, YA Series L Pack, YA-e Pack	Within NAS Grade 10
Power Packages (PMR2/PPF2)	Within NAS Grade 12
IH Servo Drive Pack	Within NAS Grade 9

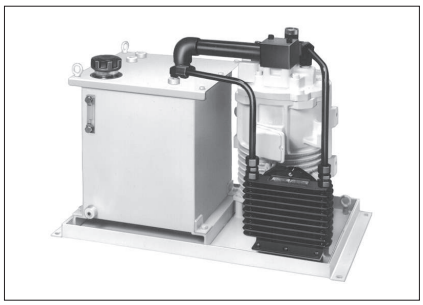
Interchangeability in Installation between Current and New Design

Model change has been made on the following products.

Name	Model Numbers		Mounting Interchangeability	Page	Major Changes
	Current	New			
YP Pack	YP10-＊-＊-＊-22	YP10-＊-＊-＊-23	Yes	K-5	Increase Mass of Pres. Adj. Range “B”
YA Pack	YA10-B-＊-0.75-51 YA10-B-3-1.5-51 YA10-B-4-1.5-51 YA16-B-＊-0.75-50 YA16-B-4-1.5-50	YA10-B-＊-0.75-52 YA10-B-3-1.5-52 YA10-B-4-1.5-52 YA16-B-＊-0.75-52 YA16-B-4-1.5-52	Yes	K-30, K-31	Change The Built-in Motor
YA Series L Pack	YAL＊-＊-＊-＊-10	YAL＊-＊-＊-＊-20	No	K-37, K-38	Change The Built-in Motor [Comply with The Top Runner Criteria]
YA-e Pack	E-YA16-B-2-0.75-50	E-YA16-B-2-0.75-52	Yes	K-47	Change The Built-in Motor
Power Packages	PMR2-＊-＊-＊-＊-＊-35	PMR2-＊-＊-＊-＊-＊-40	Yes	K-59	Bring Built-in M Series Motor into Compliance with The Top Runner Criteria.
IH Servo Drive Pack	YSD1-＊-＊＊＊-＊-＊＊-10	YSD1-＊-＊＊＊-＊-＊＊-20	Yes	K-73 - K-76	Change Servo Motor and Servo Pack
	$YSD\frac{2}{3}$-＊-＊＊-＊-＊＊＊-＊＊-20	$YSD\frac{2}{3}$-＊-＊＊-＊-＊＊＊-＊＊-30			

Low-Noise Compact Type Standard Hydraulic Power Unit YP Pack

YP pack is low-noise & compact unit equipped with PAL pump of excellent performance as power resource. It saves floor space for installation by compact design. And YUKEN has achieved noise level 55 dB(A) comfortable never before.



Low Noise & Low Vibration

Equipped with low-noise PAL pump and drain cooler. Also, low noise and vibration levels have been achieved by effectively arraying the components to control vibration.

Compact Design

YP pack is well designed to be compact by uprighting the PAL pump and reducing the fluid temperature rise ratio added small size reservoir. It saves floor space for installation.

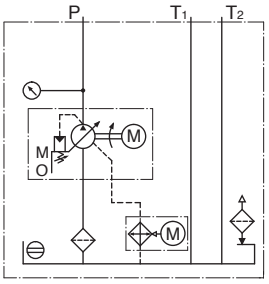
Low Fluid Temperature Rise

Standard equipment, built-in drain cooler and radiator fins of PAL pump, reduce the fluid temperature rise ratio. Good solution for heat distortion of machines.

Wide Range

YP packs offer nine different models in variety. Seven kinds of options are available such as YP pack with control circuit consists of modular & solenoid operated directional valve.

Hydraulic Circuit



Specifications

Model Numbers	Geometric Displacement of Pump cm^3/rev	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Reservoir Capacity L	Electric Motor 50 Hz : 200 V AC 60 Hz : 200 V/220 V AC	Approx. Mass kg (excluding hydraulic fluid)
YP10-B-1-0.75-23	10.0	7	B : 1.2 - 7	10	0.75 kW×4P	63
YP10-＊-1-1.5-23		16	B : 1.2 - 7 C : 2 - 16	10	1.5 kW×4P	B:73 C:68
YP16-＊-1-1.5-22	15.8			10	1.5 kW×4P	80
YP16-＊-1-2.2-22				10	2.2 kW×4P	90
YP16-＊-2-2.2-22				20	2.2 kW×4P	90
YP22-＊-2-2.2-22	22.2			20	2.2 kW×4P	90
YP22-＊-3-3.7-22				30	3.7 kW×4P	110
YP37-＊-3-3.7-22	36.9			30	3.7 kW×4P	150
YP37-＊-3-5.5-22				30	5.5 kW×4P	150

●Drain Cooler Electric Specifications

・50 Hz : 200 V AC (Single Phase), 28W ・60 Hz : 200 V AC (Single Phase), 26 W ・60 Hz : 220 V AC (Single Phase), 31 W

・Lead Wire Length : 3 m

Model Number Designation

YP	16	−B	−1	−2.2	−22
Series Number	Built-in Pump	Pres. Adj. Range MPa	Reservoir Capacity L	Electric Motor	Design Number
YP : Low-Noise Compact Type Standard Hydraulic Power Unit YP Pack	10 : PM10 (10.0 cm^3 /rev)	B : 1.2 - 7	1 : 10	0.75 : 0.75 kW×4P	23
		B : 1.2 - 7 C : 2 - 16	1 : 10	1.5 : 1.5 kW×4P	
	16 : PM16 (15.8 cm^3 /rev)		1 : 10	1.5 : 1.5 kW×4P	22
				2.2 : 2.2 kW×4P	
	22 : PM22 (22.2 cm^3 /rev)		2 : 20	2.2 : 2.2 kW×4P	
			2 : 20	2.2 : 2.2 kW×4P	
			3 : 30	3.7 : 3.7 kW×4P	
	37 : PM37 (36.9 cm^3 /rev)		3 : 30	3.7 : 3.7 kW×4P	
				5.5 : 5.5 kW×4P	

Options

❶ Base Plate Embedded：01M＊
Control circuit can be constructed by just stacking up modular valves/ solenoid valve atop the base plate. However, the circuit construction is limited to modular valves and standard solenoid directional control valves. In this case, please, indicate power supply for operation.

❷ Pressure Gauge and Mounting Block Embedded：G2, G3
Use in case that detect the pressure except pump discharge pressure by using reducing valve.
G2 is able to detect one more line pressure, G3 is able to detect two more lines except pump discharge pressure.

❸ Return Filter Embedded：F
Return filter adopt the tank top type those surge pressure of tank line lower generate. The absolute filtration is 20 μm, equipped with visual indicator.

❹ Tank Magnet Embedded：Mg
Installed inside the tank. Attracts and collects fine iron powder. Decreases component wear.

❺ Oil Level Gauge with Thermometer Embedded：Te

❻ Thermostat Embedded：TR

❼ Liquid Level Switch Embedded：Le

❽ External Paint Color Changed：PT
The standard models are painted by Munsell 2.5Y9/2, color code H22-90D. In case if required special paint, please indicate separately by JPMA code or Munsell value.

❾ Water Leak Inspection：RK
YUKEN conduct water leak inspection of tank.

❿ Different Voltage Electric Motor：(＊V×＊Hz)
200 V AC (50Hz) and 200/220/230 V AC (60Hz) are standard. In case if required other voltage, please indicate voltage and frequency. In case of 50Hz, choose from 230/380/400/415 V, in case of 60 Hz, choose from 400/440/460 V.
The drain cooler has no different voltage specifications, so please prepare another power supply of single phase 200 V AC (50Hz) or 200/220 V AC (60Hz) on the machine side.

Applicable Options Table

Available options are indicated with ○ mark.

Option Code	01M＊	G＊	F	Mg	Te	TR	Le	PT	RK	＊V×＊Hz
Option Item / Model	❶ Base Plate Embedded / Number of Base Plate Stations	❷ Pressure Gauge Embedded	❸ Return Filter Embedded	❹ Tank Magnet Embedded	❺ Oil Level Gauge with Thermometer Embedded	❻ Thermostat Embedded	❼ Liquid Level Switch Embedded	❽ External Paint Color Changed	❾ Water Leak Inspection	❿ Different Voltage Electric Motor
YP10-B-1-0.75-23	○ 1 to 3 Stations	○ G2 G3	×	○	○	○	○	○	○	50 Hz：230/380/400/415 V 60 Hz：400/440/460 V
YP10-＊-1-1.5-23			×	○	○	○	○	○	○	
YP16-＊-1-1.5-22			×	○	○	○	○	○	○	
YP16-＊-1-2.2-22			×	○	○	○	○	○	○	
YP16-＊-2-2.2-22			○	○	○	○	○	○	○	
YP22-＊-2-2.2-22			○	○	○	○	○	○	○	
YP22-＊-3-3.7-22			○	○	○	○	○	○	○	
YP37-＊-3-3.7-22			○	○	○	○	○	○	○	
YP37-＊-3-5.5-22			○	○	○	○	○	○	○	

Option Indication Method

When ordering YP Pack with options, please add「OP」at the end of standard YP Pack model number, use the example below for reference and indicate options. For summary of options, please refer to the above table.

【Example of Option Indication】

YP16-B-1-2.2-22-OP

OP -01 M3 G2 F Mg Te TR Le PT RK (380×50)

Option Incl.

Base Plate Embedded ❶
Base Plate Size
01：01 Size (1/8)

Number of Base Plate Stations ❶
M1：1 Station
M2：2 Stations
M3：3 Stations

Pressure Gauge Embedded ❷
G2：Pressure Gauge 2 Pieces
G3：Pressure Gauge 3 Pieces

F：Return Filter Embedded ❸

Mg：Tank Magnet Embedded ❹

Oil Level Gauge with Thermometer Embedded ❺

Thermostat Embedded ❻

Liquid Level Switch Embedded ❼

PT：External Paint Color Changed ❽
Note) Indicate separately by JPMA code or Munsell value.

RK：Water Leak Inspection ❾

Different Voltage Electric Motor ❿
Fill in "Voltage × Frequency"in case if they differ from standard voltage only.

Instructions

Suction/Return Air

Don't put any obstructions at air vent surface of the drain cooler.
Please install unit at the floor with good air flow to avoid heat stuff.

Transportation

Use eye bolts at the time of transportation.

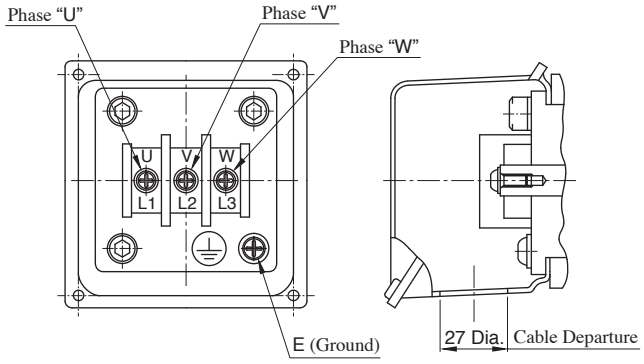
Installation

This unit is stationary type, so please fix it using bolts on the level space with no vibration.

Electrical Wiring

To protect electrical circuit from over current like short and protect motor from overload, we recommend to install no-fuse breaker with earth leakage breaker on the primary power supply.
For electrical wiring, please use crimp terminals of suitable size, and connect certainly to avoid electric leakage for main body and interphase electrical short. Please be sure to ground the earth terminal.

【Terminal Box Detail】



【Connecting Screw Size : 】

Phase "U" "V" "W" M 4

E (Ground) M 6 Motor Side [U — R, V — S, W — T] Power Supply Side

Note for Starting Operation

Before initial operation, please supply ruled mass of hydraulic fluid required from oil tank port, and fill clean hydraulic fluid from filling port of pump. Be sure to confirm that all of hydraulic circuits and electrical circuits have already prepared for starting operation. To avoid air-bound at starting operation, please adjust hydraulic circuit as that pump drain fluid return directly to oil tank, or operate directional valves for actuators no-load moving. When operate pump, also have to operate drain cooler.
There are cases when pressure increasing take time to drain air from pump or pipes. If after five minutes, the pressure does not yet increase, it may possible of motor reverse rotation, please cut off the power and check wiring.

Air Vent

Because air entrainment in pump or pipe may cause to occur vibration, please make air vent completely.

Setting of Pressure and Output Flow

〔Pressure Adjustment〕

At the time of shipping, the pressure set at minimum level, so please adjust the pressure under using conditions. Turn the pressure adjustment screw clockwise, the pressure increase. For adjustment volumes at one rotation of adjustment screw, please refer to the table below. After adjustments, do not forget to tighten the lock nut.

【Adjustment Volumes at One Rotation of Pres. Adj. Screw】

Model Numbers	Adjustment Volumes MPa
YP10/16/22–B	2.9
YP10/16/22–C	5.4
YP37–B	3.5
YP37–C	6.5

〔Output Flow Adjustment〕

Turn the flow adjustment screw clockwise, the output flow decrease. For adjustment volumes at one rotation of adjustment screw, please refer to the table below. After adjustments, do not forget to tighten the lock nut.

【Adjustment Volumes at One Rotation of Discharge Volume Adj. Screw】

Model Numbers	Adjustment Volumes at One Rotation cm^3/rev	Min. Adj. Flow cm^3/rev
YP10	1.1	2
YP16	1.5	6
YP22	2.1	8.5
YP37	2.9	10

Interchangeability between Current and New Models

As of YP 10 type model, the design number has changed from 22 to 23 due to change of built-in pump.

Change Details

Pressure adjustment range "B" mass increased 4kg.

Current		New	
Model Numbers	Mass kg	Model Numbers	Mass kg
YP10-B-1-0.75-22	58	YP10-B-1-0.75-23	63
YP10-B-1-1.5-22	68	YP10-B-1-1.5-23	73

★YP10-C-1.1.5 has no change, but the design number also change to 23.

Interchangeability in Installation

Yes

Specifications / Dimensions / Performance

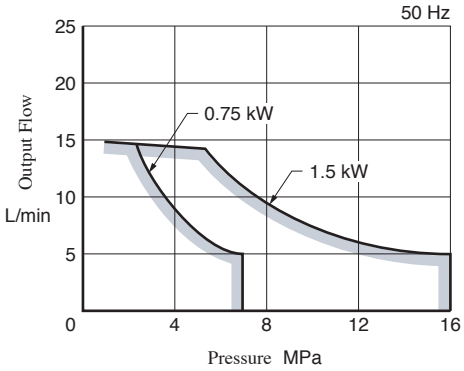
Those of current and new models are same, except for the mass.

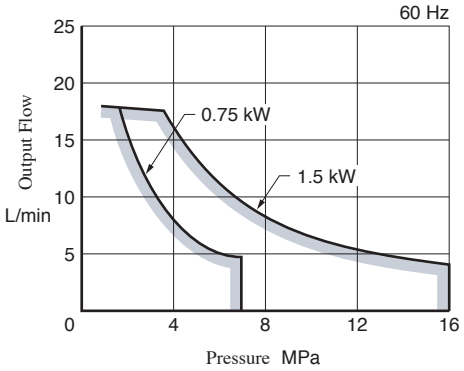
The characteristics below are the typical ones under viscosity 32 mm²/s (ISO VG32 oils, oil temperature 40℃)

■ Selection Graph

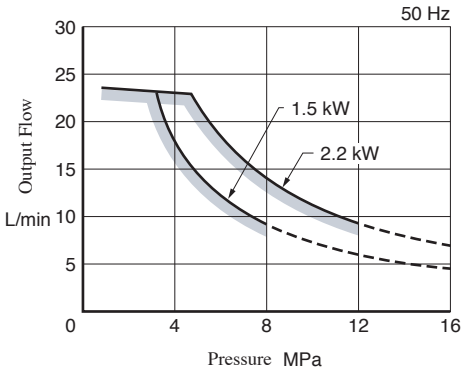
Below ▒▒ portion of the graph is the allowable operating range with regards to rated output of electric motor.
Note) ---- Lines of graphs indicate under minimum adjustment flow rate of pump. If use under minimum adjustment flow rate, please contact us.

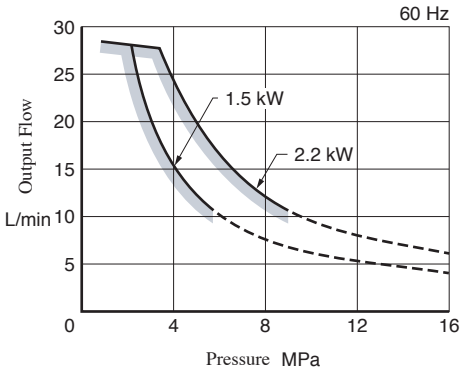
●YP10



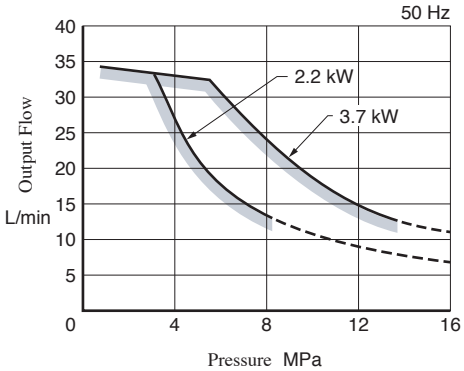


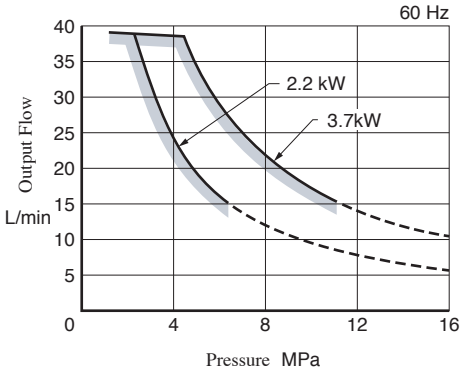
●YP16



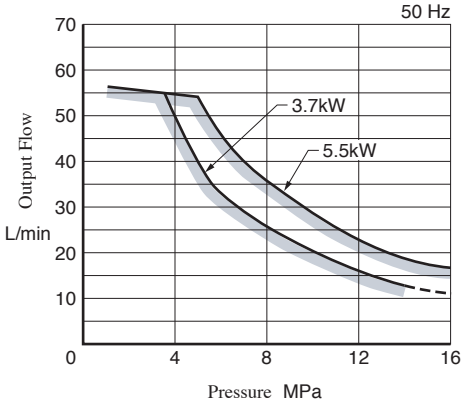


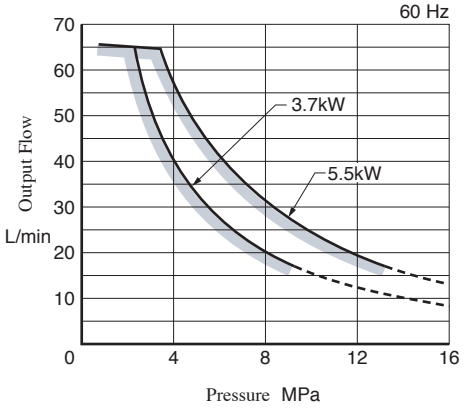
●YP22





●YP37



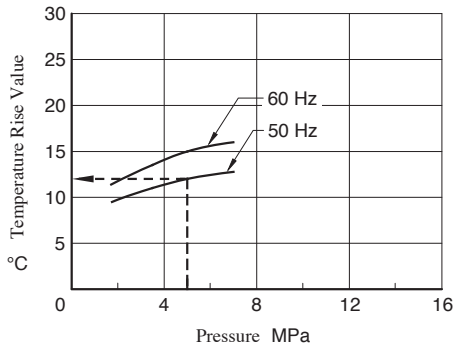


■ Oil Temperature in Reservoir〔full cut-off pressure〕

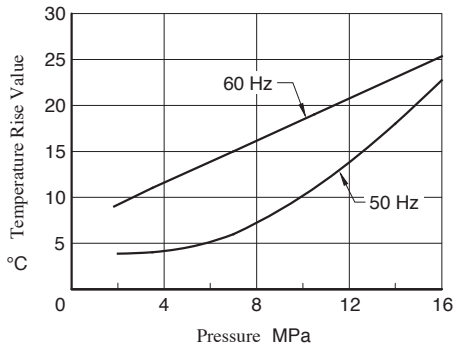
Oil temperature is expressed as (room temperature + temperature rise value). Temperature rise values (full cut-off continuous operation, windless conditions) for each model are shown below, please, check that oil temperature is below 60°C.

Note) When operating YP10-B-1-0.75 continuously (50Hz) at full cut-off pressure 5MPa, temperature rise value is 12°C as shown by broken line in the graph. Assuming that room temperature is 35°C then tank temperature will be 47°C.

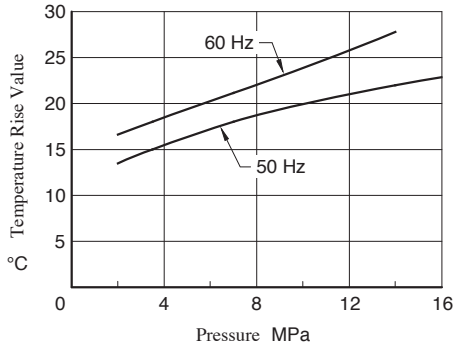
●YP10-B-1-0.75



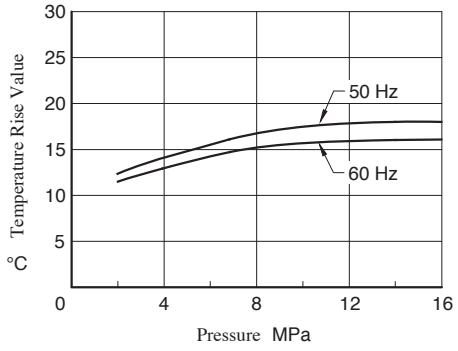
●YP10-C-1-1.5



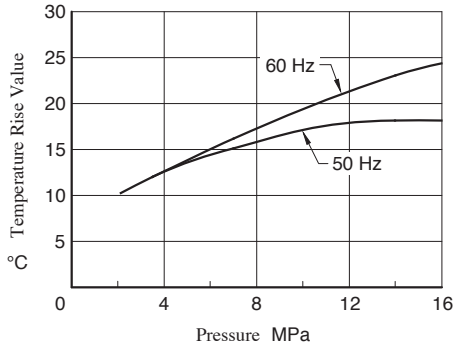
●YP16-＊-1-1.5



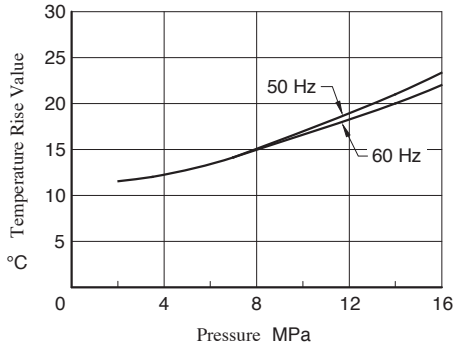
●YP16-＊-1-2.2



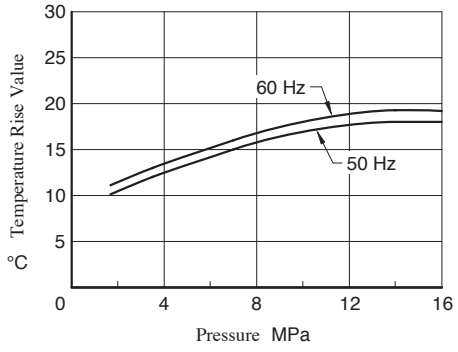
●YP16-＊-2-2.2



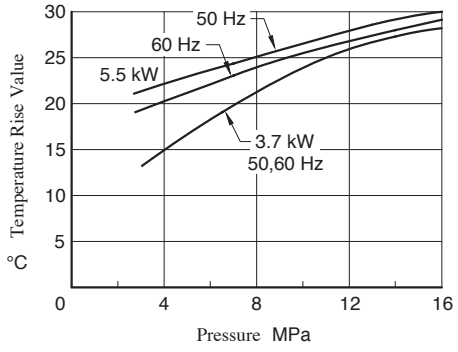
●YP22-＊-2-2.2



●YP22-＊-3-3.7



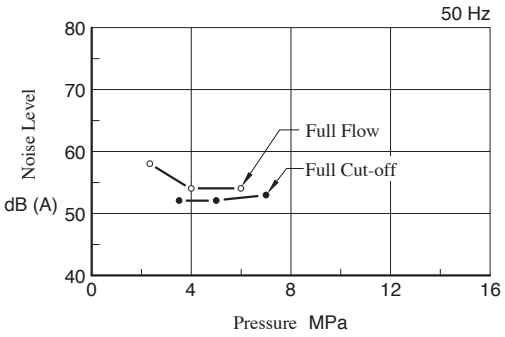
●YP37-＊-3-3.7/5.5

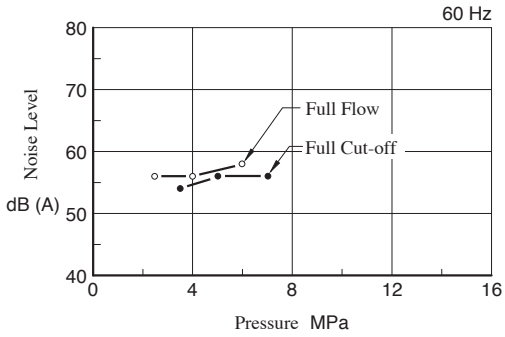


The characteristics below are the typical ones under viscosity 32 mm²/s (ISO VG32 oils, oil temperature 40℃)

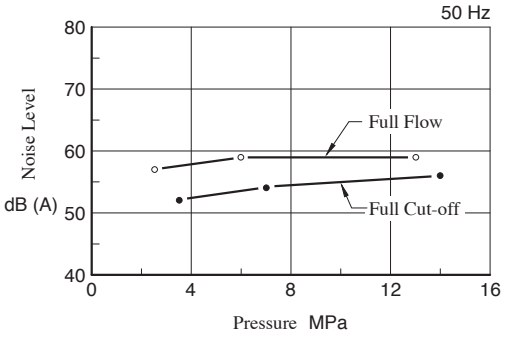
■ Noise Characteristics (Example) 〔Location of Measurement: 1m from the pump〕

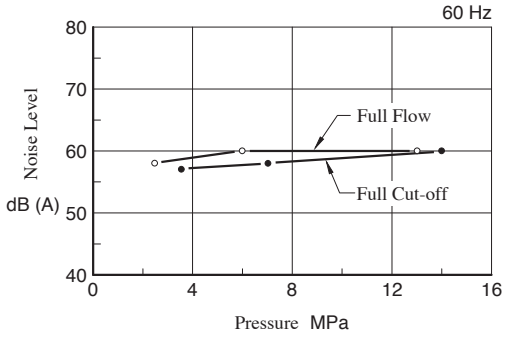
●YP10-B-1-0.75



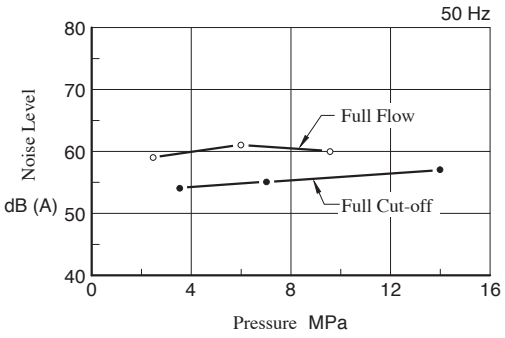


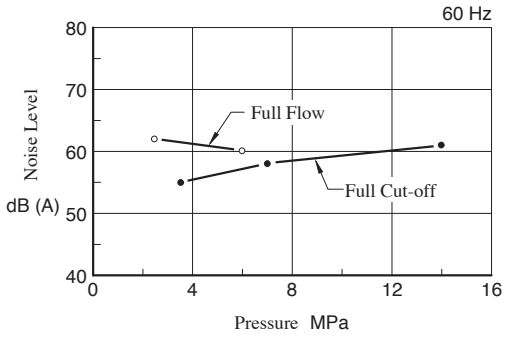
●YP10-＊-1-1.5



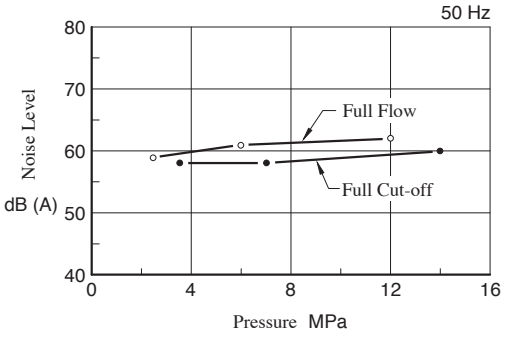


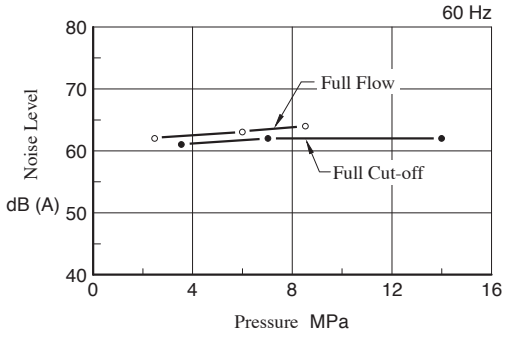
●YP16-＊-1-1.5





●YP16-＊-1-2.2

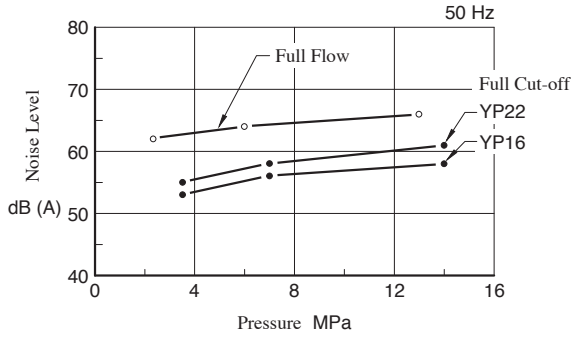


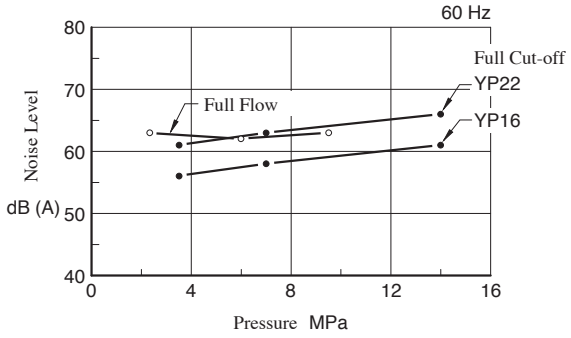


The characteristics below are the typical ones under viscosity 32 mm²/s (ISO VG32 oils, oil temperature 40℃)

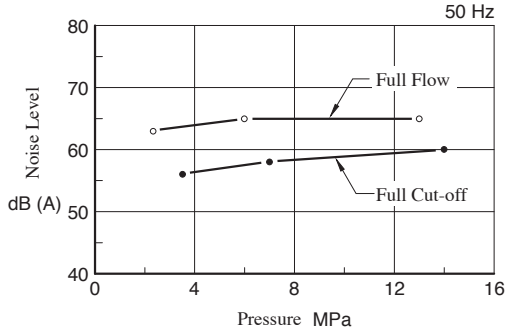
■ Noise Characteristics (Example) 〔Location of Measurement: 1m from the pump〕

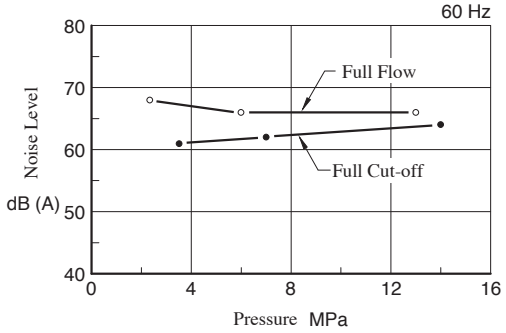
●YP16/22-＊-2-2.2



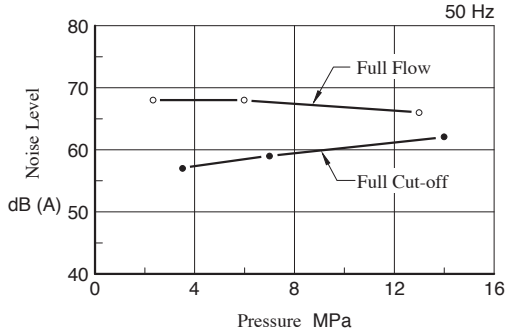


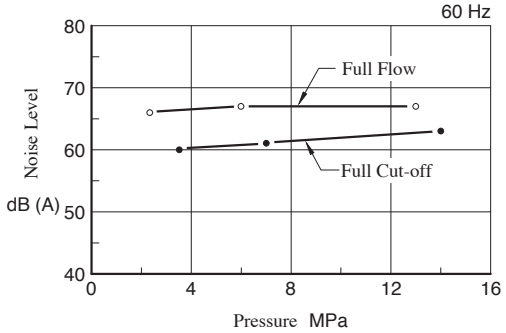
●YP22-＊-3-3.7



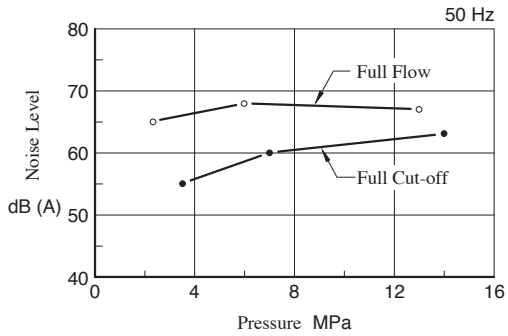


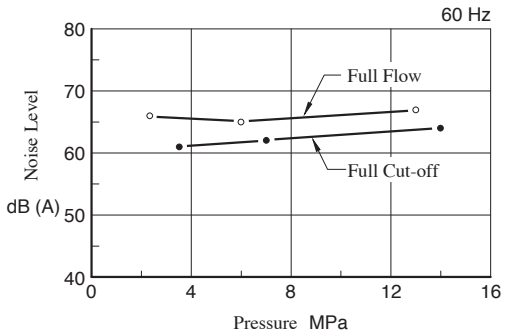
●YP37-＊-3-3.7



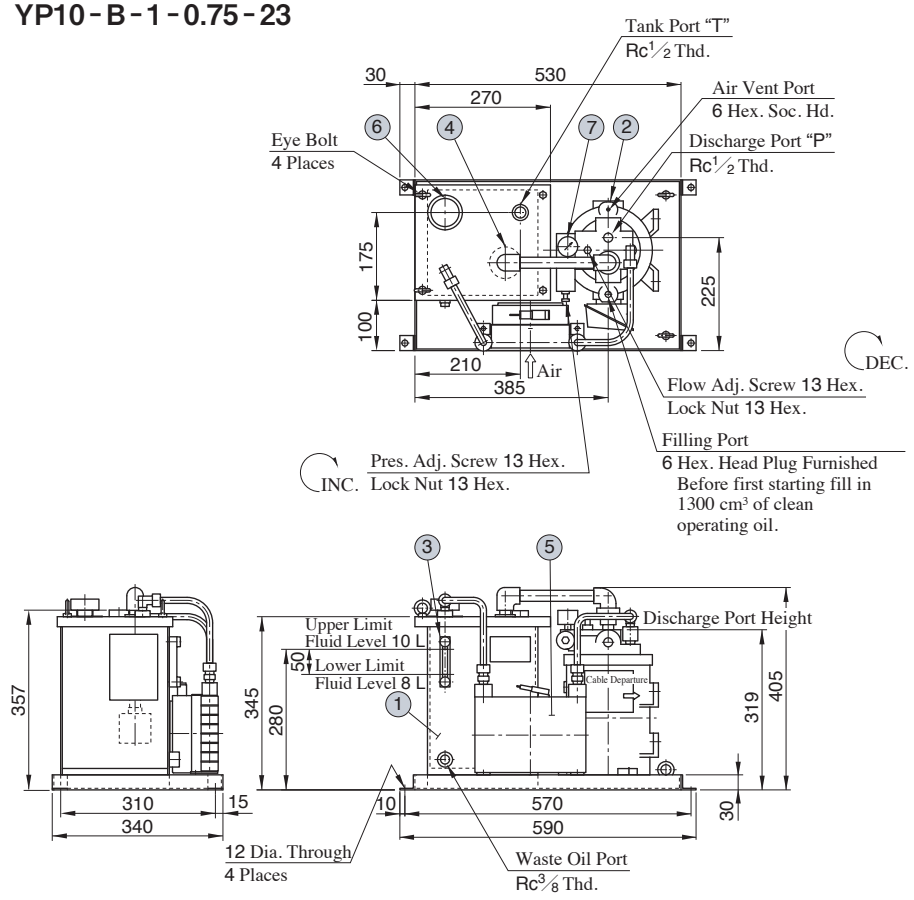


●YP37-＊-3-5.5

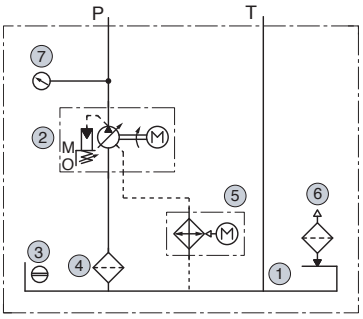




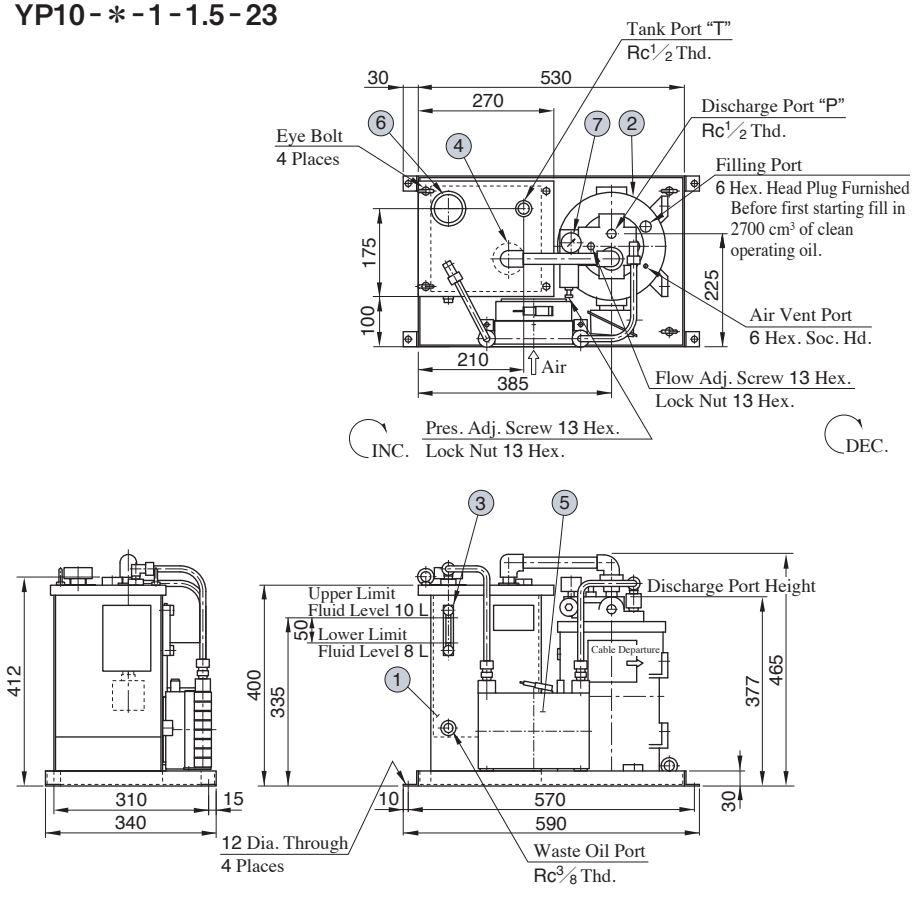
YP10-B-1-0.75-23



Hydraulic Circuit

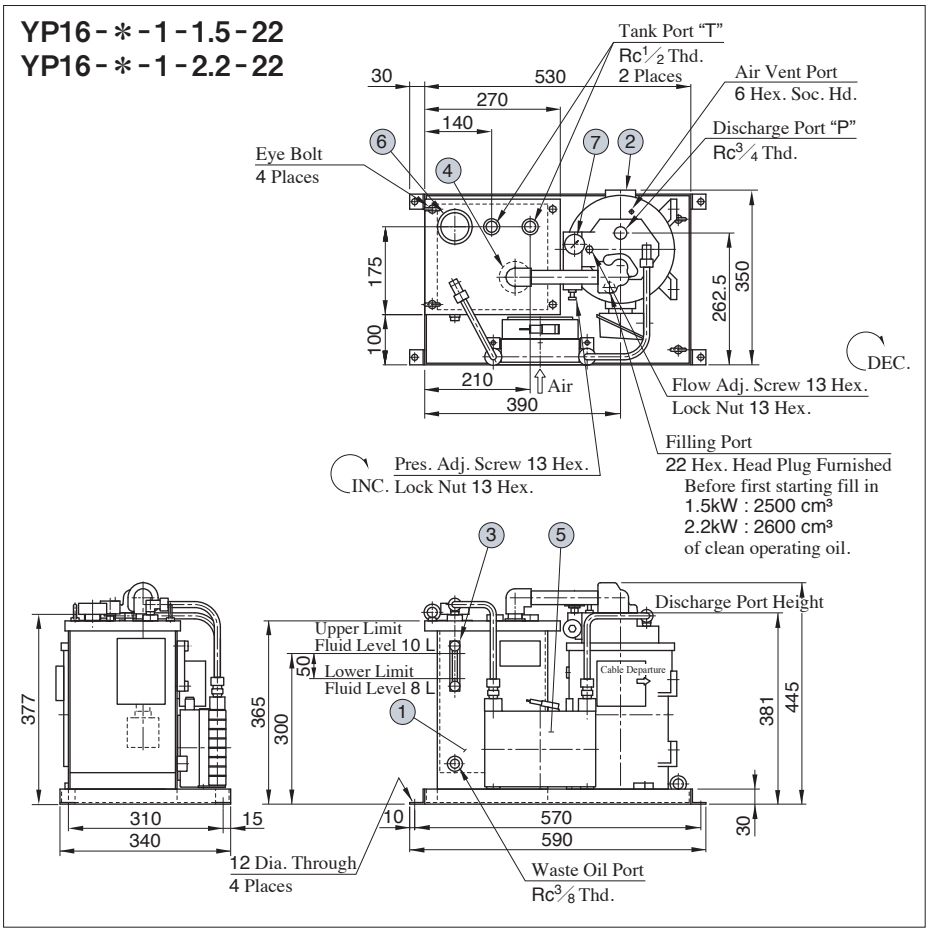


YP10-*-1-1.5-23

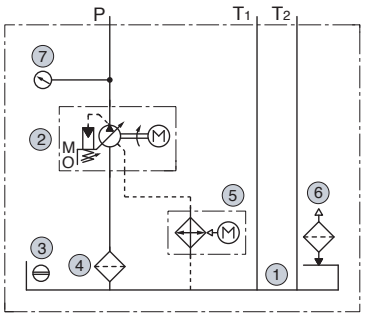


Item	Name
1	Hydraulic Reservoir
2	Pal Pump
3	Oil Level Gauge
4	Suction Strainer
5	Drain Cooler
6	Air Breather with Filling Port
7	Pressure Gauge

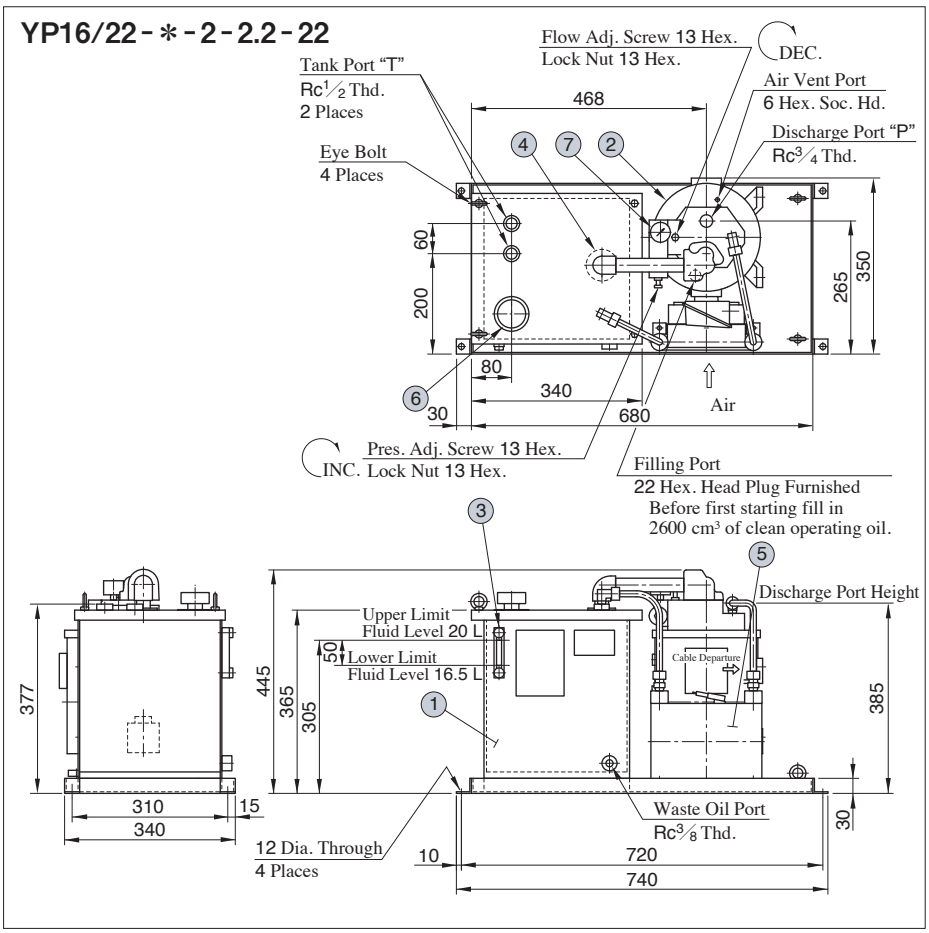
YP16-*-1-1.5-22
YP16-*-1-2.2-22



● Hydraulic Circuit



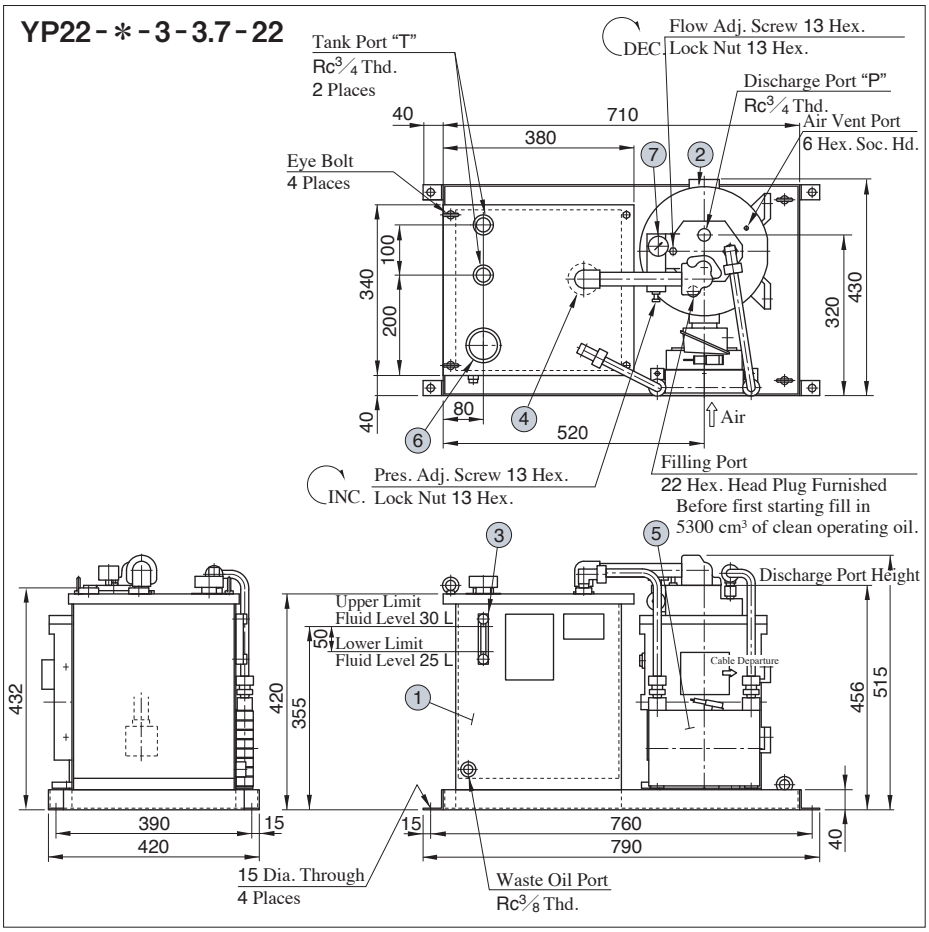
YP16/22-*-2-2.2-22



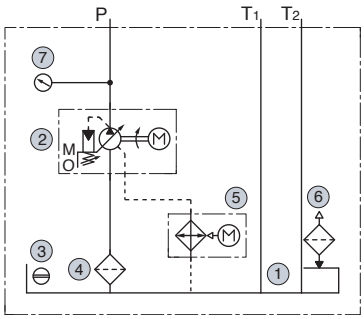
Item	Name
1	Hydraulic Reservoir
2	Pal Pump
3	Oil Level Gauge
4	Suction Strainer
5	Drain Cooler
6	Air Breather with Filling Port
7	Pressure Gauge

K
YP Pack

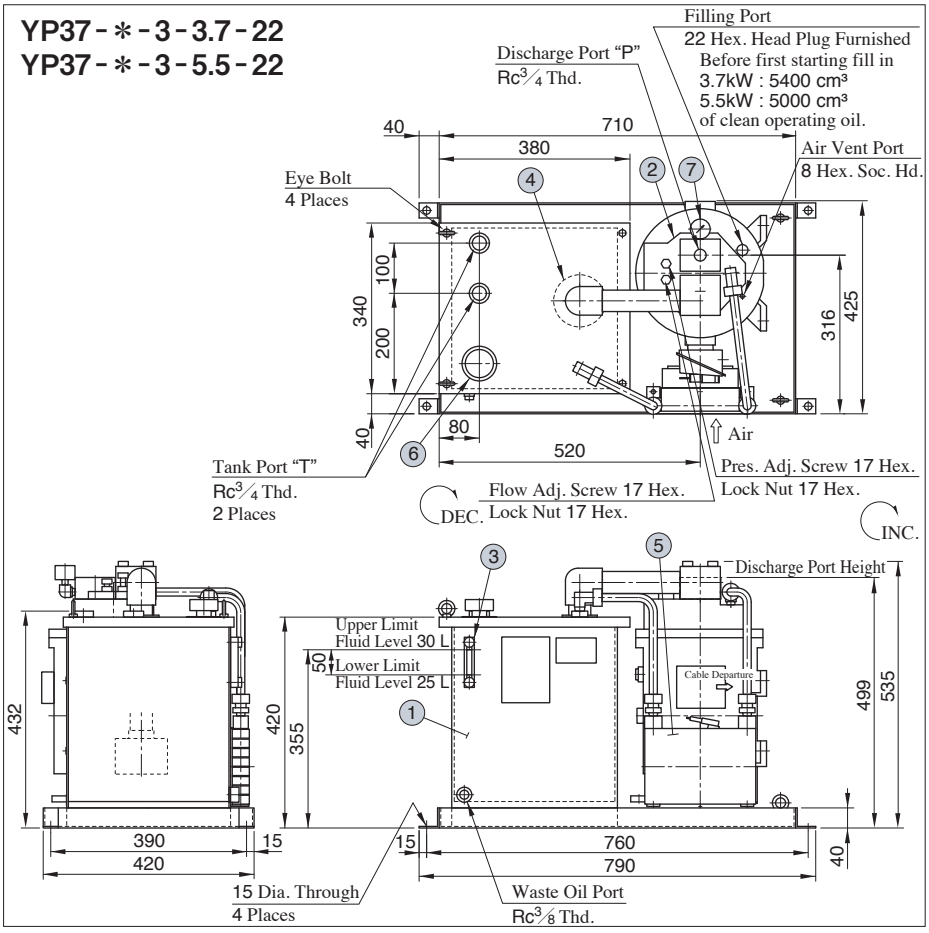
YP22-*-3-3.7-22



Hydraulic Circuit



YP37-*-3-3.7-22
YP37-*-3-5.5-22

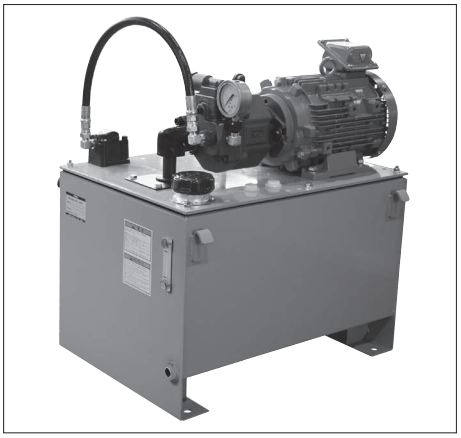


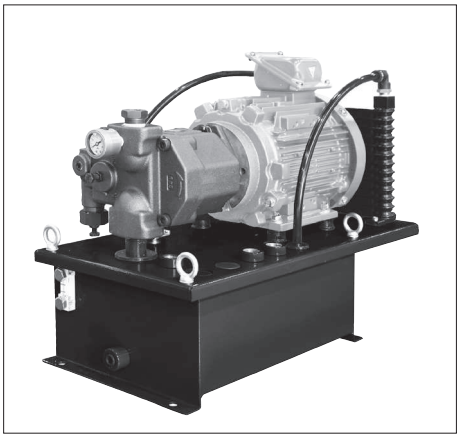
Item	Name
1	Hydraulic Reservoir
2	Pal Pump
3	Oil Level Gauge
4	Suction Strainer
5	Drain Cooler
6	Air Breather with Filling Port
7	Pressure Gauge

Standard Hydraulic Power Unit YA Pack

Yuken standard hydraulic power unit YA Pack is developed with meeting the demand of times like saving resources, saving energy and low noise, etc.

It is achieved easy usability and wide assortment of models are available, so can select models with your requests.





Low Noise

These units equipped with low noise A or AR series variable displacement piston pumps, also concerned for many places like the tank structure or piping construction, therefore the units are achieved low noise level and good sound quality.

Energy-Saving & Low Heat Generation

These units equipped with high efficiency pressure compensation type of variable displacement piston pumps can save power consumption due to reducing power loss.

Wide assortment of models

- A total of 35 models are available according to the combination of the built-in pump, the reservoir capacity, and the motor output, so that the most suitable model can be selected.
- 20 different options (incorporating a base plate, etc.) are available.

All Models Furnished with Output Flow Adj. Screw

All models are furnished with output flow adjustment screw.

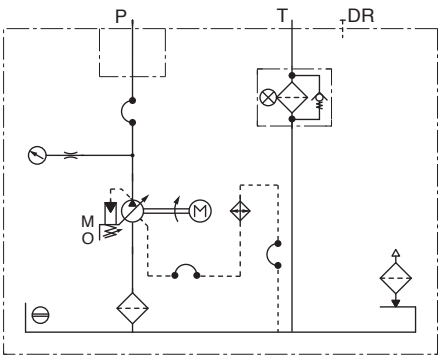
Short Delivery Time

The standardization of hydraulic units make those delivery time short.

Facilitating the configuration of the control circuit

With options that embedded modular valves, a wide variety of control circuits can be easily configured.

Hydraulic Circuit



K

YA Pack

Specifications

Model Numbers	Geometric Displacement of Pump cm^3/rev	Max. Operating Pres.(Note 1) MPa	Pres. Adj. Range MPa	Reservoir Capacity L	Electric Motor 50 Hz：200 V AC 60 Hz：200/220/230 V AC	Approx. Mass (Excluding Hydraulic oil) kg
YA10-B-2-0.75-52	10.0	7	1.2 - 7	20	0.75 kW×4P	48
YA10-B-3-0.75-52				30	0.75 kW×4P	53
YA10-B-3-1.5-52				30	1.5 kW×4P	56
YA10-B-4-0.75-52				40	0.75 kW×4P	58
YA10-B-4-1.5-52				40	1.5 kW×4P	63
YA10-B-6-1.5-51				60	1.5 kW×4P	73
YA10-B-6-2.2-51				60	2.2 kW×4P	81
YA10-C-6-2.2-51		16	2.0 - 16	60	2.2 kW×4P	82
YA10-C-6-3.7-51				60	3.7 kW×4P	94
YA10-C-10-2.2-51				100	2.2 kW×4P	107
YA10-C-10-3.7-51				100	3.7 kW×4P	116
YA16-B-1-0.75-52	15.8	7	1.2 - 7	10	0.75 kW×4P	42
YA16-B-1-1.5-50					1.5 kW×4P	46
YA16-B-1-2.2-50					2.2 kW×4P	53
YA16-B-2-0.75-52		7	1.2 - 7	18	0.75 kW×4P	44
YA16-B-2-1.5-50					1.5 kW×4P	48
YA16-B-2-2.2-50					2.2 kW×4P	55
YA16-B-4-1.5-52		7	1.2 - 7	40	1.5 kW×4P	64
YA16-B-6-1.5-50		7	1.2 - 7	60	1.5 kW×4P	74
YA16-B-6-2.2-50					2.2 kW×4P	82
YA16-B-6-3.7-50					3.7 kW×4P	94
YA16-C-6-3.7-50		16	2.0 - 16	60	3.7 kW×4P	99
YA16-B-10-2.2-50		7	1.2 - 7	100	2.2 kW×4P	107
YA16-C-10-3.7-50		16	2.0 - 16	100	3.7 kW×4P	121
YA16-C-10-5.5-50					5.5 kW×4P	145
YA16-C-10-7.5-50					7.5 kW×4P	157
YA22-B-6-2.2-50	22.2	7	1.2 - 7	60	2.2 kW×4P	82
YA22-B-6-3.7-50					3.7 kW×4P	94
YA22-B-10-2.2-50		7	1.2 - 7	100	2.2 kW×4P	112
YA22-B-10-3.7-50					3.7 kW×4P	146
YA22-C-10-5.5-50		16	2.0 - 16	100	5.5 kW×4P	145
YA22-C-10-7.5-50					7.5 kW×4P	157
YA37-B-10-3.7-50	36.9	7	1.2 - 7	100	3.7 kW×4P	141
YA37-B-16-5.5-50				160	5.5 kW×4P	175
YA37-B-16-7.5-50					7.5 kW×4P	182

Note 1) Maximum operating pressure is the upper limit of the pressure adjustment range of the pump.
2) The thermal class of the electric motor is type F in all models.
3) YA37-B-16-5.5/7.5 with a pump of two-pressure two-flow control type (control: 05 or 06) is also available as a special option. For details, please contact us.

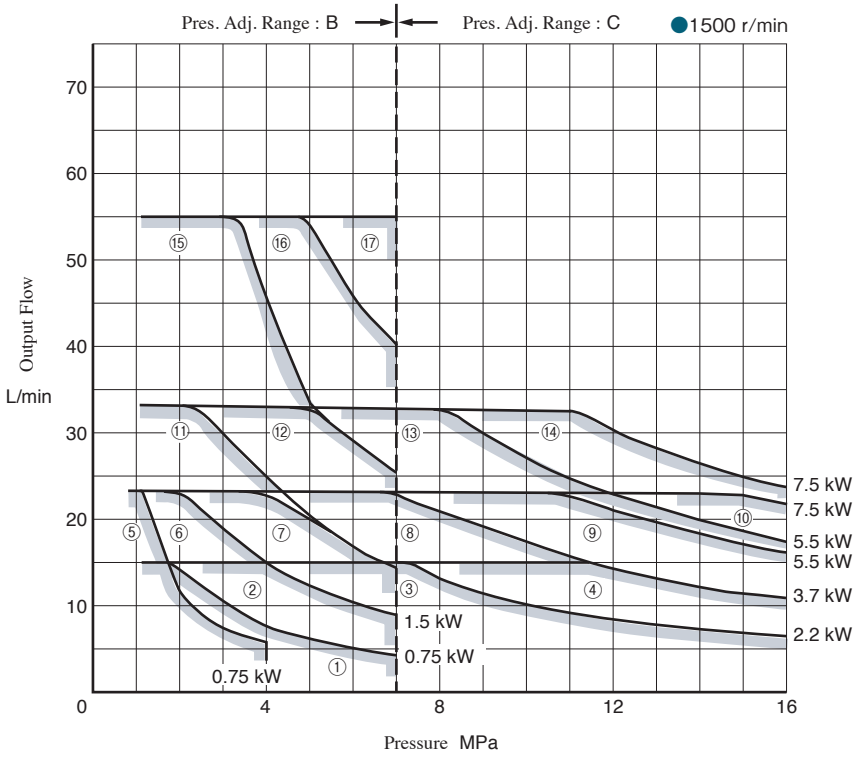
Model Number Designation

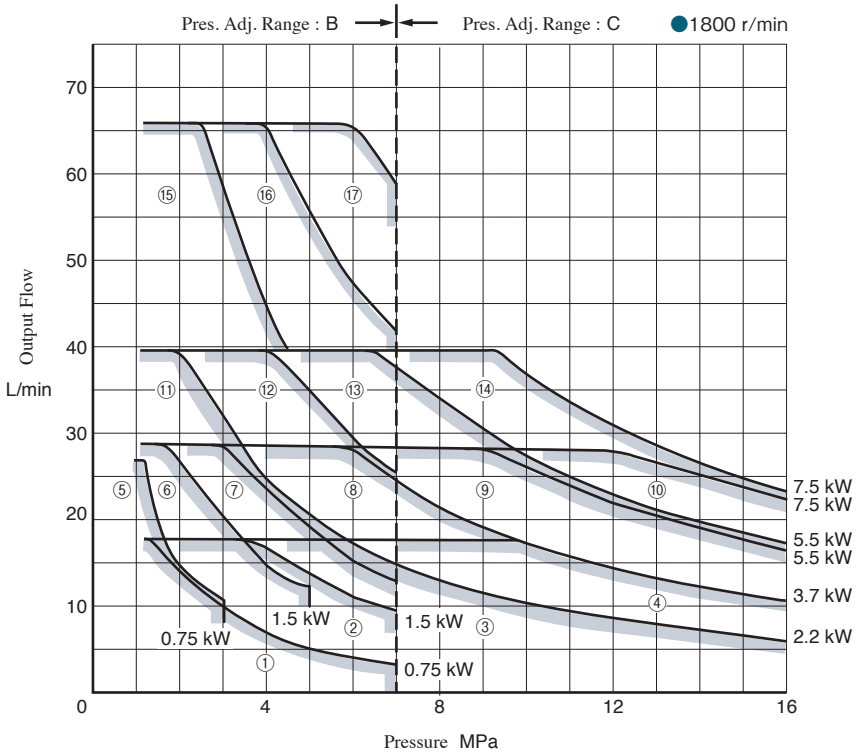
YA	16	−B	−6	−2.2	−50
Series Number	Built-in Pump	Pres. Adj. Range[Note] MPa	Reservoir Capacity L	Electric Motor	Design Number
YA：Low Noise Standard Hydraulic Power Unit YA Pack	10：A10 (10.0 cm³/rev)	B：1.2 - 7	2：20	0.75：0.75 kW×4P	52
			3：30	0.75：0.75 kW×4P	
				1.5：1.5 kW×4P	
			4：40	0.75：0.75 kW×4P	
				1.5：1.5 kW×4P	
		B：1.2 - 7	6：60	1.5：1.5 kW×4P	51
				2.2：2.2 kW×4P	
		C：2.0 - 16	6：60	2.2：2.2 kW×4P	
				3.7：3.7 kW×4P	
		C：2.0 - 16	10：100	2.2：2.2 kW×4P	
				3.7：3.7 kW×4P	
	16：AR16 (15.8 cm³/rev)	B：1.2 - 7	1：10	0.75：0.75 kW×4P	52
				1.5：1.5 kW×4P	50
				2.2：2.2 kW×4P	
		B：1.2 - 7	2：18	0.75：0.75 kW×4P	52
				1.5：1.5 kW×4P	50
				2.2：2.2 kW×4P	
		B：1.2 - 7	4：40	1.5：1.5 kW×4P	52
		B：1.2 - 7	6：60	1.5：1.5 kW×4P	50
				2.2：2.2 kW×4P	
				3.7：3.7 kW×4P	
		C：2.0 - 16	6：60	3.7：3.7 kW×4P	
		B：1.2 - 7	10：100	2.2：2.2 kW×4P	
		C：2.0 - 16	10：100	3.7：3.7 kW×4P	
				5.5：5.5 kW×4P	
				7.5：7.5 kW×4P	
	22：AR22 (22.2 cm³/rev)	B：1.2 - 7	6：60	2.2：2.2 kW×4P	
				3.7：3.7 kW×4P	
		B：1.2 - 7	10：100	2.2：2.2 kW×4P	
				3.7：3.7 kW×4P	
		C：2.0 - 16	10：100	5.5：5.5 kW×4P	
				7.5：7.5 kW×4P	
	37：A37 (36.9 cm³/rev)	B：1.2 - 7	10：100	3.7：3.7 kW×4P	
			16：160	5.5：5.5 kW×4P	
				7.5：7.5 kW×4P	

Note) Pressure adjustment range values shown are those of the pump.

Selection Graph

Below portion of the graph is the allowable operating range with regards to rated output of electric motor.



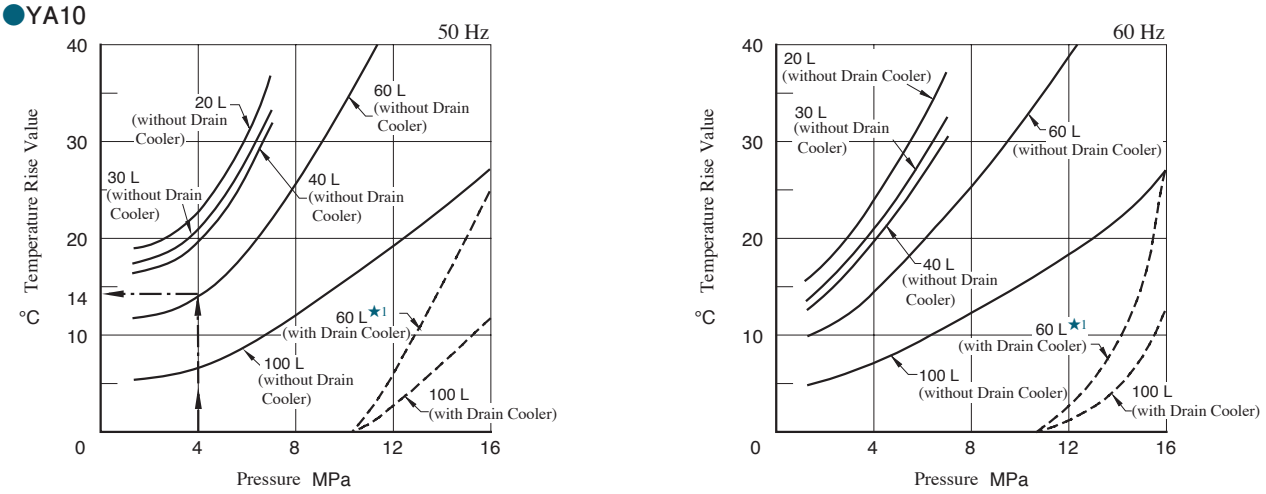


No.	Model Numbers
①	YA10-B-2-0.75 YA10-B-3-0.75 YA10-B-4-0.75
②	YA10-B-3-1.5 YA10-B-4-1.5 YA10-B-6-1.5
③	YA10-B-6-2.2 YA10-C-6-2.2 YA10-C-10-2.2
④	YA10-C-6-3.7 YA10-C-10-3.7
⑤	YA16-B-1-0.75 YA16-B-2-0.75
⑥	YA16-B-1-1.5 YA16-B-2-1.5 YA16-B-4-1.5 YA16-B-6-1.5
⑦	YA16-B-1-2.2 YA16-B-2-2.2 YA16-B-6-2.2 YA16-B-10-2.2
⑧	YA16-B-6-3.7 YA16-C-6-3.7 YA16-C-10-3.7
⑨	YA16-C-10-5.5
⑩	YA16-C-10-7.5
⑪	YA22-B-6-2.2 YA22-B-10-2.2
⑫	YA22-B-6-3.7 YA22-B-10-3.7
⑬	YA22-C-10-5.5
⑭	YA22-C-10-7.5
⑮	YA37-B-10-3.7
⑯	YA37-B-16-5.5
⑰	YA37-B-16-7.5

Oil Temperature in Reservoir

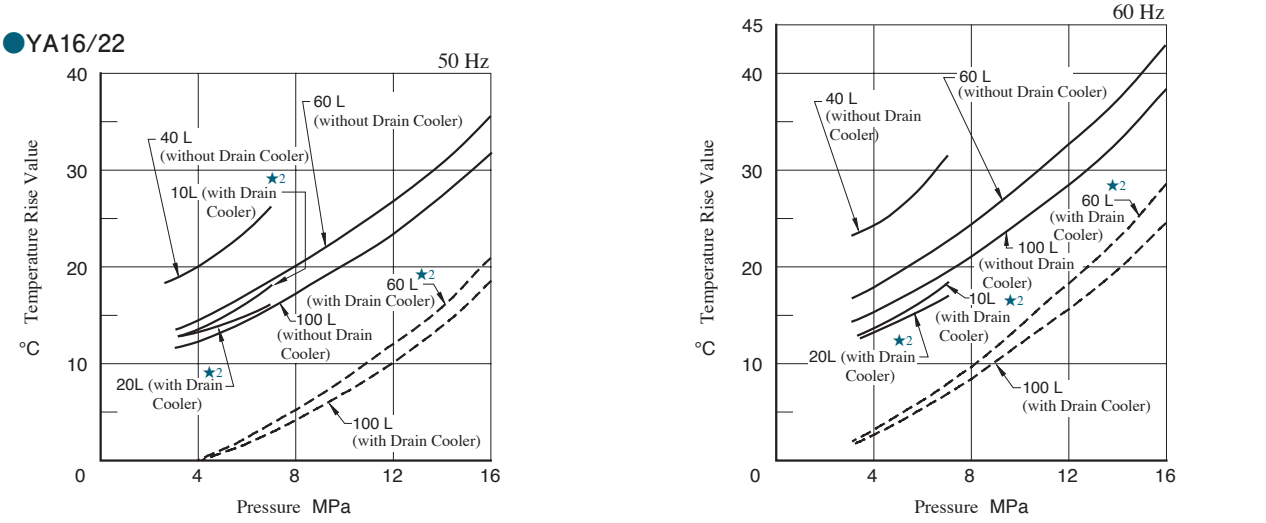
Oil temperature is expressed as (room temperature + temperature rise value).
Temperature rise values (full cut-off continuous operation, windless conditions) for each model are shown below, please check that oil temperature is below 60°C.
Drain cooler is option except for some models.
(Ex.) When operating YA10-B-6-1.5 continuously (50Hz) at full cut-off pressure 4 MPa, temperature rise value is 14°C as shown by broken line in the graph.
Assuming that room temperature is 35°C then tank temperature will be 49°C.

●YA10



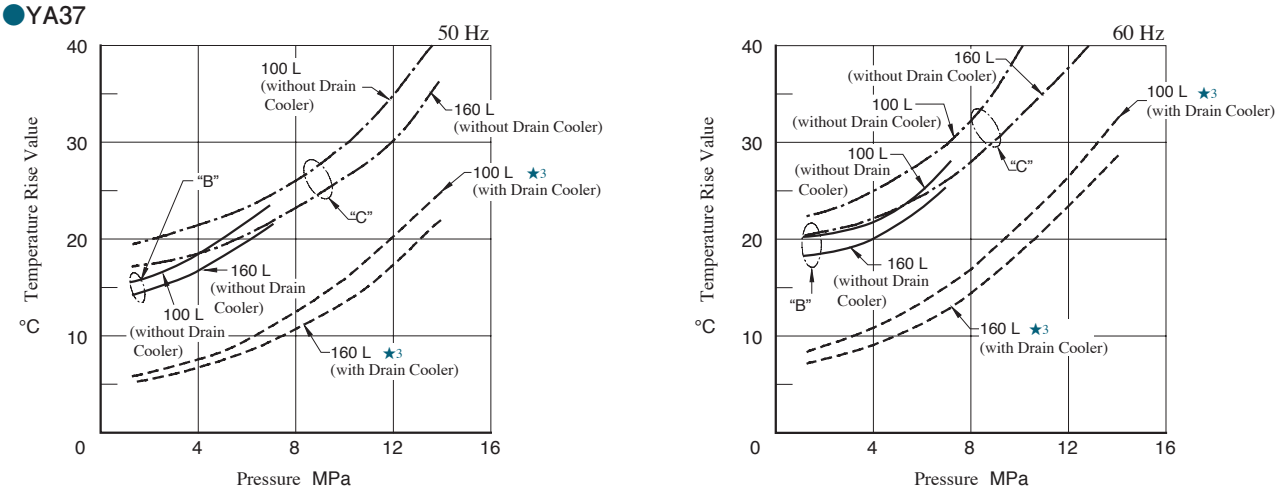
★ 1. Drain cooler is standard equipment only for YA10-C-6-2.2 and YA10-C-6-3.7.

●YA16/22



★ 2. Drain cooler is standard equipment only for YA16-B-1-＊, YA16-B-2-＊ and YA16-C-6-3.7.

●YA37

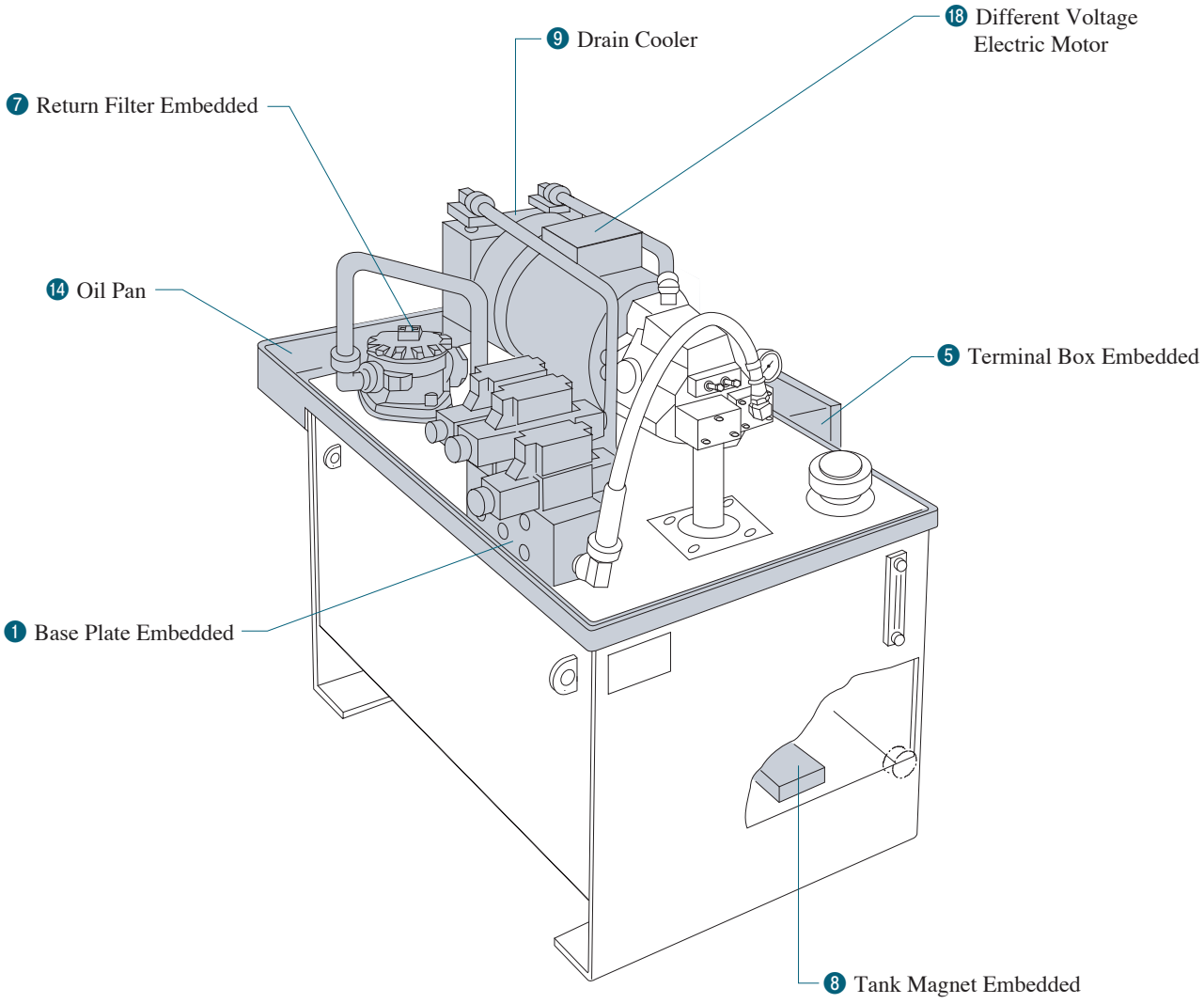


★ 3. Built-in drain cooler is option.

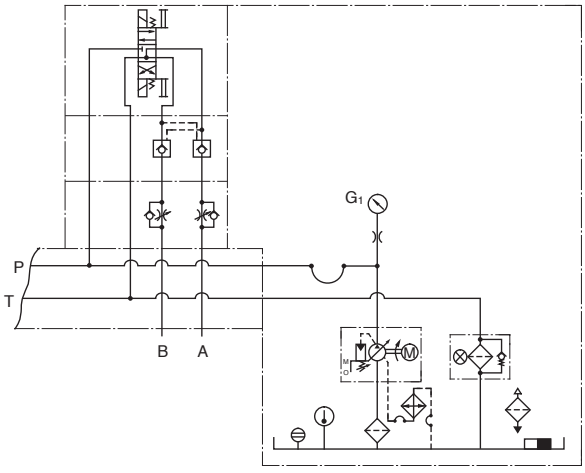
■ Options

● Example of Embedded Options

Various options are available except for standard models. Please select options with the applications. The drawing below is for an example. For details, please refer to the next page.



(Example of Hydraulic Circuit with Options Embedded)



Type and Summary of Options

❶ Base Plate Embedded：01M＊, 03M＊

Control circuit can be constructed by just stacking up modular valves/ solenoid valve atop the base plate. If need control circuit, please contact us. However, the circuit construction is limited to modular valves and standard solenoid directional control valves. In this case, please indicate power supply for operation.

❷ Without Control Circuit：B

This option is available for models with 01M* or 03M* valve. Embed base plate and make piping construction in front and rear of the base plate. Please prepare the components construct the control circuit separately.

❸ Without Port Block：E

Without port block and high pressure resin hose.

❹ Pressure Gauge and Mounting Block Embedded：G2, G3

Use in case that detect the pressure except pump discharge pressure by using reducing valve.
G2 is able to detect one more line pressure, G3 is able to detect two more lines except pump discharge pressure.

❺ Terminal Box Embedded：T1 - T3

The number of terminal is 10P for T1, 20P for T2, 34P for T3 3.7kW, 24P for T3 5.5kW, 20P for T3 7.5kW.

❻ Electric Wiring Unit：V, VT

The electric wiring between terminal box and motor / control valve use the vinyl cabtire cable as standard.
In case of special specifications (VT), please indicate separately.

❼ Return Filter Embedded：F

Return filter adopt the tank top type those surge pressure of tank line lower generate. The absolute filtration is 20 μm, equipped with visual indicator.

❽ Tank Magnet Embedded：Mg

Installed inside the tank. Attracts and collects fine iron powder. Decreases component wear.

❾ Drain Cooler Embedded：C (Radiator)
：Ca (Fan Cooler)

❿ Oil Level Gauge with Thermometer Embedded：Te

⓫ Water Cooler Embedded：Cw

⓬ Thermostat Embedded：TR

⓭ Liquid Level Switch Embedded：Le

⓮ Oil Pan Embedded：P

P：Standard Oil Pan

⓯ External Paint Color Changed：PT

In case if required special paint, please indicate separately by JPMA code or Munsell value.

⓰ Fire Service Act Applied：R

⓱ Water Leak Inspection：Rk

⓲ Different Voltage Electric Motor：(＊V×＊Hz)

200 V AC (50Hz) and 200/220/230 V AC (60Hz) are standard. In case if required other voltage, please indicate voltage and frequency.

⓳ Pressure Range Changed：(B→C)

Pressure Adjustment Range is available to change B to C. However, in case of YA37, maximum operating pressure is limited by 14 MPa.

⓴ P Port Check valve Embedded：D

Install angle type check valve for prevent reverse flow on the port block or base plate.

Attention

For the delivery time of options, please confirm us before ordering.

Options

Available options are indicated with ○ mark.

Option Code / Option Item / Model	01M＊	03M＊	B	E	G＊	T＊	V VT	F	Mg	C	Ca	Te	Cw	TR	Le	P	PT	R	Rk	＊V × ＊H	B ↓ C	D
	① Base Plate Embedded Size/Number of Plates		② Without Control Circuit	③ Without Port Block	④ Pressure Gauge for Control Circuit Embedded	⑤ Terminal Box Embedded	⑥ Electric Wiring Unit	⑦ Return Filter Embedded	⑧ Tank Magnet Embedded	⑨ Drain Cooler Embedded: Radiator	⑨ Drain Cooler Embedded: Fan Cooler Note 2	⑩ Oil Level Gauge with Thermometer Embedded	⑪ Water Cooler Embedded	⑫ Thermostat Embedded	⑬ Liquid Level Switch Embedded Note 4	⑭ Oil Pan Embedded	⑮ External Paint Color Changed	⑯ Fire Service Act Applied	⑰ Water Leak Inspection	⑱ Different Voltage Electric Motor	⑲ Pressure Range Changed	⑳ P Port Check valve Embedded
YA16-B-1-＊	○ 1 - 2	×	○	—	○	○ T1	○	×	○	Built-in	×	○	×	○	○	×	○	×	○	○	×	×
YA10-B-2-0.75	×	×	—	—	—	○ T1	○	×	○	○	×	○	×	○	○	○	○	×	○	○	×	×
YA16-B-2-＊	○ 1 - 2	×	○	—	○	○ T1,T2	○	Note 5 ○	○	Built-in	×	○	×	○	○	×	○	×	○	○	×	×
YA10-B-3-＊	×	×	—	—	—	○ T1	○	Note 5 ○	○	○	×	○	×	○	○	○	○	×	○	○	×	×
YA10-B-4-＊	○ 1 - 3	×	○	○	○	○ T1,T2	○	○	○	○	×	○	×	○	○	○	○	○	○	○	×	○
YA16-B-4-1.5	○ 1 - 3	×	○	○	○	○ T1,T2	○	○	○	○	×	○	×	○	○	○	○	○	○	○	×	○
YA10-B-6-＊	○ 1 - 5	×	○	○	○	○ T1,T2,T3	○	○	○	Note 1 ○		○	Note 3 ○	○	○	○	○	○	○	○	○	○
YA10-C-6-＊	○ 1 - 5	×	○	○	○	○ T1,T2,T3	○	Built-in	○	Built-in	×	○	Note 3 ○	○	○	○	○	○	○	○	—	○
YA16-B-6-＊	○ 1 - 5	×	○	○	○	○ T1,T2,T3	○	○	○	Note 1 ○		○	Note 3 ○	○	○	○	○	○	○	○	○	○
YA16-C-6-＊	○ 1 - 5	×	○	○	○	○ T1,T2,T3	○	Built-in	○	Built-in	×	○	Note 3 ○	○	○	○	○	○	○	○	—	○
YA22-B-6-＊	○ 1 - 5	×	○	○	○	○ T1,T2,T3	○	○	○	Note 1 ○		○	Note 3 ○	○	○	○	○	○	○	○	○	○
YA10-C-10-＊	○ 1 - 5	○ 1 - 4	○	○	○	○ T1,T2,T3	○	Built-in	○	Note 1 ○		○	○	○	○	○	○	○	○	○	—	○
YA16-B-10-2.2	○ 1 - 5	○ 1 - 4	○	○	○	○ T1,T2,T3	○		○	Note 1 ○		○	○	○	○	○	○	○	○	○	○	○
YA16-C-10-＊	○ 1 - 5	○ 1 - 4	○	○	○	○ T1,T2,T3	○		○	Note 1 ○		○	○	○	○	○	○	○	○	○	—	○
YA22-B-10-＊	○ 1 - 5	○ 1 - 4	○	○	○	○ T1,T2,T3	○		○	Note 1 ○		○	○	○	○	○	○	○	○	○	○	○
YA22-C-10-＊	○ 1 - 5	○ 1 - 4	○	○	○	○ T1,T2,T3	○		○	Note 1 ○		○	○	○	○	○	○	○	○	○	—	○
YA37-B-10-3.7	×	○ 1 - 4	○	○	○	○ T1,T2,T3	○		○	Note 1 ○		○	○	○	○	○	○	○	○	○	○	○
YA37-B-16-＊	×	○ 1 - 4	○	○	○	○ T1,T2,T3	○		○	Note 1 ○		○	○	○	○	○	○	○	○	○	○	○

Note 1) Choose either Radiator (C) or Fan Cooler (Ca) in ⑨ Drain Cooler embedded.

2) When Fan Cooler (Ca) in ⑨ Drain Cooler embedded or ⑪ Water Cooler embedded is chosen, ① The Number of Base Plates is limited.

Model	Selected Option	Number of Selectable Base Plates	
YA10/16/22-＊-6	Fan Cooler (Ca) embedded.	Up to 2 (Size: 01)	
	Water Cooler (Cw) embedded.	Up to 4 (Size: 01)	
YA10/16/22/37-＊-10	Fan Cooler (Ca) embedded.	Size: 01	Up to 3
		Size: 03	Up to 2
YA37-B-16		Up to 2 (Size: 03)	

When ⑯ Fire Service Act Applied (R) is chosen, a Fan Cooler (Ca) cannot be embedded.

3) Up to 4 base plates can be embedded in ①.

4) Only low limit level can be detected.

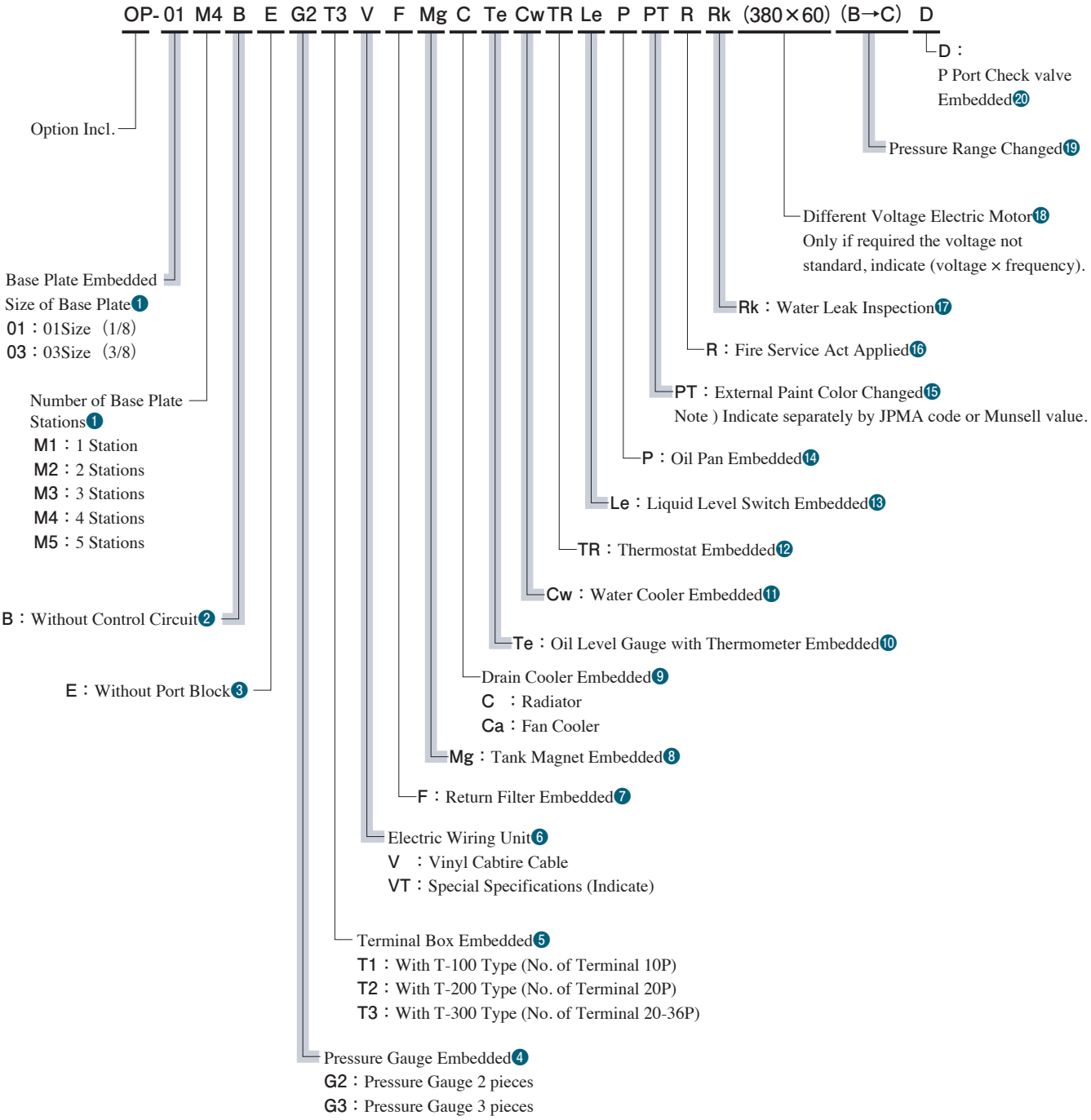
5) Oil-immersed type is available.

Option Indication Method

When ordering YA Pack with options, please add「OP」at the end of standard YA Pack model number, use the example below for reference and indicate options. For summary of options, please refer to page K-19.
About the control circuit constructed by modular valves etc., please contact us separately. For the adaptation between models and options, please refer to the table on page K-20.

【Example of Option Indication】

YA16-B-6-3.7-50-OP



Instructions

Suction/Return Air

Please install unit at the floor with good air flow to avoid heat stuff. Don't put any obstructions at air vent surface of the drain cooler.

Transportation

Use hanging hooks on the oil tank at the time of transportation.

Installation

This unit is stationary type, so please fix it using bolts on the level space with no vibration.

Electrical Wiring

To protect electrical circuit from over current like short and protect motor from overload, we recommend to install no-fuse breaker with earth leakage breaker on the primary power supply.
For electrical wiring, please use crimp terminals of suitable size, and connect certainly to avoid electric leakage for main body and interphase electrical short. Please be sure to ground the earth terminal.

Motor Side [U — R / V — S / W — T] Power Supply Side

Note for Starting Operation

Before initial operation, please supply ruled mass of hydraulic fluid required from oil tank port, and fill clean hydraulic fluid from filling port of pump till the oil full filled in pump housing. To avoid air-bound at starting operation, please adjust hydraulic circuit as that pump drain fluid return directly to oil tank, or operate directional valves for actuators no-load moving. Then start inching operation to confirm no particular, please do running operation.

Air Vent

Because air entrainment in pump or pipe may cause to occur vibration, please make air vent completely.

Setting of Pressure

〔Pressure Adjustment〕

At the time of shipping, the pressure set at minimum level, so please adjust the pressure under using conditions. Turn the pressure adjustment screw clockwise, the pressure increase. For adjustment volumes at one rotation of adjustment screw, please refer to the table below. After adjustments, do not forget to tighten the lock nut.

【Adjustment Volumes at One Rotation of Pres. Adj. Screw】

Model Numbers	Adjustment Volumes MPa
YA10/YA16/YA22-B	2.9
YA37-B	3.5
YA10/YA16/YA22-C	5.4
YA37-C	6.5

Setting of Output Flow

〔Output Flow Adjustment〕

Turn the flow adjustment screw clockwise, the output flow decrease. For adjustment volumes at one rotation of adjustment screw, please refer to the table below. After adjustments, do not forget to tighten the lock nut.

【Adjustment Volumes at One Rotation of Discharge Volume Adj. Screw】

Model Numbers	Adjustment Volumes at One Rotation cm^3/rev	Min. Adj. Flow cm^3/rev
YA10-*	1.1	2
YA16-*	1.5	6
YA22-*	2.1	8.5
YA37-B	2.9	10

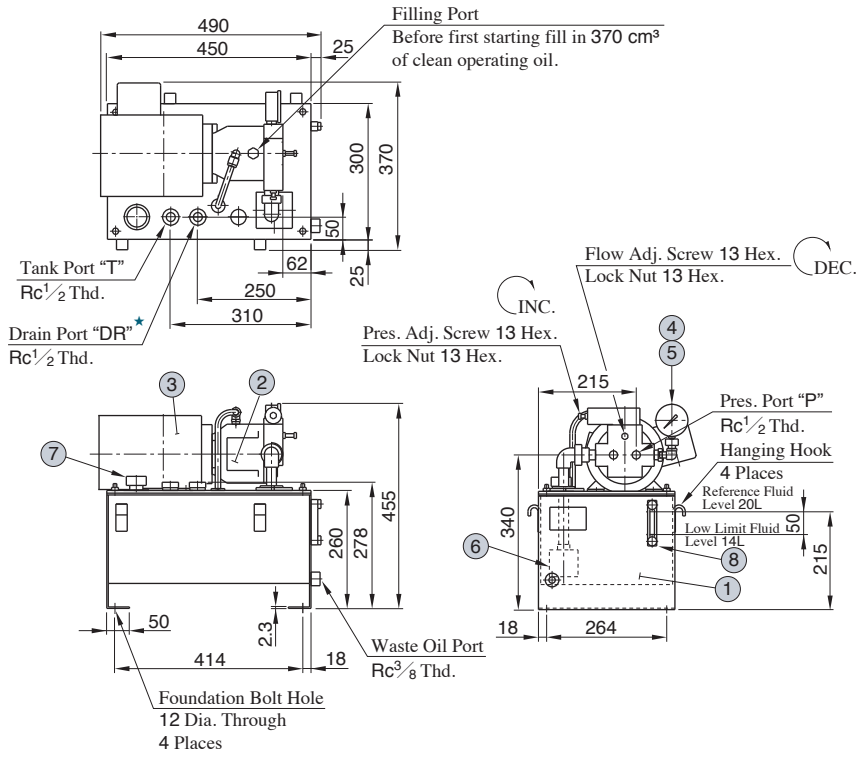
Return Filter

For return filter installation, please refer to the table below. In case if the return filter not built-in, please install the return filter as much as possible due to keep the machine life longer and show good performance for long time.

【Return Filter Installation】

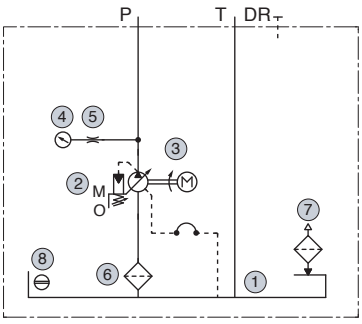
Model Numbers	Return Filter Installation
YA10-B-2 YA16-B-1	Not installed in the unit (Install separately)
YA10-B-3 YA10-B-4 YA10-B-6 YA16-B-2 YA16-B-4 YA16-B-6 YA22-B-6	Not installed in standard models (Can install as option)
Except for above	Built-in

YA10-B-2-0.75-52

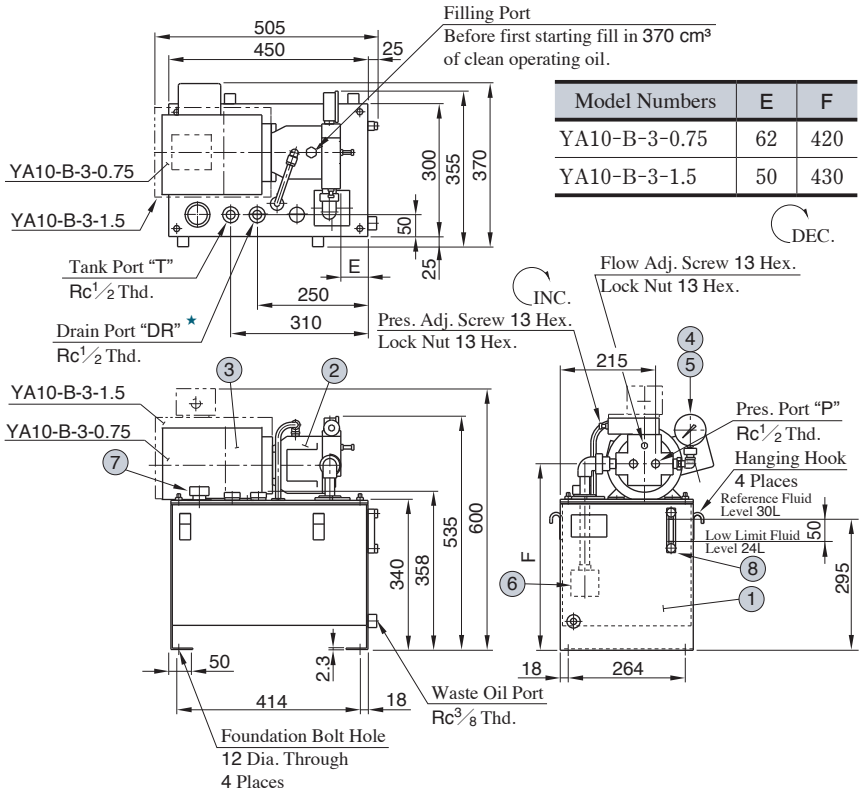


★If Liquid Level Switch Embedded (Le) is chosen as option, it is unable to use this port.

● Hydraulic Circuit



YA10-B-3-0.75-52・YA10-B-3-1.5-52

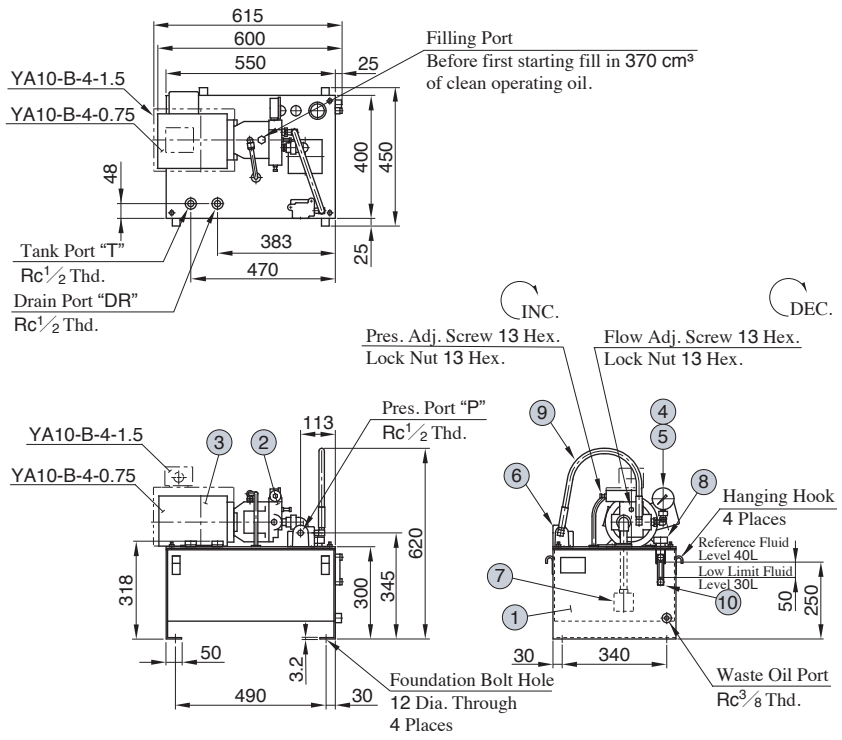


Model Numbers	E	F
YA10-B-3-0.75	62	420
YA10-B-3-1.5	50	430

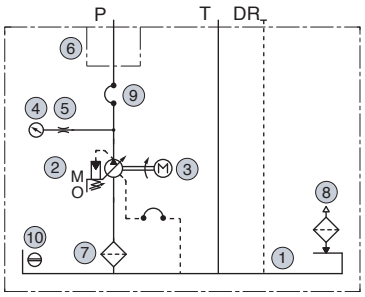
★If Liquid Level Switch Embedded (Le) is chosen as option, it is unable to use this port.

Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Adapter
6	Suction Strainer
7	Air Breather with Filling Port
8	Oil Level Gauge

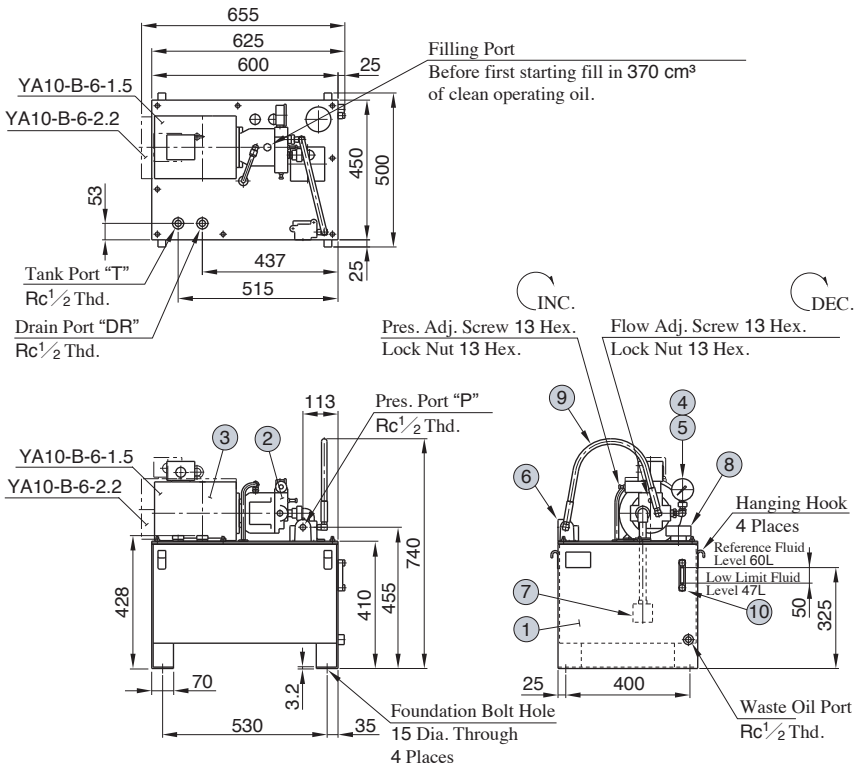
YA10-B-4-0.75-52・YA10-B-4-1.5-52



● Hydraulic Circuit

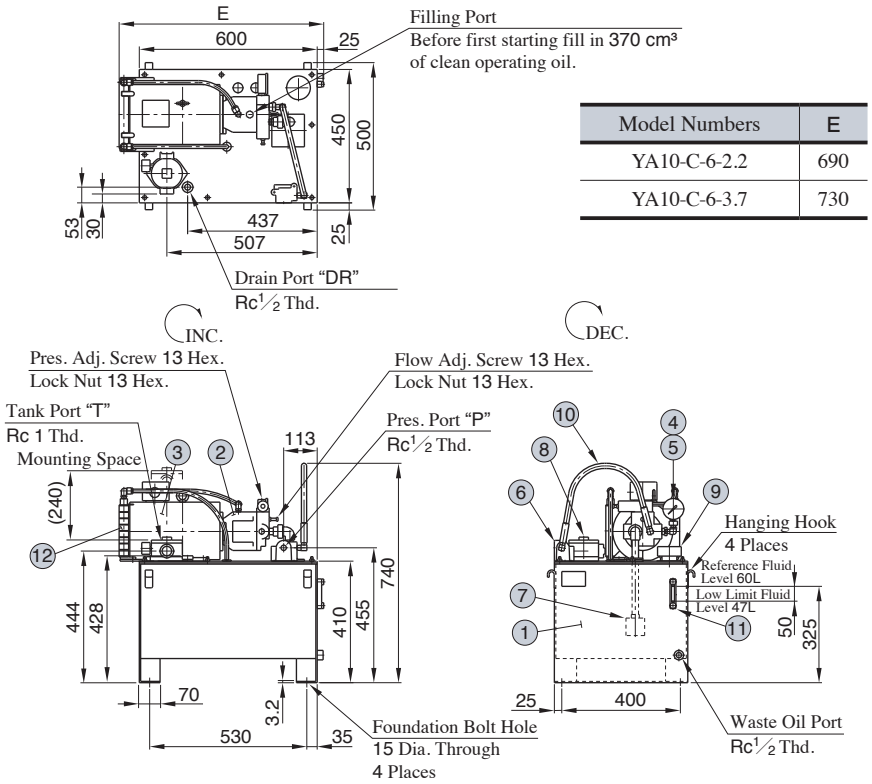


YA10-B-6-1.5-51・YA10-B-6-2.2-51



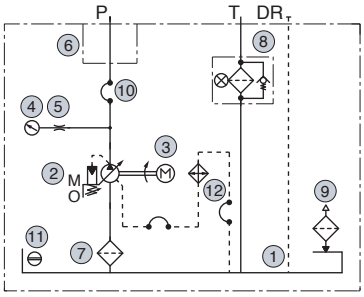
Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Adapter
6	Port Block
7	Suction Strainer
8	Air Breather with Filling Port
9	High Pressure Resin Hose
10	Oil Level Gauge

YA10-C-6-2.2-51・YA10-C-6-3.7-51



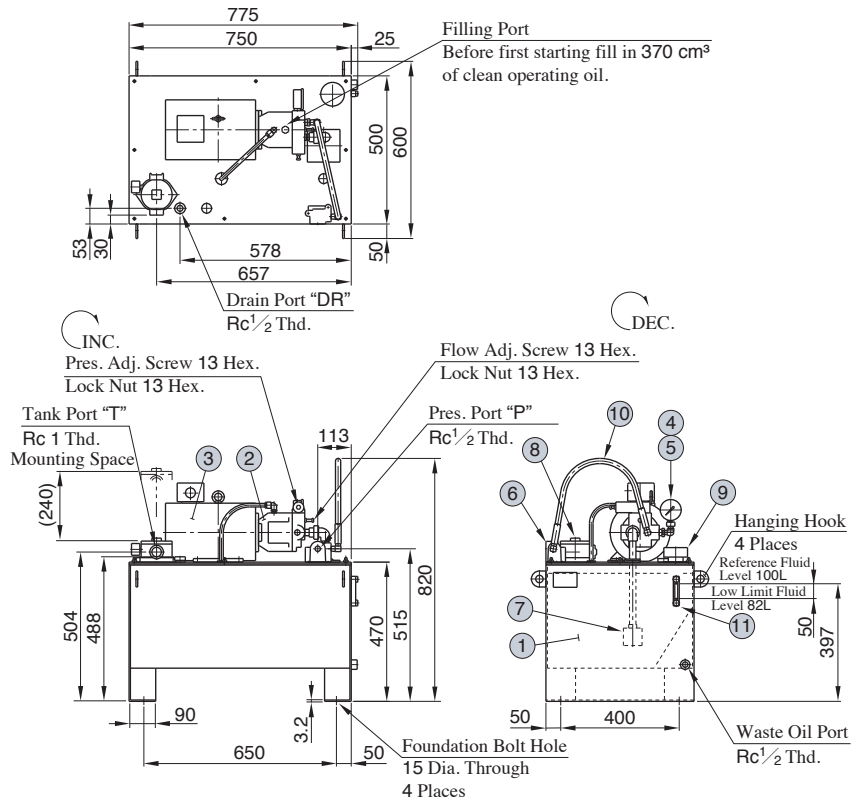
Model Numbers	E
YA10-C-6-2.2	690
YA10-C-6-3.7	730

● Hydraulic Circuit

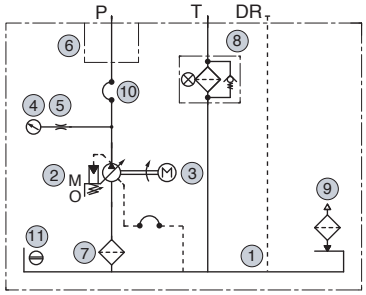


Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Adapter
6	Port Block
7	Suction Strainer
8	Return Filter
9	Air Breather with Filling Port
10	High Pressure Resin Hose
11	Oil Level Gauge
12	Drain Cooler

YA10-C-10-2.2-51・YA10-C-10-3.7-51



● Hydraulic Circuit

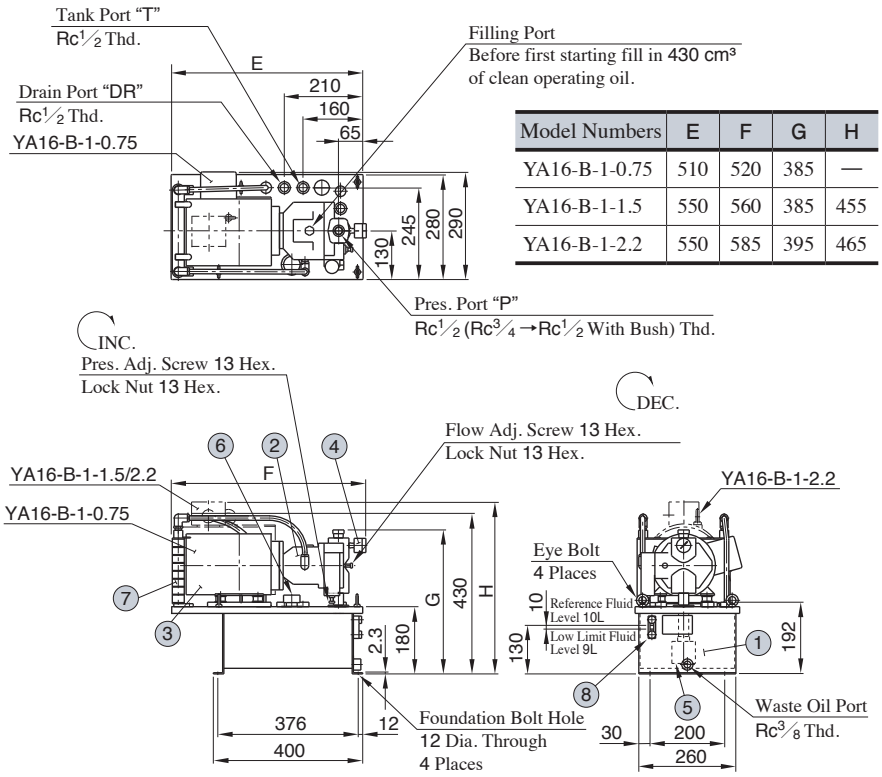


Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Adapter
6	Port Block
7	Suction Strainer
8	Return Filter
9	Air Breather with Filling Port
10	High Pressure Resin Hose
11	Oil Level Gauge

K

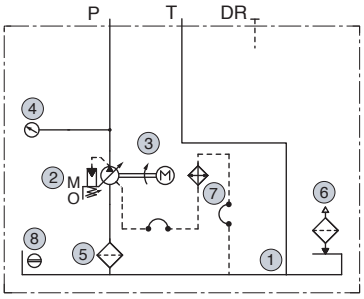
YA Pack

YA16-B-1-0.75-52•YA16-B-1-1.5-50•YA16-B-1-2.2-50

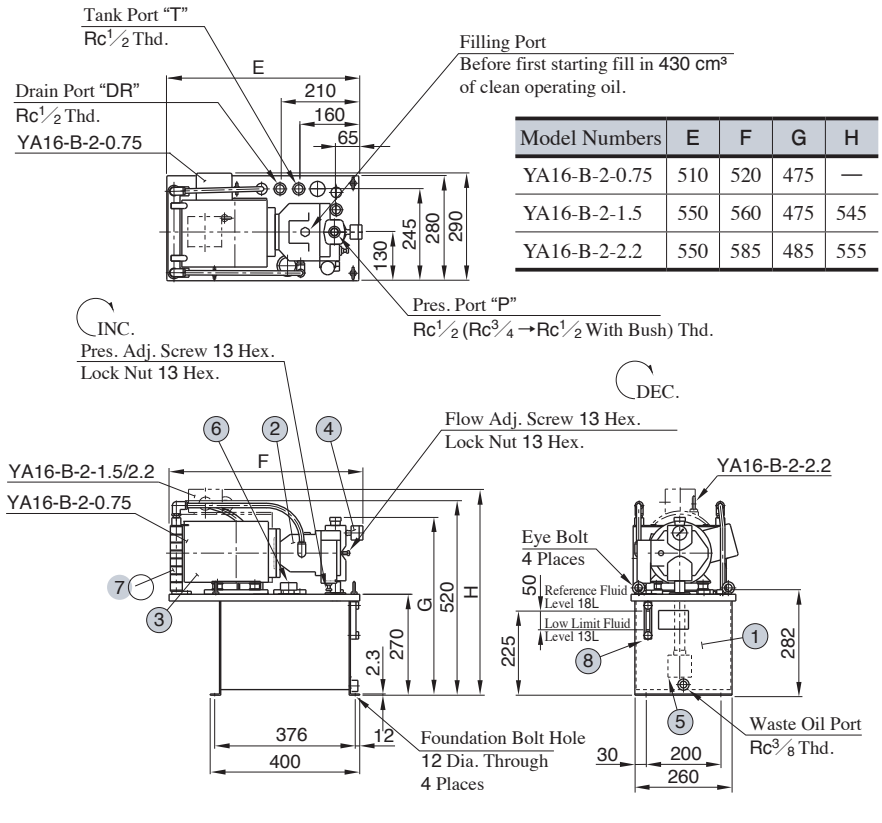


Model Numbers	E	F	G	H
YA16-B-1-0.75	510	520	385	—
YA16-B-1-1.5	550	560	385	455
YA16-B-1-2.2	550	585	395	465

Hydraulic Circuit



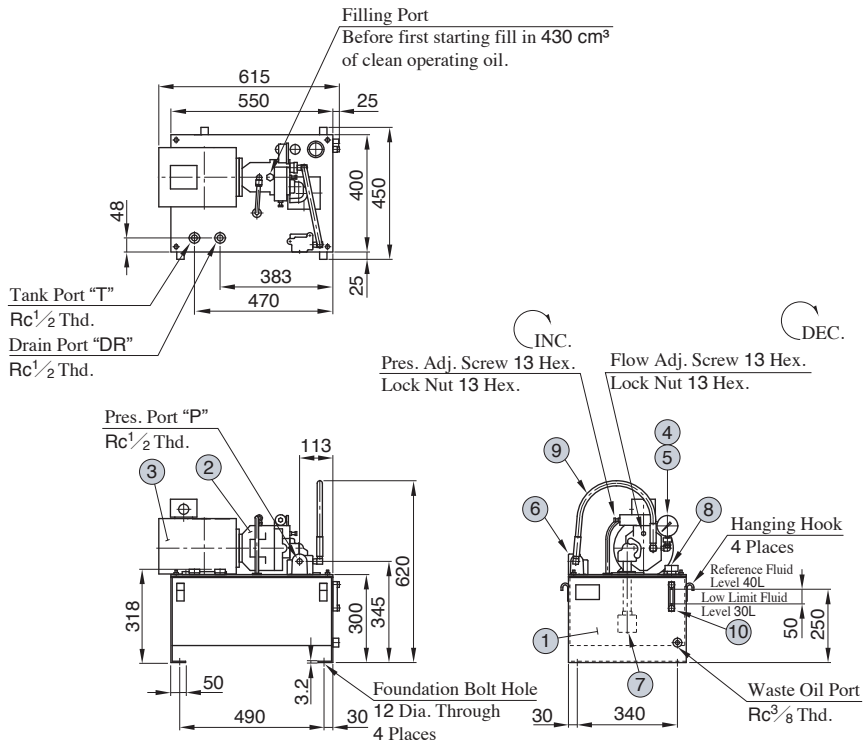
YA16-B-2-0.75-52•YA16-B-2-1.5-50•YA16-B-2-2.2-50



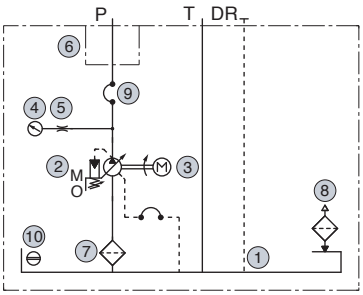
Model Numbers	E	F	G	H
YA16-B-2-0.75	510	520	475	—
YA16-B-2-1.5	550	560	475	545
YA16-B-2-2.2	550	585	485	555

Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Suction Strainer
6	Air Breather with Filling Port
7	Drain Cooler
8	Oil Level Gauge

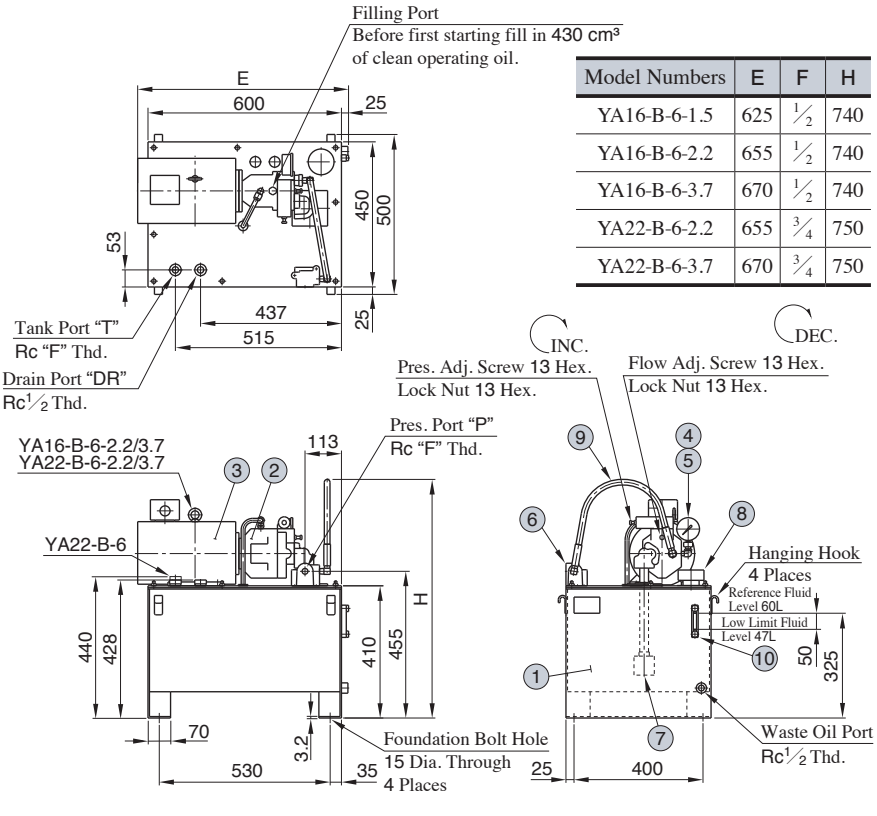
YA16-B-4-1.5-52



Hydraulic Circuit



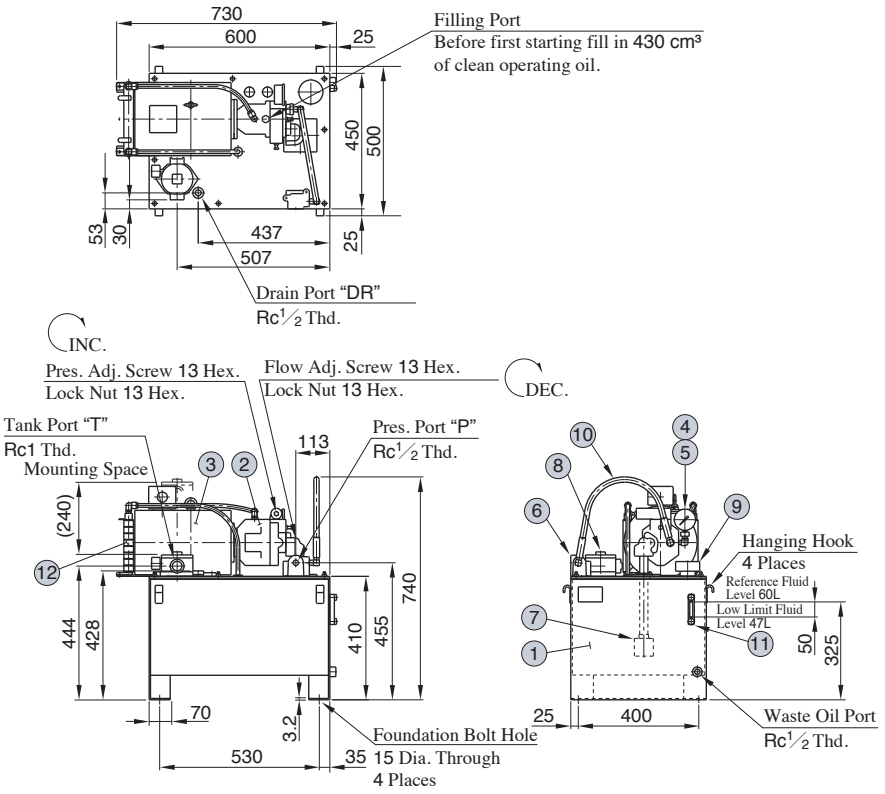
YA16-B-6-1.5-50·YA16-B-6-2.2-50·YA16-B-6-3.7-50
YA22-B-6-2.2-50·YA22-B-6-3.7-50



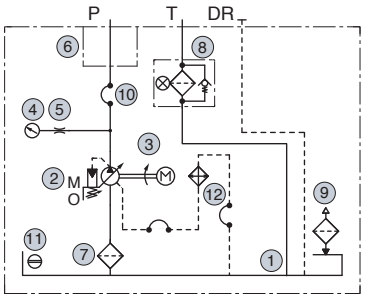
Model Numbers	E	F	H
YA16-B-6-1.5	625	1/2	740
YA16-B-6-2.2	655	1/2	740
YA16-B-6-3.7	670	1/2	740
YA22-B-6-2.2	655	3/4	750
YA22-B-6-3.7	670	3/4	750

Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Adapter
6	Port Block
7	Suction Strainer
8	Air Breather with Filling Port
9	High Pressure Resin Hose
10	Oil Level Gauge

YA16-C-6-3.7-50

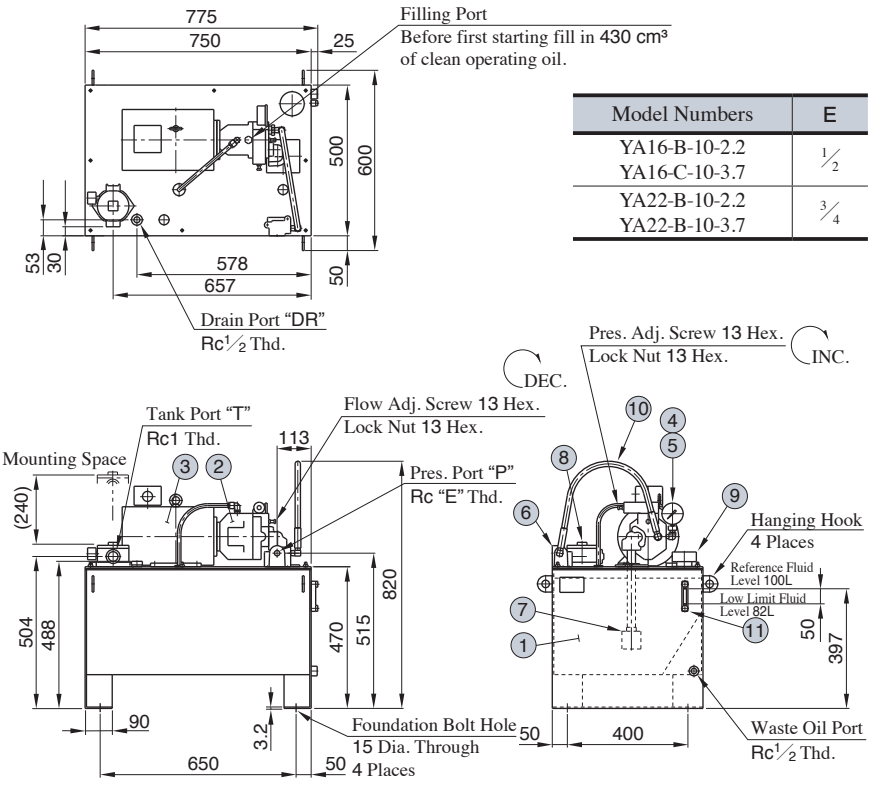


Hydraulic Circuit



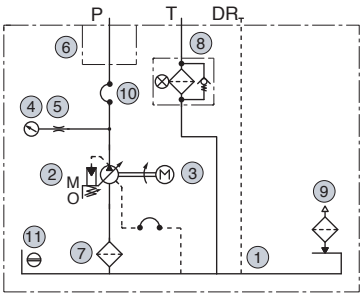
Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Adapter
6	Port Block
7	Suction Strainer
8	Return Filter
9	Air Breather with Filling Port
10	High Pressure Resin Hose
11	Oil Level Gauge
12	Drain Cooler

YA16-B-10-2.2-50·YA16-C-10-3.7-50
YA22-B-10-2.2-50·YA22-B-10-3.7-50



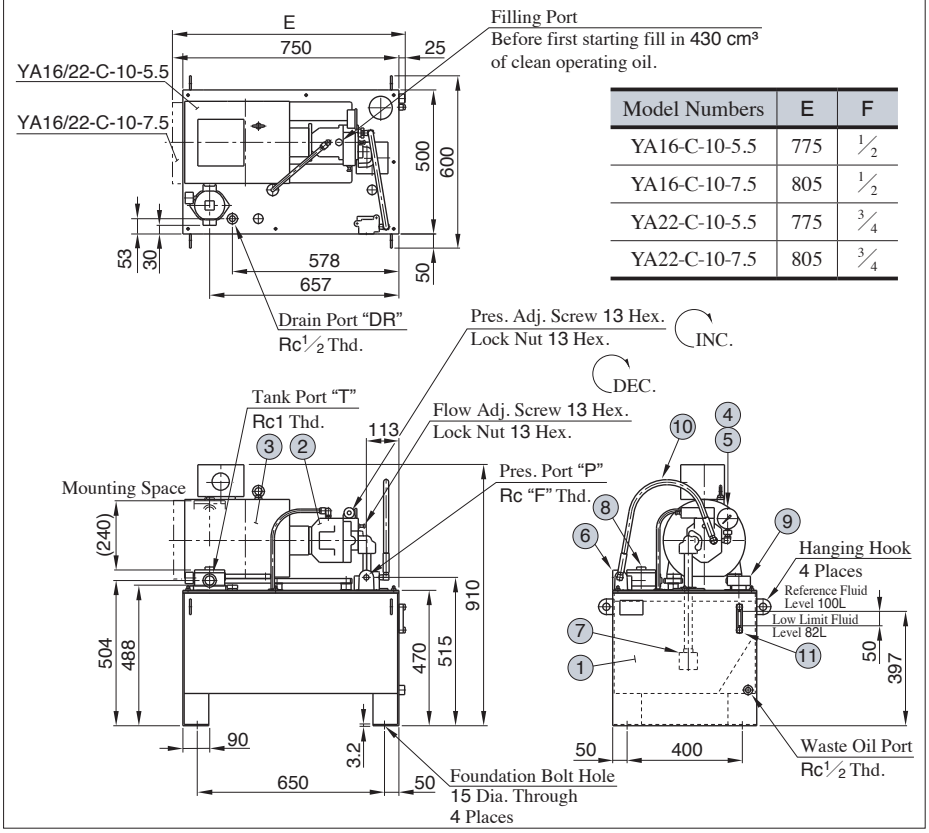
Model Numbers	E
YA16-B-10-2.2 YA16-C-10-3.7	1/2
YA22-B-10-2.2 YA22-B-10-3.7	3/4

Hydraulic Circuit



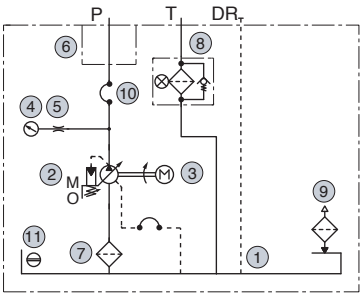
Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Adapter
6	Port Block
7	Suction Strainer
8	Return Filter
9	Air Breather with Filling Port
10	High Pressure Resin Hose
11	Oil Level Gauge

YA16-C-10-5.5-50·YA16-C-10-7.5-50
YA22-C-10-5.5-50·YA22-C-10-7.5-50

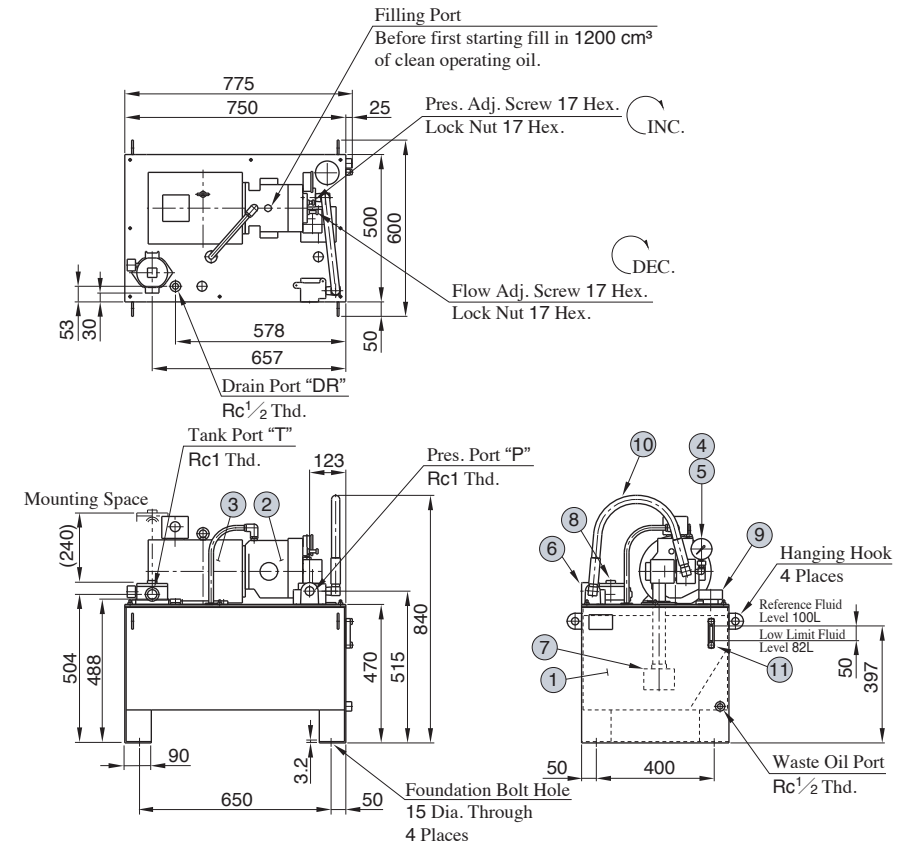


Model Numbers	E	F
YA16-C-10-5.5	775	1/2
YA16-C-10-7.5	805	1/2
YA22-C-10-5.5	775	3/4
YA22-C-10-7.5	805	3/4

● Hydraulic Circuit

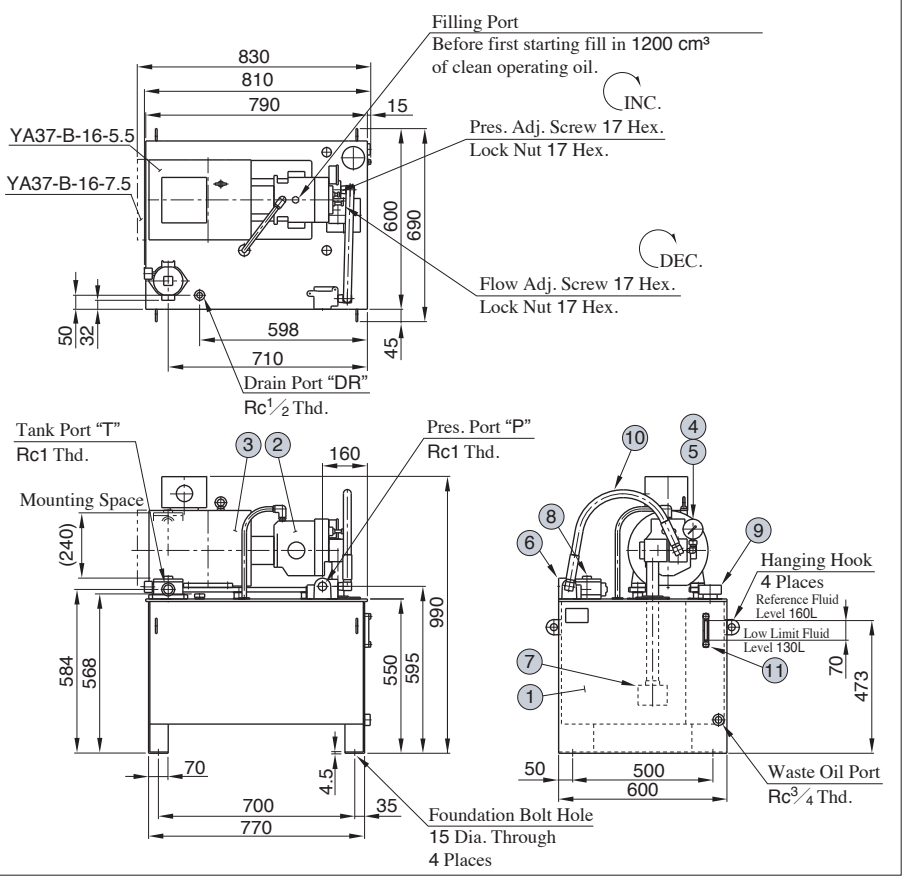


YA37-B-10-3.7-50

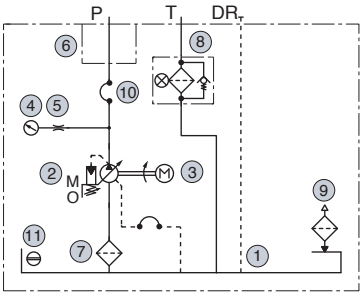


Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Adapter
6	Port Block
7	Suction Strainer
8	Return Filter
9	Air Breather with Filling Port
10	Resin Hose
11	Oil Level Gauge

YA37-B-16-5.5-50・YA37-B-16-7.5-50



Hydraulic Circuit



Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Pressure Gauge
5	Adapter
6	Port Block
7	Suction Strainer
8	Return Filter
9	Air Breather with Filling Port
10	Resin Hose
11	Oil Level Gauge

Interchangeability between Current and New Models

As of YA10 and YA16 type models, the design numbers has changed from 50/51 to 52 due to change of built-in electric motor.

Applicable Models

Current Model Numbers	New Model Numbers
YA10-B-2-0.75-51	YA10-B-2-0.75-52
YA10-B-3-0.75-51	YA10-B-3-0.75-52
YA10-B-3-1.5-51	YA10-B-3-1.5-52
YA10-B-4-0.75-51	YA10-B-4-0.75-52
YA10-B-4-1.5-51	YA10-B-4-1.5-52
YA16-B-1-0.75-50	YA16-B-1-0.75-52
YA16-B-2-0.75-50	YA16-B-2-0.75-52
YA16-B-4-1.5-50	YA16-B-4-1.5-52

Change Details

(1) Change of Built-in Electric Motor 0.75 kW (Design number change to 41)
(2) Change of Tank [Body or Top Plate]
Due to change of electric motor, the position of hanging hooks and eye bolts near electric motor has changed.
★The built-in electric motor 1.5 kW has no changes, but the design number change to 52 with change of shared tank.

Interchangeability in Installation

Yes

Comparison of Current and New Models

(1)Specifications

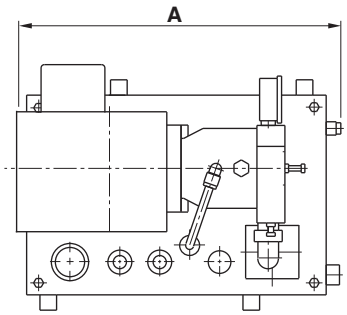
The specifications of current and new models are same except for the mass as below.

Current		New	
Model Numbers	Mass kg	Model Numbers	Mass kg
YA10-B-2-0.75-51	49	YA10-B-2-0.75-52	48
YA10-B-3-0.75-51	54	YA10-B-3-0.75-52	53
YA10-B-4-0.75-51	59	YA10-B-4-0.75-52	58
YA16-B-1-0.75-50	43	YA16-B-1-0.75-52	42
YA16-B-2-0.75-50	45	YA16-B-2-0.75-52	44

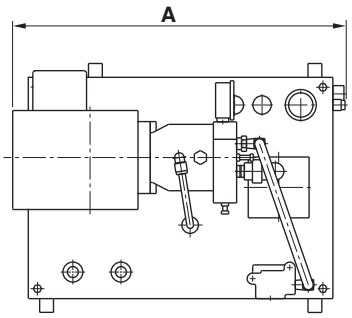
(2)Dimensions

The dimensions of current and new models are same except for below models.

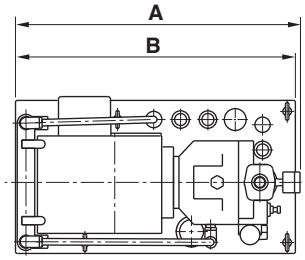
①YA10-B-2-0.75/YA10-B-3-0.75



②YA10-B-4-0.75



③YA16-B-1-0.75/YA16-B-2-0.75

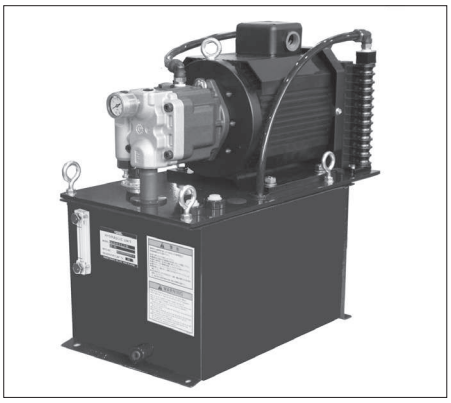


Current Model Numbers	A	B	New Model Numbers	A	B
YA10-B-2-0.75-51	505	—	YA10-B-2-0.75-52	490	—
YA10-B-3-0.75-51	505	—	YA10-B-3-0.75-52	490	—
YA10-B-4-0.75-51	615	—	YA10-B-4-0.75-52	600	—
YA16-B-1-0.75-50	560	550	YA16-B-1-0.75-52	520	510
YA16-B-2-0.75-50	560	550	YA16-B-2-0.75-52	520	510

Standard Hydraulic Power Unit YA Series L Pack <YA-Light>

Smart & Compact

YA-Light is high efficiency, compact and light weight hydraulic unit equipped with ARL1 series piston pump.



Features

High Efficiency

Due to built-in high efficiency motor and piston pump, these units has achieved high efficiency.

Compact / Light Weight

YA-Light is more compact and light weight compared with YA Pack.

Low Noise

These units are equipped with low noise pumps, so that has achieved low noise level and good sound quality.

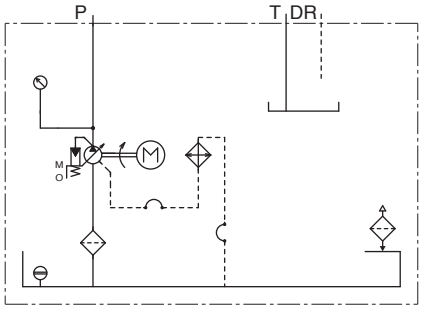
Energy-Saving & Low Heat Generation

These units equipped with piston pumps can reduce power loss and save power consumption. And also achieved low oil temperature rise with high performance drain cooler.

Facilitating the configuration of the control circuit

Due to embedded modular valves, control circuits can be easily configured.

Hydraulic Circuit



★Displacement volume adjustment function is not available.

Model Number Designation

YAL	16	−A	−1	−0.75	−20
Series Number	Built-in Pump Geometric Displacement	Pres. Adj. Range★1 MPa	Reservoir Capacity L	Electric Motor	Design Number
YAL： Piston Pump Equipped Low Noise & Small Type Hydraulic Power Unit	8：8.5 cm^3/rev	A：1.2 - 3.5	1：10	0.75：0.75kW×4P	20
				1.5：1.5kW×4P	
			2：19	0.75：0.75kW×4P	
				1.5：1.5kW×4P	
		B：1.2 - 7.0	2：19	1.5：1.5kW×4P	
	16：16.3 cm^3/rev	A：1.2 - 3.5	1：10	1.5：1.5kW×4P	
		B：1.2 - 7.0	2：19	1.5：1.5kW×4P	
				2.2：2.2kW×4P	

★1. Pressure adjustment range values shown are those of the pump.
★2. We offer auxiliaries / spare parts for pump and electric motor as Ass'y for AML1 Type Motor-Pump.

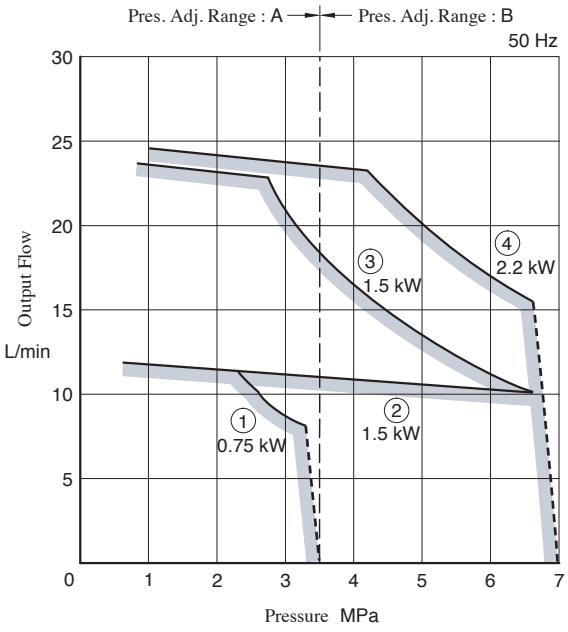
Specifications

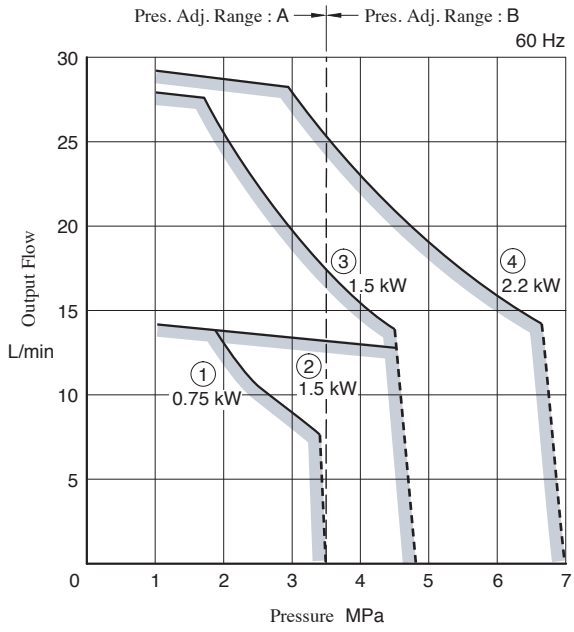
Model Numbers	Geometric Displacement cm^3/rev	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Reservoir Capacity L	Electric Motor 50Hz：200V AC 60Hz：200/220V AC	Approx. Mass (Excluding Hydraulic oil) kg
YAL8-A-1-0.75-20	8.5	3.5	1.2 - 3.5	10	0.75 kW×4P	37
YAL8-A-1-1.5-20				10	1.5 kW×4P	40
YAL8-A-2-0.75-20				19	0.75 kW×4P	39
YAL8-A-2-1.5-20				19	1.5 kW×4P	42
YAL8-B-2-1.5-20		7.0	1.2 - 7.0	19	1.5 kW×4P	42
YAL16-A-1-1.5-20	16.3	3.5	1.2 - 3.5	10	1.5 kW×4P	40
YAL16-B-2-1.5-20		7.0	1.2 - 7.0	19	1.5 kW×4P	42
YAL16-B-2-2.2-20				19	2.2 kW×4P	55

★Maximum operating pressure is the upper limit of the pressure adjustment range of the pump. For pressure and output flow operating limits pertaining to electric motor, please refer to “Selection Graph”. For tank oil temperature rise value for each model, please refer to “Oil Temperature in Reservoir”.

Selection Graph

Below portion of the graph is the allowable operating range with regards to rated output of electric motor.

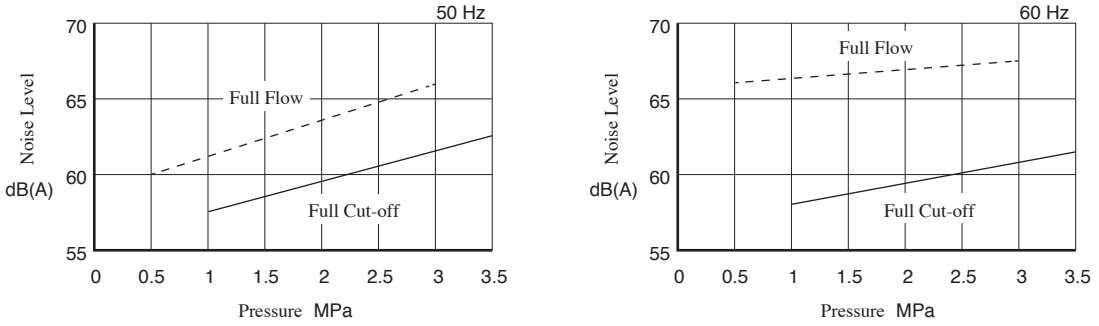




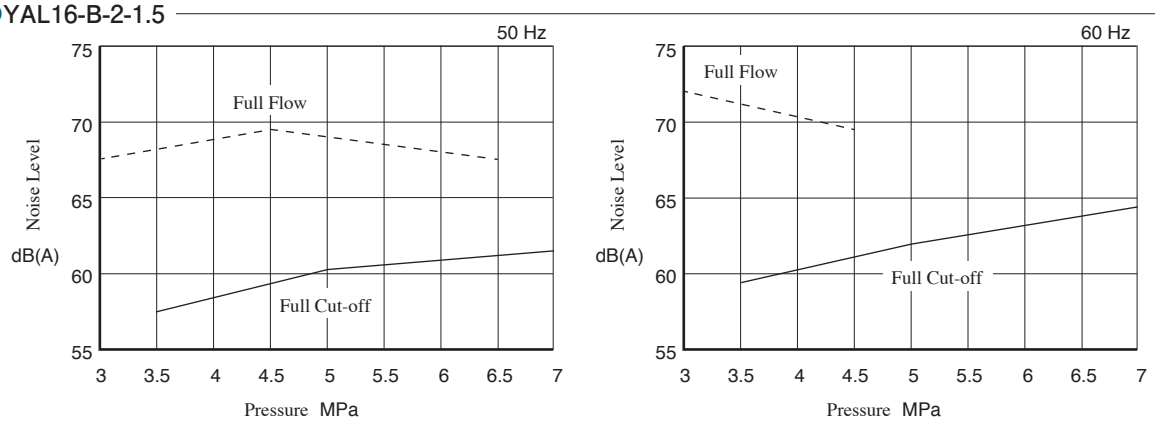
No.	Model Numbers	No.	Model Numbers
①	YAL8-A-＊-0.75	③	YAL16-＊-＊-1.5
②	YAL8-B-＊-1.5	④	YAL16-B-＊-2.2

Noise Characteristics (Example) 〔Location of Measurement: 1m from the unit (average value for 5 directions)〕

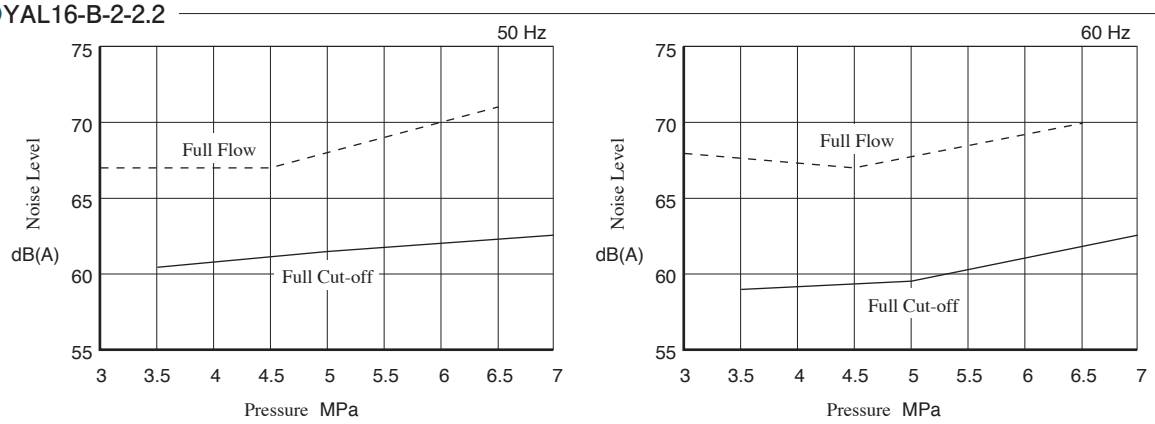
●YAL8-A-1-0.75



●YAL16-B-2-1.5

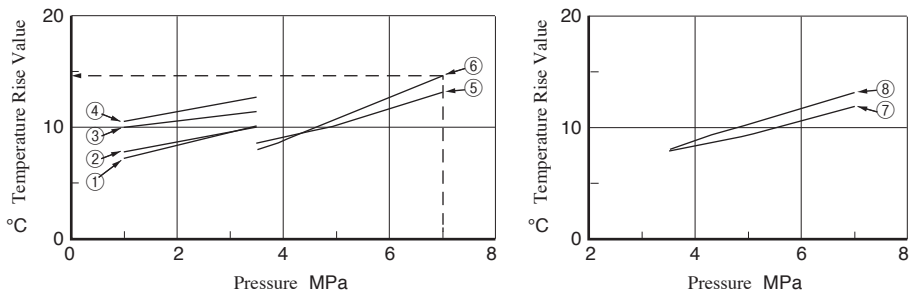


●YAL16-B-2-2.2



Oil Temperature in Reservoir

Oil temperature is expressed as (room temperature + temperature rise value).
Temperature rise values (full cut-off continuous operation, windless conditions) for each model are shown below, please check that oil temperature is below 60°C.
(Ex.) When operating YAL8/16-B-2-1.5 continuously (60Hz) at full cut-off pressure 7 MPa, temperature rise value is 14.6 °C as shown by broken line in the graph.
Assuming that room temperature is 30 °C then tank temperature will be 44.6 °C.



No.	Model Numbers
①	YAL8-A-1-0.75 50Hz
②	YAL8-A-1-0.75 60Hz
③	YAL8-A-2-0.75 50Hz
④	YAL8-A-2-0.75 60Hz
⑤	YAL8/16-B-2-1.5 50Hz
⑥	YAL8/16-B-2-1.5 60Hz
⑦	YAL16-B-2-2.2 50Hz
⑧	YAL16-B-2-2.2 60Hz

Instructions

Suction/Return Air

Don't put any obstructions at air vent surface of the drain cooler.
Please install unit at the floor with good air flow to avoid heat stuff.

Transportation

Use eye bolts at the time of transportation.

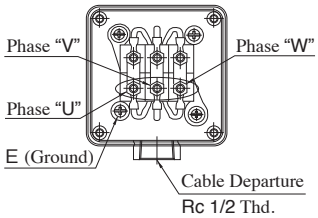
Installation

This unit is stationary type, so please fix it using bolts on the level space with no vibration.

Electrical Wiring

To protect electrical circuit from over current like short and protect motor from overload, we recommend to install no-fuse breaker with earth leakage breaker on the primary power supply,
For electrical wiring, please use crimp terminals of suitable size, and connect certainly to avoid electric leakage for main body and interphase electrical short. Please be sure to ground the earth terminal.

【Terminal Box Detail】



【Connecting Screw Size】

Phase "U" "V" "W" M5
E (Ground) M5

Motor Side [U1－R / V1－S / W1－T] Power Supply Side

Note for Starting Operation

Before initial operation, please supply ruled mass of hydraulic fluid required from oil tank port, and fill clean hydraulic fluid from filling port of pump till the oil full filled in pump housing. To avoid air-bound at starting operation, please adjust hydraulic circuit as that pump drain fluid return directly to oil tank, or operate directional valves for actuators no-load moving. Then start inching operation to confirm no particular, please do running operation.

Air Vent

Because air entrainment in pump or pipe may cause to occur vibration, please make air vent completely.

Setting of Pressure

〔Pressure Adjustment〕

At the time of shipping, the pressure set at minimum level, so please adjust the pressure under using conditions. Turn the pressure adjustment screw clockwise, the pressure increase. For adjustment volumes at one rotation of adjustment screw, please refer to the table below. After adjustments, do not forget to tighten the lock nut.

【Adjustment Volumes at One Rotation of Pres. Adj. Screw】

1.5MPa

Setting of Output Flow

〔Output Flow Adjustment〕

This model is unable to adjust output flow rate.
Please install flow control valves as required.

External Paint Color：

Only the standard models are painted by Munsell N2 (semi gloss).

Options

Base Plate Embedded：01M＊

Control circuit can be constructed by just stacking up modular valves/ solenoid valve atop the base plate. However, the circuit construction is limited to modular valves and standard solenoid directional control valves. In this case, please indicate power supply for operation.

Without Control Circuit：B

Base plate is attached directly to discharge port of the pump and return piping arranged from base plate to the tank only.
Please prepare components to construct control circuit separately. This option is applicable when 01M* is added.

Tank Magnet Embedded：Mg

Installed inside the tank. Attracts and collects fine iron powder. Decreases component wear.

Oil Level Gauge with Thermometer Embedded：Te

Different Voltage Electric Motor：（＊V × ＊Hz）

200 V AC (50Hz) and 200/220 V AC (60Hz) are standard. We can also offer 400 V AC (50Hz) and 400/440 V AC (60Hz).

Option Indication Method

When ordering L Pack with options, please add「OP」at the end of standard L Pack model number, use the example below for reference and indicate options.

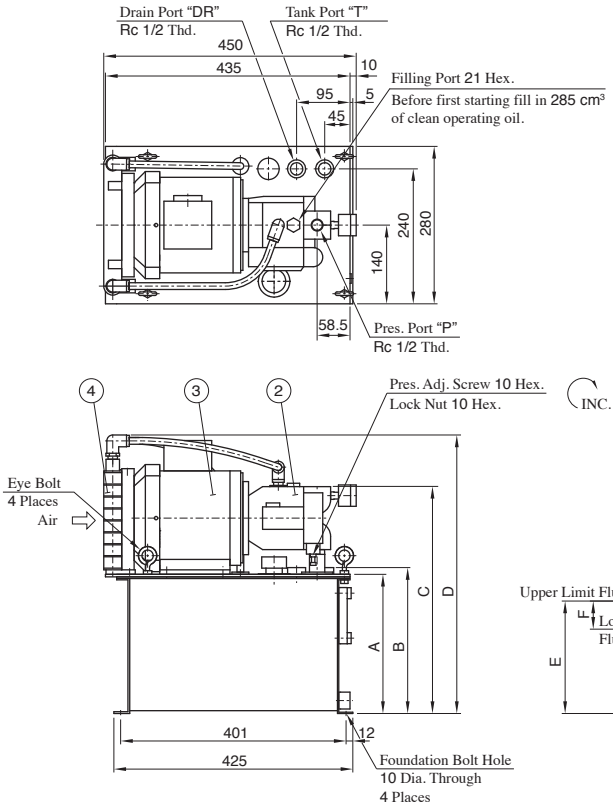
(Example) YAL8-A-1-0.75-20-OP

OP—01 M1 B Mg Te ＊V × ＊Hz

- Option Incl.
- Base Plate Embedded
- Base Plate Size
  - 01 ：01 Size
- Number of Base Plate stations
  - M1 ：1 Station
  - M2 ：2 Stations
- None：With Control Circuit
- B ：Without Control Circuit
- Mg ：Tank Magnet Embedded
- Te ：Oil Level Gauge with Thermometer Embedded
- Different Voltage Electric Motor
  Fill in "Voltage × Frequency"in case if they differ from standard voltage only

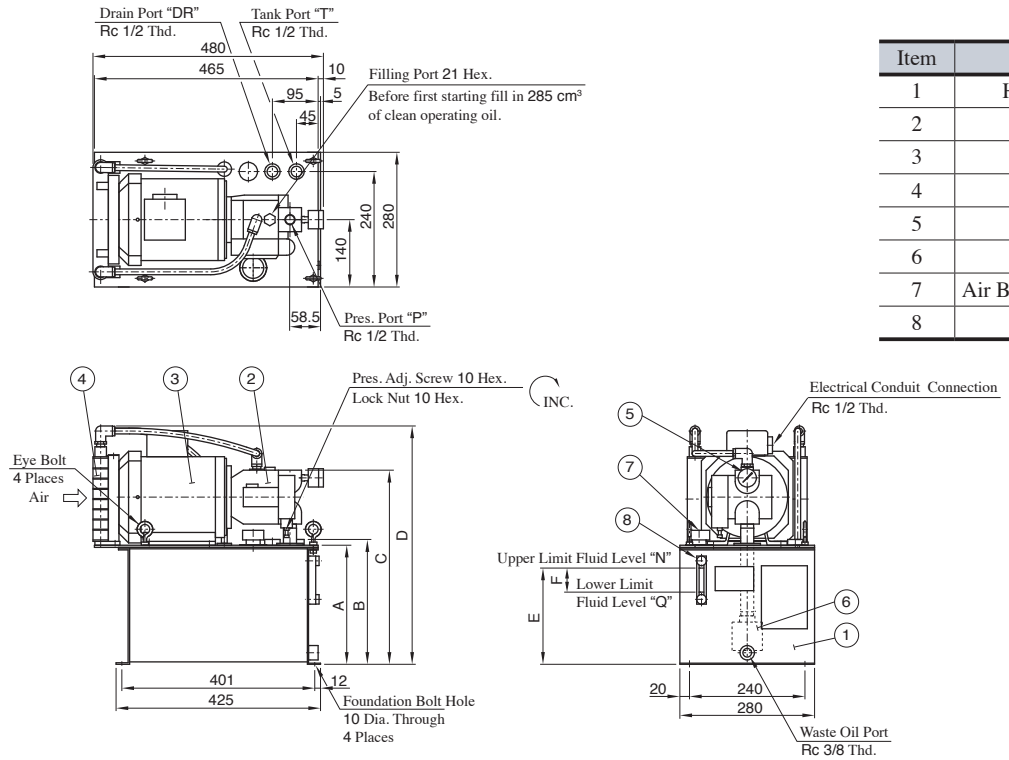
K
YA Series L Pack

●YAL8-A-＊-0.75



Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Drain Cooler
5	Pressure Gauge
6	Suction Strainer
7	Air Breather with Filling Port
8	Oil Level Gauge

●YAL8/16-＊-＊-1.5

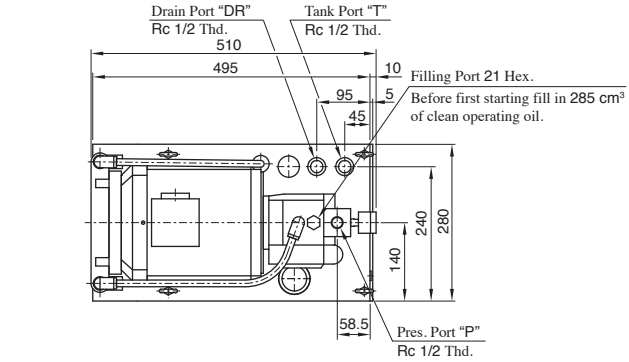


Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Drain Cooler
5	Pressure Gauge
6	Suction Strainer
7	Air Breather with Filling Port
8	Oil Level Gauge

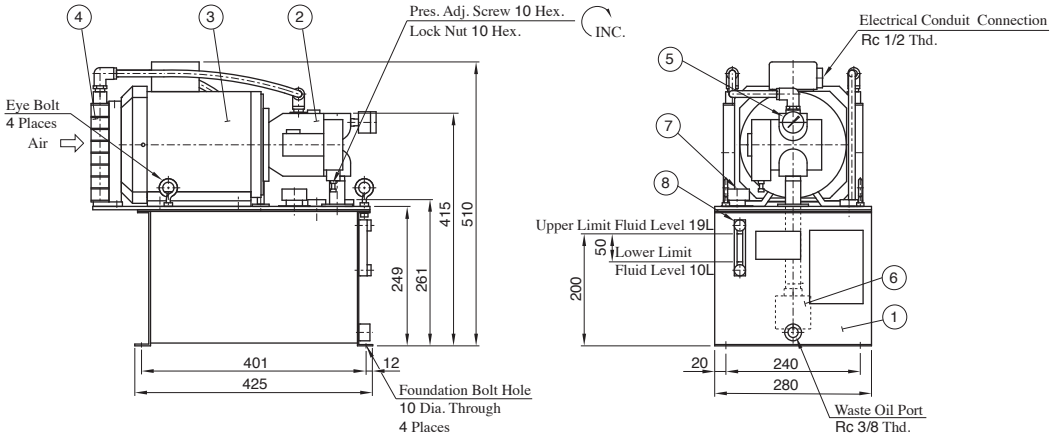
Model Numbers	Reservoir Capacity	Electric Motor Output × Poles	Dimensions						Oil Ammount L	
			A	B	C	D	E	F	N	Q
YAL8-A-1-0.75	10L	0.75kW×4P	157.5	169.5	313.5	410	110	10	10	9
YAL8-A-2-0.75	19L		247.5	259.5	403.5	500	200	50	19	15
YAL8/16-＊-1-1.5	10L	1.5kW×4P	157.5	169.5	313.5	410	110	10	10	9
YAL8/16-＊-2-1.5	19L		247.5	259.5	403.5	500	200	50	19	15

★Pump installed on this unit is not equipped with flow adjustment screw.

●YAL16-B-2-2.2



Item	Name
1	Hydraulic Reservoir
2	Pump
3	Electric Motor
4	Drain Cooler
5	Pressure Gauge
6	Suction Strainer
7	Air Breather with Filling Port
8	Oil Level Gauge



★Pump installed on this unit is not equipped with flow adjustment screw.

■ Interchangeability between Current and New Models

As of YA series L pack, the design number has changed from 10 to 20 due to change of built-in electric motor.

● Comparison of Current and New Specifications

New specifications are the same as current except for those listed below. Mass has been increased in the range of 4 - 14 kg (Mass ratio 111 - 134%)

Mass

Current		New	
Model Numbers	Mass kg	Model Numbers	Mass kg
YAL8-A-1-0.75-10	30	YAL8-A-1-0.75-20	37
YAL8-A-1-1.5-10	35	YAL8-A-1-1.5-20	40
YAL8-A-2-0.75-10	33	YAL8-A-2-0.75-20	39
YAL8-A-2-1.5-10	38	YAL8-A-2-1.5-20	42
YAL8-B-2-1.5-10	38	YAL8-B-2-1.5-20	42
YAL16-A-1-1.5-10	35	YAL16-A-1-1.5-20	40
YAL16-B-2-1.5-10	38	YAL16-B-2-1.5-20	42
YAL16-B-2-2.2-10	41	YAL16-B-2-2.2-20	55

★For comparison of electric motor specifications, please refer to page K-41.

● Major Changes

(1) Mass has been increased in the range of 4 - 14 kg (Mass ratio 111 - 134%)
(2) The body has become larger in general. Foundation mounting bolts thread pitch has not changed.
(3) Built-in electric motor efficiency class has changed to IE3. Motor specifications have been upgraded in general. For electric motor specifications, please refer to page K-39.

● Interchangeability in Installation

No interchangeability. The following dimensions are different.

Non-interchangeable Element Description	Non-interchangeable Element Dimension
Distance from tank edge to drain (DR) port	Page K-38 Dimension D
Distance from tank edge to tank (T) port	Page K-38 Dimension E
Distance from tank edge to pressure (P) port	Page K-38 Dimension F
Drain (DR) Port and Tank (T) Port Height	Page K-38 Dimension H
Pressure (P) Port Height	Page K-38 Dimension J

Comparison of Current and New Performance Characteristics

(1) Selection Graph
New is the same as current.

(2) Noise Characteristics and Tank Oil Temperature Rise
Have changed for all models.

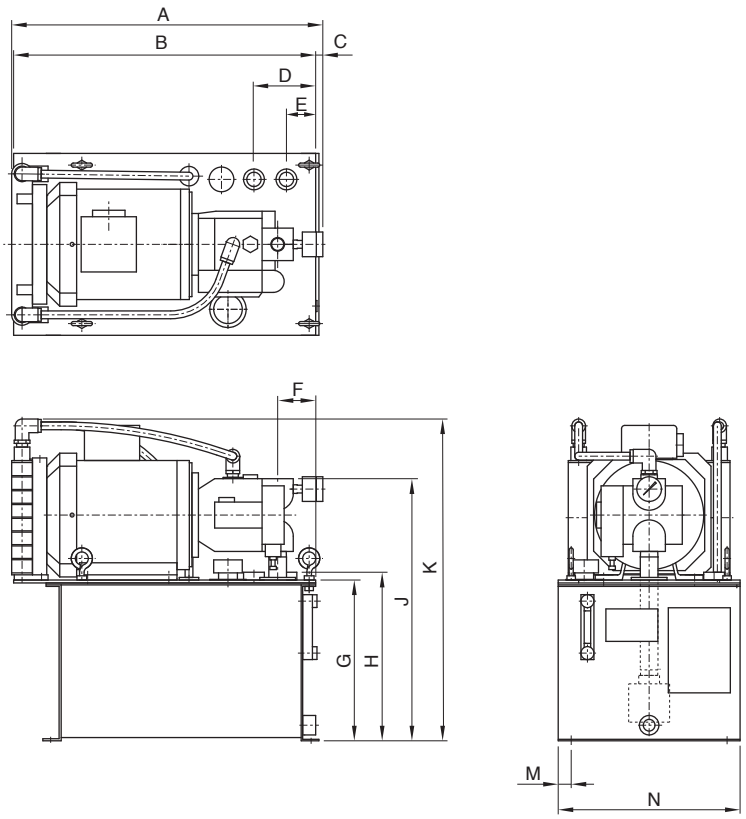
Comparison of Options

(1) Change of Exterior Paint Color : PT has been disbanded.
Standard color is black, same as that of small type YA Pack (Munsell N2［semi gloss］).

(2) Oil Level Gauge with Thermometer Embedded : Te has been added.

Comparison of Current and New Dimensions

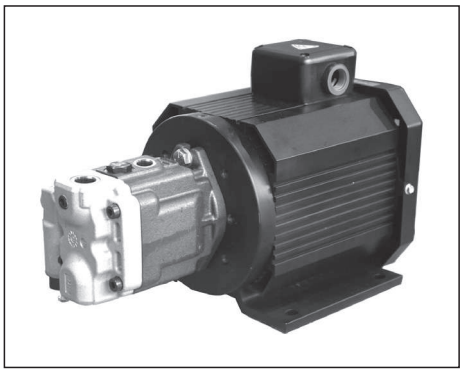
New dimensions are the same as current except for those in the chart below.



	Model Numbers	A	B	C	D	E	F	G	H	J	K	M	N
Current	YAL8-A-1-0.75-10	426	—	—	100	50	65	154	166	304	395	15	270
	YAL8/16-＊-1-1.5-10	457	—	—	100	50	65	154	166	304	395	15	270
	YAL8-A-2-0.75-10	426	—	—	100	50	65	244	256	394	485	15	270
	YAL8/16-＊-2-1.5-10	457	—	—	100	50	65	244	256	394	485	15	270
	YAL16-B-2-2.2-10	486	—	—	100	50	65	244	256	394	485	15	270
New	YAL8-A-1-0.75-20	450	435	10	95	45	58.5	157.5	169.5	313.5	410	20	280
	YAL8/16-＊-1-1.5-20	480	465	10	95	45	58.5	157.5	169.5	313.5	410	20	280
	YAL8-A-2-0.75-20	450	435	10	95	45	58.5	247.5	259.5	403.5	500	20	280
	YAL8/16-＊-2-1.5-20	480	465	10	95	45	58.5	247.5	259.5	403.5	500	20	280
	YAL16-B-2-2.2-20	510	495	10	95	45	58.5	249	261	415	510	20	280

AML1 Type Motor-Pumps

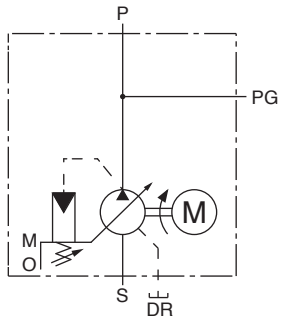
This motor-pump is ARL1 series piston pump integrated with electric motor.
Use as auxiliaries / spare parts for YA-Light, make it compact by applicable design of motor-pumps.



Specifications

Model Numbers	Geometric Displacement cm^3/rev	Max. Operating Pres. Rated Pres.	Electric Motor	Mass kg
AML1-6＊-＊-20	6.2	7 MPa Differ by operating conditions, please contact us separately for details.	0.75 kW×4P	23
			1.5 kW×4P	26.3
			2.2 kW×4P	37
AML1-8＊-＊-20	8.5		0.75 kW×4P	23
			1.5 kW×4P	26.3
			2.2 kW×4P	37
AML1-12＊-＊-20	12.3		1.5 kW×4P	26.3
			2.2 kW×4P	37
AML1-16＊-＊-20	16.3		1.5 kW×4P	26.3
			2.2 kW×4P	37

Graphic Symbol



★Displacement volume adjustment function is not available.

Electric Motor Specifications

Output × Poles	Insulation Type	Voltage - Frequency V Hz	Rated Current A	Rotation Speed r/min	Inrush Current A	Coating Structure / Surrounding Environment
0.75 kW×4P	F	200-50	3.50	1460	21.8	●Coating Structure Dust & Splash Proof / Coating Surface Self Cooling Type (IP54 IC411, IEC60034-1) ●Surrounding Environment Location：Indoor Temperature：-20 - +40°C Humidity：Relative Humidity below 80%, No Condensation Elavation：Below 1000 m Corrosive Gas / Explosive Gas / Steam not exist
		200-60	3.45	1750	19.6	
		220-60	3.30	1760	21.9	
1.5 kW×4P		200-50	6.40	1450	39.8	
		200-60	6.60	1760	37.0	
		220-60	5.90	1756	39.0	
2.2 kW×4P		200-50	9.50	1450	64.0	
		200-60	9.00	1740	56.0	
		220-60	8.50	1750	64.0	

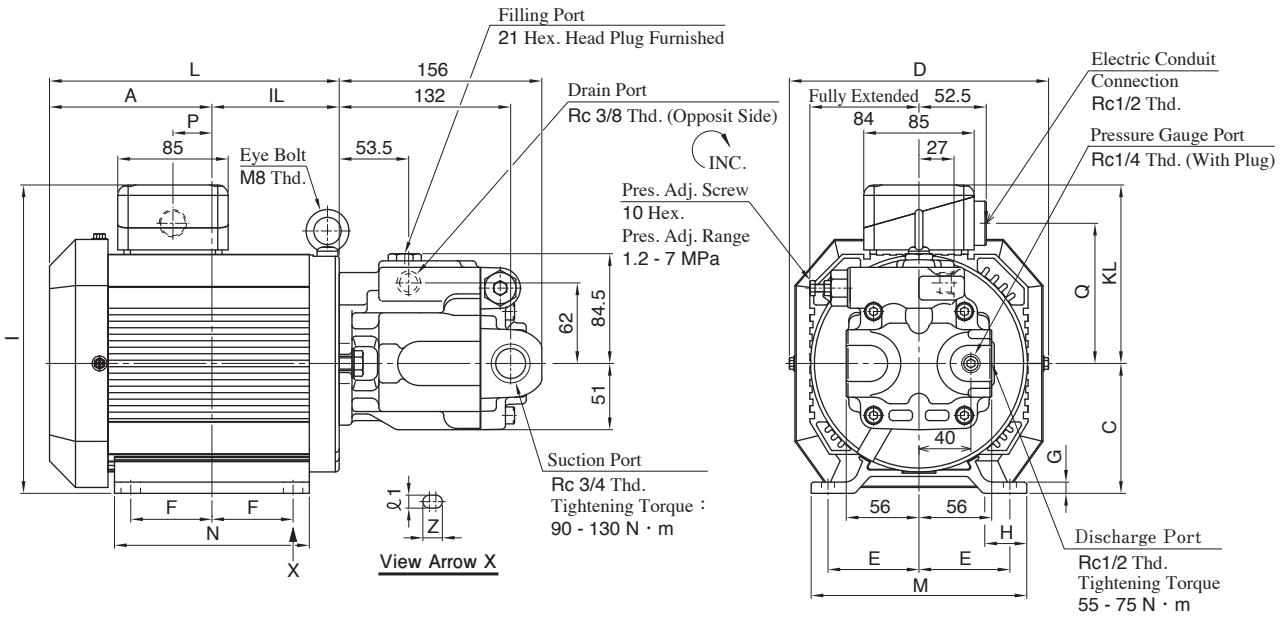
Model Number Designation

AML1	−16	A	−1.5	−20
Series Number	Geometric Displacement	Mounting Type	Electric Motor	Design Number
AML1： AML1 Type Motor-Pumps	6：6.2 cm^3/rev 8：8.5 cm^3/rev	S：Side Port (Standard) A：Suction Port Position: Downwards (For Standard L Pack)	0.75：0.75 kW×4P 1.5：1.5 kW×4P 2.2：2.2 kW×4P	20
	12：12.3 cm^3/rev 16：16.3 cm^3/rev		1.5：1.5 kW×4P 2.2：2.2 kW×4P	

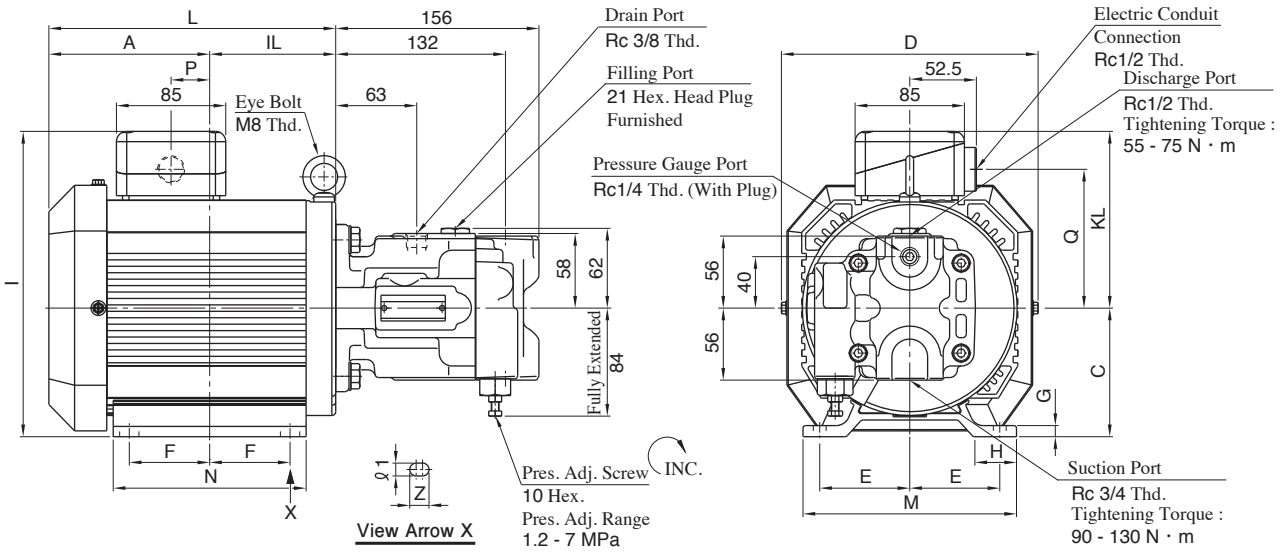
Pump Characteristics

For pump characteristics, please refer to those of ARL1 series piston pump on ["A Piston Pump"Catalog].

AML1-＊S（Side Port）



AML1-＊A（Suction Port Downwards）



Model Numbers	Electric Motor Output × Poles	A	IL	C	D	E	F	G	H	I	M
AML1-＊＊-0.75	0.75 kW×4P	108	85.5	100	200	70	50	8.7	32.4	234	166
AML1-＊＊-1.5	1.5 kW×4P	125.5	98	100	200	70	62.5	8.7	32.4	234	166
AML1-＊＊-2.2	2.2 kW×4P	139	114.5	110	218	95	70	10.7	59	254	220

Model Numbers	Electric Motor Output × Poles	N	KL	Q	Z	ℓ1	L	P
AML1-＊＊-0.75	0.75 kW×4P	125	134	108	15	10	193.5	12.5
AML1-＊＊-1.5	1.5 kW×4P	150	134	108	15	10	223.5	30
AML1-＊＊-2.2	2.2 kW×4P	185	144	118	15	12	253.5	42.5

★Electric motor for this motor-pump is not available for single sale. If spare parts required, please order as motor-pumps.

Interchangeability between Current and New Models

As of AML1 type motor pump, the design number has changed from 10 to 20 due to change of built-in electric motor.

Major Changes

(1) Mass has been increased in the range of 1.5 - 9.7 kg (Mass ratio 106 - 136%)
(2) The body has become larger in general.
(3) Built-in electric motor efficiency class has changed to IE3. Motor specifications have been upgraded in general.

Interchangeability in Installation

No interchangeability. The following dimensions are different.

Non-interchangeable Element Description	Non-interchangeable Element Dimension
Distance from pump position to center of electric motor	Next Page Dimension IL
Pump Center Height	Next Page Dimension C
Mounting Position of Electric Motor	Next Page Dimension E, F, ℓ 1 [Only for AML1-＊＊-2.2]

Comparison of Current and New Specifications

New specifications are the same as current except for those listed below. Mass has been increased in the range of 1.5 - 9.7 kg (Mass ratio 106 - 136%)

①Mass

Model Numbers	Mass kg
AML1-＊＊-0.75	23 (19.8)
AML1-＊＊-1.5	26.3 (24.8)
AML1-＊＊-2.2	37 (27.3)

★The values without parentheses represent the mass of new 20 design, those in parentheses represent the mass of current 10 design.

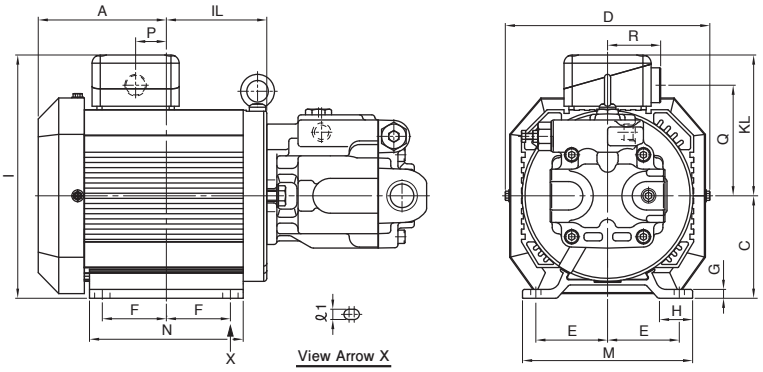
②Electric Motor

Output × Poles	Voltage - Frequency V Hz	Rated Current A	Rotation Speed r/min	Inrush Current A
0.75 kW×4P	200-50	3.50 (3.70)	1460 (1410)	21.8 (17.0)
	200-60	3.45 (3.40)	1750 (1700)	19.6 (15.5)
	220-60	3.30 (3.35)	1760 (1720)	21.9 (17.5)
1.5 kW×4P	200-50	6.40 (6.30)	1450 (1410)	39.8 (34.5)
	200-60	6.60 (6.00)	1760 (1700)	37.0 (30.0)
	220-60	5.90 (5.60)	1756 (1720)	39.0 (33.6)
2.2 kW×4P	200-50	9.50 (9.60)	1450 (1410)	64.0 (49.5)
	200-60	—	1740 (1700)	56.0 (44.5)
	220-60	—	1750 (1720)	64.0 (50.2)

★The values without parentheses represent the specifications of new 20 design, in parentheses represent those of current 10 design.

Comparison of Current and New Dimensions

New dimensions are the same as current except for those in the chart below.

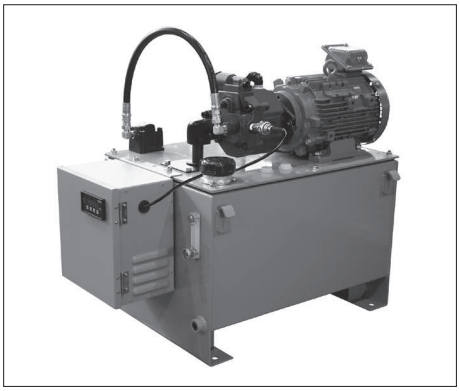


	Model Numbers	A	IL	C	D	E	F	G	H	I	M
Current	AML1-＊＊-0.75-10	128.5	65	90	192			8	—	228	
	AML1-＊＊-1.5-10	146.2	77.5	90	192			8	—	228	
	AML1-＊＊-2.2-10	176	77.5	90	192	70	62.5	8	—	228	166
New	AML1-＊＊-0.75-20	108	85.5	100	200			8.7	32.4	234	
	AML1-＊＊-1.5-20	125.5	98	100	200			8.7	32.4	234	
	AML1-＊＊-2.2-20	139	114.5	110	218	95	70	10.7	59	254	220

	Model Numbers	N	KL	Q	ℓ1	P	R
Current	AML1-＊＊-0.75-10		138	105		18	51.5
	AML1-＊＊-1.5-10		138	105		35.5	51.5
	AML1-＊＊-2.2-10	150	138	105	10	65.5	51.5
New	AML1-＊＊-0.75-20		134	108		12.5	52.5
	AML1-＊＊-1.5-20		134	108		30	52.5
	AML1-＊＊-2.2-20	185	144	118	12	42.5	52.5

Energy-Saving Standard Hydraulic Power Unit YA-e Pack

YA-e pack has obtained extensive energy-saving effect by combination of the variable displacement piston pump which can hold pressure and the personal inverter controller which controls rotational frequency by detecting a load pressure.



● Significant Reduction of Power Consumption

E-YA37 type of this power unit, compared to current YA pack, has reduced max. 70% of power consumption at full cut-off pressure.

● Low Heat Generation

E-YA37 type of this power unit, compared to current YA pack, has reduced more than 20°C of the fluid temperature increase at full cut-off pressure.

● Low Noise

By decreasing the motor speed at full cut-off pressure, it is possible to reduce the noise level extensively.

● Discharge volume can be set to a certain volume at 50/60 Hz.

YA-e pack can set the rotation speed at the maximum output flow less than 1800 r/min, regardless the power supply frequency.
(The minimum rotation speed is 300 r/min with the suction capacity of pump)

● Easy to configure the control circuit

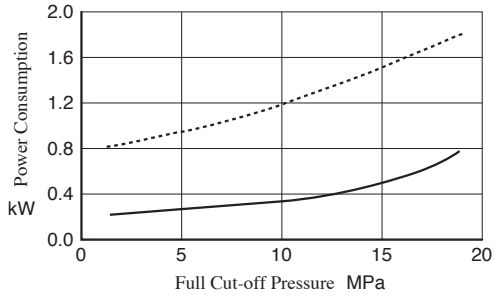
The control circuit with modular valve is available, so it is possible to configure the control circuit compactly.

● Continuous operation is possible even at breakdown of the pressure sensor or the inverter

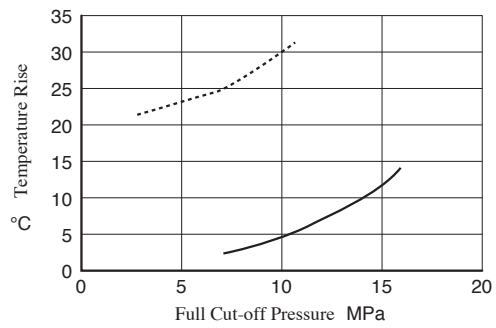
Operation at a certain rotation speed is possible even without receiving a signal from the pressure sensor due to breaking of wire or malfunction of the pressure sensor. In case of malfunction of the inverter itself, the same operation mentioned above is possible by reconnecting of the primary power supply to the motor.

■ Characteristics Comparison with Standard Type

● Power Consumption at Full Cut-off Pressure

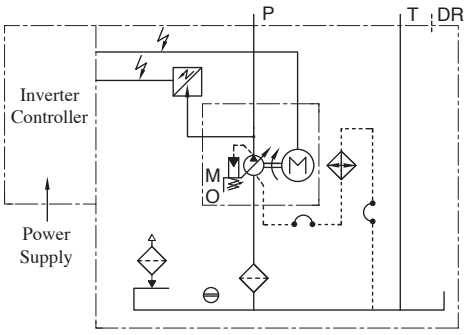


● Oil Temperature Increase in the Reservoir

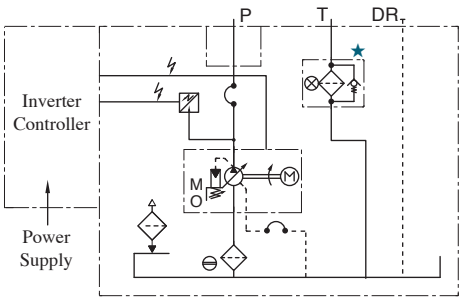


Standard Type <YA37, 3.7 kW, 1800 r/min>
Energy-Saving Type <E-YA37, 3.7 kW, 300 r/min>

Hydraulic Circuit



E-YA16-B-2



E-YA∗-∗-6/10

★ 60L (E-YA∗-∗-6) is option embedded.

K
YA-e Pack

Specifications

Model Numbers	Geometric Displacement of Pump cm^3/rev	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Reservoir Capacity L	Electric Motor 50 Hz：200 V AC 60 Hz：200/220/230 V AC	Mass (excluding hydraulic fluid) kg
E-YA10-B-6-2.2-51	10.0	7	1.2 - 7	60	2.2 kW×4P	89
E-YA10-C-10-2.2-51		16	2.0 - 16	100		115
E-YA10-C-10-3.7-51					3.7 kW×4P	126
E-YA16-B-2-0.75-52	15.8	7	1.2 - 7	18	0.75 kW×4P	47
E-YA16-B-2-1.5-50				18	1.5 kW×4P	51
E-YA16-B-2-2.2-50					2.2 kW×4P	58
E-YA16-B-6-2.2-50				60		90
E-YA16-B-6-3.7-50					3.7 kW×4P	104
E-YA16-B-10-2.2-50				100	2.2 kW×4P	115
E-YA16-C-10-3.7-50		16	2.0 - 16		3.7 kW×4P	131
E-YA16-C-10-5.5-50					5.5 kW×4P	159
E-YA16-C-10-7.5-50					7.5 kW×4P	172
E-YA22-B-6-2.2-50	22.2	7	1.2 - 7	60	2.2 kW×4P	90
E-YA22-B-6-3.7-50					3.7 kW×4P	104
E-YA22-B-10-2.2-50				100	2.2 kW×4P	120
E-YA22-B-10-3.7-50					3.7 kW×4P	156
E-YA22-C-10-5.5-50		16	2.0 - 16		5.5 kW×4P	159
E-YA22-C-10-7.5-50					7.5 kW×4P	172
E-YA37-B-10-3.7-50	36.9	7	1.2 - 7	100	3.7 kW×4P	151
E-YA37-B-16-5.5-50				160	5.5 kW×4P	189
E-YA37-B-16-7.5-50					7.5 kW×4P	197

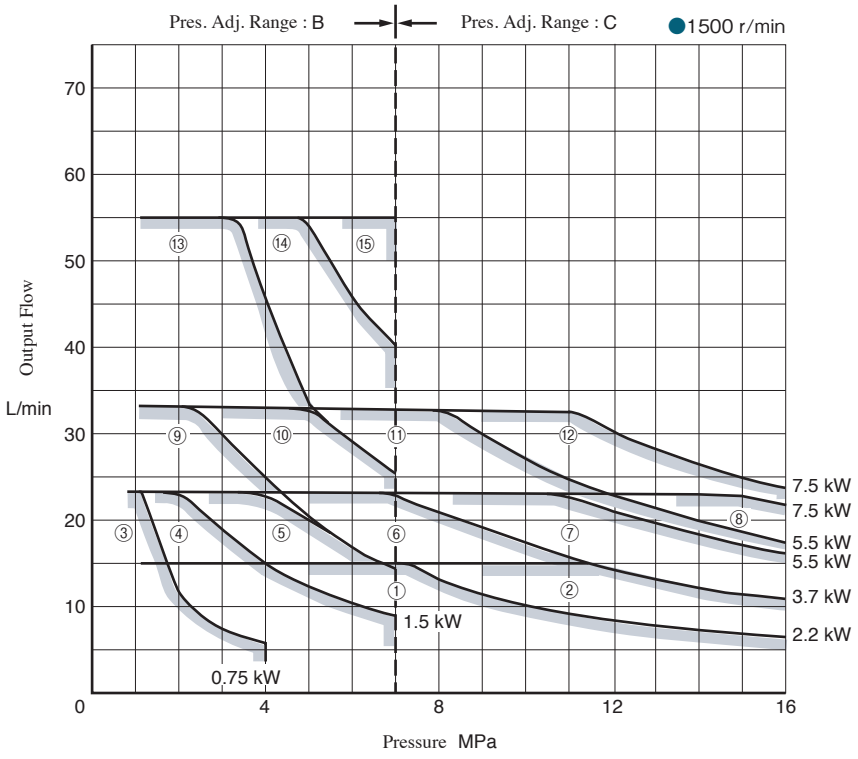
Model Number Designation

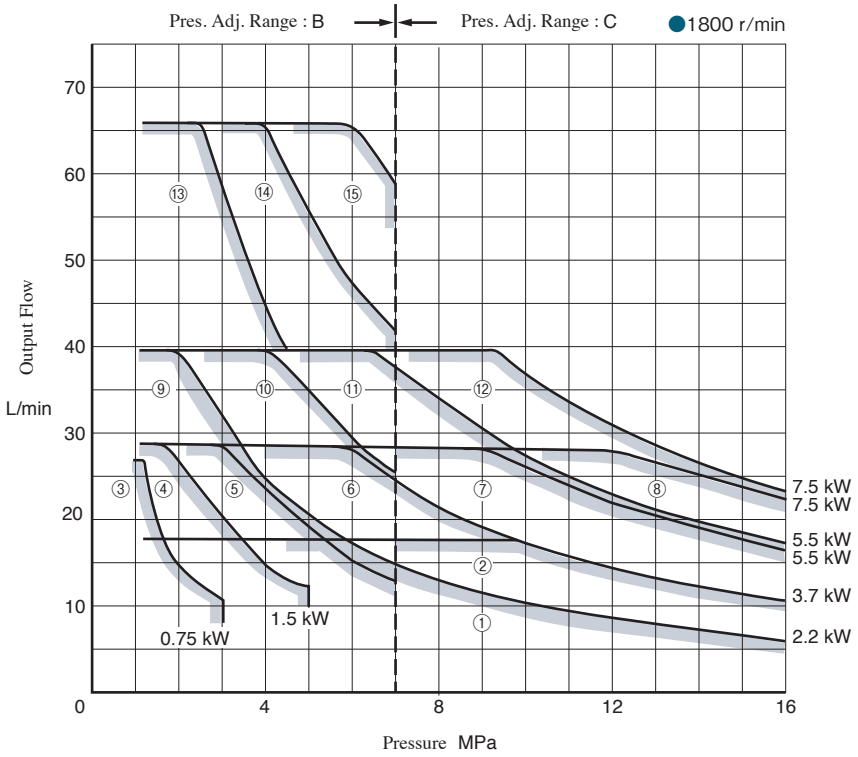
E-YA	16	−B	−6	−2.2	−50
Series Number	Built-in Pump	Pres. Adj. Range ★1 MPa	Reservoir Capacity L	Electric Motor	Design Number
E-YA：Energy-Saving Hydraulic Power Unit YA-e Pack	10：A10 (10.0 cm^3/rev)	B：1.2 - 7	6：60	2.2：2.2 kW×4P	51
		C：2.0 - 16	10：100	2.2：2.2 kW×4P	
				3.7：3.7 kW×4P	
	16：AR16 (15.8 cm^3/rev)	B：1.2 - 7	2：18	0.75：0.75 kW×4P	52
				1.5：1.5 kW×4P	50
				2.2：2.2 kW×4P	
		B：1.2 - 7	6：60	2.2：2.2 kW×4P	
				3.7：3.7 kW×4P	
		B：1.2 - 7	10：100	2.2：2.2 kW×4P	
		C：2.0 - 16	10：100	3.7：3.7 kW×4P	
				5.5：5.5 kW×4P	
				7.5：7.5 kW×4P	
	22：AR22 (22.2 cm^3/rev)	B：1.2 - 7	6：60	2.2：2.2 kW×4P	
				3.7：3.7 kW×4P	
		B：1.2 - 7	10：100	2.2：2.2 kW×4P	
				3.7：3.7 kW×4P	
		C：2.0 - 16	10：100	5.5：5.5 kW×4P	
				7.5：7.5 kW×4P	
	37：A37 (36.9 cm^3/rev)	B：1.2 - 7	10：100	3.7：3.7 kW×4P	
			16：160	5.5：5.5 kW×4P	
				7.5：7.5 kW×4P	

★1. Pressure adjustment range values shown are those of the pump.

Selection Graph

Below portion of the graph is the allowable operating range with regards to rated output of electric motor.

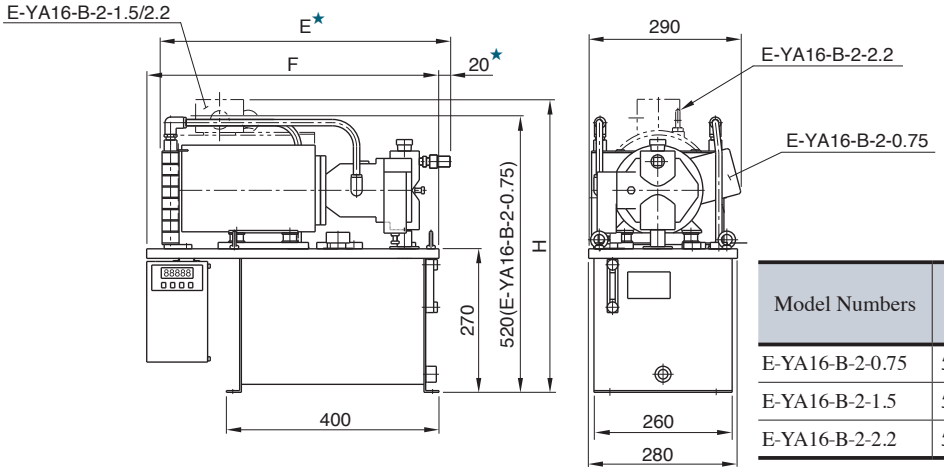




No.	Model Numbers
①	E-YA10-B-6-2.2 E-YA10-C-10-2.2
②	E-YA10-C-10-3.7
③	E-YA16-B-2-0.75
④	E-YA16-B-2-1.5
⑤	E-YA16-B-2-2.2 E-YA16-B-6-2.2 E-YA16-B-10-2.2
⑥	E-YA16-B-6-3.7 E-YA16-C-10-3.7
⑦	E-YA16-C-10-5.5
⑧	E-YA16-C-10-7.5
⑨	E-YA22-B-6-2.2 E-YA22-B-10-2.2
⑩	E-YA22-B-6-3.7 E-YA22-B-10-3.7
⑪	E-YA22-C-10-5.5
⑫	E-YA22-C-10-7.5
⑬	E-YA37-B-10-3.7
⑭	E-YA37-B-16-5.5
⑮	E-YA37-B-16-7.5

Dimensions

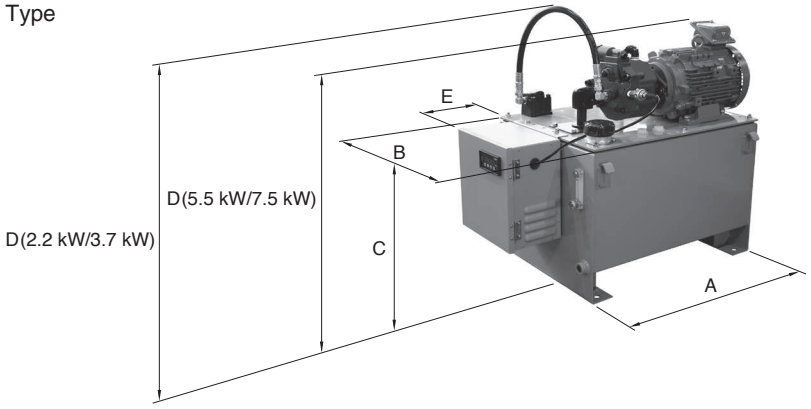
18L Tank Type



Model Numbers	E	F	H	Reservoir Capacity L	Electric Motor
E-YA16-B-2-0.75	530	510	—	18	0.75kW×4P
E-YA16-B-2-1.5	570	550	545		1.5kW×4P
E-YA16-B-2-2.2	595	550	555		2.2kW×4P

Note) The dimensions of hydraulic power unit except ★ part are same as the standard type YA pack, please refer to page K-26.

60L/100L/160L Tank Type



Model Numbers	Dimensions mm					Reservoir Capacity L	Electric Motor
	A	B	C	D	E		
E-YA10-B-6-2.2	600	450	410	740	175	60	2.2 kW×4P
E-YA10-C-10-2.2	750	500	470	820	175	100	2.2 kW×4P
E-YA10-C-10-3.7							3.7 kW×4P
E-YA16-B-6-2.2	600	450	410	740	175	60	2.2 kW×4P
E-YA16-B-6-3.7							3.7 kW×4P
E-YA16-B-10-2.2	750	500	470	820	175	100	2.2 kW×4P
E-YA16-C-10-3.7	750	500	470	820	175		3.7 kW×4P
E-YA16-C-10-5.5				910	200		5.5 kW×4P
E-YA16-C-10-7.5							7.5 kW×4P
E-YA22-B-6-2.2	600	450	410	750	175	60	2.2 kW×4P
E-YA22-B-6-3.7							3.7 kW×4P
E-YA22-B-10-2.2	750	500	470	820	175	100	2.2 kW×4P
E-YA22-B-10-3.7							3.7 kW×4P
E-YA22-C-10-5.5				910	200		5.5 kW×4P
E-YA22-C-10-7.5							7.5 kW×4P
E-YA37-B-10-3.7	750	500	470	840	175	100	3.7 kW×4P
E-YA37-B-16-5.5	790	600	550	990	200	160	5.5 kW×4P
E-YA37-B-16-7.5							7.5 kW×4P

Note) The dimensions of hydraulic power unit except ★ part are same as the standard type YA pack, please refer to pages K-24, K-25 and K-27 - K-30.
In case of some models, the electric motor or the drain cooler could overhang the tank.

Interchangeability between Current and New Models

As of E-YA16 type, the design number of some models has changed from 50 to 52 due to change of built-in electric motor.

Changes

Mass

Current		New	
Model Numbers	Mass kg	Model Numbers	Mass kg
E-YA16-B-2-0.75-50	48	E-YA16-B-2-0.75-52	47

Interchangeability in Installation

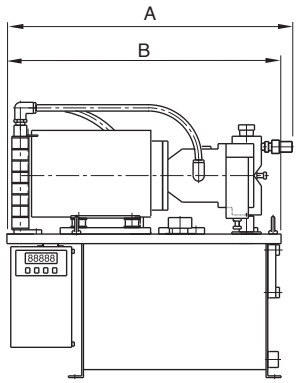
Yes

Specifications / Characteristics

Those of current and new models are same except for the mass.

Dimensions

New dimensions are the same as current except for those in the chart below.



Current or New	A	B
Current	570	550
New	530	510

Energy-Saving Control System for Hydraulic Units

Energy-saving effect can be obtained by adding this system to an existing unit and carrying out simple adjustments.

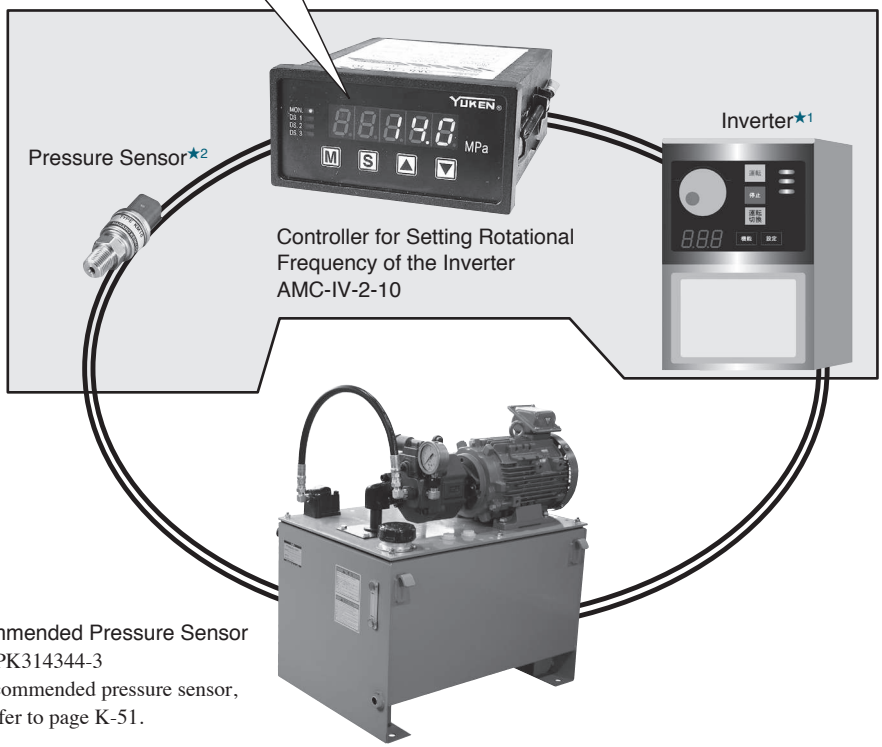
System Configuration

Use the hydraulic pump and electric motor of the current equipment, add the controller for setting rotational frequency of the inverter, the pressure sensor, and the inverter, and only carry out simple adjustments.

Due to adopt the select indication system, it is possible to indicate the five descriptions below.

①Input for pressure sensor (indicate pressure)
②Output for inverter
③Simple power calculation value
④Sequence input/output code
⑤Alarm output code

★1. Recommended Inverter
A product which performance higher than the sensorless vector control type should be used.



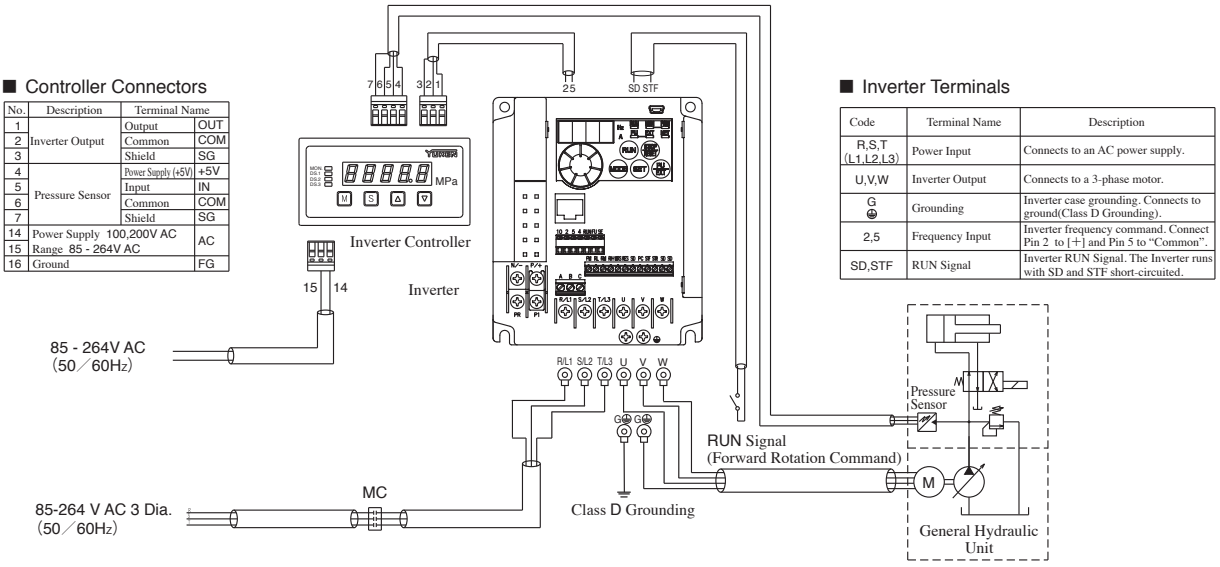
★2. Recommended Pressure Sensor
・1501-PK314344-3
As of recommended pressure sensor, please refer to page K-51.

Existing Hydraulic Unit
Equipped with Variable Displacement Piston Pump and Induction Motor：0.75 - 7.5 kW

Inverter Connection Example

■ Controller Connectors

No.	Description	Terminal Name	
1	Inverter Output	Output	OUT
2		Common	COM
3		Shield	SG
4	Pressure Sensor	Power Supply (+5V)	+5V
5		Input	IN
6		Common	COM
7		Shield	SG
14	Power Supply 100,200V AC Range 85 - 264V AC		AC
15			
16	Ground		FG



■ Inverter Terminals

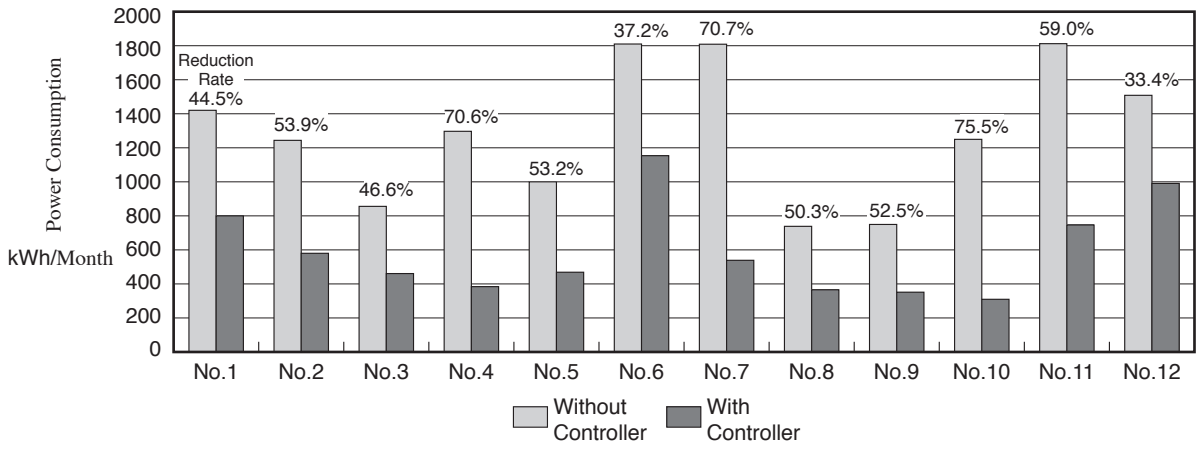
Code	Terminal Name	Description
R,S,T (L1,L2,L3)	Power Input	Connects to an AC power supply.
U,V,W	Inverter Output	Connects to a 3-phase motor.
G	Grounding	Inverter case grounding. Connects to ground(Class D Grounding).
2,5	Frequency Input	Inverter frequency command. Connect Pin 2 to [+] and Pin 5 to "Common".
SD,STF	RUN Signal	Inverter RUN Signal. The Inverter runs with SD and STF short-circuited.

Example of Reduction Rate of Power Consumption

Machining Line for Automobile Parts

Operating Condition ①Operating Time / Day：24 h Operating Days / Month：22Days Total Operating Time / Month：528 h
②Operating Time / Day：18 h Operating Days / Month：22Days Total Operating Time / Month：396 h

NO.	Name of Machines	Hydraulic Pump			Electric Motor kW	Operating Condition	Cycle Time S	Power Consumption kWh/Month		Reduction Power kWh/Month	Reduction Rate %
		Type	Geometric Displacement of Pump cm^3/rev	Pressure Setting MPa				Without Controller	With Controller		
1	Transfer Machine	Vane	100	3.5	7.5	①	76	1,424	790	634	44.5
2	Transfer Machine	Vane	100	3.6	7.5	①	76	1,243	573	670	53.9
3	Transfer Machine	Vane	100	2.6	7.5	②	77	849	453	396	46.6
4	Transfer Machine	Vane	75	3.4	5.5	①	77	1,300	382	918	70.6
5	Transfer Machine	Vane	75	3.2	5.5	②	59	999	468	531	53.2
6	Washing Machine	Vane	100	3.5	7.5	①	58	1,809	1,136	673	37.2
7	Gear Cutting Machine	Piston	63	4.0	5.5	①	16	1,811	530	1,281	70.7
8	Gear Cutting Machine	Piston	36.9	4.0	5.5	②	32	723	359	364	50.3
9	Gear Cutting Machine	Piston	36.9	4.0	5.5	②	42	735	349	386	52.5
10	Gear Cutting Machine	Vane	30	5.5	5.5	①	22	1,250	306	944	75.5
11	Gear Cutting Machine	Piston	36.9	5.2	5.5	①	46	1,811	742	1,069	59.0
12	Gear Cutting Machine	Vane	31.8	4.0	7.5	①	34	1,498	997	501	33.4
Total								15,452	7,085	8,367	54.1



K
Energy-Saving Control System

■ Controller for Setting Rotational Frequency of the Inverter

● Specifications

Descriptions \ Model Numbers	AMC–IV–2–10
Output Voltage for Inverter	3 Ranges Selectable (0 - +5 V, +1 - +5 V, +0.5 - +4.5 V)
Input Voltage for Pressure Sensor	3 Ranges Selectable (0 - +5 V, +1 - +5 V, +0.5 - +4.5 V)
Power Supply for Pressure Sensor	+5 V Max. 0.5 W
Sequence Input Signal	AC Photocoupler Input Resistance to limit the Current 3.3 kΩ Name: IN1 / IN2 / INC Description: RUN / Alarm Reset / Input Common
Sequence Output Signal	Open Collector Output (Photocoupler Insulated) Max. Supply Voltage 35 V・50 mA Name: OUT1 / IN2 / OUTC Description: Low Rotational Frequency / Alarm / Output Common
Voltage for Power Supply	85 - 264 V AC 50/60 Hz
Power Consumption	Less than 6 VA
Ambient Temperature	0 - 50°C
Mass	0.3 kg

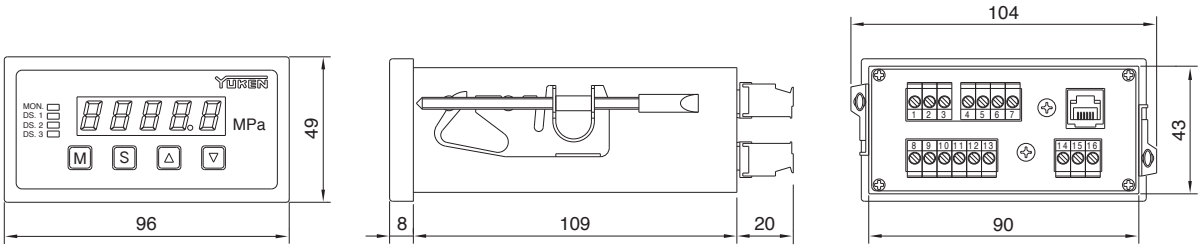
● Model Number Designation

AMC−IV	−2	−10
Series Number	Function Category	Design Number
AMC-IV：Controller for Setting Rotational Frequency of the Inverter	2：High-Function Type	10

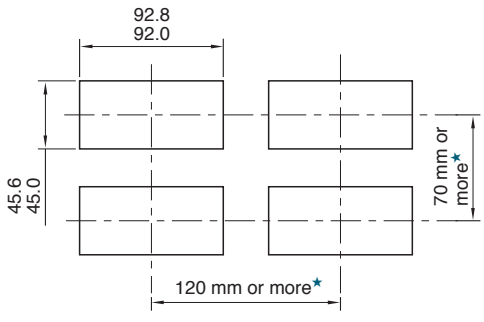
★1. This energy-saving system has no model numbers as for system itself, so when ordering this system, please indicate the model numbers of the controller for setting rotational frequency of the inverter and those of the pressure sensor.

★2. Also available with the simple model (with auto-tuning function) that is easy to set up. For details, please contact us separately.

AMC-IV-2-10



Panel Cutout Dimensions



★The value for using several controllers.

Detail of Terminal Block

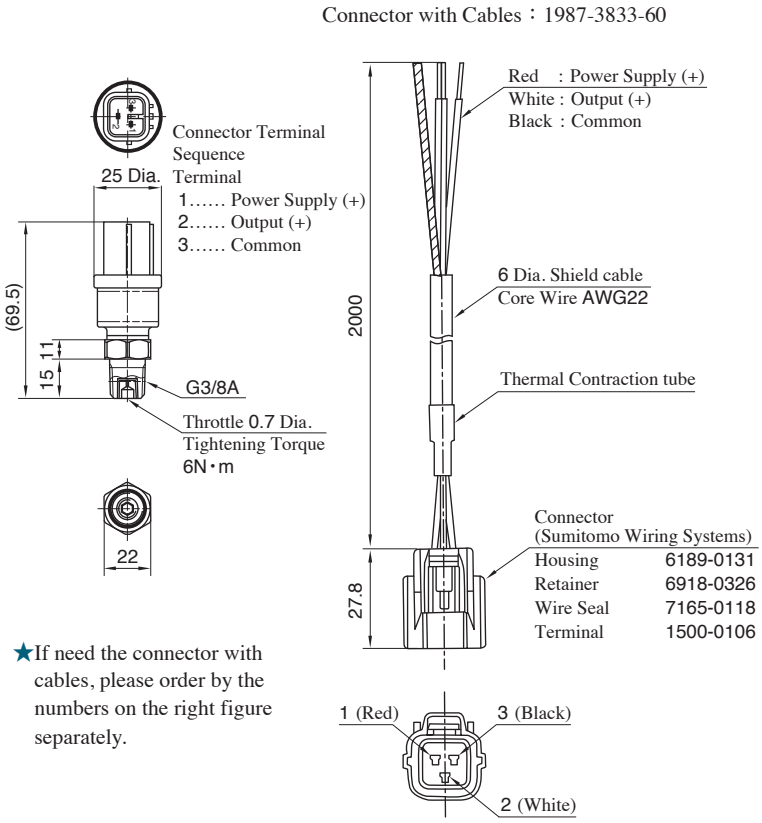
No.	Terminal Name			No.	Terminal Name		
1	Inverter Output	Output	OUT	11	Sequence Output	Low Inverter Frequency Signal	OUT1
2		Common	COM	12		Alarm	OUT2
3		Shield	SG	13		Output Common	OUTC
4	Pressure Sensor	Power Supply	+5V	14	Power Supply Range 85 - 264 [V] AC		AC
5		Input	IN	15	Power Supply 100·200 [V] AC		
6		Common	COM	16	Ground		FG
7		Shield	SG				
8	Sequence Input	RUN	IN1				
9		Alarm Reset	IN2				
10		Input Common	INC				

Pressure Sensor

1501-PK314344-3

Specifications

Model Numbers / Descriptions	1501-PK314344-3
Rated Pressure Range	0 - 35 MPa
Allowable Max. Pres.	52.5 MPa
Output Range	0.5 - 4.5 V (Supply Voltage 5.00 V)
Supply Voltage	5.0±0.5 V DC (Output is proportional to supply voltage.)
Current Consumption	10 mA or less
Load Resistance	10 kΩ or more
Load Capacity	1000 pF or less
Output Impedance	10 Ω or less
Insultation Resistance	100 MΩor more (50 V DC)
Voltage Resistance	150 V AC (1 min)
Precision	±1.0 % F.S. (23±2°C) ±3.0 % F.S. (Temperature Compensated Range)
Response Time	1 ms or less
Operating Temperature Range	–40 - +120°C
Temperature Compensated Range	–30 - +120°C
Vibration-Proof	147 m/s^2 (33.3 - 200 Hz)
Shock-Proof	490 m/s^2 (11 ms or less)
Dust-Proof / Water-Proof	IP 65
Approx. Mass	80 g

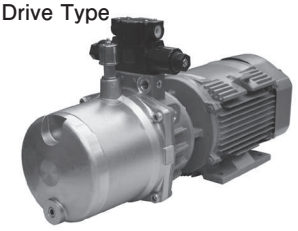


★If need the connector with cables, please order by the numbers on the right figure separately.

Power Packages

YUKEN's Power Packages have compactly integrated with compact high pressure vane pump, relief valve and oil tank etc., also be able to built-in 01 series solenoid operated directional valve (or manually operated directional valve) and modular valve.
It is easy to construct hydraulic circuit only by stacking solenoid operated valves and modular valves, so widely applicable as for compact hydraulic unit. There are two types of drive system, one is the pulley drive type with flow adjustment and another is the motor drive type(motor built-in type).

Motor Drive Type

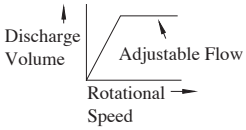


Pulley Drive Type with Flow Adjustment

Features

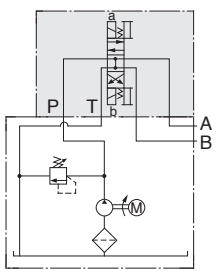
- Because of using YUKEN vane pumps with good reputation, so that achieved good performance and long life.
- Only by adding or changing modular valves stacked on the power package, it is able to add or change hydraulic circuit easily and quickly.
- Can use immediately after hydraulic piping between the power package and actuators.

Specifications

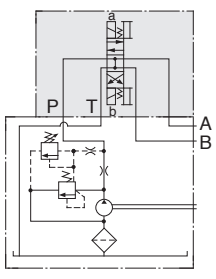
Type	Descriptions	Model Numbers	Geometric Displacement of Pump cm^3/rev	Max. Operating Pres. MPa	Rotational Speed r/min Max.	Rotational Speed r/min Min.	Reservoir Capacity L	Mass★2 kg
Motor Drive Type	This power package is driven at the voltage of 200/220 V AC. Suitable for using on cargo handling machine or general industrial machine, etc.	PMR2- 6	5.8	14	(Motor) 1.5 kW× 6 P 2.2 kW× 4 P 200 V AC, 50 Hz 220 V AC, 60 Hz		3.4	(1.5 kW×6P) 50 (2.2 kW×4P) 51.5
		PMR2- 8	8.0					
		PMR2-10	9.4					
		PMR2-12	12.2					
		PMR2-14	13.7					
		PMR2-17	16.6					
Pulley Drive Type with Flow Adjustment	This type is equipped with flow adjustment system that can keep discharge volume of the package stable regardless of increase or decrease of engine rotational speed, so that is suitable for using as power steering pump. 	PPF2- 6	5.8	10.5	4000	500 (1000)★1	3.4	(With V1S Type Pulley) 11.4 (With V1 Type Pulley) 11.8
		PPF2- 8	8.0					
		PPF2-10	9.4		3000			
		PPF2-12	12.2					
		PPF2-14	13.7		2800			
		PPF2-17	16.6		2500			

★1. Please set the minimum rotational speed on starting at the value in parenthesis.
★2. The values of mass are including hydraulic fluids in case of without control valves (circuit symbol “00”). In case of the mass with control valves, please add the additional mass of “standard circuit”on pages K-54 and K-55.

Graphic Symbols



PMR2 Type



PPF2 Type

Note) The graphic symbols of stacked solenoid operated directional valve (or manually operated directional valve) and modular valve are filled in the shaded parts of the graphic symbols left. The 15 kinds of circuit are available as standard. For details, refer to the standard circuit on pages K-54 and K-55.

Model Number Designation

PMR2	−6	——	−70	——	−A	−01	−A200	——	——	−40
PPF2	−6	−3	−70	−R	——	−01	−A200	−V1	−F	−35
Series Number	Geometric Displacement of Pump cm^3/rev	Adj. Flow L/min	Relief Valve Setting Pressure	Direction of Pump Rotation	Electric Motor Code	Circuit Symbol ★2	Directional Valve Type ★3	Pulley Type	Mounting Type	Design Number
PMR2 : Motor Drive Type	★4 6 : 5.8 8 : 8.0 10 : 9.4 12 : 12.2 14 : 13.7 17 : 16.6	——	Please specify at ★1 the range of 3.5 - 14 MPa.	(Clockwise Viewed from the Motor Fan)	A : 1.5 kW×6 P B : 2.2 kW×4 P 200/220V AC N : Without Motor	00 01 02 03 04 05 06 07 08	M : Manually Operated Directional Valve Solenoid Operated Directional Valve : Coil Type (DC) D12, D24 (AC) A100, A200 Circuit Symbol "00" or "08" : None	——	——	40
PPF2 : Pulley Drive Type with Flow Adjustment		★4 2, 3, 4 7, 8, 9 10, 12 15, 20 25	Please specify at ★1 the range of 3.5 - 10.5 MPa.	(Viewed from the Shaft End) R : Clockwise L : Anti-Clockwise	——			N : Without Pulley V1S : JIS 5 V Type 158.4 Dia. Single Pulley V1 : JIS 5 V Type 208.4 Dia. Single Pulley	F : Flange Mtg. Type L : Foot Mtg. Type	35

★ 1. Please specify the controlled pressure as of MPa×10.
(Ex.) ●In Case of 3.5 MPa…… Please specify as of 35.

★ 2. For details of circuit symbol, please refer to the standard circuit on pages K-54 and K-55. In case of "00", no control valves embedded.

★ 3. As for solenoid operated directional valves, we use the DSG-01 series solenoid operated directional valves. For details of coil type, please refer to page K-76. As for manually operated directional valves, we use the DMG-01 models.

★ 4. For the combination possibility between the geometric displacement of pump and the adjustment flow, see the table below.

Geometric Displacement of Pump	Adj. Flow L/min										
	2	3	4	7	8	9	10	12	15	20	25
6	○	○	○	○	○	○					
8	○	○	○	○	○	○	○	○			
10	○	○	○	○	○	○	○	○	○		
12			○	○	○	○	○	○	○	○	
14				○	○	○	○	○	○	○	○
17						○	○	○	○	○	○

Instructions

Exchange Period of Hydraulic Fluid

Please exchange after having operated 100 hours at the first time.
After then, please exchange every 500 hours or one year of operation.

Fluid Supply and Oil Level Change

Please supply oil after the air breather removed.
Confirm the amount of supplied oil by the oil gauge attached on the air breather.
Please keep oil level between low limit and high limit mark at the range of 3.2 - 3.4 L. (Avoid over fluid supply that will cause the external oil leakage from the air breather with the oil level change.)
The low limit fluid level is on the center axial line (2.1 L), so use within approx. 1.3 L of the oil level change by the actuator operation.
If use as like as inclined oil level condition, please consult us separately because of the restriction of oil level change amount.

Mounting Position

As for mounting, please mount horizontally with the air breather upward.
(Avoid vertical mounting with the tank upward or downward.)

Axial Load (Pulley Drive Type with Flow Adjustment)

As for the axial load, please keep less than 1000 N for radial load and less than 100 N for thrust load.

Notice on Starting

On starting, please perform intermittent operation under unloaded condition.

Please avoid long time operation under whole amount relieving condition that will waste energy and cause oil temperature rise.

Relief Valve Setting Pressure

The discharge pressure on shipping is set by the "Relief Valve Setting Pressure"in the above table "Model Number Designation".
Regardless of the designation, the relief valve setting pressure is able to adjust at the range of 3.5 - 14 MPa (3.5 - 10.5 MPa only for PPF2 type).
When pressure increasing, please pay enough attention to the motor/engine overload by power requirement increase.

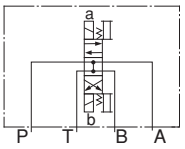
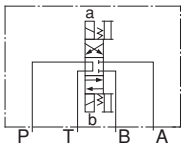
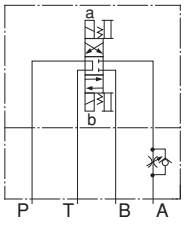
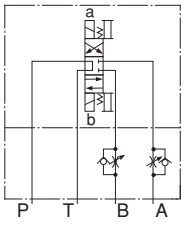
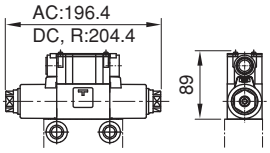
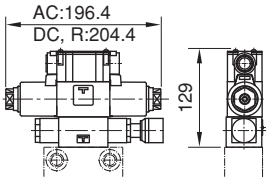
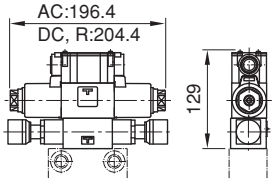
Standard Circuit

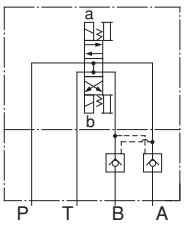
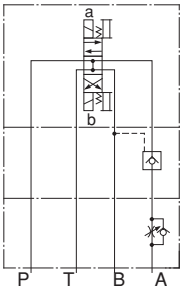
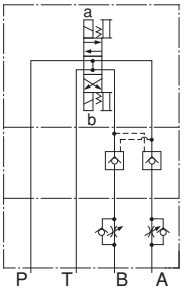
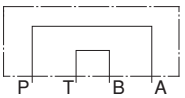
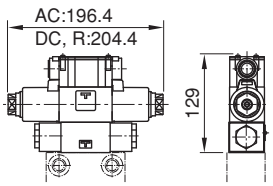
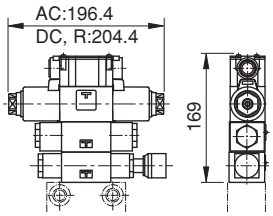
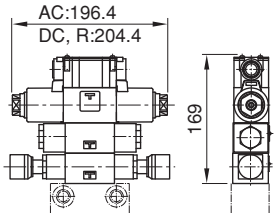
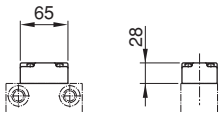
The hydraulic circuit configuration is easy only by stacking DSG-01 series solenoid operated directional valve or manually operated directional valve and modular valves on this power package.

There are 15 types of standard circuits for power package as the chart below. If need non-standard circuits, please specify the power package with no control valves (circuit symbol "00") and order DSG-01 series solenoid operated directional valve or manually operated directional valve and modular valves separately.

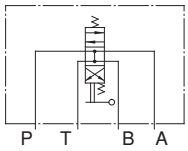
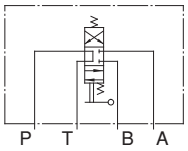
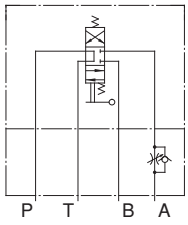
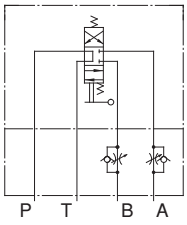
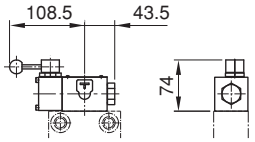
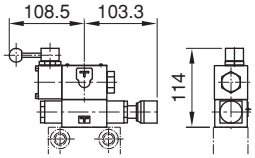
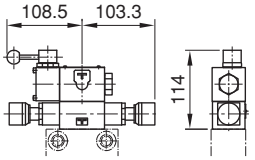
For details of DSG-01 series solenoid operated directional valve, manually operated directional valve and modular valves, please refer to the applicable pages on catalog of "E: DIRECTIONAL CONTROLS" and "F: MODULAR VALVES".

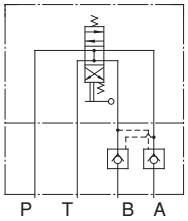
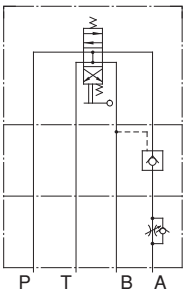
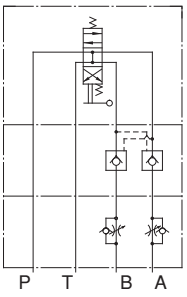
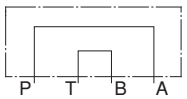
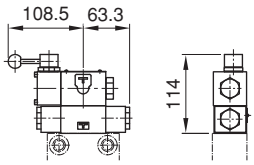
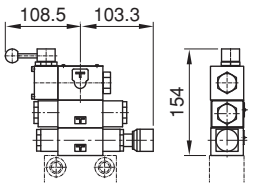
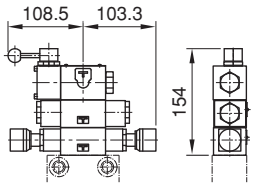
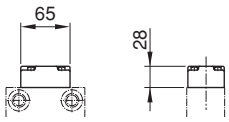
With Solenoid Operated Directional Valve

Circuit Symbols	01	02	03	04
Graphic Symbols				
Dimensions				
Additional Mass	1.9 kg		3.3 kg	3.5 kg

Circuit Symbols	05	06	07	08
Graphic Symbols				
Dimensions				
Additional Mass	3.2 kg	4.5 kg	4.7 kg	0.6 kg

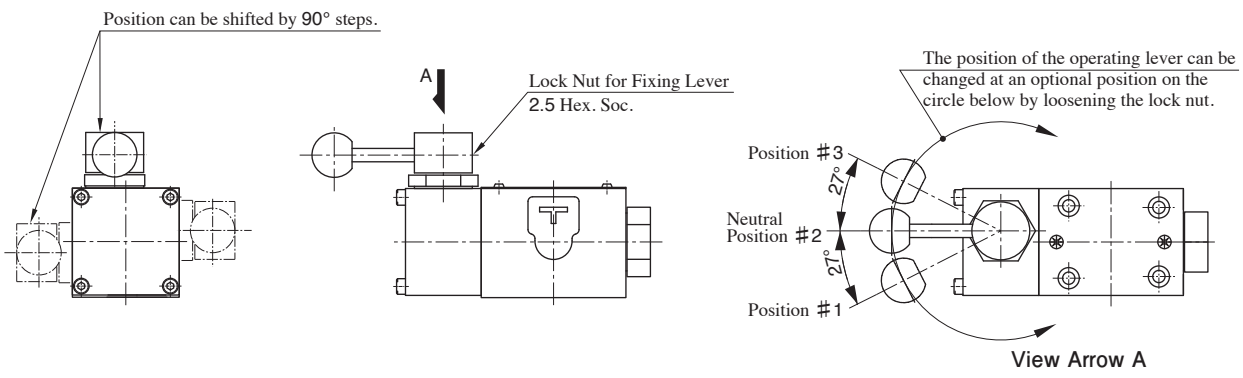
With Manually Operated Directional Valve

Circuit Symbols	01	02	03	04
Graphic Symbols				
Dimensions				
Additional Mass	1.8 kg		3.2 kg	3.4 kg

Circuit Symbols	05	06	07	08
Graphic Symbols				
Dimensions				
Additional Mass	3.1 kg	4.4 kg	4.6 kg	0.6 kg

Note) The lever position of manually operated directional valve can be changed. (See the drawing below)

Change The Lever Position of Manually Operated Directional Valve

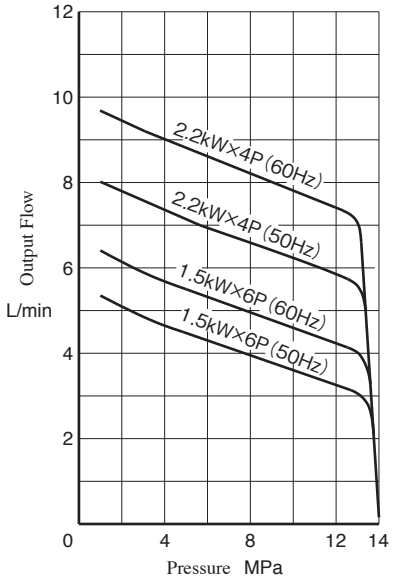


Characteristics of PMR2 Type

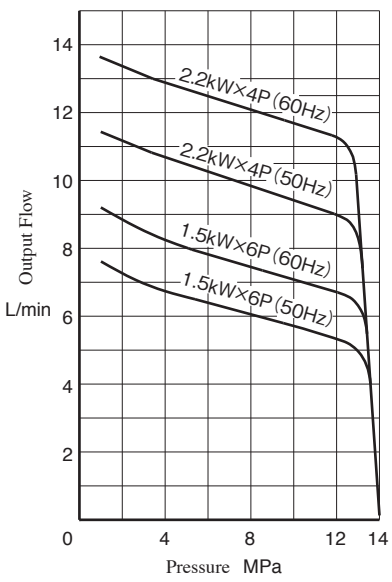
The below charts show the representative characteristics of viscosity 20 mm²/s.

■ Pressure vs. Output Flow

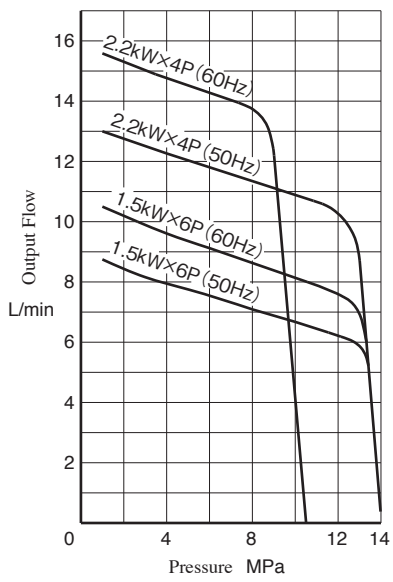
PMR2-6



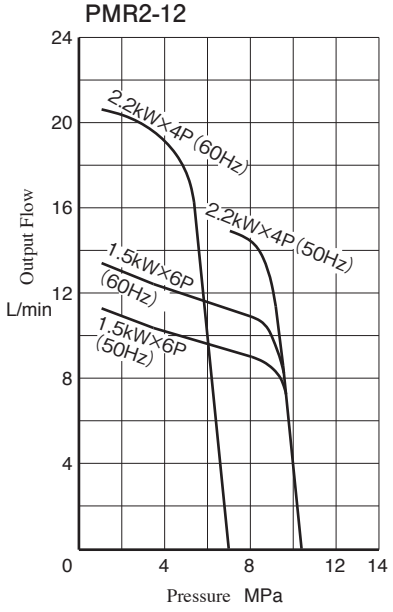
PMR2-8



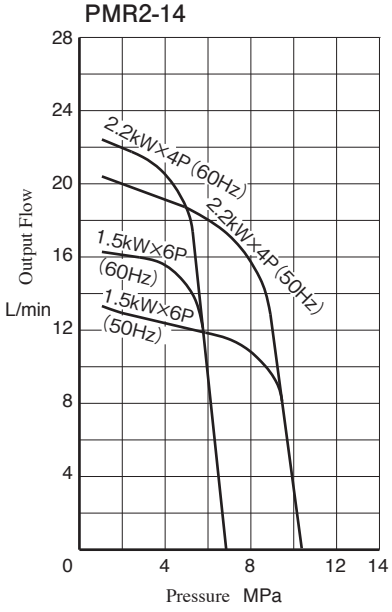
PMR2-10



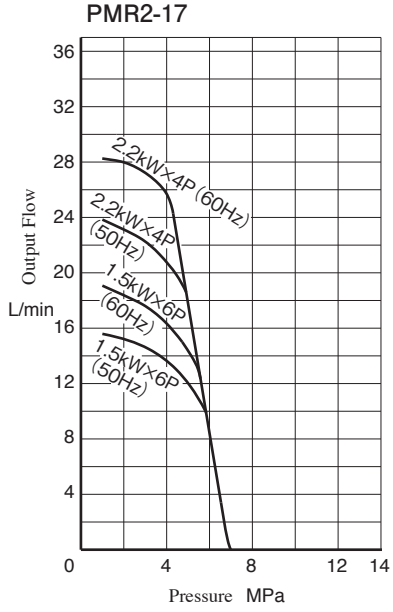
PMR2-12



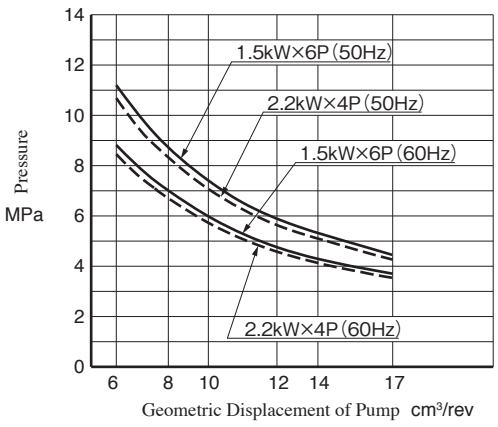
PMR2-14



PMR2-17



Max. Operating Pressure at Rated Motor Power



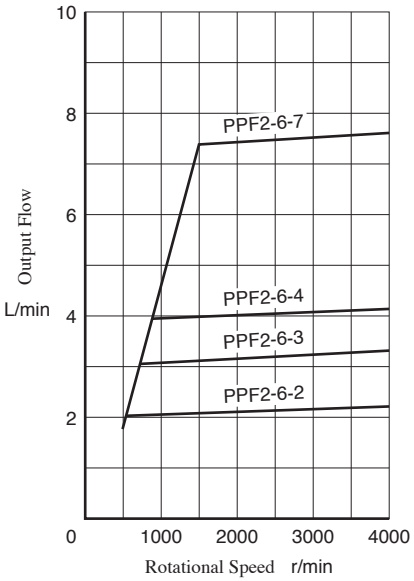
Note) The characteristics of pressure vs. output flow above indicate at the range of rated motor power 200% or less.
For the max. operating pressure at rated motor power, see the left chart.

Characteristics of PPF2 Type

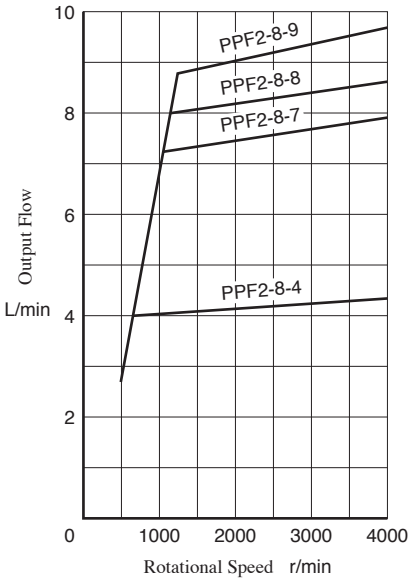
The below charts show the representative characteristics of viscosity 20 mm²/s.

Rotational Speed vs. Output Flow (Pressure 6 MPa)

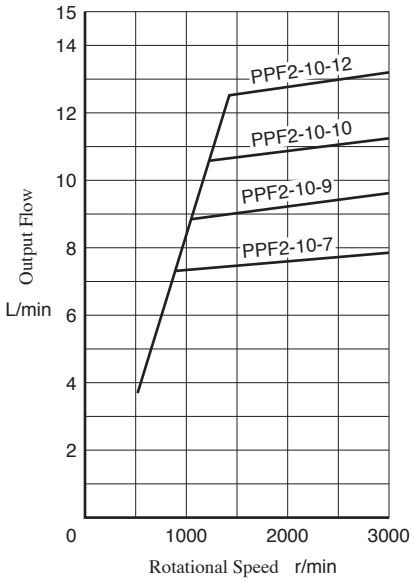
PPF2-6-＊



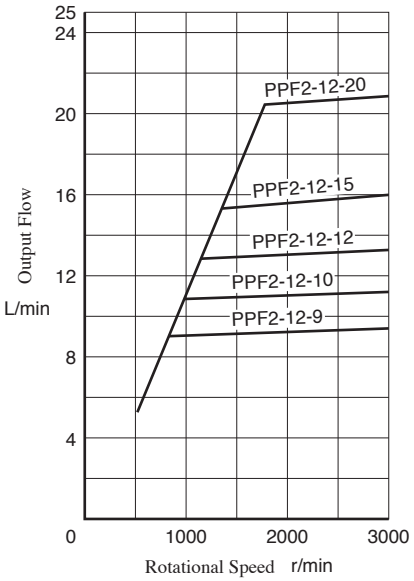
PPF2-8-＊



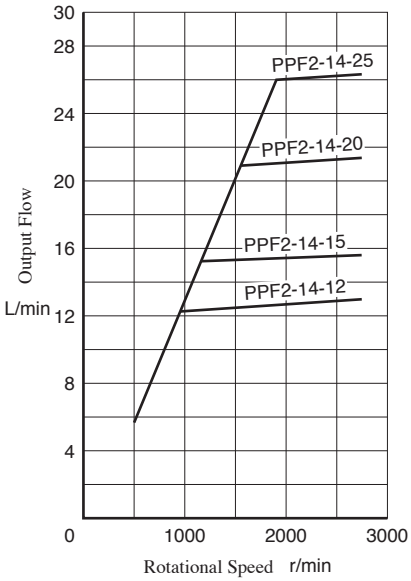
PPF2-10-＊



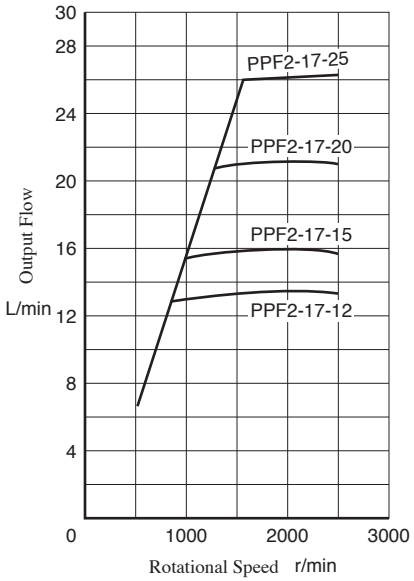
PPF2-12-＊



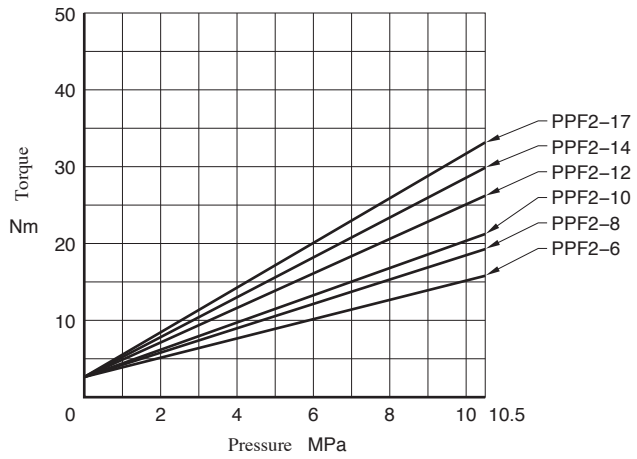
PPF2-14-＊



PPF2-17-＊



Pressure vs. Torque



Axial Input

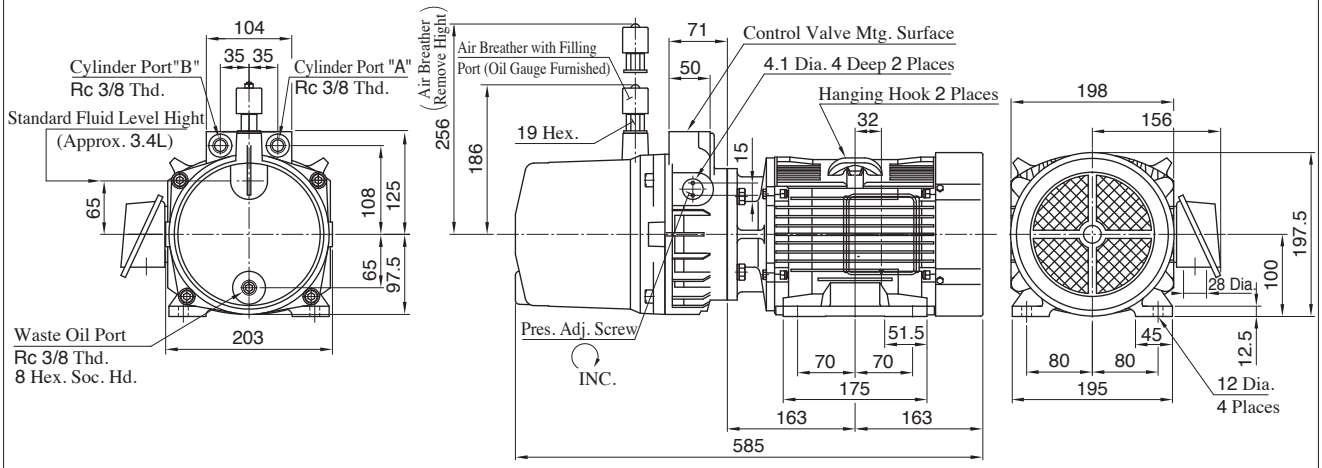
The requirement torque is determined by geometric displacement of pump and pressure regardless of the rotational speed.
The axial input is calculated from the formula below.

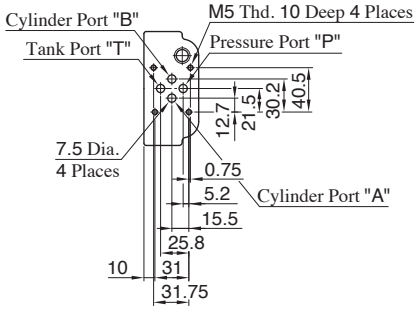
$$Li = \frac{2\pi TN}{60000}$$

Li : Axial Input kW
T : Requirement Torque Nm
N : Rotational Speed r/min

K
Power Packages

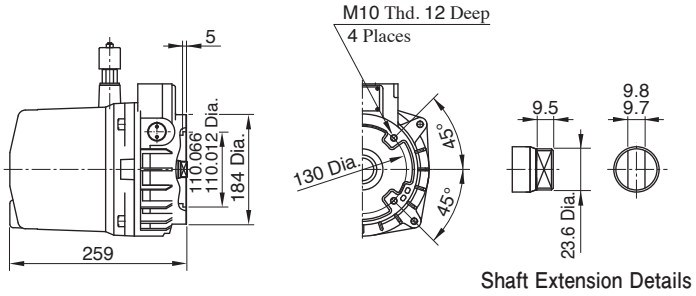
PMR2-＊-＊-$\frac{A}{B}$-00





Dimensions of Control Valve Mtg. Surface
(ISO 4401-03-02-0-94)

PMR2-＊-＊-N-00

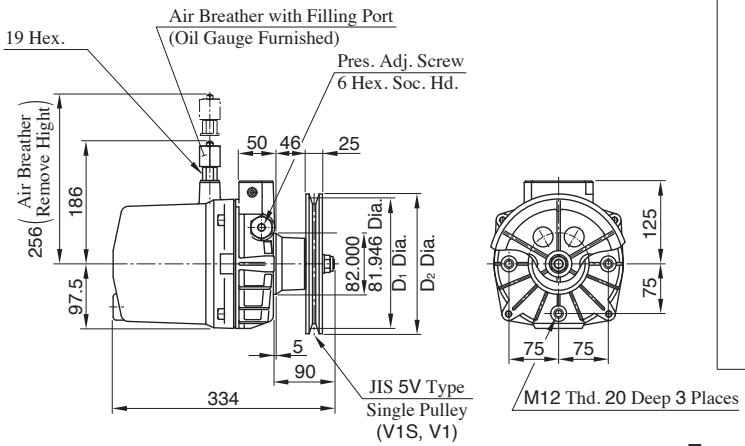


Shaft Extension Details

For other dimensions, refer to the drawing above.

PPF2-＊-＊-＊-＊-00

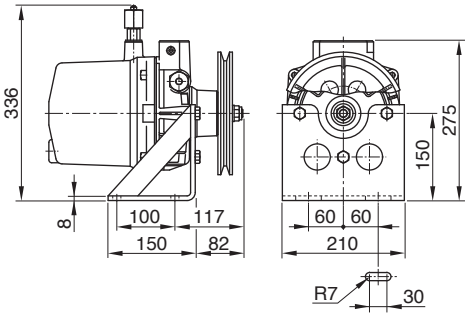
Flange Mtg. Type



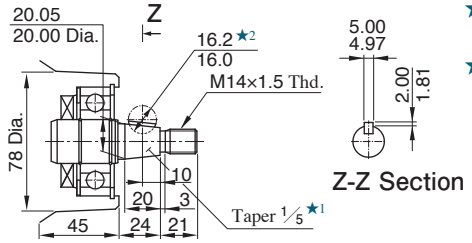
Pulley Type	D_1	D_2
V1S	158.4	161
V1	208.4	211

●For other dimensions, refer to the PMR2 type above.

Foot Mtg. Type



For other dimensions, refer to the flange mtg. type.



Z-Z Section

Shaft Extension Details

★1. Taper Angle Tolerance: :
JIS B 0614 AT6

★2. Semilunar Key: :
JIS B 1301 WA 5×16

Interchangeability between Current and New Models

PMR2,35 Design → 40 Design

Major Changes

To conform to The Motor Top Runner Criteria, we changed the motor drive type power package PMR2 model.

・Motor efficiency class is changed to IE3, so the motor specifications improved generally.

・The sizes of the current and new motor are almost same, the mass increased (mass ratio 139,145%).

Comparison of Motor Specifications

Output×Number of Poles	Voltage－Frequency V Hz	Rated Current A	Inrush Current A	Rotational Speed r/min	Insulation Class
1.5 kW×6P	200－50	8.0 (7.5)	63.9 (35.5)	965 (948)	F (E)
	200－60	7.0 (6.8)	53.3 (32.5)	1160 (1134)	
	220－60	7.0 (6.6)	58.6 (35.8)	1170 (1147)	
2.2 kW×4P	200－50	9.8 (9.9)	93.2 (58.0)	1460 (1448)	F (E)
	200－60	8.8 (8.9)	79.1 (53.0)	1755 (1730)	
	220－60	8.6 (8.6)	87.0 (58.5)	1765 (1744)	

Note 1) The difference between current and new design indicates in the parenthesis.
Without Parenthesis: New 40 Design, Within Parenthesis: Current 35 Design

2) The starting current of new 40 design is larger in comparison with current 35 design. Please pay attention to the power distribution design.

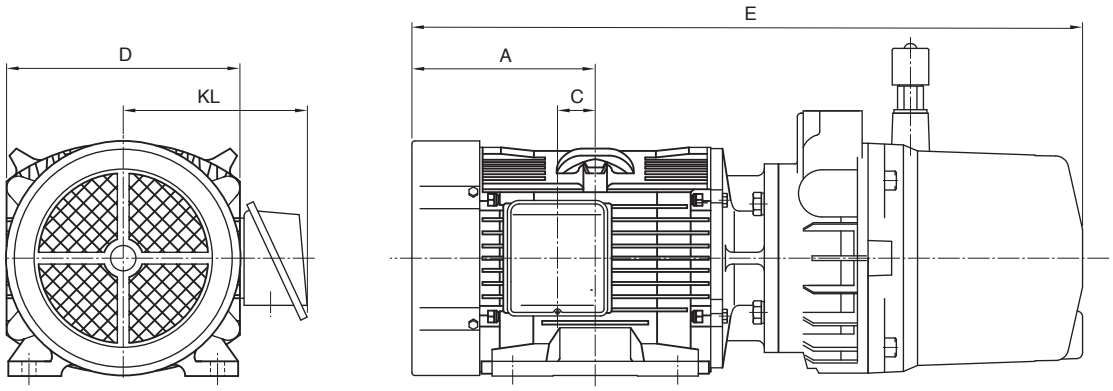
3) The rotational speed of new 40 design is faster in comparison with current 35 design by the improvement of slip down.
By the operating conditions, "Output Increase"or "Over Flow"is possible, so please pay attention.

＊Because of the improvement in the flow rate characteristics of power package, actually the output increase.

Interchangeability in Installation

There is interchangeability in installation, but the dimension from the center of motor to the end of terminal box (KL) is slightly longer.

Comparison of Dimensions

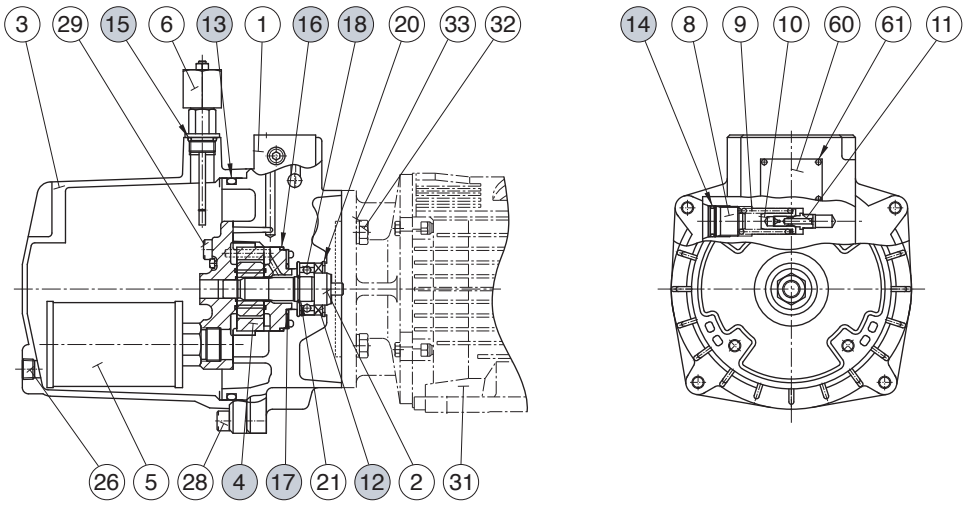


Model Numbers	Dimensions mm					Mass kg
	A	C	D	E	KL	
Current PMR2-＊-＊-A-＊-＊-35	163.5	46	199	585.5	153	36
New PMR2-＊-＊-A-＊-＊-40	163	32	198	585	156	50
Current PMR2-＊-＊-B-＊-＊-35	163.5	46	199	585.5	153	35.5
New PMR2-＊-＊-B-＊-＊-40	163	32	198	585	156	51.5

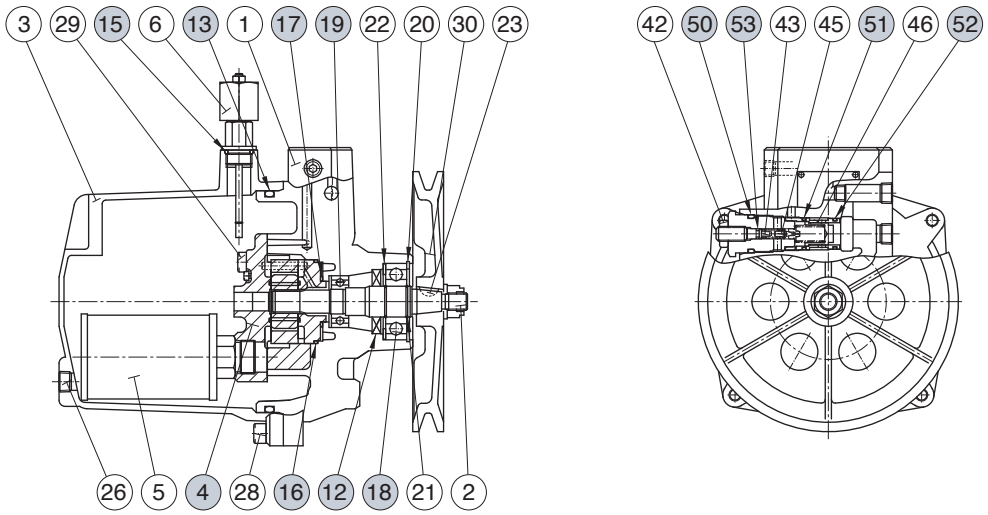
Note) The other dimensions are same, please refer to the drawing of dimensions.

List of Cartridge Kits, Seals and Bearings

PMR2



PPF2



List of Seals and Bearings

Item	Name of Parts	Part Numbers		Qty.
		PMR2	PPF2	
12	Oil Seal	ISD 26428	SC 25528	1
13	O-Ring	OR NBR-70-1 G170-N	OR NBR-70-1 G170-N	1
14	O-Ring	OR NBR-90 P21-N	—	1
15	O-Ring	OR NBR-90 P18-N	OR NBR-90 P18-N	1
16	O-Ring	AS568-144 (FKM-90)		(1)
17	O-Ring	AS568-125 (FKM-90)		(1)
50	O-Ring	—	OR NBR-90 P25-N	1
51	O-Ring	—	OR NBR-90 P22-N	1
52	O-Ring	—	OR NBR-90 P21-N	1
53	O-Ring	—	OR NBR-70-1 P5-N	1
18	Bearing	6004	6305DDU-D4M-K	1
19	Bearing	—	6004	1

Note) O-Rings of item ⑯ and ⑰ are included in the cartridge kit ④.

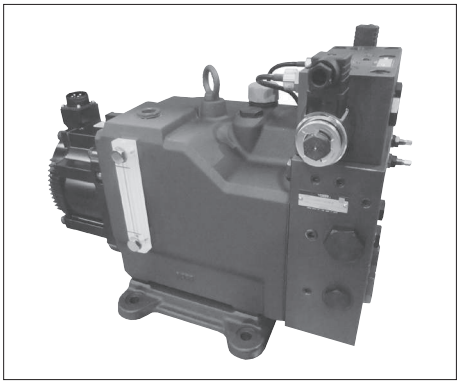
List of Cartridge Kits

Model Numbers	④ Cartridge Kit Numbers
PMR2-★	CP2-★-R-40
PPF2-★-＊-＊-R	CP2-★-R-40
PPF2-★-＊-＊-L	CP2-★-L-40

Note) ★ parts in the chart above are filled by the geometric displacement of pump.
(Refer to the model number designation on page K-53)

Intelligent Hydraulic Servo Drive Pack

The IH (intelligent hydraulic) servo drive pack is a compact energy-saving and low-noise hydraulic device which is combined as one with the AC servo motor, bidirectional rotation piston pump, reservoir and hydraulic control circuit. This combination can control the number of revolutions of the servo motor and adjust the discharge and pressure of the pump. This device can be combined with the sensor – equipped cylinder and dedicated controller to facilitate the configuration of a position, speed and pressure control system.



Energy Saving

The operation at the number of revolutions meeting the machine requirements (flow rate and pressure) reduces useless power losses and provides energy savings.
Furthermore, by using bidirectional rotation pump, need no directional control valves, so can minimize pressure loss.

Low Noise

During pressure control, the pump rotation compensating for the internal leakage of oil pressure provides low revolutions with almost no noise.
During flow control, the number of revolutions meeting the machine requirements ensures lower noise generation than conventional devices.

Compact

A substantial reduction in heat generation enables the operation with a minimum amount of fluid oil for cylinder operation in addition something extra oil. This results in a combination of the servo motor, piston pump, reservoir and hydraulic control circuit in one, providing energy savings.
Incorporation into an integral part of the machine is also possible.

Digital Control

Software control of the dedicated controller allows a system to have a great deal of versatility.
Digital control parameter setting facilitates to operate the system and its maintenance, furthermore the analog input/output ports provide as standard for user interface.

Optional Circuit Support

As for the option of tare load circuit, it is possible to built-in counterbalance valve and shut-off valve. (only for YSD2 type and YSD3 type)

Specifications

Model Numbers	Geometric Displacement of Pump cm^3/rev	Max. Rotational Speed r/min	Thrust Output and Cylinder Bore	Reservoir Capacity cm^3	Oil Level Variations cm^3
YSD1-✻-09/13	6、10	2000★	20 - 30 kN (Cylinder Bore 63)	2500	1500
YSD2-✻-24/29/44	6、10、16		50 - 60 kN (Cylinder Bore 80)	4200	2500
YSD3-✻-55/75	10、16、30		100 kN (Cylinder Bore 100)	5800	3500

★There are cases when the max. rotational speed is limited by operating pressure and motor output.

Instructions

Transportation

Use the hanging hook embedded with this pack for transportation. Don't hang a kind of wires for lifting at the place except for that of hanging hook.

Piping

When use steel pipes, please be careful not to apply excessive force by piping on this pack.

Oil Supply

The oil gauge is embedded with this pack. Before operation, please supply specified hydraulic fluid oil from reservoir filling port to the standard level of oil gauge.

First Operation

At the first operation after installation, start-up with the pressure signal set near by unload pressure and confirm the fluid suctioned normally.

Air Vent

The air mixing inside the equipment or pipe may occur some vibrations, so please vent air completely.
As of YSD2/YSD3 type, air vent valves embedded on two places of rod side and head side, please operate under the condition that the applicable ports of each air vent valve are set on discharge side.(Never operate under the condition set on suction side.)

In Operation

In operation, the temperatures of AC servo motor and body surface are high, so please prevent hands or body from touching the pack.

Area Difference between Cap Side and Rod Side of Cylinder

If the area difference between cap side and rod side of cylinder is small, please contact us separately.

Exchange Period of Hydraulic Fluid

After first operation, please exchange the hydraulic fluid after three months or operating 500 hours later. After the first exchange, please exchange about every two years or total 5000 hours operation, whichever is earlier.
If the contamination level or characteristic of hydraulic fluid is outside of specified values, please exchange the hydraulic fluid regardless of the period above.

Model Number Designation

N−	YSD3	−F	−55	A	55★1	−10	−H	R	−B	A★2	B★2	R	−30
Sub Ass'y Code	Series Number	Mtg. Type	Servo Motor Output kW	Direction of servo Motor Connection (Viewed from the Motor End)	Servo Pack kW	Geometric Displacement of Pump cm³/rev	Relief Valve Setting Pres. MPa	Pressure Sensor	Option Related				
									Counterbalance Valve	Pres. Adj. Range of Head Side Counterbalance Valve MPa	Pres. Adj. Range of Rod Side Counterbalance Valve MPa	Shut-off Valve	Design Number
N : Pump Motor Sub Ass'y (Omit if not required)	YSD1	F : Flange Mtg. Type B : Blacket Mtg. Type	N1 : Without Servo Motor (For 0.85kW) N2 : Without Servo Motor (For 1.3kW) 09 : 0.85 13 : 1.3	A : Upward B : Downward R : Right L : Left	N : None 09 : 0.85 13 : 1.3	6 : 6 10 : 10	B : 9.5 C : 18.5	H : Head Side R : Rod Side B : Both Side N : Without Pressure Sensor	—	—	—	—	20
	YSD2		N : Without Servo Motor 24 : 2.4 29 : 2.9 44 : 4.4		N : None 24 : 2.4 29 : 2.9 44 : 4.4	6 : 6 10 : 10 16 : 16	B : 9.5 C : 18.5 H : 23.5		H : Head Side R : Rod Side B : Both Side None : Without Counterbalance Valve	B : ★3 - 7		H : Head Side R : Rod Side B : Both Side None : Without Shut-off Valve	30
	YSD3		N : Without Servo Motor 55 : 5.5 75 : 7.5		N : None 55 : 5.5 75 : 7.5	10 : 10 16 : 16 30 : 30				N : ★3 - 1.8 A : 1.8 - 3.5 B : 3.5 - 7			

★1. If pump motor sub ass'y is selected, no need to fill in this item (Not selectable).
★2. If select those of without counterbalance valves, this item is none.
★3. Please refer to the "Minimum Adj. Pres. Characteristics"(Pages K-66 and K-67).

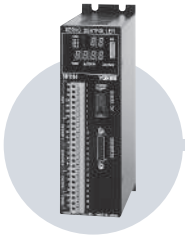
System Configuration

■Confirm of User Specifications

Control Details:
Position/Pressure/Speed Control

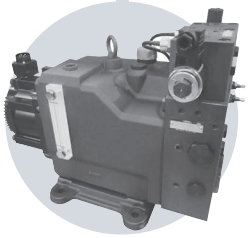
Electrical Interface:
Command Input: Analog ±10 V etc.
Monitor Output: As Above
Sequence I/O

IH Controller
Model Numbers : SK1114-11

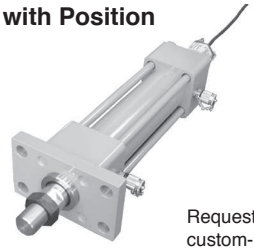


Servo Pack Applicable for AC Servo Motor

N-YSD



Cylinder with Position Sensor

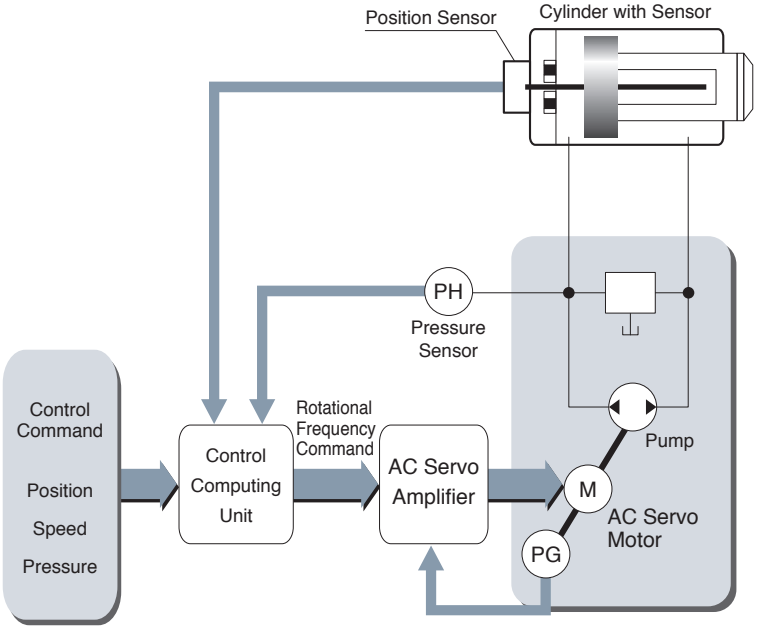


Request us for your custom-made.

Note) Model number《YSD＊》does not include IH Controller: SK1114-11 and Cylinder with Position Sensor.
If use those equipments, please order separately.

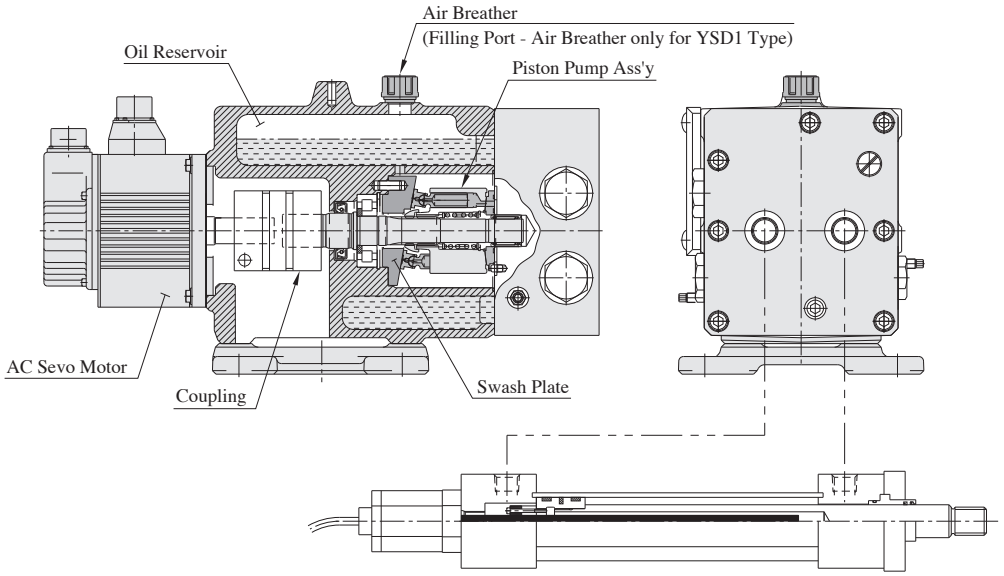
Operation

The bidirectional revolution piston pump is driven by AC servo motor and supply pressured oil to normal or reverse directions. So this is a simple hydraulic circuit only to connect the load cylinder on both output ports. The fluid suction of pump is operated by supplying from cylinder back line and compensation by self-suction valve for excess/ efficiency of oil quantity. As of control, provide the control deviation output between upper signal and sensor signal to servo driver (AC servo amplifier), and construct the feedback loop by driving AC servo motor.

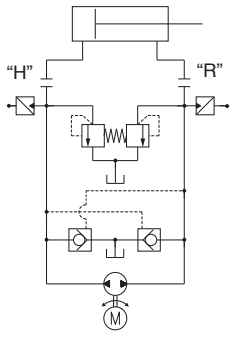


Structure / Hydraulic Circuit

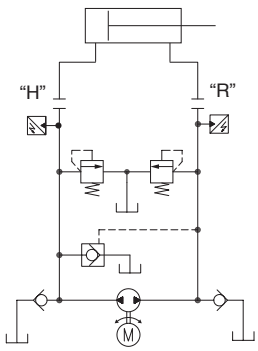
The IH servo drive pack pump is a bidirectional revolution piston pump which offers high performance in a wide range of very low to high revolution. The hydraulic control circuit simply consists of safety valves and self priming valve, without a control valve in the pump discharge line and the series line between cylinders. The reservoir is made compact by using space around the pump. With the oil supply port of hydraulic fluid doubling as an air breather and the side-mounted oil level gauge, the pump is well equipped as a hydraulic driving force.



Hydraulic Circuit



YSD1



YSD2/YSD3

Energy Saving Hydraulic System by Rotational Frequency Control

Energy saving on hydraulic control is achieved by sensing load pressure and control to avoid excess fluid discharge for the required (Output) = (Pressure) × (Flow). Piston pump generally discharge required flow by changing swash plate degree and control geometric displacement.
On the other hand, the rotational frequency control achieves by control rotational speed of motor. That is, (Flow) = (Rotational Speed) × (Geometric Displacement of Pump). In this case, sensing load pressure by pressure sensor and construct energy saving system by electric feedback control.
As the conventional way with the pump of high speed fixed rotation, there are some power losses from internal hydraulic drain and low efficiency of induction motor at low load operation. As the rotational frequency control system, the motor rotate on requirement and supply flow, so that is excellent as for energy saving system.

Example of Standard System Control

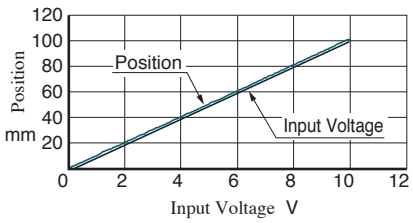
● Characteristics Example of The Position and Pressure Control System with IH Servo Drive Pack.

(Note: Control characteristics is different by system, please contact us separately.

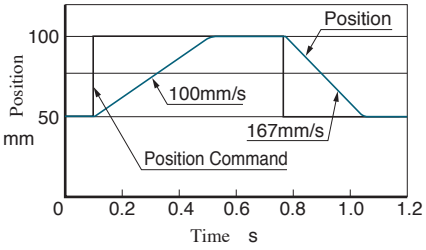
Structure Example : Cylinder 80 Dia.×45×250st Use YSD2-F-44A44-16

Characteristics Example of Position Control

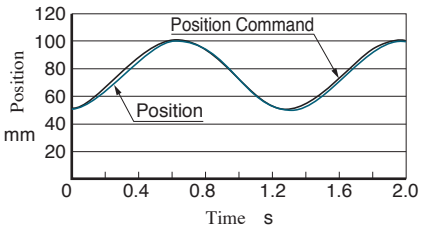
Input Voltage—Position



Step Response of Position

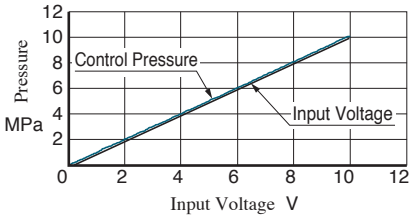


Sine Wave Input Tracking

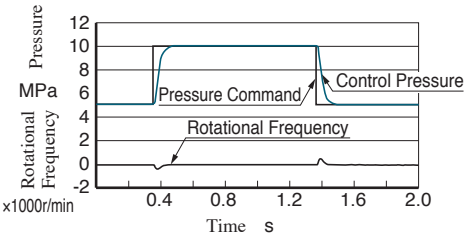


Characteristics Example of Pressure Control

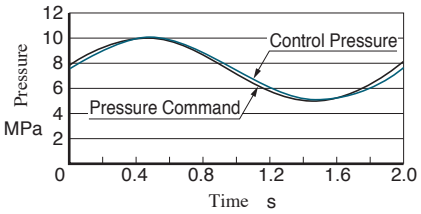
Input Voltage—Pressure



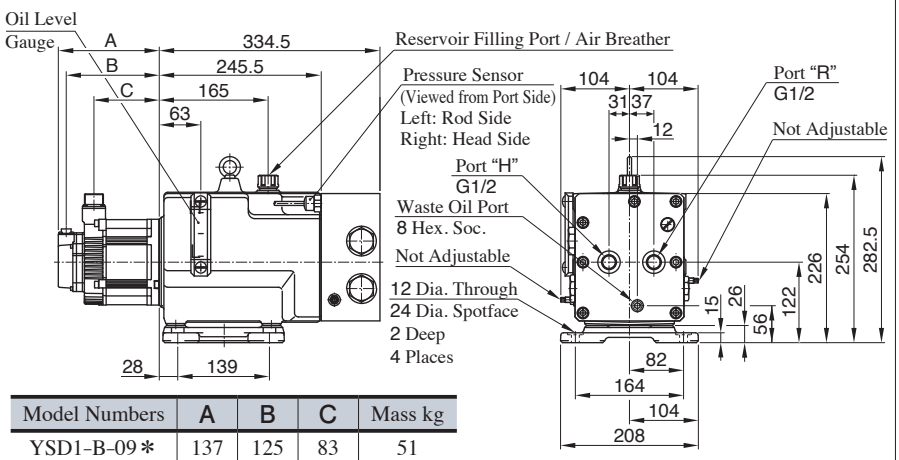
Step Response of Pressure



Sine Wave Input Tracking

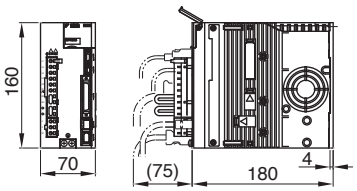


YSD1-B-$^{09}_{13}$＊＊-＊-＊＊＊-20 (Bracket Mtg. type)



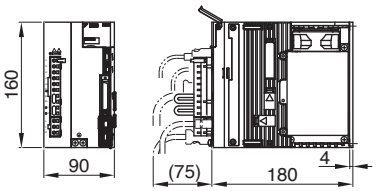
Model Numbers	A	B	C	Mass kg
YSD1-B-09＊	137	125	83	51
YSD1-B-13＊	153	141	99	52

●Servo Pack



For YSD1-＊-09

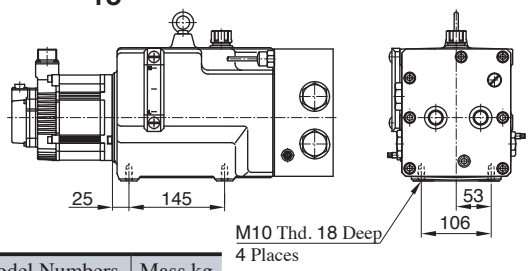
Mass : 1.5 kg



For YSD1-＊-13

Mass : 2.4 kg

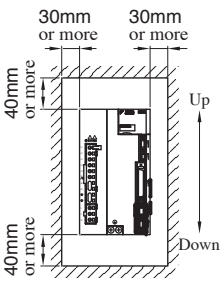
YSD1-F-$^{09}_{13}$＊＊-＊-＊＊＊-20 (Flange Mtg. type)



Model Numbers	Mass kg
YSD1-F-09＊	48
YSD1-F-13＊	49

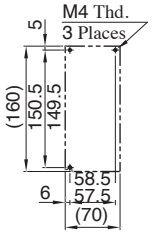
●For other dimensions, refer to the "Bracket Mtg. Type" above.

Mtg. Standard

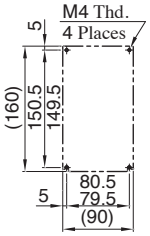


Dimension of Mtg. Hole

For YSD1-＊-09

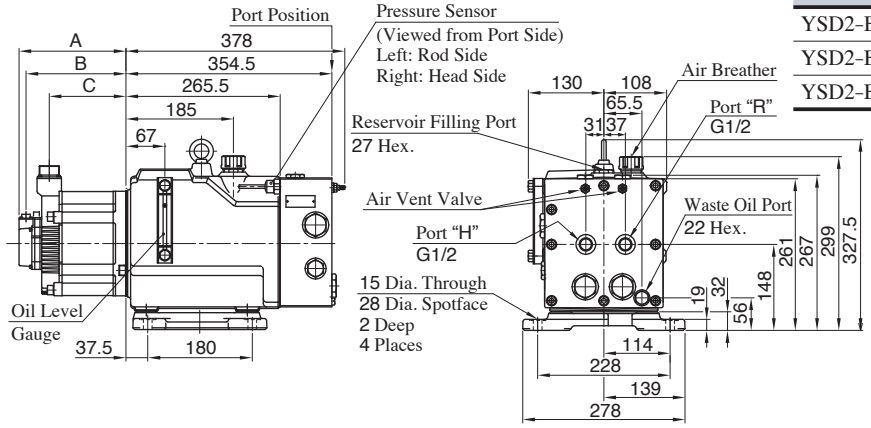


For YSD1-＊-13



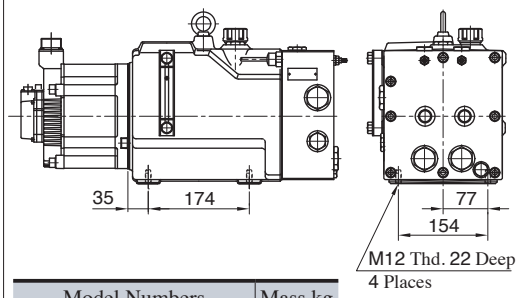
★If set the servo amplifiers in a row, please contact us separately.

YSD2-B-＊＊＊-＊-＊＊＊-30 (Bracket Mtg. type)



Model Numbers	A	B	C	Mass kg
YSD2-B-24＊＊-＊-＊＊＊-	160	148	108	84
YSD2-B-29＊＊-＊-＊＊＊-				
YSD2-B-44＊＊-＊-＊＊＊-	184	172	132	88

YSD2-F-＊＊＊-＊-＊＊＊-30 (Flange Mtg. type)



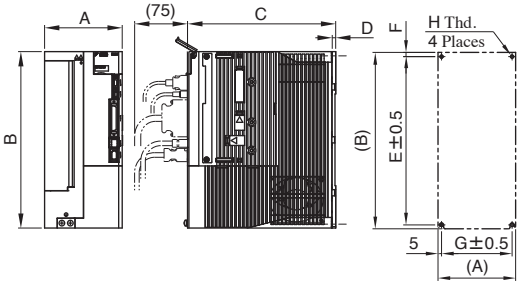
Model Numbers	Mass kg
YSD2-F-24＊＊-＊-＊＊＊-	78
YSD2-F-29＊＊-＊-＊＊＊-	
YSD2-F-44＊＊-＊-＊＊＊-	82

●For other dimensions, refer to the "Bracket Mtg. Type" above.

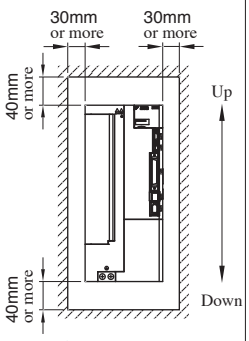
●Servo Pack

For YSD2-＊-24
For YSD2-＊-29/44

Dimension of Mtg. Hole



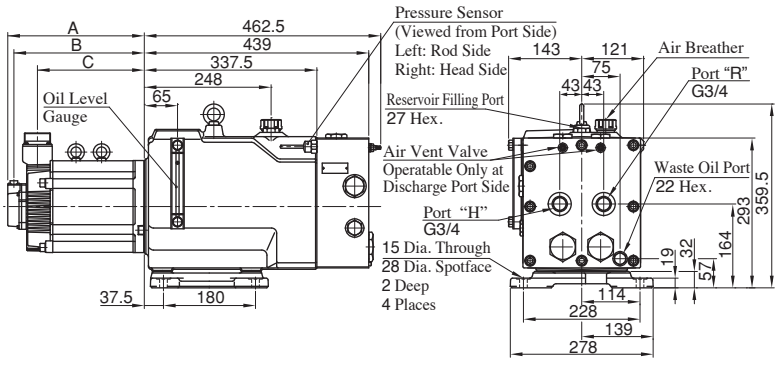
Mtg. Standard



Type	A	B	C	D	E	F	G	H	Mass kg
For YSD2-＊-24	100	180	180	4	170	5	90	M4	2.8
For YSD2-＊-29/44	110	250	210	5	238.5	6	100	M5	4.6

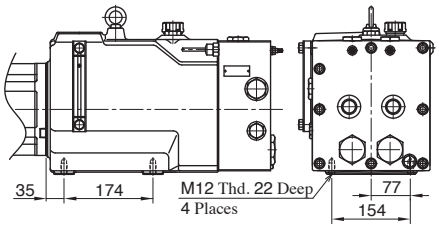
★If set the servo amplifiers in a row, please contact us separately.

YSD3-B-$\frac{55}{75}$＊＊-＊-＊＊＊-30 (Bracket Mtg. type)



Model Numbers	A	B	C	Mass kg
YSD3-B-55＊＊-＊-＊＊＊-	221	209	163	122
YSD3-B-75＊＊-＊-＊＊＊-	267	255	209	130

YSD3-F-$\frac{55}{75}$＊＊-＊-＊＊＊-30 (Flange Mtg. type)



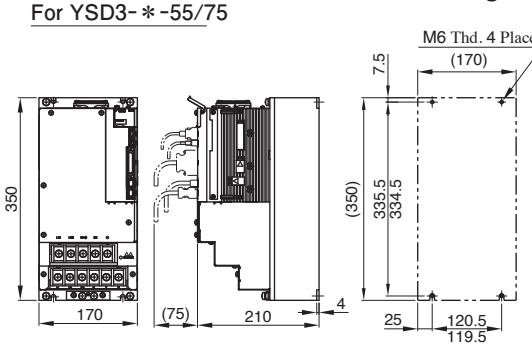
Model Numbers	Mass kg
YSD3-F-55＊＊-＊-＊＊＊-	116
YSD3-F-75＊＊-＊-＊＊＊-	124

●For other dimensions, refer to the "Bracket Mtg. Type" above.

●Servo Pack

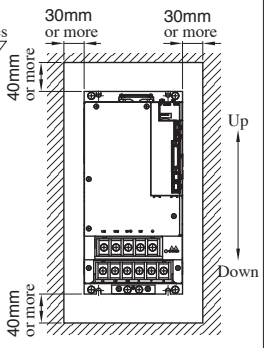
For YSD3-＊-55/75

Dimension of Mtg. Hole



Mass : 10.2 kg

Mtg. Standard

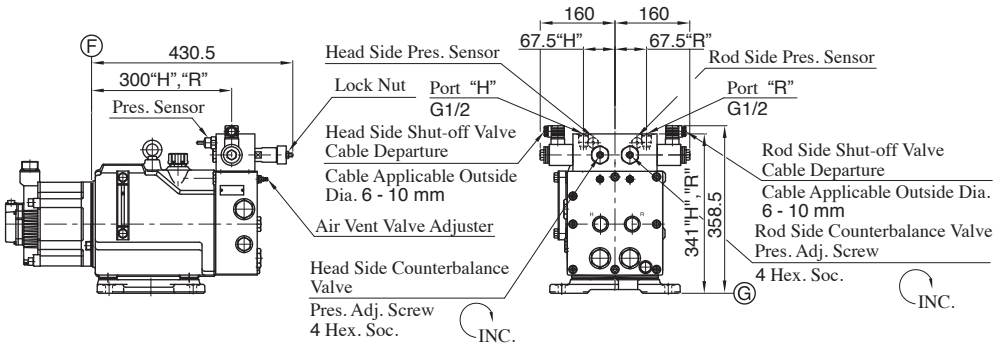


★If set the servo amplifiers in a row, please contact us separately.

Options

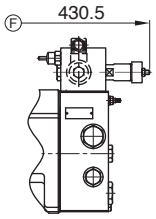
YSD2-∗-∗∗∗-∗-∗∗-BBBB

(Counterbalance Valves / Shut-off Valves : With Both Sides)

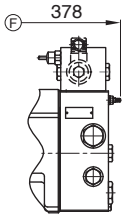


●For other dimensions, refer to "Standard"on the previous page.

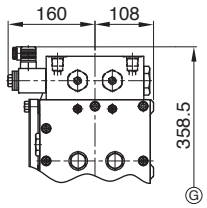
Counterbalance Valves : With Head Side or Rod Side



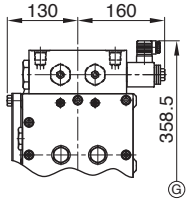
Counterbalance Valves : None



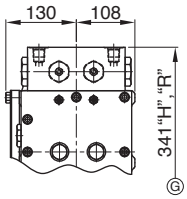
Shut-off Valves : With Head Side



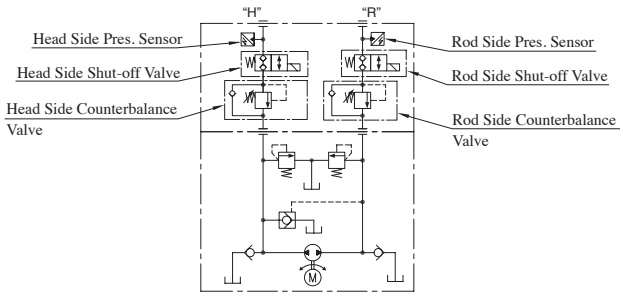
Shut-off Valves : With Rod Side



Shut-off Valves : None



Graphic Symbol



● Additional Mass with Options

With options, add the additional mass below on that of "Standard"on the previous page.

Embedded Position of Option Valves		Additional Mass kg
Counterbalance Valves	Shut-off Valves	
Both Sides	Both Sides	10
	Head Side or Rod Side	
Head Side or Rod Side	Both Sides	
Combination Other Than The Above		9

■ Specifications/Characteristics of Option Valves

Counterbalance Valves

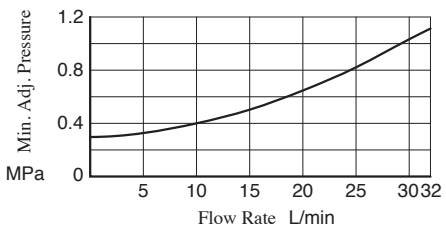
● Specifications

Pres. Adj. Range …… ★ - 7 MPa

★Please refer to the Min. Adj. Pressure below. If the model embedded with shut-off valves, that minimum adjustment pressure is the below value added pressure drop of shut-off valves.

● Min. Adj. Pressure

Viscosity 35 mm²/s Gravity 0.850



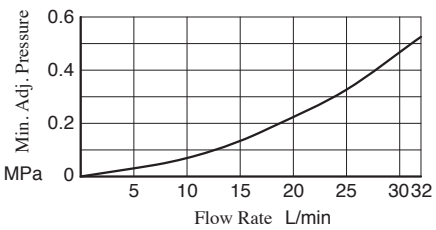
Shut-off Valves

● Solenoid Ratings

Power Supply	Voltage (V)		Current/Power at Power Supply Rated	
	Power Supply Rated	Range of Use	Holding Current (A)	Power (W)
DC	24	21.6 - 25.2	1.36	32.7

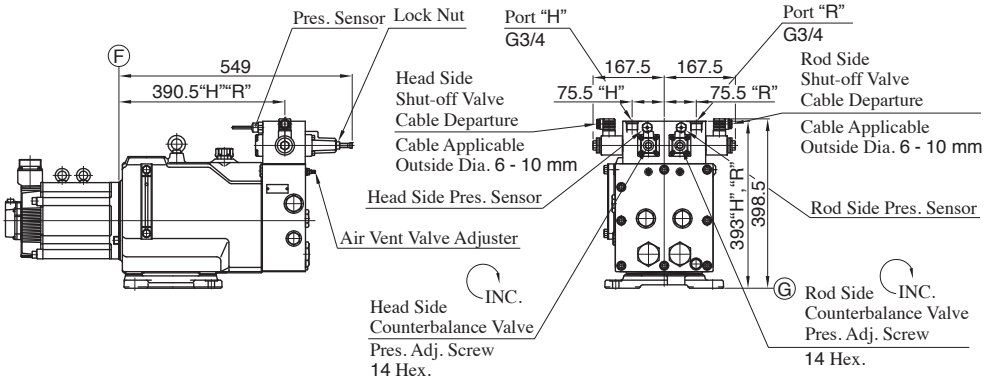
● Pressure Drop

Viscosity 35 mm²/s Gravity 0.850



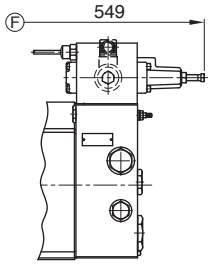
Options

YSD3-*-****-*-***-BBBB
(Counterbalance Valves / Shut-off Valves : With Both Sides)

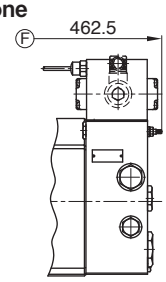


●For other dimensions, refer to "Standard"on page K-65.

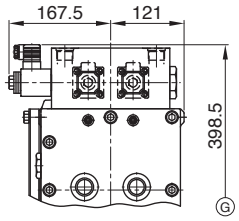
Counterbalance Valves : With Head Side or Rod Side



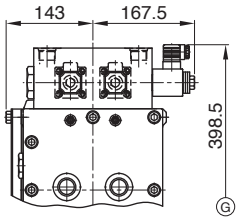
Counterbalance Valves : None



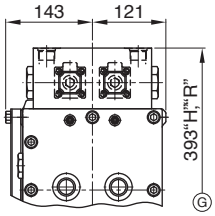
Shut-off Valves : With Head Side



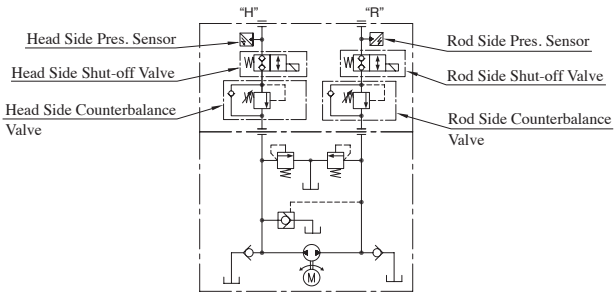
Shut-off Valves : With Rod Side



Shut-off Valves : None



Graphic Symbol



● Additional Mass with Options

With options, add the additional mass below on that of "Standard"on page K-65.

Embedded Position of Option Valves		Additional Mass kg
Counterbalance Valves	Shut-off Valves	
Both Sides	Both Sides	16
	Head Side or Rod Side	
Head Side or Rod Side	Both Sides	
Combination Other Than The Above		15

■ Specifications/Characteristics of Option Valves

Counterbalance Valves

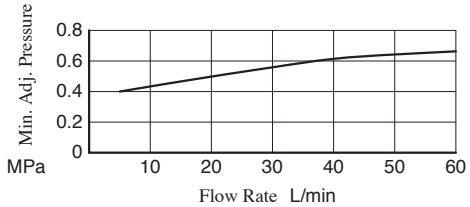
● Specifications

Code of Pres. Adj. Range	Pres. Adj. Range MPa
N	★ - 1.8
A	1.8 - 3.5
B	3.5 - 7

★Please refer to the Min. Adj. Pressure below. If the model embedded with shut-off valves, that minimum adjustment pressure is the below value added pressure drop of shut-off valves.

● Min. Adj. Pressure

Viscosity 35 mm²/s Gravity 0.850



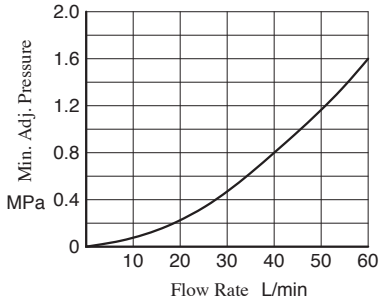
Shut-off Valves

● Solenoid Ratings

Power Supply	Voltage (V)		Current/Power at Power Supply Rated	
	Power Supply Rated	Range of Use	Holding Current (A)	Power (W)
DC	24	21.6 - 25.2	1.36	32.7

● Pressure Drop

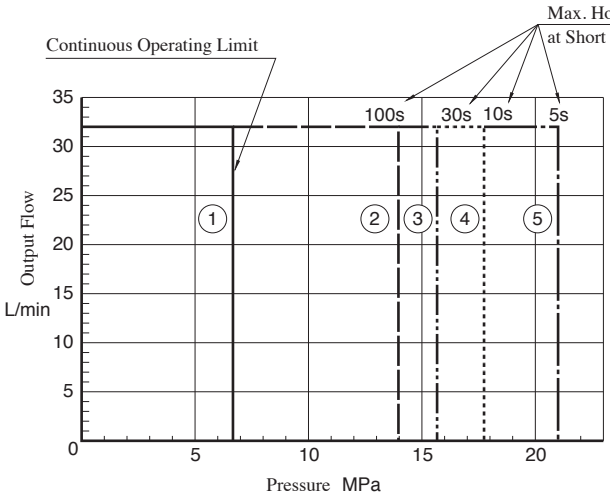
Viscosity 35 mm²/s Gravity 0.850



Pressure vs. Output Flow Characteristics

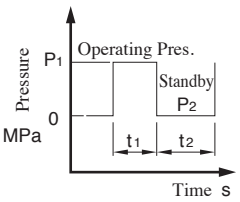
The characteristics charts below show the operating limits of “Pressure”and “Output Flow”calculated with AC servo motor specifications.
For the characteristics charts, see the descriptions below.

Description of Characteristics Chart



Standby Time after Short Time Operating

Operating Pres. P_1 MPa	Operating time t_1 s	Standby Time t_2 s (P_2=0 MPa)
21	5	72
18	10	101
16	30	229
14	100	588

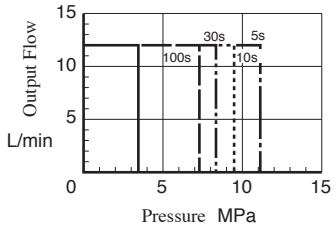


① ——— Continuous Operating Area: The area can pressurizing continuously.

② - ⑤ Short Time Operating Area: The area can use only at the time limited on the characteristics chart. After operating, need a fixed standby time shown on the chart. The standby time on chart is the value at 0 MPa of the standby pressure. If the standby pressure higher than 0 MPa, the standby time is longer. For details, please contact us separately.

YSD1 Type

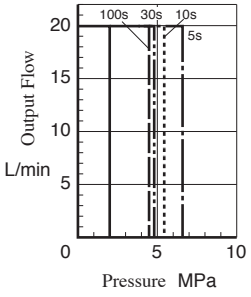
●YSD1-＊-09＊09-6-＊＊-20



Standby Time after Short Time Operating

Operating Pres. P_1 MPa	Operating time t_1 s	Standby Time t_2 s
11.1	5	86
9	10	105
8	30	238
7	100	607

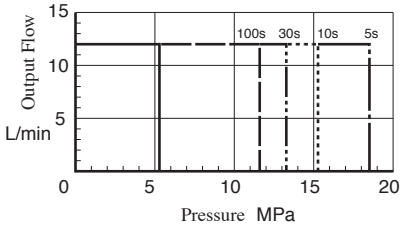
●YSD1-＊-09＊09-10-＊＊-20



Standby Time after Short Time Operating

Operating Pres. P_1 MPa	Operating time t_1 s	Standby Time t_2 s
6.6	5	86
5.4	10	105
4.9	30	238
4.3	100	607

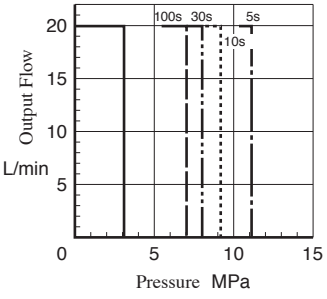
●YSD1-＊-13＊13-6-＊＊-20



Standby Time after Short Time Operating

Operating Pres. P_1 MPa	Operating time t_1 s	Standby Time t_2 s
18.5	5	120
15	10	123
13	30	275
11.8	100	688

●YSD1-＊-13＊13-10-＊＊-20

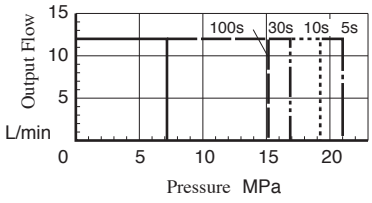


Standby Time after Short Time Operating

Operating Pres. P_1 MPa	Operating time t_1 s	Standby Time t_2 s
11.1	5	103
9	10	123
8	30	275
7	100	688

YSD2 Type

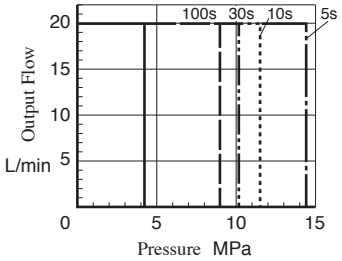
●YSD2-＊-24＊24-6-＊＊-30



Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
21	5	61
19	10	100
16.9	30	228
15	100	585

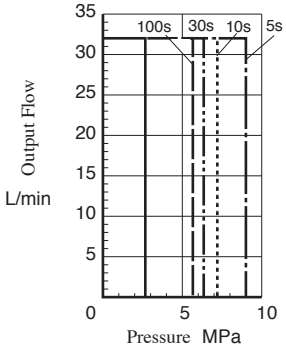
●YSD2-＊-24＊24-10-＊＊-30



Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
14	5	82
11.5	10	100
10	30	228
9	100	585

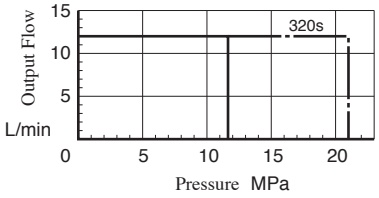
●YSD2-＊-24＊24-16-＊＊-30



Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
9	5	82
7	10	100
6	30	228
5.7	100	585

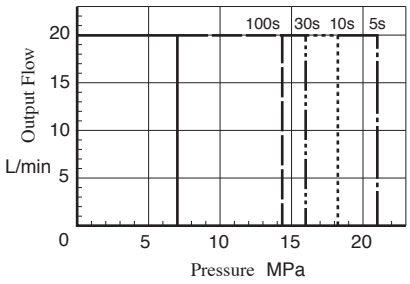
●YSD2-＊-29＊29-6-＊＊-30



Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
21	320	1294

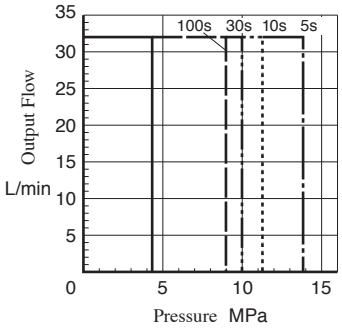
●YSD2-＊-29＊29-10-＊＊-30



Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
21	5	65
18	10	95
16	30	218
14	100	562

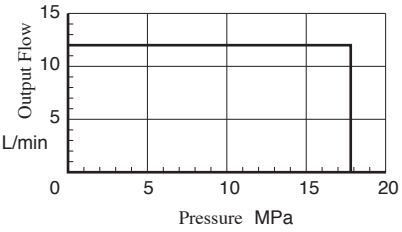
●YSD2-＊-29＊29-16-＊＊-30



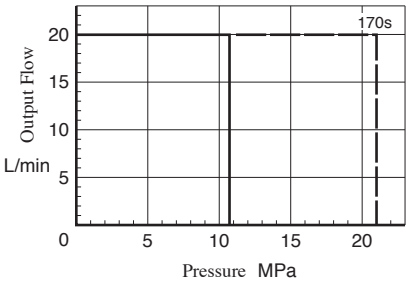
Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
13.9	5	77
11	10	95
10	30	218
9	100	562

●YSD2-＊-44＊44-6-＊＊-30



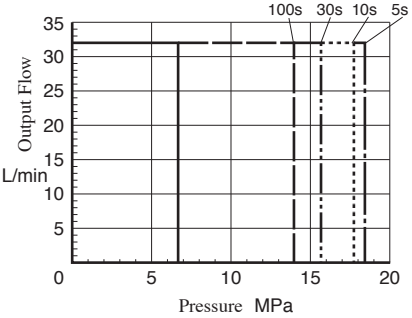
●YSD2-＊-44＊44-10-＊＊-30



Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
21	170	852

●YSD2-＊-44＊44-16-＊＊-30



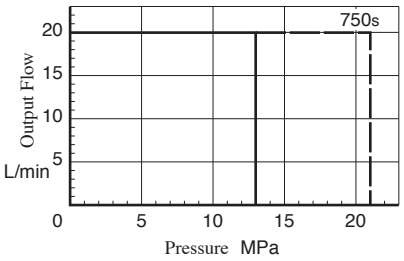
Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
18.3	5	72
17.8	10	101
15.7	30	229
14	100	588

★For the description of characteristics chart, refer to page K-68.

YSD3 Type

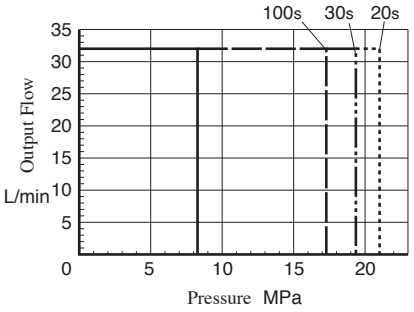
●YSD3-＊-55＊55-10-＊＊-30



Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
21	750	2218

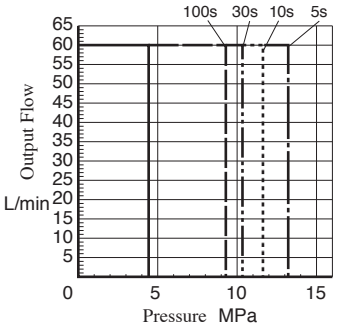
●YSD3-＊-55＊55-16-＊＊-30



Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
21	20	183
19	30	229
17	100	588

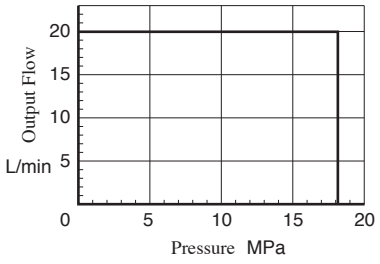
●YSD3-＊-55＊55-30-＊＊-30



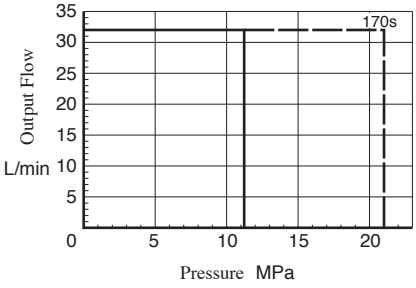
Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
13.2	5	82
11.7	10	101
10	30	229
9	100	588

●YSD3-＊-75＊75-10-＊＊-30



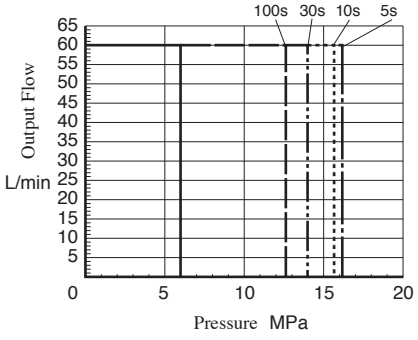
●YSD3-＊-75＊75-16-＊＊-30



Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
21	170	746

●YSD3-＊-75＊75-30-＊＊-30

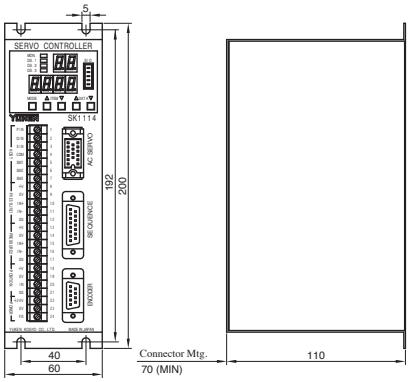


Standby Time after Short Time Operating

Operating Pres. P1 MPa	Operating time t1 s	Standby Time t2 s
16.1	5	80
15.7	10	99
14	30	226
12.7	100	580

★For the description of characteristics chart, refer to page K-68.

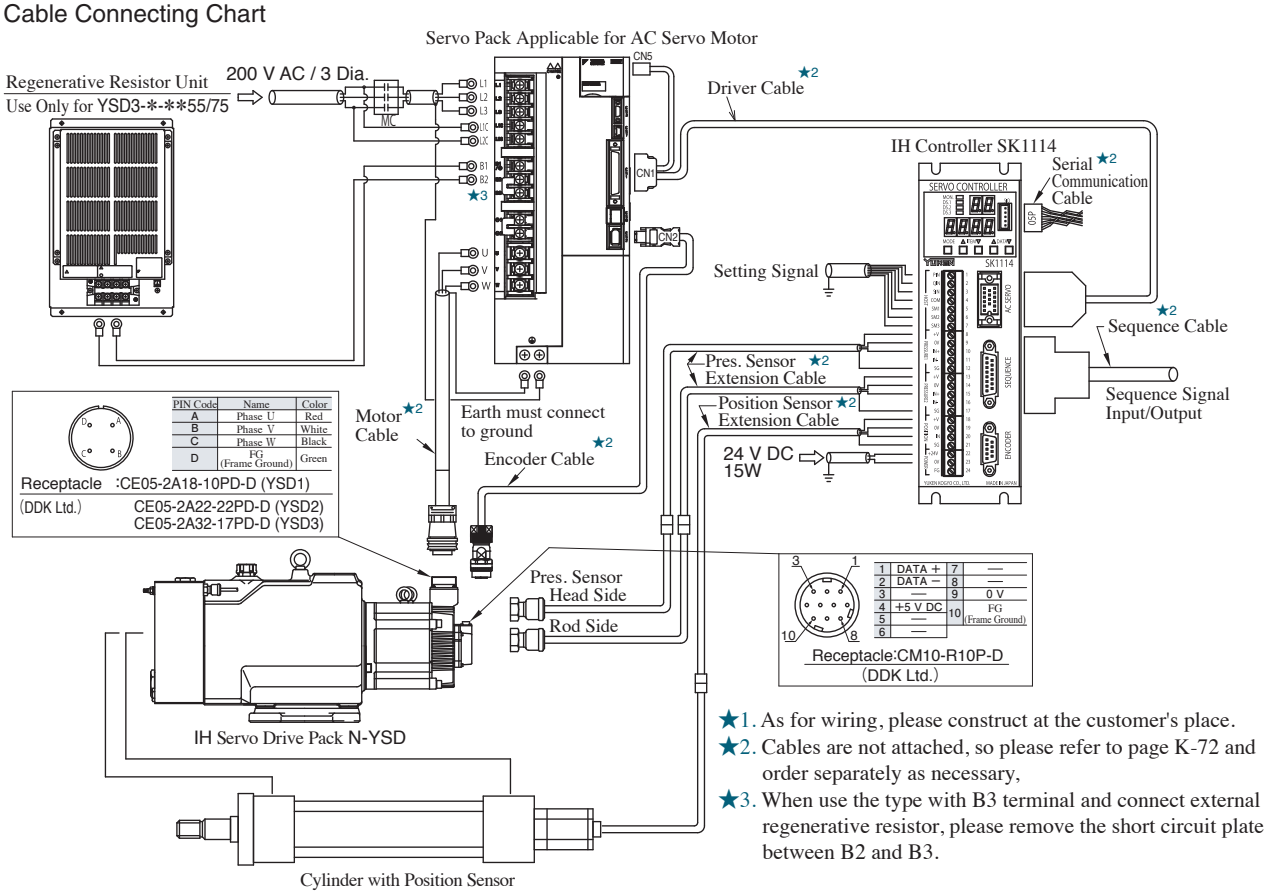
IH Controller：SK1114-11



Specifications

AC Servo Input	±5 V
Input Impedance	10 kΩ (PIN, QIN, SIN)
Power Supply Voltage	24 V DC (21 - 28VIncluding Ripple)
Max. Power Consumption	10 W
Input Signal	Rated／5 V (PIN, QIN, SIN)
Signal for Sensor Monitor	±5 V (SM*)
Ambient Temperature	0 - 50 °C
Mass	0.5 kg
ENCODER Imput	Option

Cable Connecting Chart



★1. As for wiring, please construct at the customer's place.
★2. Cables are not attached, so please refer to page K-72 and order separately as necessary,
★3. When use the type with B3 terminal and connect external regenerative resistor, please remove the short circuit plate between B2 and B3.

Terminal Details

SK1114

Terminal Name	No.		Signal	Wire Color
HOST (Setting Signal Input/Output)	1	PIN	Pres. Input Signal	–
	2	QIN	Flow Input Signal	
	3	SIN	Position Input Signal	
	4	COM	Signal Common	
	5	SM1	General Monitor Output 1	
	6	SM2	General Monitor Output 2	
	7	SM3	General Monitor Output 3	
PRESSURE1 (Head Side Pres. Sensor)	8	+V	Sensor Power Supply (+4V)	Red
	9	0V		White
	10	IN+	Sensor Input Signal	Green
	11	IN−		Blue
	12	SG	Shield Wire	–
PRESSURE2 (Head Side Pres. Sensor)	13	+V	Sensor Power Supply (+4V)	Red
	14	0V		White
	15	IN+	Sensor Input Signal	Green
	16	IN−		Blue
	17	SG	Shield Wire	–
POSITION (Position Sensor)	18	+V	Sensor Power Supply (+24V)	Brown
	19	0V		Blue/Gray
	20	IN	Sensor Input Signal	Green
	21	SG	Shield Wire	
POWER (Power Supply)	22	+24V	+24 [V]	–
	23	0V	0 [V]	
	24	FG	Ground	

Connector Details

AC SERVO
(Driver Cable Connect)

No.	Signal		
1	Speed Command	Output	V-REF
2	Common		SG
3	Torque Monitor		TRQ-M
4	Speed Monitor	Input	VTG-M
5	Common		SG
6			ALO1
7	Alarm Code	Input	ALO2
8			ALO3
9	Common		SG
10	Servo ON		SV-ON
11	Alarm OFF	Output	ALM-RST
12	+24V [V]		+24V
13	Servo Standby		S-RDY+
14		Input	S-RDY−
15	Alarm		ALM+
16			ALM−

SIO
(Serial Communication Cable Connect)

No.	Signal		
1	TxD	Send Data	Output
2	RxD	Receive Data	Input
3	RTS	Send Require	Output
4	CTS	Send Ready	Input
5	GND	Common	

Upper Communication：RS-232C

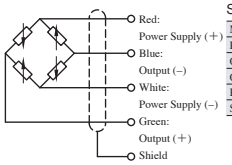
SEQUENCE
(Sequence Cable Connect)

No.	Signal		
1	COM	Input Common	Input
2	IN1	Code Input (BIN) x0 - x7	
3	IN2		
4	IN3		
5	IN4	Select Control Mode	
6	IN5	Select Control Direction	
7	IN6	Standby	
8	IN7	Alarm Reset	
9	IN8	Servo ON	
	Internal Circuit	3.3kΩ IN COM	
10	OUT1	Code Change Recognition	Output
11	OUT2	Standby	
12	OUT3	Coincidence	
13	OUT4	Alarm	
14	COM	Output Common	
	Internal Circuit	OUT COM	
15	Unused		

Cable Connector and Wire

	Sequence Cable	Driver Cable	Serial Communication Cable
Housing	DA-15P (JAE)	MR-16M (HONDA)	XHP-5 (JST)
Terminal	——	——	SXH-00IT-P0.6 (JST)
Case	DA-C4-J10 (JAE)	MR-16L (HONDA)	——
Applicable Wire: Core Wire Size	AWG # 20	AWG # 24 - 28	AWG # 22 - 28
Applicable Wire: Coated Outside Dia.	2.9 Dia.	1.2 - 1.5 Dia.	0.9 - 1.9 Dia.
Applicable Wire: Strip Length	2.0 - 2.5mm	2.0 - 2.5mm	1.2 - 2.6mm

Pressure Sensor



Specifications

Model	KH17 (NAGANO KEIKI)
Range	0 - 35MPa
Output	70±25mV DC
Operating Voltage	5V DC
Precision	±0.5 % F.S.
Standard Cable Length	2m

Position Sensor

Model	BTL5-A11-*(BALLUFF)
Standard Cable Length	5m

Cables

Cables are not attached for IH servo drive pack, so please refer to the table below and order separately as necessary.
The cables except for motor cable are common to each model.

Motor Cable

IH Servo Drive Pack Model Numbers	Cable Model Numbers	Notes
YSD1-＊-09＊-	YSDC-M1-09-☆-★-10	☆：Plug Type S：Straight Type　L：L Type ★：Cable Length 03：3m　05：5m　10：10m　15：15m　20：20m N：Plug and Cable Clamp Only
YSD1-＊-13＊-	YSDC-M1-13-☆-★-10	
YSD2-＊-24＊-	YSDC-M1-29-☆-★-10	
YSD2-＊-29＊-	YSDC-M1-29-☆-★-10	
YSD2-＊-44＊-	YSDC-M1-44-☆-★-10	
YSD3-＊-55＊-	YSDC-M1-55-☆-★-10	
YSD3-＊-75＊-	YSDC-M1-75-☆-★-10	

Sequence Cable / Driver Cable

Cable Type	Cable Model Numbers	Notes
Sequence Cable	YSDC-S1-00-★-10	★：Cable Length 03：3m　05：5m　10：10m　15：15m　20：20m
Driver Cable	YSDC-D1-★-10	★：Cable Length 01：1m　02：2m　03：3m

Encoder Cable / Pres. Sensor Extension Cable / Position Sensor Extension Cable

Cable Type	Cable Model Numbers	Notes
Encoder Cable	YSDC-E8-☆-★-10	☆：Plug Type S：Straight Type　L：L Type ★：Cable Length R03：0.3m　03：3m　05：5m　10：10m　15：15m　20：20m
Pres. Sensor Extension Cable	YSDC-P1-01-★-10	★：Cable Length 03：3m　05：5m　10：10m　15：15m　20：20m　50：50m
Position Sensor Extension Cable	YSDC-L1-01-★-10	★：Cable Length 03：3m　05：5m　10：10m　15：15m　20：20m

Serial Communication Cable

Cable Type	Cable Model Numbers	Notes
Serial Communication Cable	YSDC-T2-☆-★-10	☆：Cable End Type 02：Dsub-9pin ★：Cable Length 03：3m　05：5m　10：10m

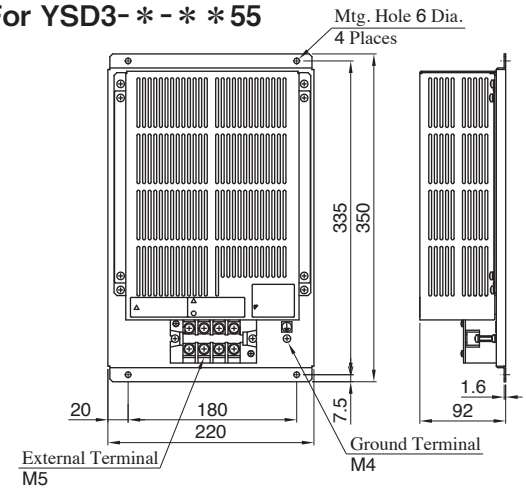
Regenerative Resistor Unit

Specifications

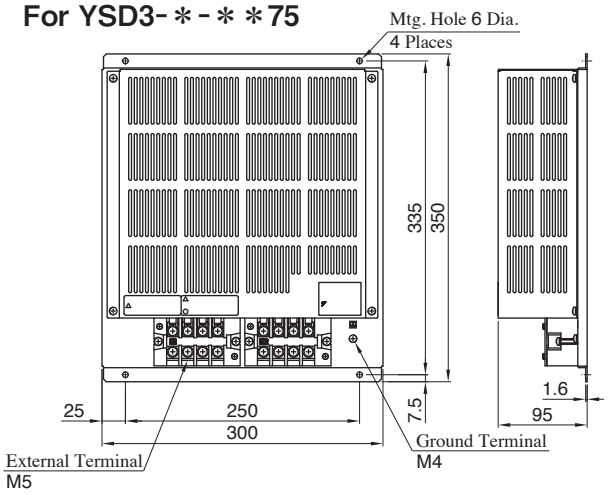
IH Servo Drive Pack Model Numbers	YASKAWA ELECTRIC Model	Resistance Value	Power	Approx. Mass kg
YSD3-＊-＊＊55-	JUSP-RA04-E	6.25Ω (25Ω×4Parallel Connected)	880W (220W×4)	4.2
YSD3-＊-＊＊75-	JUSP-RA05-E	3.13Ω (25Ω×8Parallel Connected)	1760W (220W×8)	6.6

★Regenerative resistor may reach to high temperature. Please use heat-resistant fireproof wires and avoid to contact the regenerative resistor on wiring.

For YSD3-＊-＊＊55



For YSD3-＊-＊＊75



Interchangeability between Current and New Models

Because the motor manufacturer stopped production of the built-in servo motor, so IH servo drive pack has changed models as below.

Major Changes

①Totally Change of Servo Motor and Servo Pack.
②1.8 kW embedded model changes to 2.4 kW embedded model same as above.
③Change The Connector Type of Encorder Cable.

Design Number

Series	Change of Design Number
YSD1	10→20 Design
YSD2/YSD3	20→30 Design

Interchangeability in Installation

There is interchangeability between current and new pumps with no changes.
As for servo motor, servo pack and encoder cable, there is no interchangeability between current and new models, so these parts of current design have to exchange as a set.

Interchangeability	Name	No Interchangeability / Differences	No Interchangeability / Details
Yes	Pump	———	———
No	Servo Motor	Distance from Pump Mtg. Surface to Cable Connecting Position	Page K-74
No	Servo Pack	Mtg. Hole Dimensions	Page K-75
		Connector Insert Direction for YSD3	
Yes	Motor Cable Sequence Cable Driver Cable Pres. Sensor Extension Cable Position Sensor Extension Cable	———	———
No	Serial Communication Cable	Cable End Type : Delete Some Parts	Page K-76
No	Encoder Cable	Cable Length, Connector type	Pages K-73, K-75
Yes★	Regenerative Resistor Unit	———	———

★The model numbers are changed (see the table below).

Model Numbers

①IH Servo Drive Pack

Current Model Numbers	New Model Numbers
YSD2-∗-18A18-∗-∗∗-∗∗∗∗∗-20	YSD2-∗-24A24-∗-∗∗-∗∗∗∗∗-30

②Encoder Cable / Regenerative Resistor Unit

Current Model Numbers		New Model Numbers	
Encoder Cable	Regenerative Resistor Unit	Encoder Cable	Regenerative Resistor Unit
YSDC-E1-☆-★-10 ★ : Cable Length 03 : 3m 05 : 5m 10 : 10m 15 : 15m 20 : 20m 50 : 50m	JUSP-RA04	YSDC-E8-☆-★-10 ★ : Cable Length R3 : 0.3m 03 : 3m 05 : 5m 10 : 10m 15 : 15m 20 : 20m	JUSP-RA04-E
	JUSP-RA05		JUSP-RA05-E

Specifications

Current and new models are same except below.

1. Servo Motor Output / Servo Pack type

Current			New		
Model Numbers	Servo Motor Output	Servo Pack type	Model Numbers	Servo Motor Output	Servo Pack type
YSD2-＊-18A18	1.8 kW	For 1.8 kW Motor	YSD2-＊-24A24	2.4 kW	For 2.4 kW Motor

2. Mass

①Pump / Motor

Current			New		
Model Numbers	Mass Flange Mtg. Type	Mass Foot Mtg. Type	Model Numbers	Mass Flange Mtg. Type	Mass Foot Mtg. Type
YSD1-＊-09A09-＊-＊＊-10	50 kg	53 kg	YSD1-＊-09A09-＊-＊＊-20	48 kg	51 kg
YSD1-＊-13A13-＊-＊＊-10	52 kg	55 kg	YSD1-＊-13A13-＊-＊＊-20	49 kg	52 kg
YSD2-＊-29A29-＊-＊＊-20	82 kg	88 kg	YSD2-＊-29A29-＊-＊＊-30	78 kg	84 kg
YSD2-＊-44A44-＊-＊＊-20	87 kg	93 kg	YSD2-＊-44A44-＊-＊＊-30	82 kg	88 kg
YSD3-＊-55A55-＊-＊＊-20	124 kg	130 kg	YSD3-＊-55A55-＊-＊＊-30	116 kg	122 kg
YSD3-＊-75A75-＊-＊＊-20	134 kg	140 kg	YSD3-＊-75A75-＊-＊＊-30	124 kg	130 kg

②Servo Pack

Current		New	
Type	Mass	Type	Mass
For YSD1-＊-09	1.7 kg	For YSD1-＊-09	1.5 kg
For YSD1-＊-13	2.8 kg	For YSD1-＊-13	2.4 kg
For YSD2-＊-18/29	3.8 kg	For YSD2-＊-24	2.8 kg
For YSD2-＊-44	5.5 kg	For YSD2-＊-29/44	4.6 kg
For YSD3-＊-55/75	14.6 kg	For YSD3-＊-55/75	10.2 kg

Characteristics

Pressure vs. Output Flow Characteristics are changed as below.

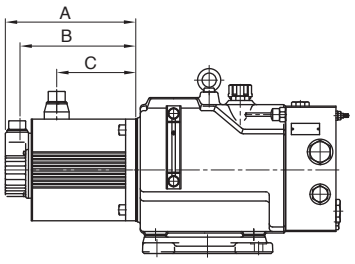
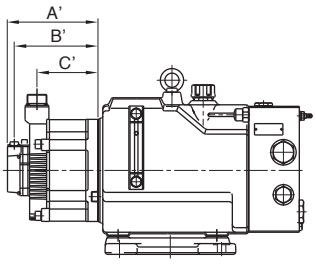
①Operating pressure at short time operating is changed a part.

②Delete the forced air cooling area at continuous and short time operating.

Dimensions

①Pump / Mootor

Current				New			
Model Numbers	A	B	C	Model Numbers	A’	B’	C’
YSD1-＊-09A09-＊-＊＊-10	161	140	88	YSD1-＊-09A09-＊-＊＊-20	137	125	83
YSD1-＊-13A13-＊-＊＊-10	185	164	112	YSD1-＊-13A13-＊-＊＊-20	153	141	99
YSD2-＊-18A18-＊-＊＊-20	166	144	89	YSD2-＊-24A24-＊-＊＊-30	160	148	108
YSD2-＊-29A29-＊-＊＊-20	192	170	115	YSD2-＊-29A29-＊-＊＊-30	160	148	108
YSD2-＊-44A44-＊-＊＊-20	226	204	149	YSD2-＊-44A44-＊-＊＊-30	184	172	132
YSD3-＊-55A55-＊-＊＊-20	260	238	174	YSD3-＊-55A55-＊-＊＊-30	221	209	163
YSD3-＊-75A75-＊-＊＊-20	334	312	248	YSD3-＊-75A75-＊-＊＊-30	267	255	209

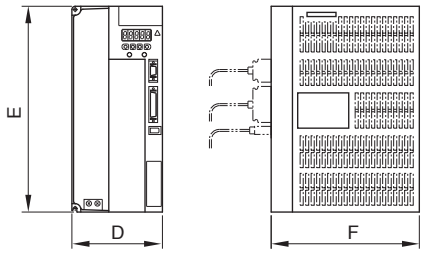
Current	New
	

②Servo Pack

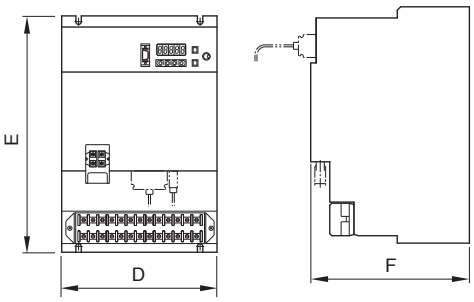
Current							New						
Type	D	E	F	G	H	J	Type	D'	E'	F'	G'	H'	J'
For YSD1-∗-09	90	160	180	27	149.5	5	For YSD1-∗-09	70	160	180	58	150	(5)
For YSD1-∗-13	110	160	180	100	149.5	5	For YSD1-∗-13	90	160	180	80	150	(5)
For YSD2-∗-18/29	110	250	180	100	238.5	6	For YSD2-∗-24	100	180	180	90	170	(5)
For YSD2-∗-44	135	250	230	125	238.5	5.7	For YSD2-∗-29/44	110	250	210	100	238.5	(6)
For YSD3-∗-55/75	230	350	235	180	335	7	For YSD3-∗-55/75	170	350	210	120	335	(7)

Current

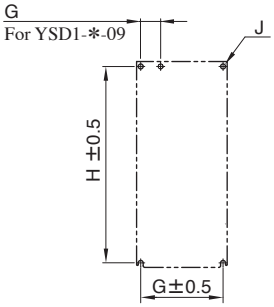
For YSD1/YSD2



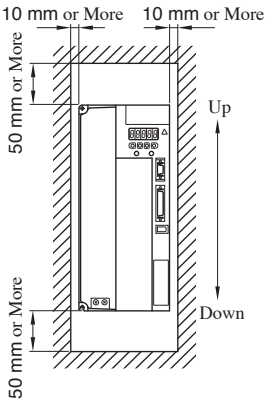
For YSD3



Mtg. Hole Dimensions

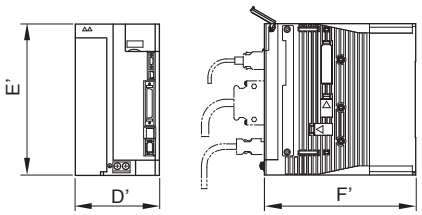


Installation Standard

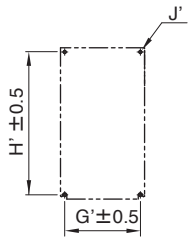


New

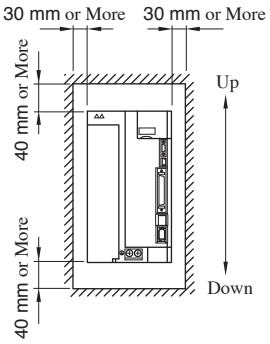
For YSD1/YSD2/YSD3



Mtg. Hole Dimensions

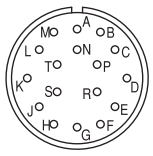


Installation Standard



③Encoder Cable

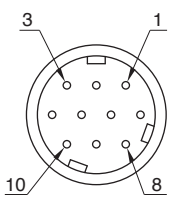
Current



Receptacle
MS3102A20-29P
DDK Ltd.

PIN Code	Name	PIN Code	Name
A	—	K	—
B	—	L	—
C	DATA +	M	—
D	DATA −	N	—
E	—	P	—
F	—	R	—
G	0 V	S	—
H	+ 5V DC	T	—
J	FG (Frame Ground)		—

New



Receptacle
CM10-R10P-D
DDK Ltd.

PIN Code	Name
1	DATA +
2	DATA −
3	—
4	+5 V DC
5	—
6	—
7	—
8	—
9	0 V
10	FG (Frame Ground)

④Serial Communication Cable

Descriptions	Current	New
Cable Model Numbers	YSDC-T1-☆-★-10	YSDC-T2-☆-★-10
Cable End Type	01：Dsub-25pin 02：Dsub-9pin	02：Dsub-9pin

Solenoid Ratings

Type	Power Supply	Coil Type★3	Frequency (Hz)	Voltage (V)		Current/Power at Rated Power Supply Voltage		
				Power Supply Rated	Range of Use	Inrush Current★2 (A)	Holding Current (A)	Power (W)
Standard Type	AC★1	A 100	50	100	80 - 110	2.42	0.51	—
			60	100	90 - 120	2.14	0.37	
				110		2.35	0.44	
		A 120	50	120	96 - 132	2.02	0.42	
			60		108 - 144	1.78	0.31	
		A 200	50	200	160 - 220	1.21	0.25	
			60	200	180 - 240	1.07	0.19	
				220		1.18	0.22	
		A 240	50	240	192 - 264	1.01	0.21	
			60		216 - 288	0.89	0.15	
Shockless Type	DC (K Series)	D 12	—	12	10.8 - 13.2	—	2.45	29
		D 24		24	21.6 - 26.4		1.23	
		D 48		48	43.2 - 52.8		0.61	
	R (AC→DC)	R 100	50/60	100	90 - 110	—	0.33	29
		R 200		200	180 - 220		0.16	

★1. AC Solenoid
AC Solenoid (A＊) is not available for the shockless type. If need shockless type of power supply, please order R type solenoid (R＊).

★2. Inrush Current
The inrush current value indicates the rms value at max. stroke.

★3. The coil types other than the above are also available. For details, please contact us separately.

The coil types highlighted with shade represent the optional extras. If use, please confirm the time of delivery with us befor ordering.

L

ACCESSORIES & OTHERS

- Air Bleed Valves ..... page L-2
- List of Accessories ..... page L-2
- Pipe Flange Kits ..... page L-3
- CONTAMIKIT (Microscopic Inspection Device) ..... page L-6

Accessories & others are published simply. For details, please contact us separately.

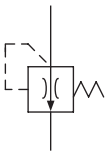
Air Bleed Valves

These air bleed valves are designed to use, at the start-up of the pumps, to bleed off the air enclosed in the suction line or the other lines in the system.

Specifications

Descriptions \ Model Numbers	S T 1004-2-1002	S T 1004-5-10	S T 1004-10-10
Port Size	Rc 3/8 Thd.		
Max. Operating Pressure	25 MPa		
Reseating Pressure	0.15 MPa		
Cracking Pressure	0.34 MPa		
Flow Rate to Reseating	2 L/min	5 L/min	10 L/min
Range of Usage to Pump Output Flow	For Under 20 L/min	For 20 to 75 L/min	For Over 75 L/min

Graphic Symbol



List of Accessories

The following accessories are also available for hydraulic system.
Please consult us for details.

Control Valves

Low Pressure Stop Valves / Check Valves
High Pressure Stop Valves
Accumulator Stop Valves
Maintenance Valves
Throttle Valves / Throttle and Check Valves
Flow Dividing / Combining Valves
Water Solenoid Valves
Automatic Water Supply Valves with A Temperature Detector
No-Leakage Type Directional Valves
Air Bleed Valves

Filters

Air Breather
Strainer (Immersion Type Reservoir Filters)
Suction Filters
Line Filters
Return Filters
Magnet Separator

Accumulators

Oil Coolers

Air-Cooling Coolers
Water-Cooling Coolers

Heaters

Gauge, Switch etc.

Pressure Gauge / Damper
Gauge Isolator
Pressure Exchanger
Pressure Sensor
Pressure Switch
Thermometer
Thermo Switch
Oil Level Gauge
Level Switch
Flow Meter

Rubber Hose & Fittings

Rubber Hoses
Self-Sealing Couplings
Pipe Clamp

Shaft Couplings

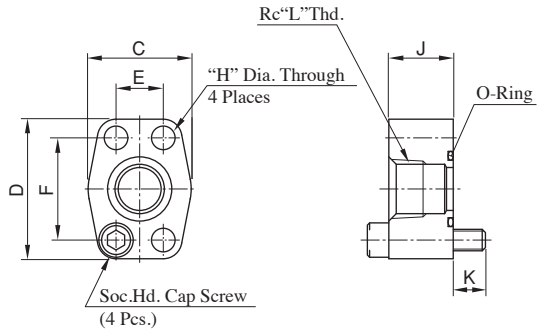
4 Bolt Solid Flanges (SAE)
"F5" Series Pipe Flange Kits

The dimensions of the flange mounting surface are based upon SAE 4 Bolt Split Flange (Standard Pressure Series).

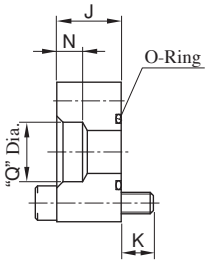
Model Number Designation

F5	−06	−A	−10
Series Number	Flange Size	Type of Pipe Connection	Design Standards
F5	Refer to below table	A : Threaded Connection B : Socket Welding C : Butt Welding	10

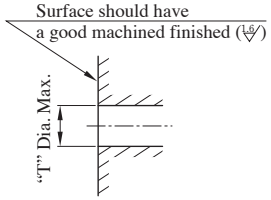
F5-＊-A



F5-＊-B



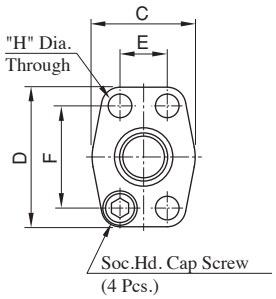
Costomer's Mounting Surface

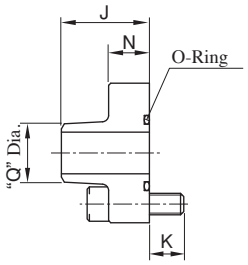


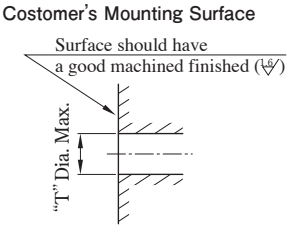
Kit Number	Piping Size	Dimension mm C	D	E	F	H	J	K	L	N	Q	T	O-Ring (OR NBR-90) P(G)＊＊-N	Socket Head Cap Screw (4 Pcs.)	Max. Operating Pressure MPa	★1 Approx. Mass kg	★2 Tightening Torque Nm Recommendation	Tolerance
F5-04W-A	3/8	40	54	17.5	38.1	8.8	30	10	3/8	–	–	13	P22	M 8 ×40	28	0.5	35	±10%
F5-04W-B									–	9	17.8							
F5-04 -A	1/2								1/2	–	–							
F5-04 -B									–	11	22.2							
F5-06X-A	3/4	48	65	22.2	47.6	8.8	30	15	3/4	–	–	19	G30	M 8 ×45	28	0.7		
F5-06X-B									–	12	27.7							
F5-06 -A						11			3/4	–	–			M10×45	28	0.7		
F5-06 -B									–	12	27.7				14			
F5-08W-A	3/4	55	70	26.2	52.4	11	30	15	3/4	–	–	26	G35	M10×45	28	0.9	68.5	
F5-08W-B									–	12	27.7							
F5-08 -A	1								1	–	–				28			
F5-08 -B									–	14	34.5				14			
F5-10 -A	1 1/4	64	80	30.2	58.7	11	38	17	1 1/4	–	–	32	G40	M10×55	28	1.2		
F5-10 -B									–	16	43.2				14			
F5-12 -A	1 1/2	72	94	35.7	69.9	13.5	38	17	1 1/2	–	–	38	G50	M12×55	21	1.5	118	
F5-12 -B									–	18	49.1				14			
F5-16W-A	1 1/2	85	102	42.9	77.8	13.5	38	17	1 1/2	–	–	48	G60	M12×55	21	1.8		
F5-16W-B									–	18	49.1							
F5-16 -A	2								2	–	–	51	G65		17.5	1.7		
F5-16 -B									–	20	61.1				10.5			
F5-20 -A	2 1/2	102	114	50.8	88.9	13.5	48	17	2 1/2	–	–	63	G75	M12×65	17.5	2.0		
F5-20 -B									–	22	77.1				7			
F5-24 -A	3	116	135	61.9	106.4	17.5	53	17	3	–	–	76	G85	M16×70	3.5	2.7	287	
F5-24 -B							38		–	25	90.0			M16×55				
F5-28 -A	3 1/2	134	153	69.9	120.7	17.5	53	17	3 1/2	–	–	88	G100	M16×70	3.5	3.4		
F5-28 -B							38		–	28	102.8			M16×55				
F5-32 -A	4	150	162	77.8	130.2	17.5	53	17	4	–	–	101	G115	M16×70	3.5	3.7		
F5-32 -B							38		–	28	115.5			M16×55				

★1. Approx. mass is the value including socket head cap screw (4 pcs.).
★2. The values of tightening torque above apply to when these flanges are used for pressure line.

F5-＊-C







Kit Number	Piping Size	Dimension mm										O-Ring (OR NBR-90) P(G)＊＊-N	Socket Head Cap Screw (4 Pcs.)	Max. Operating Pressure MPa	Approx. Mass ★1 kg	Tightening Torque ★2 Nm	
		C	D	E	F	H	J	K	N	Q	T					Recommendation	Tolerance
F5-04-C	1/2	40	54	17.5	38.1	8.8	39	13	17	21.7	13	P22	M 8 ×30	28	0.25	35	
F5-06-C	3/4	48	65	22.2	47.6	11	41	16	19	27.2	19	G30	M10×35	28	0.35	68.5	
F5-08-C	1	55	70	26.2	52.4	11	42	16	19	34	26	G35	M10×35	28	0.45	68.5	
F5-10-C	1 1/4	64	80	30.2	58.7	11	44	16	19	42.7	32	G40	M10×35	28	0.63	68.5	±10%
F5-12-C	1 1/2	72	94	35.7	69.9	13.5	50	18	22	48.6	38	G50	M12×40	21	1.3	118	
F5-16-C	2	85	102	42.9	77.8	13.5	50	18	22	60.5	51	G65	M12×40	17.5	1.3	118	
F5-20-C	2 1/2	102	114	50.8	88.9	13.5	50	20	25	76.3	63	G75	M12×45	14	1.4	118	

★1. Approx. mass is the value including socket head cap screw (4 pcs.).
★2. The values of tightening torque above apply to when these flanges are used for pressure line.

4 Bolt Solid Flanges (SAE)
"F6" Series Pipe Flange Kits

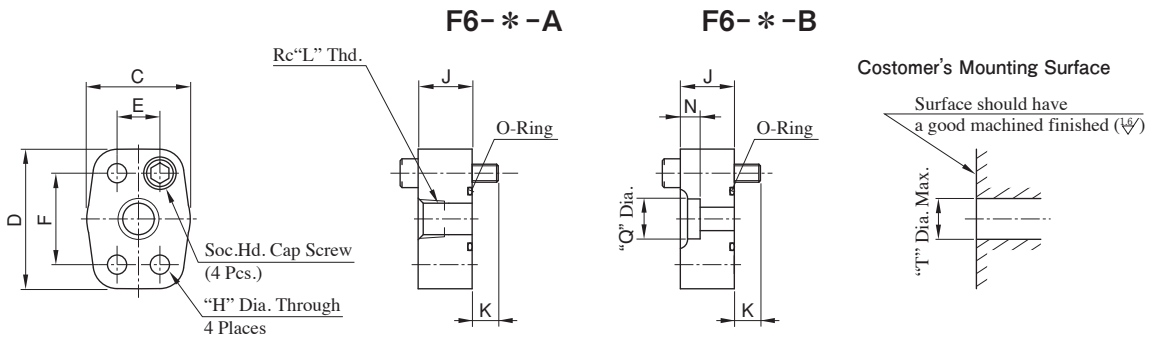
The dimensions of the flange mounting surface are based upon SAE 4 Bolt Split Flange (High Pressure Series).

Specifications

Max. Operating Pressure..... 42 MPa
However, Rc Threaded Connection Type..... 31 MPa

Model Number Designation

F6	−04W	−A	−M	−10
Series Number	Flange Size	Type of Pipe Connection	Type of Mounting Bolt	Design Standards
F6	Refer to below table	A : Threaded Connection B : Socket Welding	M : Metric Thd.	10



Kit Number	Piping Size	Dimension mm											O-Ring (OR NBR-90) P(G)＊＊-N	Socket Head Cap Screw (4 Pcs.)	Approx.★1 Mass kg	Tightening Torque Nm	
		C	D	E	F	H	J	K	L	N	Q	T				Recommendation	Tolerance
F6-04W-A	3/8	48	56.5	18.2	40.5	8.8	28	12	3/8	–	–	15	P22	M 8 ×40	0.4	35	±10%
F6-04W-B									–	9	17.8						
F6-04 -A	1/2								1/2	–	–						
F6-04 -B									–	11	22.2						
F6-06W-A	1/2	57.5	77.5	23.8	50.8	11	30	15	1/2	–	–	21	G30	M10×45	0.9	68.5	
F6-06W-B									–	11	22.2						
F6-06 -A	3/4								3/4	–	–						
F6-06 -B									–	12	27.7						
F6-08W-A	3/4	65	81	27.8	57.2	13.5	30	15	3/4	–	–	26	G35	M12×45	1.1		
F6-08W-B									–	12	27.7						
F6-08 -A	1						34	16	1	–	–			M12×50			
F6-08 -B							30	15	–	14	34.5			M12×45			
F6-10W-A	1	72	95	31.8	66.7	13.5	34	16	1	–	–	34	G40	M12×50	1.3	118	
F6-10W-B									–	14	34.5						
F6-10 -A	1 1/4						39		1 1/4	–	–			M12×55			
F6-10 -B							34		–	16	43.2			M12×50			
F6-12W-A	1 1/4	90	113	36.5	79.4	17.5	34	21	1 1/4	–	–	44	G50	M16×55	1.5	287	
F6-12W-B									–	16	43.2						
F6-12 -A	1 1/2						39		1 1/2	–	–			M16×60			
F6-12 -B							34		–	18	49.1			M16×55			

★1. Approx. mass is the value including socket head cap screw (4Pcs.).
★2. The values of tightening torque above apply to when these flanges are used for pressure line.

CONTAMIKIT (Microscopic Inspection Device) “YC-100”

This device is a portable instrument for measuring the contamination level of hydraulic fluid compared to the standard contamination plate. (The contamination level is determined by the NAS1638 grade as reference.) It has high reliability with easy operation.

- You can use it anywhere.
  It is portable and can be switched to either AC or DC power supply.
- Anybody can use it by comparing the sample with the standard contamination plate.
- Measurement takes only about 10 minutes.
- The results can be photographed by an SLR camera.

CONTAMIKIT
“YC-100”

Options

The following options are separately available.

(1) Filter Kit for Water-Glycol Hydraulic Fluid

For use in measuring the contamination of water-glycol hydraulic fluid. For this measurement use clean tap water instead of cleaning solvent. For other parts, use standard ones.

- Model No. : M-KYC-100-F-20
- Components : ① 50 Membrane Filter Elements (25 mm in dia., 3 μm thick)
  ② 50 Slide Glass Sheets
  ③ 50 One-Sided Adhesive Papers

(2) Four-times Objective Lens

The four-times objective lens can give you an enlarged field of view under the microscope. It is suitable for measuring samples having a wide distribution of relatively large particles of contaminations.

- Model No. : KYC-100-L-20
- Components : A pair of four-times objective lenses

Parts

The following parts are separately available.

Name of Parts	Model Numbers	Specifications
Camera Adaptor	KYC-100-C-20	
Manual Vacuum Pump	KYC-100-P-20	Vacuum Hose (0.4m)
Filtering Flask	KYC-100-R1-20	
Glass Base	KYC-100-R2-20	
Funnel	KYC-100-R3-21	
Clamp	KYC-100-R4-21	
Holder	KYC-100-R5-20	
Spare Lamp	KYC-100-D-20	5V・0.47A (With Frost Gass)
Filter-Kit	KYC-100-F-20	50 Membrane Filter Elements 50 Slide Glasses Sheets 50 One-Sided Adhesive Papers
Cleaning Vial ★	KYC-100-N-20	500ml×6 Bottles

★This is an inflammable substance, so not available for the transportation by plane or ship. For the oversea use of the product, obtain the cleaning solvent.

M

ENVIRONMENTAL PRODUCTS

●Automatic Shavings Compactor <KIRIKO> ..... page M-2
●Automatic Shavings Compactor <KIRIKO> Global Version ..... page M-3

The following products are also available. For details, please contact us separately.
・Compacting & Separation Machine for Kitchen Garbage
・PET Bottle Compacting Press
・Automatic Multi Compactor
・Automatic Multi Compactor mounted with ASR Series AC Servo Motor Driven Pumps
・Compacting Press

Automatic Shavings Compactor <KIRIKO> Patented

Compact the volume of shavings and chips down to 1/40 !

Automatic Shavings Compactor <KIRIKO> can ensure the compression and solidification of iron, aluminum, brass and other shavings/chips by strong hydraulic power.
Models equipped with crusher for curly shavings are also available.

- Contributing to acquire ISO 14001 certification.
- Achieving environmental beautification and improvement because of easier shaving management.
- Significantly reducing the cost of transportation.
- Saving space for storing shavings and preventing outflow of cutting oil on shavings.
- You can discharge and recovery the sticking liquid when compression.

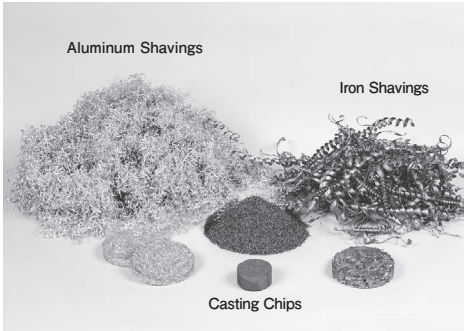
Specifications

Item \ Model	Upper: Standard Model / Lower: Standard Model with Shaving Bridge Breaker				
	YK-40V-3 YK-40V-3B	YK-40V-10 YK-40V-10B	YK-80V-6 YK-80V-6B	YK-80V-10 YK-80V-10B	YK-80V-20 YK-80V-20B
Product Dimensions (Max.)	130 Dia.×65 mm	70 Dia.×65 mm	130 Dia.×65 mm	100 Dia.×65 mm	70 Dia.×65 mm
Compressing Pressure	29 MPa	98 MPa	59 MPa	98 MPa	196 MPa
Operating Time	About 26 sec./ dry cycle (excluding charging time)★1		About 30 sec./ dry cycle (excluding charging time) ★1		
Main Motor	3.7 kW×4P				
Charging Motor	0.1 kW×4P				
Power Supply	200/220 V (50/60 Hz), 3-phase				
Dimensions (D×W×H) mm	650×1092×1895 (650×1172×1895) mm★2		735×1168×2125 (735×1248×2125) mm★2		
Mass	700 kg		1200 kg		

Item \ Model	Model Equipped with Crusher	
	YK-40V-3C＊	YK-40V-10C＊
Product Dimensions (Max.)	130 Dia.×65 mm	70 Dia.×65 mm
Compressing Pressure	29 MPa	98 MPa
Operating Time	About 26 sec./ dry cycle (excluding charging time)★1	
Main Motor	3.7 kW×4P	
Charging Motor	1.5 kW×4P	
Power Supply	200/220 V (50/60 Hz), 3-phase	
Dimensions (D×W×H) mm	650×1092×1895	650×1062×1895
Mass	850 kg	

★1. The charging time will be changed by shape of shavings.(variable by timer)
★2. Dimensions in parentheses are for the models with shaving bridge breaker.

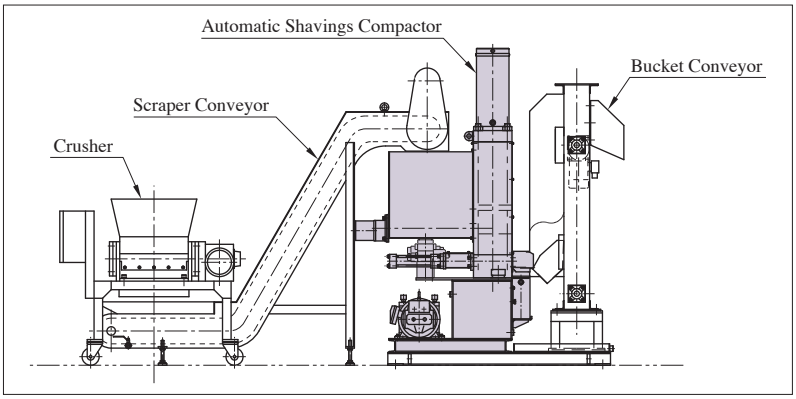
Compaction Materials



★Automatic Shavings Compactor <KIRIKO> is published simply. For details, please refer to dedicated catalog.

Peripheral Equipment (Example of Combination with Options)

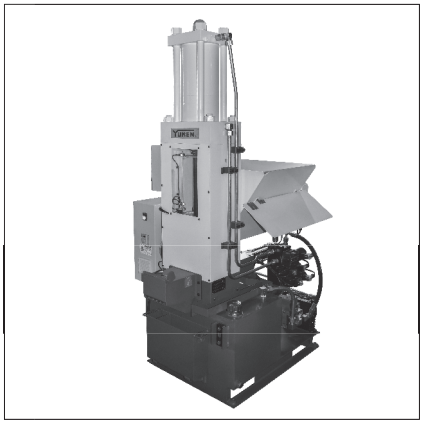
- The configuration of automatic shavings compactor, conveyors and peripheral equipment can be optimized according to the shape and amount of shavings/chips. Please consult YUKEN with experience for details.



Automatic Shavings Compactor <KIRIKO> Global Version

Multilingual support improves convenience for users around the world

- Operating conditions and inspection procedure in case of alarm are displayed in various languages.
- Added electric fan to drain cooler and control panel.
  Stable operation in high temperatures and humidity.
- You can compact the volume of shavings and chips down to 1/40.
  Optimal for enviromental preservation and recycling.
- Separating cutting oil from briquettes to allow recovery and reuse of the oil.
- Significantly facilitating the transportation of collection shavings/chips.



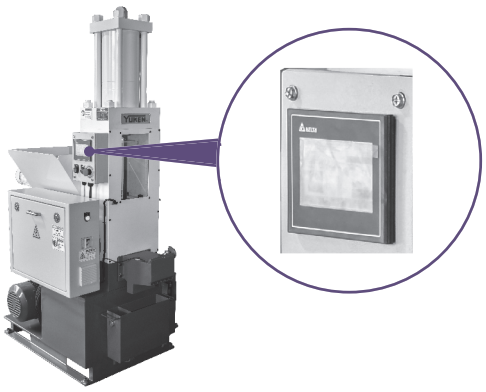
Specifications

Model numbers	GL-YK-40V-＊＊ ＊-10
Product Dimensions(Max.)	70 Dia.×65 mm
Compressing Pressure	98 MPa
Operating Time	Approx. 26 sec. / dry cycle (excluding charging time)
Electric Motor	3.9 kW(motor efficiency class : IE2)★
Power Supply	380 to 415 V AC 50 / 60 Hz , 3-phase
Touch Panel Interface Languages (Prospects Included)	English / Japanese / Chinese(Simplified / Traditional) / Thai / Indonesian / Korean / Vietnamese / Filipino / Malay etc.
Dimentions (D×W×H)	790 mm × 1090 mm × 1870 mm
Approx. Mass	800 kg

★Installation of IE3 motors and country certified motors is optional.

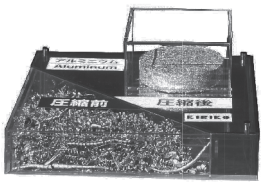
Touch Panal

Standard products are equipped with multilingual support touch panel.



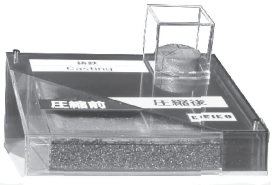
Compaction Materials

Iron

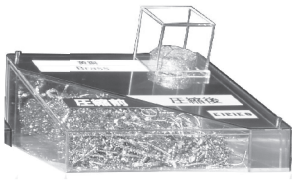


Aluminum

Casting



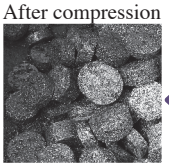
Brass



★Mainly for chip-shaped material

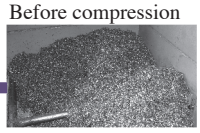
Processes

After compression

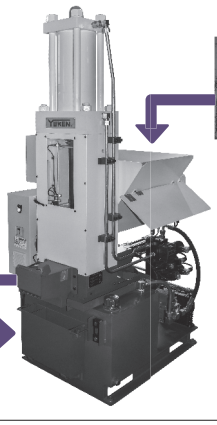


The shavings are compacted into solid blocks and extracted

Before compression



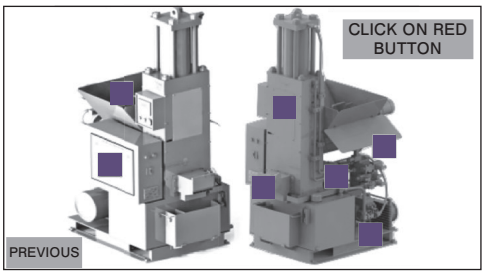
Example : Iron chips



Collect cutting oil to collection tank with compactor

Alarm Display

A red button (■) lights up at the position where the alarm occurred. Click on red button details of alarms that have occurred and what should be checked.



This product is exclusively use for foreign countries outside of Japan

DATA SHEET

● Hydraulic Fluid Z-2
Part 1: Requirements, Classification, and Properties
Part 2: Viscosity and Contamination Control
Part 3: Service Limit and Contamination Measuring Instrument
Part 4: YUKEN's Hydraulic Equipment and Fluid Types ①
Part 5: YUKEN's Hydraulic Equipment and Fluid Types ②

● Formulas/Nomograms Z-7
Part 1: Formulas
(① Pump Output, ② Shaft Input, ③ Volumetric Efficiency, ④ Overall Efficiency, etc.)
Part 2: ① Cylinder Speed, ② Cylinder Pressure
Part 3: ① Pipe Size/Flow Velocity, ② Steel Pipes/Tubes
Part 4: ① Viscosity vs. Temperature, ② Viscosity Conversion Chart

● O-Ring Size Z-11
Part 1: JIS B 2401–1
Part 2: AS 568, Aerospace Size Standard for O-Rings

● International System of Units (SI) Z-13

● Graphic Symbols/Circuits Z-17

● Piping Thread Connection for Foreign Countries Outside of Japan ... Z-24

Hydraulic Fluid [Part 1]
Requirements, Classification, and Properties

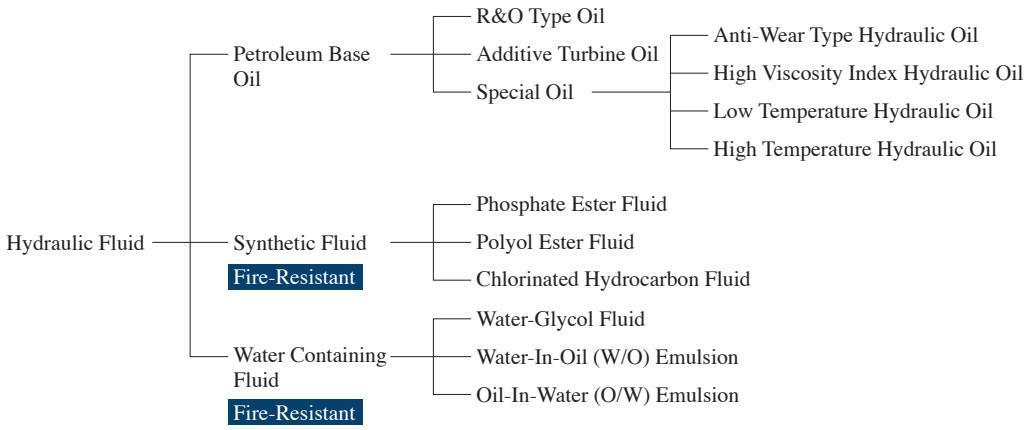
Requirements

Hydraulic pumps, control valves, and hydraulic cylinders operate at high pressure and high speed; they are also constructed of a variety of materials. Considering these facts as well as fluid temperature and ambient conditions during operation, the following requirements for hydraulic fluids must be met.

- Maintaining proper viscosity as temperature changes
- Flowable at low temperature
- Resistant to high temperature degradation
- Providing high lubricity and wear resistance
- Highly oxidation stable
- Highly shear stable
- Non-corrosive to metal
- Exhibiting good demulsibility/water separation when mixed with water
- Rust-preventive
- No damage to rubber or paint
- Non-compressible
- Providing good defoaming performance
- Fire-resistant

Classification

JIS standards for hydraulic fluids do not currently exist, and fluids that meet the above requirements and have a viscosity equivalent to that of petroleum based turbine oils (JIS K 2213) are used. Turbine oils are classified into two types: Type 1 (without additives) and Type 2 (with additives). Type 2 turbine oils contain antirust, antioxidant, and other additives. JIS K 2213 Type 2 turbine oils and special oils with a viscosity grade of ISO VG 32, 46, or 68 are widely used. If there is a risk of fire in the event of fluid leakage or blowout from hydraulic systems, fire-resistant synthetic which is synthetic fluids / water containing fluids are employed. These fire-resistant fluids have different properties from petroleum base oils and must be handled carefully in practical applications. Chlorinated hydrocarbon fluids are rarely used for industrial purposes in Japan, since they become highly toxic and corrosive when decomposed. While other fluids are also available, fluids used for general industrial purposes are largely categorized as follows.



Properties (Example)

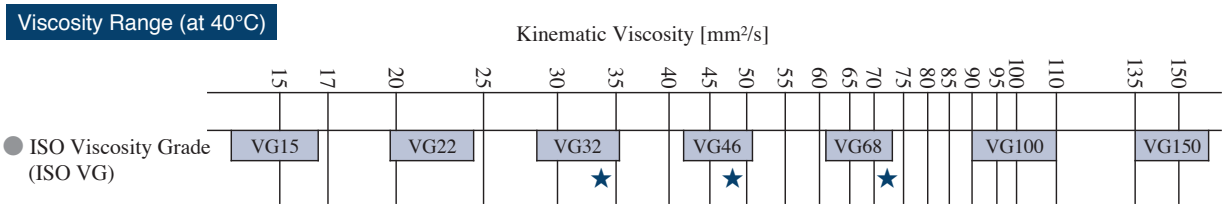
Item \ Hydraulic Fluid	Petroleum Base Oil (Type 2 Turbine Oil Equivalent to ISO VG 32)	Phosphate Ester Fluid	Polyol Ester Fluid	Water-Glycol Fluid	W/O Emulsion	O/W Emulsion
Specific Gravity (15/4°C)	0.87	1.13	0.93	1.04 - 1.07	0.93	1.00
Viscosity(mm^2/s) 40℃	32.0	41.8	40.3	38.0	95.1	0.7
Viscosity(mm^2/s) 100℃	5.4	5.2	8.1	7.7	—	—
Viscosity Index (VI)	100	20	160	146	140	—
Max. Operating Temp. (°C)	70	100	100	50	50	50
Min. Operating Temp. (°C)	–10	–20	–5	–30	0	0
Strainer Resistance	1.0	1.03	1.0	1.2	0.7 - 0.8	(Same As Water)

Viscosity

The viscosity of industrial lubricants, including hydraulic fluids, is measured by kinematic viscosity ν [m²/s], which is obtained by dividing absolute viscosity by density. It is typically expressed in units of square millimeters per second (mm²/s). For viscosity measurement, a capillary viscometer is used to determine kinematic viscosity (mm²/s) as per JIS K 2283 "Crude petroleum and petroleum products - Determination of kinematic viscosity and calculation of viscosity index from kinematic viscosity". Hydraulic fluid viscosity critically affects the performance of hydraulic systems. System operation with a hydraulic fluid viscosity outside the specified range may result in pump suction failure, internal leakage, poor lubrication, valve malfunction, or heat generation in the circuit, shortening the life of equipment or causing a major accident.

According to JIS K 2001 "Industrial liquid lubricants - ISO viscosity classification", 20 viscosity grades are available ranging from ISO VG 2 to 3200. The figure below shows the viscosity range associated with the operation of hydraulic systems. For details, see "Viscosity vs. Temperature" on page Z-10.

Viscosity Range (at 40°C)



★For JIS K 2213 Type 2 (with additives), three grades ISO VG 32, 46 and 68 are available.

Contamination Control

Cleanliness

Hydraulic fluid replacement is required in the following three cases.

(a) Deterioration or degradation of the fluid
(b) Particulate contamination of the fluid
(c) Water contamination of the fluid

While Table 3 provides guidelines for (a), the necessity of hydraulic fluid replacement is caused by (b) and (c) in most cases.

Particulate contamination of hydraulic fluids may result in pump wear or valve malfunction. In particular, the performance of systems equipped with precision valves (e.g. electro-hydraulic servo valves) and actuators is adversely affected by fine particles of a few micrometers to a few tens of micrometers. Thus, it is necessary to control the level of contamination properly by measuring the size and number of particles in the fluid with a microscope or by measuring the mass of particles per unit volume of the fluid.

For the determination of the fluid cleanliness level, filter 100 ml of the fluid through a filtration device and collect particles on a millipore filter (a filter with fine pores of 1/1000 mm). Measure the number and size of the collected particles for classification as shown in Table 1. For highly contaminated fluids, determine the cleanliness level based on the mass of particles collected on the millipore filter, as shown in Table 2. Unused R&O type oils have a cleanliness level of Class 6 to 8 shown in Table 1.

Table 1 NAS Cleanliness Level Based on Particle Counting

Number of particles per 100 ml

Size µm	Class (NAS 1638)													
	00	0	1	2	3	4	5	6	7	8	9	10	11	12
5 - 15	125	250	500	1,000	2,000	4,000	8,000	16,000	32,000	64,000	128,000	256,000	512,000	1,024,000
15 - 25	22	44	89	178	356	712	1,425	2,850	5,700	11,400	22,800	45,600	91,000	182,400
25 - 50	4	8	16	32	63	126	253	506	1,012	2,025	4,050	8,100	16,200	32,400
50 - 100	1	2	3	6	11	22	45	90	180	360	720	1,440	2,880	5,760
More than 100	0	0	1	1	2	4	8	16	32	64	128	256	512	1,024

NAS : National Aerospace Standard ISO : International Organization for Standardization

Table 2 Classification Based on the Gravimetric Method

NAS	Class	100	101	102	103	104	105	106	107	108
	mg/100 ml	0.02	0.05	0.10	0.3	0.5	0.7	1.0	2.0	4.0
MIL	Class	A	B	C	D	E	F	G	H	I
	mg/100 ml	Less than 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0	4.0 - 5.0	5.0 - 7.0	7.0 - 10.0	10.0 - 15.0	15.0 - 25.0

MIL : Military Specifications and Standards

● Service Limit

Unused R&O type oils contain 50 to 80 ppm (0.005 to 0.008%) of water, but the water content increases due to entry of atmospheric moisture through the actuator or air breather. Water may cause rust on the inside of hydraulic equipment, poor lubrication, or accelerated degradation of the hydraulic fluid. The water content of the fluid is measured by Karl Fischer titration (based on the quantitative reaction of the reagent with water) with a sensitivity of 10 ppm. The particulate/water contamination tolerance of hydraulic fluids varies depending on the system configuration as outlined in Tables 4 and 5.

Table 3 Criteria for Hydraulic Fluid Replacement (Example)

Test Item \ Fluid Type	Petroleum Base Oil			Water-Glycol Fluid
	R&O	Anti-Wear		
Kinematic Viscosity (40°C)★ mm²/s	±10%			±10%
Total Acid Number★ mgKOH/g	0.25	a☆	0.25	——
		b☆	±40%	

★ : Variation in kinematic viscosity
☆ : Additive type (a: Non-zinc based, b: Zinc based)

Table 3 provides guidelines for hydraulic fluid replacement. Detailed specifications vary depending on the manufacturer, and additional control requirements may be applied. Contacting the fluid manufacturer is recommended.
For example, the total acid number (or acid number) is a measure of fluid degradation and affected by the additive type and level. For water-glycol fluids, the pH value is also controlled.

Table 4 Recommended Control Level of Fluid Contamination

System Configuration	Class	
	JIS B 9933 (ISO 4406)	NAS
System with Servo Valve	18/16/13	7
System with Piston Pump	20/18/14	9
System with Proportional Electro-Hydraulic Control Valve	20/18/14	9
System Operating at Pressures Higher than 21 MPa	20/18/14	9
System Operating at Pressures of 14 to 21 MPa	21/19/15	10
General Low Pressure Hydraulic System	21/20/16	11

★Comparison of JIS B 9933 (ISO 4406) and NAS for reference

Table 5 Water Contamination Tolerance of R&O Type Oils

1 ppm = 1/1000000

System Conditions	Service Limit
The hydraulic fluid is cloudy with water.	To be immediately replaced
The system has a circuit for circulating the hydraulic fluid back to the oil tank and operates without long-term shutdown.	500 ppm
The piping length of the system is long, and the hydraulic fluid does not fully circulate in the circuit.	300 ppm
The system remains out of service for a long period (safety system), has a circuit in which the hydraulic fluid hardly moves, or is designed to provide precision control.	200 ppm

● Portable Fluid Contamination Measuring Instrument

YUKEN CONTAMI-KIT

Model Numbers : YC - 100 - 22

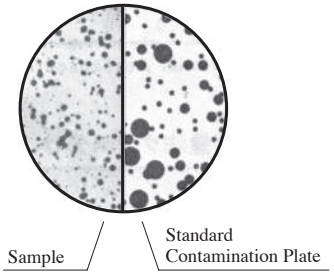
YUKEN's CONTAMI-KIT is a fluid contamination measuring instrument that samples hydraulic fluids and microscopically measures the distribution of particles collected on a membrane filter as per JIS B 9930 or SAE ARP 598 A.

■ Specifications

①Power Supply……Both AC and DC power supplies supported (100 V AC/6 V DC)
②Microscope magnification: 100 times
(40 times: Option for KYC-100-L-20)
③Applicable fluids……Petroleum base oil, polyol ester fluid, and water-glycol fluid (optional)
④Case dimensions……L 600×W 240×H 360 mm
⑤Total mass……Approx. 9 kg

■ Features of CONTAMI-KIT

①Usable everywhere
Portable and supports both AC and DC power supplies (switchable).
②User-friendly
Requires no skills and involves only comparing the results with the standard contamination plate.
③Time-efficient
Takes only about 10 minutes for each measurement.
④Supporting photo taking
Allows photo taking with a single-lens reflex camera for recording.



Hydraulic Fluid [Part 4]

YUKEN's Hydraulic Equipment and Fluid Types ①

Hydraulic equipment is affected differently depending on the fluid type; special care should be taken when selecting the equipment. The table below shows YUKEN's hydraulic equipment available for each fluid type. For details, see the relevant pages.

Equipment \ Hydraulic Fluid		Petroleum Base Oil (Equivalent to JIS K 2213 Type 2)	Phosphate Ester Fluid	Polyol Ester Fluid
A Series Variable Displacement Piston Pump		Standard	Custom: Z6 Seal: Fluororubber	Custom: Z450
Fixed Displacement Vane Pump		Standard	"F-" + Standard Model Seal: Fluororubber	Standard
Pressure Control Valve		Standard	"F-" + Standard Model Seal: Fluororubber	Standard
Flow Control Valve		Standard	"F-" + Standard Model Seal: Fluororubber	Standard
Directional Control Valve		Standard	"F-" + Standard Model Seal: Fluororubber	Standard
Modular Valve		Standard	"F-" + Standard Model Seal: Fluororubber	Standard
Logic Valve		Standard	"F-" + Standard Model Seal: Fluororubber	Standard
Proportional Electro-Hydraulic Control Valve		Standard	"F-" + Standard Model ★1 Seal: Fluororubber	Standard ★2
Servo Valve		Standard	"F-" + Standard Model Seal: Fluororubber	Standard
Cylinder	CJT Series	Standard	"F-" + Standard Model Seal: Fluororubber	Standard
Cylinder	CBY14 Series	Standard Packing Material: 6 (HNBR)	Semi-Standard Packing Material: 3 (Fluororubber)	Standard Packing Material: 6 (HNBR)
Accumulator		Standard Commercially Available Product	Butyl Rubber Diaphragm Type/ Piston Type (Except for Aluminum) Permitted	Butyl Rubber Diaphragm Type Prohibited
Needle Valve		Standard	"F-" + Standard Model Seal: Fluororubber	Standard
Tank Filter		Aluminum	Aluminum	Aluminum
Oil Level Gauge		Direct Reading Type	Direct Reading Type	Direct Reading Type
Rubber Tube		Nitrile Rubber	For Phosphate Ester Fluid	Nitrile Rubber
Inside Coating of Oil Tank		Epoxy Coating Permitted	Inside Coating Prohibited (Chemical Conversion Coating Permitted)	No Inside Coating (Chemical Conversion Coating Permitted) or Epoxy Coating Permitted
Effect on Metals		None	Aluminum Sliding Parts Prohibited	Care for Lead, Cadmium and Zinc
Seal	Nitrile Rubber	Permitted	Prohibited	Permitted
Seal	Fluororubber	Permitted	Permitted	Permitted
Seal	Silicone Rubber	Prohibited	Permitted	Permitted
Seal	Butyl Rubber	Prohibited	Permitted	Prohibited
Seal	Ethylene Propylene Rubber	Prohibited	Permitted	Permitted
Seal	Urethane Rubber	Permitted	Prohibited	Permitted
Seal	Fluororesin	Permitted	Permitted	Permitted
Seal	Chloroprene	Permitted	Prohibited	Permitted
Seal	Leather	Permitted	Permitted	Permitted
Other		———	Protect electrical wiring by applying oil resistant coating or by running it in conduits.	———

★1. Contact us for details of EH Series High Response Directional and Flow Control Valves (EHDFG-04/06).
★2. Contact us for details of EH Series Directional and Flow Control Valves (EHDFG-03) and EH Series High Response Directional and Flow Control Valves (EHDFG-04/06).

Hydraulic Fluid [Part 5]

YUKEN's Hydraulic Equipment and Fluid Types ②

Equipment \ Hydraulic Fluid		Water-Glycol Fluid	W/O Emulsion
A Series Variable Displacement Piston Pump		Custom: Z30	————
Fixed Displacement Vane Pump		"M-" + Standard Model PV2R: Standard	————
Pressure Control Valve		Standard	Consult us.
Flow Control Valve		Standard	Consult us.
Directional Control Valve		Standard	Standard
Modular Valve		Standard	Consult us.
Logic Valve		Standard	Consult us.
Proportional Electro-Hydraulic Control Valve		Standard ★1	Consult us.
Servo Valve		Standard ★2	Consult us.
Cylinder	CJT Series	Standard ★3 Packing Material: 6 (HNBR)	Standard ★3 Packing Material: 6 (HNBR)
Cylinder	CBY14 Series	Standard Packing Material: 6 (HNBR)	Standard Packing Material: 6 (HNBR)
Accumulator		Inside Coating Prohibited	Inside Coating Prohibited
Needle Valve		Standard	Standard
Tank Filter		Stainless Steel (Aluminum, Cadmium, or Galvanizing Prohibited)	Aluminum/Stainless Steel (Cadmium or Galvanizing Prohibited)
Oil Level Gauge		Direct Reading Type	Direct Reading Type
Rubber Tube		Nitrile Rubber, Metallic Parts for Water-Glycol	Nitrile Rubber
Inside Coating of Oil Tank		Inside Coating Prohibited (Chemical Conversion Coating Permitted)	Inside Coating Prohibited (Chemical Conversion Coating Permitted)
Effect on Metals		Aluminum, Cadmium, or Zinc Prohibited	Copper, Cadmium, or Zinc Prohibited
Seal	Nitrile Rubber	Permitted	Permitted
Seal	Fluororubber	Permitted	Permitted
Seal	Silicone Rubber	Prohibited	Prohibited
Seal	Butyl Rubber	Permitted	Prohibited
Seal	Ethylene Propylene Rubber	Permitted	Prohibited
Seal	Urethane Rubber	Prohibited	Prohibited
Seal	Fluororesin	Permitted	Permitted
Seal	Chloroprene	Permitted	Permitted
Seal	Leather	Prohibited	Prohibited
Other		————	Be sure to have the oil tank bottom tilted and equipped with a drain cock.

★1. Contact us for details of EH Series High Response Directional and Flow Control Valves (EHDFG-04/06).
★2. The following products are not available to use.
On-Board Electronics Type Linear Servo Valves without DR Port (Wet Type Pilot Valve: LSVHG-*EH-*-W)
★3. CJT 70/140 are custom products.

⚠ Caution

In the case of Water Glycol fluid, a slight oil leak occurs from the shaft seal part.
(Criterion: 500 ml / 6 months of oil leakages.)
Install a tray appropriate capacity on the pump-base, please.

Hydraulic Pump

● Hydraulic Power (Pump Output)

SI Unit	Engineering Unit (Reference)
$L_O = \frac{P \cdot Q}{60}$	$L_O = \frac{P \cdot Q}{612}$
L_O : Hydraulic Power kW P : Pressure MPa Q : Flow Rate L/min ＊1 kW＝1 kN·m/s ＝60 kN·m/min	L_O : Hydraulic Power kW P : Pressure kgf/cm² Q : Flow Rate L/min ＊1 kW＝102 kgf·m/s ＝6120 kgf·m/min

● Shaft Input

SI Unit	Engineering Unit (Reference)
$L_i = \frac{2\pi TN}{60000}$	$L_i = \frac{2\pi TN}{6120}$
L_i : Shaft Input kW T : Shaft Torque N·m N : Shaft Speed r/min	L_i : Shaft Input kW T : Shaft Torque kgf·m N : Shaft Speed rpm

● Volumetric Efficiency

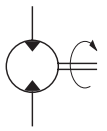
$$\eta_V = \frac{Q_P}{Q_O} \times 100$$

η_V : Volumetric Efficiency %
Q_P : Flow Rate at Pressure P L/min
Q_O : Flow Rate at No Load L/min
＊ $Q_O - Q_P$ = Pump's Total Internal Leakage

● Overall Efficiency

SI Unit	Engineering Unit (Reference)
$\eta = \frac{L_O}{L_i} \times 100 = \frac{P \cdot Q}{60 L_i} \times 100$	$\eta = \frac{L_O}{L_i} \times 100 = \frac{P \cdot Q}{612 L_i} \times 100$
η : Overall Efficiency % L_O : Hydraulic Power kW L_i : Shaft Input kW P : Discharge Pressure MPa Q : Flow Rate L/mim	η : Overall Efficiency % L_O : Hydraulic Power kW L_i : Shaft Input kW P : Discharge Pressure kgf/cm² Q : Flow Rate L/mim

● Hydraulic Motor Output

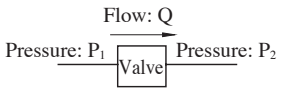


SI Unit	Engineering Unit (Reference)
$L = \frac{2\pi T \cdot N}{60\,000}$	$L = \frac{2\pi T \cdot N}{6120}$
L : Output kW T : Torque Nm N : Speed r/min	L : Output kW T : Torque kgf·m N : Speed rpm

● Cylinder Output

SI Unit	Engineering Unit (Reference)
$L = \frac{F \cdot V}{60}$	$L = \frac{F \cdot V}{6120}$
L : Output kW F : Force kN V : Speed m/min	L : Output kW F : Force kgf V : Speed m/min

● Valve Power Loss



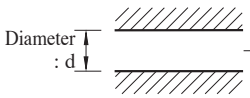
Pressure Loss: $\Delta P = P_1 - P_2$
Power Loss between Valve Inlet and Outlet: L

SI Unit	Engineering Unit (Reference)
$L = \frac{\Delta P \cdot Q}{60}$	$L = \frac{\Delta P \cdot Q}{612}$
L : kW ΔP : MPa Q : L/mim	L : kW ΔP : kgf/cm² Q : L/mim

● Viscosity (Absolute) and Kinematic Viscosity

SI Unit	Engineering Unit (Reference)
$\mu = \rho \cdot \nu_1 = \rho \cdot \nu_2 \times 10^{-6}$	$\mu = \rho \cdot \nu_1 = \frac{\gamma}{g} \cdot \nu_1 = \frac{\gamma \cdot \nu_2}{100 g}$
μ : Viscosity (Absolute) Pa·s(=N·s/m²) ϱ : Density kg/m³ ν_1 : Kinematic Viscosity m²/s ν_2 : Kinematic Viscosity mm²/s	μ : Viscosity (Absolute) kgf·s/cm² ϱ : Density kgf·s²/cm⁴ ν_1 : Kinematic Viscosity cm²/s ν_2 : Kinematic Viscosity cSt γ : Specific Gravity kgf/cm³ g : Gravitational Acceleration 980 cm/s² ＊1 cSt = 0.01 cm²/s

● Reynolds Number



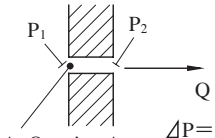
R: Reynolds Number
ν: Kinematic Viscosity:

$$R = \frac{V \cdot d}{\nu_1} = \frac{4000Q}{60\pi d \cdot \nu_1} = \frac{2120Q}{d \cdot \nu_2}$$

R : Dimensionless Quantity
V : cm/s
d : cm
ν_1 : cm²/s
ν_2 : mm²/s {cSt}
Q : L/min

＊R＜2300……Laminar Flow
R＞2300……Turbulent Flow

● Orifice Flow

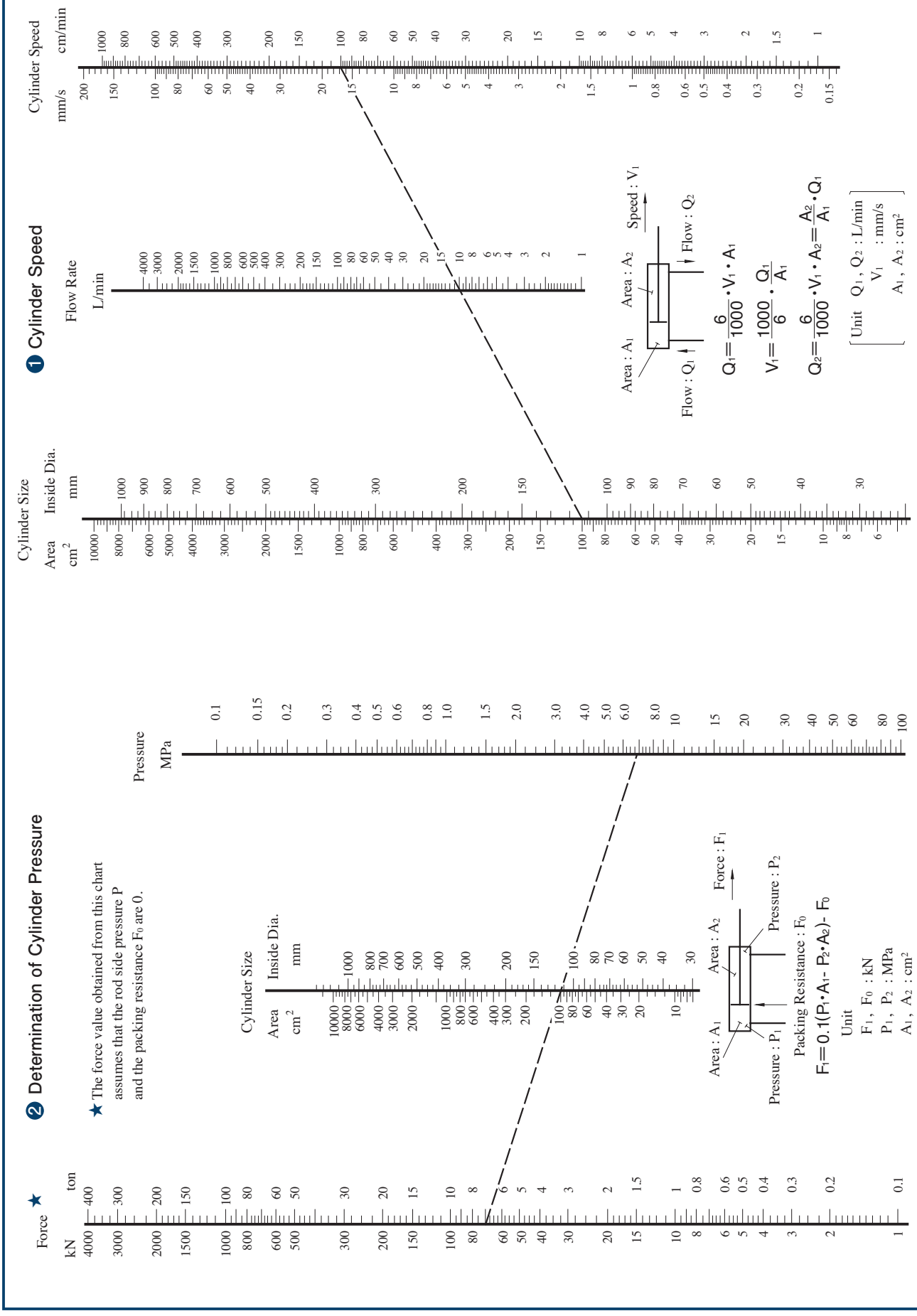


A: Opening Area

$\Delta P = P_1 - P_2$
C = Discharge Coefficient
γ = Specific Gravity
ϱ = Density

SI Unit	Engineering Unit (Reference)
$Q = C \cdot A \sqrt{\frac{2\Delta P}{\rho} \times 10^6} \times 6$	$Q = C \cdot A \sqrt{\frac{2g}{\gamma} \cdot \Delta P} \times \frac{60}{1000} = 2.66 C \cdot A \sqrt{\frac{\Delta P}{\gamma}}$
Q : L/min C : Dimensionless Discharge Coefficient A : cm² ϱ : kg/m³ ΔP : MPa	Q : L/min C : Dimensionless Discharge Coefficient A : cm² g : 980 cm/s² γ : kgf/cm³ ΔP : kgf/cm²

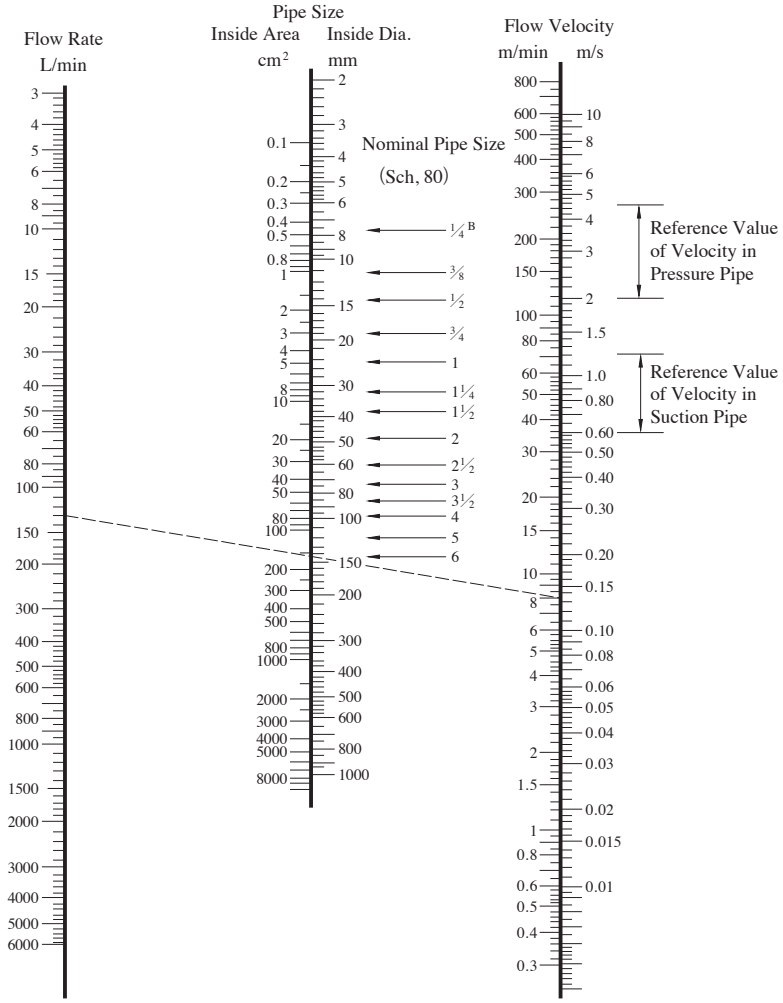
Note) The value of discharge coefficient depends on the flow channel geometry and the Reynolds number; it generally ranges from 0.6 to 0.9.


① Cylinder Speed
Cylinder Size
Area cm²
Inside Dia. mm
Flow Rate L/min
Cylinder Speed mm/s cm/min
Area : A1
Area : A2
Speed : V1
Flow : Q1
Flow : Q2
Q1= 6/1000 · V1 · A1
V1= 1000/6 · Q1/A1
Q2= 6/1000 · V1 · A2= A2/A1 · Q1
Unit Q1 , Q2 : L/min
V1 : mm/s
A1 , A2 : cm²
② Determination of Cylinder Pressure
★ The force value obtained from this chart assumes that the rod side pressure P and the packing resistance F0 are 0.
Force ★ kN ton
Pressure MPa
Cylinder Size
Area cm²
Inside Dia. mm
Area : A1
Area : A2
Force : F1
Pressure : P1
Pressure : P2
Packing Resistance : F0
F1= 0.1(P1 • A1 - P2 • A2) - F0
Unit
F1 , F0 : kN
P1 , P2 : MPa
A1 , A2 : cm²

Formulas/Nomograms [Part 3]

① Pipe Size/Flow Velocity, ② Steel Pipes/Tubes

❶ Pipe Size/Flow Velocity



❷ Steel Pipes/Tubes

● Carbon Steel Pipes

STS370,STPT410S

Nominal Dia. A	Nominal Dia. B	Outside mm	Operating Pres. MPa: 1.6 Thick mm	1.6 Sch. No.	7.0 Thick mm	7.0 Sch. No.	10 Thick mm	10 Sch. No.	14 Thick mm	14 Sch. No.	17.5 Thick mm	17.5 Sch. No.	21 Thick mm	21 Sch. No.	25 Thick mm	25 Sch. No.	31.5 Thick mm	31.5 Sch. No.	35 Thick mm	35 Sch. No.
8	¼	13.8	3.0	Sch80	3.0	Sch80	3.0	Sch80	3.0	Sch80	3.0	Sch80	3.0	Sch80	3.0	Sch80	3.0	Sch80	3.0	Sch80
10	⅜	17.3	3.2	Sch80	3.2	Sch80	3.2	Sch80	3.2	Sch80	3.2	Sch80	3.2	Sch80	3.2	Sch80	3.2	Sch80	3.2	Sch80
15	½	21.7	3.7	Sch80	3.7	Sch80	3.7	Sch80	3.7	Sch80	3.7	Sch80	3.7	Sch80	3.7	Sch80	3.7	Sch80	4.7	Sch160
20	¾	27.2	3.9	Sch80	3.9	Sch80	3.9	Sch80	3.9	Sch80	3.9	Sch80	3.9	Sch80	3.9	Sch80	5.5	Sch160	5.5	Sch160
25	1	34.0	4.5	Sch80	4.5	Sch80	4.5	Sch80	4.5	Sch80	4.5	Sch80	4.5	Sch80	4.5	Sch80	6.4	Sch160	6.4	Sch160
32	1¼	42.7	4.9	Sch80	4.9	Sch80	4.9	Sch80	4.9	Sch80	4.9	Sch80	4.9	Sch80	6.4	Sch160	9.7	XXS	9.7	XXS
40	1½	48.6	5.1	Sch80	5.1	Sch80	5.1	Sch80	7.1	Sch160	7.1	Sch160	7.1	Sch160	7.1	Sch160	10.2	XXS	10.2	XXS
50	2	60.5	5.5	Sch80	5.5	Sch80	5.5	Sch80	8.7	Sch160	8.7	Sch160	8.7	Sch160	8.7	Sch160	11.1	XXS	11.1	XXS
65	2½	76.3	7.0	Sch80	7.0	Sch80	7.0	Sch80	9.5	Sch160	9.5	Sch160	9.5	Sch160	14.0	XXS	14.0	XXS	14.0	XXS
80	3	89.1	7.6	Sch80	7.6	Sch80	7.6	Sch80	11.1	Sch160	11.1	Sch160	11.1	Sch160	15.2	XXS	15.2	XXS	15.2	XXS
100	4	114.3	8.6	Sch80	8.6	Sch80	13.5	Sch160	13.5	Sch160	13.5	Sch160	13.5	Sch160	17.1	XXS	17.1	XXS	Min.20	★1
125	5	139.8	9.5	Sch80	9.5	Sch80	15.0	Sch160	15.0	Sch160	15.0	Sch160	15.0	Sch160	19.1	XXS	Min.24	★1	Min.24	★1
150	6	165.2	11.0	Sch80	11.0	Sch80	18.2	Sch160	18.2	Sch160	18.2	Sch160	18.2	Sch160	21.9	XXS	Min.28	★1	Min.28	★1

★1. Special Thick Wall Steel Pipe
★2. Designation
(Example 1) STS370 Standard Thick Wall Steel Pipe:STS370-¾B×Sch80
(Example 2) STS370 Special Thick Wall Steel Pipe:STS370-5B×24t

● Precision Carbon Steel Tubes for Compression Type Tube Fittings

OST-2

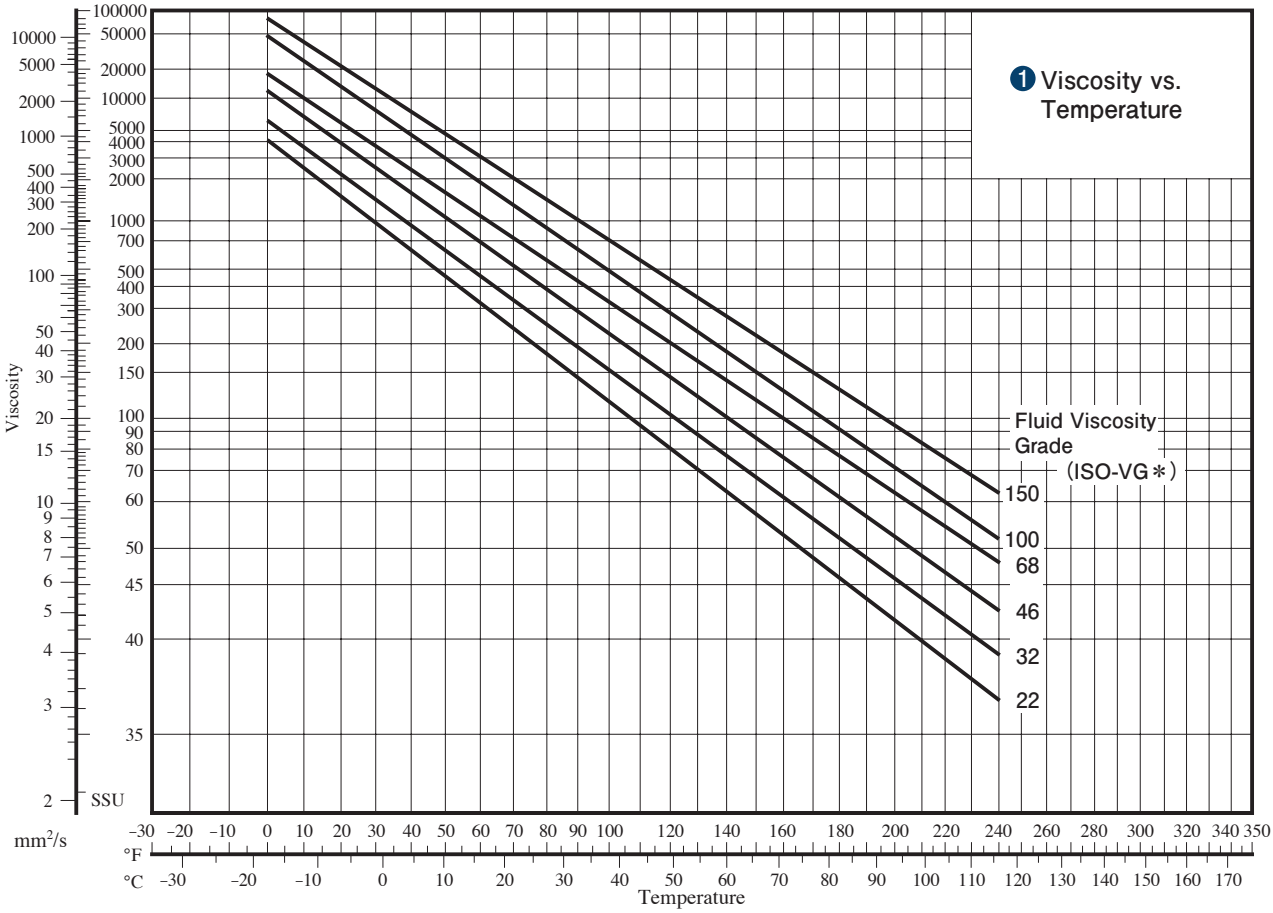
Nominal Dia.	Outside mm	Thick mm	Operating Pres. MPa: 1.6	4.0	6.0	6.9	7.0	10	14	16	17.4	17.5	21	25	31.5	35	Max. Operating Pres. MPa
6	6	1.5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	35
10	10	2.0	○	○	○	○	○	○	○	○	○	○	○	○	○	○	35
12	12	2.0	○	○	○	○	○	○	○	○	○	○	○	○			25
16	16	2.0	○	○	○	○	○	○	○	○	○	○					17.5
20	20	2.5	○	○	○	○	○	○	★1	★1	★1	○					17.5
25	25	3.0	○	○	○	○	○	○	○	★1	★1	○					17.5

★1. Available if the safety factor is 4.
★2. Designation
(Example) OST-2 12×2.0

Formulas/Nomograms [Part 4]

① Viscosity vs. Temperature, ② Viscosity Conversion Chart

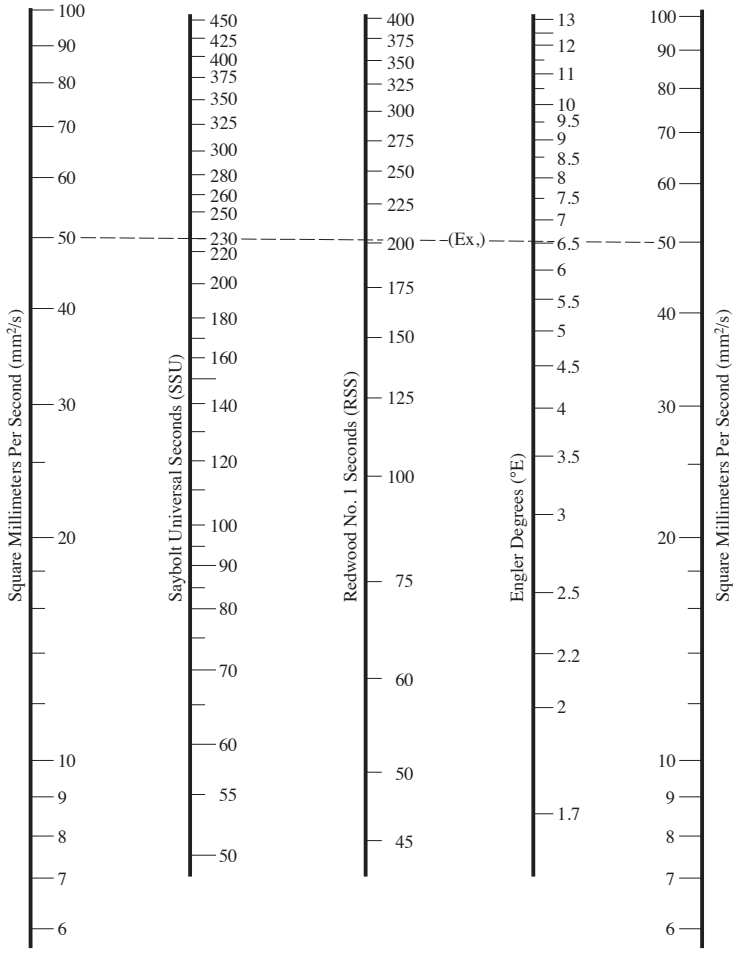
❶ Viscosity vs. Temperature

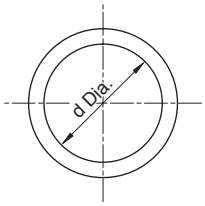


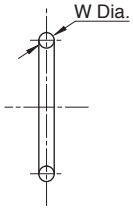
❷ Viscosity Conversion Chart

Use the following equations when the viscosity is 100 mm²/s or more.

SSU×0.220=mm²/s
RSS×0.2435=mm²/s
°E×7.6=mm²/s







O-Ring Types According to JIS and YES (Yuken Engineering Standards)

JIS B 2401-1	YES	Remarks	
OR NBR-70-1 P✻ G✻ -N	SO-NA- P✻ G✻	For Use with Mineral Oils Material: Nitrile Rubber	Spring Hardness70
OR NBR-90 P✻ G✻ -N	SO-NB- P✻ G✻		Spring Hardness90
OR FKM-70 P✻ G✻ -N	SO-FA- P✻ G✻	For Use with Heat Resistant/Synthetic Oils Material:Fluororubber	Spring Hardness70
OR FKM-90 P✻ G✻ -N	SO-FB- P✻ G✻		Spring Hardness90

Note) 1. "-P✻" denotes dynamic O-rings; "-G✻" denotes static O-rings.
2. The basic sizes are the same.
3. JIS W 1516-AN6227, AN6230「Packing and Gasket for Airplane」 was abolished at Sep.1st, 1977.

JIS B 2401-1 OR NBR/FKM 70-1/90 P✻-N

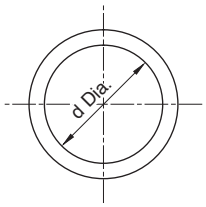
Designation	Actual Size mm d	w
P 3	2.8	1.9
P 4	3.8	
P 5	4.8	
P 6	5.8	
P 7	6.8	
P 8	7.8	1.9
P 9	8.8	
P 10	9.8	
P 10A	9.8	2.4
P 11	10.8	
P 11.2	11.0	2.4
P 12	11.8	
P 12.5	12.3	
P 14	13.8	
P 15	14.8	
P 16	15.8	2.4
P 18	17.8	
P 20	19.8	
P 21	20.8	
P 22	21.8	
P 22A	21.7	3.5
P 22.4	22.1	
P 24	23.7	
P 25	24.7	
P 25.5	25.2	
P 26	25.7	3.5
P 28	27.7	
P 29	28.7	
P 29.5	29.2	
P 30	29.7	
P 31	30.7	3.5
P 31.5	31.2	
P 32	31.7	
P 34	33.7	
P 35	34.7	
P 35.5	35.2	3.5
P 36	35.7	
P 38	37.7	
P 39	38.7	
P 40	39.7	
P 41	40.7	3.5
P 42	41.7	
P 44	43.7	
P 45	44.7	
P 46	45.7	
P 48	47.7	3.5
P 49	48.7	
P 50	49.7	
P 48A	47.6	5.7
P 50A	49.6	
P 52	51.6	5.7
P 53	52.6	
P 55	54.6	
P 56	55.6	
P 58	57.6	
P 60	59.6	5.7
P 62	61.6	
P 63	62.6	
P 65	64.6	
P 67	66.6	
P 70	69.6	5.7
P 71	70.6	
P 75	74.6	
P 80	79.6	
P 85	84.6	
P 90	89.6	5.7
P 95	94.6	
P 100	99.6	
P 102	101.6	
P 105	104.6	
P 110	109.6	5.7
P 112	111.6	
P 115	114.6	
P 120	119.6	
P 125	124.6	
P 130	129.6	5.7
P 132	131.6	
P 135	134.6	
P 140	139.6	
P 145	144.6	
P 150	149.6	5.7
P 150A	149.5	8.4
P 155	154.5	
P 160	159.5	
P 165	164.5	
P 170	169.5	8.4
P 175	174.5	
P 180	179.5	
P 185	184.5	
P 190	189.5	
P 195	194.5	8.4
P 200	199.5	
P 205	204.5	
P 209	208.5	
P 210	209.5	
P 215	214.5	8.4
P 220	219.5	
P 225	224.5	
P 230	229.5	
P 235	234.5	
P 240	239.5	8.4
P 245	244.5	
P 250	249.5	
P 255	254.5	
P 260	259.5	
P 265	264.5	8.4
P 270	269.5	
P 275	274.5	
P 280	279.5	
P 285	284.5	
P 290	289.5	8.4
P 295	294.5	
P 300	299.5	
P 315	314.5	
P 320	319.5	
P 335	334.5	8.4
P 340	339.5	
P 355	354.5	
P 360	359.5	
P 375	374.5	
P 385	384.5	8.4
P 400	399.5	

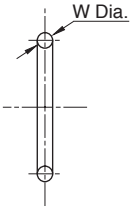
JIS B 2401-1 OR NBR/FKM 70-1/90 G✻-N

Designation	Actual Size mm d	w
G 25	24.4	3.1
G 30	29.4	
G 35	34.4	
G 40	39.4	
G 45	44.4	
G 50	49.4	3.1
G 55	54.4	
G 60	59.4	
G 65	64.4	
G 70	69.4	
G 75	74.4	3.1
G 80	79.4	
G 85	84.4	
G 90	89.4	
G 95	94.4	
G 100	99.4	3.1
G 105	104.4	
G 110	109.4	
G 115	114.4	
G 120	119.4	
G 125	124.4	3.1
G 130	129.4	
G 135	134.4	
G 140	139.4	
G 145	144.4	
G 150	149.3	5.7
G 155	154.3	
G 160	159.3	
G 165	164.3	
G 170	169.3	
G 175	174.3	5.7
G 180	179.3	
G 185	184.3	
G 190	189.3	
G 195	194.3	
G 200	199.3	5.7
G 210	209.3	
G 220	219.3	
G 230	229.3	
G 240	239.3	
G 250	249.3	5.7
G 260	259.3	
G 270	269.3	
G 280	279.3	
G 290	289.3	
G 300	299.3	5.7

O-Ring Size [Part 2]

AS 568 (Former ARP568), Aerospace Size Standard for O-Rings





AS 568 Designation	Actual Size mm	
	w	d
001	1.02	0.74
002	1.27	1.07
003	1.52	1.42
004	1.78	1.78
005	1.78	2.57
006		2.90
007		3.68
008	1.78	4.47
009		5.28
010		6.07
011		7.65
012		9.25
013	1.78	10.82
014		12.42
015		14.00
016		15.60
017		17.17
018	1.78	18.77
019		20.35
020		21.95
021		23.52
022		25.12
023	1.78	26.70
024		28.30
025		29.87
026		31.47
027		33.05
028	1.78	34.65
029		37.82
030		41.00
031		44.17
032		47.35
033	1.78	50.52
034		53.70
035		56.87
036		60.05
037		63.22
038	1.78	66.40
039		69.57
040		72.75
041		75.92
042		82.27
043	1.78	88.62
044		94.97
045		101.32
046		107.67
047		114.02
048	1.78	120.37
049		126.72
050		133.07
106		4.42
107		5.23
108	2.62	6.02
109		7.59
110		9.19
111		10.77
112		12.37
113	2.62	13.94
114		15.54
115		17.12

AS 568 Designation	Actual Size mm	
	w	d
116		18.72
117		20.29
118	2.62	21.89
119		23.47
120		25.07
121		26.64
122		28.24
123	2.62	29.82
124		31.42
125		32.99
126		34.59
127		36.17
128	2.62	37.77
129		39.34
130		40.94
131		42.52
132		44.12
133	2.62	45.69
134		47.29
135		48.90
136		50.47
137		52.07
138	2.62	53.64
139		55.24
140		56.82
141		58.42
142		59.99
143	2.62	61.60
144		63.17
145		64.77
146		66.34
147		67.94
148	2.62	69.52
149		71.12
150		72.69
151		75.87
152		82.22
153	2.62	88.57
154		94.92
155		101.27
156		107.62
157		113.97
158	2.62	120.32
159		126.67
160		133.02
161		139.37
162		145.72
163	2.62	152.07
164		158.42
165		164.77
166		171.12
167		177.47
168	2.62	183.82
169		190.17
170		196.52
171		202.87
172		209.22
173	2.62	215.57
174		221.92
175		228.27

AS 568 Designation	Actual Size mm	
	w	d
176		234.62
177	2.62	240.97
178		247.32
210		18.64
211		20.22
212	3.53	21.82
213		23.39
214		24.99
215		26.57
216		28.17
217	3.53	29.74
218		31.34
219		32.92
220		34.52
221		36.09
222	3.53	37.69
223		40.87
224		44.04
225		47.22
226		50.39
227	3.53	53.57
228		56.74
229		59.92
230		63.09
231		66.27
232	3.53	69.44
233		72.62
234		75.79
235		78.97
236		82.14
237	3.53	85.32
238		88.49
239		91.67
240		94.84
241		98.02
242	3.53	101.19
243		104.37
244		107.54
245		110.72
246		113.89
247	3.53	117.07
248		120.24
249		123.42
250		126.59
251		129.77
252	3.53	132.94
253		136.12
254		139.29
255		142.47
256		145.64
257	3.53	148.82
258		151.99
259		158.34
260		164.69
261		171.04
262	3.53	177.39
263		183.74
264		190.09
265		196.44
266		202.79
267	3.53	209.14
268		215.49
269		221.84
270		228.19
271		234.54
272	3.53	240.89
273		247.24
274		253.59

AS 568 Designation	Actual Size mm	
	w	d
275		266.29
276		278.99
277	3.53	291.69
278		304.39
279		329.79
280		355.19
281		380.59
282	3.53	405.26
283		430.66
284		456.06
325		37.46
326		40.64
327	5.33	43.82
328		46.99
329		50.16
330		53.34
331		56.52
332	5.33	59.69
333		62.86
334		66.04
335		69.22
336		72.39
337	5.33	75.57
338		78.74
339		81.92
340		85.09
341		88.27
342	5.33	91.44
343		94.62
344		97.79
345		100.97
346		104.14
347	5.33	107.32
348		110.49
349		113.67
350		116.84
351		120.02
352	5.33	123.19
353		126.37
354		129.54
355		132.72
356		135.89
357	5.33	139.07
358		142.24
359		145.42
360		148.59
361		151.77
362	5.33	158.12
363		164.47
364		170.82
365		177.17
366		183.52
367	5.33	189.87
368		196.22
369		202.57
370		208.92
371		215.27
372	5.33	221.62
373		227.97
374		234.32
375		240.67
376		247.02
377	5.33	253.37
378		266.07
379		278.77
380		291.47
381		304.17
382	5.33	329.57
383		354.97
384		380.37

AS 568 Designation	Actual Size mm	
	w	d
385		405.26
386		430.66
387	5.33	456.06
388		481.46
389		506.86
390		532.26
391		557.66
392	5.33	582.68
393		608.08
394		633.48
395	5.33	658.88
425		113.66
426		116.84
427	6.98	120.02
428		123.19
429		126.36
430		129.54
431		132.72
432	6.98	135.89
433		139.06
434		142.24
435		145.42
436		148.59
437	6.98	151.76
438		158.12
439		164.46
440		170.82
441		177.16
442	6.98	183.52
443		189.86
444		196.22
445		202.56
446		215.27
447	6.98	227.96
448		240.67
449		253.36
450		266.07
451		278.76
452	6.98	291.47
453		304.16
454		316.87
455		329.56
456		342.27
457	6.98	354.96
458		367.67
459		380.36
460		393.07
461		405.26
462	6.98	417.96
463		430.66
464		443.36
465		456.06
466		468.76
467	6.98	481.46
468		494.16
469		506.86
470		532.26
471		557.66
472	6.98	582.68
473		608.08
474		633.48
475	6.98	658.88

International System of Units (SI) [Part 1]

(According to JIS Z 8203 "SI units and recommendations for the use of their multiples and of certain other units" and Z 8202 "Quantities and units")

Origin of the term SI (International System of Units)

SI stands for Système International d'Unités in French (International System of Units in English), an internationally accepted official abbreviation.

Purpose and historical background of the SI

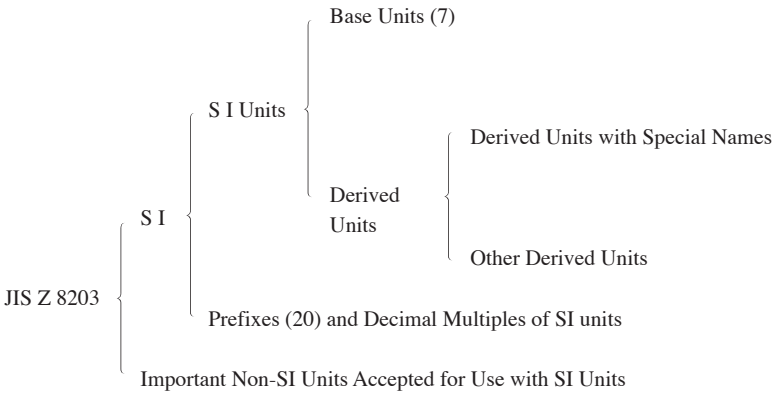
The Metre Convention was signed in 1875 to oversee the keeping of metric system as a unified international system of units. Then, the metric system had more than ten variations, losing its consistency. At the 9th General Conference on Weights and Measures (Conférence Générale des Poids et Mesures: CGPM) in 1948, a resolution was adopted "to use a unified system of units in all fields". The International Committee for Weights and Measures (Comité International des Poids et Mesures: CIPM) of the treaty organization started a process to establish a unified system and determined the framework of the SI in 1960. In 1973, the International Organization for Standardization (ISO) developed the standard ISO 1000, which describes SI units and recommendations for the use of them, leading to global adoption of the system. In Japan, a policy to introduce SI units into JIS through the following three phases was determined in 1972; the introduction of SI units into JIS progressed rapidly.

First phase: Use of conventional units followed by SI units e.g. 1 kgf {9.8 N}
Second phase: Use of SI units followed by conventional units e.g. 10 N {1.02 kgf}
Third phase: Use of SI units only e.g. 10 N

The Measurement Act in Japan was fully revised in 1992 and enacted in 1993 to unify statutory measurement units into SI units. Under the new Measurement Act, a transition period of up to seven years was granted before the exclusive use of SI units for "pressure" and "moment of force" in the field of hydraulics, and the period expired on September 30, 1999. Since October 1, 1999, it has been mandatory to use SI units as statutory measurement units for transactions and certifications. Commercially available pressure gauges are in SI units. The units used in this catalog are SI units.

All units used in this catalog are SI units as applicable in the third phase of the SI implementation process.

Structure of SI units and JIS Z 8203



Base Units

Quantity	Base Unit	
	Name	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric Current	ampere	A
Thermodynamic Temperature	kelvin	K
Amount of Substance	mole	mol
Luminous Intensity	candela	cd

International System of Units (SI) [Part 2]

Prefixes

Prefixes are used to form decimal multiples of SI units.

Unit Multiplier	Prefix	
	Name	Symbol
10^{24}	yotta	Y
10^{21}	zetta	Z
10^{18}	exa	E
10^{15}	peta	P
10^{12}	tera	T
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
10^{2}	hecto	h
10	deka	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a
10^{-21}	zepto	z
10^{-24}	yocto	y

Non-SI units accepted for use with SI units

Quantity	Unit Name	Unit Symbol
Time	minute hour day	min h d
Plane Angle	degree minute second	° ′ ″
Volume	liter	l, L★
Mass	metric ton	t

★The letter "L" may be used as the symbol for liter, when the symbol "l" for liter might be confused with any other character (as a general rule, Yuken uses "L").

Non-SI units accepted for use with SI units, those values by SI units obtained experimentally.

Quantity	Unit Name	Unit Symbol
Energy	electronvolt	eV
Atomic Mass	atomic mass unit	u

Units accepted for use with SI units for usefulness in special fields

Quantity	Unit Name	Unit Symbol
Fluid Pressure	bar	bar

Derived Units

Derived units are expressed algebraically in terms of base units and supplementary units (by means of the mathematical symbols of multiplication and division) in the International System of Units.

Derived units expressed in terms of SI base units

Quantity	Derived Unit	
	Name	Symbol
Area	square meter	m^2
Volume	cubic meter	m^3
Speed, Velocity	meter per second	m/s
Acceleration	meter per second squared	m/s^2
Wavenumber	reciprocal meter	m^{-1}
Density	kilogram per cubic meter	kg/m^3
Current Density	ampere per square meter	A/m^2
Magnetic Field Strength	ampere per meter	A/m
(Amount-of-substance) Concentration	mole per cubic meter	mol/m^3
Specific Volume	cubic meter per kilogram	m^3/kg
Luminance	candela per square meter	cd/m^2

Derived units with special names

Quantity	Derived Unit		
	Name	Symbol	Definition
Plane Angle (Supplementary Unit)	radian	rad	m/m
Solid Angle (Supplementary Unit)	steradian	sr	m^2/m^2
Frequency	hertz	Hz	s^{-1}
Force	newton	N	$kg \cdot m/s^2$
Pressure, Stress	pascal	Pa	N/m^2
Energy, Work, Amount of Heat	joule	J	N·m
Amount of Work Done Per Time, Motive Power, Electrical Power	watt	W	J/s
Electric Charge, Amount of Electricity	coulomb	C	A·s
Electric Potential, Potential Difference, Voltage, Electromotive Force	volt	V	W/A
Capacitance	farad	F	C/V
Electric Resistance	ohm	Ω	V/A
(Electric) Conductance	siemens	S	A/V
Magnetic Flux	weber	Wb	V·s
Magnetic Flux Density, Magnetic Induction	tesla	T	Wb/m^2
Inductance	henry	H	Wb/A
Celsius Temperature	degree celsius/degree	°C	
Luminous Flux	lumen	lm	cd·sy
Illuminance	lux	lx	lm/m^2

Derived units with special names those recognized for protecting human health

Quantity	Derived Unit		
	Name	Symbol	Definition
Activity Referred to a Radionuclide	becquerel	Bq	S^{-1}
Absorbed Dose	gray	Gy	J/kg
Dose Equivalent	sievert	Sv	Gy

International System of Units (SI) [Part 3]

Use of SI units

Space and Time

Quantity	SI unit	Decimal Multiple Unit
Plane Angle	rad (radian)	mrad µrad
Solid Angle	sr (steradian)	
Length, Width, Height, Thickness, Radius, Diameter, Length of Path Traveled, Distance	m (meter)	km dm cm mm µm nm pm
Area	m^2 (square meter)	km^2 dm^2 cm^2 mm^2
Volume	m^3 (cubic meter)	dm^3 cm^3 mm^3
Time	s (second)	ks ms µs ns
Angular Velocity	rad/s (radian per second)	
Speed, Velocity	m/s (meter per second)	
Acceleration	m/s^2 (meter per second squared)	

Periodic and Related Phenomena

Frequency	Hz (hertz)	THz GHz MHz kHz
Rotational Speed, Revolutions	s^{-1} (per second)	

Dynamics

Mass	kg (kilogram)	Mg g mg µg

Dynamics

Quantity	SI unit	Decimal Multiple Unit
Density, Concentration	kg/m^3 (kilogram per cubic meter)	Mg/m^3 or kg/dm^3 or g/cm^3
Moment of Inertia	$kg \cdot m^2$ (kilogram meter squared)	
Force	N (newton)	MN kN mN µN
Moment of Force	N · m (newton meter)	MN·m kN·m mN·m µN·m
Pressure	Pa (pascal)	GPa MPa kPa mPa µPa
Stress	(pascal or newton per square meter) Pa or N/m^2	GPa MPa or N/mm^2 kPa
Viscosity	Pa·s (pascal second)	mPa·s
Kinematic Viscosity	m^2/s (square meter per second)	mm^2/s
Work, Energy, Amount of Heat	J (joule)	TJ GJ MJ kJ mJ
Power, Amount of Work Done Per Unit of Time	W (watt)	GW MW kW mW µW
Flow Rate	m^3/s (cubic meter per second)	

Heat

Quantity	SI unit	Decimal Multiple Unit
Thermodynamic Temperature	K (kelvin)	
Celsius Temperature	°C (degree Celsius or degree)	
Temperature Interval, Temperature Difference	K or °C	
Amount of Heat	J (joule)	TJ GJ MJ kJ mJ
Heat Flow Rate	W (watt)	kW
Thermal Conductivity	W/ (m·K)	
Coefficient of Heat Transfer	W/ (m^2·K)	
Specific Heat Capacity	J/(kg·K)	kJ/(kg·K)

Electricity and Magnetism

Electric Current	A (ampere)	kA mA µA nA pA
Electric Potential, Electric Potential Difference, Voltage, Electromotive Force	V (volt)	MV kV mV µV
(Electric) Resistance (Direct Current)	Ω (ohm)	GΩ MΩ (Remarks) MΩ is also referred to as megohm. kΩ mΩ µΩ
(Active) Electric Power	W (watt)	TW GW MW kW mW µW nW

Sound

Frequency	Hz (hertz)	GHz MHz kHz
Sound Pressure Level	*	

* This SI unit is not provided by ISO 1000-1973 and ISO 31 Part -1978, but JIS adopts and specifies dB (decibel) as a unit accepted for use with SI units.

International System of Units (SI) [Part 4]

SI unit conversion factors table

(Shaded columns represent SI units.)

Force

N newton	dyn	kgf
1	1×10^{5}	$1.019\ 72\times10^{-1}$
1×10^{-5}	1	$1.019\ 72\times10^{-6}$
9.806 65	$9.806\ 65\times10^{5}$	1

Moment of Inertia

N·m newton meter	kgf·m
1	0.101 972
9.807	1

Note) 1 N·m=1 kg·m²/s²

Pressure

Pa pascal	bar	kgf/cm^2	atm	mmH$_2$O	mmHg or Torr
1	1×10^{-5}	$1.019\ 72\times10^{-5}$	$9.869\ 23\times10^{-6}$	$1.019\ 72\times10^{-1}$	$7.500\ 62\times10^{-3}$
1×10^{5}	1	1.019 72	$9.869\ 23\times10^{-1}$	$1.019\ 72\times10^{4}$	$7.500\ 62\times10^{2}$
$9.806\ 65\times10^{4}$	$9.806\ 65\times10^{-1}$	1	$9.678\ 41\times10^{-1}$	1×10^{4}	$7.355\ 59\times10^{2}$
$1.013\ 25\times10^{5}$	1.013 25	1.033 23	1	$1.033\ 23\times10^{4}$	$7.600\ 00\times10^{2}$
9.806 65	$9.806\ 65\times10^{-5}$	1×10^{-4}	$9.678\ 41\times10^{-5}$	1	$7.355\ 59\times10^{-2}$
$1.333\ 22\times10^{2}$	$1.333\ 22\times10^{-3}$	$1.359\ 51\times10^{-3}$	$1.315\ 79\times10^{-3}$	1.359 51×10	1

Note) 1 Pa=1 N/m²

Stress

Pa pascal	MPa or N/mm^2 megapascal or newton per square milimeter	kgf/mm^2	kgf/cm^2
1	1×10^{-6}	$1.019\ 72\times10^{-7}$	$1.019\ 72\times10^{-5}$
1×10^{6}	1	$1.019\ 72\times10^{-1}$	1.019 72×10
$9.806\ 65\times10^{6}$	9.806 65	1	1×10^{2}
$9.806\ 65\times10^{4}$	$9.806\ 65\times10^{-2}$	1×10^{-2}	1

Viscosity

Pa·s pascal second	cP	P
1	1×10^{3}	1×10
1×10^{-3}	1	1×10^{-2}
1×10^{-1}	1×10^{2}	1

Note) 1 P=1 dyn·s/cm²= 1g/cm·s
1 Pa·s=1 N·s/m² , 1 cP=1 mPa·s

Work, Energy, Amount of Heat

J joule	kW·h	kgf·m	kcal
1	$2.777\ 78\times10^{-7}$	$1.019\ 72\times10^{-1}$	$2.388\ 89\times10^{-4}$
$3.600\ \times10^{6}$	1	$3.670\ 98\times10^{5}$	$8.600\ 0\ \times10^{2}$
9.806 65	$2.724\ 07\times10^{-6}$	1	$2.342\ 70\times10^{-3}$
$4.186\ 05\times10^{3}$	$1.162\ 79\times10^{-3}$	$4.268\ 58\times10^{2}$	1

Note) 1 J=1 W·s , 1 W·h=3 600 W·s
1 cal=4.186 05 J (according to the Measurement Act)

Kinematic Viscosity

m²/s (square meter per second)	cSt	St
1	1×10^{6}	1×10^{4}
1×10^{-6}	1	1×10^{-2}
1×10^{-4}	1×10^{2}	1

Note) 1 cSt=1 mm²/s, 1 St=1 cm²/s

Power (Amount of Work Done Per Unit of Time, Motive Power)

kW kilowatt	kgf·m/s	PS	kcal/h
1	$1.019\ 72\times10^{2}$	1.359 62	$8.600\ 0\ \times10^{2}$
$9.806\ 65\times10^{-3}$	1	$1.333\ 33\times10^{-2}$	8.433 71
$7.355\ \times10^{-1}$	7.5 ×10	1	$6.325\ 29\times10^{2}$
$1.162\ 79\times10^{-3}$	$1.185\ 72\times10^{-1}$	$1.580\ 95\times10^{-3}$	1

Note) 1 W=1 J/s, PS:French horsepower
1 PS=0.735 5kW (according to the Act for Enforcement of the Measurement Act)
1 cal=4.186 05 J (according to the Measurement Act)

Thermal Conductivity

W/(m·K) watt per meter kelvin	kcal/(h·m·°C)
1	$8.600\ 0\times10^{-1}$
1.162 79	1

Note) 1 cal=4.186 05 J
(according to the Measurement Act)

Temperature

$T_1=T_2+273.15$
$T_3=1.8\ T_2+32$

T_1 : Thermodynamic Temperature	K (kelvin)
T_2 : Celsius Temperature	℃ (degree)
T_3 : °F	

Specific heat capacity

J/(kg·K) joule per kilogram kelvin	kcal/(kg·°C) cal/(g·°C)
1	$2.388\ 89\times10^{-4}$
$4.186\ 05\times10^{3}$	1

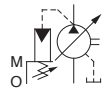
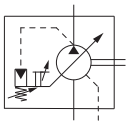
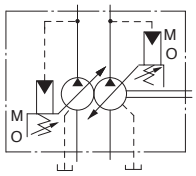
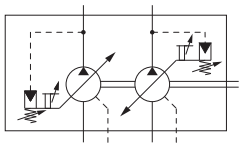
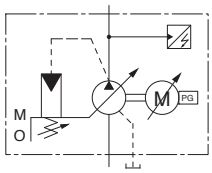
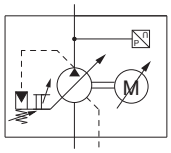
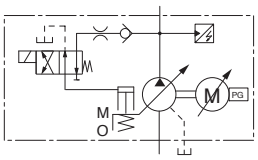
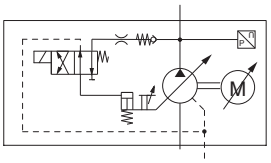
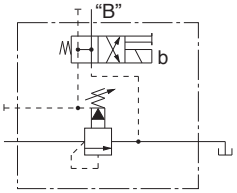
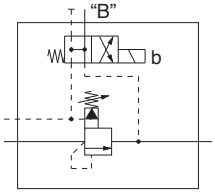
Note) 1 cal=4.186 05 J
(according to the Measurement Act)

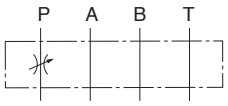
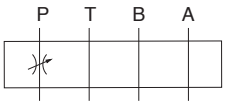
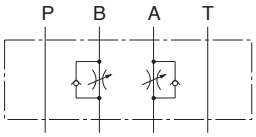
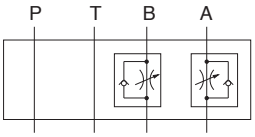
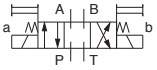
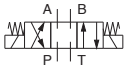
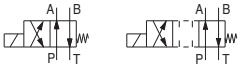
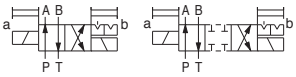
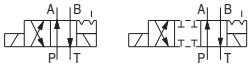
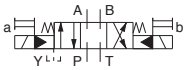
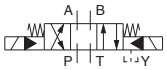
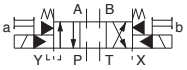
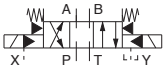
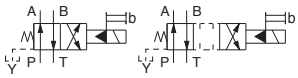
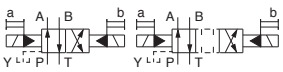
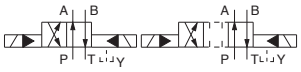
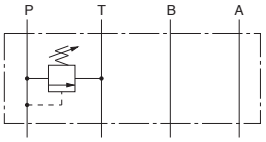
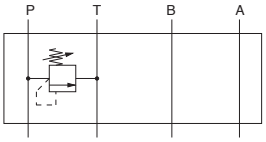
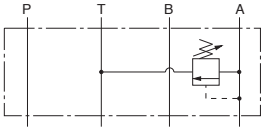
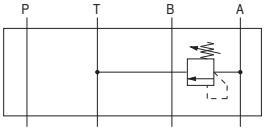
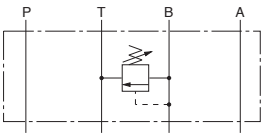
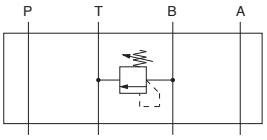
Coefficient of Heat Transfer

W/(m²·K) watt per meter squared kelvin	kcal/(h·m²·°C)
1	$8.600\ 0\times10^{-1}$
1.162 79	1

Note) 1 cal=4.186 05 J
(according to the Measurement Act)

Graphic symbol standard JIS B 0125-1 is revised in 2007, although Yuken still use the symbols of current JIS standard.
The comparison between graphic symbols used on this catalog and those of JIS B 0125-1:2007 are indicated in the table below.

Name	Model Numbers	Graphic Symbols	
		YUKEN	JIS B 0125-1:2007
Variable Displacement Piston Pumps Single Pumps	AR＊ A＊ A3H＊ A3HG＊		
Variable Displacement Piston Pumps Double Pumps	A＊A＊		
ASR Series AC Servo Motor Driven Pumps Single Displacement Type	ASR＊-＊＊-＊X＊		
ASR Series AC Servo Motor Driven Pumps Dual Displacement Type	ASR＊-＊＊-＊W＊		
Vane Pumps Fixed Displacement Type Single Pumps	50T/150T PV2R＊ PV2R4A		
Remote Control Relief Valves Direct Type Relief Valves	DT DG		
Pilot Operated Relief Valves Low Noise Type Relief Valves Relief Valves (High Pressure Type)	BT/BG S-BG B3G		
Solenoid Controlled Relief Valves Solenoid Controlled Relief Valves (High Pressure Type)	BST/BSG-＊-2B3B B3SG-＊-2B3B		
Pressure Reducing Valves	RT/RG		
Semiconductor Type Pressure Switches	JT		
Flow Control Valves	FG		
Flow Control and Check Valves	FCG		

Name	Model Numbers	Graphic Symbols	
		YUKEN	JIS B 0125-1:2007
Restrictors	SRT/SRG		
One Way Restrictors	SRCT/SRCG		
Throttle Module	TC1G		
Throttle and Check Module	TC2G		
Needle Valves	GCT/GCTR		
Solenoid Operated Directional Valves Spring Centered	DSG-＊-3C＊/L-DSG-＊-3C＊ S-DSG-＊-3C＊/T-(S-)DSG-＊-3C＊ E-DSG-＊-3C＊/G-DSG-＊-3C＊		
Solenoid Operated Directional Valves Spring Offset	DSG-＊-2B＊/L-DSG-＊-2B＊ S-DSG-＊-2B＊/T-(S-)DSG-＊-2B＊ E-DSG-＊-2B＊/G-DSG-＊-2B7		
Solenoid Operated Directional Valves No-Spring Detended	DSG-＊-2D2/L-DSG-＊-2D2 S-DSG-＊-2D2/T-DSG-＊-2D2 E-DSG-＊-2D2		
Solenoid Controlled Pilot Operated Directional Valves Spring Centered	DSHG-＊-3C＊ S-DSHG-＊-3C＊ G-DSHG-＊-3C＊		
Solenoid Controlled Pilot Operated Directional Valves Pressure Centered	DSHG-06-3H＊ S-DSHG-06-3H＊		
Solenoid Controlled Pilot Operated Directional Valves Spring Offset	DSHG-＊-2B＊ S-DSHG-＊-2B＊		
Solenoid Controlled Pilot Operated Directional Valves No-Spring	DSHG-＊-2N＊ S-DSHG-＊-2N＊		
005/01 Series Relief Modular Valves	MBP-005/01		
01 Series Relief Modular Valves	MBA-01		
	MBB-01		

Name	Model Numbers	Graphic Symbols	
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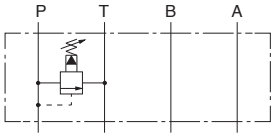
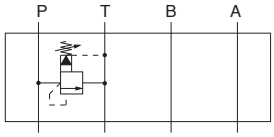
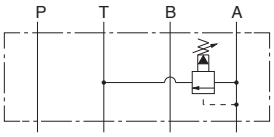
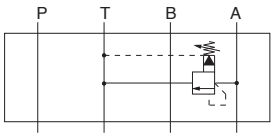
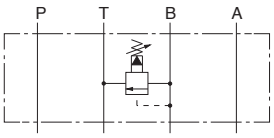
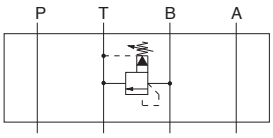
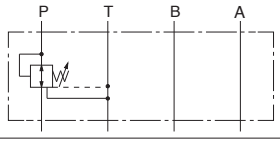
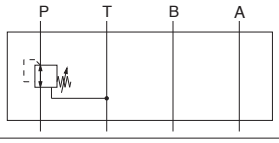
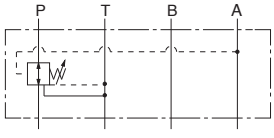
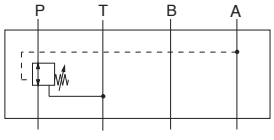
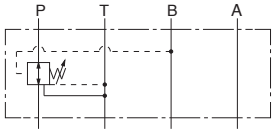
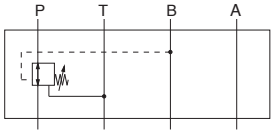
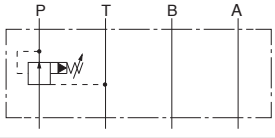
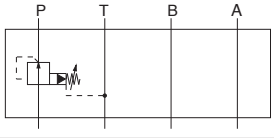
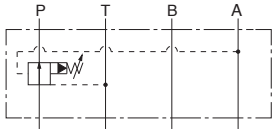
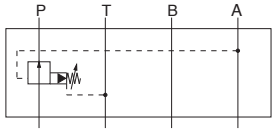
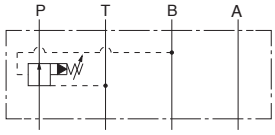
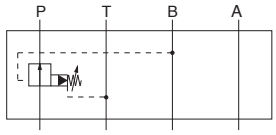
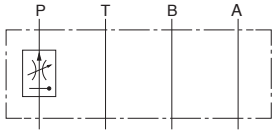
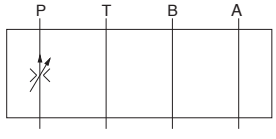
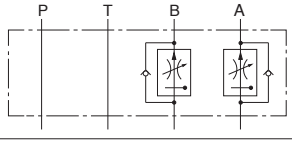
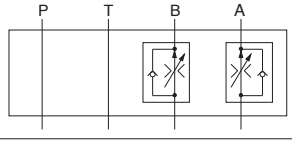
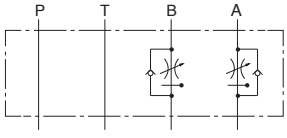
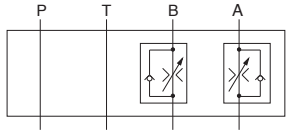
03 Series Relief Modular Valves	MBP-03		
	MBA-03		
	MBB-03		
005/007/01 Series Reducing Modular Valves	MRP-005/007/01		
01 Series Reducing Modular Valves	MRA-01		
	MRB-01		
03 Series Reducing Modular Valves	MRP-03		
	MRA-03		
	MRB-03		
01/03 Series Flow Control Modular Valves	MFP-01/03		
01/03 Series Flow Control and Check Modular Valves	MFW-01-X MFW-03-X		
01/03 Series Temperature Compensated Throttle and Check Modular Valves	MSTW-01-X MSTW-03-X		

Name	Model Numbers	Graphic Symbols	
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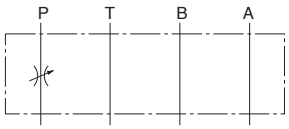
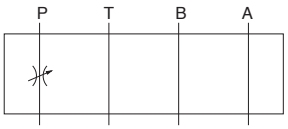
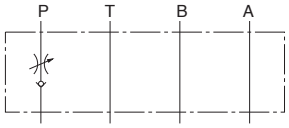
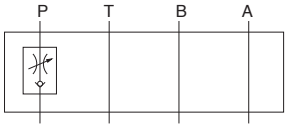
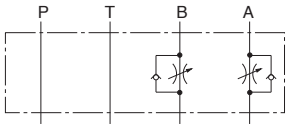
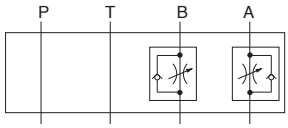
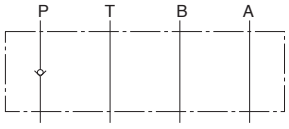
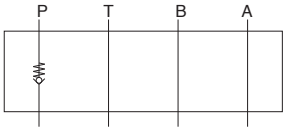
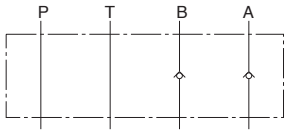
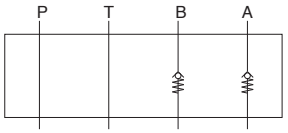
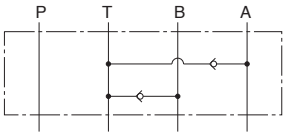
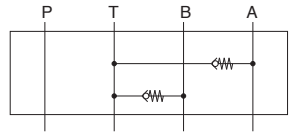
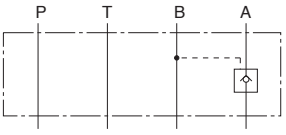
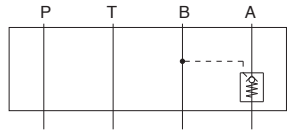
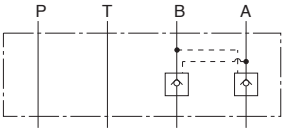
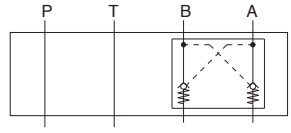
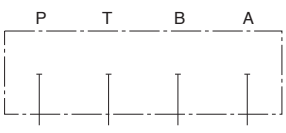
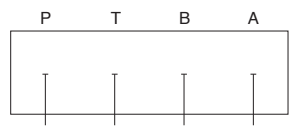
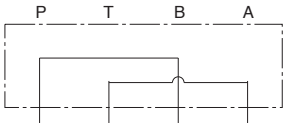
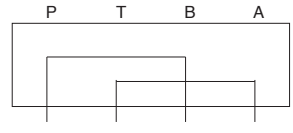
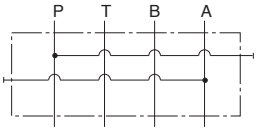
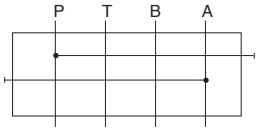
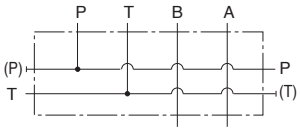
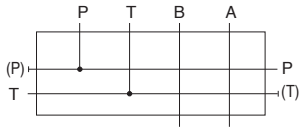
01/03 Series Throttle Modular Valves	MSP-01/03		
01/03 Series Check and Throttle Modular Valves	MSCP-01/03		
005/007/01/03 Series Throttle and Check Modular Valves	MSW-005-X MSW-007-X MSW-01-X MSW-03-X		
005/01/03 Series Check Modular Valves	MCP-005/01/03		
01/03 Series Check Modular Valves	MCW-01/03		
01/03 Series Anti-Cavitation Modular Valves	MAC-01/03		
005/007/01/03 Series Pilot Operated Check Modular Valves	MPA-005/007/01/03		
	MPW-005/007/01/03		
005/007/01/03 Series End Plates	MDC-005-A MDC-007-A MDC-01-A MDC-03-A		
01/03 Series End Plates	MDC-01-B MDC-03-B		
01 Series Connecting Plates	MDS-01-PA		
005/007/01/03 Series Base Plates	MMC-005-1 MMC-007-1 MMC-01-1 MMC-03-1		

Name	Model Numbers	Graphic Symbols	
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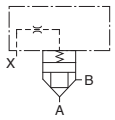
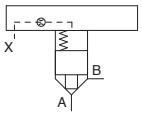
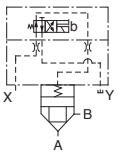
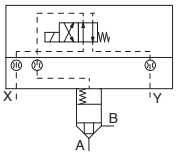
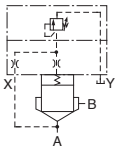
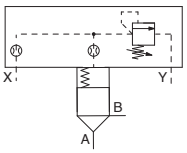
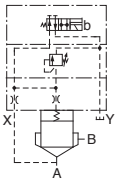
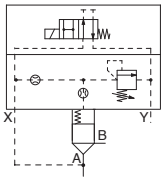
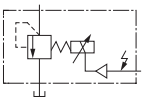
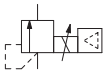
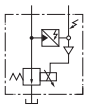
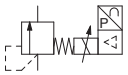
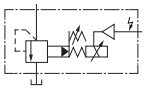
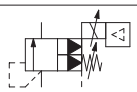
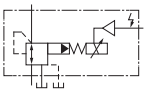
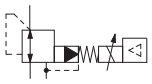
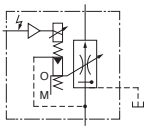
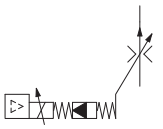
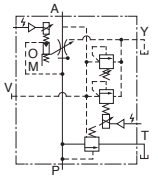
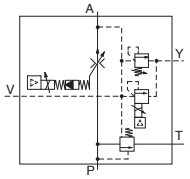
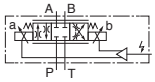
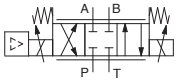
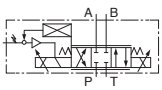
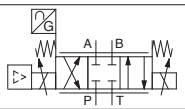
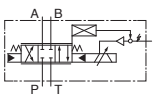
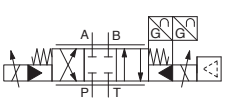
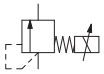
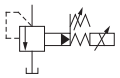
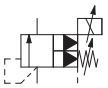
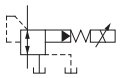
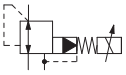
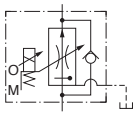
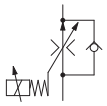
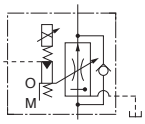
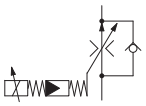
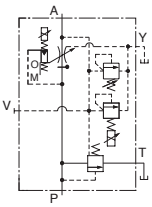
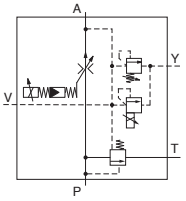
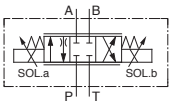
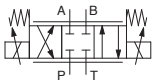
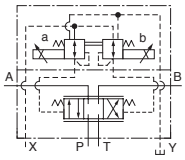
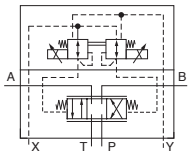
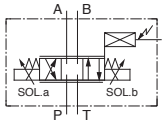
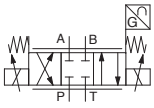
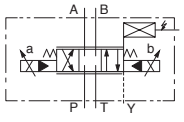
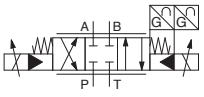
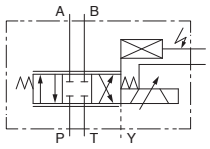
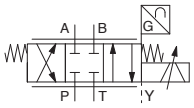
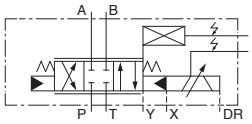
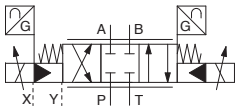
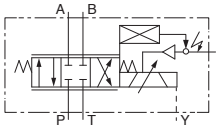
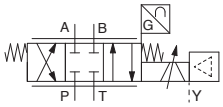
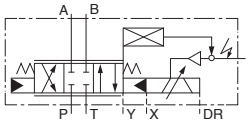
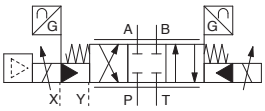
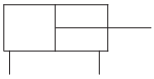
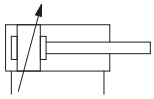
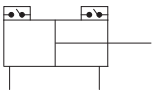
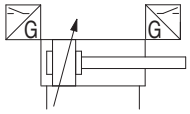
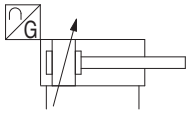
Directional Control Logic Valves Directional and Flow Control Logic Valves	LD		
Solenoid Operated Directional Control Logic Valves	LDS		
Relief Logic Valves	LB		
Solenoid Operated Relief Logic Valves	LBS		
EH Series Proportional Electro-Hydraulic Pilot Relief Valves	EHDG		
EH Series Proportional Electro-Hydraulic Pressure Control Valves	SB1110/SB1190		
EH Series Proportional Electro-Hydraulic Relief Valves	EHBG		
EH Series Proportional Electro-Hydraulic Relieving and Reducing Valves	EHRBG		
EH Series Proportional Electro-Hydraulic Flow Control (and Check) Valves	EHF(C)G		
EH Series Proportional Electro-Hydraulic Flow Control and Relief Valves	EHFBG		
EH Series Proportional Electro-Hydraulic Directional and Flow Control Valves	EHDFG		
EH Series Direct Operated High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves	ELDFG-＊EH		
EH Series High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves (Two Stage Type)	ELDFHG-＊EH		

Name	Model Numbers	Graphic Symbols	
		YUKEN	JIS B 0125-1:2007
E Series Proportional Electro-Hydraulic Pilot Relief Valves	EDG		
E Series Proportional Electro-Hydraulic Relief Valves	EBG		
E Series Proportional Electro-Hydraulic Relieving and Reducing Valves	ERBG		
E Series 40Ω Type Proportional Electro-Hydraulic Flow Control (and Check) Valves	EFG EFCG		
E Series 10Ω Type Proportional Electro-Hydraulic Flow Control (and Check) Valves	EFG EFCG		
E Series 10Ω-10Ω Type Proportional Electro-Hydraulic Flow Control and Relief Valves (High Flow Type)	EFBG		
Shockless Type Proportional Electro-Hydraulic Directional and Flow Control Valves	EDFG		
E Series Proportional Electro-Hydraulic Directional and Flow Control Valves	EDFHG		
E Series Direct Operated High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves	ELDFG		
E Series High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves (Two Stage Type)	ELDFHG		

Name	Model Numbers	Graphic Symbols	
		YUKEN	JIS B 0125-1:2007
Direct Type High-Speed Linear Servo Valves	LSVG		
Two Stage Type High-Speed Linear Servo Valves	LSVHG		
OBE Type Direct Operated Linear Servo Valves	LSVG-＊EH		
OBE Type Linear Servo Valves (Two Stage Type)	LSVHG-＊EH		
Standard Hydraulic Cylinders	CJT CBY KM PM		
Switch Set Type Standard Hydraulic Cylinders	CJT＊L CBY＊L HK PM		
Position Sensing Hydraulic Cylinders	CJT＊PS	———	

Piping Thread Connection for Foreign Countries Outside of Japan [Part 1]

Piping threads for foreign countries outside of Japan are available for the following products.
The special design number [Z80/90/950] will appear at the end of the design number.
(Example) 3280, 3290, 32950
For models not listed, please contact us.

Design Standard

Special Design Number	Z80	Z90	Z950	Standard[Reference]
Thread Type	Parallel Pipe Thread	American Tapered Pipe Thread	Unified Thread	Tapered Pipe Thread
Example of thread display [Female thread]	G 1/8	1/8-27 NPT	3/8-24 UNF-2B	Rc 1/8
Thread Standard	ISO228-1[JIS]	ANSI	SAE J1926-1 ISO 11926-1	JIS B 0203
Connecting part seal	Bonded Seal	O-Ring	O-Ring	O-Ring
Major Regions	Europe	North America	North America	Associated Countries

Products

Piston Pumps

Name	Model Numbers	Design Number	Special Design Number		
			Z80	Z90	Z950
AR Series Variable Disp. Piston Pumps	AR16-FR01	22			○
	AR22-FR01	22			○
A Series Variable Displacement Piston Pumps	A10-FR01	13	○	○	○
	A16-*-R-01	32	○	○	○
	A22-*-R-01	32	○	○	○
	A37-*-R-01	32	○	○	○
	A56-*-R-01	32	○	○	○
	A70-*R01	60		○	○
	A90-*R01	60		○	○
	A145-*R01	60		○	○
	A16-*-R-02	32			○
	A70-FR02	60			○
	A37-*-R-03	32		○	
	A145-*R03	60		○	
	A16-*-R-04	32	○		○
	A22-*-R-04	32	○		
	A37-*-R-04	32	○		○
	A56-*-R-04	32	○		○
	A22-*R04EH	44			○
	A37-*R04EH	44			○
	A56-*R04EH	44			○
	A70-*R04EH	62			○
	A16-*-R-05	32		○	
	A37-*-R-05	32		○	
	A56-*-R-05	32			○
	A10-FR07	13	○		○
	A16-*-R-07	32	○	○	○
	A22-*-R-07	32	○	○	○
	A37-*-R-07	32	○	○	○
	A56-*-R-07	32	○	○	○
	A70-*R07	60	○	○	○
	A90-*R07	60	○	○	○
	A145-*R07	60	○	○	○
	A1637-*-R-01*01	32		○	○
	A1656-*-R-01*01	32	○		
	A16R1-*-R-01	32	○		
	A37R1-*-R-01	32			○
	A56R1-*-R-01	32	○		
A3H Series High Pressure Variable Displacement Piston Pumps	A3H16-*R01	10	○		
	A3H37-*R01	10	○		
	A3H56-*R01	10	○		○
	A3H71-*R01	10	○		
	A3H100-*R01	10	○		
	A3H145-*R01	10	○		
	A3H180-*R01	10	○		
	A3H37-*R09	10	○		
	A3H56-*R09	10	○		
	A3H71-*R09	10	○		

Name	Model Numbers	Design Number	Special Design Number		
			Z80	Z90	Z950
A3H Series High Pressure Variable Displacement Piston Pumps	A3H100-*R09	10	○		
	A3H145-*R09	10	○		
	A3H180-*R09	10	○		
	A3H16-*R14	10	○		
	A3H37-*R14	10	○		
	A3H56-*R14	10	○		
	A3H71-*R14	10	○		
	A3H100-*R14	10	○		
	A3H145-*R14	10	○		
	A3H180-*R14	10	○		○
A3HM Series High Pressure Variable Displacement Piston Pumps	A3HM18-R01	11			○
	A3HM28-R01	12			○
	A3HM45-R01	12			○
	A3HM63-R01	12			○
	A3HM85-R01	11			○
	A3HM100-R01	11			○
	A3HM18-R07	11			○
	A3HM28-R07	12			○
	A3HM45-R07	12			○
	A3HM63-R07	12			○
	A3HM85-R07	11			○
	A3HM100-R07	11			○
	A3HM18-R14	11			○
	A3HM28-R14	12			○
	A3HM45-R14	12			○
	A3HM63-R14	12			○
	A3HM85-R14	11			○
	A3HM100-R14	11			○

Vane Pumps

Name	Model Numbers	Design Number	Special Design Number		
			Z80	Z90	Z950
Single Vane Pumps	50T	30	○	○	
	150T	40	○	○	
PV2R Series Single Vane Pumps	PV2R1	43		○	
	PV2R2	41		○	
	PV2R3	31		○	
	PV2R4	30		○	○
PV2R Series Double Vane Pumps	PV2R12	43		○	
	PV2R13	43		○	
	PV2R23	41		○	

Piping Thread Connection for Foreign Countries Outside of Japan [Part 2]

Pressure Controls

Name	Model Numbers	Design Number	Special Design Number		
			Z80	Z90	Z950
Remote Cont. Relief Valves	DT-01	22	○	○	
Direct Type Relief Valves	DT-02	22	○	○	
Pilot Operated Relief Valves	BT-03	32	○	○	
	BT-06	32	○	○	
	BT-10	32	○	○	
	BG-03	32		○	
	BG-06	32		○	
	BG-10	32		○	
Solenoid Controlled Relief Valves	BST-03	48	○	○	
	BST-06	48	○	○	
	BST-10	48	○	○	
	BSG-03	48	○	○	
	BSG-06	48	○	○	
	BSG-10	48	○	○	
H/HC Type Pressure Control Valves	HT-03	22	○	○	
	HT-06	22	○	○	
	HT-10	22	○	○	
	HG-03	22		○	
	HG-06	22		○	
	HCT-03	22		○	
	HCT-06	22	○	○	
	HCT-10	22	○	○	
	HCG-03	22		○	
	HCG-06	22		○	
Pressure Reducing (and Check) Valves	RT-03	22	○	○	
	RT-06	22	○	○	
	RT-10	22	○		
	RG-03	22		○	
	RG-06	22		○	
	RCT-03	22	○	○	
	RCT-06	22	○	○	
	RCG-03	22		○	
	RCG-06	22		○	
Pres. Reducing & Relieving	RBG-03	10		○	
Unloading Relief Valves	BUCG-06	30	○	○	
	BUCG-10	25	○	○	

Flow Controls

Name	Model Numbers	Design Number	Special Design Number		
			Z80	Z90	Z950
Flow Control Valves	FGM-01X	10	○	○	
	FGM-02*	20		○	
	FGM-03*	20		○	
	FGM-06*	20		○	
Pilot Operated Flow Control	FHCG-03	13			○
Restrictors/ One Way Restrictors	SRT-03	50	○	○	
	SRT-06	50	○	○	
	SRT-10	50	○	○	
	SRG-03	50	○	○	
	SRG-06	50	○	○	
	SRG-10	50	○	○	
	SRCT-03	50	○	○	
	SRCT-06	50	○	○	
	SRCT-10	50	○	○	
	SRCG-03	50	○	○	
	SRCG-06	50	○	○	
	SRCG-10	50	○	○	
Needle Valves	GCT-02	34	○	○	
	GCTR-02	34	○	○	

Modules

Name	Model Numbers	Design Number	Special Design Number		
			Z80	Z90	Z950
005 Series Mod. Valves	MMC-005	20	○	○	
01 Series Modular Valves	MRP/A/B-01	70		○	○
	MSTA/B/W-01	10		○	
	MSP/MST-01	50	○	○	
	MMC-01	40	○	○	
03 Series Modular Valves	MRP/A/B-03	70		○	○
	MHP/A/B-03	20		○	
	MSTA/B/W-03	20	○	○	
	MSP-03	30	○	○	
	MSCP-03	20	○	○	
	MDS-03	10	○	○	
	MMC-03	21	○	○	
06 Series Mod. Valves	MRP/A/B-06	70		○	

Directional Controls

Name	Model Numbers	Design Number	Special Design Number		
			Z80	Z90	Z950
DSG-005 Series	DSG-005	40		○	
DSG-01 Series Solenoid Operated Directional Valves	DSG-01	70		○	
	S-DSG-01	70		○	
	L-DSG-01	70		○	
	DSGM-01*	31	○	○	
DSG-03 Series Solenoid Operated Directional Valves	DSG-03	50		○	
	S-DSG-03	50		○	
	L-DSG-03	50		○	
Low Wattage (5W) Type	E-DSG-01	70		○	
Electronic Relay Incorporated Solenoid Operated Directional Valves	T-DSG-01	70		○	
	T-S-DSG-01	70		○	
	T-DSG-03	50		○	
	T-S-DSG-03	50		○	
Solenoid Controlled Pilot Operated Directional Valves	DSHG-03	14		○	
	DSHG-04	52		○	
	DSHG-06	53		○	
	DSHG-10	43		○	
	DHGM-04*	20	○	○	
	DHGM-06*	50	○	○	
"G" Series Shockless Type Solenoid Operated Directional Valves	G-DSG-01	51		○	
	G-DSG-03	51		○	
	G-DSHG-04	50		○	
	G-DSHG-06	50		○	
Pilot Operated Directional Valves	DHG-04	50		○	
	DHG-06	50		○	
Manually Operated Directional Valves	DMT-03	50		○	
	DMT-06	30		○	
	DMT-10	30		○	
	DMG-10	40		○	
Cam Operated Directional Valves	DCT-01	40	○	○	
	DCT-03	50	○	○	
Poppet Type Two-Way	CDST-03*	21		○	
In-Line Check Valves	CIT-02	50	○	○	
	CIT-03	50	○	○	
	CIT-06	50	○	○	
	CIT-10	50	○	○	
Right Angle Check Valves	CRT-03	50	○	○	
	CRT-06	50	○	○	
	CRT-10	50	○	○	
	CRG-03	50	○	○	
	CRG-06	50	○	○	
	CRG-10	50	○	○	
Pilot Controlled Check Valves	CPT-03	50	○	○	
	CPT-06	50		○	
	CPT-10	50	○	○	
	CPDT-03	50	○	○	
	CPDT-06	50		○	
	CPDT-10	50	○	○	
	CPG-03	50	○	○	
	CPG-06	50	○	○	
	CPG-10	50	○	○	
	CPDG-03	50	○	○	
	CPDG-06	50	○	○	
	CPDG-10	50	○	○	

Proportional Electro-Hydraulic Controls

Name	Model Numbers	Design Number	Special Design Number		
			Z80	Z90	Z950
10Ω Series Proportional Electro-Hydraulic Flow Control Valves	EFG-06-250	51		○	
	EFCG-06-250	51		○	
	EFGM-03*	30		○	○
	EFGM-06*	30	○	○	○

Accessories and Others

Name	Model Numbers	Design Number	Special Design Number		
			Z80	Z90	Z950
F5 Type Flange Kits	F5	10		○	