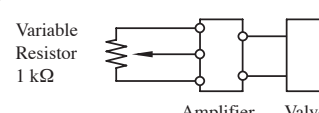
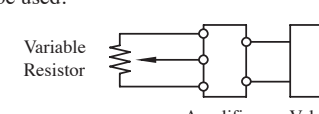


## Power Amplifiers / Setting Adjusters For Proportional Electro-Hydraulic Control Valves

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.)	<p>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.</p> <p>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.</p> 
	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.)	<p>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.</p>
	AME-DF-S-**-50	Flow Control (For 40 Ω Sol.)	
Slow Up-Down	AME-T-S-**-22	Flow Control (For 40 Ω Sol.)	<p>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.</p>
DC Input For DC Power 24 V DC	SK1015-11 AMN-D-10	Pressure or Flow Control (For 10 Ω Sol.)	<p>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.</p> <p>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.</p>  <p>SK1015 amplifier can be used in automobile construction machine.</p>
	AMN-W-10 SK1091-D24-10	Directional and Flow Control	
DC Input with Minor Feedback	SK1115-**-20	Flow Control (For 10 Ω Sol.)	<p>An amplifier which is operated by a battery power supply (24V).</p> <p>This is for high-response, high-accuracy control and used to feedback the pressure or flow rate converted to electric signals.</p>
	AMN-L-01-**-**-10	High Response Type Directional and Flow Control	
	AMB-EL-**-**-**-20		
Shockless	AMN-G-10	Shockless Directional and Flow Control	<p>Outputs shockless patterns, low speed (Level 1) high-speed (Level 2) low speed (Level 3).</p> <p>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.</p>

### 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	—	— <sup>*</sup>	11

<sup>\*</sup>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

Model No.	AME-D-10-*-20	SK1022-A-*-11	SK1022-B-*-11	SK1015-11
Descriptions				
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) <sup>*</sup>	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

<sup>\*</sup>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.

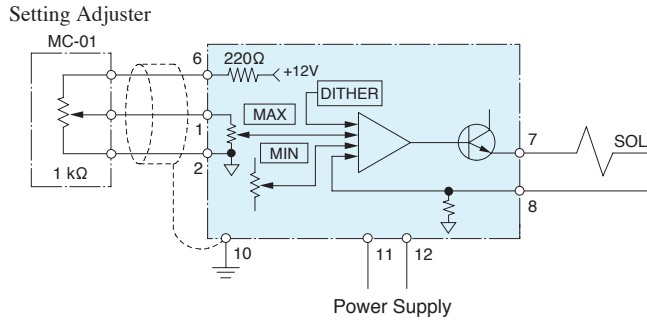
### Instructions

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.

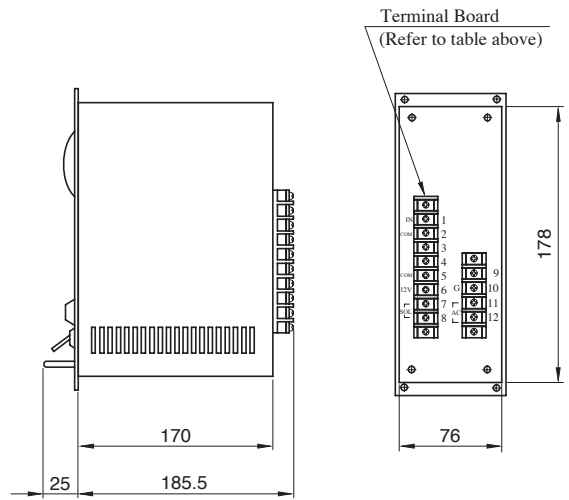
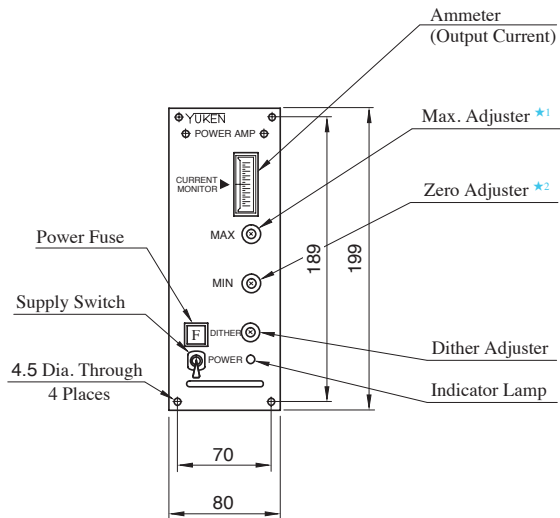
**AME-D-10**

[Example Diagram]



● Detail of Terminal Board

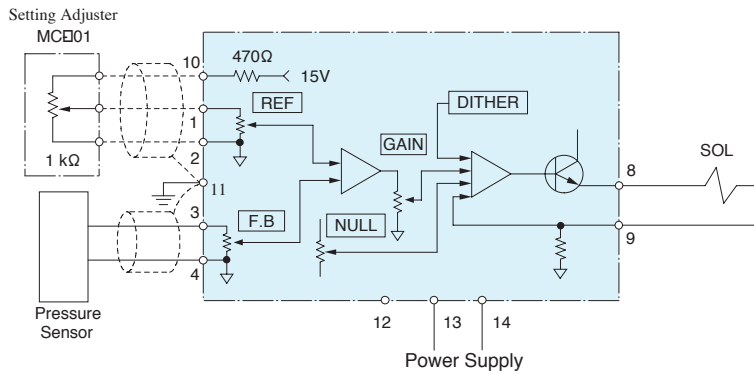
Terminal Number	Name	
1	Input Signal	IN
2	Input Signal	COM
3		—
4		—
5	Input Signal	COM
6	Internal Power Supply	+12 V
7	Output to Valve Solenoid	SOL
8		
9		—
10	Ground	G
11	Power Supply	
12	100/200 VAC	



- ★ 1. Adjustment of upper limit of usable range
- ★ 2. Adjustment of lower limit of usable range

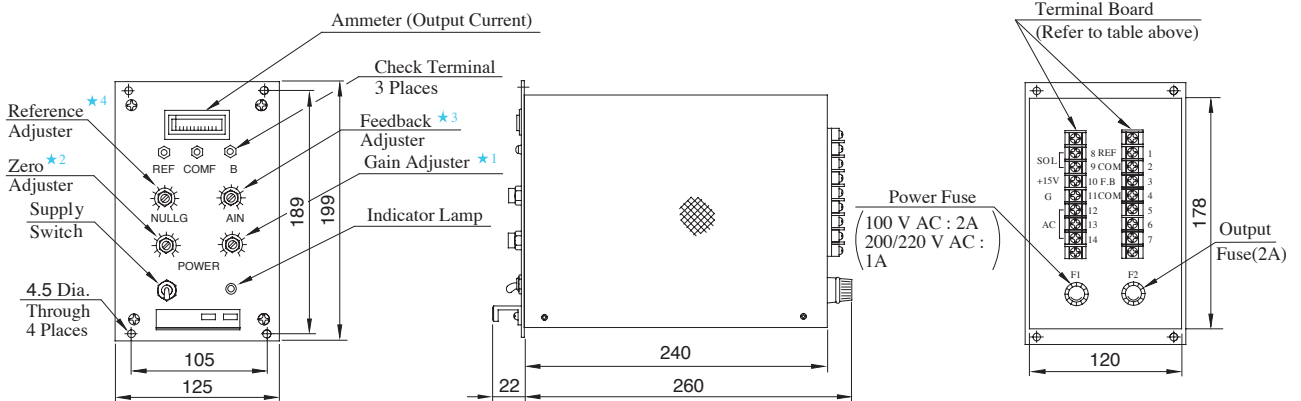
**SK1022-A  
B**

[Example Diagram]



● Detail of Terminal Board

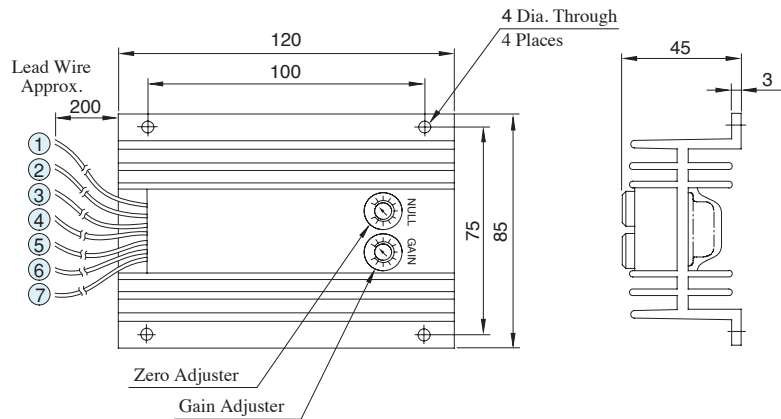
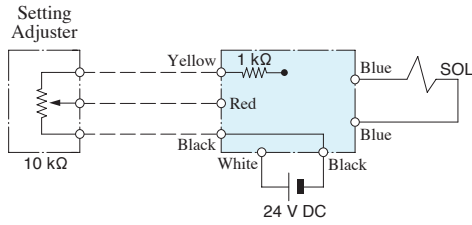
Terminal Number	Name	
1	Input Signal REF	
2	Input Signal COM	
3	Feedback Signal F.B	
4	Feedback Signal COM	
5	—	
6	—	
7	—	
8	Output to Valve Solenoid SOL	
9	SOL	
10	Power Supply for Setting Adjuster (+15V (10 V at 1 kΩ))	
11	Ground G	
12	Power Supply	
13		100 V AC, 200V AC : 13, 14
14		220 V AC : 12, 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.....
- ④ Blue..... } Output to Valve Solenoid
- 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

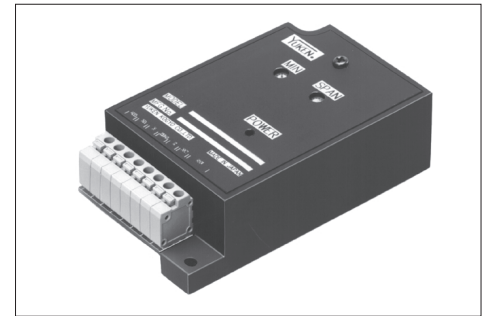
Compact power amplifiers for 10Ω proportional solenoids. The power supply is 24 V DC. It uses a new circuitry to be slow to heat.

### Model Number Designation

AMN	-D	-10
Series Number	Type of Function	Design Number
<b>AMN</b>	<b>D</b> : DC Input Type	<b>10</b>

### Specifications

Model No.	AMN-D-10
Descriptions	
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

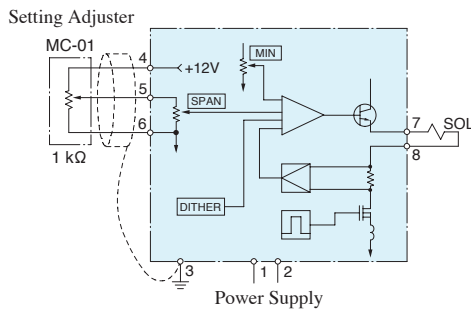
When the power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 1 kΩ for the setting adjuster.

#### 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.

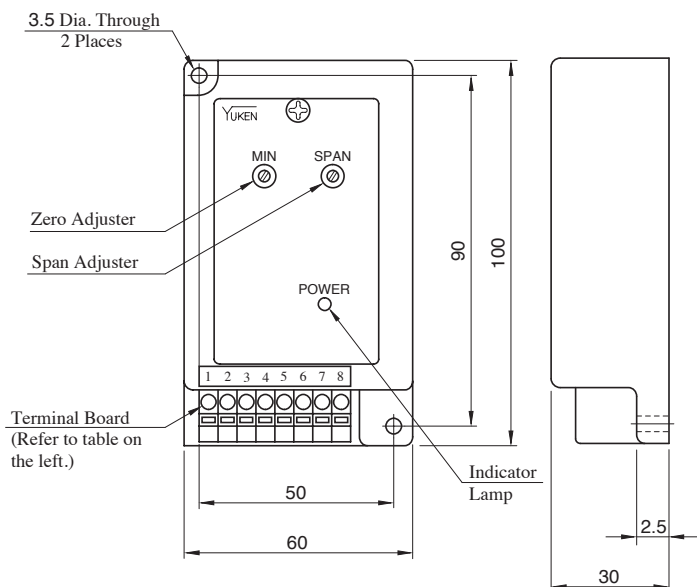
### AMN-D

[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	SOL
8	Solenoid	



## 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	<b>D:</b> DC Input Type <b>DF:</b> DC Input Feedback Type	<b>None:</b> Wall Mount Type <b>S:</b> Panel Mount Type	<b>AC:</b> 85 - 230 V AC <b>DC:</b> 20 - 55 V DC	<b>50</b>

★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	<b>T:</b> Slow Up Down Type	<b>S:</b> Panel Mounting Type	<b>100:</b> 100 V AC <b>200:</b> 200/220 V AC	<b>22</b>



### 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

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
Descriptions							
Type of Function	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.

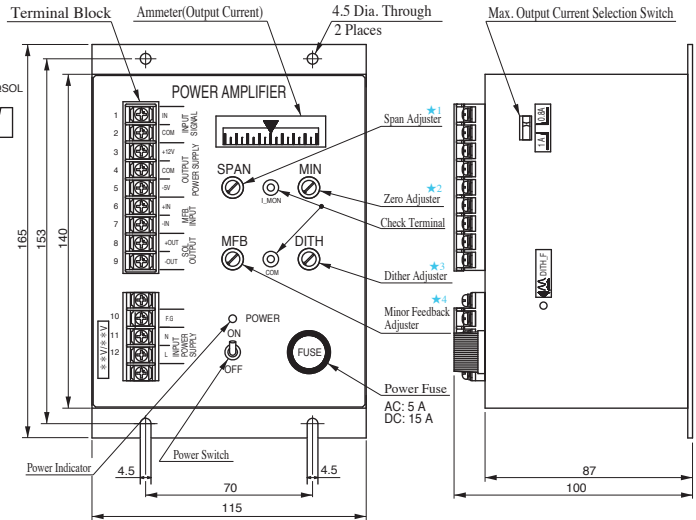
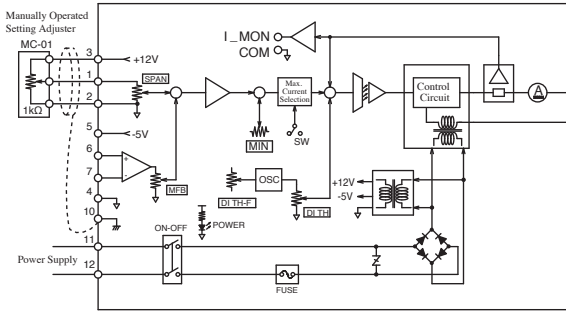
### Instructions

#### ● 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

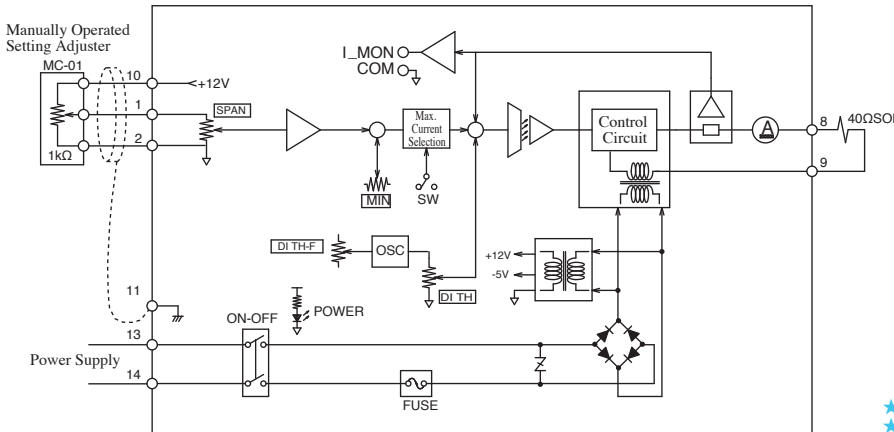
#### Accessories

Spare Fuses  
 AC specifications: 5A 250V (Dia. 6.4x30 mm) 1 pc  
 DC specifications: 15A 250V (Dia. 6.4x30 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]



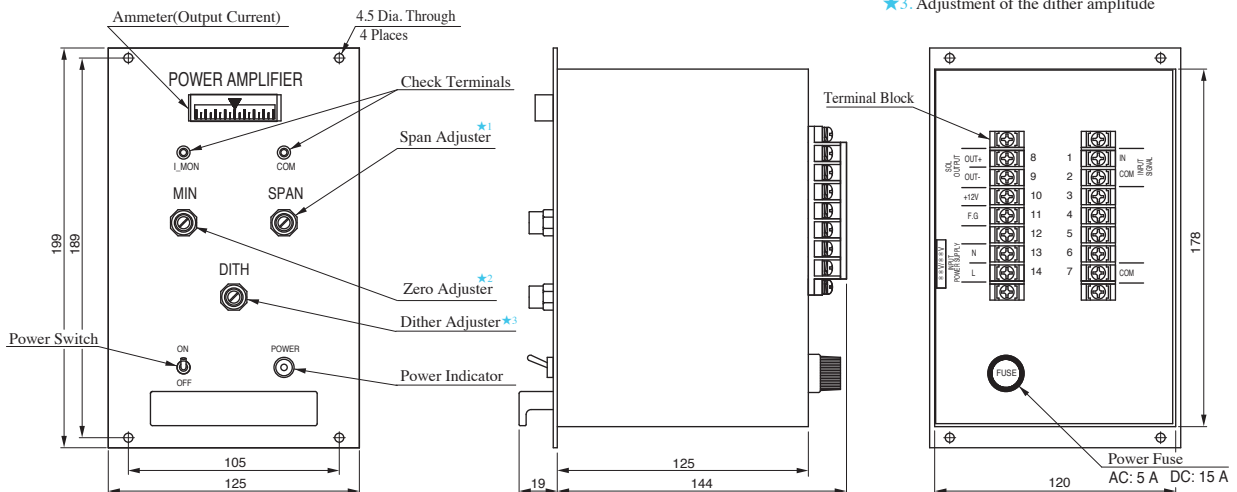
#### Detail of Terminal Block

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. 6.4x30 mm) 1 pc  
 DC specifications: 15A 250V (Dia. 6.4x30 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

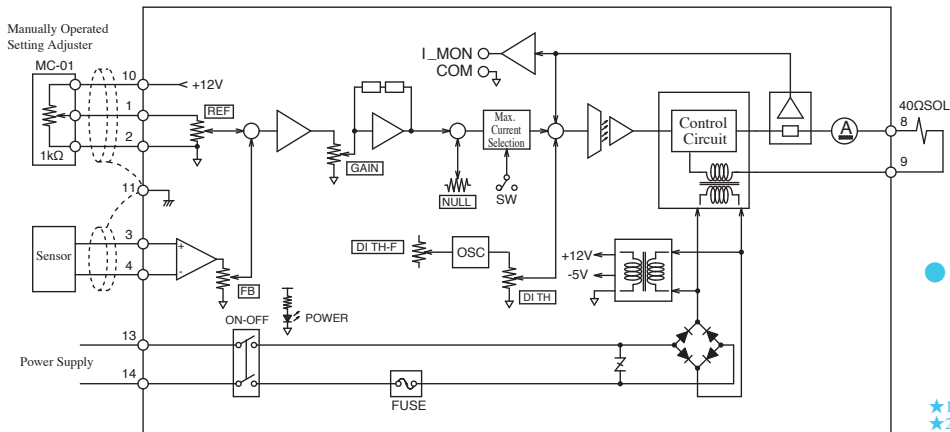


Power Amplifiers



AME-DF-S \*-50

[Example Diagram]



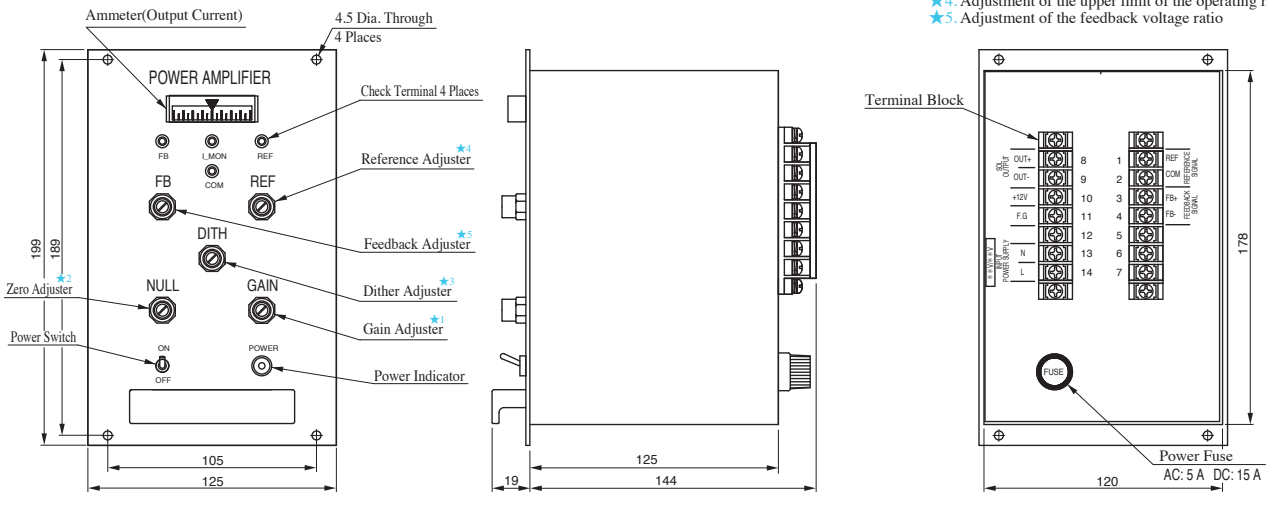
● Detail of Terminal Block

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. 6.4x30 mm) 1 pc  
 DC specifications: 15A 250V (Dia. 6.4x30 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

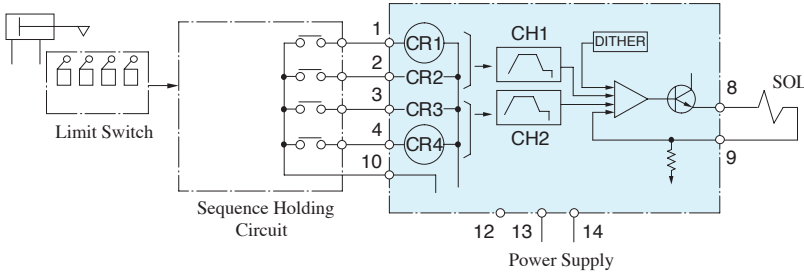
● Installation Interchangeability

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).

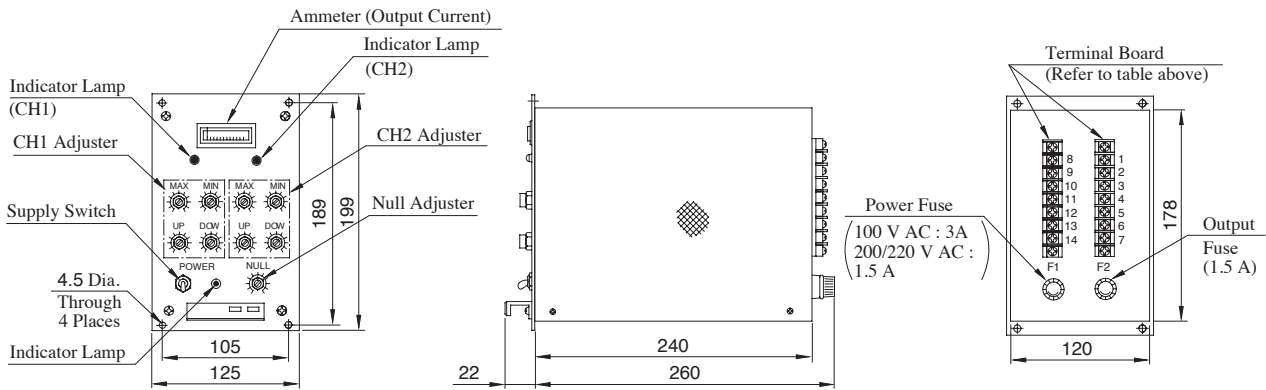
**AME-T-S**

[Example Diagram]

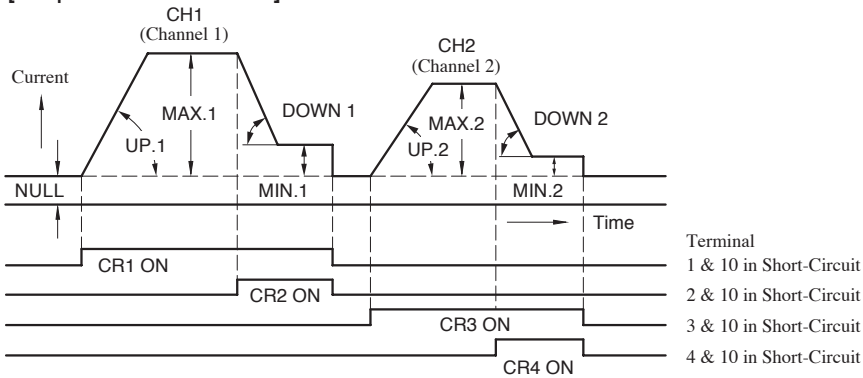


● Detail of Terminal Board

Terminal 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 minimum 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:

$$520 \text{ mA} - 300 \text{ mA} = 220 \text{ mA}$$

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).

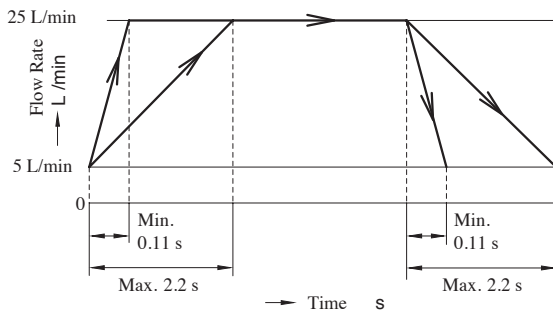
Therefore, the minimum and maximum adjustable time can be obtained as follows:

$$\frac{220 \text{ mA}}{100 \text{ mA}} \times 0.05 \text{ second} = 0.11 \text{ second (Minimum)}$$

$$\frac{220 \text{ mA}}{100 \text{ mA}} \times 1.0 \text{ second} = 2.2 \text{ second (Maximum)}$$

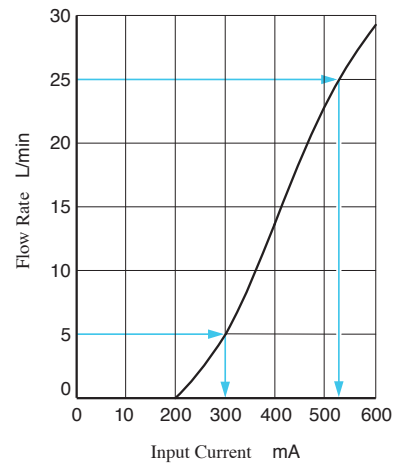
The result above are as illustrated on the below.

**[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
<b>AME</b>	<b>D2:</b> DC Input Type	<b>1010:</b> 10 Ω × 2	<b>11</b>

### 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

### 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.

### Applicable to Valve

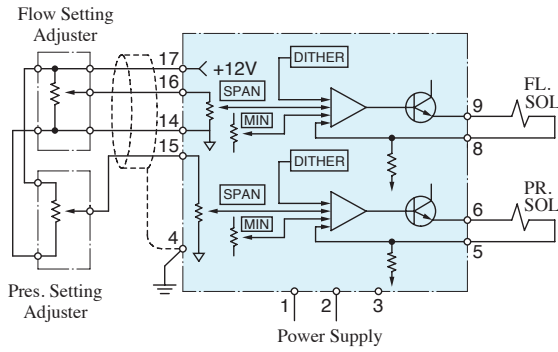
Name of Valve	Model Numbers
Pilot Relief Valves	EDG-01*
Relief Valves	EBG-03 EBG-06 EBG-10
Relieving and Reducing Valves	ERBG-06 ERBG-10
10Ω Series Flow Control Valves	EFG-03/06 EFCG-03/06 (51 Design)
10Ω -10Ω Series High Flow Series Flow Control and Relief Valves	EFBG-03 EFBG-06 EFBG-10

### Applicable to Piston Pump

Name of Pump	Model Numbers
"A" Series Variable Displacement Piston Pump	A16 A22 A37 *R-04 A56
( Proportional Electro-Hydraulic Load Sensing Type )	Also, double pumps combined with the models listed above and fixed displacement vane pumps.

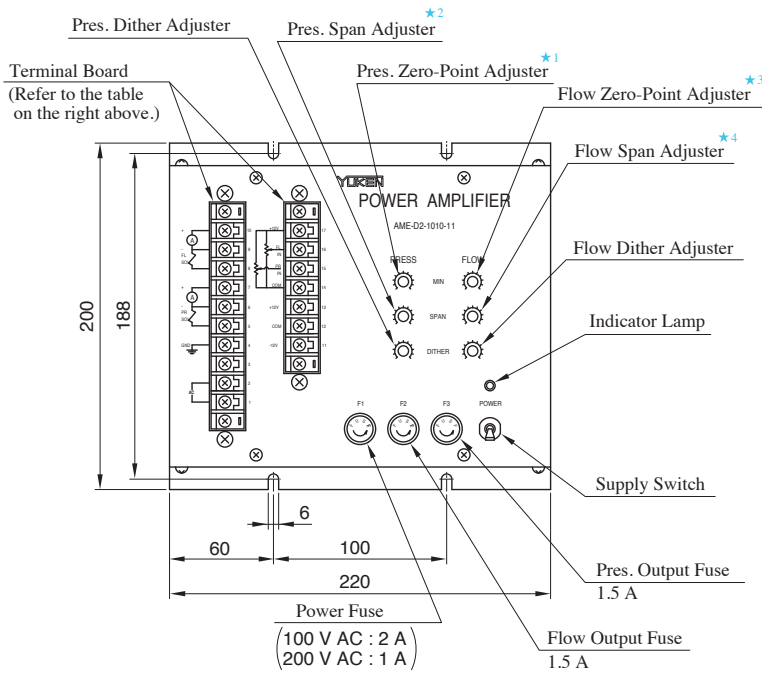
**AME-D2-1010-11**

**[Example Diagram]**



**Detail of Terminal Board**

Terminal Number	Name	
1	Power Supply	
2		85 - 264 VAC
3		
4	Ground	
5	Output to Pressure Control	
6	Valve Solenoid	PR. SOL
7	Ammeter	
8	Output to Flow Control	
9	Valve Solenoid	FL. SOL
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



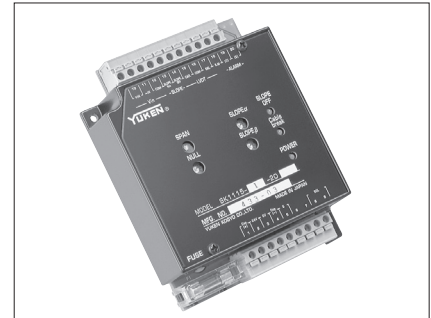
- ★1. Minimum Pressure Setting
- ★2. Variable Pressure Range Setting
- ★3. Minimum Flow Setting
- ★4. Variable Flow Range Setting

## Power Amplifiers For Flow Control and Relief Valves

These power amplifiers are used to drive the proportional electro-hydraulic flow control and relief valves,

### Specifications

Model No.	SK1115- *-20
Descriptions	
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

<b>SK1115</b>	<b>-1</b>	<b>-20</b>
Series Number	Compensation	Design Number
<b>SK1115</b>	1 : For ELFBG-03 -125 2 : For ELFBG-03 -170	<b>20</b>

### 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.

### Applicable to Valve

Name of Valve	Model Number
Proportional Electro-Hydraulic Flow Control and Relief Valves	ELFBG-03

Power Amplifiers

### SK1115- \*-20

### [Example Diagram]

#### Detail of Terminal Board

Terminal Number	Name	Terminal Number	Name
1	Power Supply CAPACITOR(+)	10	Input Signal +IN
2	Power Supply +24	11	Input Signal -IN
3	Power Supply 0V	12	Input 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

Model Numbers		AMN-G-10	AMN-W-10
Descriptions			
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

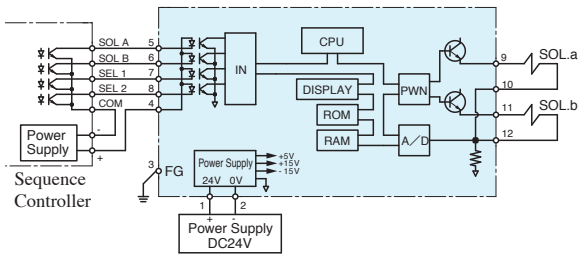
#### ● Power Supply of the Outside Setting Adjuster

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

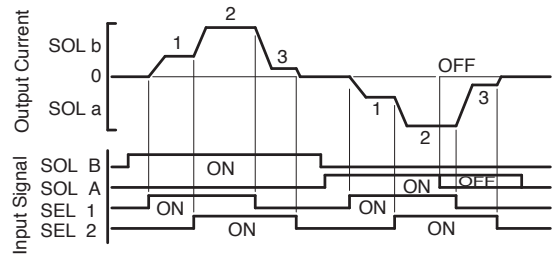
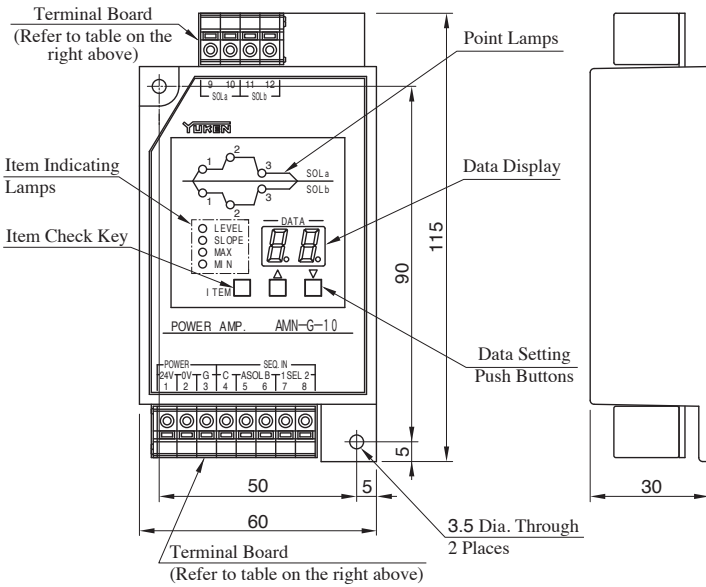
The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

**AMN-G-10 [Example Diagram]**

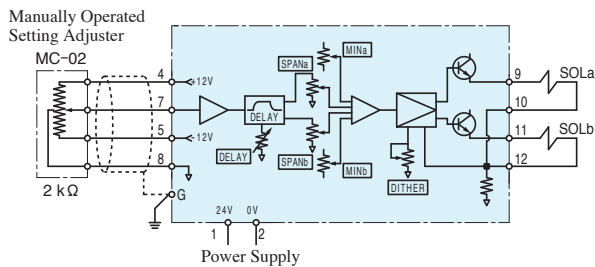


**Detail of Terminal Board**

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	Output to Valve Solenoid SOL b
5	Sequence Input SOL A	11	
6	Sequence Input SOL B	12	

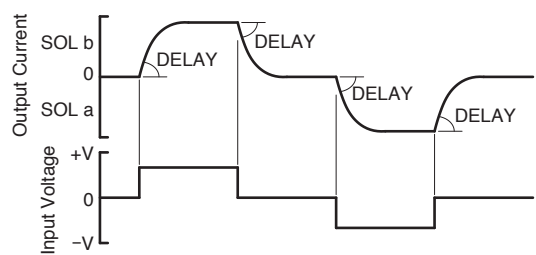
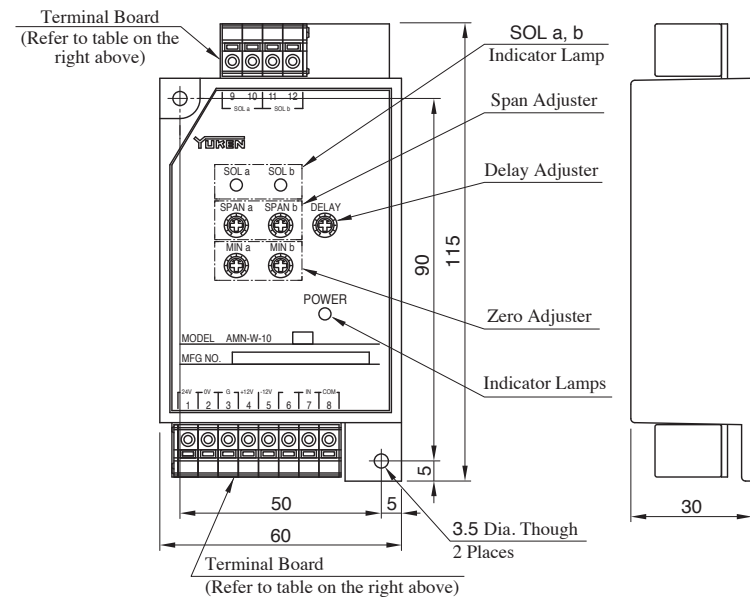


**AMN-W-10 [Example Diagram]**



**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	Output to Valve Solenoid SOL b
5	Internal Power Supply -12V	11	
6		12	



Power Amplifiers



## 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
<b>SK1091</b>	<b>D24: 24 V DC</b>	<b>10</b>



### Applicable to Valve

Name of Valve	Model Numbers
Directional and Flow Control Valve	03 EDFHG-04 06

### Specifications

Model No.	SK1091-D24-10
Descriptions	
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

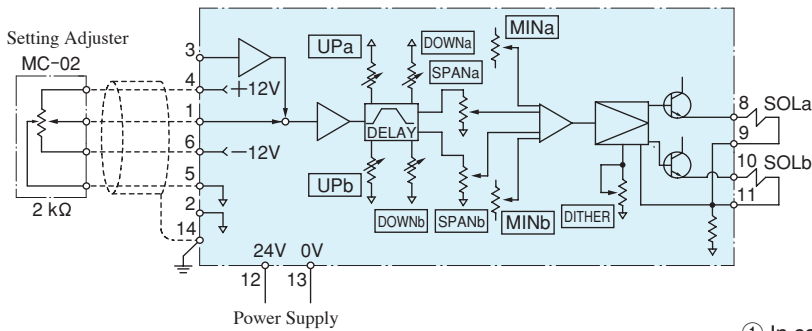
Power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 2 kΩ for the setting adjuster.

#### ● Power Switch

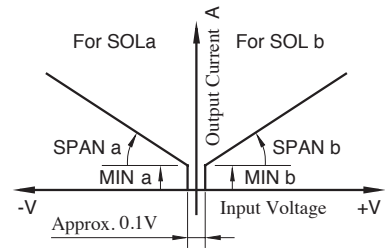
The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

SK1091-D24-10

[Example Diagram]

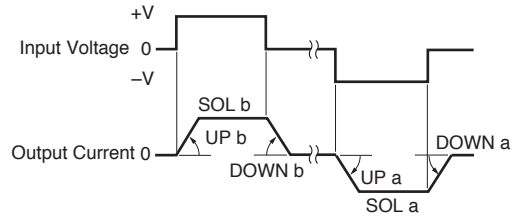


[Input-Output Characteristics]

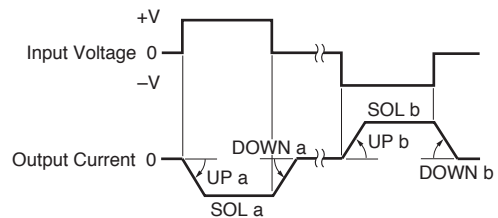


[Delay Function]

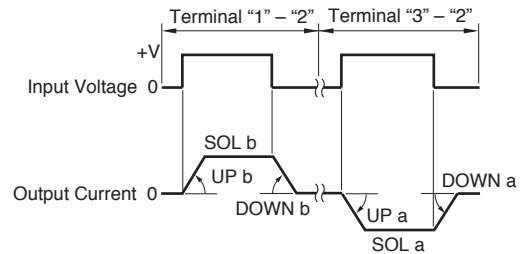
① In case "1" and "2" Input signal terminals are used.



② In case "3" and "2" Input signal terminals are used.



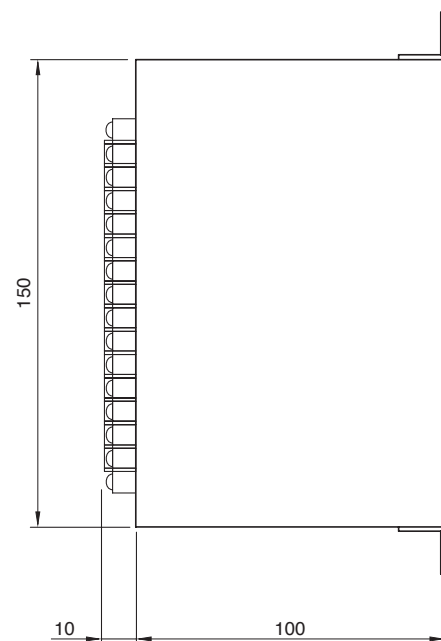
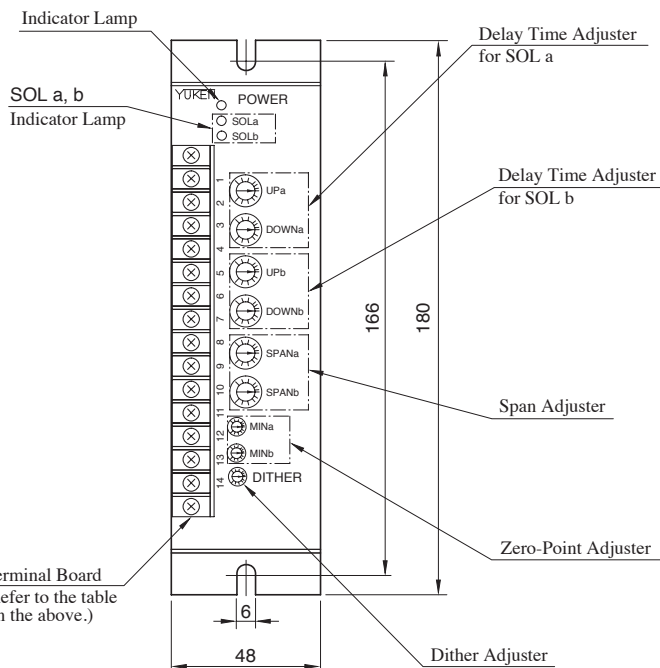
③ In case "1", "2" and "3" Input signal terminals are used.



● 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	Output to Valve Solenoid SOL b
10	Output to Valve Solenoid SOL b
11	Output to Valve Solenoid SOL b
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).



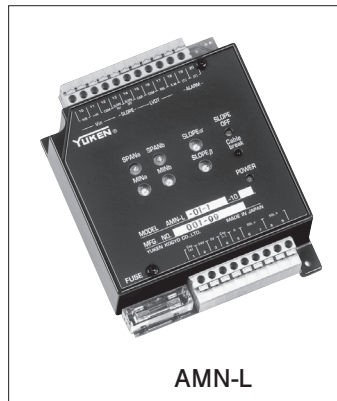
## Power Amplifiers

### 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	<b>A:</b> Voltage Signal ±10 V (P→B→A→T Flow with Input Signal (+)) <b>B:</b> Current Signal 4 - 20 mA (P→B→A→T Flow with Current 12 - 20 mA) <b>C:</b> Current Signal ±10 mA (P→B→A→T Flow with Input Signal (+)) <b>D:</b> Voltage Signal ±10 V (P→A→B→T Flow with Input Signal (+)) <b>E:</b> Current Signal 4 - 20 mA (P→A→B→T Flow with Current 12 - 20 mA) <b>F:</b> 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

Model Numbers Descriptions	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

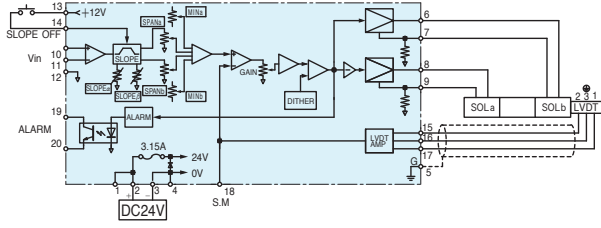
## Instructions

### ● 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.

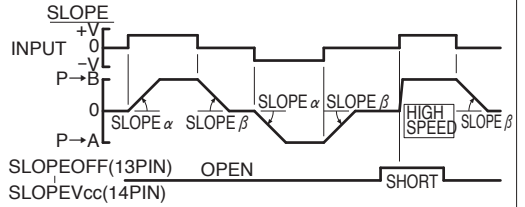
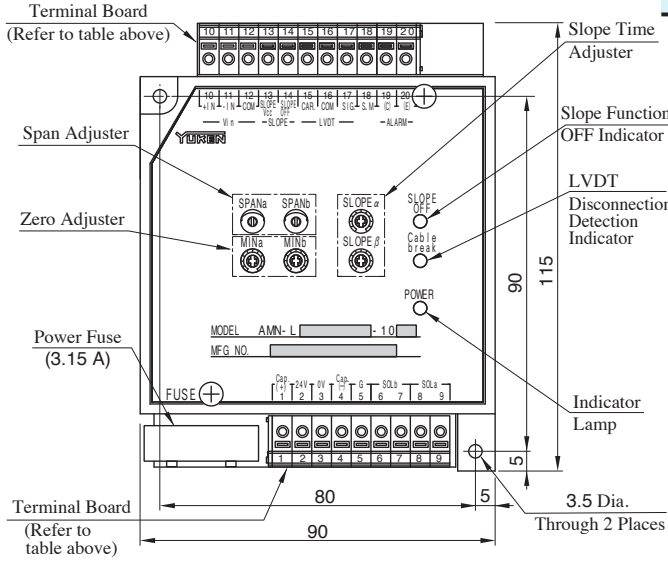
**AMN-L-01-1-10**

[Example Diagram]



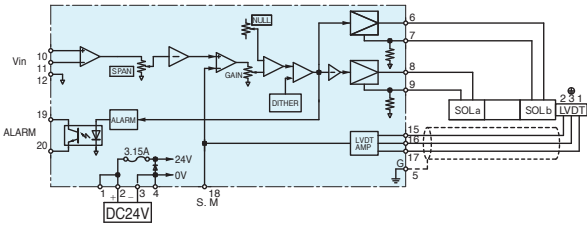
● Detail of Terminal Board

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	Output to Valve Solenoid SOL a	17	LVDT Terminal SIG.
8	Output to Valve Solenoid SOL a	18	Sensor Monitor Output S.M
9	Output to Valve Solenoid SOL a	19	Alarm Output ALM(C)
10	Input Signal +IN	20	Alarm Output ALM(E)



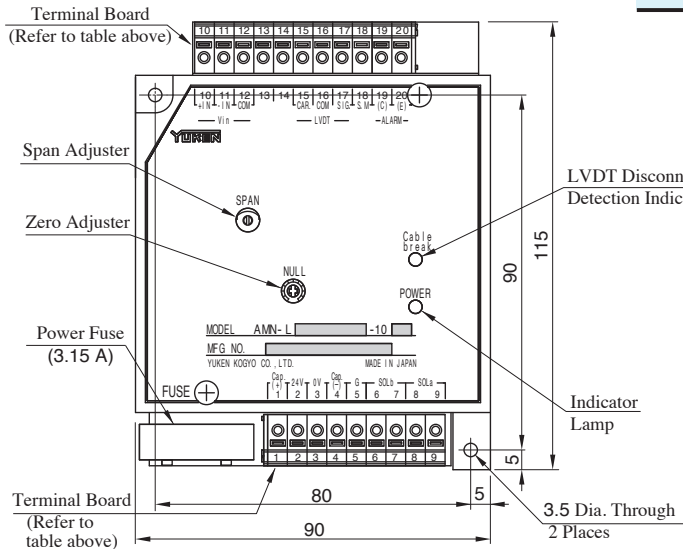
**AMN-L-01-3-2P-10**

[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	Output to Valve Solenoid SOL b	17	LVDT Terminal SIG.
8	Output to Valve Solenoid SOL a	18	Sensor Monitor Output S.M
9	Output to Valve Solenoid SOL a	19	Alarm Output ALM(C)
10	Input Signal +IN	20	Alarm Output ALM(E)



**AMB-EL-\*\*-\*\*-\*\*20**

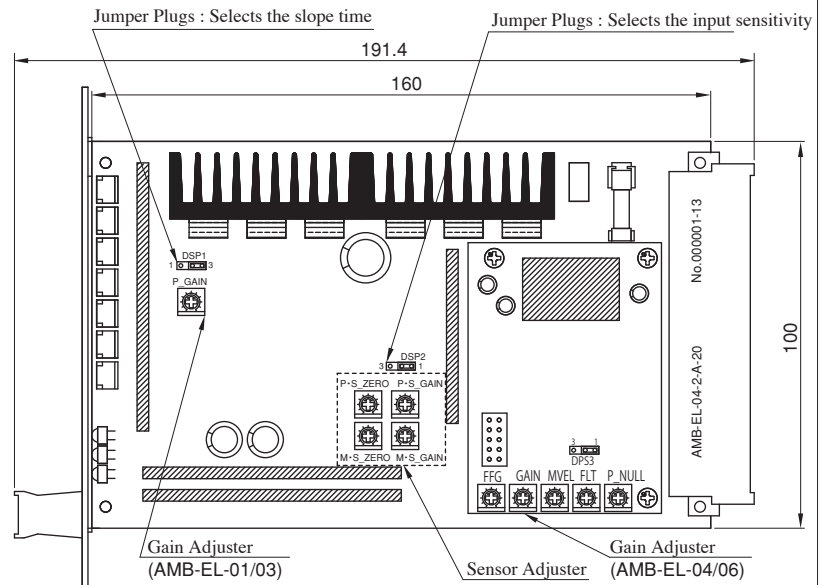
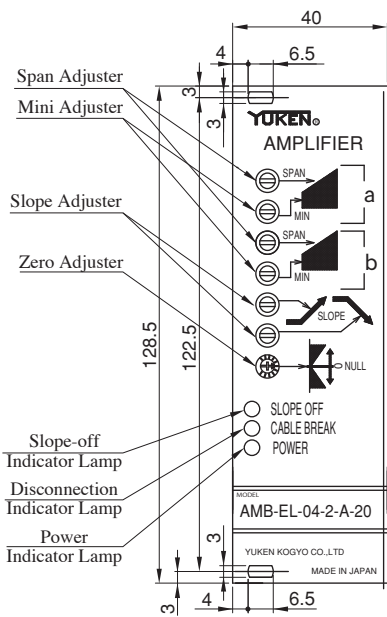
**● Pin Connections and Functions**

Pin Number	Name	Pin Number	Name	
b02	Power Supply	0V	z02	sol a(+)
b04	Power Supply	0V	z04	sol a(-)
b06			z06	
b08			z08	
b10			z10	Command Input (+)
b12			z12	Command Input (-)
b14	COM		z14	
b16	Power Supply	+24V	z16	COM (No.2) <sup>★1</sup> Connected to main valve sensor.
b18	Power Supply	+24V	z18	Carrier (No.3) See "Sensor Connection"
b20	Slope Off		z20	Signal (No.1)
b22	COM (No.3) <sup>★1</sup> Connected to pilot valve sensor.		z22	
b24	Signal (No.1) See "Sensor Connection"		z24	Alarm Output (-)
b26	Carrier (No.2) See "Sensor Connection"		z26	Alarm Output (+)
b28	Output	24V	z28	Stroke Monitor Signal (P) <sup>★2</sup>
b30	Output	24V	z30	Stroke Monitor Signal (S) <sup>★3</sup>
b32	FG		z32	

This power amplifier requires connector cards for connection. A connector card attached model is also available. Please ask for details if interested.

See the "Sensor Connection" diagram on the bottom left.

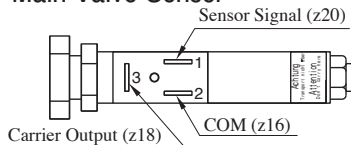
- (according to the I/O signal type)
- Pilot spool travel monitoring (fixed to ±10 V)



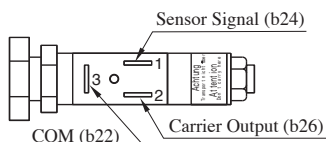
Power Amplifiers

**■ Sensor Connection**

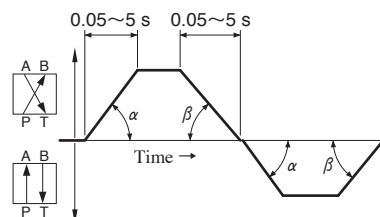
**● Main Valve Sensor**



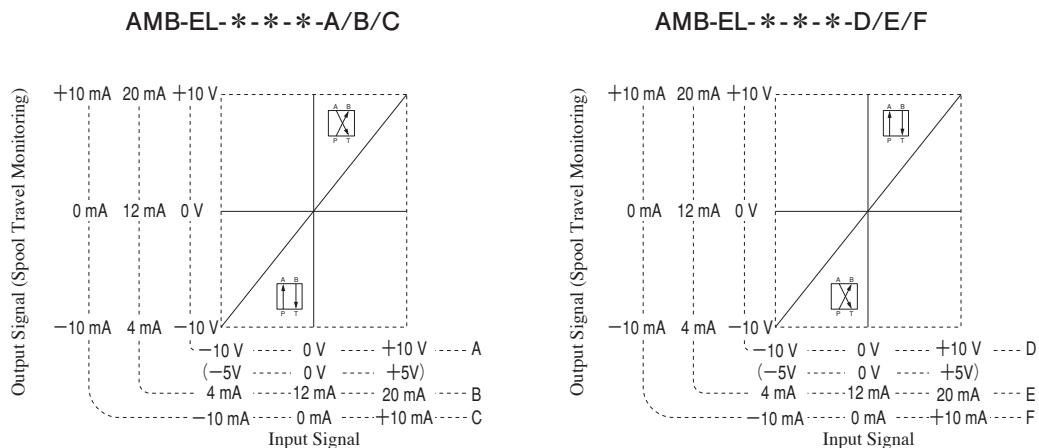
**● Pilot Valve Sensor**



**■ Lamp Pattern**



**I/O Signal Characteristics**



**Interchangeability in Installation Current and New Design**

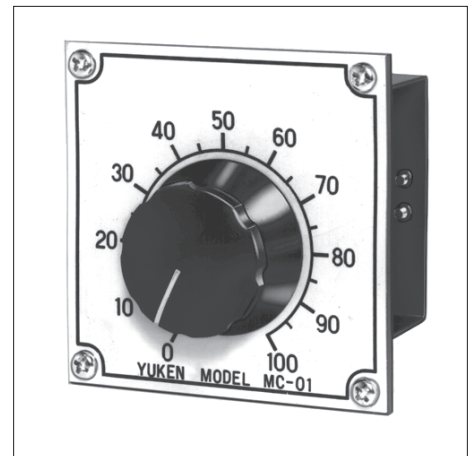
The power amplifier AMB-EL models were remodeled because I/O signal types were added, and the design number was changed from 10 to 20.

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 pattern 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.