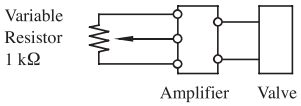
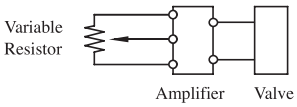
Power Amplifiers / Setting Adjusters For Proportional Electro-Hydraulic Control Valves

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

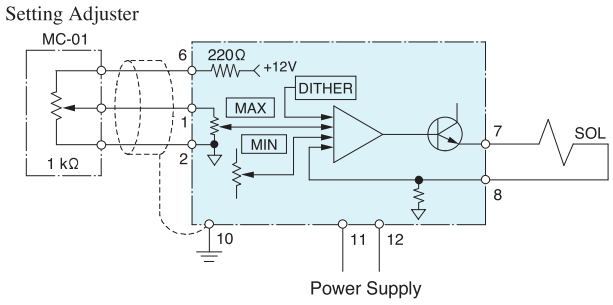
★ Serviceable Range: 100 V AC can be used from 90 to 132 V AC, 200 V AC can be used from 180 to 264 V AC.

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.

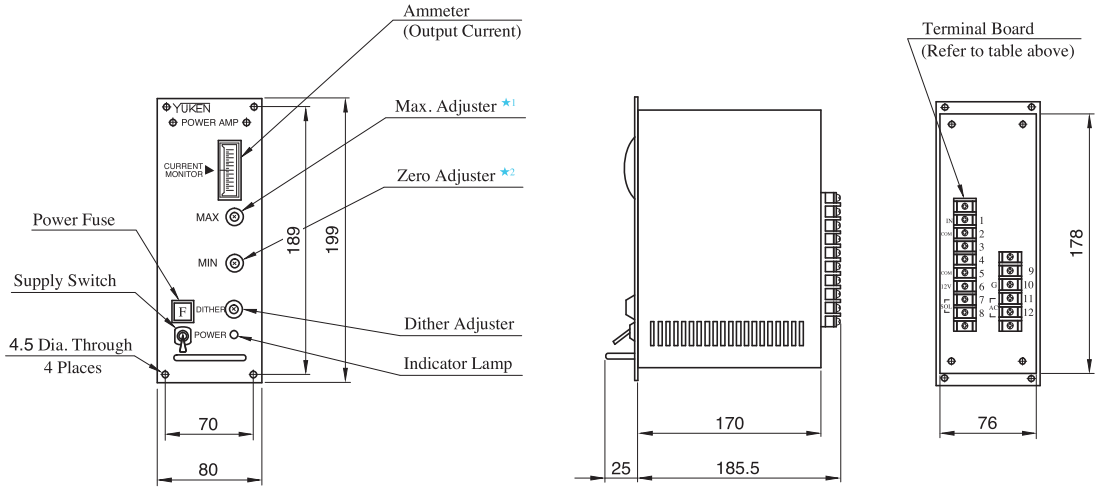
AME-D-10

[Example Diagram]



Detail of Terminal Board

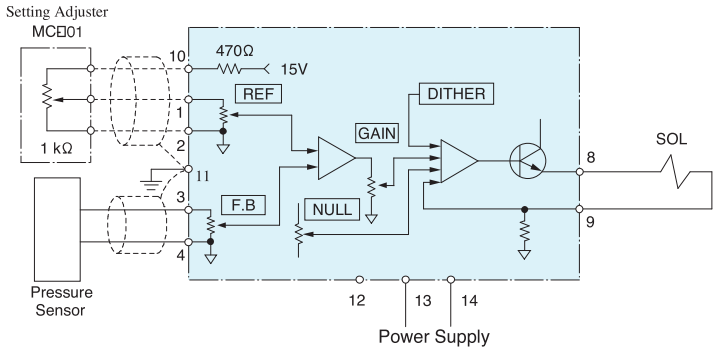
Terminal Number	Name	
1	Input Signal	IN
2	Input Signal	COM
3	—	
4	—	
5	Input Signal	COM
6	Internal Power Supply	+12 V
7	Output to Valve Solenoid	SOL
8		
9	—	
10	Ground	G
11	Power Supply 100/200 VAC	
12		



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

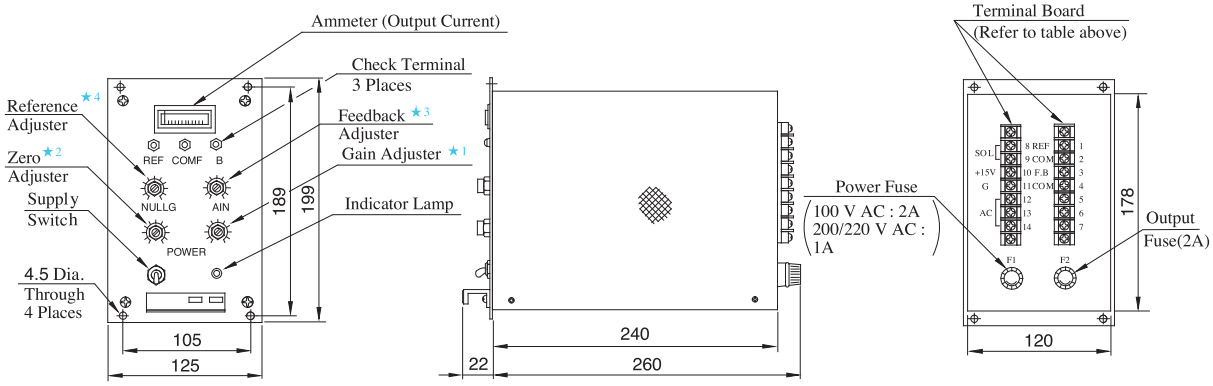
SK1022-A/B

[Example Diagram]



Detail of Terminal Board

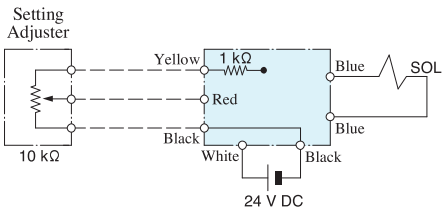
Terminal Number	Name	
1	Input Signal	REF
2	Input Signal	COM
3	Feedback Signal	F.B
4	Feedback Signal	COM
5	—	
6	—	
7	—	
8	Output to Valve Solenoid	SOL
9		
10	Power Supply for Setting Adjuster (10 V at 1 kΩ)	+15V
11	Ground	G
12	Power Supply 100 V AC, 200V AC : 13, 14 220 V AC : 12, 14	
13		
14		

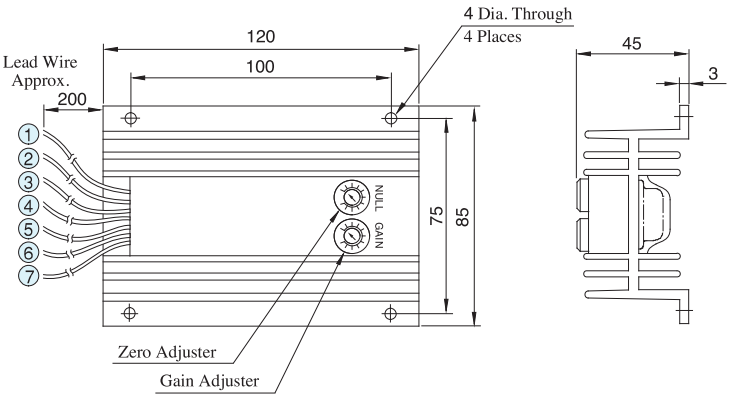


★1. Adjustment of upper limit of usable range
★2. Adjustment of lower limit of usable range
★3. Adjustment of feedback voltage ratio
★4. Adjustment of input voltage ratio

SK1015

[Example Diagram]





Lead Wire Detail

① White.....Plus of 24 V DC
② Black.....Zero of 24 V DC
③ Blue.....
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
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

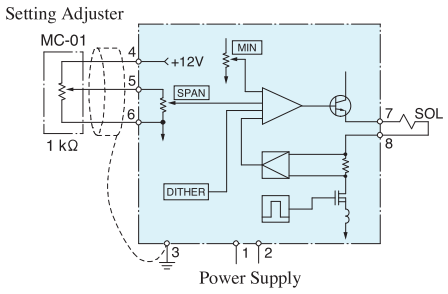
When the power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 1 kΩ for the setting adjuster.

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.

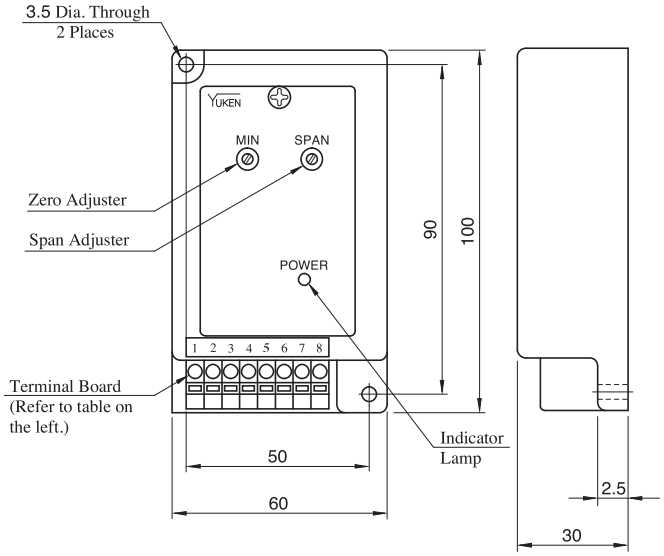
AMN-D

[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.

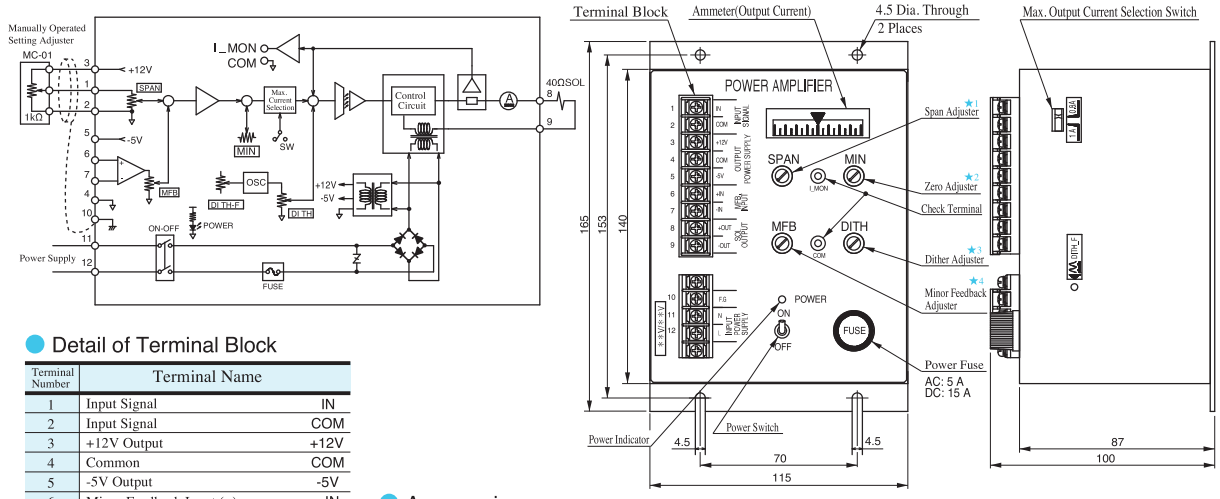
Instructions

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

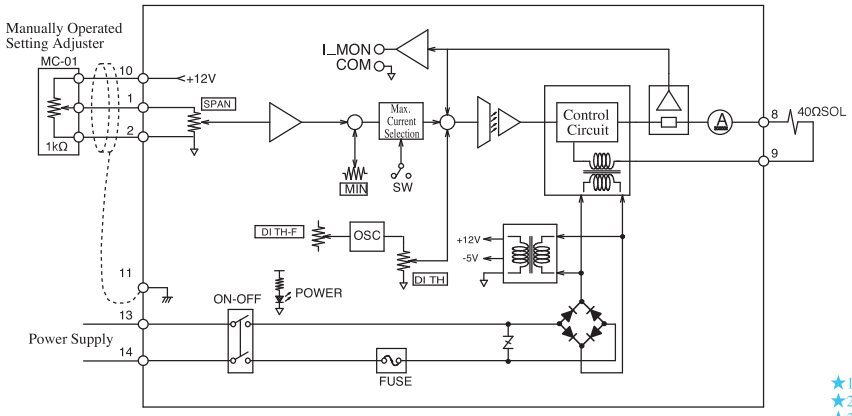
Accessories

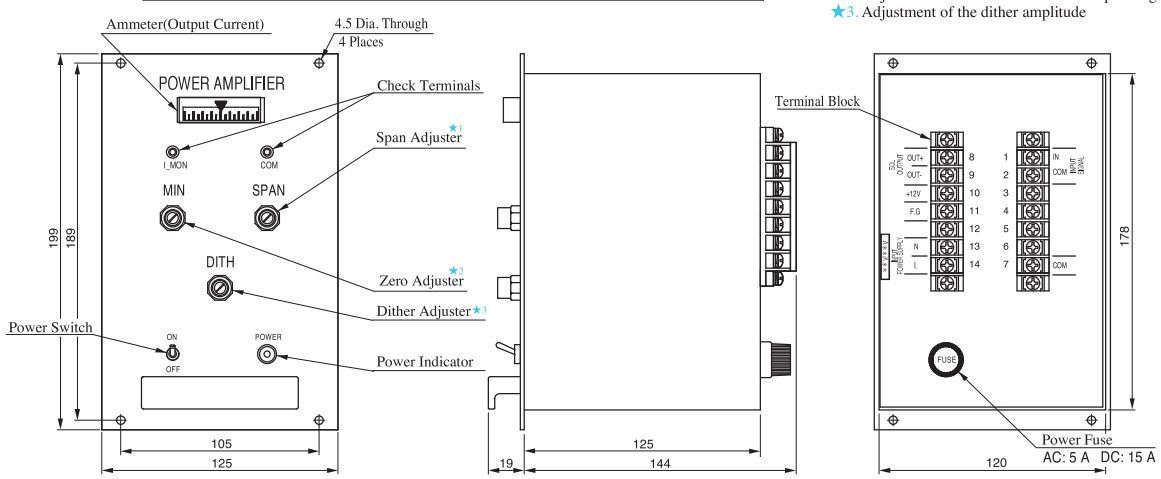
Spare Fuses
AC specifications: 5A 250V (Dia. 6.4×30 mm) 1 pc
DC specifications: 15A 250V (Dia. 6.4×30 mm) 1 pc
Test Pins (Manufactured by MAC8)
OP6-1 (Red) 1 pc
OP6-1 (Black) 1 pc

★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

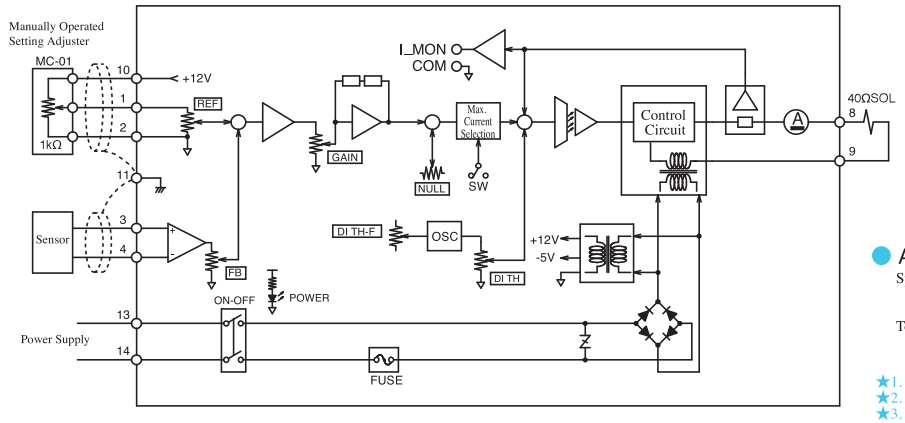
Accessories

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]



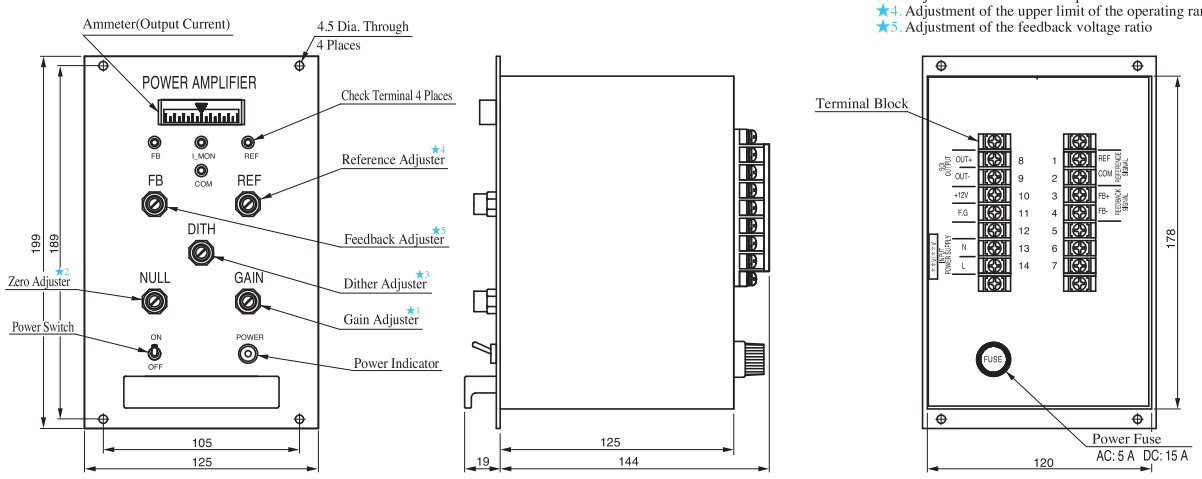
Detail of Terminal Block

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

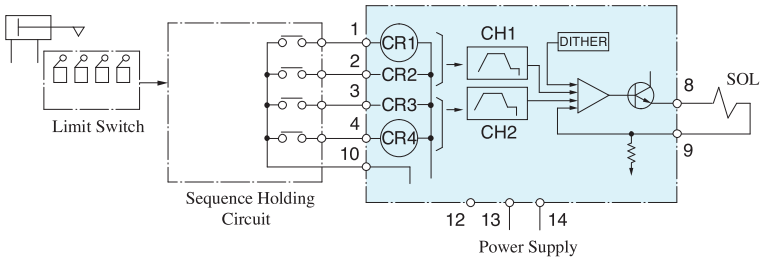
Installation Interchangeability

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).

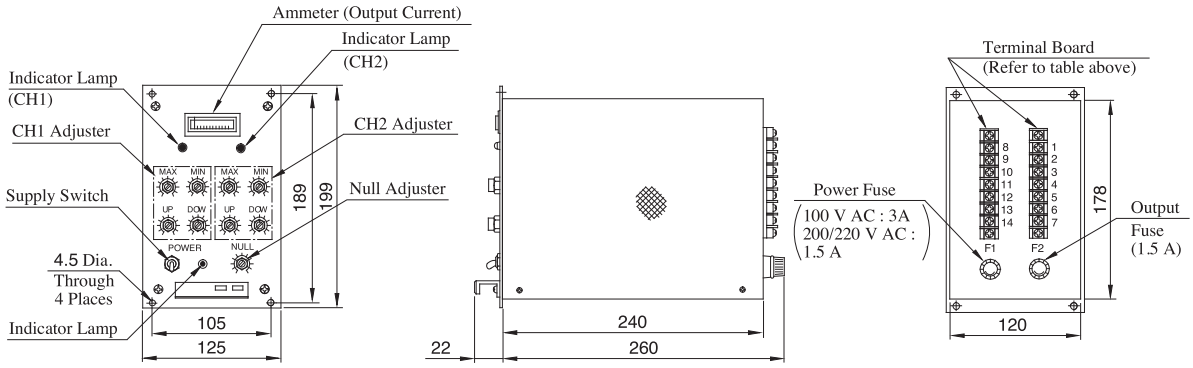
AME-T-S

[Example Diagram]

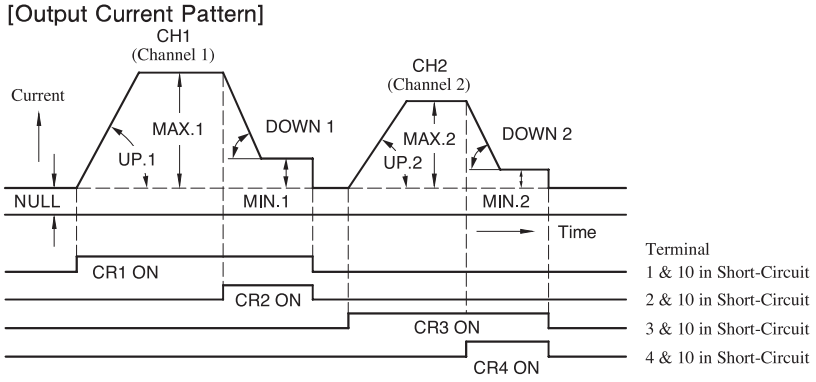


Detail of Terminal Board

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 100 V AC, 200 V AC: 13, 14 220 V AC: 12, 14	
13		
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).

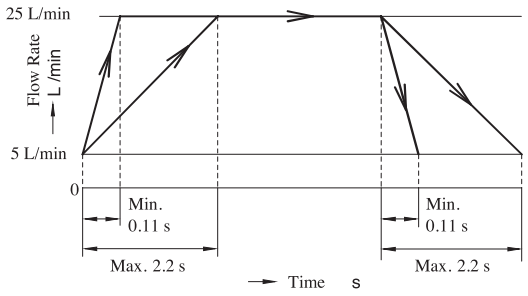
Therefore, the minimum and maximum adjustable time can be obtained as follows:

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

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

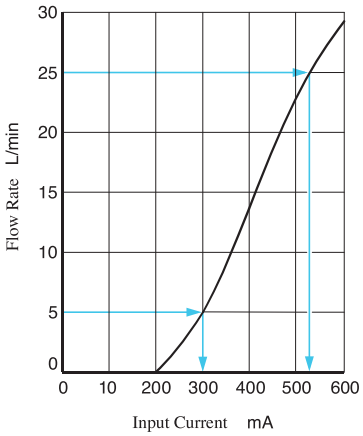
The result above are as illustrated on the below.

[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

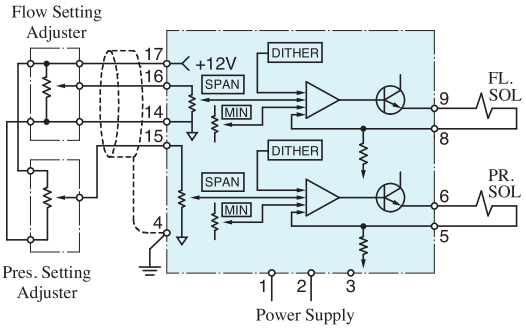
Name of Pump	Model Numbers
"A" Series Variable Displacement Piston Pump (Proportional Electro-Hydraulic Load Sensing Type)	A16 A22 A37 - ✻R-04 A56 Also, double pumps combined with the models listed above and fixed displacement vane pumps.

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.

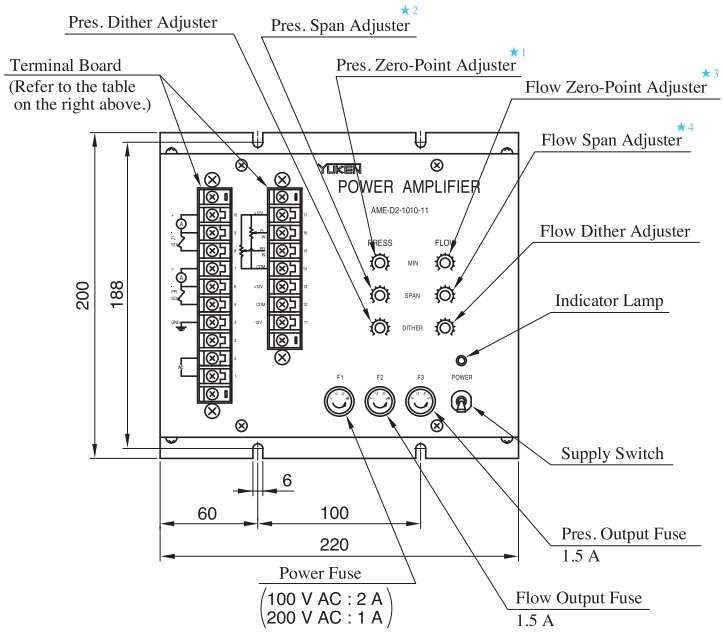
AME-D2-1010-11

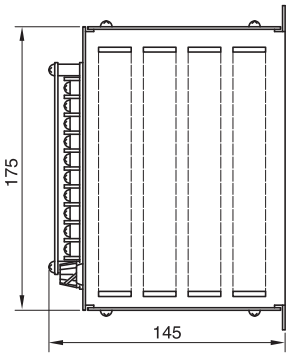
[Example Diagram]



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

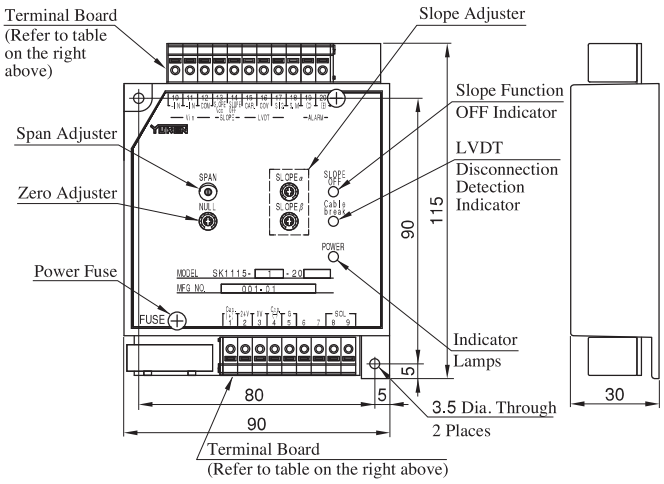
Name of Valve	Model Number
Proportional Elecctro-Hydraulic Flow Control and Relief Valves	ELFBG-03

Instructions

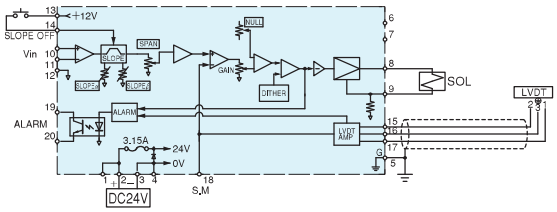
Supply Switch

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



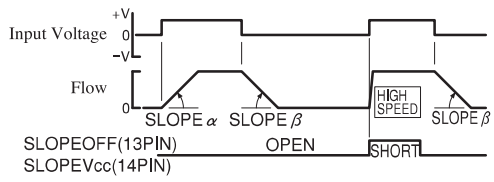
[Example Diagram]



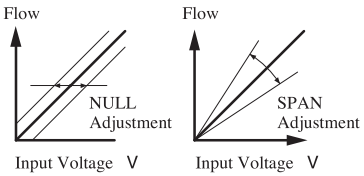
Detail of Terminal Board

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

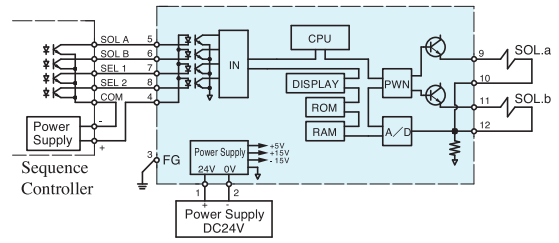
When DC input type (AMN-W) power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 2 kΩ for the setting adjuster.

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.

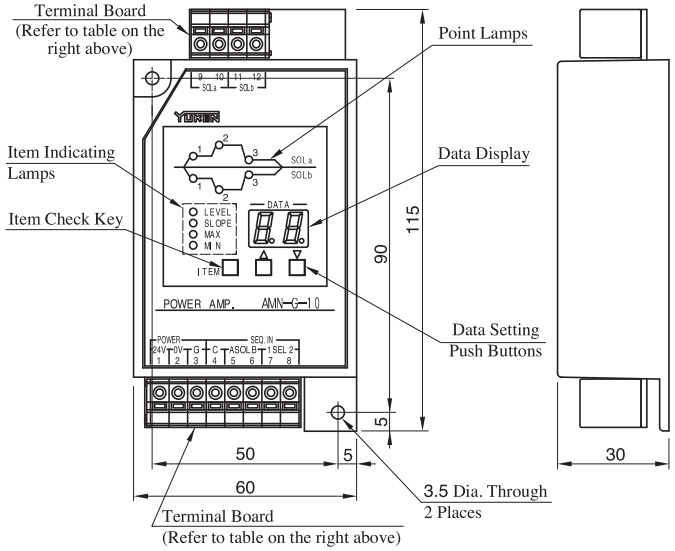
AMN-G-10

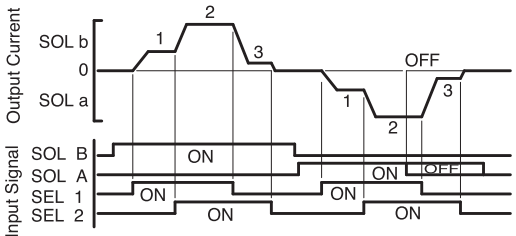
[Example Diagram]



Detail of Terminal Board

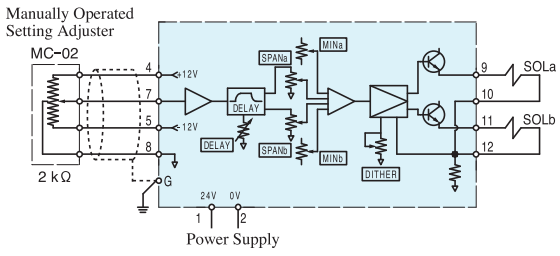
Terminal Number	Name		Terminal Number	Name	
1	Power Supply	+24V	7	Sequence Input	SEL 1
2	Power Supply	0V	8	Sequence Input	SEL 2
3	Ground	G	9	Output to Valve Solenoid	SOL a
4	Sequence Input	IN COM	10		
5	Sequence Input	SOL A	11	Output to Valve Solenoid	SOL b
6	Sequence Input	SOL B	12		





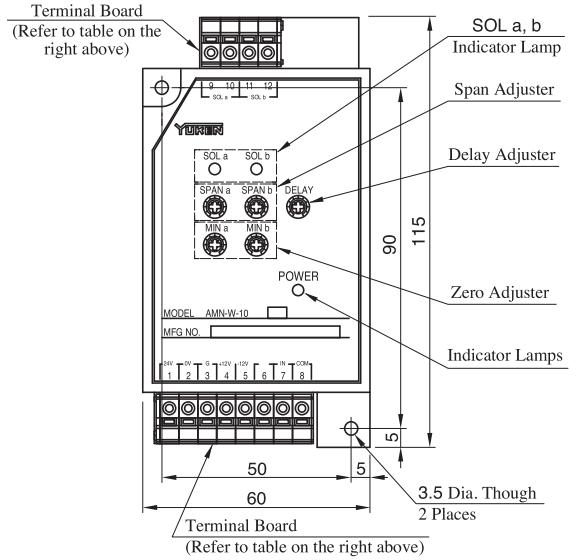
AMN-W-10

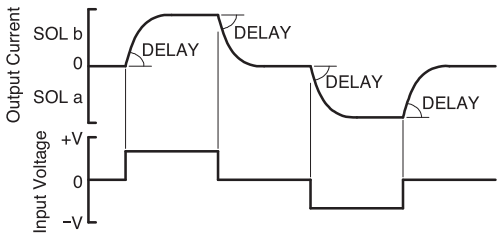
[Example Diagram]



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

Descriptions \ Model No.	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

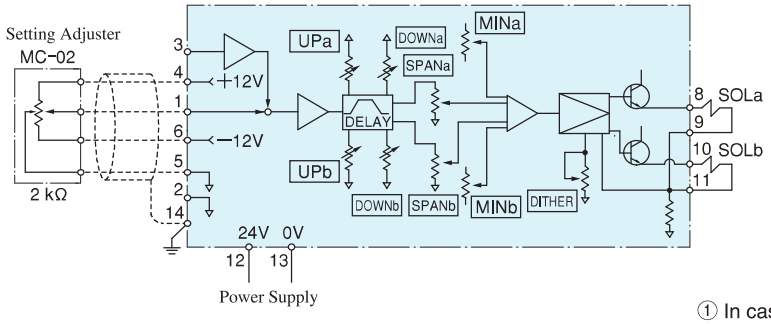
Power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 2 kΩ for the setting adjuster.

Power Switch

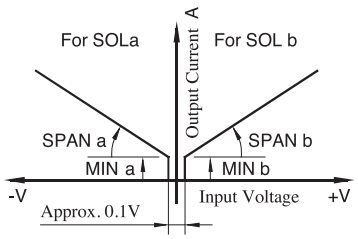
The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

SK1091-D24-10

[Example Diagram]



[Input-Output Characteristics]



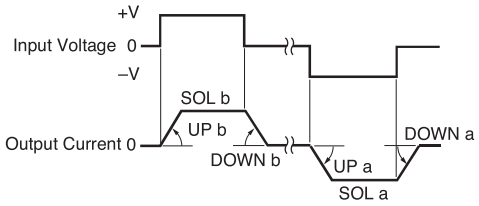
Detail of Terminal Board

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

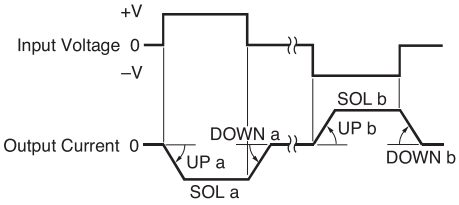
★ Three (3) usages are available as shown ① to ③ of "Delay Function" at right hand side for Input signal terminal (IN).

[Delay Function]

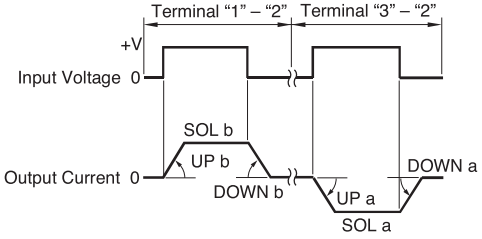
① In case "1" and "2" Input signal terminals are used.

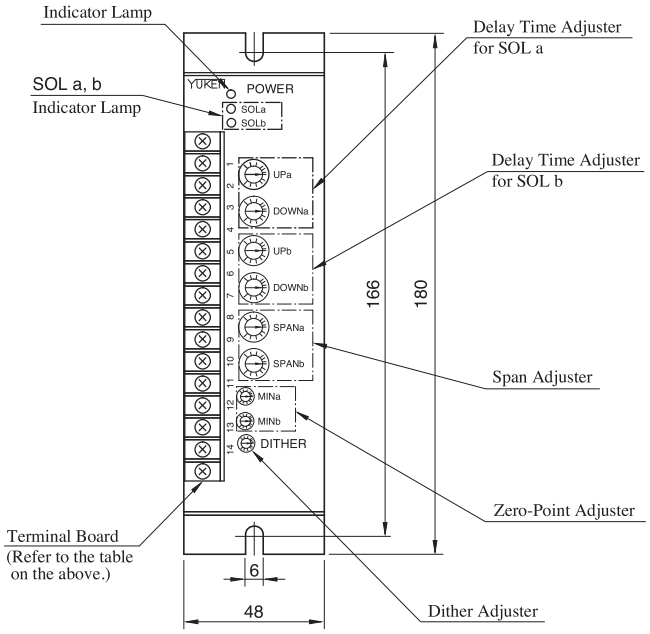


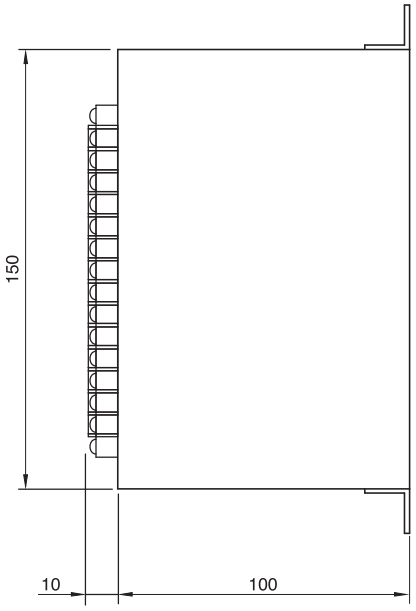
② In case "3" and "2" Input signal terminals are used.



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







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

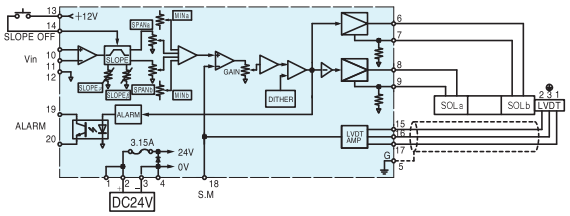
Instructions

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.

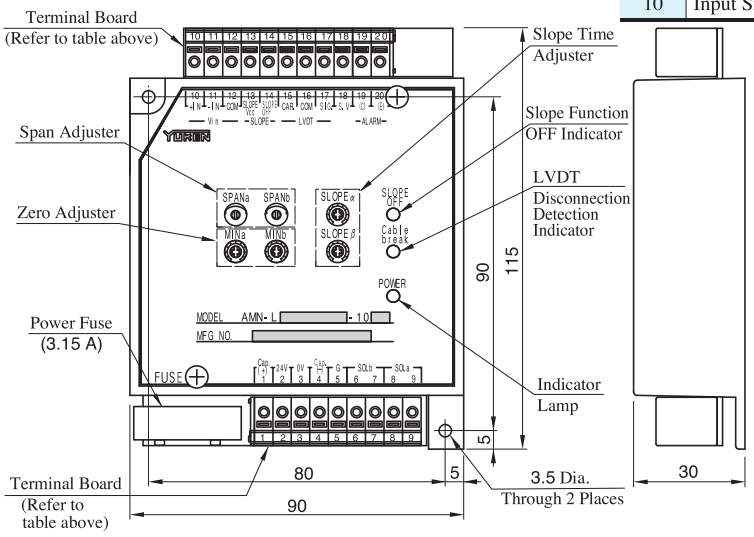
AMN-L-01-1-10

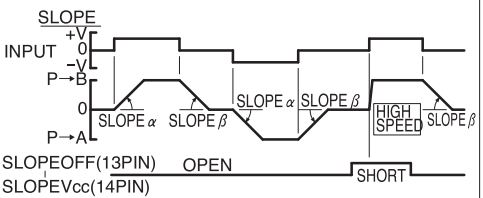
[Example Diagram]



Detail of Terminal Board

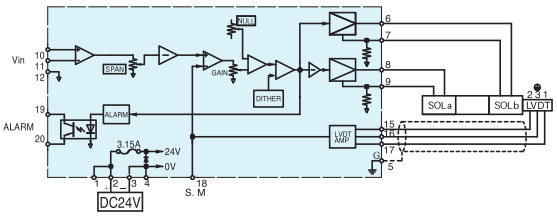
Terminal Number	Name		Terminal Number	Name	
1	Power Supply	CAPACITOR(+)	11	Input Signal	–IN
2	Power Supply	+24V	12	Input Signal	COM
3	Power Supply	0V	13	Slope Control ON/OFF Terminal	SLOPE Vcc
4	Power Supply	CAPACITOR(–)	14	Slope Control ON/OFF Terminal	SLOPE OFF
5	Frame Ground	G	15	LVDT Terminal	CAR.
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)





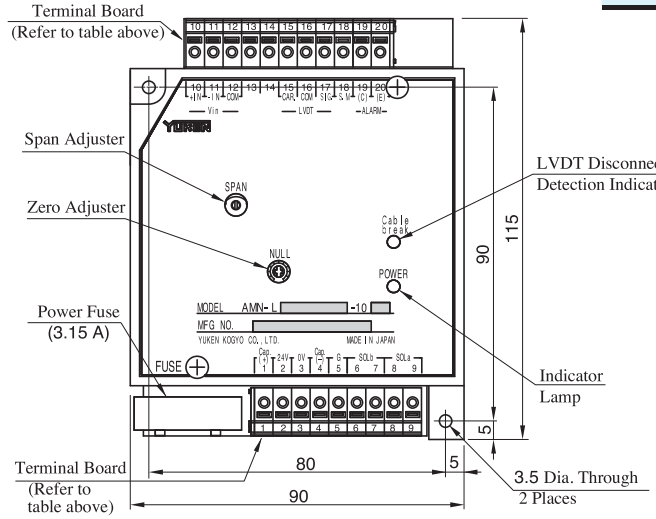
AMN-L-01-3-2P-10

[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)



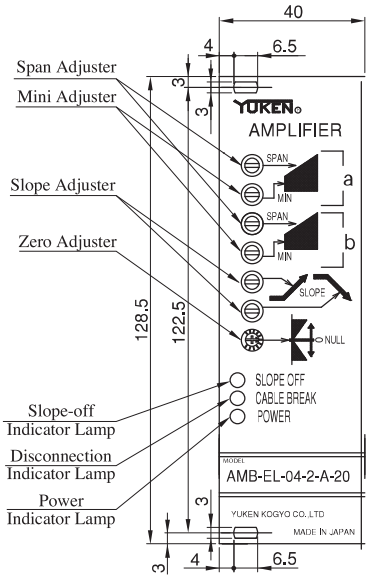
AMB-EL-∗-∗-∗-20

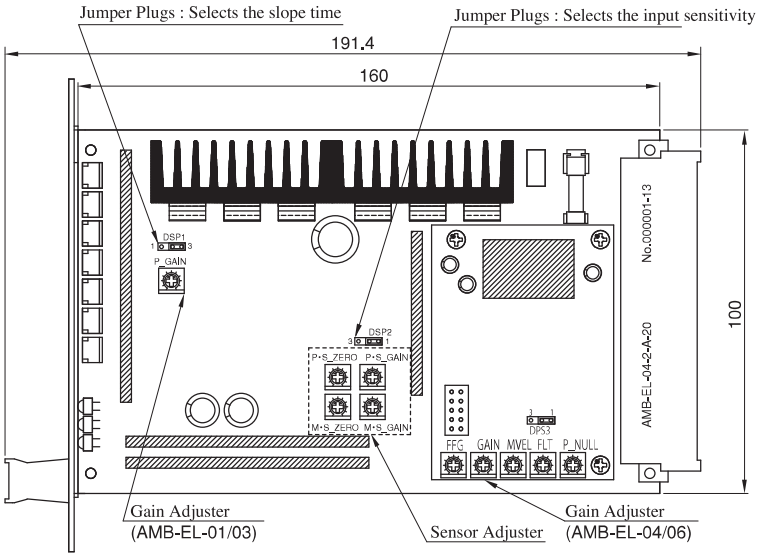
This power amplifier requires connector cards for connection. A connector card attached model is also available.
Please ask for details if interested.

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	————	

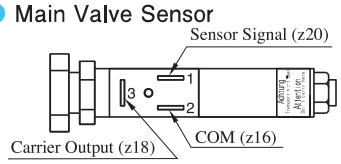
See the "Sensor Connection" diagram on the bottom left.
- (according to the I/O signal type)
- Pilot spool travel monitoring (fixed to ±10 V)



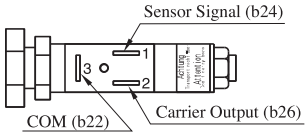


Sensor Connection

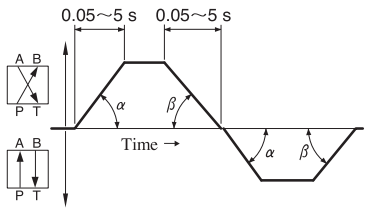
Main Valve Sensor



Pilot Valve Sensor

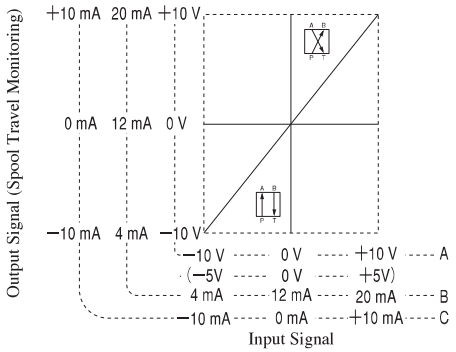


Lamp Pattern

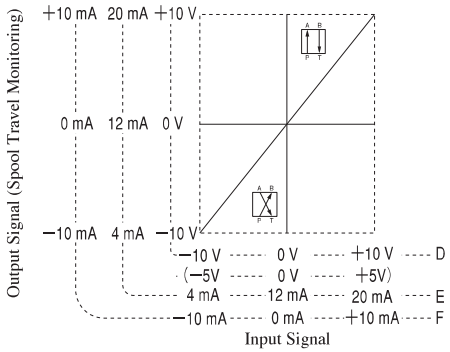


I/O Signal Characteristics

AMB-EL-∗-∗-∗-A/B/C



AMB-EL-∗-∗-∗-D/E/F



Interchangeability in Installation Current and New Design

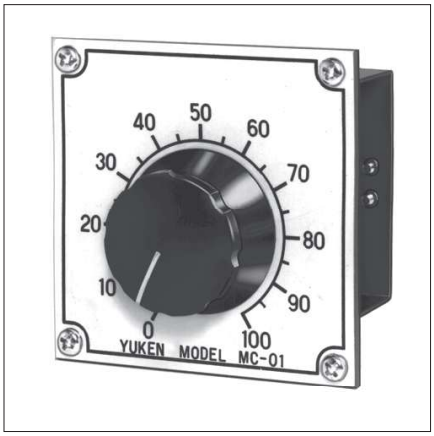
The power amplifier AMB-EL models were remodeled because I/O signal types were added, and the design number was changed from 10 to 20.

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.

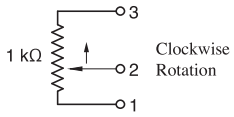


Type	Model Number	Function
Manually Operated Setting Adjuster	MC-01	This is the simplest setting adjuster, consisting of a trimmer (1 kΩ) and a dial.
	MC-02	Consisting of a center-tapped trimmer (1 kΩ - 1 kΩ) and a dial, this setting adjuster is ideal for a servo system.
6-point Setting Adjuster	AMC-V6-S-∗-10	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.

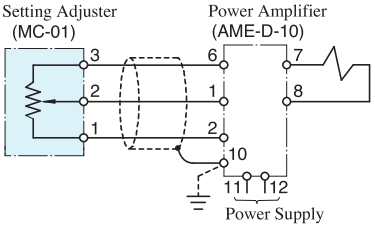
Manually Operated Setting Adjuster

MC-01

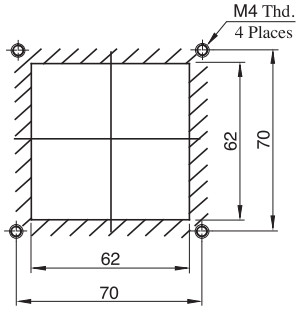
[Electric Circuit]

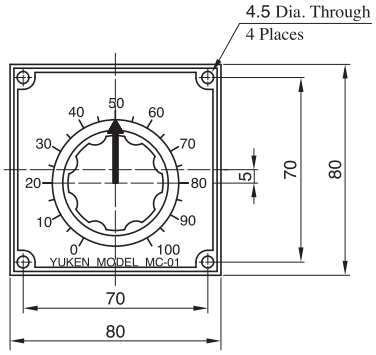


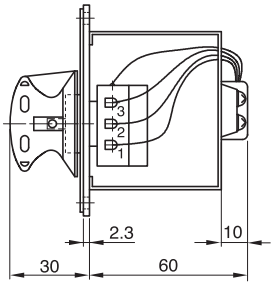
[Example Diagram]

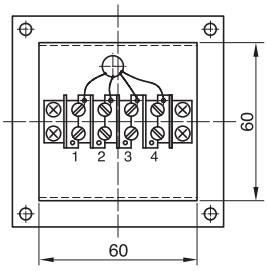


[Mounting Panel]









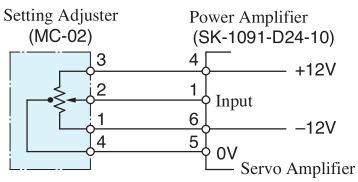
Approx. Mass.....0.5 kg

MC-02

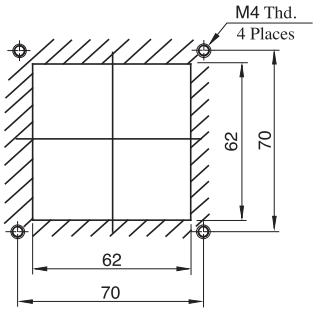
[How to Use]

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.

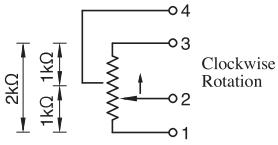
[Example Diagram]

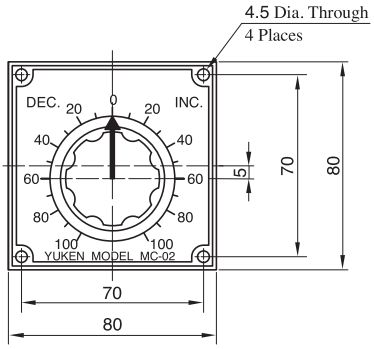


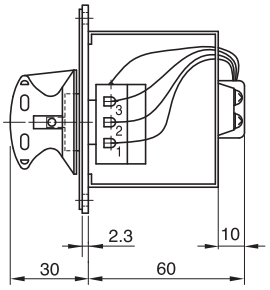
[Mounting Panel]

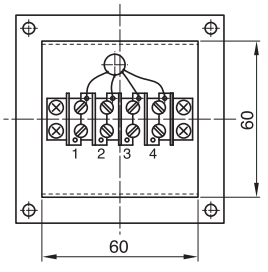


[Electric Circuit]









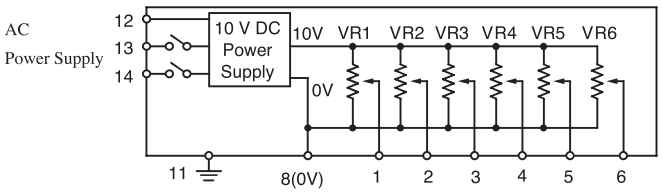
Approx. Mass.....0.5 kg

6-Point Setting Adjuster

AMC-V6-S-∗-10

Power Supply
100 ..... 100 V AC
200 ..... 200 V AC
220 ..... 220 V AC

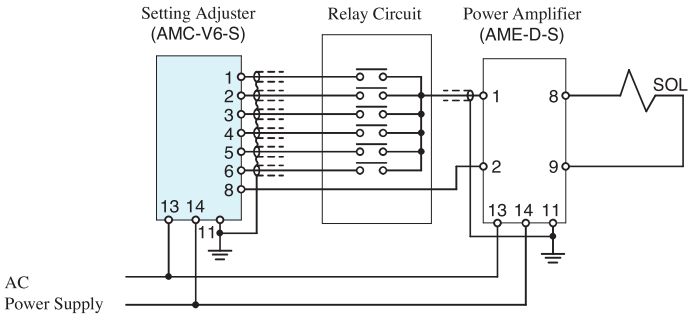
[Electric Circuit]

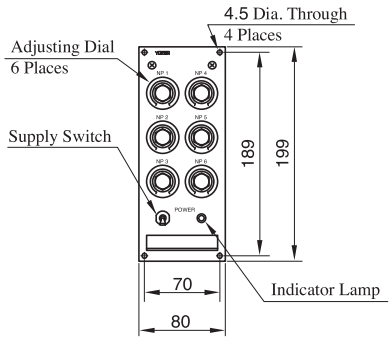


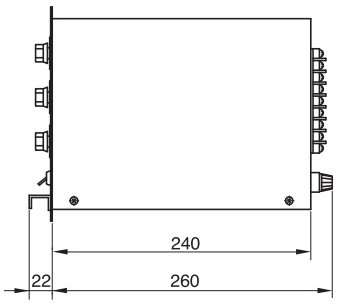
Detail of Terminal Board

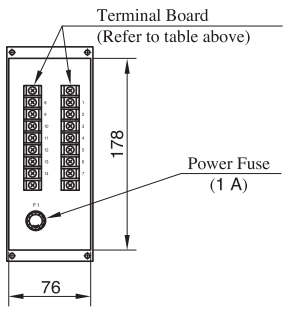
Terminal Number	Name
1	1 OUT (VR1)
2	2 OUT (VR2)
3	3 OUT (VR3)
4	4 OUT (VR4)
5	5 OUT (VR5)
6	6 OUT (VR6)
7	—
8	0V COM
9	—
10	—
11	Ground G
12	—
13	Power Supply 85- 265 VAC
14	

[Example Diagram]





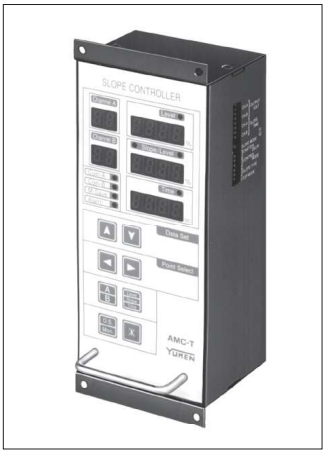




Approx. Mass.....1.6 kg

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

Descriptions \ Model No.	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

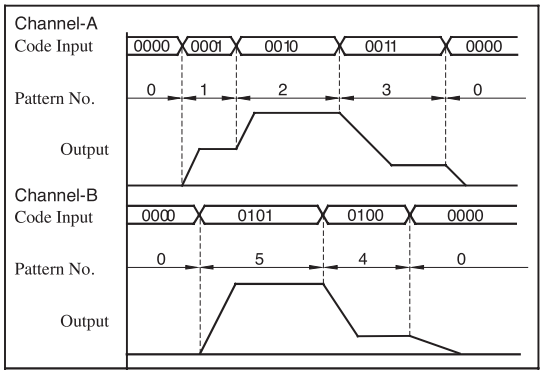
- Since this controller incorporates a micro computer, do subject it to undue electrical noise.

Control Modes

One among the following three types of control modes can be chosen by changing DIP swicth.

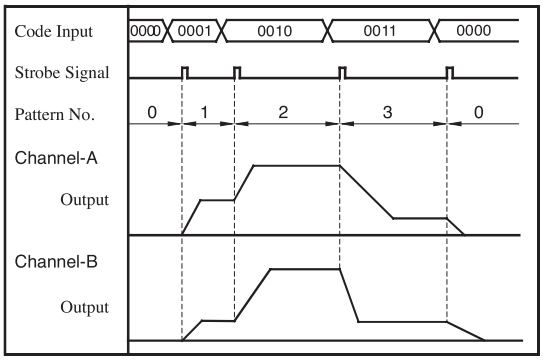
Control Mode 1

Channels A and B generate optional slopes independently each other.



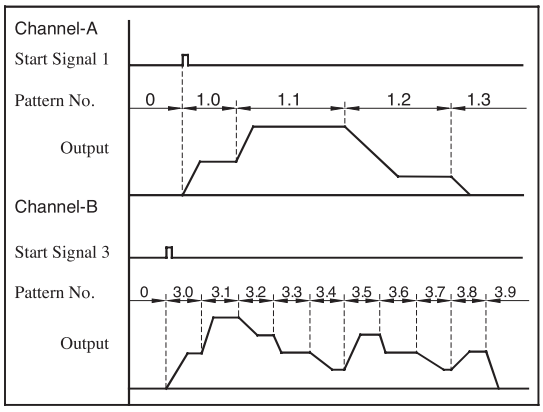
Control Mode 2

A slope is generated by a strobe signal (signal for change to next signal). Channels A and B operate synchronously.



Control Mode 3

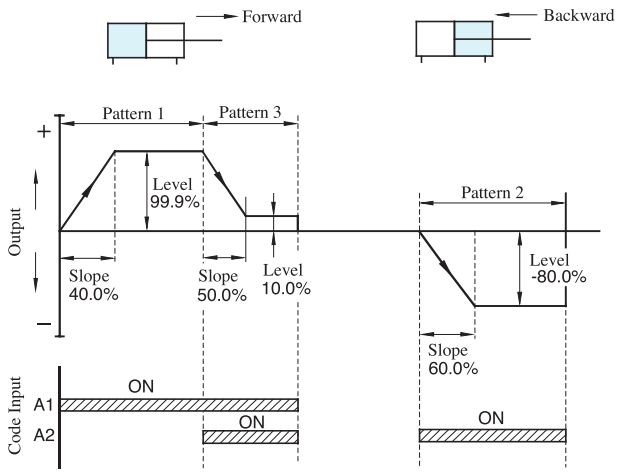
The internal timer is activated by a start signal, causing the slopes to be generated successively in memory. Channels A and B operate independently.



Setting Example

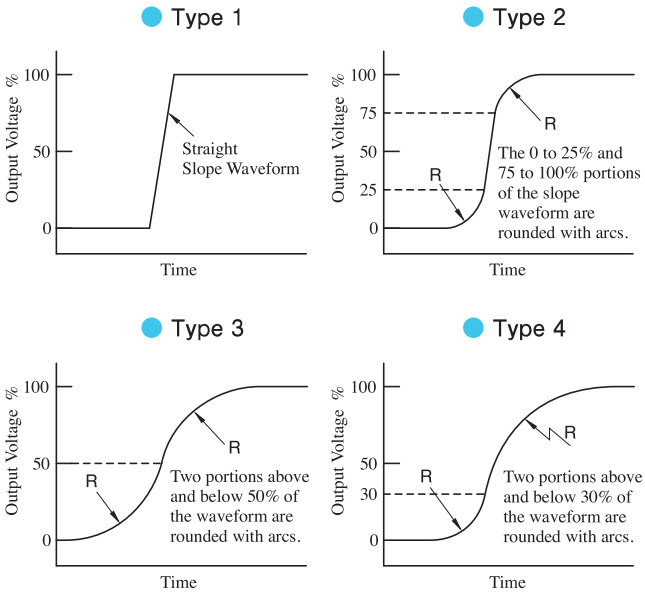
Control Mode 1 Channel - A

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	



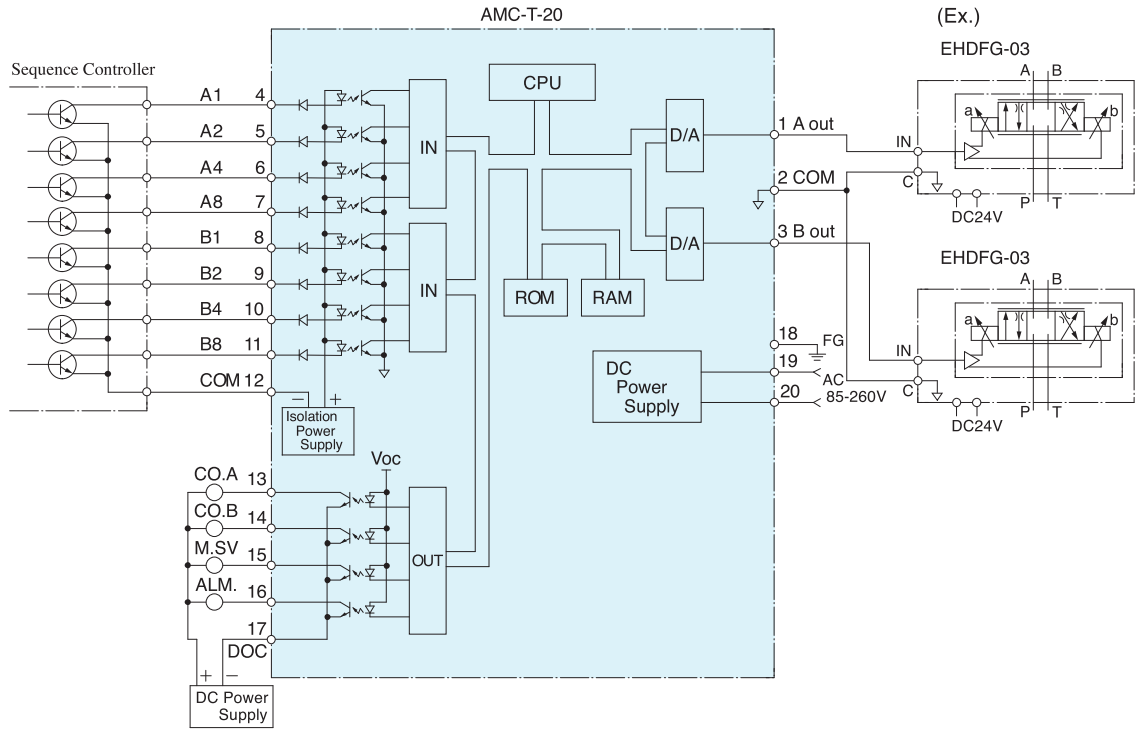
Slope Type

One among the follwing four types can be chosen by changing DIP switch.



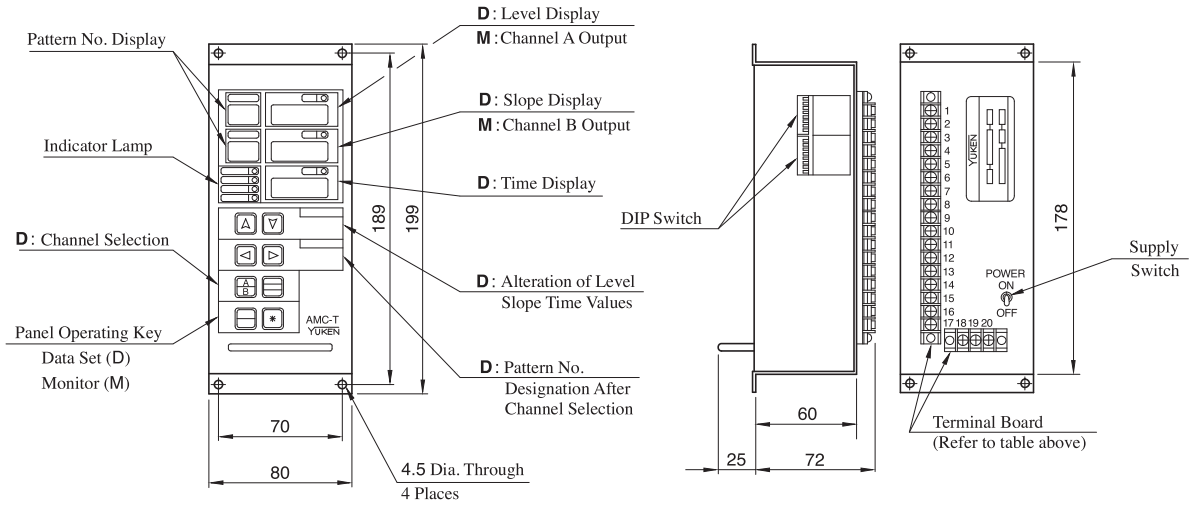
AMC-T-20

[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

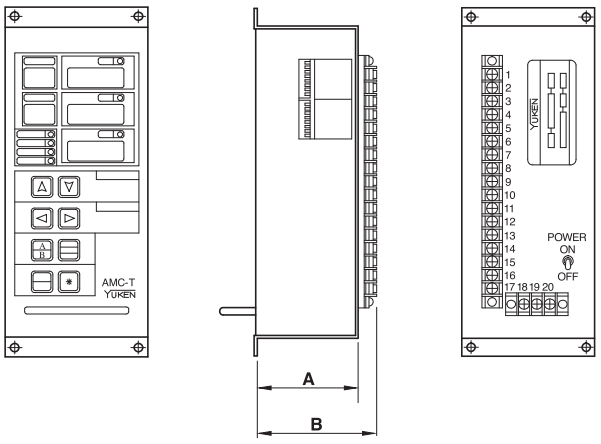
Terminal

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

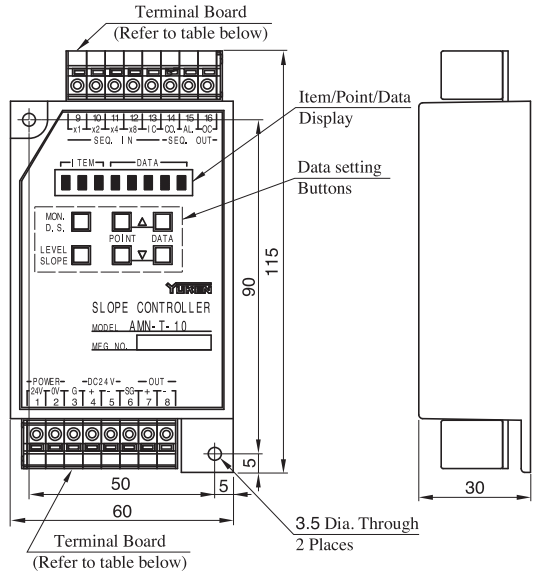
Descriptions \ Model Numbers	AMN-T-10
Number of Output Channels	1 Channel
Maximum Output Range	0 - +5 V (Factory Preset) 0 - +10 V 5 V 10 V
Maximum Slope Time	● Slope-constant type: ★1 1-9999 s/Max. Output Signal (Factory Setting, 5 s) ● Time-constant type: ★2 1-9999 s (Can be set in 1 second increments)
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]

