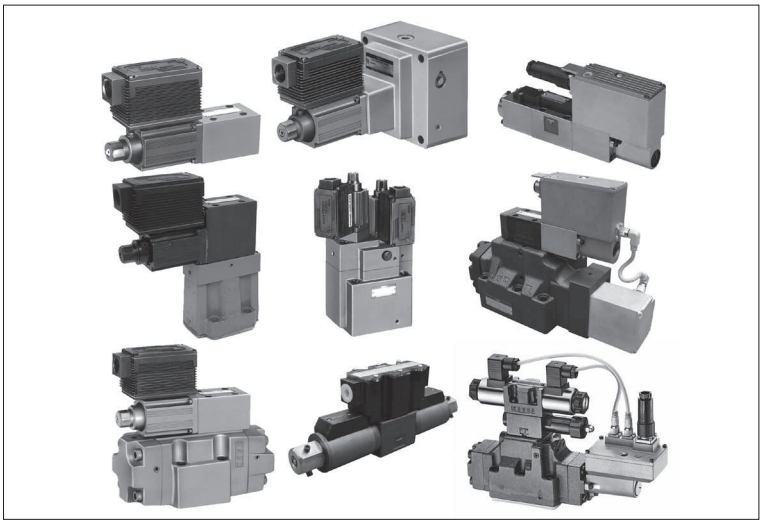
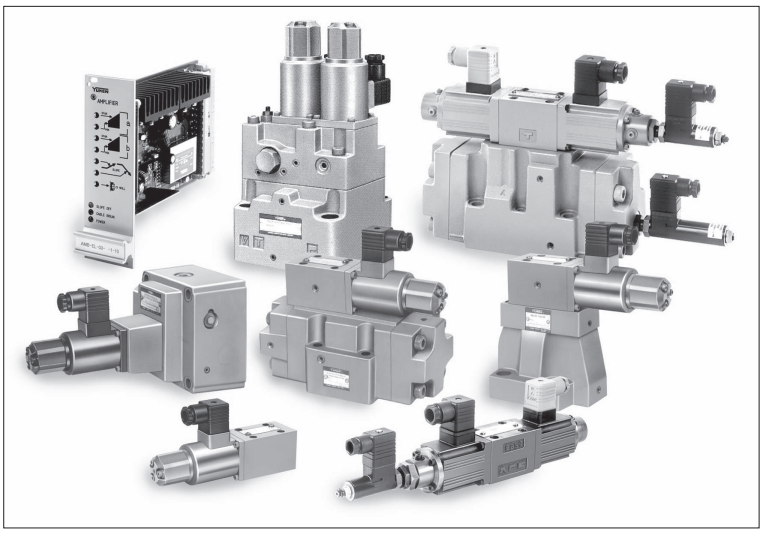
PROPORTIONAL ELECTRO-HYDRAULIC CONTOROLS

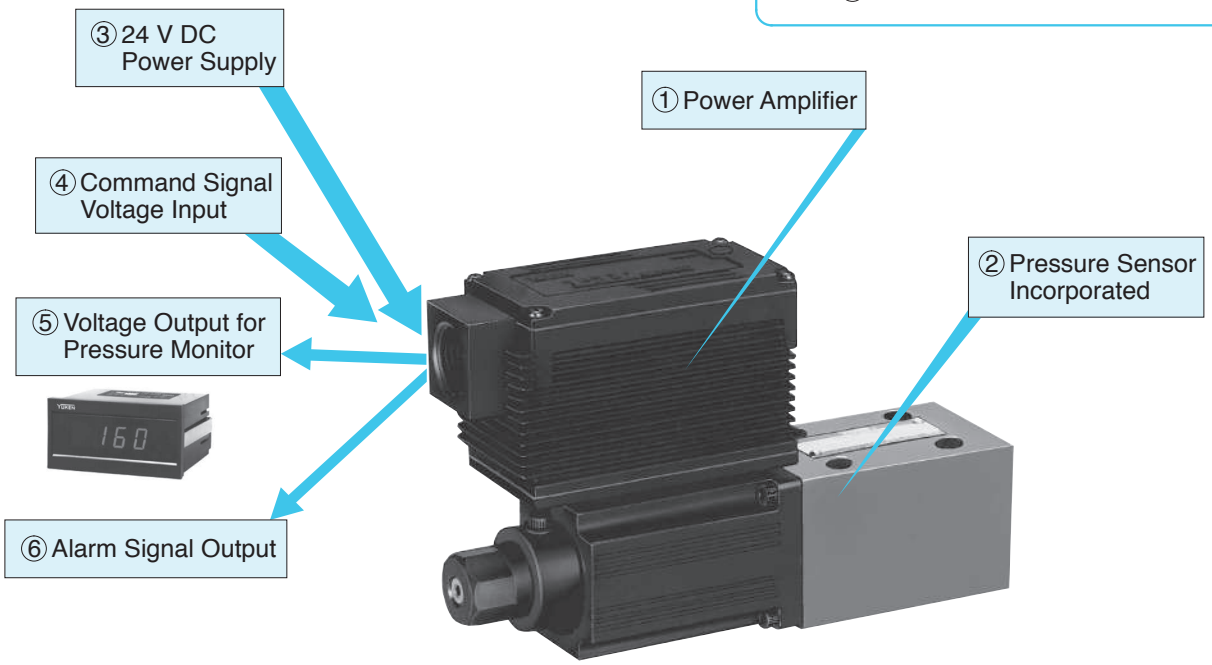




High-accuracy, simple, convenient
EH Series realizes your dreams.

Why simple ?

Highly accurate hydraulic control can be obtained only by supplying 24 V DC power ③[★3] and inputting a command signal voltage of 0 to 5 V ④.[★4]



Details of Proportional Electro-Hydraulic Relief Valve

Why high-accuracy ?

The power amplifier ① and pressure sensor ②[★1] are integrated in the control valve.
Furthermore, the closed-loop control [★2] design greatly improves the linearity, hysteresis and stability in control pressure.

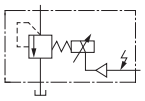
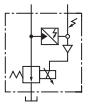
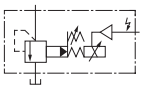
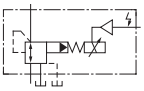
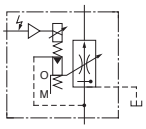
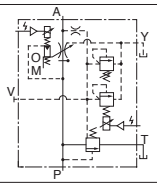
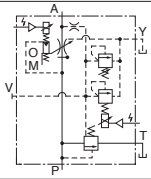
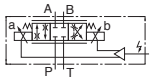
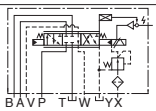
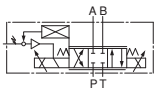
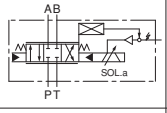
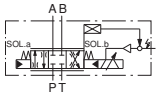
Why convenient ?

Analog voltages can be output by using the incorporated sensor for monitoring pressure, etc. ⑤[★5].
Pressure can be displayed remotely with the indicators obtainable in the market and also can be transmitted into a computer.

If any trouble arises in the system and the command signal does not match to the output, the alarm signal ⑥ is dispatched.
The trouble, if arises, can be easily detected by monitoring the dispatch of the alarm signal with sequence controller or computer.

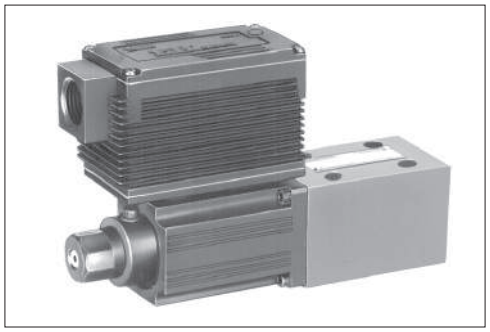
★1. Pressure sensors are incorporated only in pressure control valves. Directional and flow control valves (EHDFG-04,06) use a spool position sensor. However, some types of pressure control valves and directional/ flow control valves do not incorporate a sensor.
★2. Open-loop types are also available.
★3. EHDFG-04 and 06: ±24 V DC power supply is needed.
★4. The following products have the following command signal voltages and currents.
EHDFG-01, 03, 04, 06:0−±5 V
ELDFG-01EH, 03EH:0−±10 V, 4−20 mA, 0−±10 mA
ELDFHG-03EH, 04EH, 06EH, 10EH, ECDFHG-04EH, 06EH:
0−±10 V, 4−20 mA, 0−±10 mA
★5. Spool displacement for the following products is shown in %.
EHDFG-04, 06
ELDFG-01EH, 03EH
ELDFHG-03EH, 04EH, 06EH, 10EH
ECDFHG-04EH, 06EH

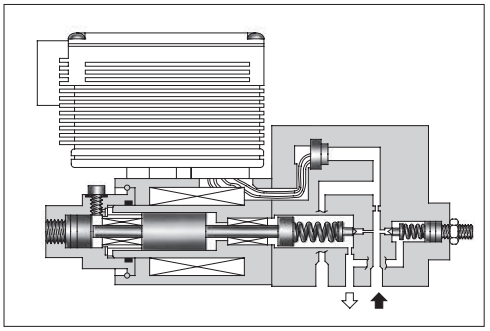
EH Series-Hybrid Components
Proportional Electro-Hydraulic Controls

Type	Graphic Symbol	Max. Operating Pressure MPa	Maximum Flow L/min	Page
Pilot Relief Valves		24.5	EHDG 01	H-4
Pressure Control Valves		SB1110: 24.5 SB1190: 7.0	SB1110 / SB1190	H-11
Relief Valves		24.5	EHBG 03 / 06 / 10	H-15
Relieving and Reducing Valves		24.5	EHRBG 06 / 10	H-23
Flow Control (and Check) Valves		03: 20.6 06: 24.5	EHFG EHFCG 03 / 06	H-29
Flow Control and Relief Valves		24.5	EHFBG 03 / 06 / 10	H-36
High Flow Series Flow Control and Relief Valves		24.5	EHFBG 03 / 06	H-45
Directional and Flow Control Valves		25	EHDFG 01 / 03	H-51
High Response Type Directional and Flow Control Valves		15.7	EHDFG 04 / 06	H-57
Direct Operated and High Response Type Directional and Flow Control Valves		35	ELDFG 01EH / 03EH	H-62
Two Stage Type High Response Type Directional and Flow Control Valves		04EH 06EH350:35 10EH 03EH 06EH500:31.5	ELDFHG 03EH / 04EH / 06EH / 10EH	H-68
Directional and Flow Control Valves (with Main Valve Feedback Control)		04EH:35 06EH:31.5	ECDFHG 04EH / 06EH	H-80

Proportional Electro-Hydraulic Pilot Relief Valves

The valve can be used as a pilot valve of the proportional electro-hydraulic control valves.
The valve can also be used as a relief valve for the hydraulic system where a small flow rate and continuous pressure control are required.



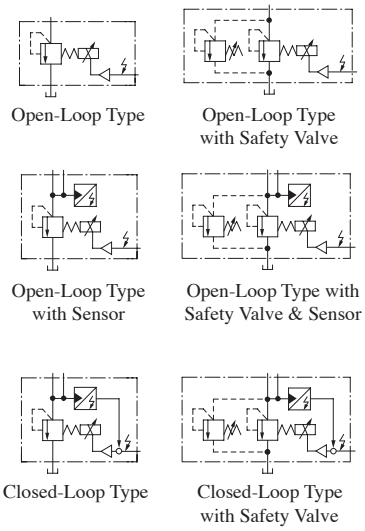


Specifications

Descriptions \ Model Numbers	EHDG-01∗
Max. Operating Pres. MPa	24.5
Max. Flow L/min	2
Min. Flow L/min	0.3
Pressure Adjustment Range	Refer to Model Number Designation
Coil Resistance	10 Ω
Hysteresis	3% (1%)★1 or less
Repeatability	1%★2 or less
Frequency Response	B : 10 (27) Hz★1 C : 10 (27) Hz★1 (-90 degree) H : 12 (27) Hz★1
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)
Power Input (Max.)	28 W
Input Signal Voltage	B : 6.9 MPa / 5 V DC C : 15.7 MPa / 5 V DC H : 24.5 MPa / 5 V DC
Input Impedance	10 kΩ
Alarm Signal Output (Open Collector)	Voltage: Max. 30 V DC Current: Max. 40 mA
Pressure Signal Output	B : 5 V DC / 6.9 MPa C : 5 V DC / 15.7 MPa H : 5 V DC / 24.5 MPa
Ambient Temperature	0 - 50°C (With Circulated Air)
Mass	Refer to Page H-6

★1. The value in parentheses is for the closed-loop type.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols



Model Number Designation

EHD	G	-01	V	-B	-S	-1	-PN	T15	M10	-50
Series Number	Type of Mounting	Valve Size	Applicable Control	Pres. Adj. Range MPa (PSI)	Control Type	Safety Valve	P-Line Orifice	T-Line Orifice	P-B Line Orifice	Design Number
EHD : Proportional Electro-Hydraulic Pilot Relief Valve	**G**: Sub-Plate Mounting	**01**	**None**: For general use **V** : Vent Control of Relief Valve (Omit if not required)	**B**: 0.5 - 6.9 **C**: 1 - 15.7 **H**: 1.2 - 24.5	**None**: Open-Loop **S**: Open-Loop with Sensor **L** : Closed-Loop★1	**None**: Without Safety Valve **1** : With Safety Valve	**PN** : Without Orifice (Standard)	**T15** **T13** **T11** ★2	— **M10**: Standard Orifice	**50**

★1. For closed-loop models, specify applicable control code "V" even though the valve may not be used as vent control of relief valve.
★2. Standard of T-line Orifice.
Pres. Adj. Range B:T15, C:T13, H:T11.
★3. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHDG-01＊-＊-＊-PNT＊	M5 × 45 L·····4 Pcs.
EHDG-01＊-＊-S＊-＊-PNT＊M10	M5 × 75 L·····4 Pcs.
EHDG-01V-＊-L＊-＊-PNT＊M10	

Sub-Plate

Sub-Plate Model Numbers	Thread Size Rc	Mass kg
DSGM-01-31	1/8	0.8
DSGM-01X-31	1/4	
DSGM-01Y-31	3/8	

● Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

Instructions

Piping to the Reservoir

The tank port should be connected directly to the reservoir with a back pressure of not more than 0.2 MPa. Be sure the end of pipe is dipped into the oil in the reservoir.

Vent Control

When this valve is to be used as a relief valve or for other valve vent control purposes, use 6 mm ID, 300 mm or less long pipes for piping connections.

If pressure instability is encountered, provide a 1 - 1.5 mm diameter orifice for the relief or other valve vent port.

Circuit Pressure Control

When circuit pressure is directly controlled by this valve, make sure that the trapped oil volume is exceeding 40 cm^3.

Low Flow Rates

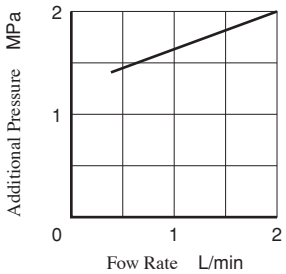
The preselected pressure may become instable. To avoid such pressure instability, the flow rate should not be lower than 0.3 L/min.

Safety Valve Pressure Setting

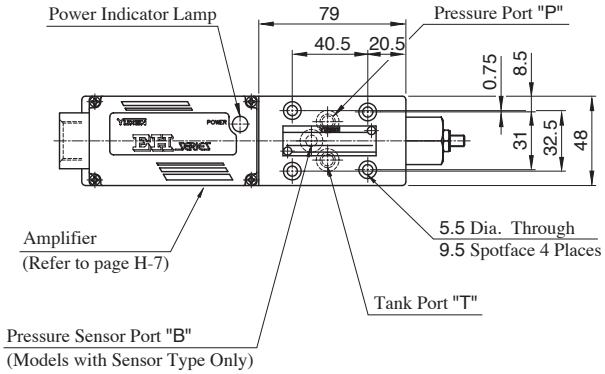
The safety valve pressure setting at the maximum flow rate is preset to a level that is 2 MPa higher than the pressure adjustment range upper limit. If the operating pressure upper limit is low or a different flow rate upper limit is used, make adjustment after calculating the safety valve pressure setting from the following equation:

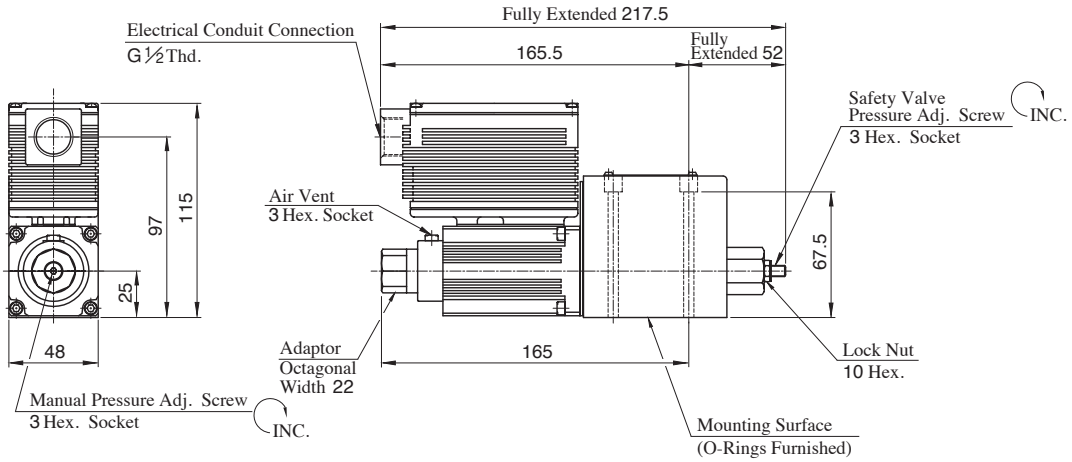
Pressure setting = (Operating pressure upper limit) + (Additional pressure indicated below)

To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.



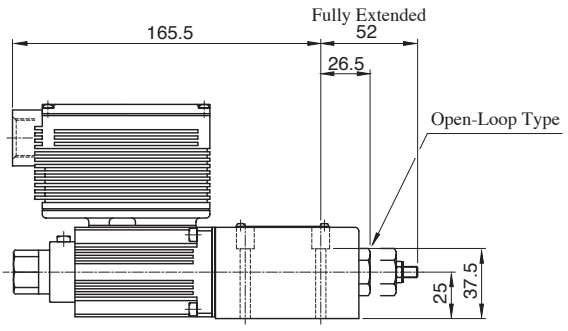
EHDG-01＊-＊-S-1-PNT＊M10-50：Open-Loop Type with Sensor and Safety Valve
EHDG-01＊-＊-L-1-PNT＊M10-50：Closed-Loop Type with Safety Valve





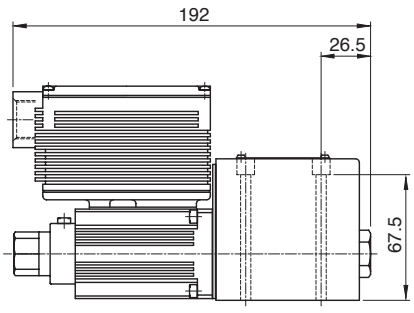
Mass·····2.9 kg

EHDG-01＊-＊-PNT＊-50：
Open-Loop Type
EHDG-01＊-＊-1-PNT＊-50：
Open-Loop Type with Safety Valve



Mass·····2.2 kg

EHDG-01＊-＊-S-PNT＊M10-50：
Open-Loop Type with Sensor
EHDG-01＊-＊-L-PNT＊M10-50：
Closed-Loop Type

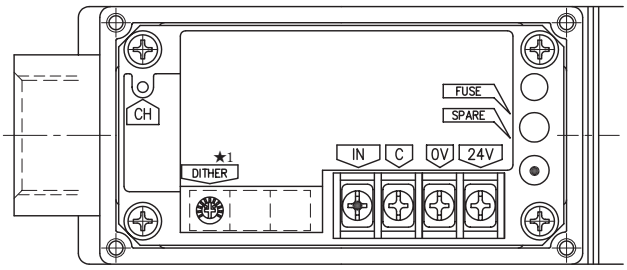


Mass·····2.9 kg

Detail of Amplifier

Connectiing Terminal

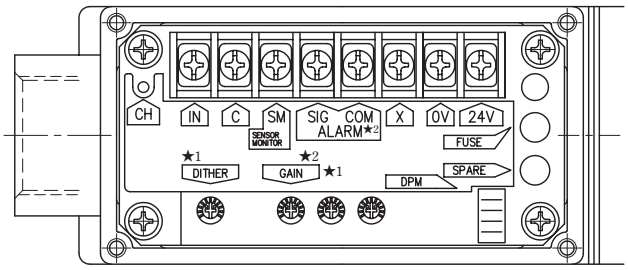
- Open-Loop Type



Terminal	Name
IN	Input Signal (+)
C	Input Signal (COM)
0 V	Power Supply
24V	
CH	Output Current Check (to C)

★1. DITHER/GAIN
Use as they are since they are factory-preset to the optimum position.
(Do not touch them in normal condition.)

- Closed-Loop Type
- Open-Loop Type with Sensor

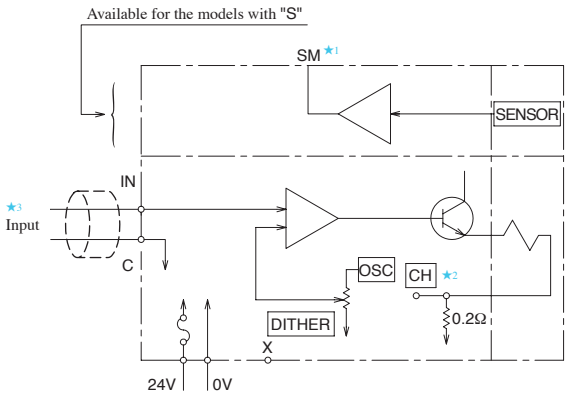


Terminal		Name
IN		Input Signal (+)
C		Input Signal (COM)
SM		Sensor Monitor (to C)
ALARM	SIG	Alarm Output★2
	COM	
X		(Open)
0 V		Power Supply
24V		
CH		Output Current Check (to C)

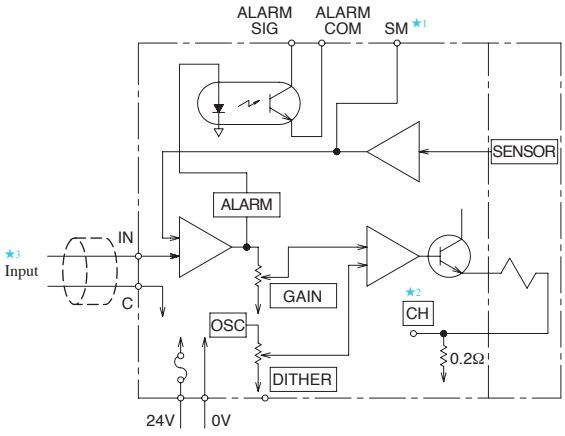
★2. GAIN/ALARM
GAIN adjusting volume is not available for open-loop type with sensor.

Circuit Schematic

- Open-Loop Type
- Open-Loop Type with Sensor

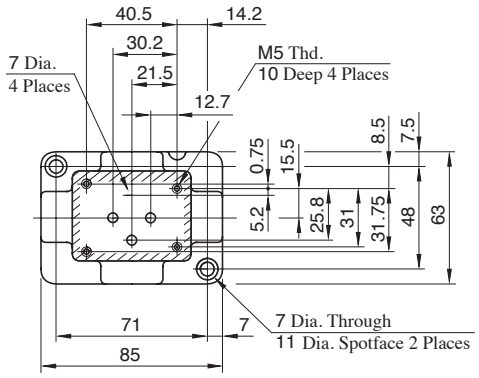


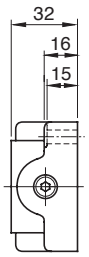
- Closed-Loop Type

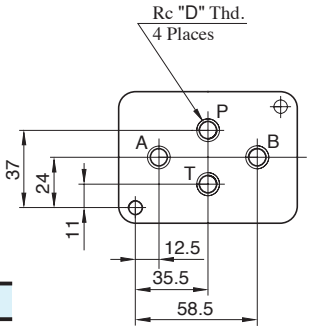


★1. For "SM" terminal, external instruments should have input impedance of more than 10 kΩ.
★2. For "CH" terminal, external instruments should have input impedance of more than 10 kΩ.
★3. Use shielded cable for "Input" connection. The ground of the shielded cable must be connected to input signal side.

Sub-Plates : DSGM-01, 01X, 01Y





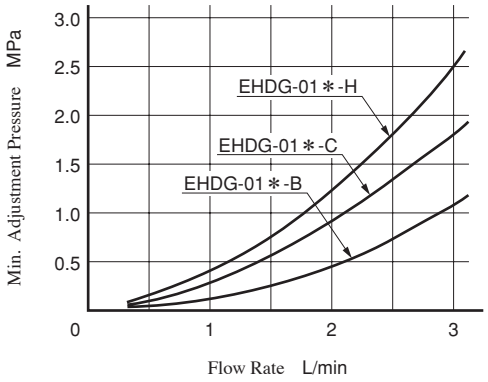


Sub-Plate Model No.	D
DSGM-01-31	1/8
DSGM-01X-31	1/4
DSGM-01Y-31	3/8

Min. Adjustment Pressure

EHDG-01 * -C B H

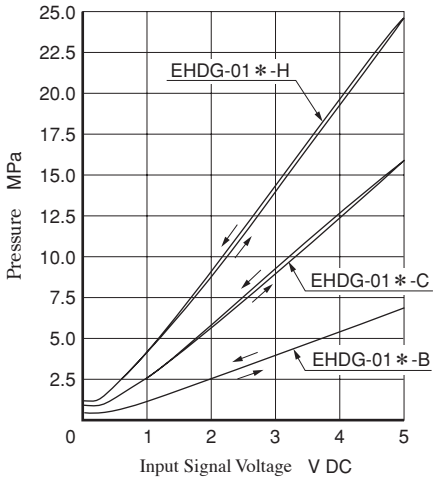
Viscosity: 30 mm²/s



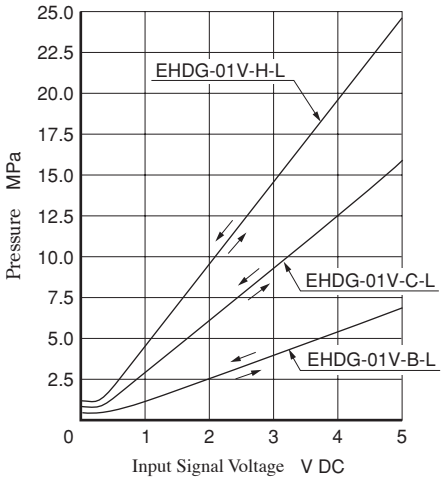
Input Signal Voltage vs. Pressure

Flow Rate : 2 L/min
Viscosity : 30 mm²/s

Open-Loop Type



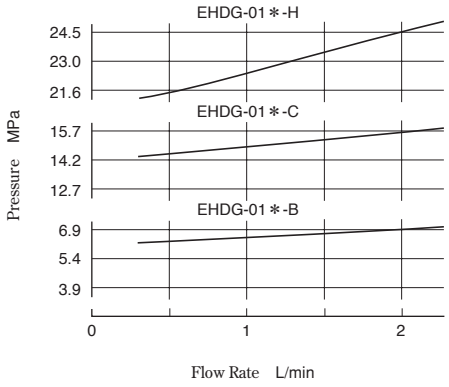
Closed-Loop Type



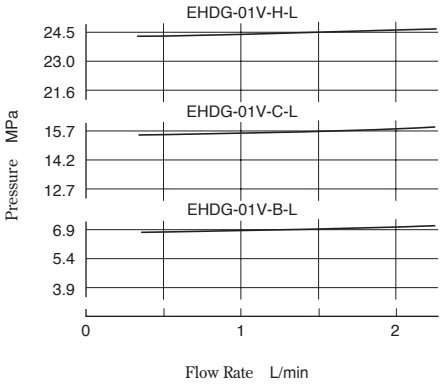
Flow Rate vs. Pressure

Viscosity : 30 mm²/s

Open-Loop Type
EHDG-01＊-＊



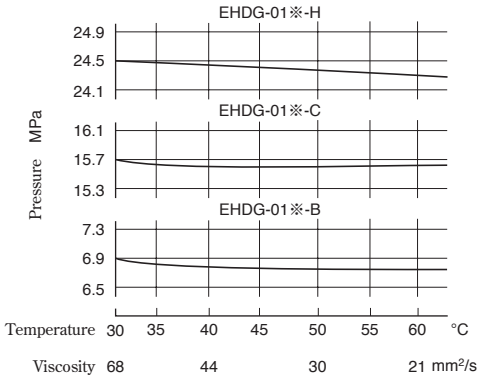
Closed-Loop Type
EHDG-01V-＊-L



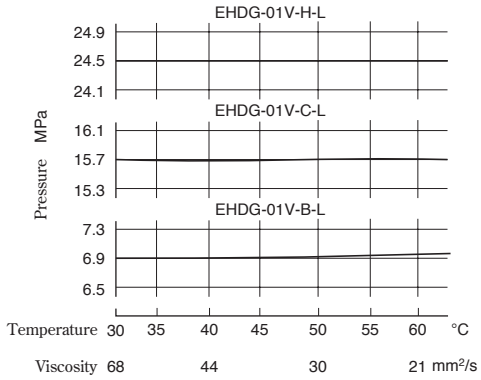
Viscosity vs. Pressure

Flow Rate : 2 L/min
Oil : ISO VG 46 Oil

Open-Loop Type
EHDG-01＊-＊



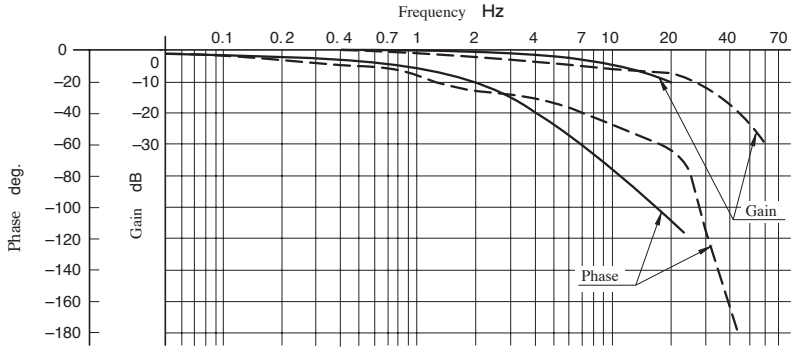
Closed-Loop Type
EHDG-01V-＊-L



Frequency Response

Open-Loop Type
Closed-Loop Type

Flow Rate : 2 L/min
Pressure : 7.8 ± 1.6 MPa
Trapped Oil Volume : 40 cm³
Viscosity : 30 mm²/s



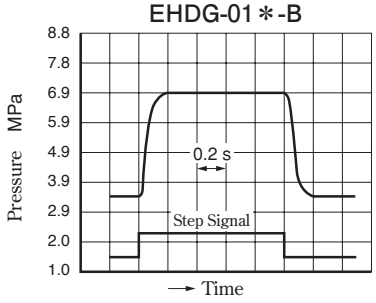
Step Response (Example)

The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combinations with other control valves.

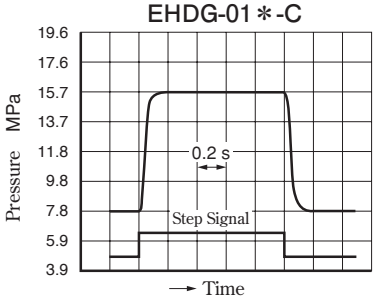
Flow Rate : 2 L/min
Trapped Oil Volume : 40 cm^3
Viscosity : 30 mm^2/s

Open-Loop Type

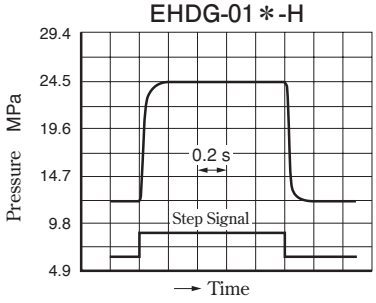
EHDG-01∗-B



EHDG-01∗-C

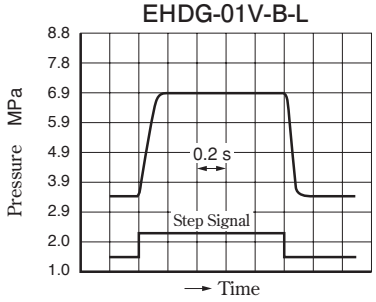


EHDG-01∗-H

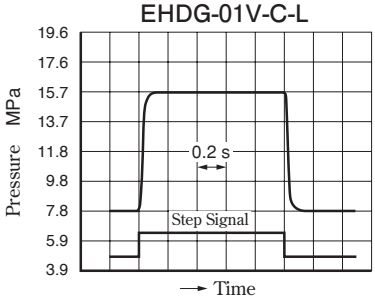


Closed-Loop Type

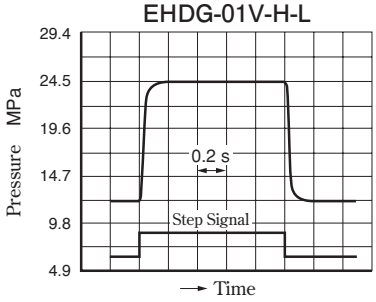
EHDG-01V-B-L



EHDG-01V-C-L

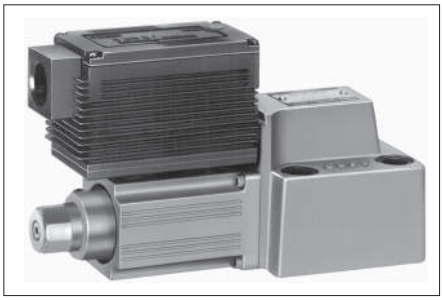


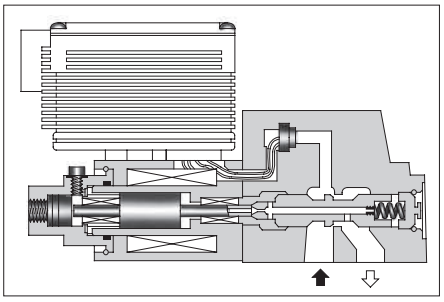
EHDG-01V-H-L



Proportional Electro-Hydraulic Pressure Control Valves

These are closed-loop type pressure control valves controlling the system pressure from low to high in proportion to the input voltage. The stable pressure control is possible even in a small flow rate.



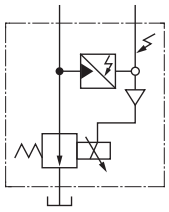


Specifications

Descriptions \ Model Numbers	SB1110	SB1190
Max. Operating Pres. MPa	B: 6.9 H: 24.5	7.0
Max. Flow L/min	30	70
Min. Flow L/min	B: 0.5 H: 0.5 (at 0.2 - 6.9 MPa) 1.5 (at 6.9 - 15.7 MPa) 3.0 (at 15.7 - 24.5 MPa)	1
Pressure Adjustment Range	Refer to Model Number Designation	
Coil Resistance	10 Ω	
Hysteresis	1 % or less	1.5 % or less
Repeatability	1 % ★1 or less	
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)	
Power Input (Max.)	28 W	
Input Signal Voltage	B: 6.9 MPa / 5 V DC H: 24.5 MPa / 5 V DC	7.0 MPa / 5 V DC
Input Impedance	10 kΩ	
Alarm Signal Output (Open Collector)	Voltage: Max. 30 V DC Current: Max. 40 mA	
Pressure Signal Output	B: 5 V DC / 6.9 MPa H: 5 V DC / 24.5 MPa	5 V DC / 7.0 MPa
Ambient Temperature	0 - 50°C (With Circulated Air)	
Mass	3.3 kg	10.2 kg

★1. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbol



Model Number Designation

SB1110	-B	-20
Series Number	Pres. Adj. Range MPa	Design Number
SB1110: Proportional Electro-Hydraulic Pressure Control Valve (3/8, Sub-Plate Mounting)	**B**: 0.2 ★- 6.9 **H**: 0.2 ★- 24.5	**20**
SB1190: Proportional Electro-Hydraulic Pressure Control Valve (3/4, Sub-Plate Mounting)	**B**: 0.2 ★ - 7.0	**10**

★1. The minimum adjustable pressure is the value obtained at Max. Flow.

★2. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
SB1110	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
SB1190	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7

- Sub-plates are available. Specify sub-plate model from the table above.
  When sub-plates are not used, the mounting surface should have a good machined finish. (▽)

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
SB1110	M12 × 65 L·····4 Pcs.
SB1190	M16 × 100 L·····4 Pcs.

Instructions

Safety Valve

As the function of safety valve has not been included in the valve itself, provide safety valve in the hydraulic circuit if required.

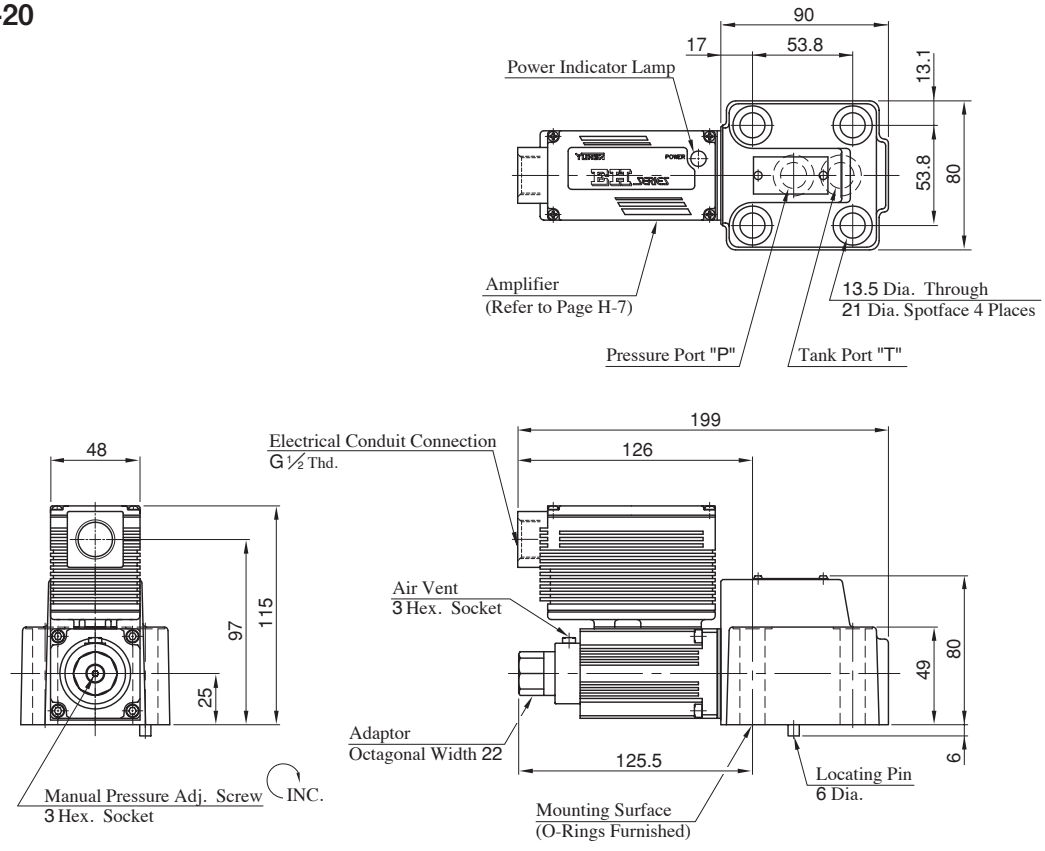
Piping to the Reservoir

The tank port should be connected directly to the reservoir. Be sure the end of pipe is dipped into the oil in the reservoir.

Low Flow Rates

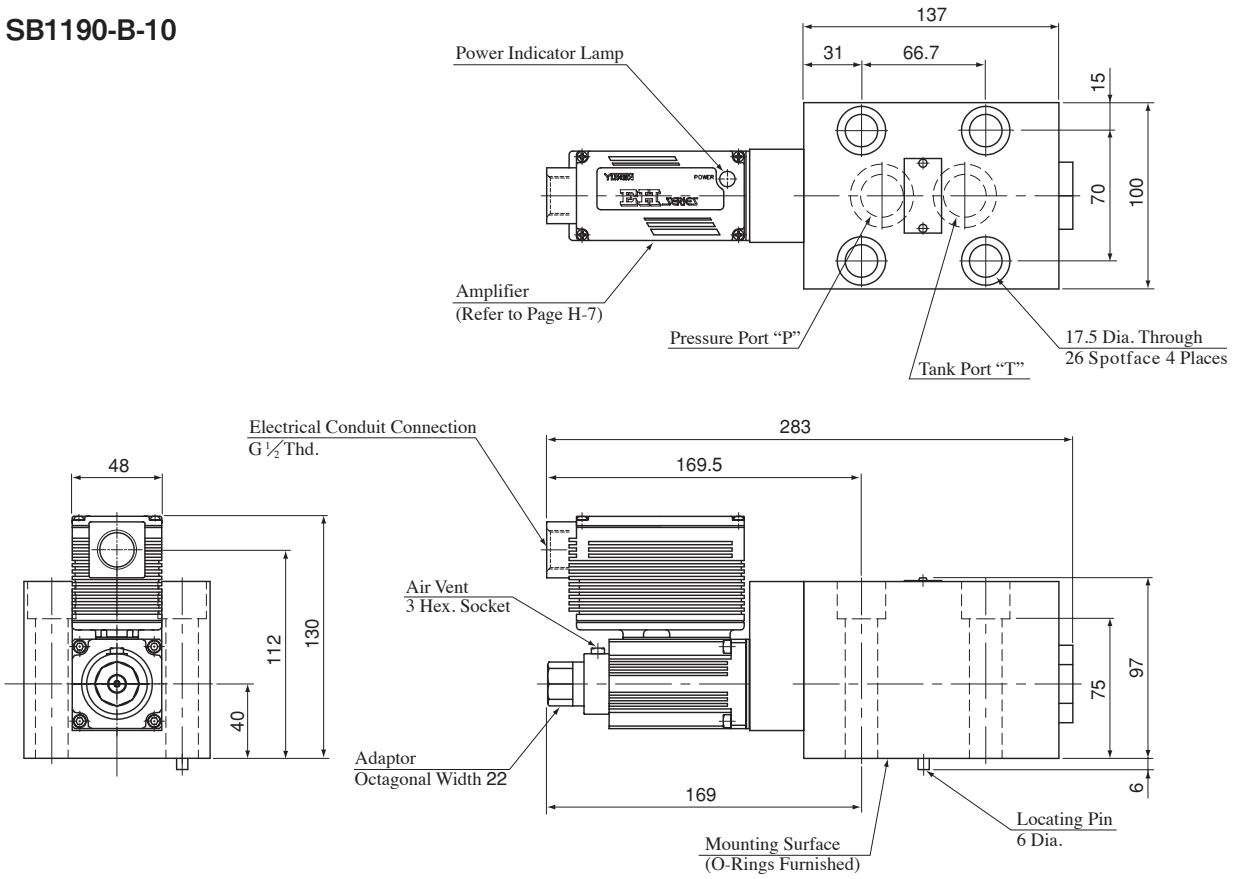
The preselected pressure may become instable. To aboid such pressure instability, the flow rate should not be lower than minimum flow.

SB1110-∗-20



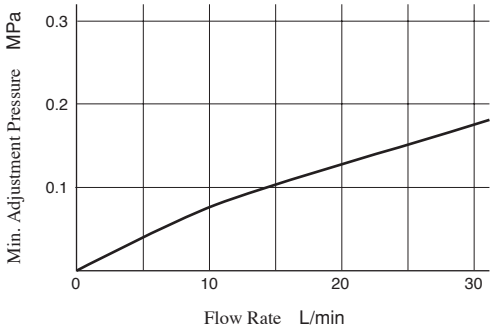
- Sub-plate is common to that of EBG-03. Refer to page H-18 for the dimensions of mounting surface.

SB1190-B-10

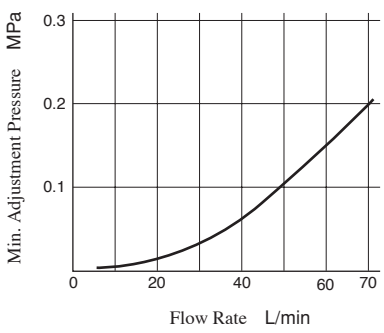


Min. Adjustment Pressure

SB1110 Viscosity : 30 mm²/s

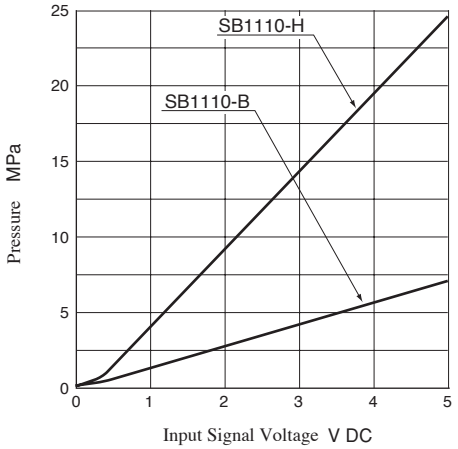


SB1190 Viscosity : 30 mm²/s

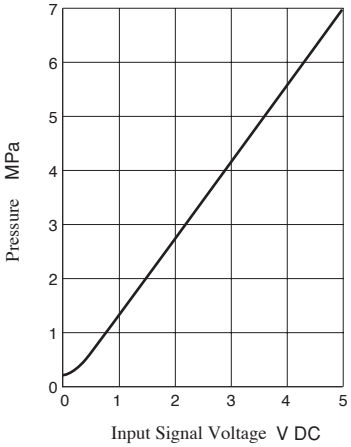


Input Signal Voltage vs. Pressure

SB1110 Flow Rate : 30 L/min
Viscosity : 30 mm²/s

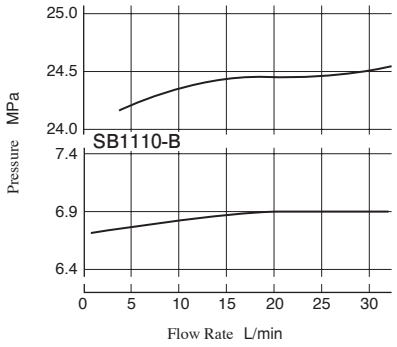


SB1190 Flow Rate : 70 L/min
Viscosity : 30 mm²/s

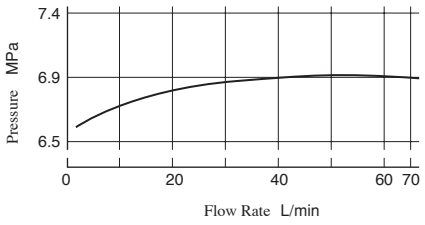


Flow Rate vs. Pressure

SB1110-H Viscosity : 30 mm²/s

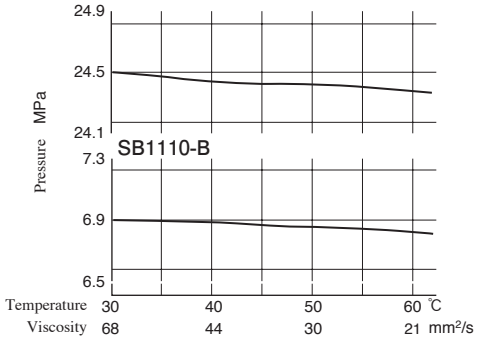


SB1119 Viscosity : 30 mm²/s

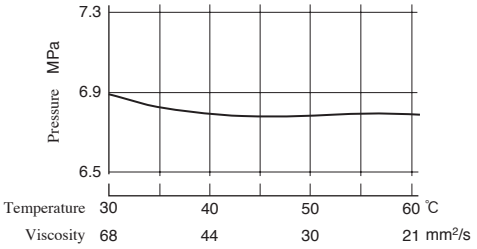


Viscosity vs. Pressure

SB1110-H
Flow Rate : 30 L/min
Oil : ISO VG46

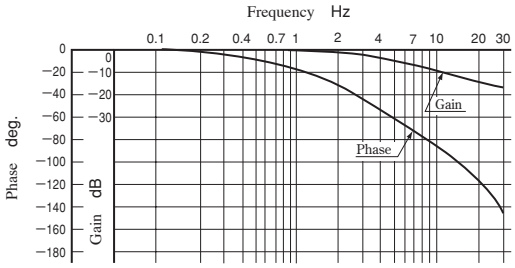


SB1119
Flow Rate : 70 L/min
Oil : ISO VG46

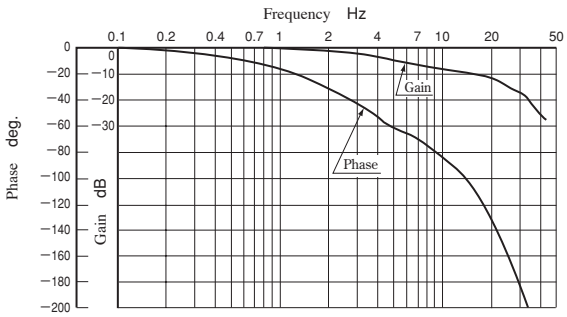


Frequency Response

Flow Rate : 30 L/min
Pressure : 7.8 ± 1.6 MPa
Trapped Oil Volume : 500 cm³
Viscosity : 30 mm²/s



Flow Rate : 70 L/min
Pressure : 3.4 ± 0.7 MPa
Trapped Oil Volume : 1035 cm³
Viscosity : 30 mm²/s

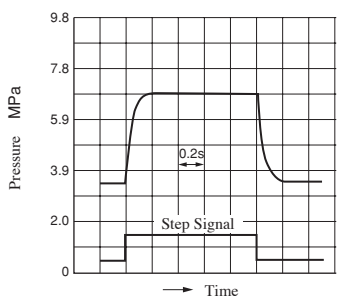


Step Response (Example)

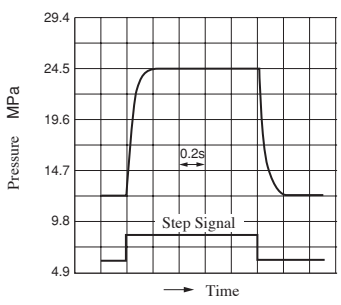
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

Flow Rate : 30 L/min
Trapped Oil Volume : 500 cm³
Viscosity : 30 mm²/s

SB1110-B

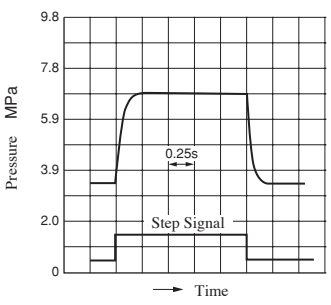


SB1110-H



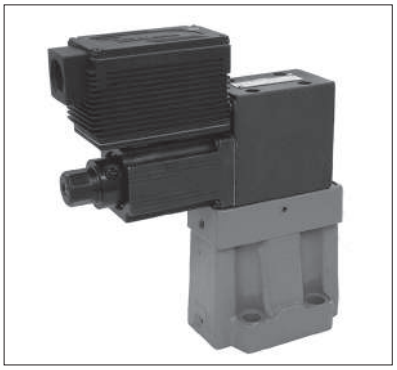
Flow Rate : 70 L/min
Trapped Oil Volume : 1035 cm³
Viscosity : 30 mm²/s

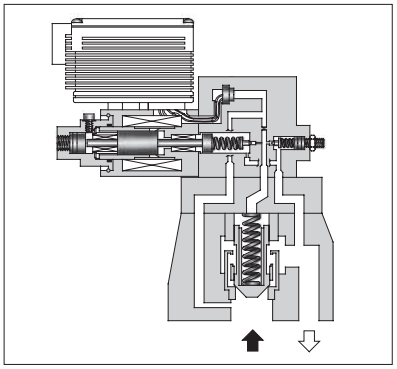
SB1190-B



Proportional Electro-Hydraulic Relief Valves

These valves, consist of a small size but high performance EH series electro-hydraulic proportional pilot relief valve and a low noise type relief valve. The valves control the system pressure proportionally through a controlled input voltage.



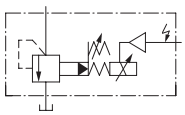


Specifications

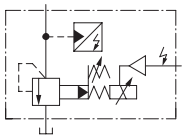
Descriptions \ Model Numbers	EHBG-03	EHBG-06	EHBG-10
Max. Operating Pres.	24.5 MPa		
Max. Flow	100 L/min	200 L/min	400 L/min
Min. Flow	3 L/min	3 L/min	3 L/min
Pressure Adjustment Range	Refer to Model Number Designation		
Coil Resistance	10 Ω		
Hysteresis	2% (1%) ★1 or less		
Repeatability	1% ★2 or less		
Frequency Response	C : 10 (22) Hz★1 H : 10 (25) Hz★1 (-90 degree)	C : 11 (22) Hz★1 H : 13 (24.5) Hz★1 (-90 degree)	C : 7 (10.5) Hz★1 H : 6 (14) Hz★1 (-90 degree)
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)		
Power Input (Max.)	28 W		
Input Signal Voltage	C : 15.7 MPa / 5 V DC H : 24.5 MPa / 5 V DC (At Max. Flow)		
Input Impedance	10 kΩ		
Alarm Signal Output (Open Collector)	Voltage: Max. 30 V DC Current: Max. 40 mA		
Pressure Signal Output	C : 5 V DC / 15.7 MPa H : 5 V DC / 24.5 MPa		
Ambient Temperature	0 - 50°C (With Circulated Air)		
Mass	Refer to Page H-17		

★1. The value in parentheses is for the closed-loop type.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

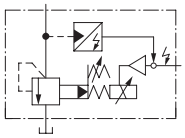
Graphic Symbols



Open-Loop Type



Open-Loop Type with Sensor



Closed-Loop Type

Model Number Designation

EHB	G	-03	-C	-S	-50
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa	Control Type	Design Number
EHB: Proportional Electro-Hydraulic Relief Valve	**G**: Sub-Plate Mounting	**03**	**C** : ★-15.7 **H** : ★-24.5	**None**: Open-Loop	**50**
		06		**S**: Open-Loop with Sensor	**50**
		10		**L** : Closed-Loop	**50**

Note1: For the lower limits of the adjustable pressure shown with an asterisk (★), see the minimum adjustable pressure characteristics on page H-19.
Note2: Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHBG-03	M12 × 40 L·····4 Pcs.
EHBG-06	M16 × 50 L·····4 Pcs.
EHBG-10	M20 × 60 L·····4 Pcs.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHBG-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
EHBG-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7
EHBG-10	BGM-10-20	1 1/4	8.4
	BGM-10X-20	1 1/2	10.3

● Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (▽)

Instructions

Piping to the Reservoir

The tank port should be connected directly to the reservoir. Be sure the end of pipe is dipped into the oil in the reservoir.

Low Flow Rates

A flow rate of 3 L/min or higher should be used to avoid preselected pressure instability.

Safety Valve

At shipment, the pressure of safety valves is set to the upper limits of the adjustable pressure ranges plus the extra as shown below.

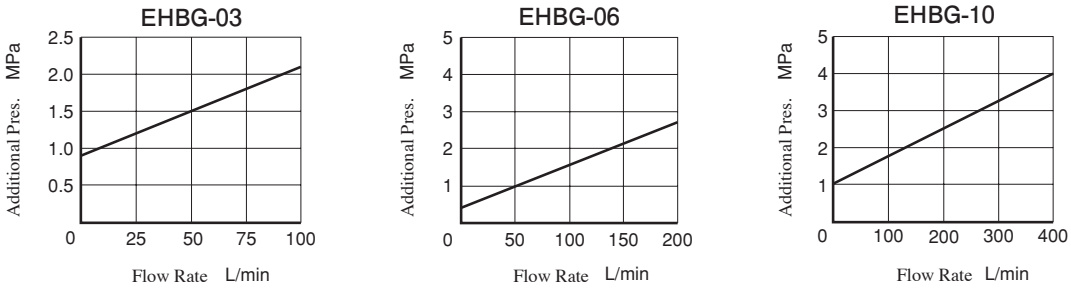
Additional Pressures for Safety Valves at Shipment

Model No.	Additional Pressures at Shipment MPa	
EHBG-03	1.5	(at 50 L/min)
EHBG-06	1.5	(at 100 L/min)
EHBG-10	2.5	(at 200 L/min)

If the operating pressure upper limit is low or a different flow rate upper limit is used, make adjustment after calculating the safety valve pressure setting from the following equation;

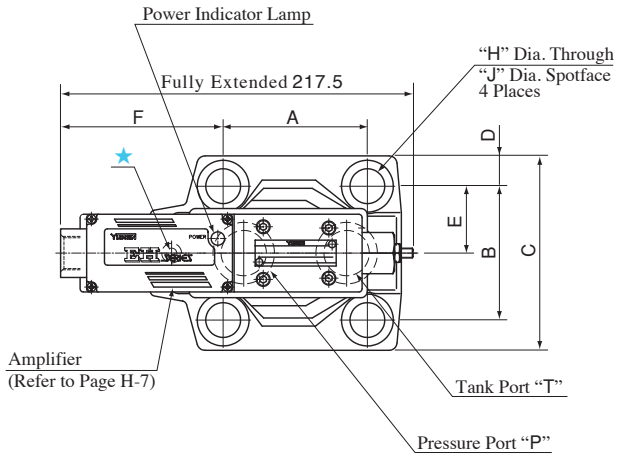
Pressure Setting = (Operating Pressure Upper Limit) + (Additional Pressure Indicated Below)

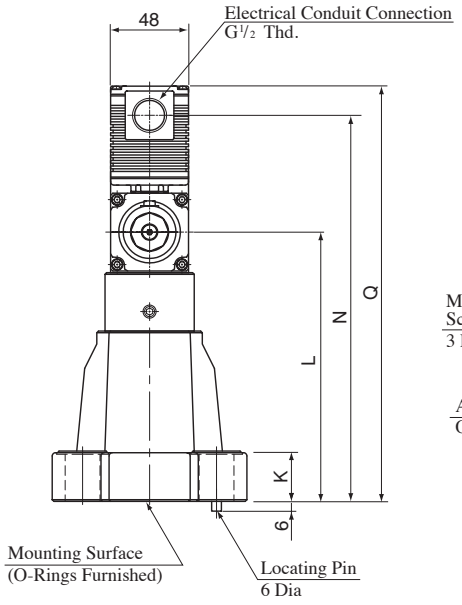
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

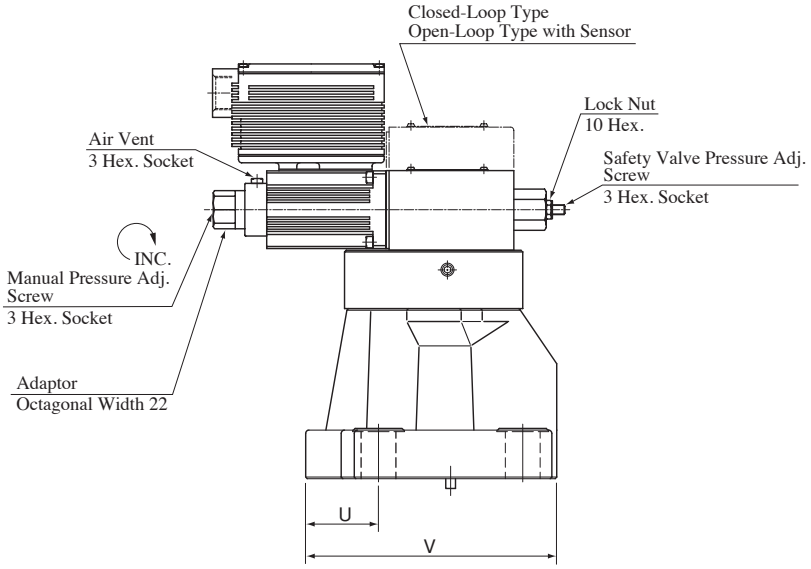


●EHBG-03/06/10-＊-50：Open-Loop Type
●EHBG-03/06/10-＊-S-50：Open-Loop Type with Sensor
●EHBG-03/06/10-＊-L-50：Closed-Loop Type

Model Numbers	Mass kg	
	Open-Loop Type	Open-Loop Type with Sensor Closed-Loop Type
EHBG-03	5.6	6.3
EHBG-06	6.8	7.5
EHBG-10	10.5	11.2







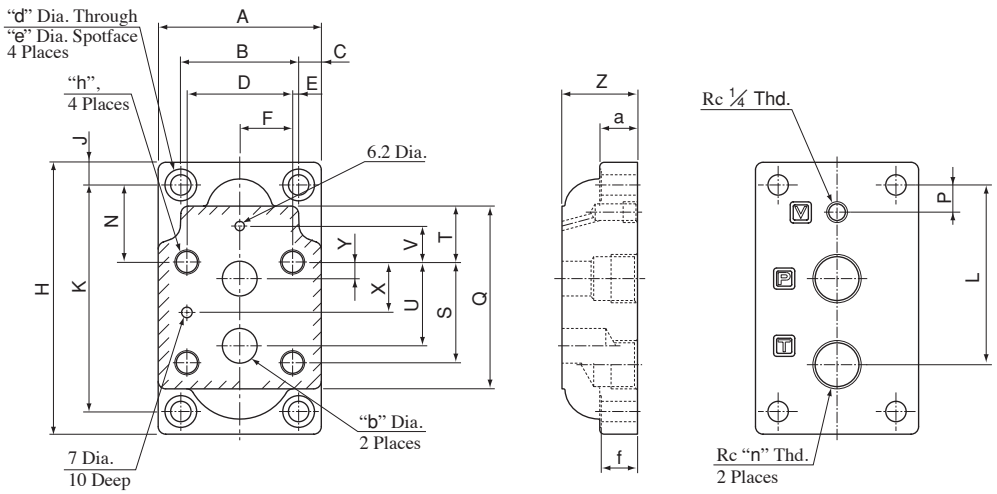
★ This port connection is not used.

Model No.	A	B	C	D	E	F	H	J	K
EHBG-03	53.8	53.8	76	11.1	26.9	119.1	13.5	21	21.5
EHBG-06	66.7	70	98	14	35	121	17.5	26	26
EHBG-10	88.9	82.6	120	18.7	41.3	102.5	21.5	32	33.5

Model No.	L	N	Q	U	V	Mounting Surface
EHBG-03	130	202	220	26.1	106	ISO 6264-AR-06-2-A
EHBG-06	130	202	220	36	122	ISO 6264-AS-08-2-A
EHBG-10	166	238	256	45	155	ISO 6264-AT-10-2-A

Sub-Plates

BGM-03, 03X
06, 06X
10, 10X



Model No.	A	B	C	D	E	F	H	J	K	L	N	P	Q	S
BGM-03	86	60	13	53.8	3.1	26.9	149	13	123	86	32	26	97	53.8
BGM-03X										95		21		
BGM-06	108	78	15	70	4	35	180	15	150	106.5	51	27.2	121	66.7
BGM-06X										119		18		
BGM-10	126	94	16	82.6	5.7	41.3	227	16	195	138.2	62	30.2	154	88.9
BGM-10X										158		17		

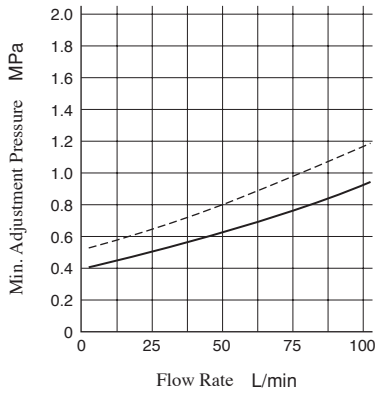
Model No.	T	U	V	X	Y	Z	a	b	d	e	f	h	n
BGM-03	19	47.4	0	22	22	32	20	14.5	11	17.5	19	M12 Thd. 20 Deep	3/8
BGM-03X						40							1/2
BGM-06	37	55.5	23.8	33.4	11	40	25	23	13.5	21	24	M16 Thd. 25 Deep	3/4
BGM-06X						50							1
BGM-10	42	76.2	31.8	44.5	12.7	50	32	28	17.5	26	31	M20 Thd. 28 Deep	1 1/4
BGM-10X						63							1 1/2

Min. Adjustment Pressure

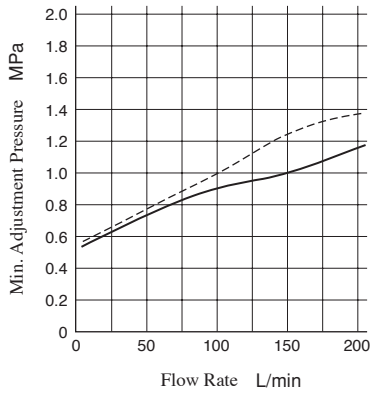
——— Open-Loop Type
- - - - - Closed-Loop Type

Viscosity : 30 mm²/s

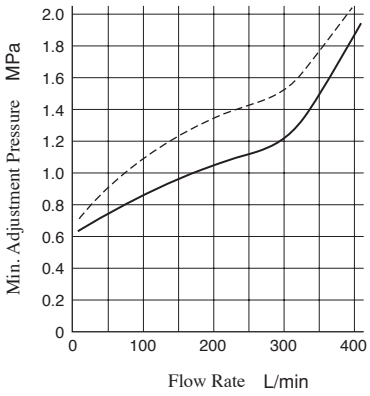
EHBG-03



EHBG-06



EHBG-10

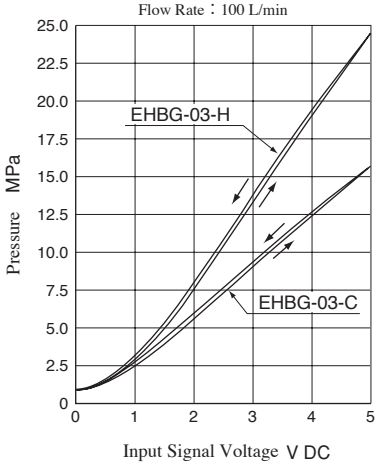


Input Signal Voltage vs. Pressure

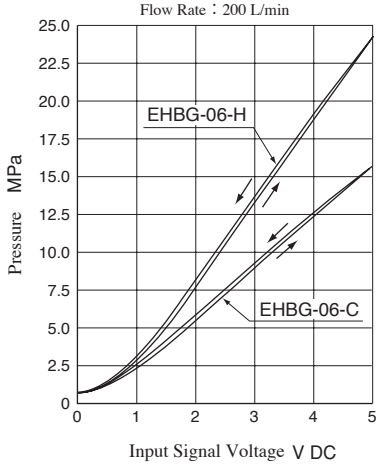
Open-Loop Type

Viscosity : 30 mm²/s

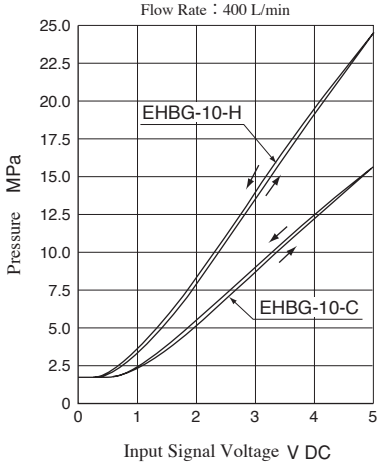
EHBG-03-＊
Flow Rate：100 L/min



EHBG-06-＊
Flow Rate：200 L/min

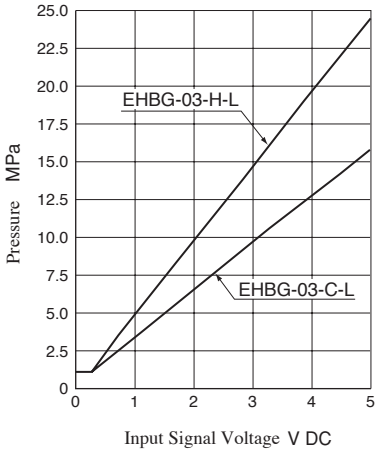


EHBG-10-＊
Flow Rate：400 L/min

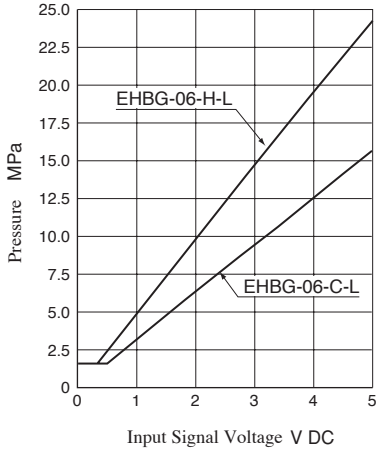


Closed-Loop Type

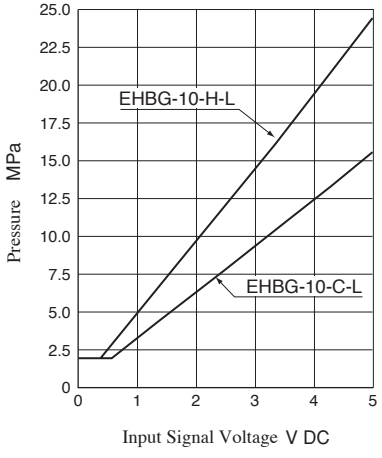
EHBG-03-＊
Flow Rate：100 L/min



EHBG-06-＊
Flow Rate：200 L/min



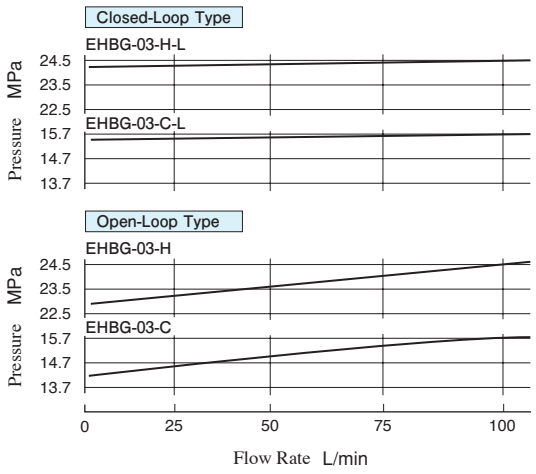
EHBG-10-＊
Flow Rate：400 L/min



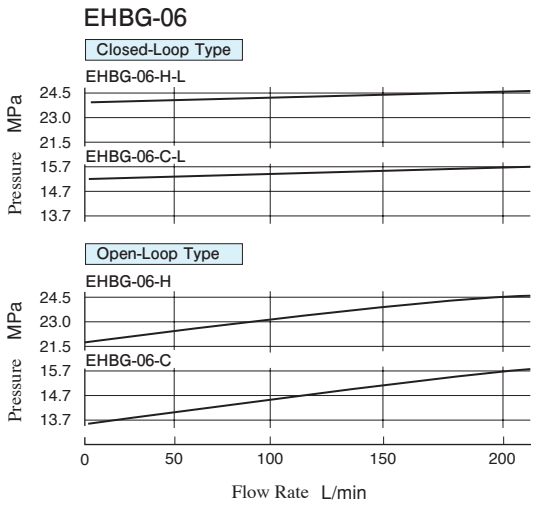
Flow Rate vs. Pressure

Viscosity : 30 mm²/s

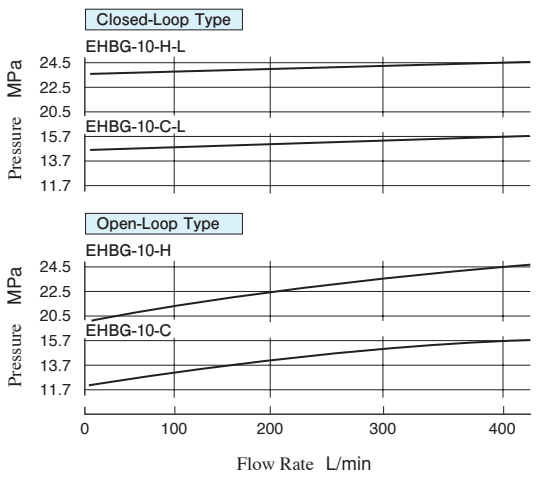
EHBG-03



EHBG-06



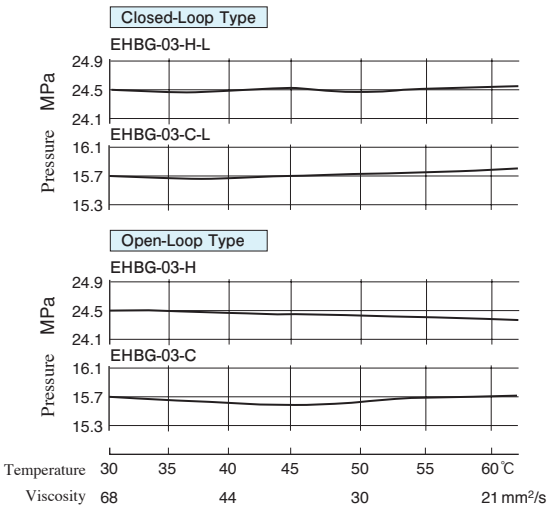
EHBG-10



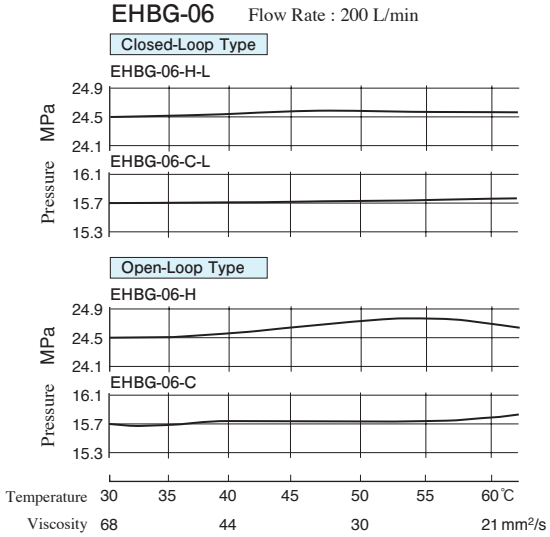
Viscosity vs. Pressure

Oil : ISO VG46 Oil

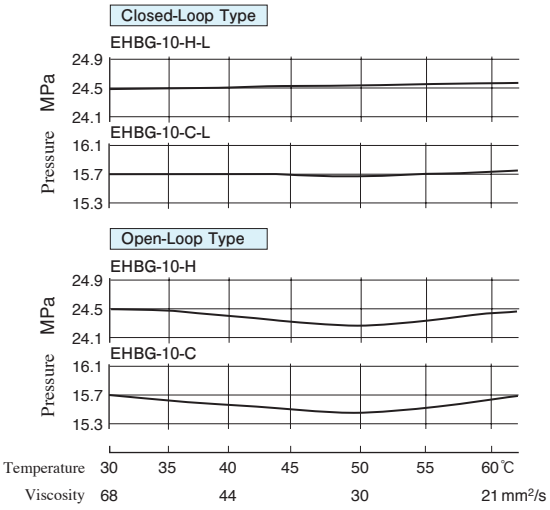
EHBG-03 Flow Rate : 100 L/min



EHBG-06 Flow Rate : 200 L/min



EHBG-10 Flow Rate : 400 L/min



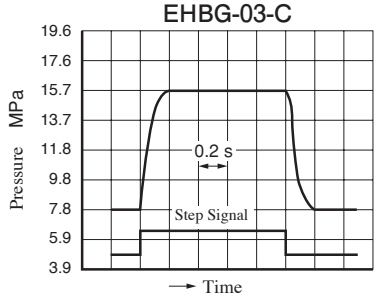
Step Response (Example)

The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combinations with other control valves.

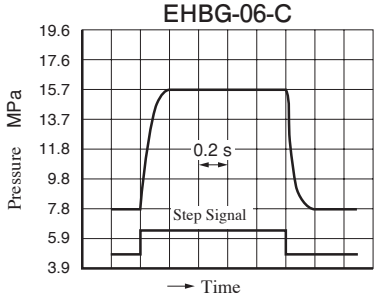
Trapped Oil Volume : 1 L
Viscosity : 30 mm²/s

Open-Loop Type

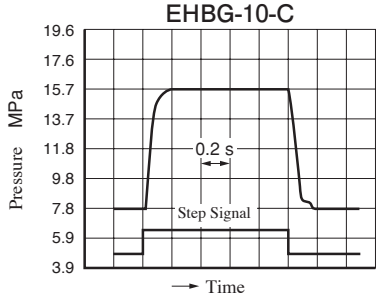
Flow Rate : 100 L/min

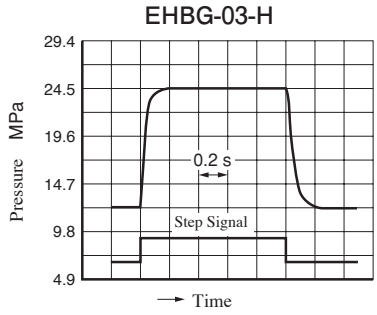


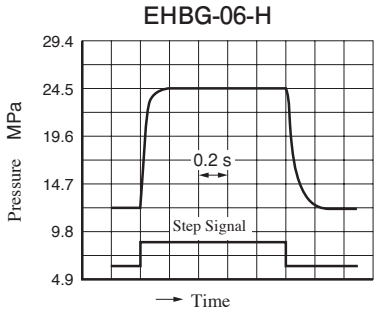
Flow Rate : 200 L/min

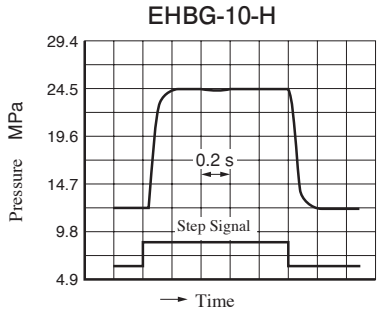


Flow Rate : 400 L/min



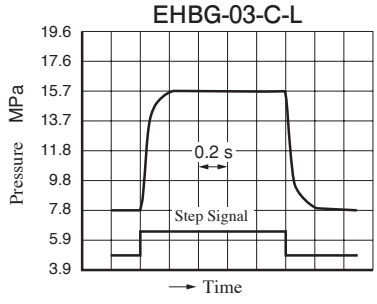




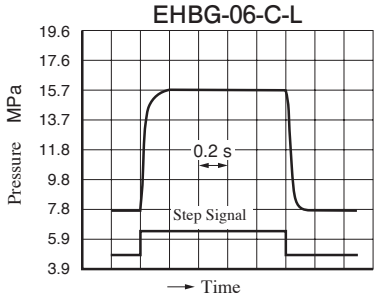


Closed-Loop Type

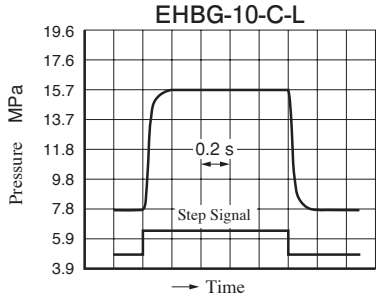
Flow Rate : 100 L/min

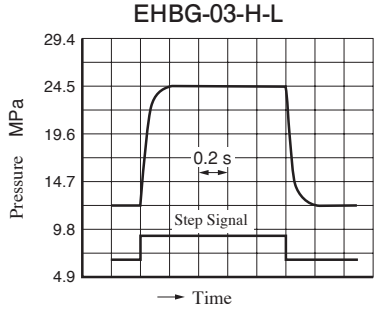


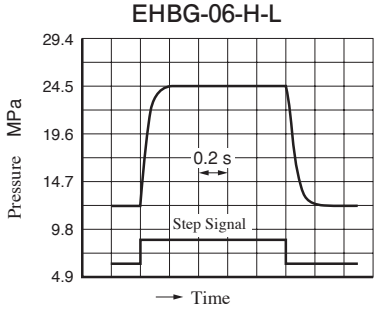
Flow Rate : 200 L/min

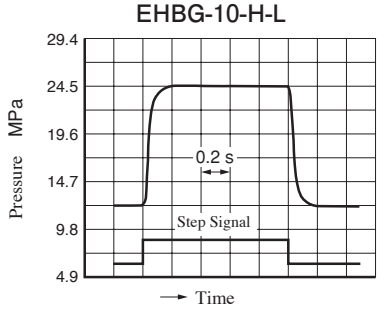


Flow Rate : 400 L/min







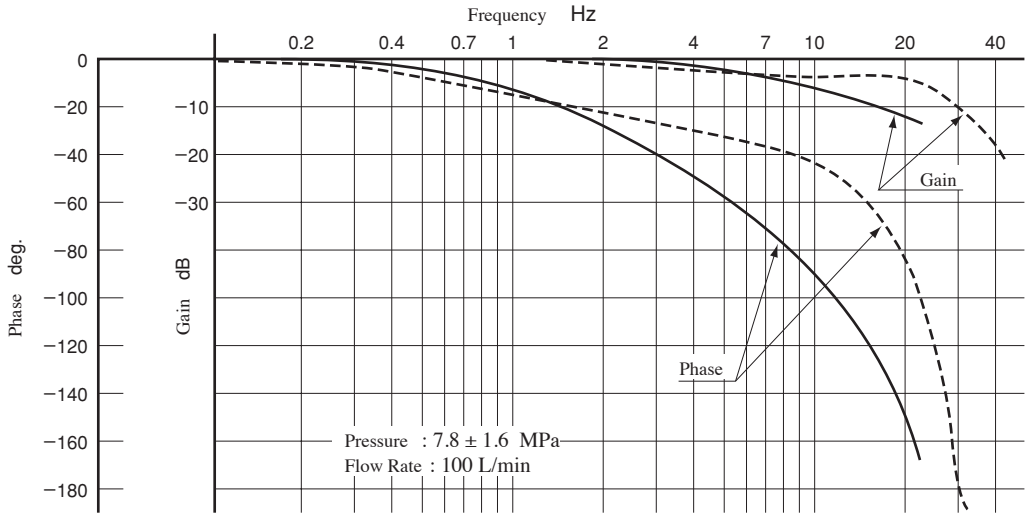


Frequency Response

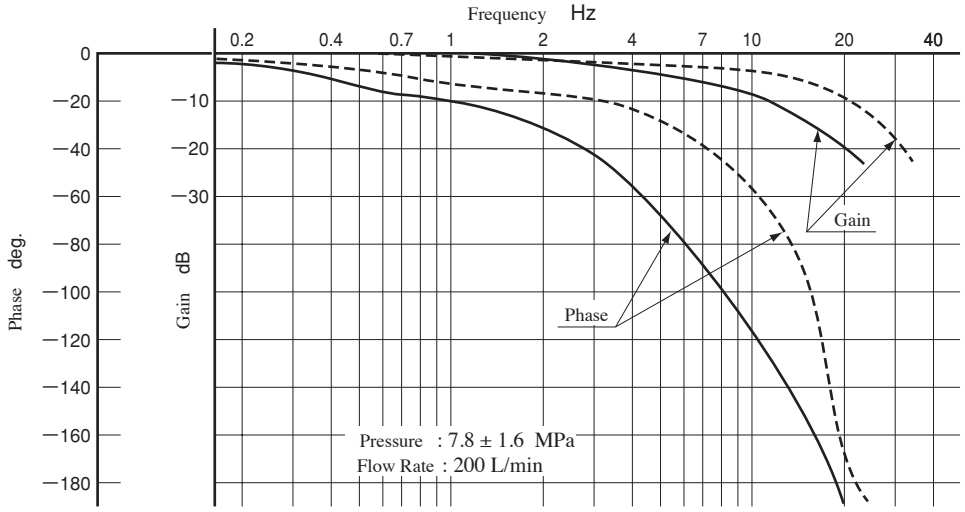
Open-Loop Type
Closed-Loop Type

Trapped Oil Volume : 1 L
Viscosity : 30 mm²/s

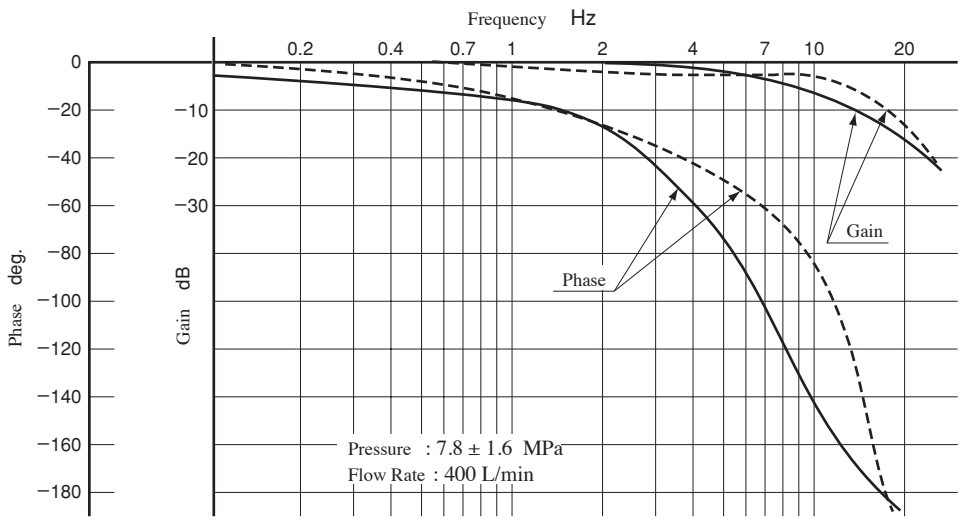
EHBG-03



EHBG-06

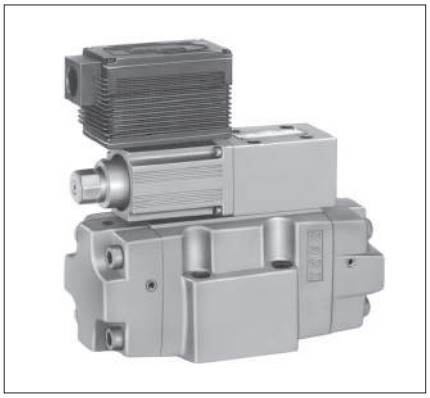


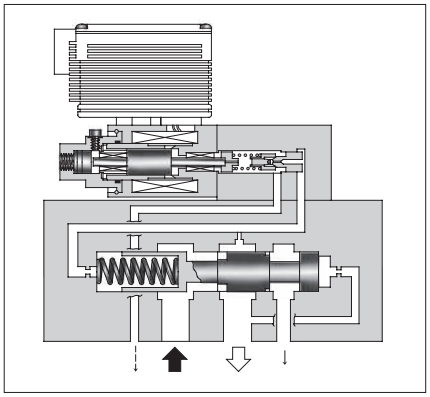
EHBG-10



Proportional Electro-Hydraulic Relieving and Reducing Valves

These valves consist of a small size but high performance electro-hydraulic proportional pilot relief valve and reducing valve with relief function. The valves control the system pressure proportionally through a controlled input voltage. Moreover, a good response speed in reducing the pressure even at a large load capacity can be obtained with the relief function of the valves.



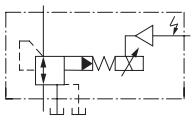


Specifications

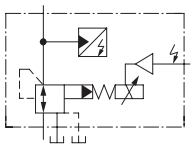
Descriptions \ Model Numbers	EHRBG-06	EHRBG-10
Max. Operating Pres. MPa	24.5	
Max. Flow L/min	100	250
Max. Relieving Flow L/min	35★1	15★1
Pressure Adjustment Range	Refer to Model Number Designation	
Coil Resistance	10 Ω	
Hysteresis	3% or less	
Repeatability	1%★2 or less	
Frequency Response	B : 4 Hz C : 3 Hz (-90 degree) H : 3 Hz	
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)	
Power Input (Max.)	28 W	
Input Signal Voltage	B : 6.9 MPa / 5 V DC C : 13.7 MPa / 5 V DC H : 20.6 MPa / 5 V DC (at Flow Rate Zero)	
Input Impedance	10 kΩ	
Pressure Signal Output	B : 5 V DC / 6.9 MPa C : 5 V DC / 13.7 MPa H : 5 V DC / 20.6 MPa	
Ambient Temperature	0 - 50°C (With Circulated Air)	
Mass	Refer to Pages H-24 & H-25	

★1. The figures shown are those obtained where the differential pressure between the secondary pressure port and tank port is 13.7 MPa.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols



Open-Loop Type



Open-Loop Type with Sensor

Model Number Designation

EHRB	G	-06	-C	-S	-50
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa	Control Type	Design Number
EHRB: Proportional Electro-Hydraulic Relieving & Reducing Valve	G: Sub-Plate Mounting	06	B: 0.8 - 6.9 C: 1.2 - 13.7 H: 1.5 - 20.6	None: Open-Loop	50
		10	B: 0.9 - 6.9 C: 1.2 - 13.7 H: 1.5 - 20.6	S: Open-Loop with Sensor	

★ Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Sub-Plate

Valve Model No.	Sub-Plate Model No.	Thread Size Rc	Mass kg
EHRBG-06	ERBGM-06-20	3/4	3.0
EHRBG-10	ERBGM-10-10	1 1/4	6.5

●Sub-plates are available. Specify sub-plates model from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

Accessories

Mounting Bolts

Model No.	Socket Head Cap Screw
EHRBG-06	M10 × 70 L·····4 Pcs.
EHRBG-10	M10 × 70 L·····6 Pcs.

Instructions

Pressure at the Primary Pressure Port

The necessary pressure at the primary pressure port should be equal to the set pressure plus 1 MPa.

Drain Port

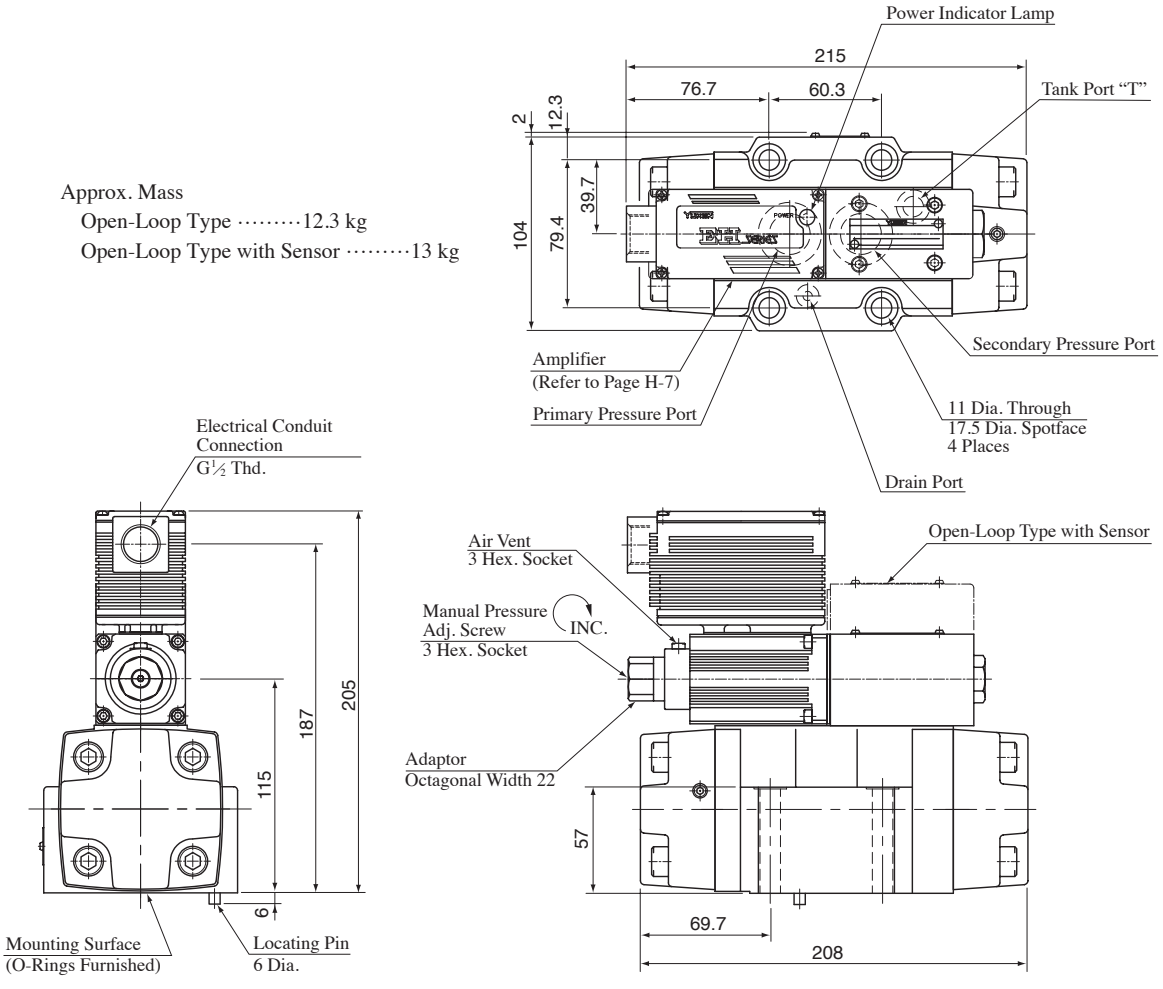
The back pressure at the drain port should be less than 0.2 MPa. The pipe from the drain port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

Load Capacity

The use of the valves at the load capacity of about 20 L is recommended. Even at the lowest, a load capacity of more than 1.4 L is required.

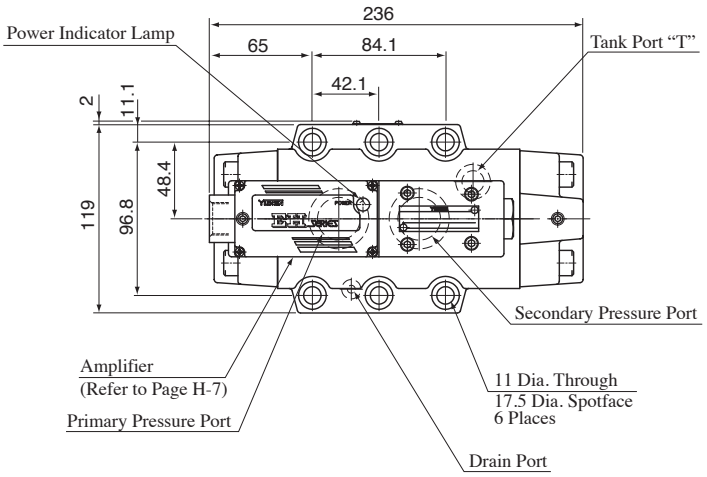
●EHRBG-06-＊-50：Open-Loop Type
●EHRBG-06-＊-S-50：Open-Loop Type with Sensor

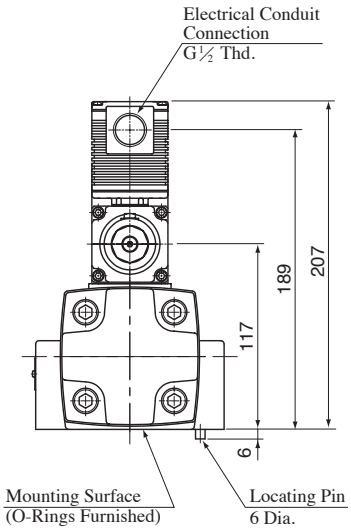
Approx. Mass
Open-Loop Type ·····12.3 kg
Open-Loop Type with Sensor ·····13 kg

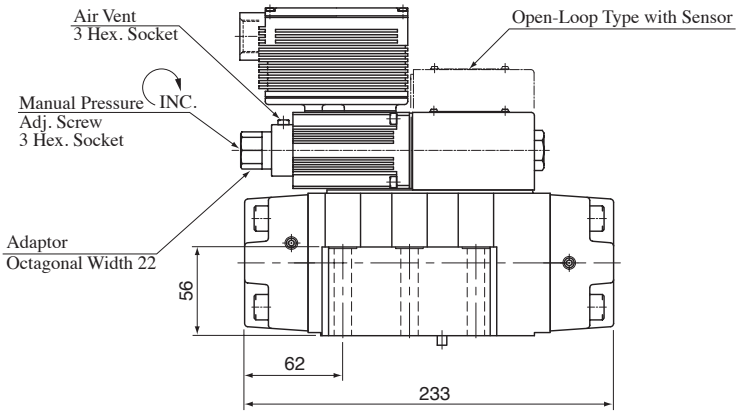


●EHRBG-10-＊-50：Open-Loop Type
●EHRBG-10-＊-S-50：Open-Loop Type with Sensor

Approx. Mass
Open-Loop Type ·····13.8 kg
Open-Loop Type with Sensor ·····14.5 kg

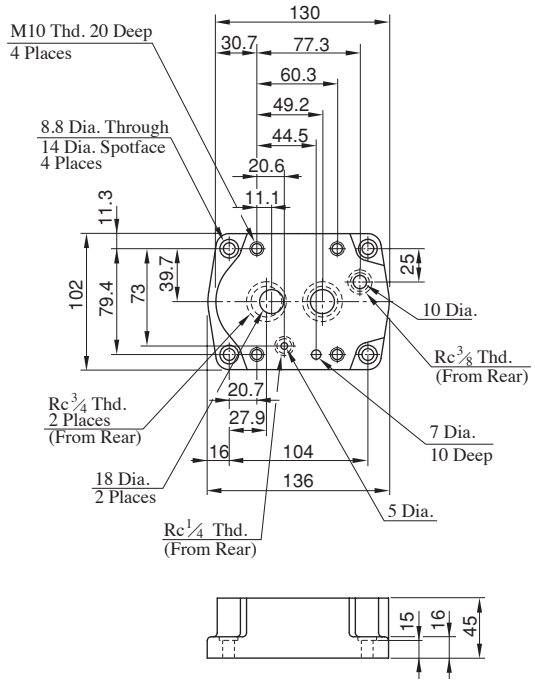




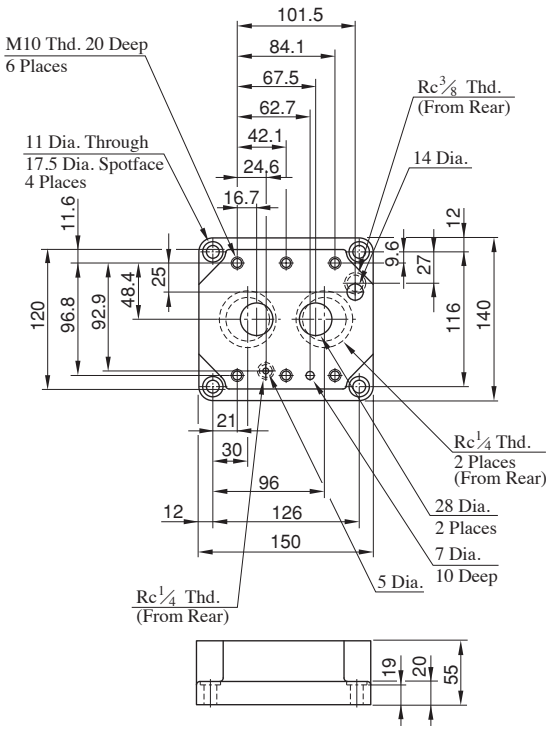


Sub-Plates

ERBGM-06



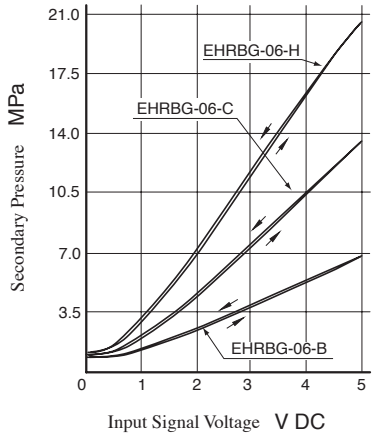
ERBGM-10



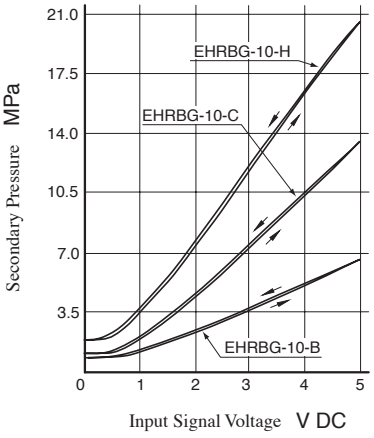
Input Signal Voltage vs. Secondary Pressure

Primary Pressure : 24.5 MPa
Viscosity : 30 mm²/s

EHRBG-06

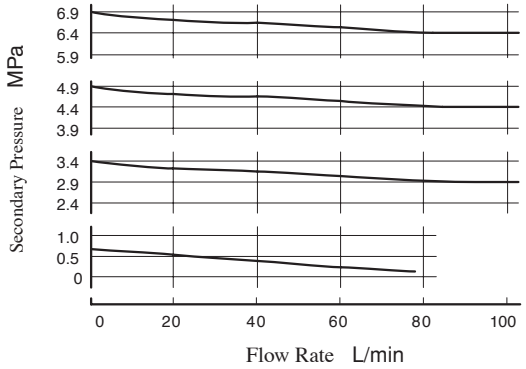


EHRBG-10

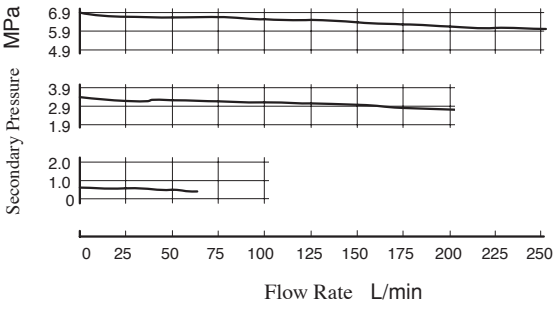


Flow vs. Secondary Pressure

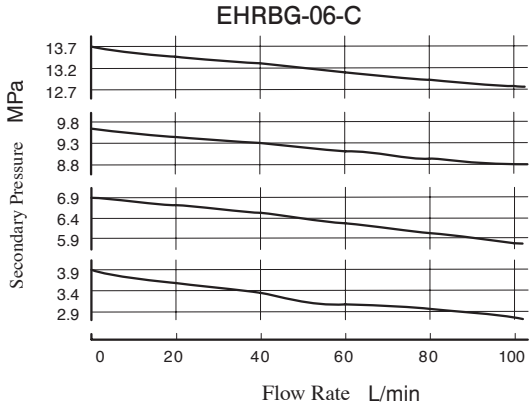
EHRBG-06-B



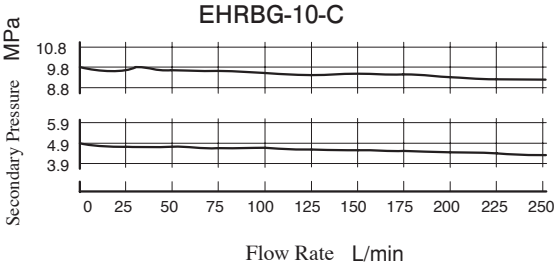
EHRBG-10-B



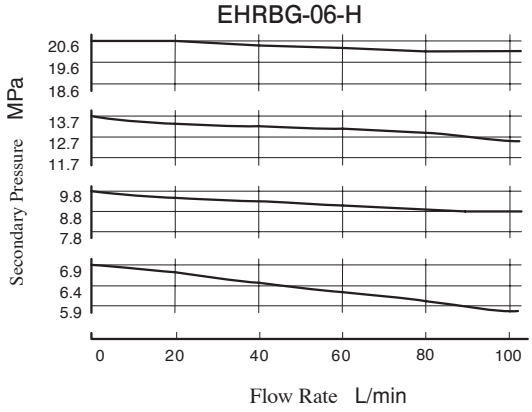
EHRBG-06-C



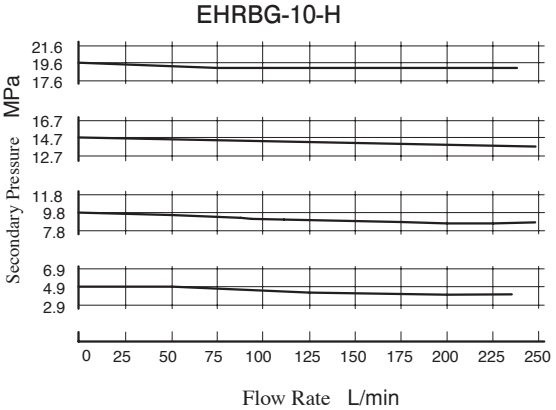
EHRBG-10-C



EHRBG-06-H

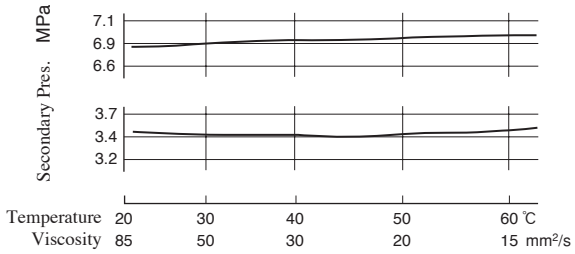


EHRBG-10-H

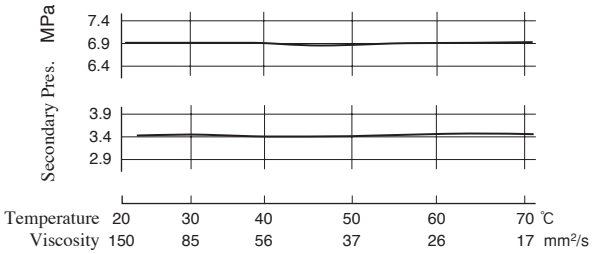


Viscosity vs. Secondary Pressure

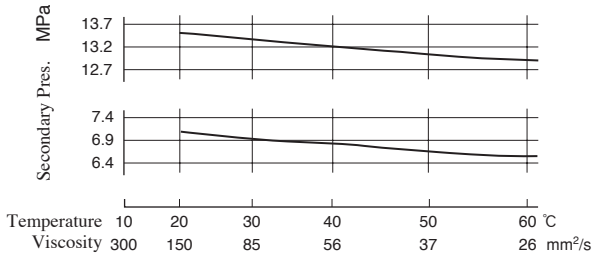
EHRBG-06-B
Oil : ISO VG 32 Oil



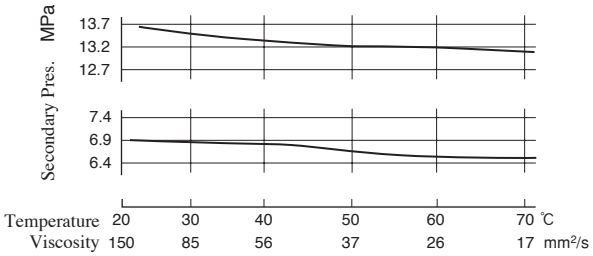
EHRBG-10-B
Oil : ISO VG 56 Oil



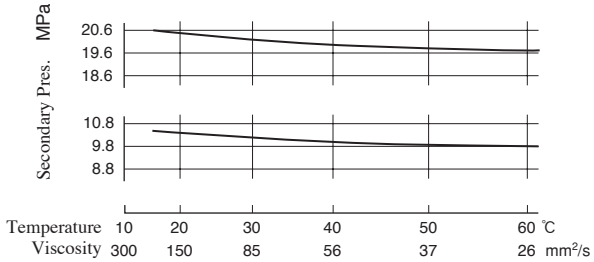
EHRBG-06-C
Oil : ISO VG 56 Oil



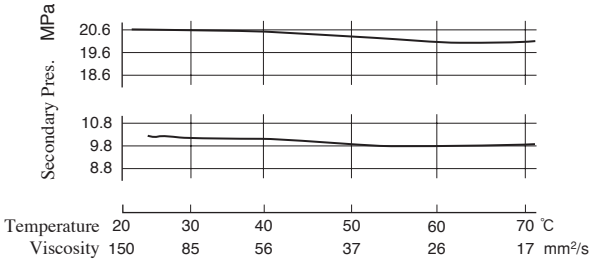
EHRBG-10-C
Oil : ISO VG 56 Oil



EHRBG-06-H
Oil : ISO VG 56 Oil



EHRBG-10-H
Oil : ISO VG 56 Oil

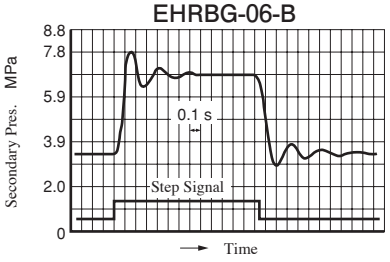


Step Response (Example)

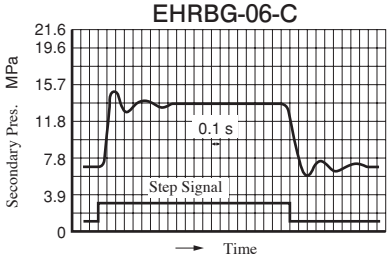
The following step response measurements are taken when the trapped oil volume is 20 L. The step response varies by trapped oil volume.

Primary Pressure : 24.5 MPa
Trapped Oil Volume : 20 L
Viscosity : 30 mm²/s

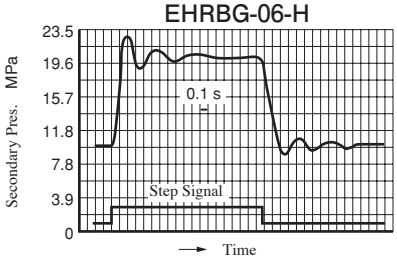
EHRBG-06-B



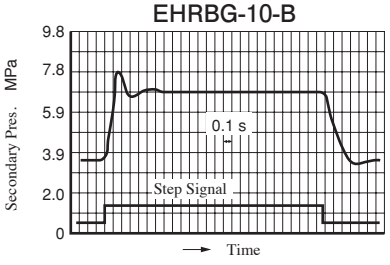
EHRBG-06-C



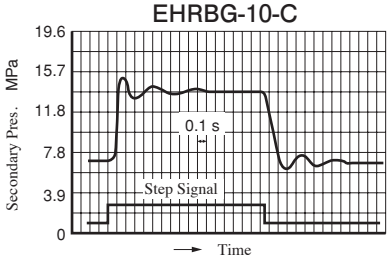
EHRBG-06-H



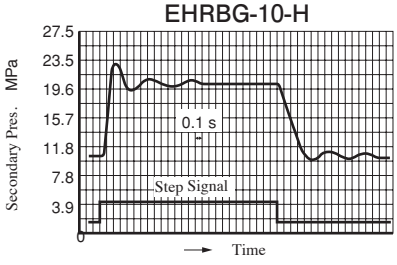
EHRBG-10-B



EHRBG-10-C



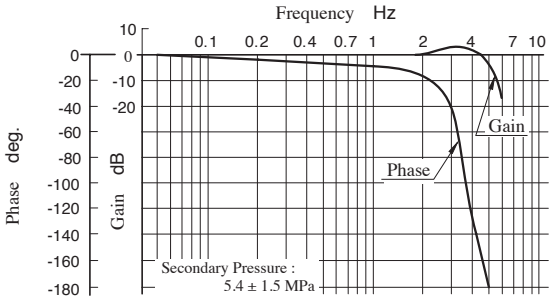
EHRBG-10-H



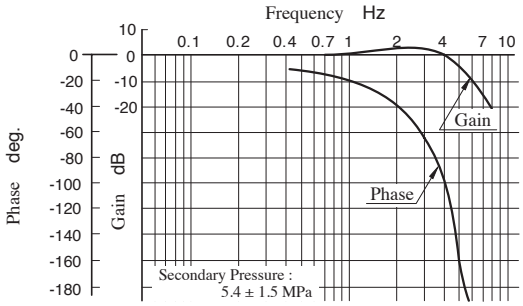
Frequency Response

Primary Pressure : 24.5 MPa
Trapped Oil Volume : 20 L
Viscosity : 30 mm²/s

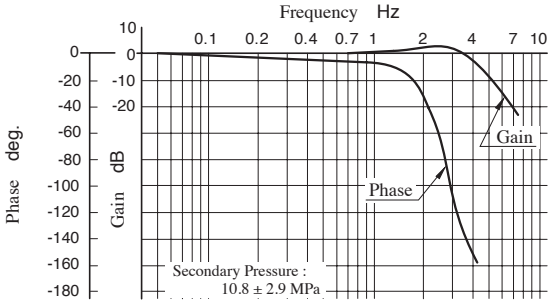
EHRBG-06-B



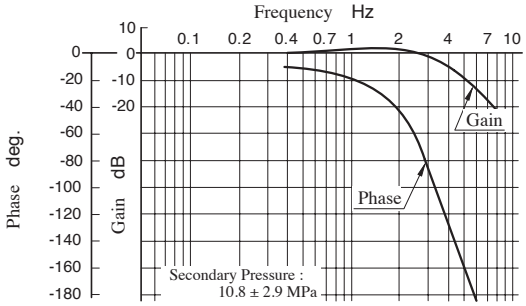
EHRBG-10-B



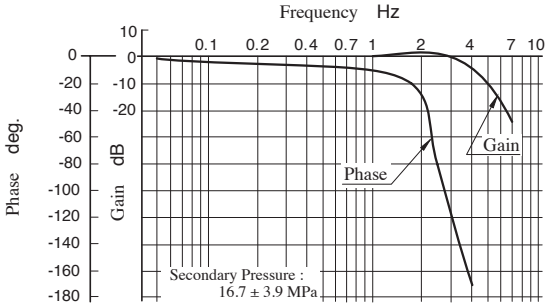
EHRBG-06-C



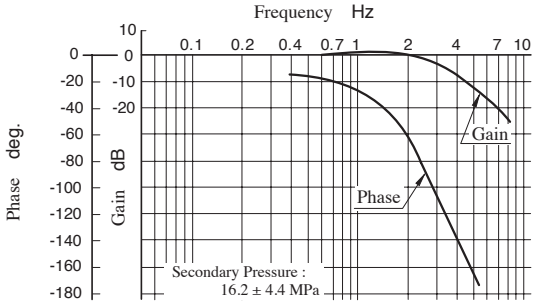
EHRBG-10-C



EHRBG-06-H

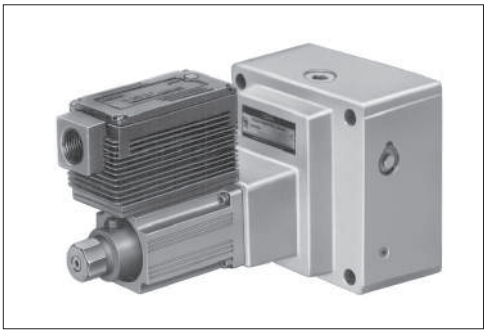


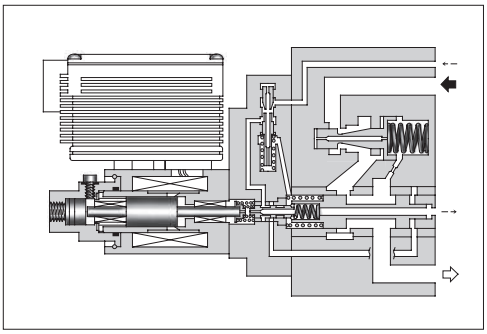
EHRBG-10-H



Proportional Electro-Hydraulic Flow Control (and Check) Valves

The system flow rate can be controlled remotely as desired by regulating input voltage. Further, since pressure and temperature compensation functions are provided, the preselected flow rate is not be affected by pressure (load) or temperature (fluid viscosity).





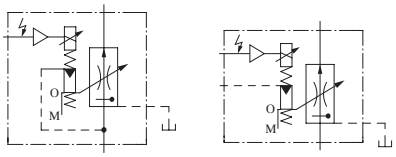
Specifications

Descriptions \ Model Numbers		EHF*G-03-60 / 125	EHF*G-06-250
Max. Operating Pres. MPa		20.6	24.5
Max. Metered Flow L/min		**60**: 60 **125**: 125	250
Min. Metered Flow L/min		1	2.5
Min. Differential Pressure ★1 MPa		1.0	1.0
Free Flow (Only with Check Valve) L/min		130	280
Pilot Flow L/min	at Normal	0.5	1
	at Transition	2.6	4
Min. Pilot Pressure MPa		1.0	1.5
Frequency Response		12 Hz (-90 degree)	
Hysteresis		3% or less	
Repeatability		1% ★2 or less	
Coil Resistance		10 Ω	
Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
Power Input (Max.)		28 W	
Input Signal Voltage		Max. Metered Flow / 5V DC	
Input Impedance		10 kΩ	
Ambient Temperature		0 - 50°C (With Circulated Air)	
Mass		10 kg	25 kg

★1. Minimum differential pressure means fine pressure compensation at inlet and outlet port.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

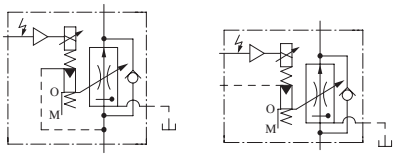
Graphic Symbols

● EHFG



Internal Pilot　　External Pilot

● EHFCG



Internal Pilot　　External Pilot

Model Number Designation

EHF	G	-03	-60	-E	-50
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pilot Connection	Design Number
EHF: Proportional Electro-Hydraulic Flow Control Valve **EHFC**: Proportional Electro-Hydraulic Flow Control and Check Valve	**G**: Sub-Plate Mounting	**03**	**60**: 60 **125**: 125	**None**: Internal Pilot **E**: External Pilot	**50**
		06	**250**: 250		**50**

★ Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHFG EHFCG -03	M10 × 80 L·····4 Pcs.
EHFG EHFCG -06	M16 × 130 L·····4 Pcs.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHFG EHFCG -03	EFGM-03Y-30	3/4	5.7
	EFGM-03Z-30	1	5.6
EHFG EHFCG -06	EFGM-06X-30	1	12.5
	EFGM-06Y-30	1 1/4	16.0

●Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa.

Pilot Type Selection

This valve is constructed so as to operate at a predetermined pilot pressure. For the 03, a pilot pressure of 1 MPa or higher is required. For the 06, the required pilot pressure is 1.5 MPa or higher.

To obtain such a required pilot pressure, select the pilot type according to the circuit examples on the right.

①/②

Use the external pilot type (type symbol: E) whether a meter-in or meter-out circuit is employed.

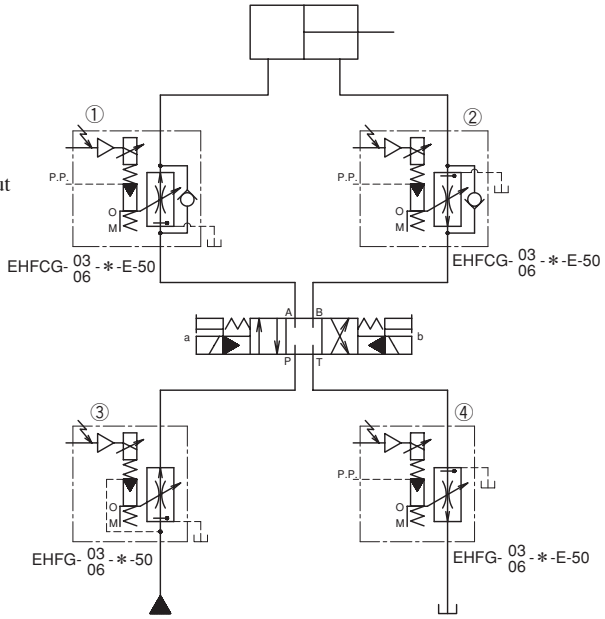
③

Use the internal pillot type (type symbol: None).

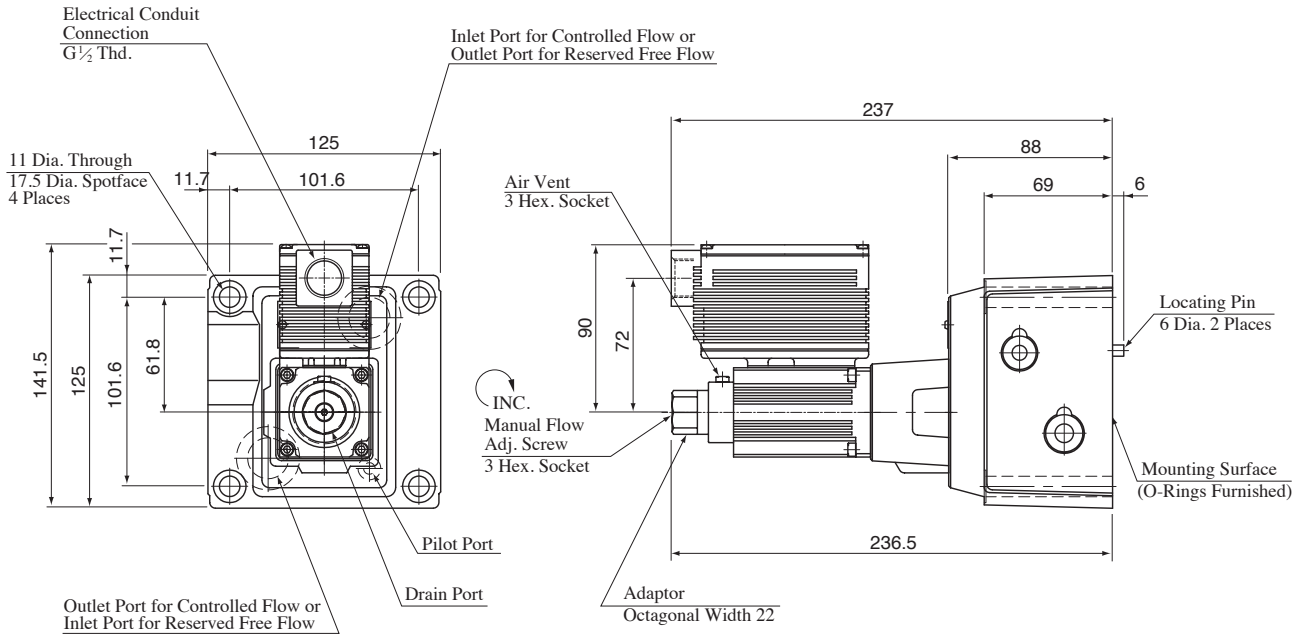
④

Use the external pilot type (type symbol: E).

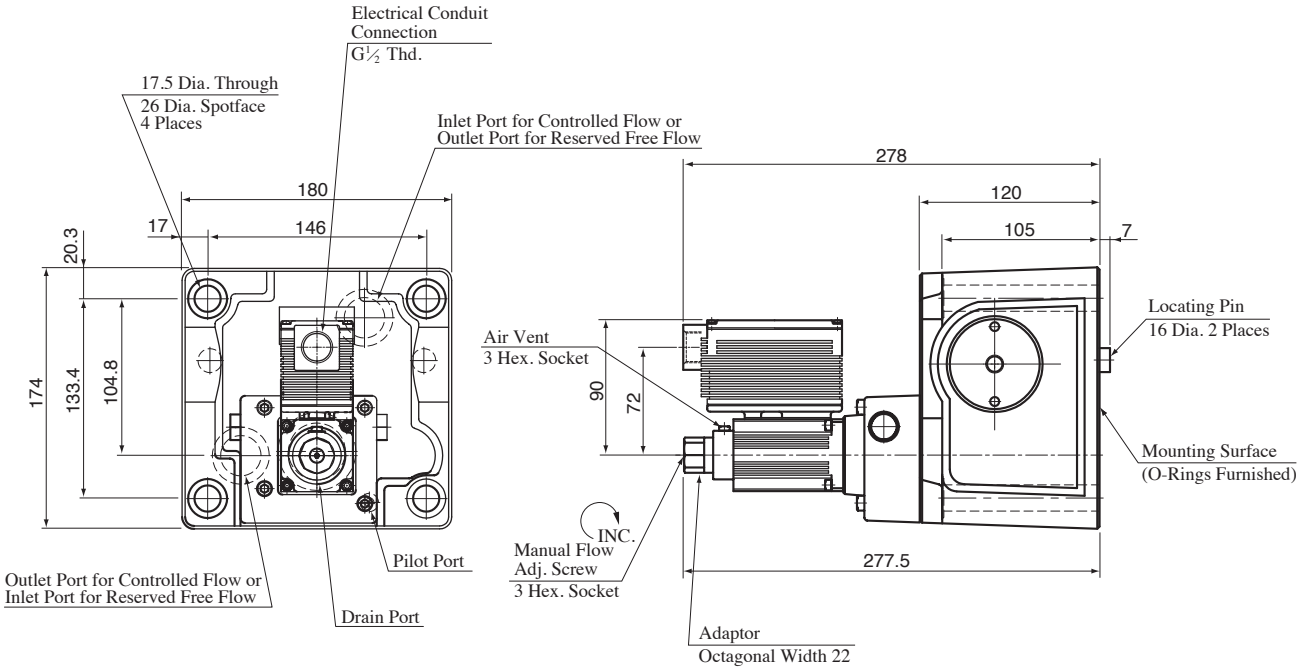
【Example of Circuit】



EHFG EHFCG-03

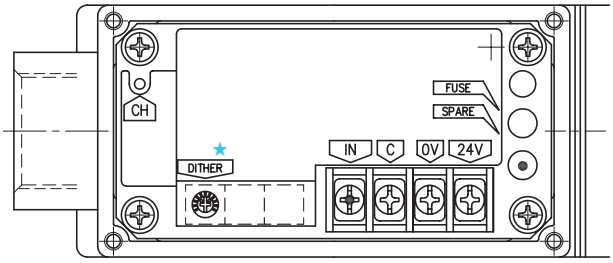


EHFG EHFCG-06



Detail of Amplifier

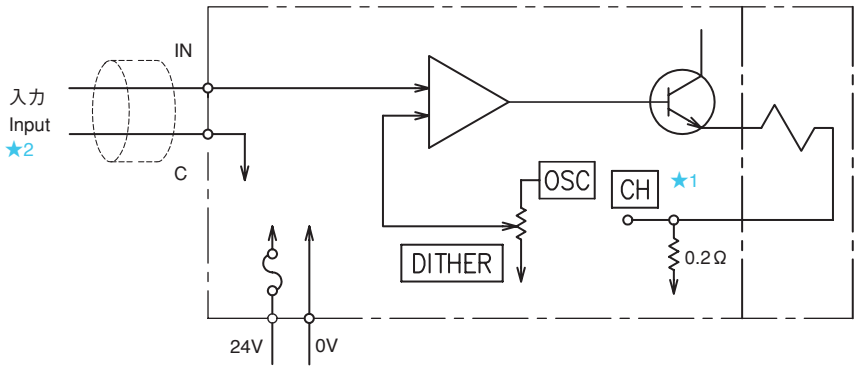
Connecting Terminals



★DITHER
Use as it is since they are factory preset to the optimum position.
(Do not touch as it is in normal condition.)

Terminal	Name
IN	Input Signal (+)
C	Input Signal (COM)
0 V	Power Supply
24 V	
CH	Output Current Check (to C)

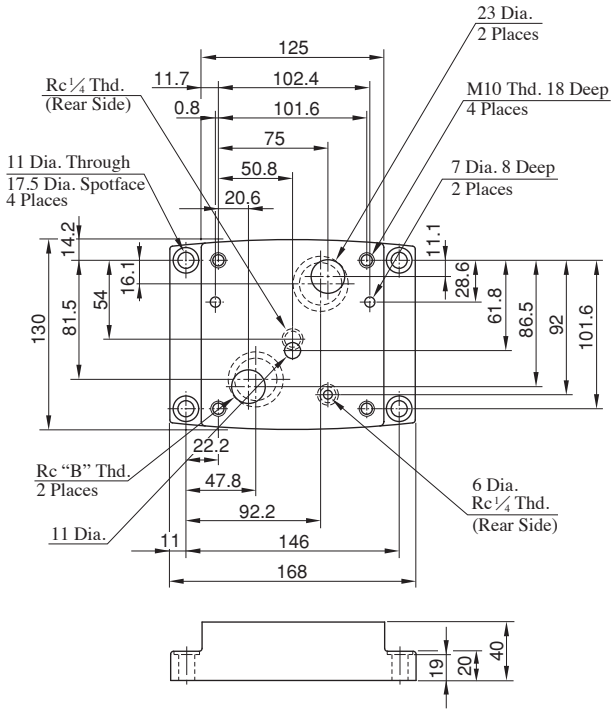
Circuit Schematic



★1. For “CH” terminal, external instruments should have input impedance of more than 10 kΩ.
★2. Use shielded cable for “Input” connection. The ground of the shielded cable must be connected to input signal side.

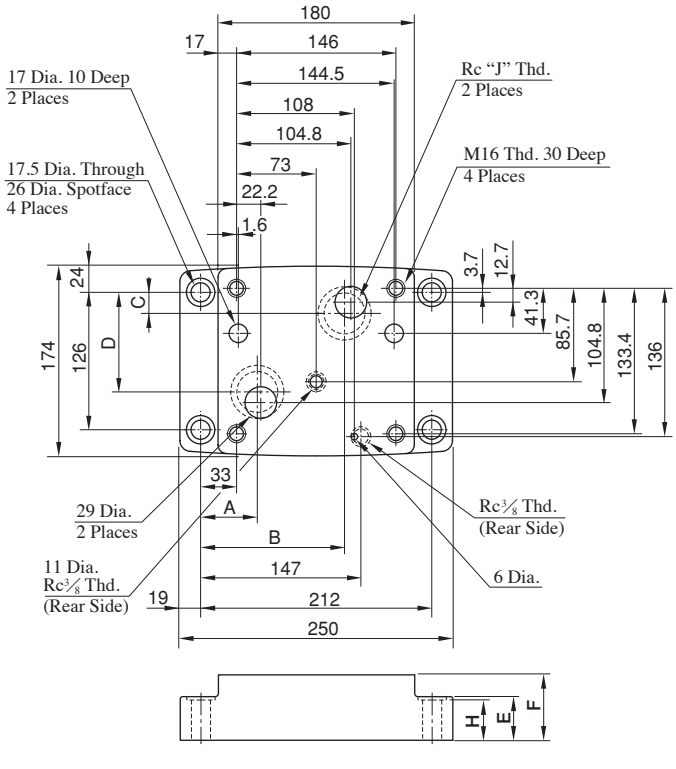
Sub-Plates

EFGM-03Y, 03Z



Sub-Plate Model Numbers	B
EFGM-03Y-30	3/4
EFGM-03Z-30	1

EFGM-06X, 06Y

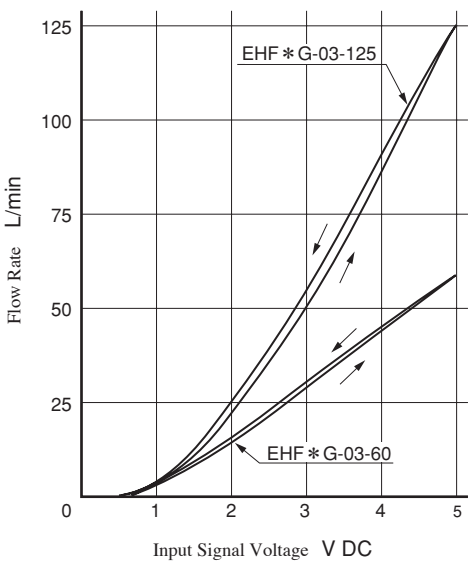


Sub-Plate Model Numbers	A	B	C	D	E	F	H	J
EFGM-06X-30	55.2	137.8	14.3	101.1	35	45	34	1
EFGM-06Y-30	52	132	19.3	91.3	40	60	39	1 1/4

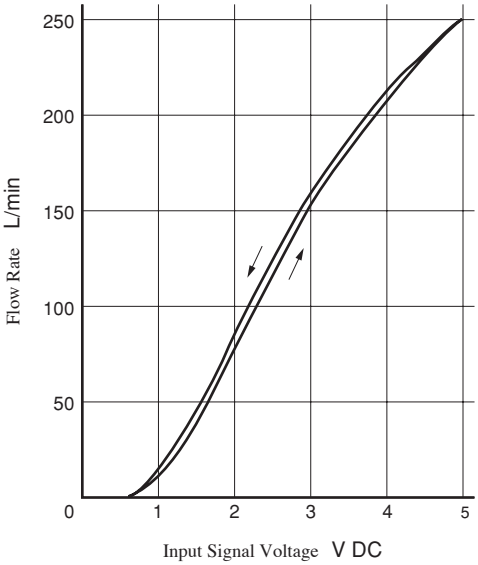
Input Signal Voltage vs. Flow Rate

Viscosity : 30 mm²/s

EHFG
EHFCG-03

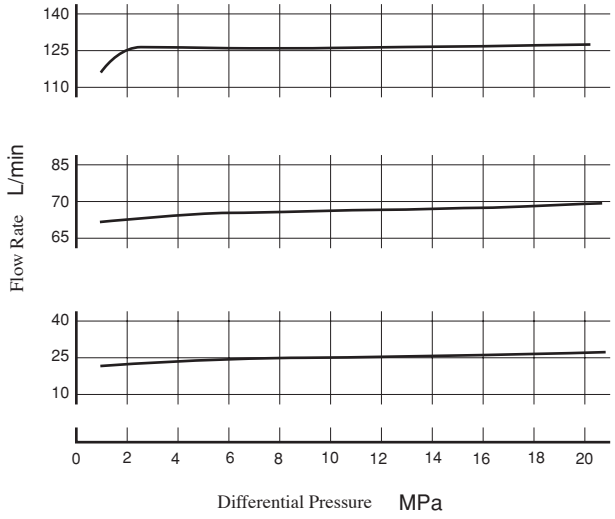


EHFG
EHFCG-06

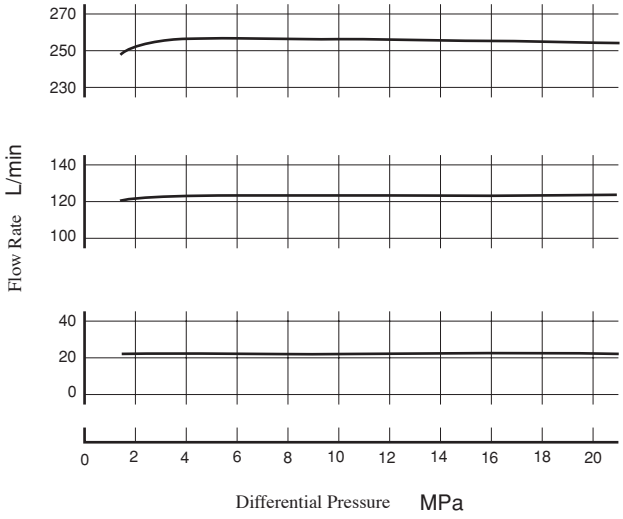


Differential Pressure vs. Flow Rate

EHFG
EHFCG-03



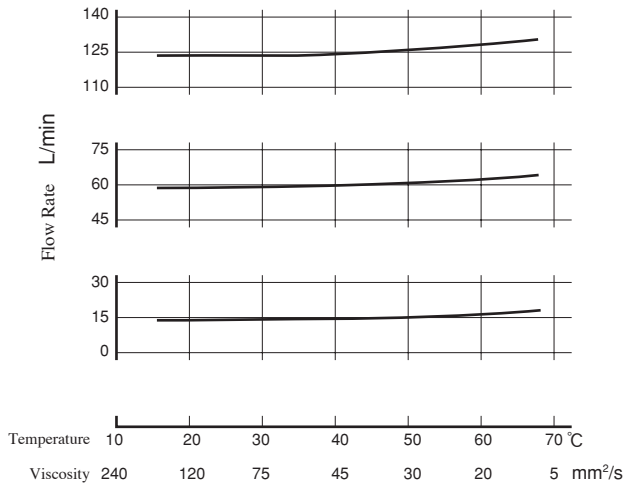
EHFG
EHFCG-06



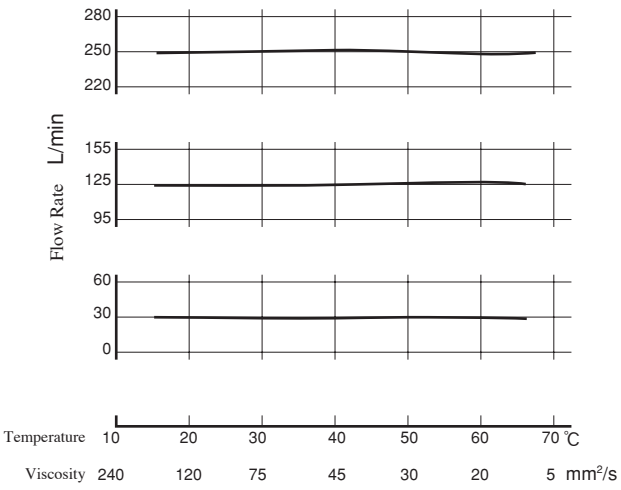
Viscosity vs. Flow Rate

Oil : ISO VG 46 Oil

EHFG
EHFCG-03



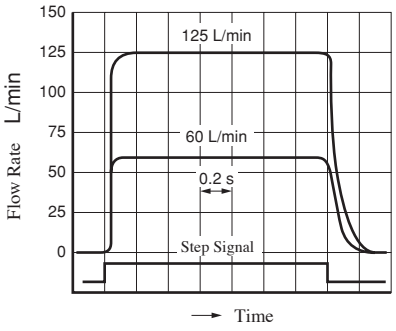
EHFG
EHFCG-06



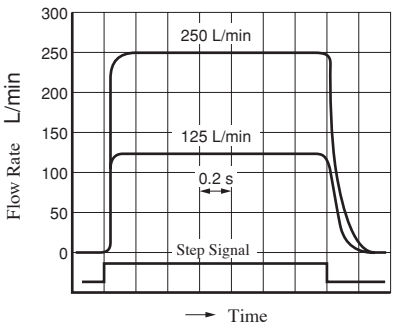
Step Response (Example)

The step responses right are those obtained when the valve itself is tested independently. The step responses may differ from them when the valve is used in combination with other control valves.

EHFG EHFCG-03



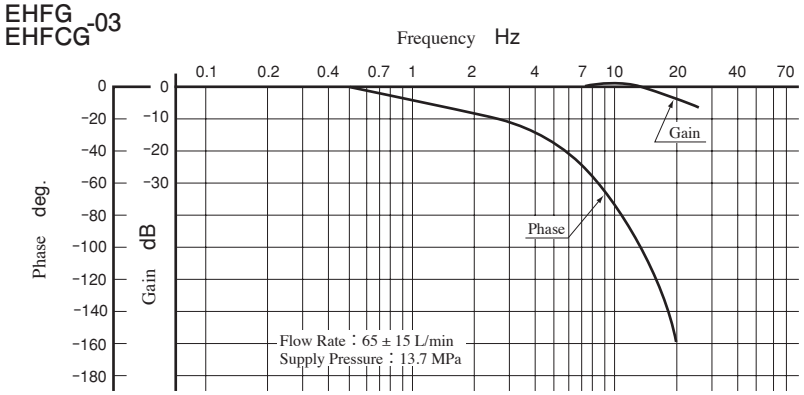
EHFG EHFCG-06



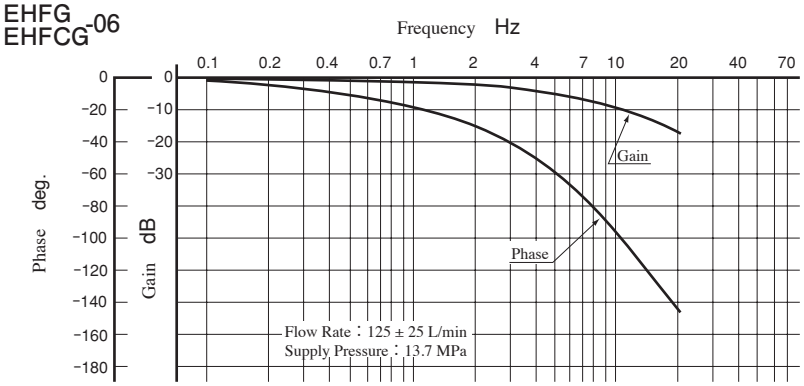
Frequency Response

Trapped Oil Volume : 1 L
Viscosity : 30 mm 2/s

EHFG EHFCG-03

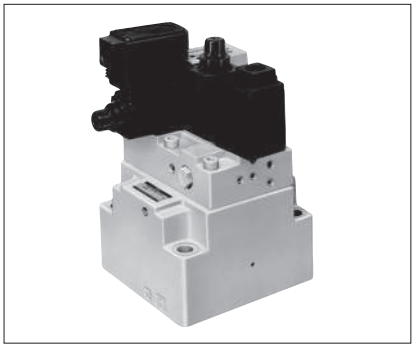


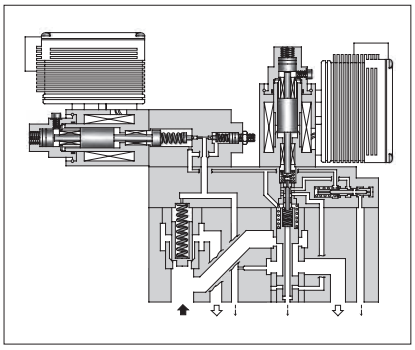
EHFG EHFCG-06



Proportional Electro-Hydraulic Flow Control and Relief Valves

These are proportional electro-hydraulic flow control valves having functions for controlling the direct electric current of meter-in type and for pressure control.
They are energy-saving valves for supplying the minimum pressure and flow required to operate actuators.



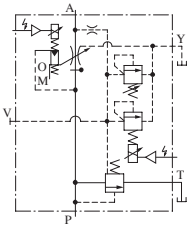


Specifications

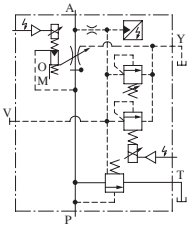
Descriptions \ Model Numbers			EHFBG-03-*	EHFBG-06-250	EHFBG-10-500
Max. Operating Pressure MPa			24.5	24.5	24.5
Max. Flow L/min			60 : 60 125 : 125	250	500
Metered Flow Capacity L/min			60 : 1-60 125 : 1-125	2.5-250	5-500
Min. Pilot Pressure MPa			1.5	1.5	1.5
Pilot Flow L/min		at Normal	1	1	1
		at Transition	3	4	6
Differential Pressure MPa			0.6	0.7	0.9
Flow Controls	Hysteresis		3% or less		
	Repeatability		1%★ or less		
	Input Signal Voltage		Max. Flow / 5 V DC		
	Coil Resistance		10 Ω		
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)		
	Input Impedance		10 kΩ		
	Power Input (Max.)		28 W		
Pressure Controls	Pres. Adj. Range MPa	Adj. Range:C	1.2-15.7	1.4-15.7	1.5-15.7
		Adj. Range:H	1.4-24.5	1.4-24.5	1.5-24.5
	Hysteresis		2% or less		
	Repeatability		1%★ or less		
	Coil Resistance		10 Ω		
	Input Signal Voltage		Max. Adj. Pres. / 5 V DC		
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)		
	Input Impedance		10 kΩ		
	Power Input (Max.)		28 W		
Output Signal (Sensor Monitor)			C : 5 V DC / 15.7 MPa H : 5 V DC / 24.5 MPa		
Ambient Temperature			0 - 50°C (With Circulated Air)		
Mass			Refer to Pages H-38 to H-40		

★1. The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.
★2. The specifications for pressure controls is applied to models with pilot relief valve. (Ex. EHFBG-03-125-C-*-50)
★3. Pressure adjustment range of the valves without pilot relief valves (Ex. EHFBG-03-125-*-50) is from a minimum adjustable pressure to 25 MPa.

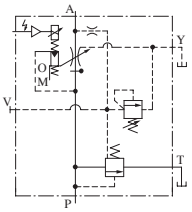
Graphic Symbols



Models with Proportional Pilot Relief Valve



Models with Proportional Pilot Relief Valve and Sensor



Models without Proportional Pilot Relief Valve

External Pilot Pres. Connection

Model Number Designation

EHFB	G	-03	-60	-C	-E	-S	-50
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pilot Relief Valve Pres. Adj. Range	Pilot Connection of Flow Control	Pressure Controls	Design Number
EHFB: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G**: Sub-Plate Mounting	**03**	**60** **125**	**None**: Without Proportional Pilot Relief Valve **C, H**: See Specifications	**None**: Internal Pilot **E**: External Pilot	**None**: Open-Loop **S**: Open-Loop with Sensor	**50**
		06	**250**				**50**
		10	**500**				**50**

★Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHFBG-03-60/125	M10 × 65 L ····· 4 Pcs.
EHFBG-06-250	M16 × 100 L ····· 4 Pcs.
EHFBG-10-500	M20 × 130 L ····· 4 Pcs.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHFBG-03	EFBGM-03Y-20	$^3/_4$	6
	EFBGM-03Z-20	1	6
EHFBG-06	EFBGM-06X-20	1	12.5
	EFBGM-06Y-20	$1^1/_4$	16
EHFBG-10	EFBGM-10Y-20	$1^1/_2$, 2Pipe Flange Mtg.	37

- Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. ($\overset{1.6}{\nabla}$)
- EFBGM-10Y is special type sub-plate to be used with pipe flange. When ordering EFBGM-10Y specify pipe flange in addition to EFBGM-10Y. Refer to Engineering Information Catalogue.

Instructions

Drain Back Pressure

Check that the drain back pressure does not exceed 0.2 MPa.

When Relief Valve Passing Flow Rate is Low in Pressure Control State

To avoid preselected pressure instability, use a passing flow rate of 15 L/min or higher.

Further, check that the tank-side back pressure does not exceed 0.5 MPa.

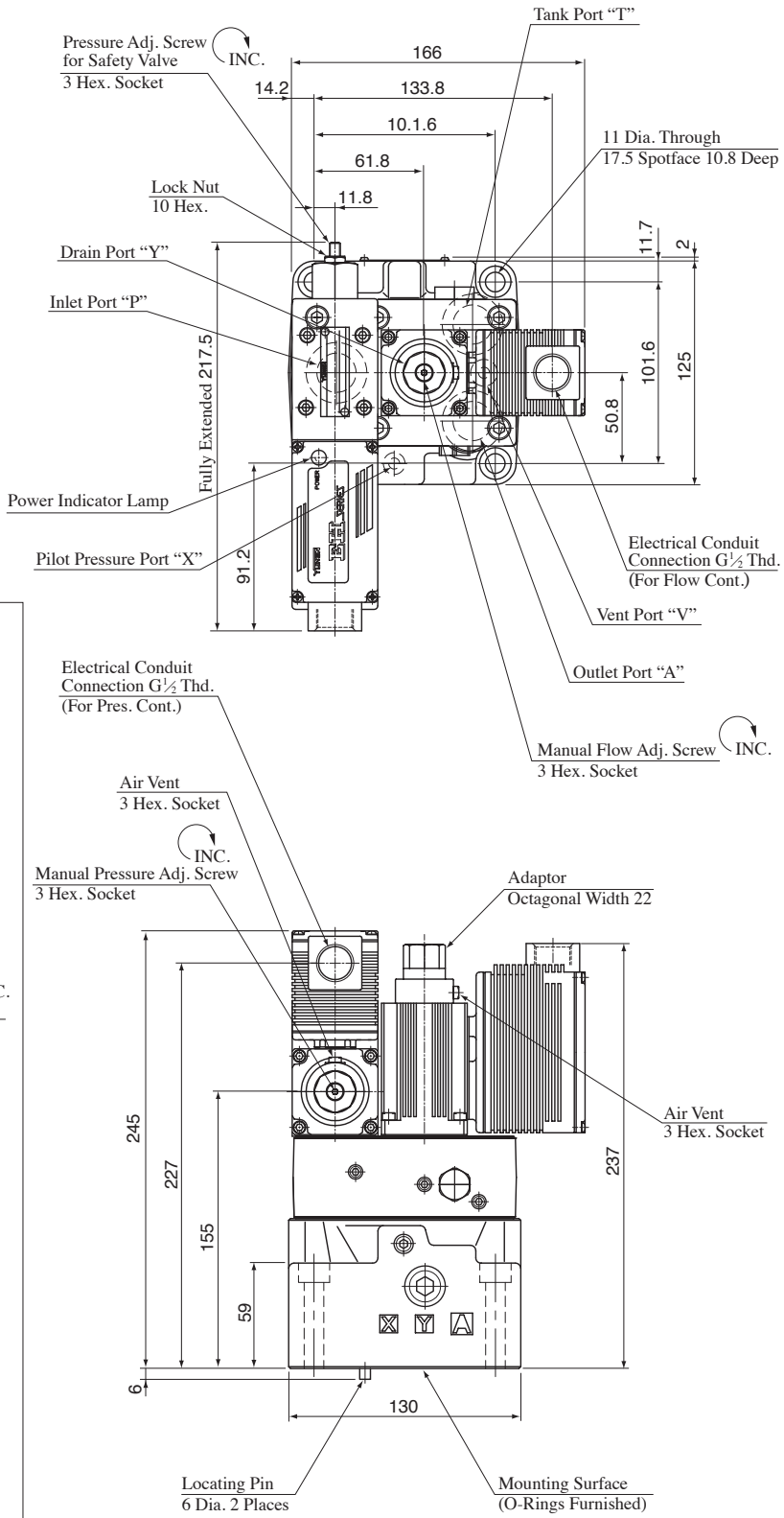
Safety Valve Pressure Setting

The safety valve is preset to a pressure that is 2 MPa higher than the maximum adjustment pressure.

Therefore, adjust this pressure setting as needed to suit the pressure used.

To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

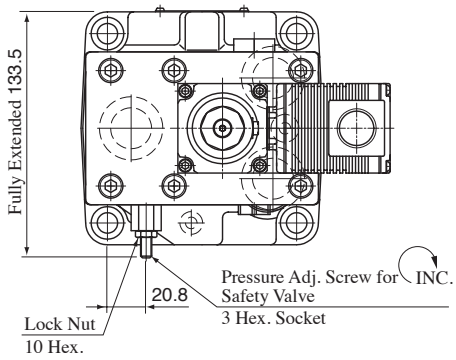
EHFBG-03-$\frac{60}{125}$-$\frac{C}{H}$(-E)-＊-50

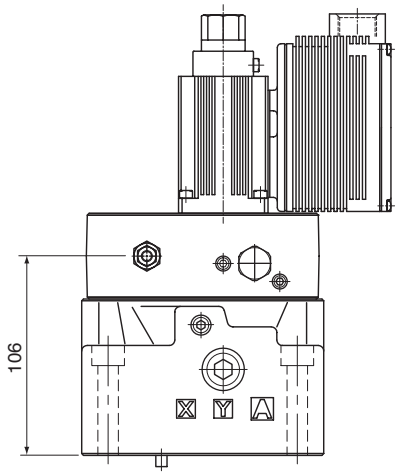


Mass ····· 17 kg

(Models with Sensor····· 17.7 kg)

EHFBG-03-$\frac{60}{125}$(-E)-50

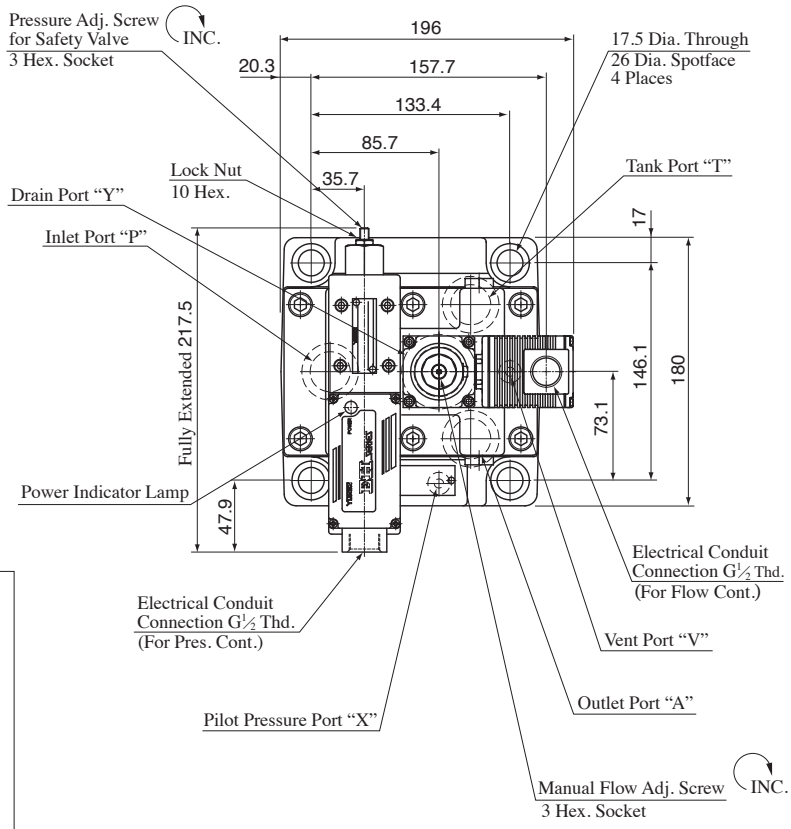




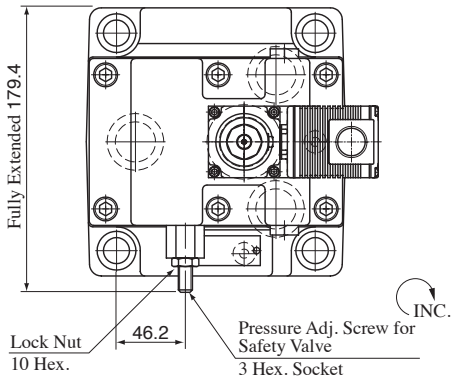
For other dimensions, refer to right drawing.

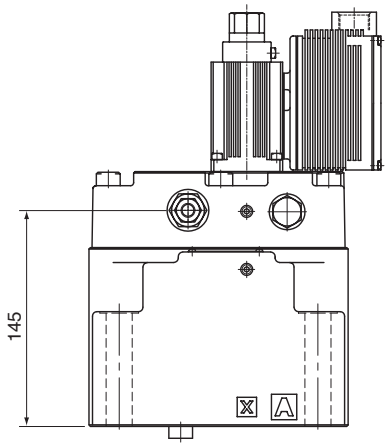
Mass ····· 14.8 kg

EHFBG-06-250-$\frac{C}{H}$(-E)-＊-50



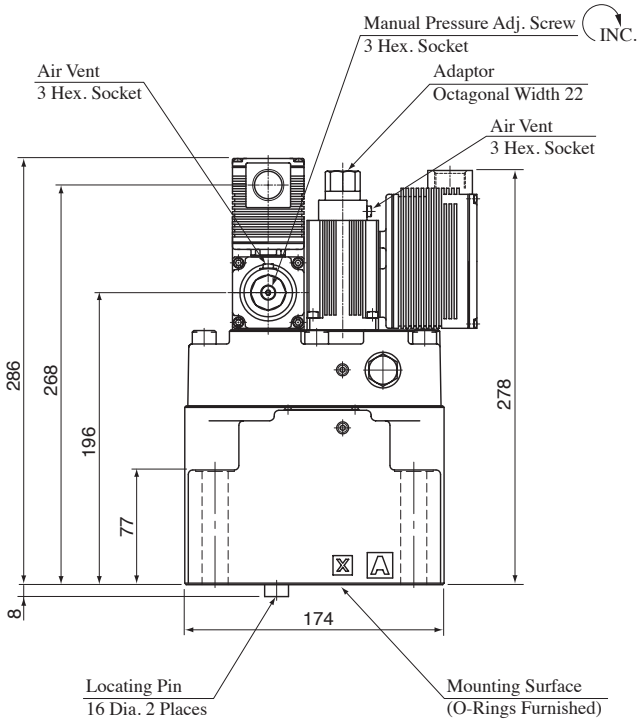
EHFBG-06-250(-E)-50





For other dimensions, refer to right drawing.

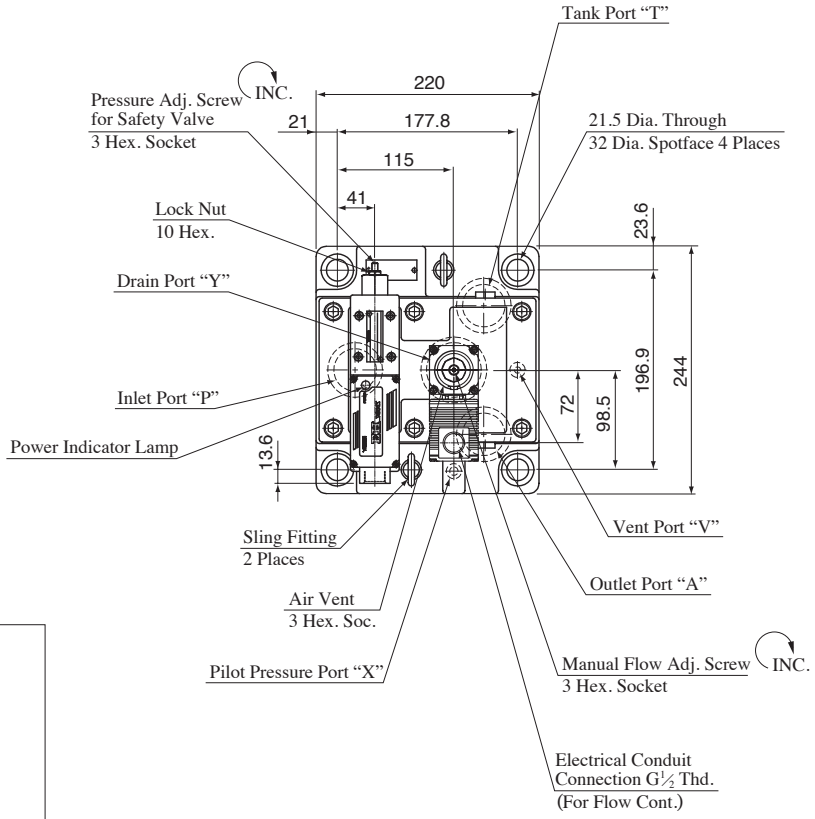
Mass …… 21.8 kg



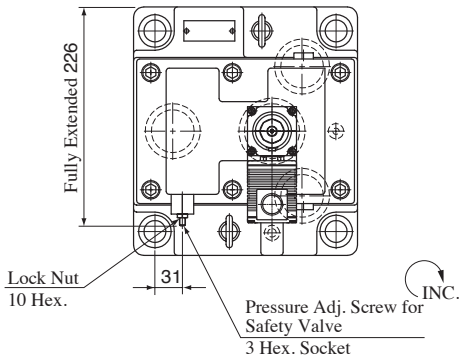
Mass …… 24 kg

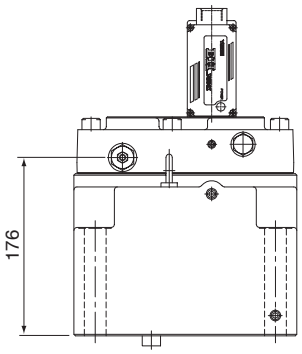
(Models with Sensor…… 24.7 kg)

EHFBG-10-500-$\frac{C}{H}$(-E)-＊-50



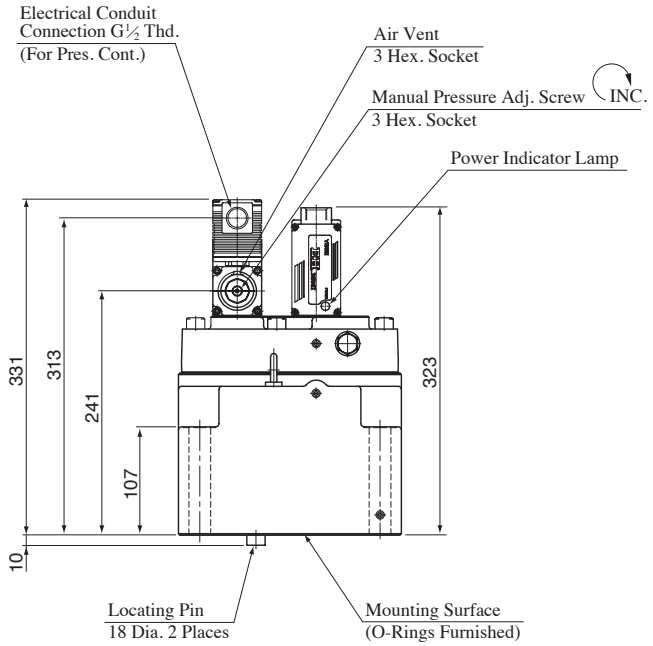
EHFBG-10-500(-E)-50





For other dimensions, refer to right drawing.

Mass …… 61.8 kg



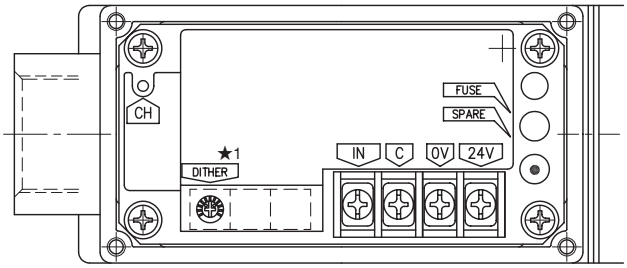
Mass…… 64 kg

(Models with Sensor…… 64.7 kg)

Detail of Amplifier

Connecting Terminal

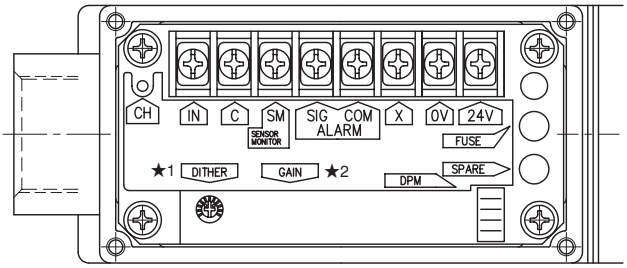
- Flow Control
- Pressure Controls···Open-Loop Type



Terminal	Name
IN	Input Signal (+)
C	Input Signal (COM)
0 V	Power Supply
24 V	
CH	Output Current Check (to C)

★1. DITHER
Use as they are since they are factory-preset to the optimum position. (Do not touch them in normal condition.)
★2. GAIN
GAIN adjusting volume is not available.

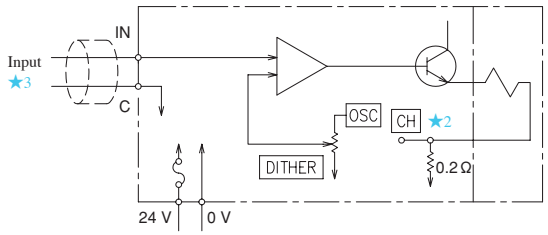
- Pressure Controls···Open-Loop Type with Sensor



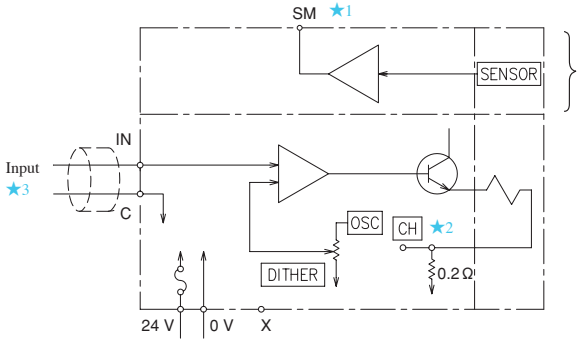
Terminal		Name
IN		Input Signal (+)
C		Input Signal (COM)
SM		Sensor Monitor (to C)
ALARM	SIG	(Open)
	COM	
X		(Open)
0 V		Power Supply
24 V		
CH		Output Current Check (to C)

Circuit Schematic

- Flow Controls



- Pressure Controls

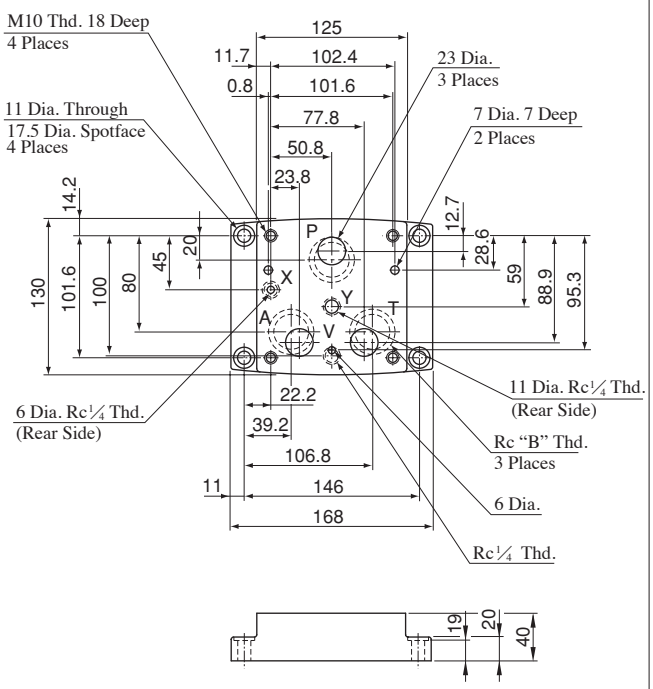


Available for the models with pres. controls " S"

★1. For "SM" terminal, external instruments should have input impedance of more than 10 kΩ.
★2. For "CH" terminal, external instruments should have input impedance of more than 10 kΩ.
★3. Use shielded cable for "Input" connection. The ground of the shielded cable must be connected to input signal side.

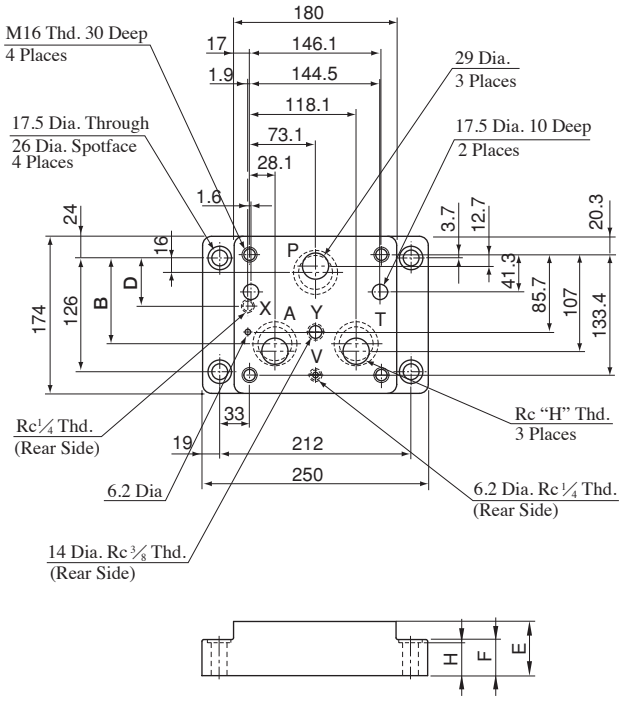
Sub-Plate

EFBGM-$^{03Y}_{03Z}$ -20



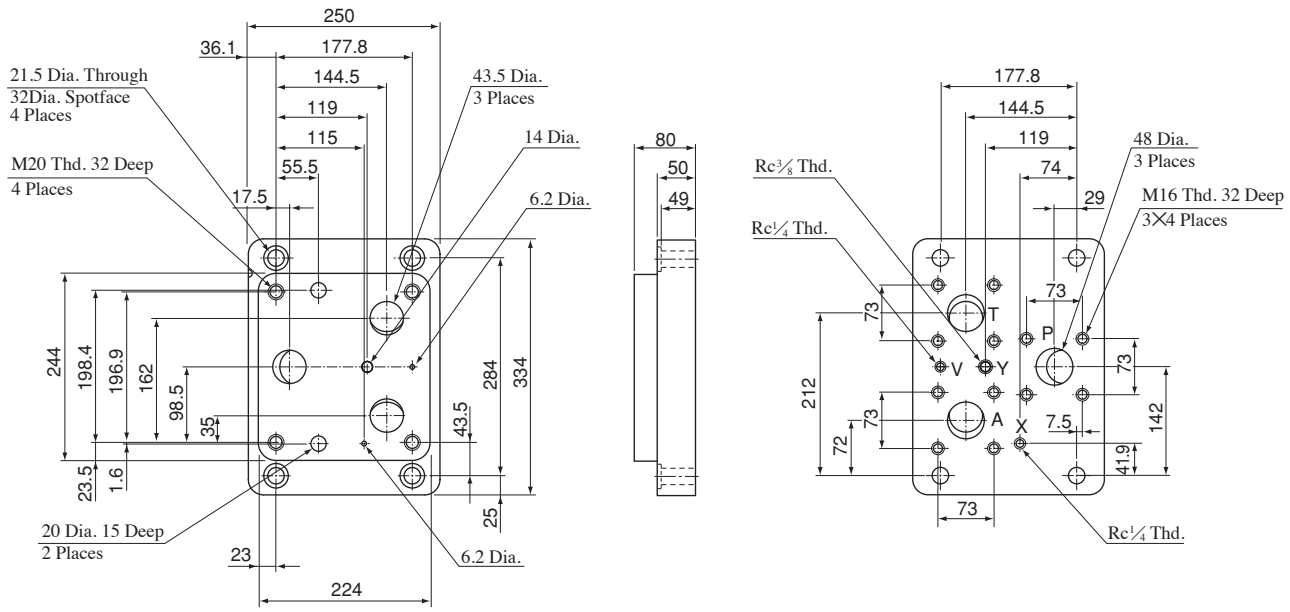
Sub-Plate Model Numbers	B
EFBGM-03Y-20	3/4
EFBGM-03Z-20	1

EFBGM-$^{06X}_{06Y}$ -20



Sub-Plate Model Numbers	B	D	E	F	H
EFBGM-06X-20	107	67	45	35	1
EFBGM-06Y-20	95	57	60	40	1 1/4

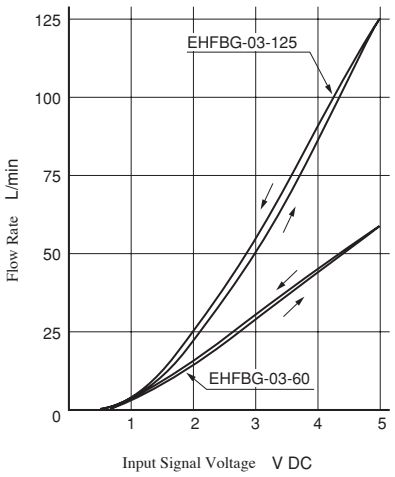
EFBGM-10Y-20



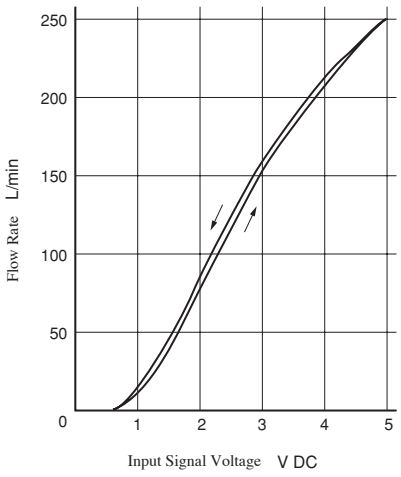
Input Signal Voltage vs. Flow

Viscosity : 30 mm²/s

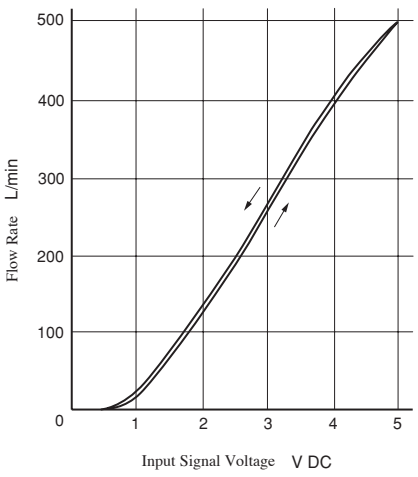
EHFBG-03



EHFBG-06



EHFBG-10

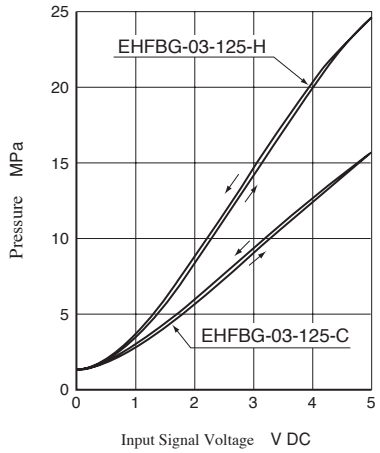


Input Signal Voltage vs. Pressure

Viscosity : 30 mm²/s

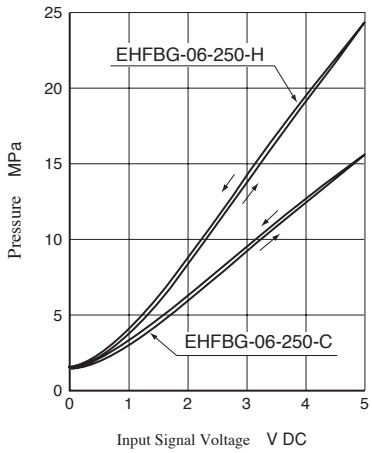
EHFBG-03

Flow Rate : 125 L/min



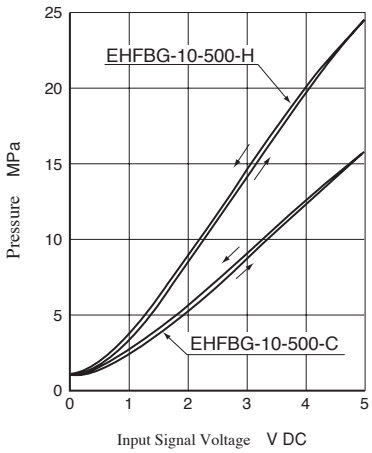
EHFBG-06

Flow Rate : 250 L/min



EHFBG-10

Flow Rate : 500 L/min

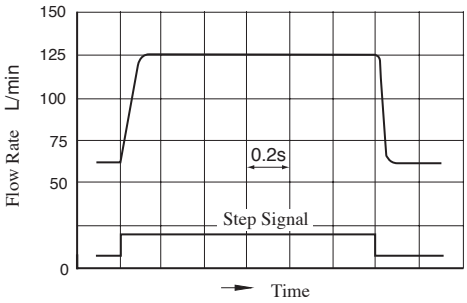


Step Response (Flow Controls)

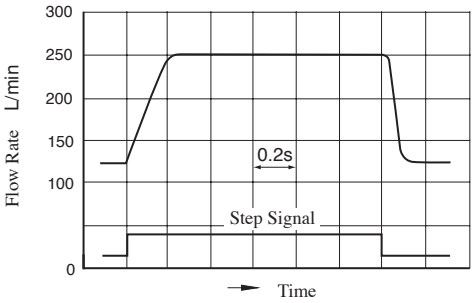
Viscosity : 30 mm²/s

The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

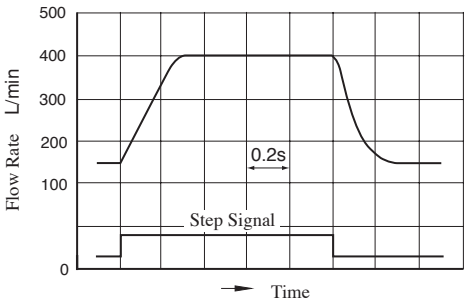
EHFBG-03



EHFBG-06



EHFBG-10

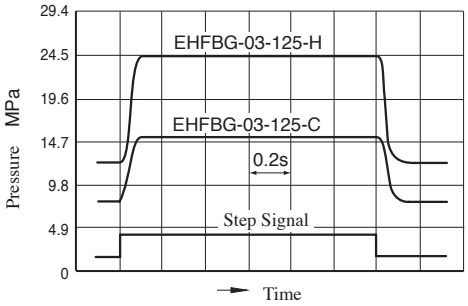


Step Response (Pressure Controls)

Viscosity : 30 mm²/s

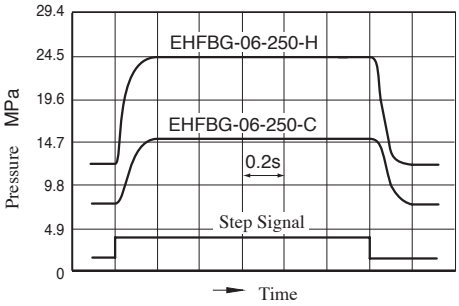
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

EHFBG-03



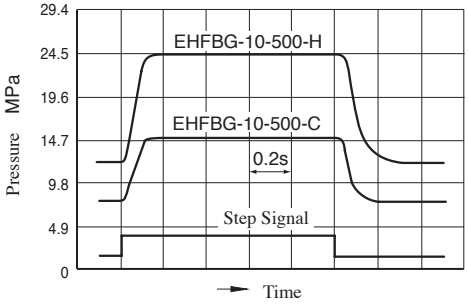
Flow Rate : 125 L/min
Trapped Oil Volume : < 1 L

EHFBG-06



Flow Rate : 250 L/min
Trapped Oil Volume : < 1 L

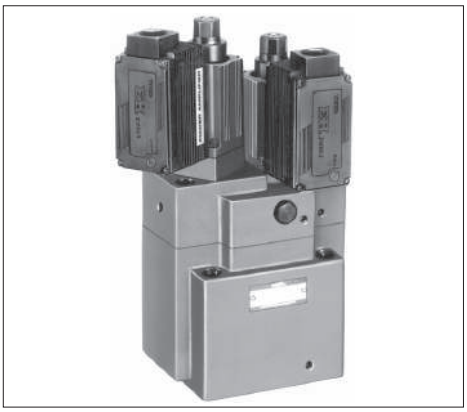
EHFBG-10

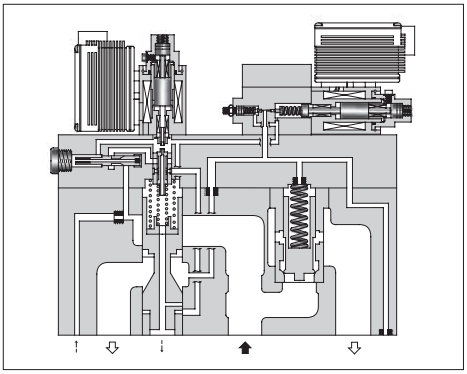


Flow Rate : 500 L/min
Trapped Oil Volume : < 1 L

High Flow Series
Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is a energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
For the High Flow Series, double maximum flow rate [03 size: 125 → 250 L/min, 06 size: 250 → 500 L/min] enables a smaller valve size than conventional products; compact-sized devices can be provided.



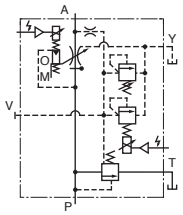


Specifications

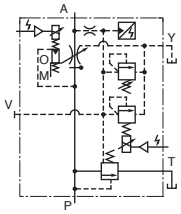
Descriptions \ Model Numbers			EHFBG-03-250	EHFBG-06-500
Max. Operating Pressure		MPa	24.5	24.5
Max. Flow		L/min	250	500
Metered Flow Capacity		L/min	2.5-250	5-500
Min. Pilot Pressure		MPa	1.5	1.5
Pilot Flow L/min	at Normal		1	1
	at Transition		4	6
Differential Pressure		MPa	0.8	0.9
Flow Controls	Hysteresis		3% or less	
	Repeatability		1%★ or less	
	Input Signal Voltage		Max. Flow / 5 V DC	
	Coil Resistance		10 Ω	
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
	Input Impedance		10 kΩ	
	Power Input (Max.)		28 W	
Pressure Controls	Pres. Adj. Range MPa	Adj. Range:C	1.6-15.7	1.5-15.7
		Adj. Range:H	1.8-24.5	1.5-24.5
	Hysteresis		3% or less	
	Repeatability		1%★ or less	
	Coil Resistance		10 Ω	
	Input Signal Voltage		Max. Adj. Pres. / 5 V DC	
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
	Input Impedance		10 kΩ	
	Power Input (Max.)		28 W	
Output Signal (Sensor Monitor)			C : 5 V DC / 15.7 MPa H : 5 V DC / 24.5 MPa	
Ambient Temperature			0 - 50°C (With Circulated Air)	
Mass			Refer to Pages H-47 to H-48	

★1. The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.
★2. The specifications for pressure controls is applied to models with pilot relief valve. (Ex. EHFBG-03-125-C-∗-50)
★3. Pressure adjustment range of the valves without pilot relief valves (Ex. EHFBG-03-250-∗-50) is from a minimum adjustable pressure to 24.5 MPa.

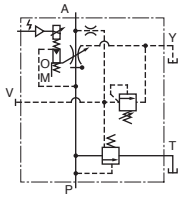
Graphic Symbols



Models with Proportional Pilot Relief Valve



Models with Proportional Pilot Relief Valve and Sensor



Models without Proportional Pilot Relief Valve

External Pilot Pres. Connection

Model Number Designation

EHFB	G	-03	-250	-C	-E	-S	-50
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pilot Relief Valve Pres. Adj. Range	Pilot Connection of Flow Control	Pressure Controls	Design Number
EHFB: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G**: Sub-Plate Mounting	**03**	**250**	**None**: Without Proportional Pilot Relief Valve	**None**: Internal Pilot	**None**: Open-Loop	**50**
		06	**500**	**C, H** : See Specifications	**E**: External Pilot	**S**: Open-Loop with Sensor	**50**

★Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHFBG-03-250	M12 × 120 L ····· 4 Pcs.
EHFBG-06-500	M16 × 120 L ····· 4 Pcs.

Instructions

Drain Back Pressure

Check that the drain back pressure does not exceed 0.2 MPa.

When Relief Valve Passing Flow Rate is Low in Pressure Control State

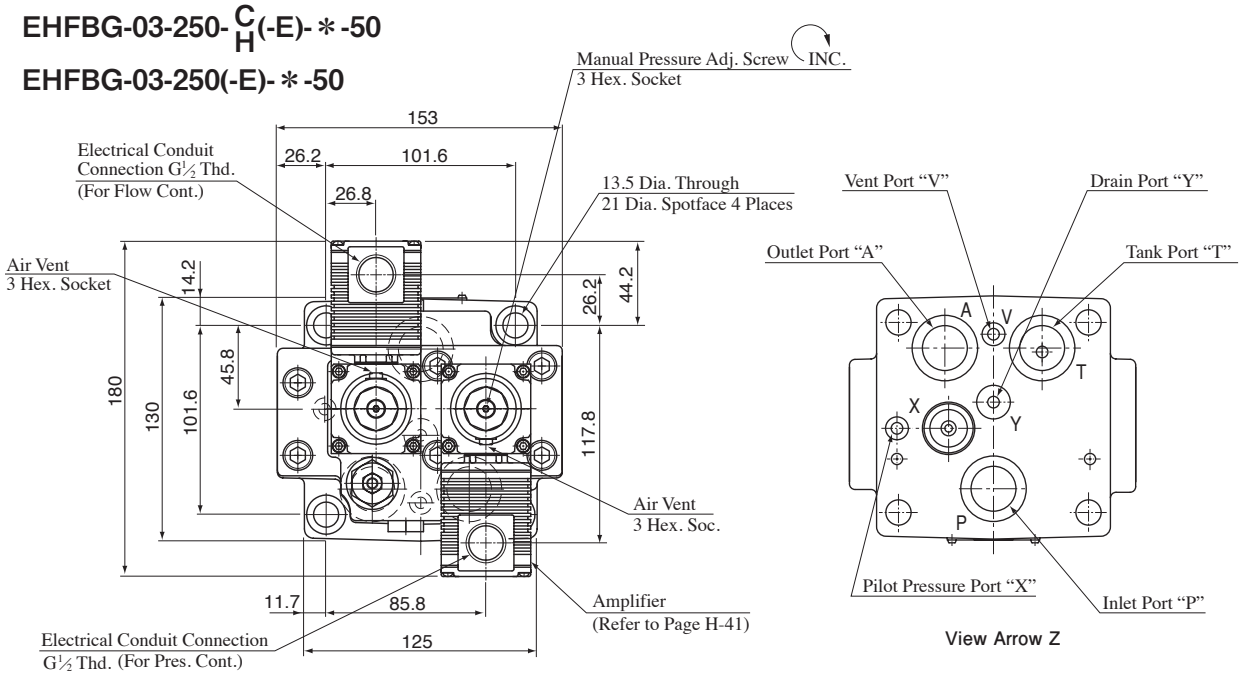
To avoid preselected pressure instability, use a passing flow rate of 15 L/min or higher.
Further, check that the tank-side back pressure does not exceed 0.5 MPa.

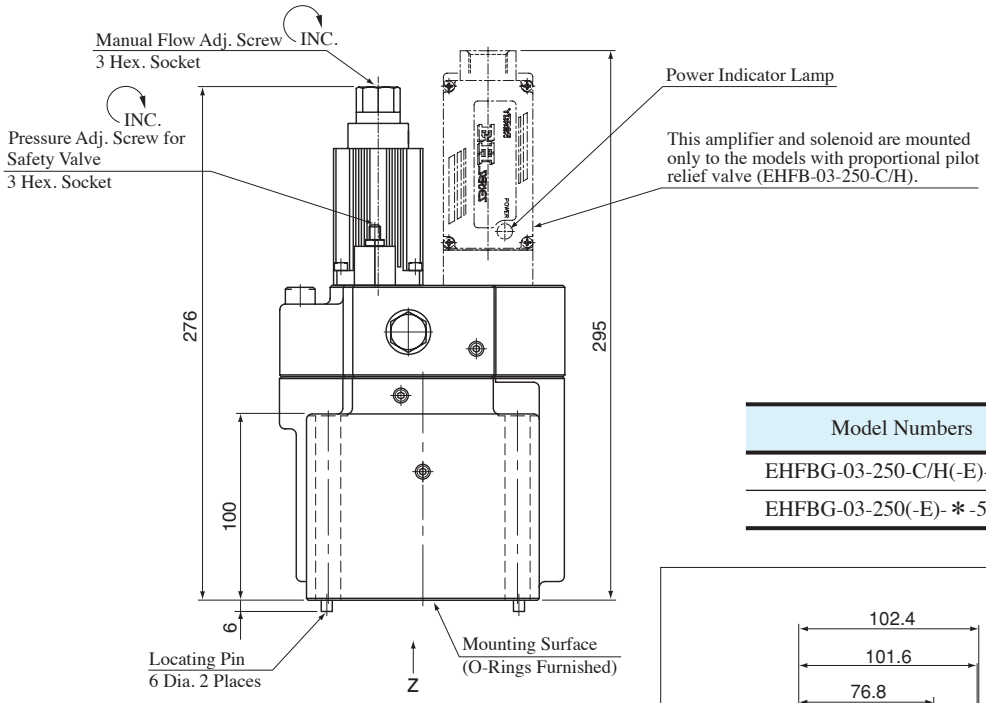
Safety Valve Pressure Setting

The safety valve is preset to a pressure that is 2 MPa higher than the maximum adjustment pressure.
Therefore, adjust this pressure setting as needed to suit the pressure used.
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

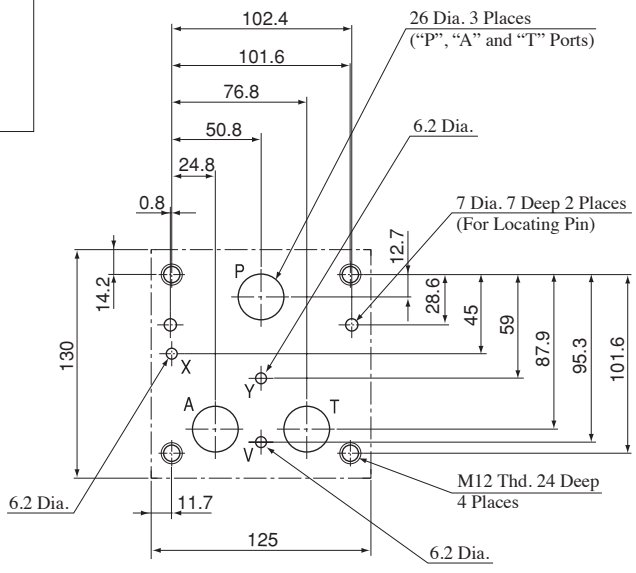
EHFBG-03-250-$\frac{C}{H}$(-E)-＊-50

EHFBG-03-250(-E)-＊-50





Model Numbers	Mass
EHFBG-03-250-C/H(-E)-＊-50	19 kg
EHFBG-03-250(-E)-＊-50	17.4 kg



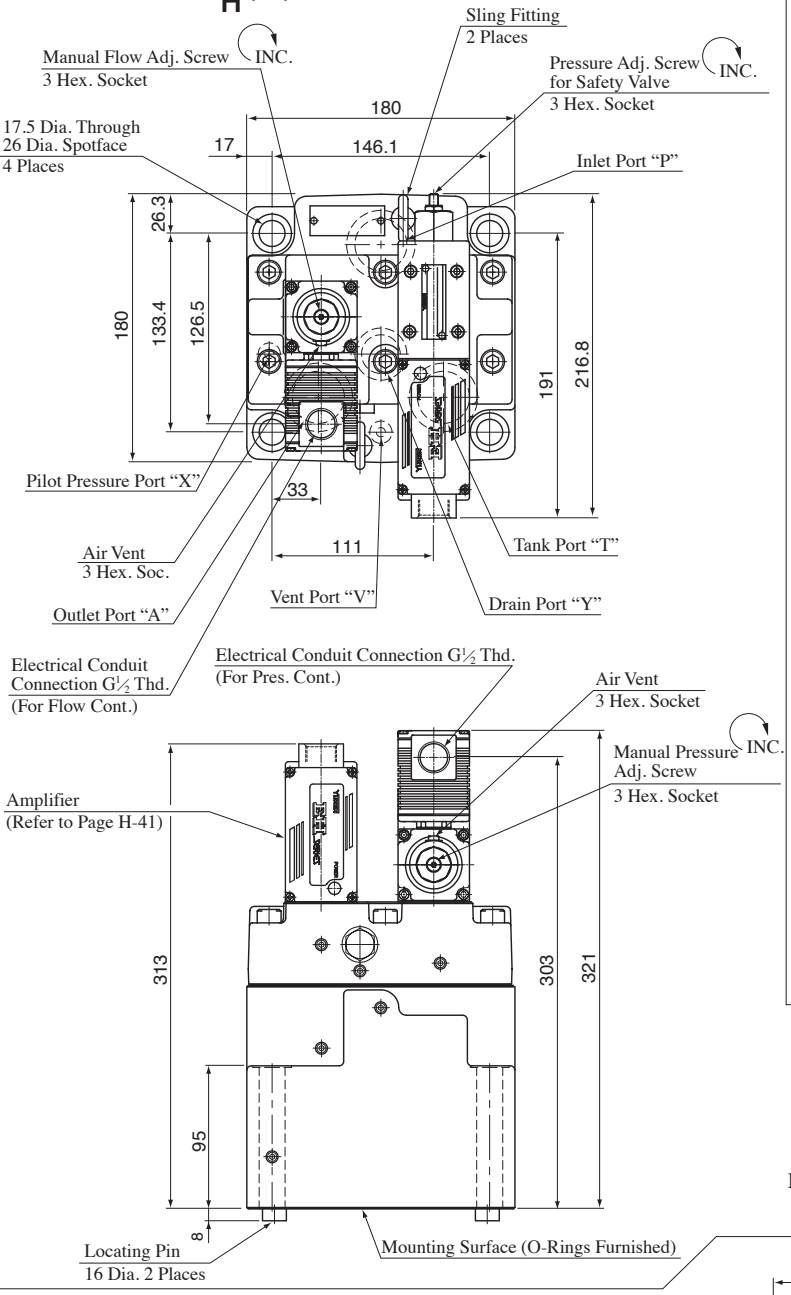
Dimensions of Valve Mounting Surface

Prepare the mounting surface as shown on the right.
It should be fine finished.

Mounting Interchangeability with Conventional Models

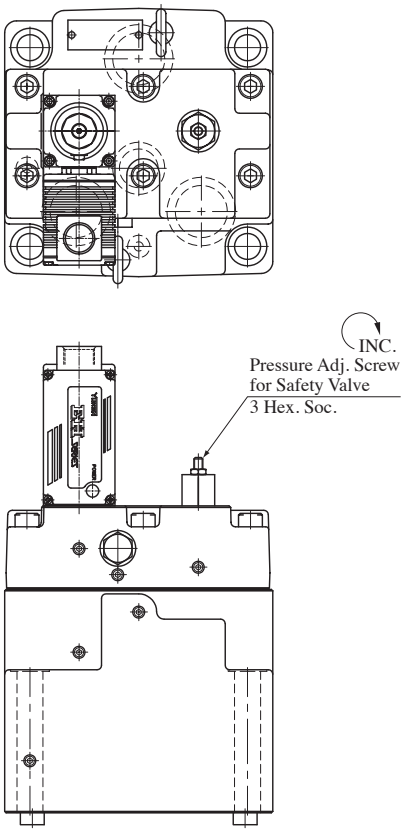
The high flow models are not interchangeable in mounting with the conventional models.

EHFBG-06-500-$\frac{C}{H}$(-E)-＊-50



Mass ····· 36 kg

EHFBG-06-500(-E)-＊-50



Mass ····· 33.8 kg

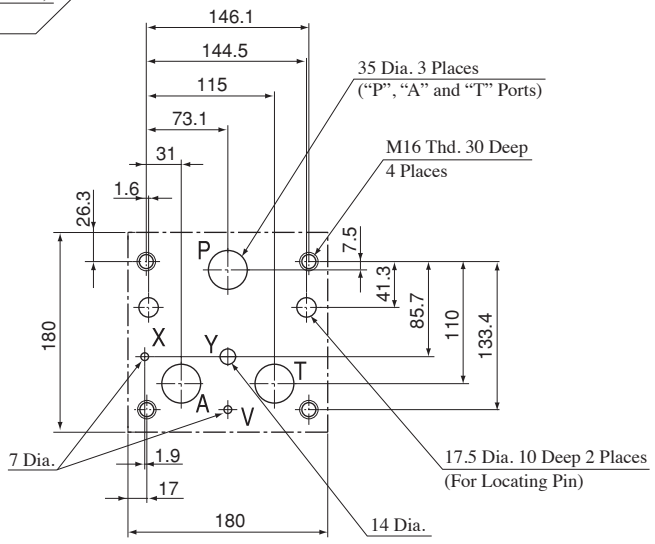
For other dimensions, refer to left drawing.

Dimensions of Valve Mounting Surface

Prepare the mounting surface as shown on the right.
It should be fine finished.

Mounting Interchangeability with Conventional Models

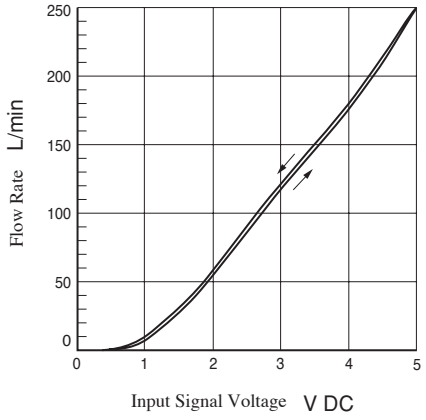
A valve in the high-flow series can be mounted on the mounting surface for a conventional valve.
(Conventional valve : EHFBG-06-250 cannot be mounted on a mounting surface for the high-flow series.)



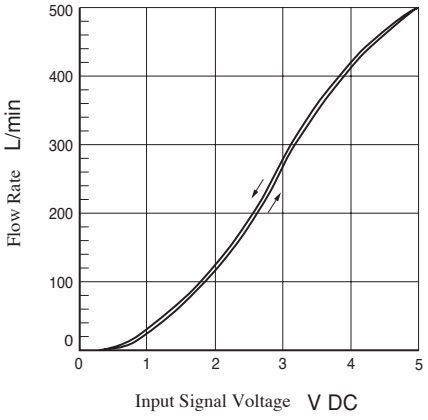
Input Signal Voltage vs. Flow

Viscosity : 30 mm²/s

EHFBG-03-250



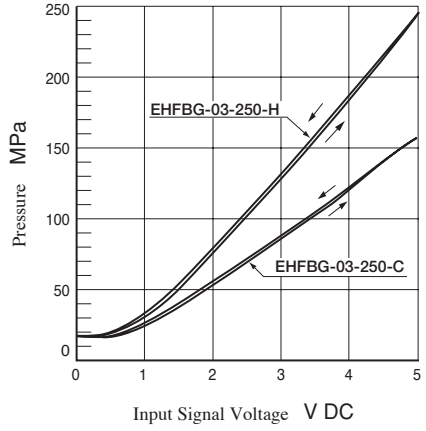
EHFBG-06-500



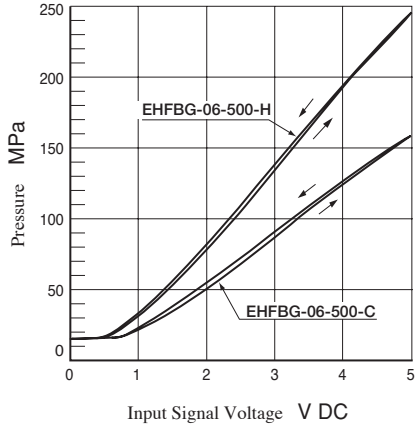
Input Signal Voltage vs. Pressure

Viscosity : 30 mm²/s

EHFBG-03-250



EHFBG-06-500

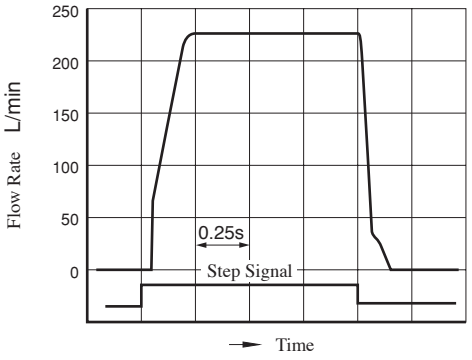


Step Response (Flow Controls)

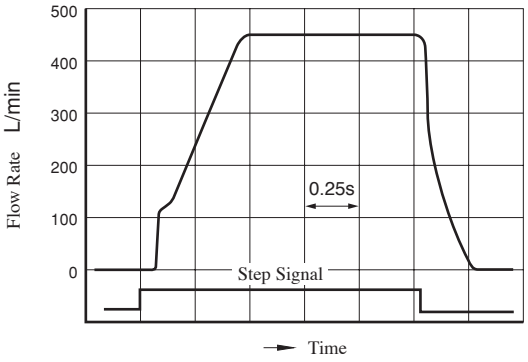
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

Viscosity : 30 mm²/s

EHFBG-03-250



EHFBG-06-500

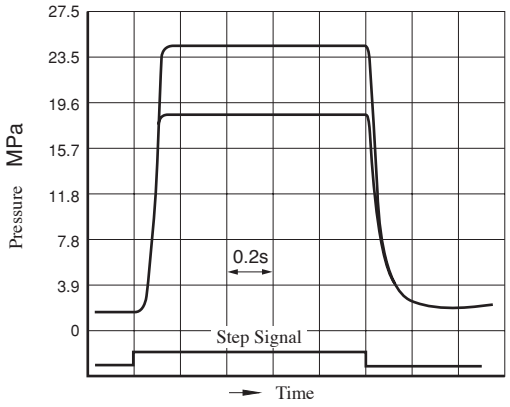


Step Response (Pressure Controls)

The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

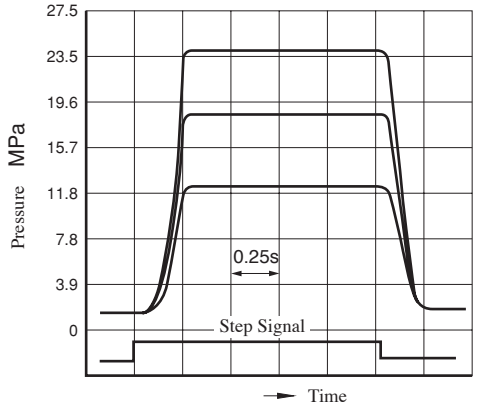
Viscosity : 30 mm²/s

EHFBG-03-250-H



Flow Rate : 250 L/min
Trapped Oil Volume : ＜1 L

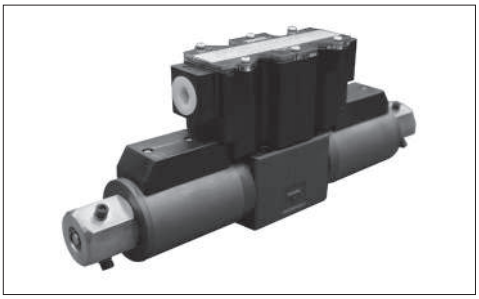
EHFBG-06-500-H

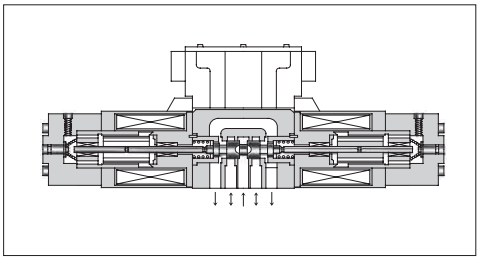


Flow Rate : 500 L/min
Trapped Oil Volume : ＜6 L

Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves incorporate two control functions - flow and direction - which simplify the hydraulic circuit composition and therefore the cost of the system is reduced.





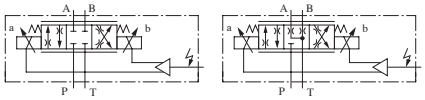
Specifications

Descriptions \ Model Numbers		EHDFG-01	EHDFG-03
Max. Operating Pressure	MPa	25	25
Max. Tank Line Back Pres.	MPa	7	7
Rated Flow [Valve ⊿P 7 MPa]	L/min	30	60
Hysteresis		5% or less	
Repeatability		1%★ or less	
Frequency Response		20 (Phase: -90°)	17 (Phase: -90°)
Coil Resistance		10.5 Ω	8.0 Ω
Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
Input Signal Voltage	By Controlling Variable Resistance (Using of Power from Amp.)	1 - 2 kΩ Volume Range	
	By Controlling Voltage (Using of Power outside Amp.)	0 - –5 V for SOL a 0 - +5 V for SOL b	
Input Impedance		10 kΩ	10 kΩ
Power Input (Max.)		40 W	45 W
Ambient Temperature		0 - 50°C (With Circulated Air)	
Mass		3.0 kg	9.2 kg

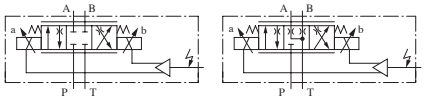
★The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols

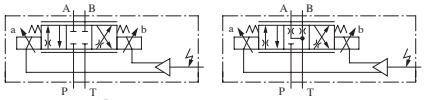
● Meter-in • Meter-out Control



● Meter-out Control



● Meter-in Control



Model Number Designation

EHDF	G	-01	-30	-3C2	-E	-30
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type★	Direction of Flow	Design Number
EHDF: Proportional Electro-Hydraulic Directional and Flow Control Valve	**G**: Sub-Plate Mounting	**01**	**30**	**3C2**	**XY** : Meter-in · Meter-out **X** : Meter-in **Y** : Meter-out	**30**
		03	**60**	**3C40**		**30**

★1. Spool type shown under the neutral position.
★2. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw
EHDFG-01	M5×45 L ····· 4 Pcs.
EHDFG-03	M6×35 L ····· 4 Pcs.

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHDFG-01	DSGM-01-31★	1/8	0.8
	DSGM-01X-31★	1/4	
	DSGM-01Y-31★	3/8	
EHDFG-03	DSGM-03-40	3/8	3
	DSGM-03X-40	1/2	
	DSGM-03Y-40	3/4	4.7

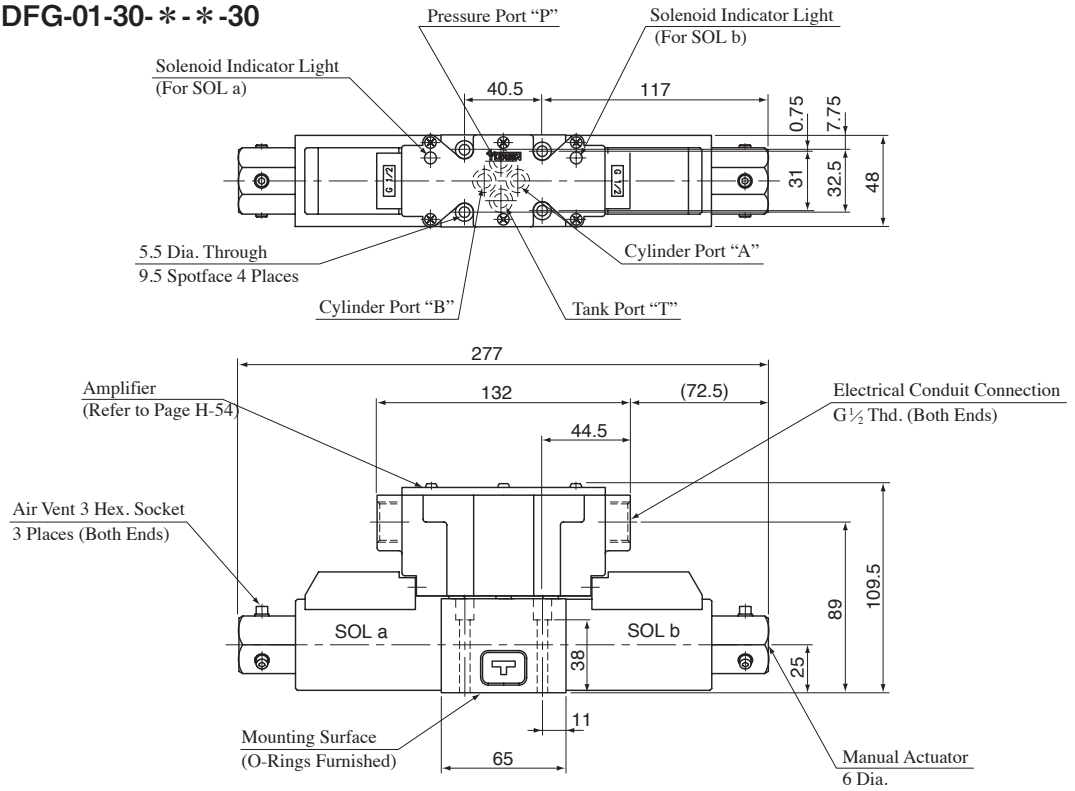
★ Refer to Page H-8.

●Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (▽)

Instructions

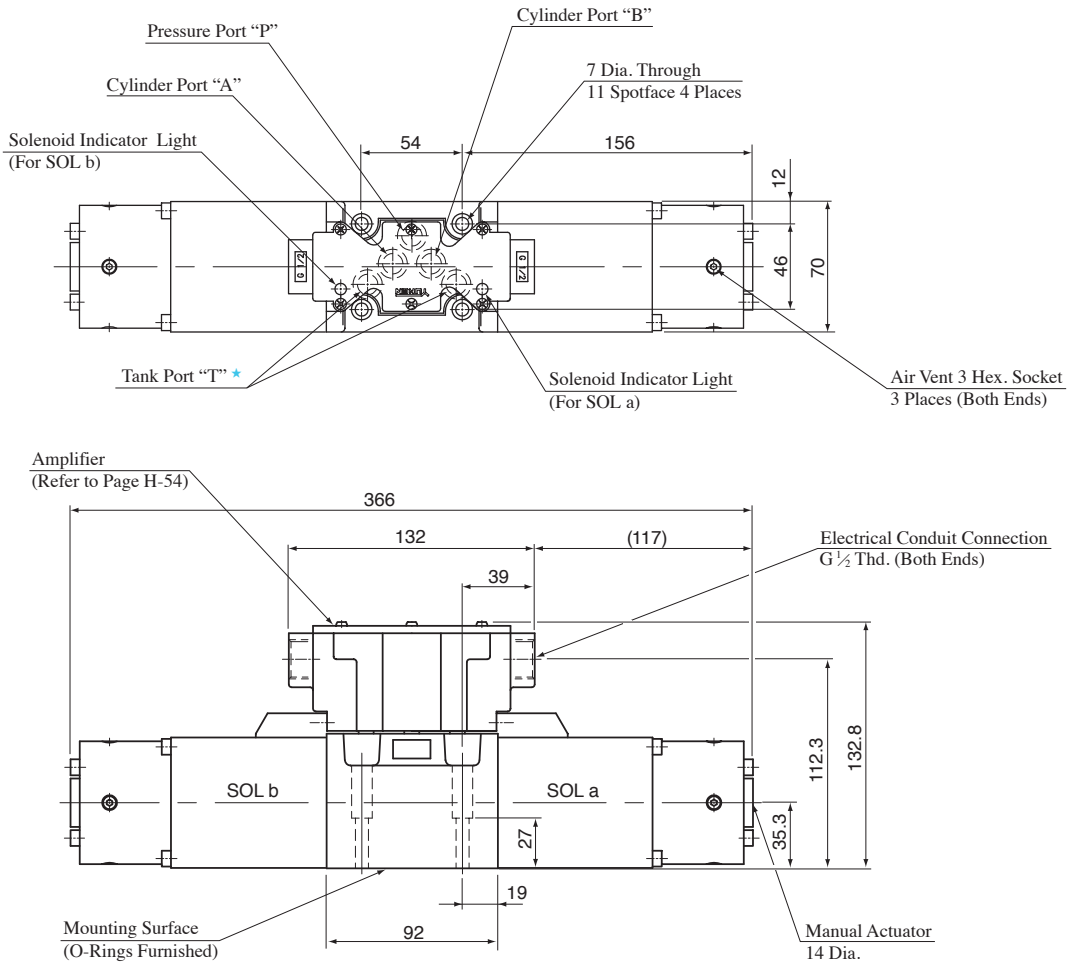
Take care of filling the valve tank port with the hydraulic oil at any time.
However, check valve with cracking pressure 0.04 MPa approx. shall be provided as required.
The pipe from the tank port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

EHDFG-01-30-＊-＊-30



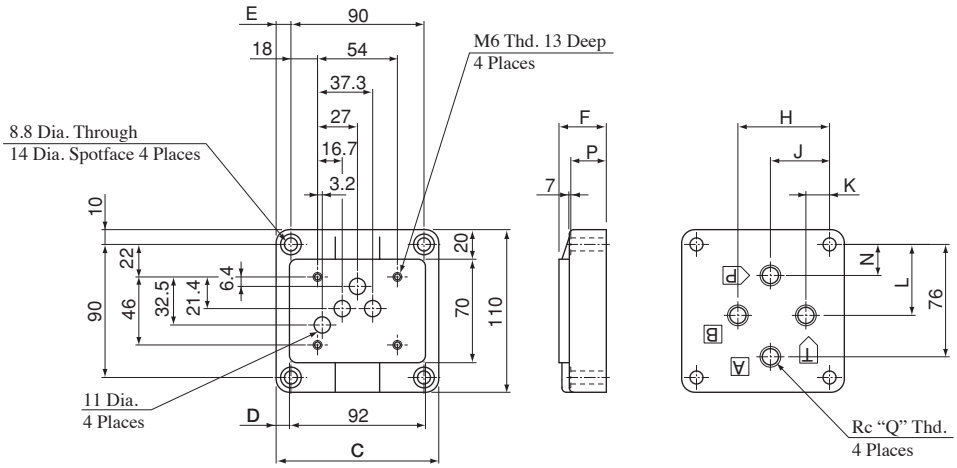
Note : Sub-plate is common to that of EHDG-01.
Refer to page H-8 for the dimensions of mounting surface.

EHDFG-03-60-＊-＊-30



★Of the two of tank port "T', the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

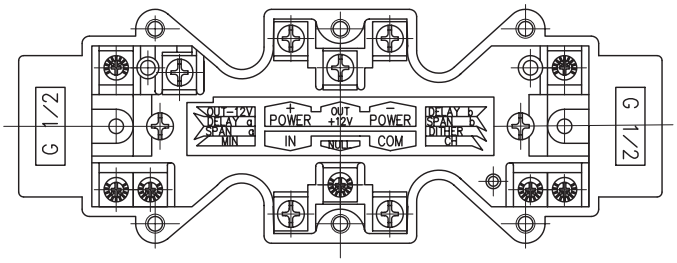
Sub-Plates



Sub-Plate Model Numbers	C	D	E	F	H	J	K	L	N	P	Q
DSGM-03-40	110	9	10	32	62	40	16	48	21	24	3/8
DSGM-03X-40											1/2
DSGM-03Y-40	120	14	15	50	80	45	10	47	16	42	3/4

Detail of Amplifier

Connecting Terminal

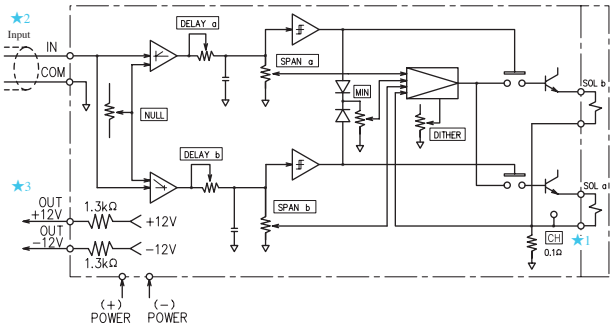


Terminal	Name
POWER ＋	24V DC Power Supply
POWER －	
IN	Input Signal
COM	Input Signal (COM)
OUT ＋12V	Internal Voltage Output ＋12V
OUT －12V	Internal Voltage Output －12V
CH	Output Current Check (to COM)

★1 DITHER / SPAN / NULL / MIN
Use as they are since they are factory-preset to the optimum position. (Do not touch them in normal condition.)

★2 DELAY
The adjusting volume is set to minimum at shipping. Set a delay time according to the machine conditions.

Circuit Schematic



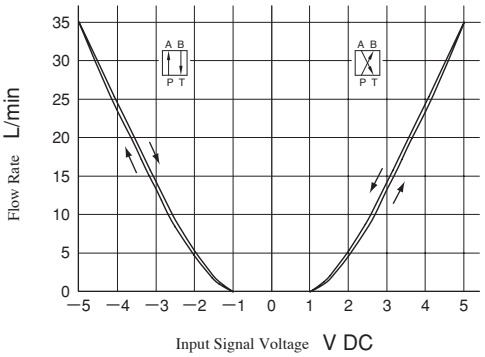
★1. For “CH” terminal, external instruments should have input impedance of more than 10 kΩ.

★2. Use shielded cable for “Input” connection.
The ground of shielded cable must be connected to input signal side.

★3. Internal output voltage ±12V terminal is used when input signal voltage is controlled by variable resister. Volume of 1 kΩ - 2 kΩ should be used.

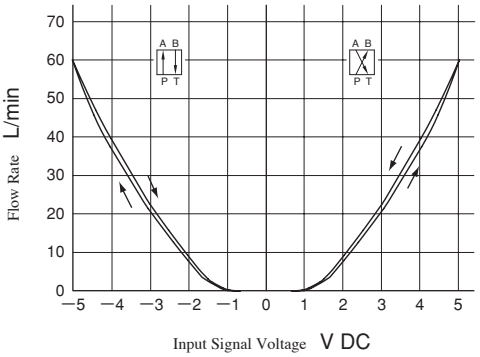
Input Signal Voltage vs Flow

EHDFG-01



Viscosity : 30 mm²/s
Valve Pres. Difference : 3.4 MPa

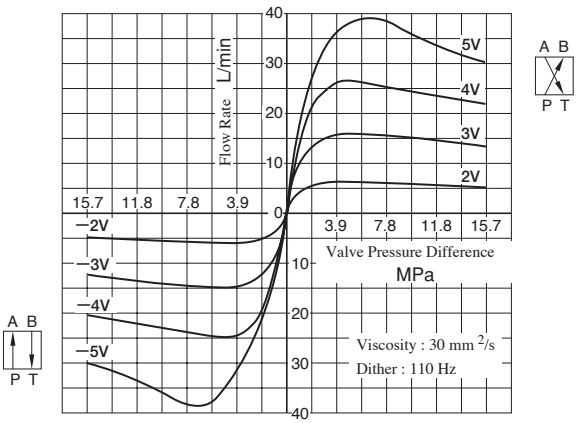
EHDFG-03



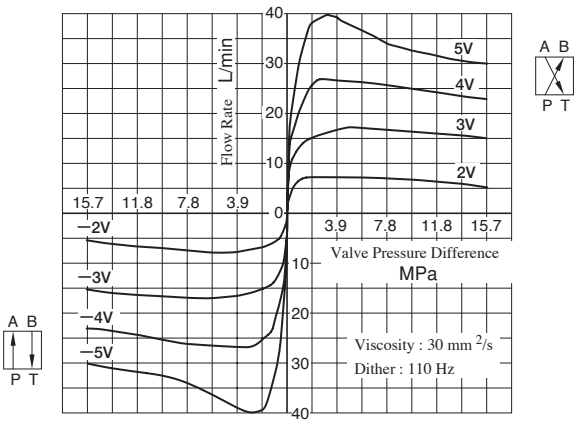
Viscosity : 30 mm²/s
Valve Pres. Difference : 3.4 MPa

Differential Pressure vs. Metered Flow

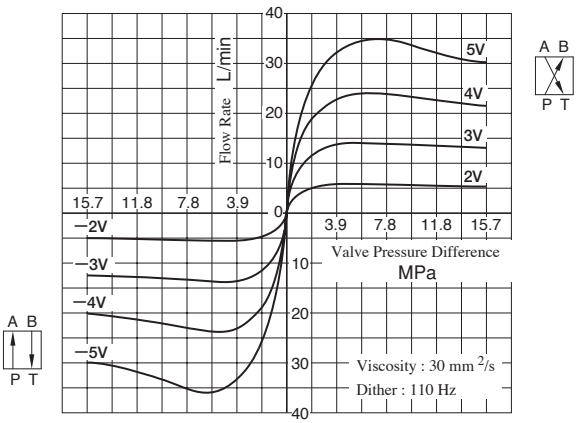
EHDFG-01-30-＊-XY-30



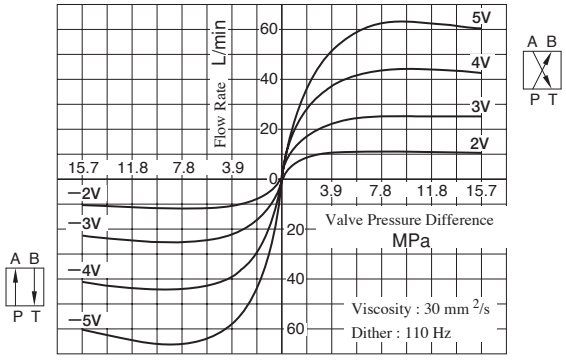
EHDFG-01-30-＊-X-30



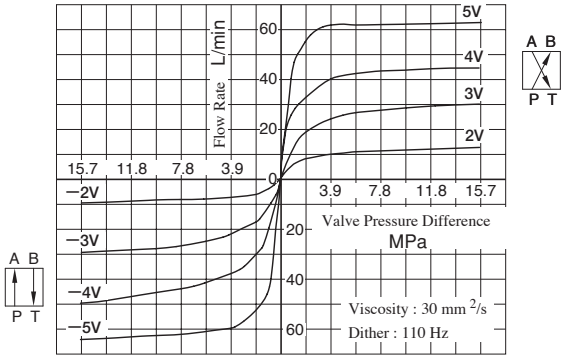
EHDFG-01-30-＊-Y-30



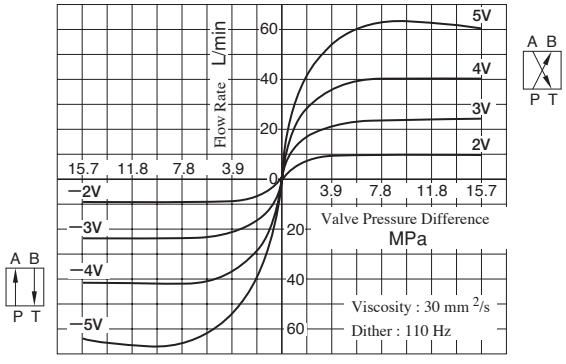
EHDFG-03-60-＊-XY-30



EHDFG-03-60-＊-X-30

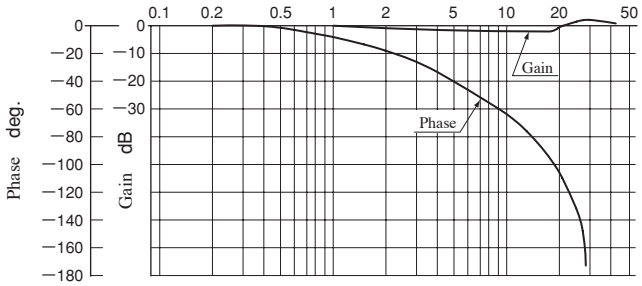


EHDFG-03-60-＊-Y-30



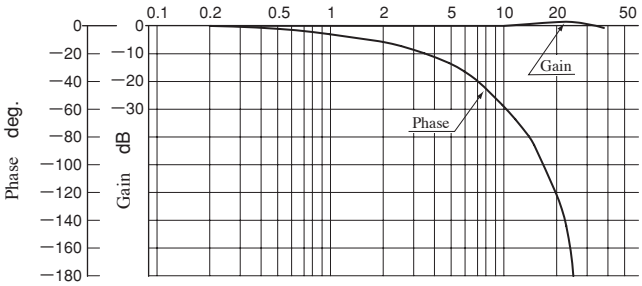
Frequency Response (Travel of Spool)

EHDFG-01



Model Number : EHDFG-01-03-∗-Y-30
Viscosity : 30 mm²/s
Supply Pressure : 6.9 MPa
Flow Rate : 15±6 L/min

EHDFG-03

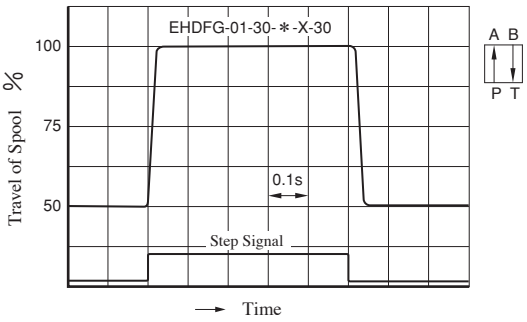


Model Number : EHDFG-03-60-∗-Y-30
Viscosity : 30 mm²/s
Supply Pressure : 6.9 MPa
Flow Rate : 30±6 L/min

Step Response (Example)

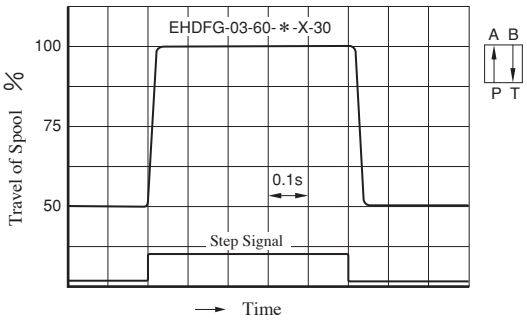
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

EHDFG-01



Viscosity : 30 mm²/s
Supply Pressure : 6.9 MPa

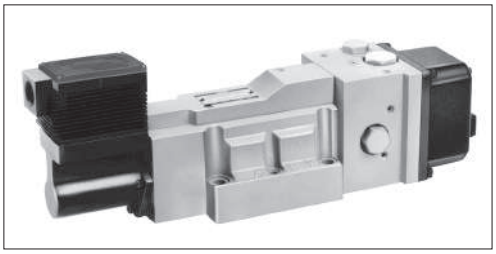
EHDFG-03

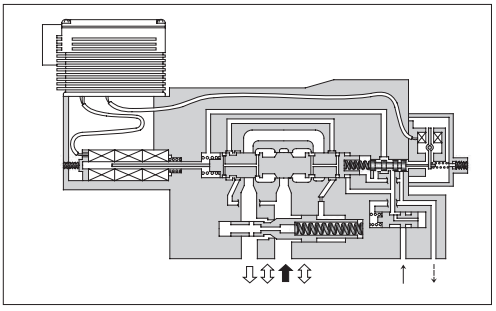


Viscosity : 30 mm²/s
Supply Pressure : 6.9 MPa

High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves pursue the ultimate performance of proportional electro-hydraulic directional & flow control valves and make themselves to have high response features.
The closed-loop is composed in the valve inside by combination of a differential transformer (LVDT) and a power amplifier. Thus, high accuracy and reliability are provided.
In addition to control in the open-loop, these can be used for the closed-loop system as simplified servo valves.





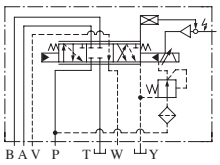
Specifications

Descriptions \ Model Numbers		EHDFG-04	EHDFG-06
Max. Operating Pressure MPa		15.7	15.7
Rated Flow L/min Valve Pres. Difference: 1.5 MPa		130	280
Min. Required Pilot Pressure MPa		1.5	1.5
Min. Required Pilot Flow L/min	at Normal	2	2
	at Transition	6	10
Max. Drain Line Back Pressure MPa		0.1	0.1
Hysteresis		1% or less	
Repeatability		1%★ or less	
Frequency Response		55 (Phase: -90°)	45 (Phase: -90°)
Coil Resistance		30 Ω	
Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
Input Signal Voltage		Rated Flow / 5 V DC	
Input Impedance		10 kΩ	
Power Input (Max.)		20 W	
Alarm Signal Output (Open Collector)		Voltage: Max. 30 V DC Current: Max. 30 mA	
LVDT Output (Sensor Monitor)		5 V DC / Rated Travel of Spool	
Ambient Temperature		0 - 50°C (With Circulated Air)	

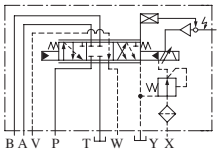
★The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols

● Models without Pressure Compensator Valve

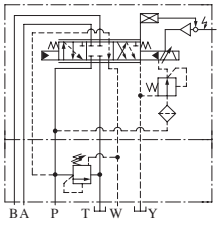


Internal Pilot



External Pilot

● Models with Pressure Compensator Valve



Internal Pilot

Model Number Designation

EHDF	G	-04	-130	-2	-E	-CB	-10
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type★	Pilot Connection	Relief Type Pres. Compensator	Design Number
EHDF: Proportional Electro-Hydraulic Directional and Flow Control Valve	**G**: Sub-Plate Mounting	**04**	**130**	**2** 	**None**: Internal Pilot	**None**: Not Provided	**10**
		06	**280**	**40** 	**E**: External Pilot	**CB**: Provided	**10**

★1. Spool type shown in the column is for the neutral position.
★2. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw		
	Models without Pres. Compensator	Models with Pres. Compensator	Q'ty
EHDFG-04	M6 × 40 L	M6 × 120 L	2
	M10 × 45 L	M10 × 125 L	4
EHDFG-06	M12 × 60 L	—	6
	—	Mtg. Bolt Kit MBK-06-01-30	1 Set

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EHDFG-04	DHGM-04-20	1/2	4.4
	DHGM-04X-20	3/4	4.1
EHDFG-06	DHGM-06-50	3/4	7.4
	DHGM-06X-50	1	

● Sub-plates are available. Specify sub-plate model from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽L6)

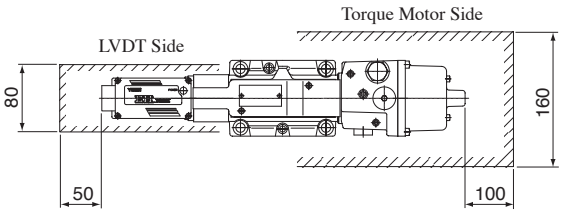
Instructions

Back Pressure to Drain Port

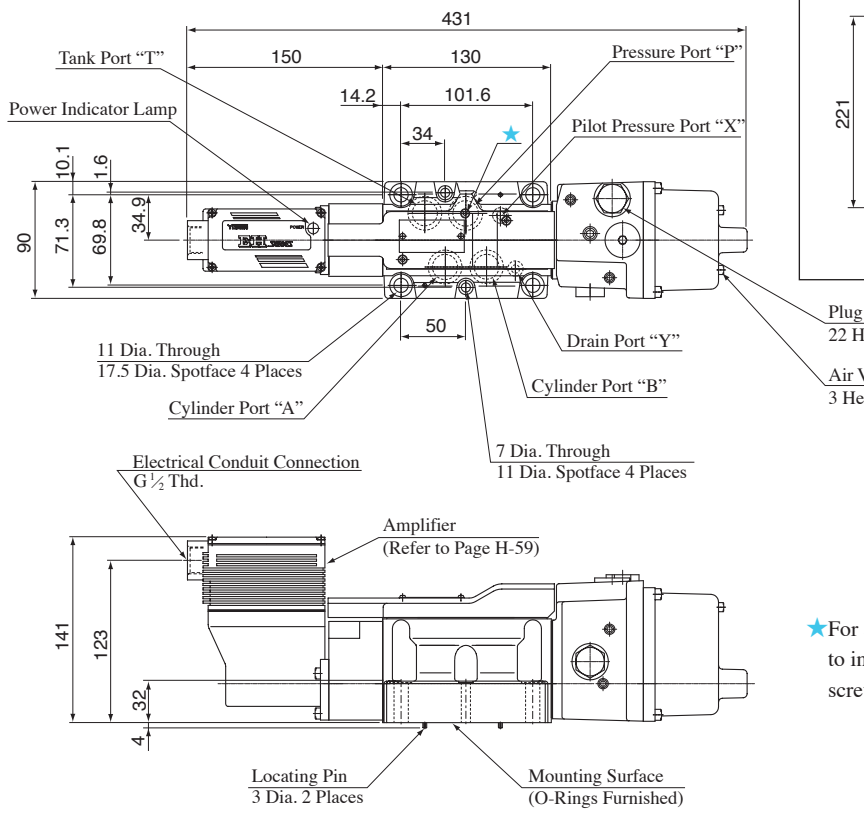
The drain port should be connected directly to the oil tank with a back pressure of not more than 0.1 MPa.

Installation Condition (Protection from Magnetic Field of DC SOL)

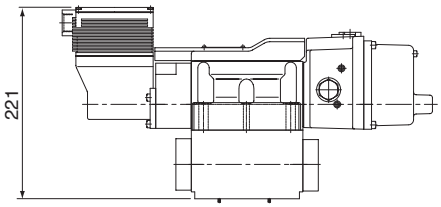
If a DC SOL. is installed near this valve, the magnetic field of DC SOL. may affect the control flow rate. Therefore, install the DC SOL. outside the area shown below.



EHDFG-04-130-∗-∗-10



EHDFG-04-130-∗-∗-CB-10

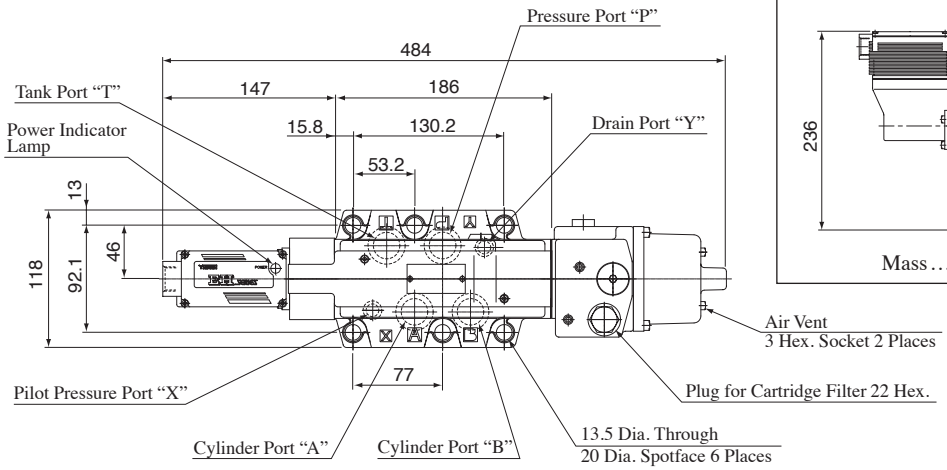


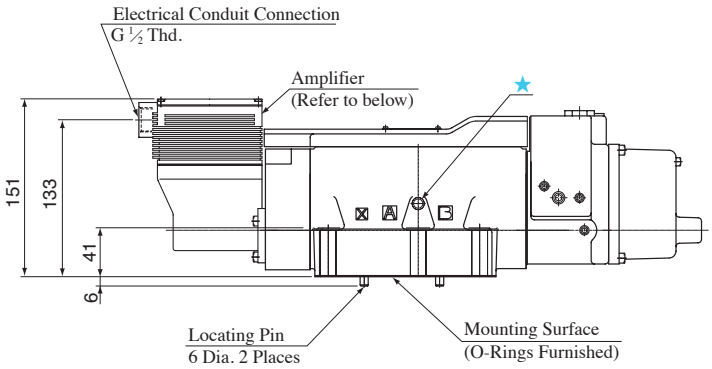
Mass ..... 17 kg

★For alternation of model from external pilot pressure to internal pilot pressure, take out another inner screw plug behind this plug.

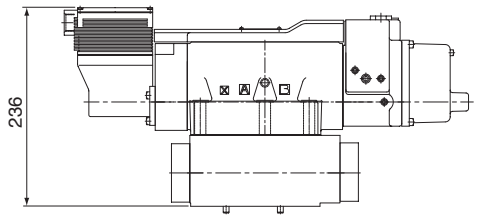
Mass ..... 10.5 kg

EHDFG-06-280-＊-＊-10





EHDFG-06-280-＊-＊-CB-10



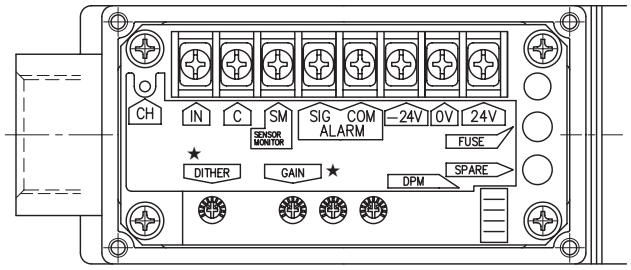
Mass ..... 29.6 kg

★For alternation of model from external pilot pressure to internal pilot pressure, take out another inner screw plug behind this plug.

Mass ..... 18.5 kg

Detail of Amplifier

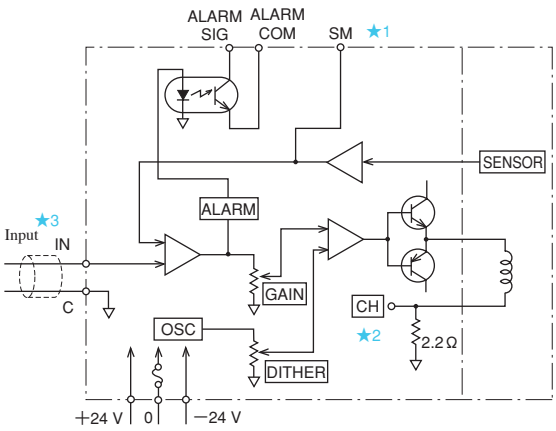
Connecting Terminal



Terminal		Name
IN		Input Signal (±)
C		Input Signal (COM)
SM		Sensor Monitor (to C)
ALARM	SIG	Alarm Output
	COM	
−24V		Power Supply
0V		
24V		
CH		Output Current Check (to C)

★DITHER / GAIN
Use as they are since they are factory-preset to the optimum position.
(Do not touch them in normal condition.)

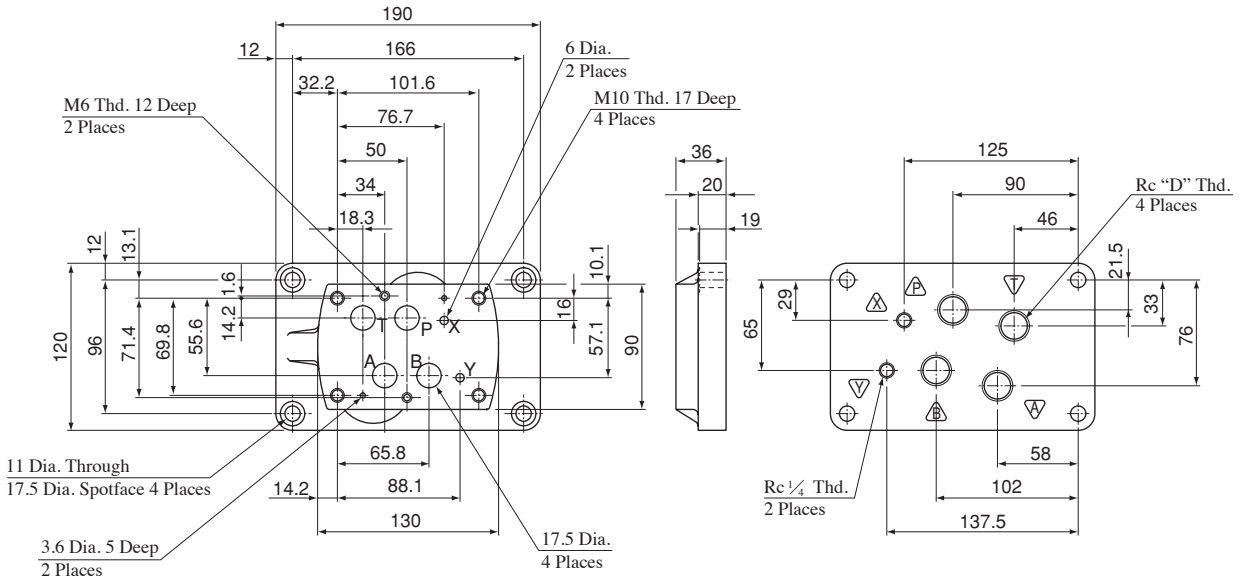
Circuit Schematic



★1. For "SM" terminal, external instruments should have input impedance of more than 10 kΩ.
★2. For "CH" terminal, external instruments should have input impedance of more than 10 kΩ.
★3. Use shielded cable for "Input" connection.
The ground of shielded cable must be connected to input signal side.

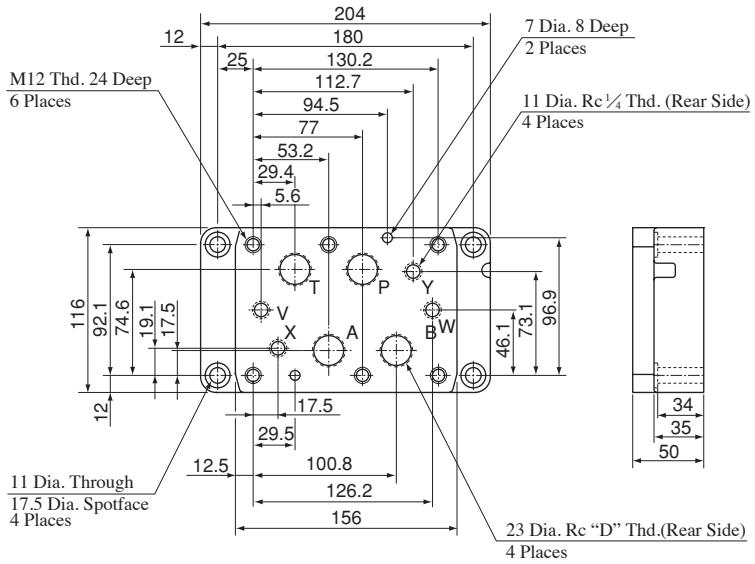
Sub-Plate

DHGM-04, 04X



Model Numbers	D
DHGM-04-20	1/2
DHGM-04X-20	3/4

DHGM-06, 06X

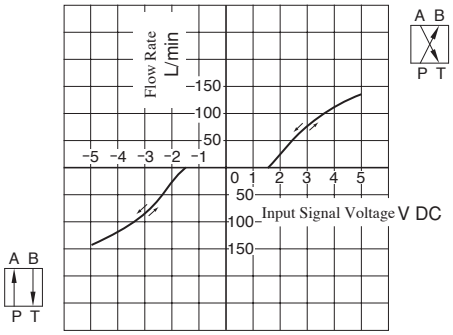


Model Numbers	D
DHGM-06-50	3/4
DHGM-06X-50	1

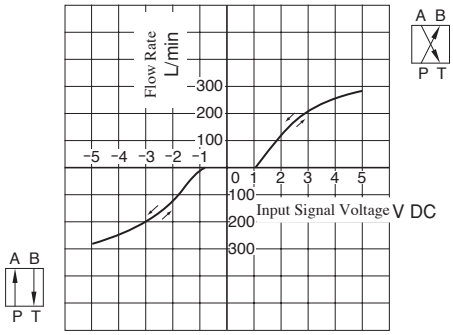
Input Signal Voltage vs. Flow

Viscosity : 30 mm²/s
Valve Pressure Difference : 1.5 MPa Const.

EHDFG-04



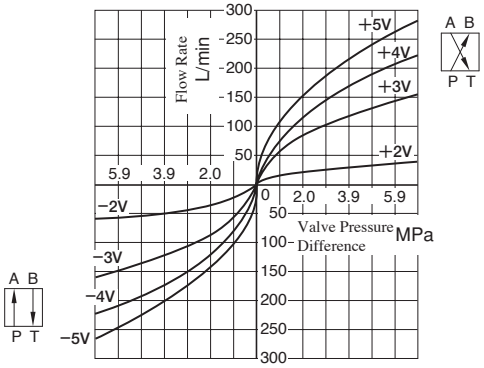
EHDFG-06



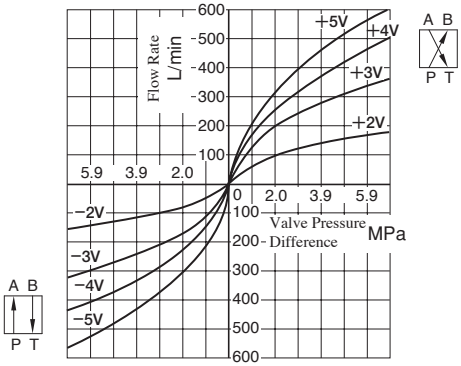
Differential Pressure vs. Metered Flow

Viscosity : 30 mm²/s

EHDFG-04

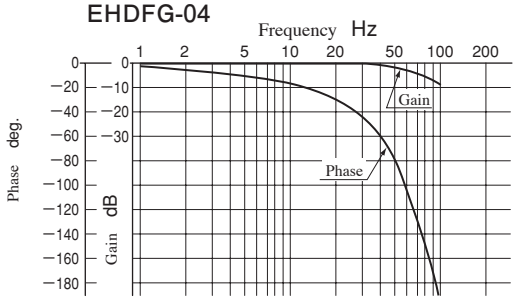


EHDFG-06



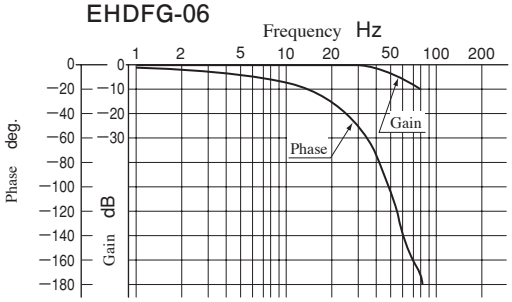
Frequency Response (Travel of Spool)

EHDFG-04



Model Number : EHDFG-04-130-2-E-10
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Rated Travel

EHDFG-06

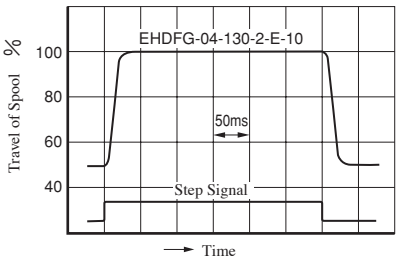


Model Number : EHDFG-06-280-2-E-10
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Rated Travel

Step Response

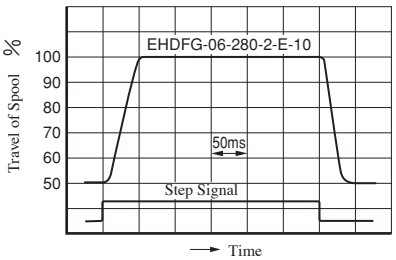
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.

EHDFG-04



Viscosity : 30 mm²/s

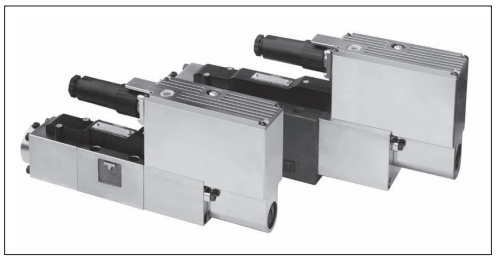
EHDFG-06



Viscosity : 30 mm²/s

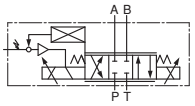
Direct Operated and High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves are closed-loop, high response type proportional electro-hydraulic directional and flow control valves with OBE (on board electronics). Two direct type models with a maximum rated flow rate up to 80 L/min (@ΔP = 1 MPa) are available. The addition of OBE to the well-received ELDFG series valves for simplified wiring offers simple operation and user-friendliness. With closed-loop control based on a combination of newly developed compact, powerful solenoids and a LVDT for spool position detection, the valves provide high response, high accuracy, and high reliability equivalent to those of simple servo valves.
2% Overlap spool type (spool type 3C2L) is suitable for position or pressure control.

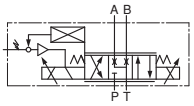


Graphic Symbols

3C2, 3C2L



3C40



Specifications

Descriptions \ Model Numbers			ELDFG-01EH			ELDFG-03EH	
			-10-3C*	-20-3C*	-35-3C*	-40-3C*	-80-3C*
Max. Operating Pressure		MPa	35			35	
Max. Tank Line Back Pressure		MPa	21				
Rated Flow [ΔP = 1 MPa (4-Way Valve)]★1		L/min	10	20	35	40	80
Hysteresis			0.1% or less				
Repeatability			0.1% or less				
Step Response Pilot Pressure : 14 MPa (Typical Rating)★2	(0→100%V)	ms	16			23	
	(100→0%V)	ms					
Frequency Response (±25% Amplitude) Pilot Pressure : 14 MPa (Typical Rating)★3	Gain: -3 dB	Hz	80			50	
	Phase: -90°	Hz					
Vibration Proof		G	10				
Protection			IP65				
Ambient Temperature		°C	-15 - +60				
Spool Stroke to Stops		mm	±2.5			±3	
Coil Resistance [20 °C]		Ω	3			2	
Current Consumption		A	2 (Impulse Load 3)				
Approx. Mass		kg	3.3			7.3	
Electric Connection			6 + PE Connector				

★1. Use the valves so that the relationship between the valve pressure difference and the flow rate, as specified in “Range of Flow Control” on page H-63, is met.
★2. This value is measured for each valve; it may differ depending on the actual circuit.
★3. There are restrictions on the mounting position. See “Mounting Position” on page H-64.

Model Number Designation

ELDF	G	-01	EH	-10	-3C2	-XY	-C	-D	-10
Series Number	Type of Mounting	Valve Size	Amplifier Type	Rated Flow L/min	Spool Type★1	Direction of Flow	Fail-Safe Function	Input Signal/Spool Travel Monitoring	Design Number
ELDF : Direct Operated and High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves	G : Sub-Plate Mounting	01 03	EH : OBE Type	10 20 35 40 80	3C2 : 10% Overlap 3C40 : A, B, T Connection 3C2L : 2% Overlap (Linear Flow Gain)	XY : Meter-In・Meter-Out	C : Neutral A : P-A, B-T Position B : P-B, A-T Position	D : Voltage Signal ±10 V (P→A→B→T Flow with Input Signal (+)) E : Current Signal 4 - 20 mA (P→A→B→T Flow with Current 12 - 20 mA Signal) F : Current Signal ±10 mA (P→A→B→T Flow with Input Signal (+))	10

★1. The spool in the neutral position is shown.
★2. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Model No.	Mounting Bolt	Qty.	Tightening Torque Nm
ELDFG-01EH	Socket Head Cap Screw: M5 × 45L	4	6 - 8
ELDFG-03EH	Socket Head Cap Screw: M6 × 35L	4	13 - 16

Note) The connector is separately available. Use a 6 + PE connector [EN175201 Part 804].

Sub-Plate

Model Number	Sub-Plate Model Numbers	Thread Size Rc	Mass	Page
ELDFG-01EH	DSGM-01-31	1/8	0.8	H-8
	DSGM-01X-31	1/4		
	DSGM-01Y-31	3/8		
ELDFG-03EH	DSGM-03-40	3/8	3	H-53
	DSGM-03X-40	1/2		
	DSGM-03Y-40	3/4	4.7	

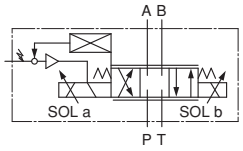
★Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish (▽).

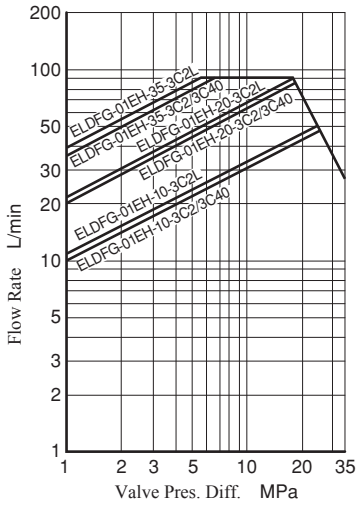
Instructions

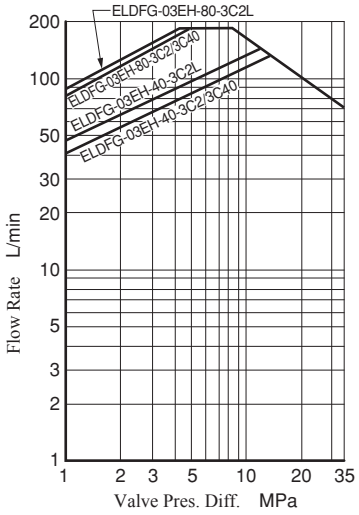
Take care of filling the valve tank port with the hydraulic oil at any time. However, check valve with cracking pressure 0.04 MPa approx. shall be provided as required. The pipe from the tank port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

Range of Flow Control

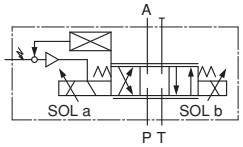
Control Method: 4-Way Valve

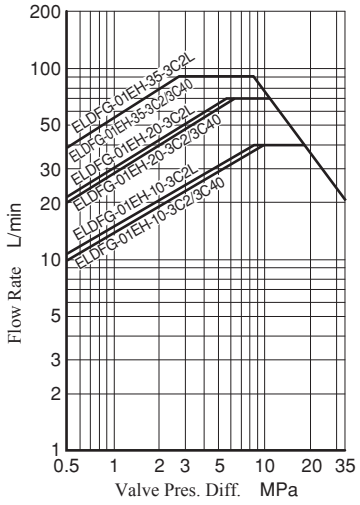


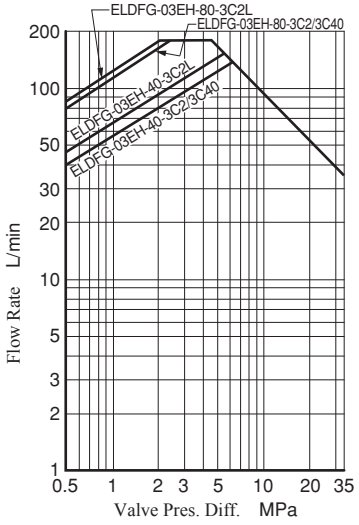




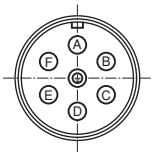
Control Method: 3-Way Valve







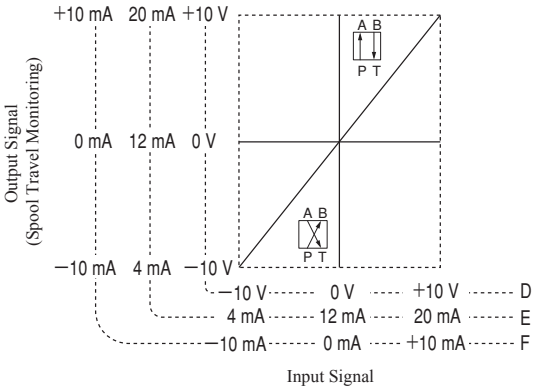
Electrical Specification



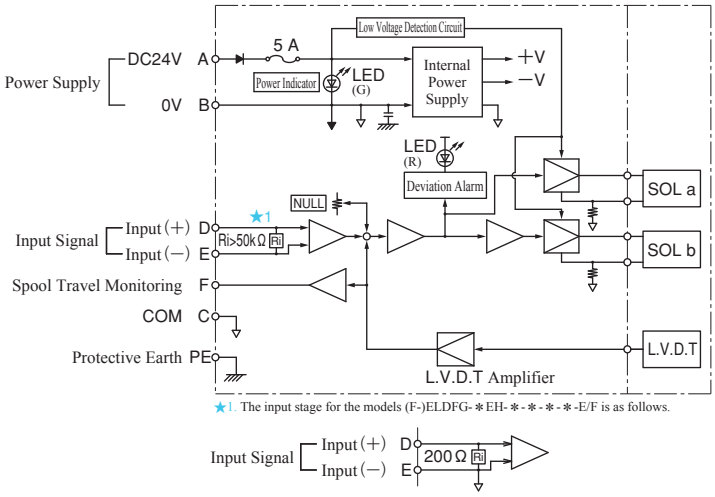
Pin \ Valve Model		ELDFG-＊EH-＊-D	ELDFG-＊EH-＊-E	ELDFG-＊EH-＊-F
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+) (Differential)★1	0 - ±10 V Ri ≧ 50 kΩ	4 - 20 mA Ri = 200 Ω	0 - ±10 mA Ri = 200 Ω
Pin E	Input (-) (Differential)★1			
Pin F	Spool Travel Monitoring	0 - ±10 V Ri ≧ 10 kΩ	4 - 20 mA Ri = 100 - 500 Ω★2	0 - ±10 mA Ri = 100 - 500 Ω★2
Pin ⏚	Protective Earth	—		

★1. Differential input signals can be used only for the valves with the voltage signal specifications of ±10 V (ELDFG-＊EH-＊-D).
★2. The recommended load resistance is 200 Ω.

I/O Signal Characteristics



Circuit Schematic



★1. The input stage for the models (F-)ELDFG-＊EH-＊-＊-＊-＊-E/F is as follows.

Details of the Valve Fail-Safe Functions

With reference to the information given table right, select the option for the fail-safe function according to the use of applications.
A separate safety circuit should be provided if the hydraulic actuator must be reliably held or stopped.

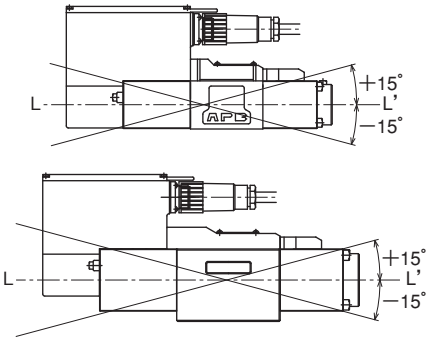
Condition: Electric System OFF

Model Numbers	Fail-Safe Function		
	Spool Position	Function	Graphic Symbol
ELDFG-＊＊EH-＊-3C2-XY-C	Neutral	All Ports Blocked	
ELDFG-＊＊EH-＊-3C2L-XY-C	Neutral	—	or or
ELDFG-＊＊EH-＊-3C40-XY-C	Neutral	A, B, T Connection	
ELDFG-01EH-＊-＊-XY-A	about 20%	PABT Position	
ELDFG-03EH-＊-＊-XY-A	about 17%		
ELDFG-01EH-＊-＊-XY-B	about 20%	PBAT Position	
ELDFG-03EH-＊-＊-XY-B	about 17%		

★The fail-safe function's activation time depends on the electric and hydraulic conditions.

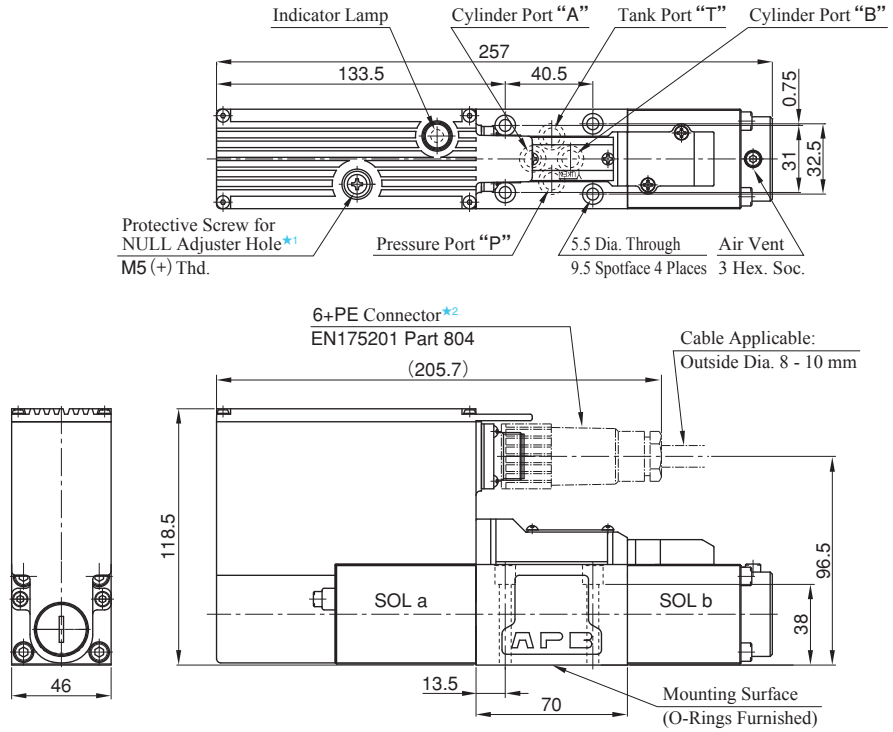
Mounting Position

Mount the valve with the angle of the axis line L-L′ within about ±15° from the horizontal plane, as shown in the right figures. If the axial direction of the spool corresponds to the principal vibration direction, an external force may cause the spool to malfunction. The valve must be mounted in such a way that the axial direction of the spool does not correspond to the principal vibration direction.



ELDFG-01EH-＊-＊-XY-＊-＊-10

Mounting surface: ISO4401-AB-03-02-0-05



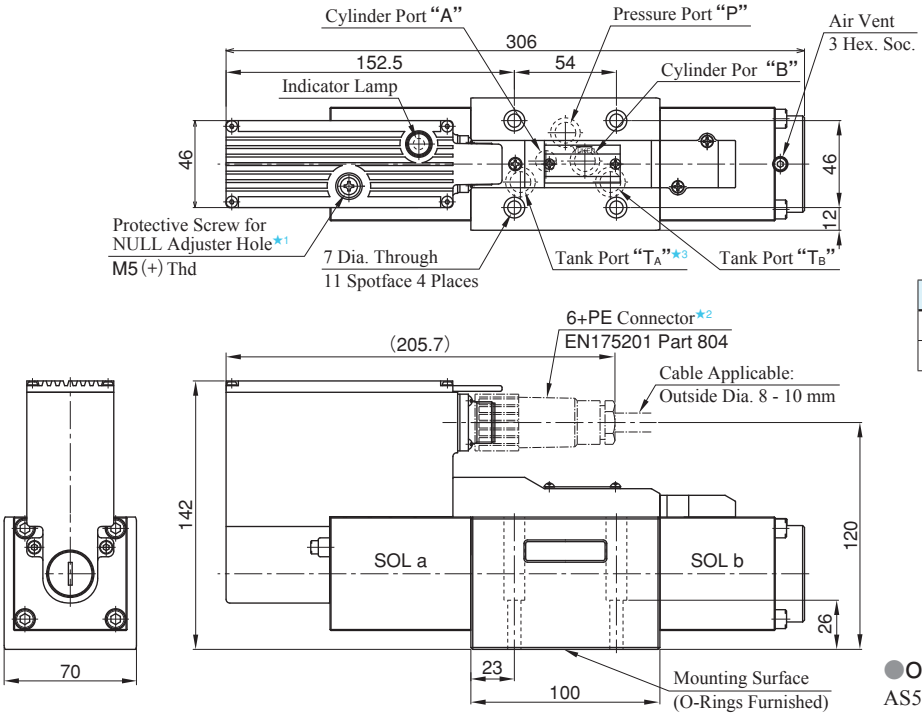
Color	Indicator Lamp
Green	Power Supply
Red	Deviation Alarm

●O-Rings for the Ports
AS568-012 (NBR-90): 4 Pieces

★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.
★2. The 6 + PE connector is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1
Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (H-8) in common use.

ELDFG-03EH-＊-＊-XY-＊-＊-10

Mounting surface: ISO4401-05-04-0-05



Color	Indicator Lamp
Green	Power Supply
Red	Deviation Alarm

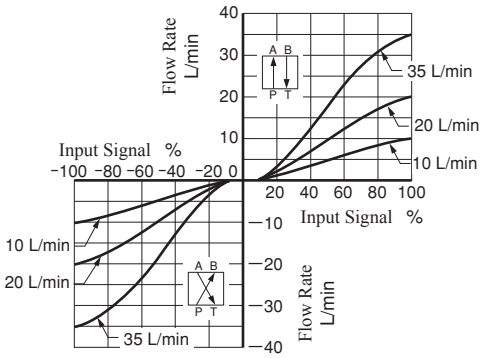
●O-Rings for the Ports
AS568-014 (NBR-90): 5 Pieces

★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.
★2. The 6 + PE connector is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1
★3. With standard sub-plates, one ("TA") of the two tank ports is used, but either one may be used.
Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (H-53) in common use.

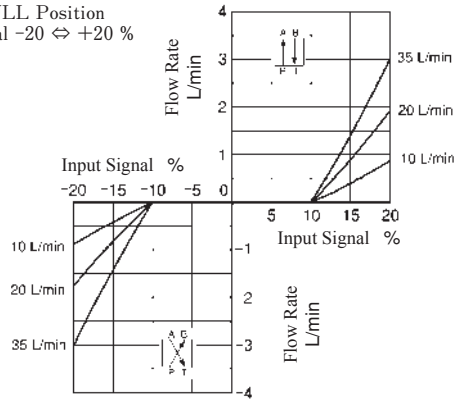
No-Load Flow Characteristics

〈Conditions〉●Valve Pressure Difference: 1 MPa ●Viscosity: 30 mm²/s

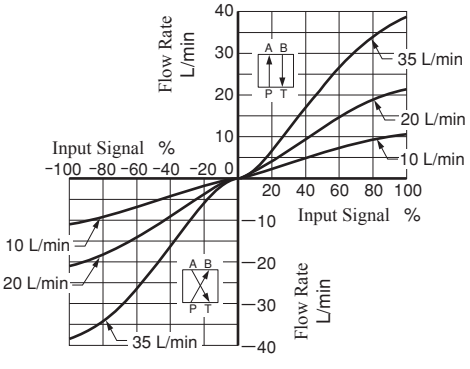
ELDFG-01EH-＊-3C2/3C40-XY-＊-＊-10



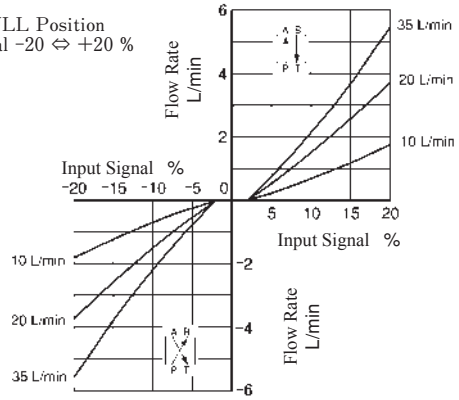
Around NULL Position
Input Signal −20 ⇔ +20 %



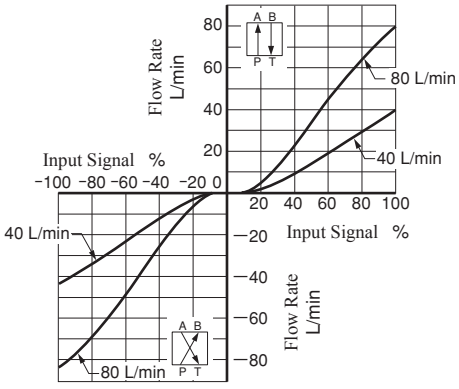
ELDFG-01EH-＊-3C2L-XY-＊-＊-10



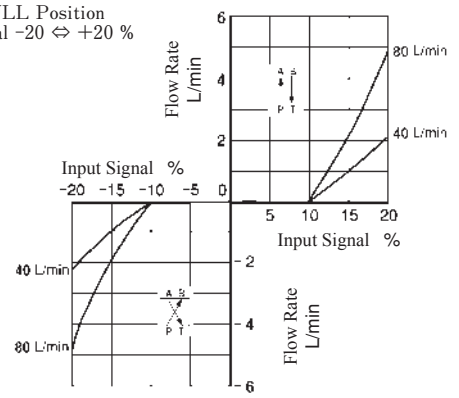
Around NULL Position
Input Signal −20 ⇔ +20 %



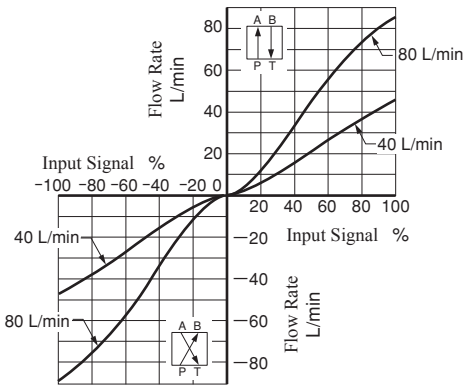
ELDFG-03EH-＊-3C2/3C40-XY-＊-＊-10



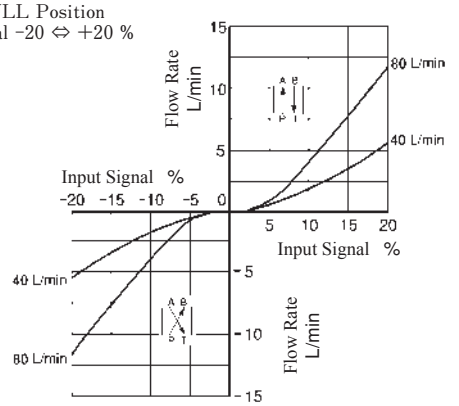
Around NULL Position
Input Signal −20 ⇔ +20 %



ELDFG-03EH-＊-3C2L-XY-＊-＊-10



Around NULL Position
Input Signal −20 ⇔ +20 %

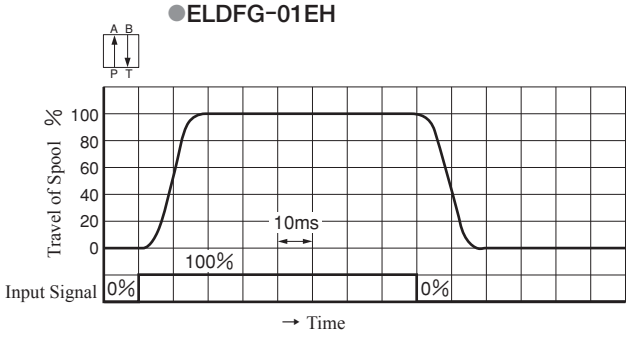


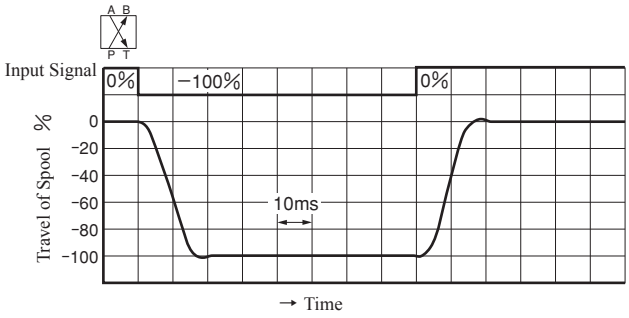
Step Response (Example)

〈Conditions〉●Hydraulic Circuit: Port A/B Closed ●Input Signal: 0 ↔ 100% ●Viscosity: 30 mm²/s

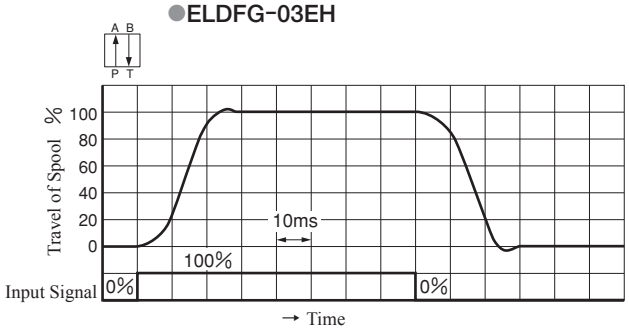
This value is measured for each valve; it may differ depending on the actual circuit.

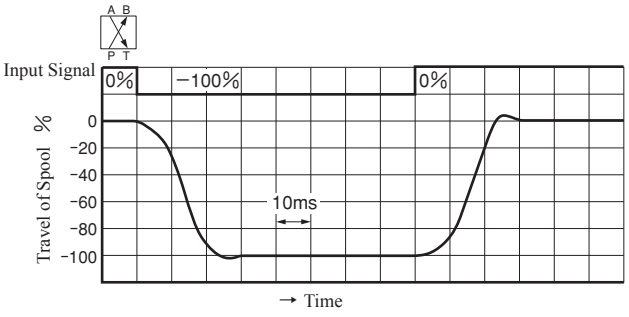
●ELDFG-01EH





●ELDFG-03EH

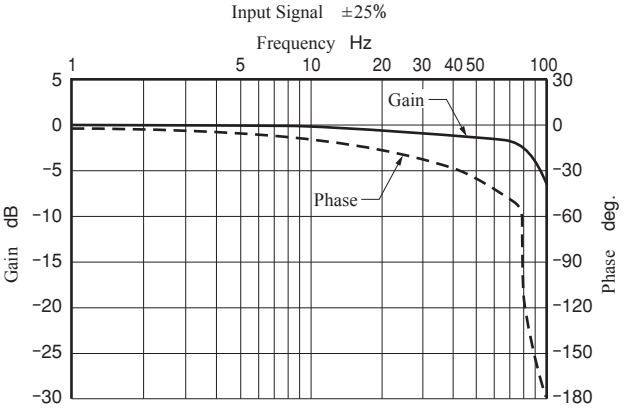


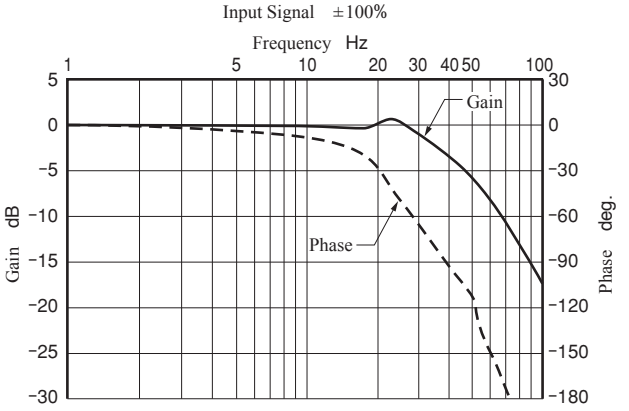


Frequency Response

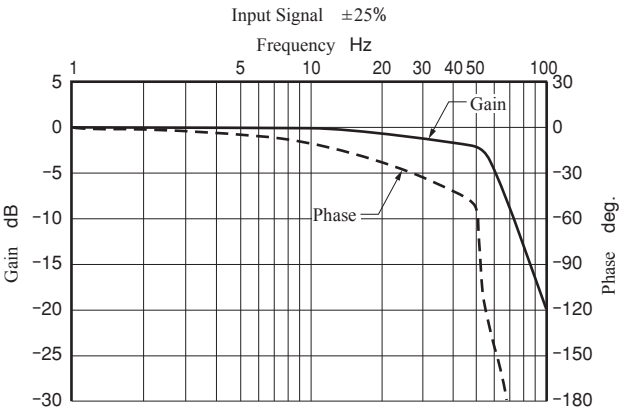
〈Conditions〉●Hydraulic Circuit: Port A/B Closed ●Supply Pressure: 14 MPa ●Viscosity: 30 mm²/s

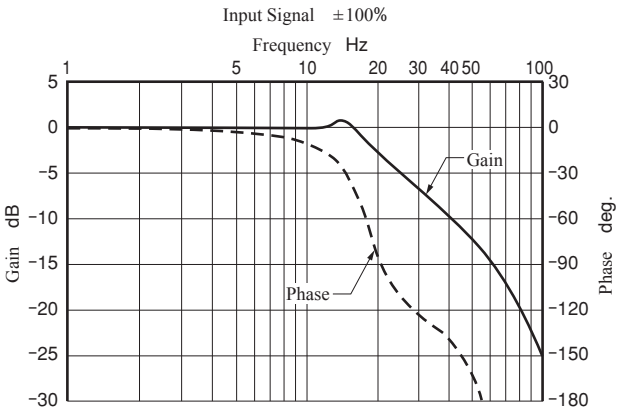
●ELDFG-01EH





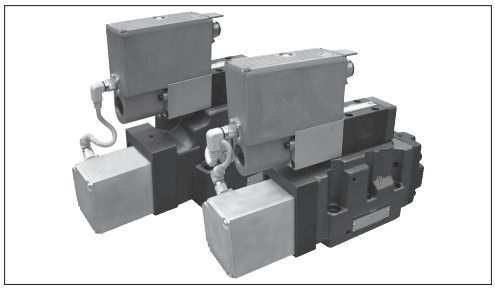
●ELDFG-03EH





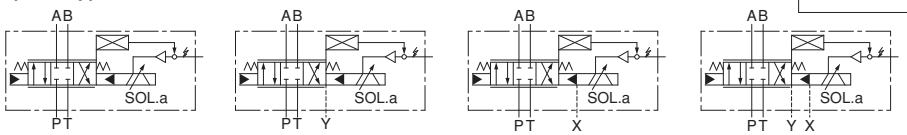
High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves (Two Stage Type)

These are high flow rate and two stage type valves as an addition to our highly appreciated product series: OBE type direct operated and high response proportional electro-hydraulic directional and flow control valve series.



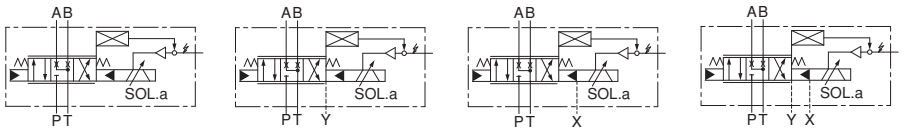
Graphic Symbols

Spool Type "3C2", "3C2P", "3C2L"

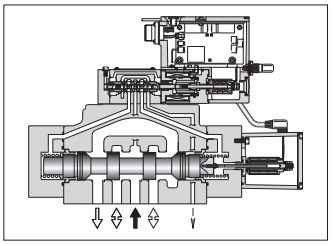


Internal Pilot Internal Drain Type | Internal Pilot External Drain Type | External Pilot Internal Drain Type | External Pilot External Drain Type

Spool Type "3C40"



Internal Pilot Internal Drain Type | Internal Pilot External Drain Type | External Pilot Internal Drain Type | External Pilot External Drain Type



* "SOL.a" is for the model 04EH & 03EH.
For the model-06EH & 10EH, it is "SOL.b"

Specifications

Descriptions \ Model Numbers				ELDFHG-03EH-100-3C2L	ELDFHG-03EH-100-*	ELDFHG-04EH	ELDFHG-06EH-350	ELDFHG-06EH-500	ELDFHG-10EH
Rated Flow [ΔP=1 MPa (4-Way Valve)] ΔP = 0.5 MPa per Land			L/min	90	100	280	350	500	1440
Max. Operating Pressure			MPa	31.5		35		31.5	35
Proof Pres. at Return Port★1	External Drain T Port		MPa	21		31.5	35	25	28
	External Drain Y Port		MPa	21					
	Internal Drain T & Y Ports		MPa	21					
Pilot Pressure★2			MPa	1.5 to 25					
Pilot Flow Rate★3			L/min	5 or more		11 or more	12 or more	16 or more	17 or more
Internal Leakage Supply Pressure: 14MPa Pilot Pressure: 14MPa Fluid Viscosity: 32mm²/s	Pilot Valve		L/min	1.5 or less		1.8 or less			1.5 or less
	Main Valve L/min	3C2		3C2L:1.6 or less	3C2:0.5 or less 3C40:1.0 or less 3C2P:5.6 or less	0.8 or less	0.9 or less	1.0 or less	5.0 or less
		3C40				1.6 or less	1.8 or less	1.8 or less	9.0 or less
		3C2P				6.8 or less	7.0 or less	8.0 or less	14.5 or less
		3C2L				2.1 or less	2.5 or less	2.5 or less	11.5 or less
Hysteresis				0.2% or less		0.1% or less			0.1% or less
Step Response (0 <=> 100%) V Pilot Pressure: 14MPa (Typical Rating)★4			ms	15	14	20	20	22	28
Frequency Response ±25% Amplitude Pilot Pressure: 14MPa (Typical Rating)★4	Phase: -90°		Hz	50	55	51	50	45	33
	Gain: -3 dB		Hz	56	60	56			40
Vibration Proof★5			m/s²	100					
Protection				Equivalent to IP65					
Ambient Temperature			℃	-15 - +60					
Spool Stroke to Stops			mm	±4	±3.5	±5	±5	±7	±7
Spool End Area			cm²	3		7	8	8	11.3
Current			A	2 (Impulse Loud 3)					
Coil Resistance at 20 ℃			Ω	3					
Approx. Mass			kg	10.7	8.2	13	19		74.5
Electric Connection				6 + PE Connector [EN 175201 Part 804]					

★1. Pressure at the return port should be the actual supply pressure or less.
★2. Supply pressure for the pilot valve should be within the range described above and should also be 60% of the actual main valve supply pressure or more.
★3. Pilot flow is calculated with the above step response time at pilot pressure 14 MPa.
★4. This value is measured on a per-valve basis under the conditions described above; it may differ depending on the actual circuit and operating conditions.
★5. There are restrictions on the mounting position. See page H-71 for details.

Model Number Designation

ELDFHG	- 04	EH	- 280	-3C2P	- XY	-E	T	- C	-D	-10
Series Number	Valve Size	Amplifier Type	Rated Flow L/min ΔP= 1 MPa (4-Way Valve)	Spool Type	Direction of Flow	Pilot Type	Drain Type	Fail-Safe Function	Input Signal/ Spool Travel Monitoring	Design Number
ELDFHG: Two Stage Type High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves (Sub-Plate Mounting)	03	EH: OBE Type	100★2	3C2: 10% Overlap 3C40: A, B, T Connection	XY: Meter-In /Meter-Out	None: Internal Pilot E: External Pilot	None: External Drain T: Internal Drain	C: Neutral	D: Voltage Signal ± 10 V (PABT Flow with Positive Input) E: Current Signal 4 to 20 mA (PABT Flow with 12 to 20 mA Input) F: Current Signal ± 10 mA (PABT Flow with Positive Input)	10
				3C2P: Zero Lap (Dual Flow Gain) 3C2L: 2% Overlap (Linear Flow Gain)				A: P→A,B→T Position (Valve Opening: 20%) B: P→B,A→T Position (Valve Opening: 20%)		
	04		280	3C2: 10% Overlap 3C40: A, B, T Connection				C: Neutral		
				3C2P: Zero Lap (Dual Flow Gain) 3C2L: 2% Overlap (Linear Flow Gain)				A: P→A,B→T Position (Valve Opening: 10%) B: P→B,A→T Position (Valve Opening: 10%)		
	06		350 500	3C2: 10% Overlap 3C40: A, B, T Connection				C: Neutral		
				3C2P: Zero Lap (Dual Flow Gain) 3C2L: 2% Overlap (Linear Flow Gain)				A: P→A,B→T Position (Valve Opening: 10%) B: P→B,A→T Position (Valve Opening: 10%)		
	10		1440	3C2: 10% Overlap 3C40: A, B, T Connection				C: Neutral		
				3C2P: Zero Lap (Dual Flow Gain) 3C2L: 2% Overlap (Linear Flow Gain)				A: P→A,B→T Position (Valve Opening: 20%) B: P→B,A→T Position (Valve Opening: 20%)		

★1. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

★2. In case of spool type "3C2L", it is 90L/min.

Details of the Valve Fail-Safe Functions

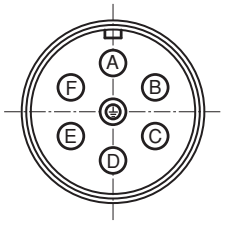
With reference to the information given below, select the option for the fail-safe function according to the use of applications.

A separate safety circuit should be provided if the hydraulic actuator must be reliably held or stopped.

No.	Model Numbers	Fail-Safe Function	
		Spool Position	Function
1	ELDFHG-＊EH-＊-3C2-XY-＊＊-C	Neutral	All Ports Blocked
2	ELDFHG-＊EH-＊-3C40-XY-＊＊-C	Neutral	A, B, T Connection
3	ELDFHG-＊EH-＊-3C2L/3C2P-XY-＊＊-A	Valve Opening: 10% (04EH, 06EH) Valve Opening: 20% (03EH, 10EH)	PABT Position
4	ELDFHG-＊EH-＊-3C2L/3C2P-XY-＊＊-B	Valve Opening: 10% (04EH, 06EH) Valve Opening: 20% (03EH, 10EH)	PBAT Position

＊The fail-safe function's activation time depends on the electric and hydraulic conditions.

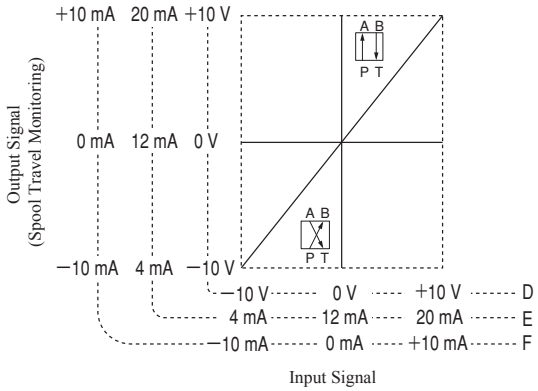
Electrical specifications



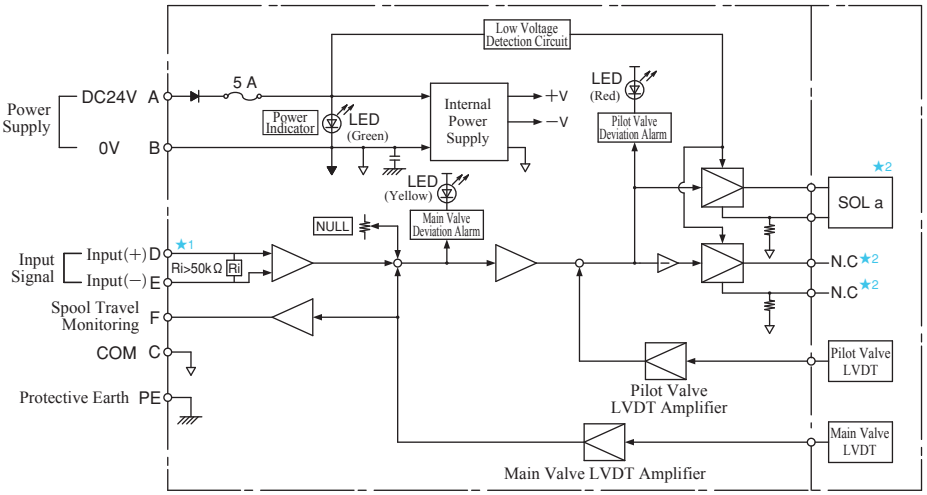
Input Signal		Voltage Signal "D"	Current Signal "E"	Current Signal "F"
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+)(Differential)★2	0-±10 V Ri ≧ 50 kΩ	4-20 mA Ri = 200 Ω	0-±10 mA Ri = 200 Ω
Pin E	Input (−)(Differential)★2			
Pin F	Spool Travel Monitoring	0-±10 V R_L ≧ 10 kΩ	4-20 mA R_L = 100-500 Ω★1	0-±10 mA R_L = 100-500 Ω★1
Pin ⏚	Protective Earth	—		

★1. The recommended load resistance is 200 Ω.
★2. Differential input signals can be used only for the valves with the voltage signal specifications of ±10V. (ELDFHG-∗EH-∗-D)

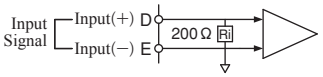
I/O Signal Characteristics



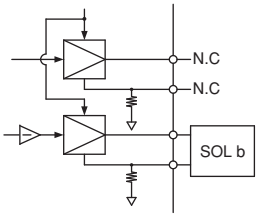
Block Diagram



★1. The input stage for the current signal "E" and "F" is as follows.



★2. The solenoid name is for the model ELDFHG-03EH & 04EH. The name for the model ELDFHG-06EH & 10EH are as follows.



Accessories

Mounting Bolts

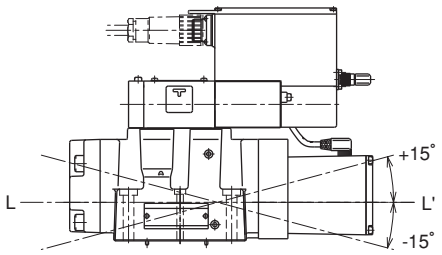
Valve Model Number	Mounting Bolt	Qty.	Tightening Torque Nm
ELDFHG-03EH	Hex. Socket Head Cap Screw: M6 × 35L	4	12.9 - 15.9
ELDFHG-04EH	Hex. Socket Head Cap Screw: M6 × 55L	2	
	Hex. Socket Head Cap Screw: M10×60L	4	60.6 - 74.1
ELDFHG-06EH	Hex. Socket Head Cap Screw: M12×85L	6	104 - 127
ELDFHG-10EH	Hex. Socket Head Cap Screw: M20×90L		493 - 603

Instructions

Take care of filling the valve tank port with the hydraulic oil at any time.
However, check valve with cracking pressure 0.04 MPa approx. shall be provided as required.
The pipe from the tank port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

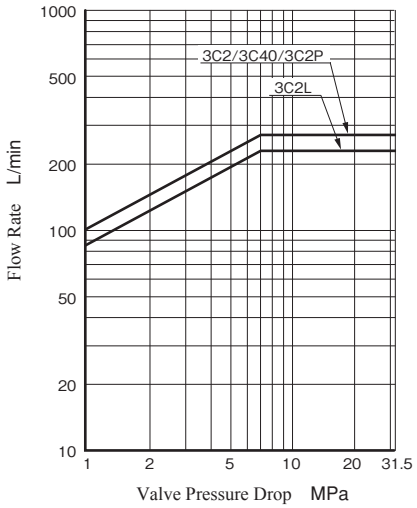
Mounting Position

Mount the valve with the angle of the axis line L-L' within about ±15° from the horizontal plane as shown in the right figure. When the principal vibration direction is consistent with the axial direction of the spool, the spool may malfunction due to external force. Make sure that the principal vibration direction is not consistent with the axial direction of the spool.

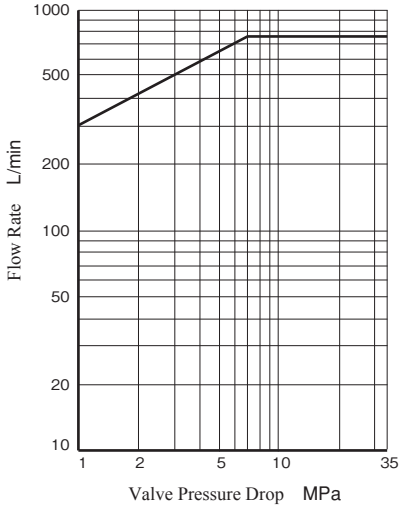


The Effective Range of The Fail-Safe Function

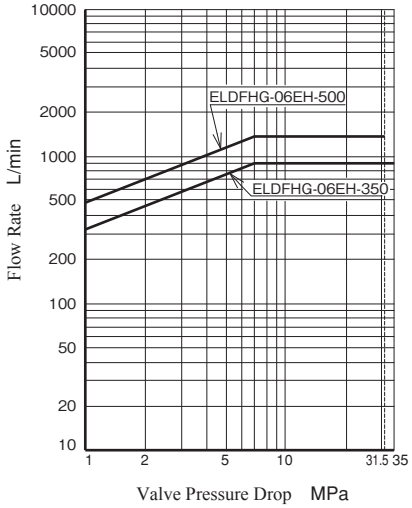
ELDFHG-03EH-100-3C2/3C40/3C2P/3C2L



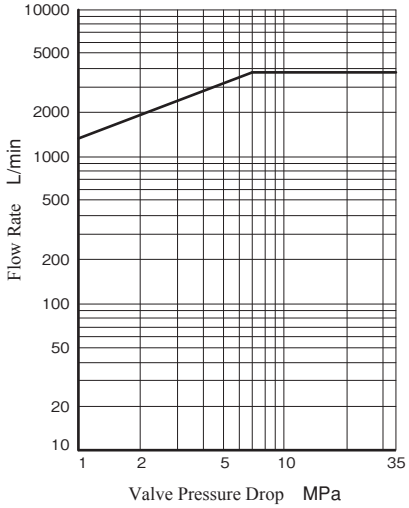
ELDFHG-04EH



ELDFHG-06EH

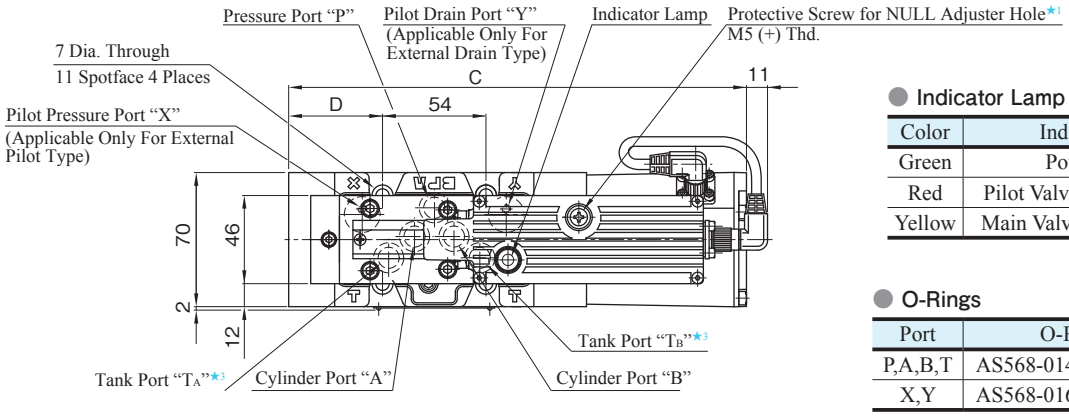


ELDFHG-10EH



ELDFHG-03EH-100-＊-XY-＊＊-＊-＊-10

Mounting Surface: ISO 4401-05-05-0-05

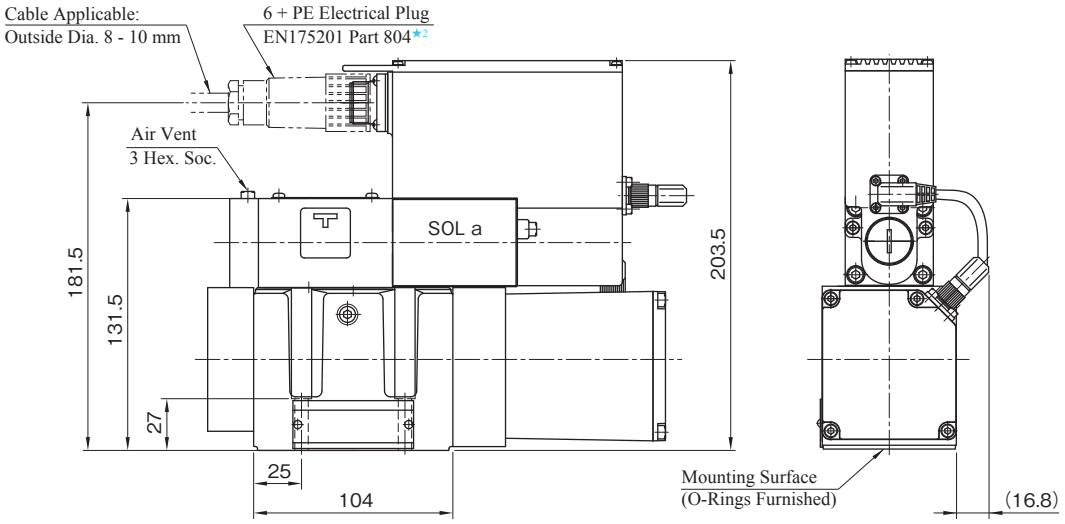


Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

O-Rings

Port	O-Ring	Qty.
P,A,B,T	AS568-014 (NBR-90)	5
X,Y	AS568-016 (NBR-90)	2

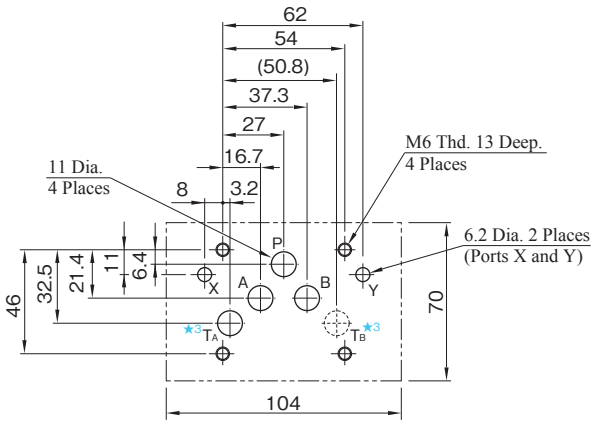


Model Numbers	C	D
ELDFHG-03EH-100-3C2/3C40/3C2P	239	49
ELDFHG-03EH-100-3C2L	248	58

Dimensions of Mounting Surface

Prepare the mounting surface as shown below.

The mounting surface should have a good machined finish. (▽6)



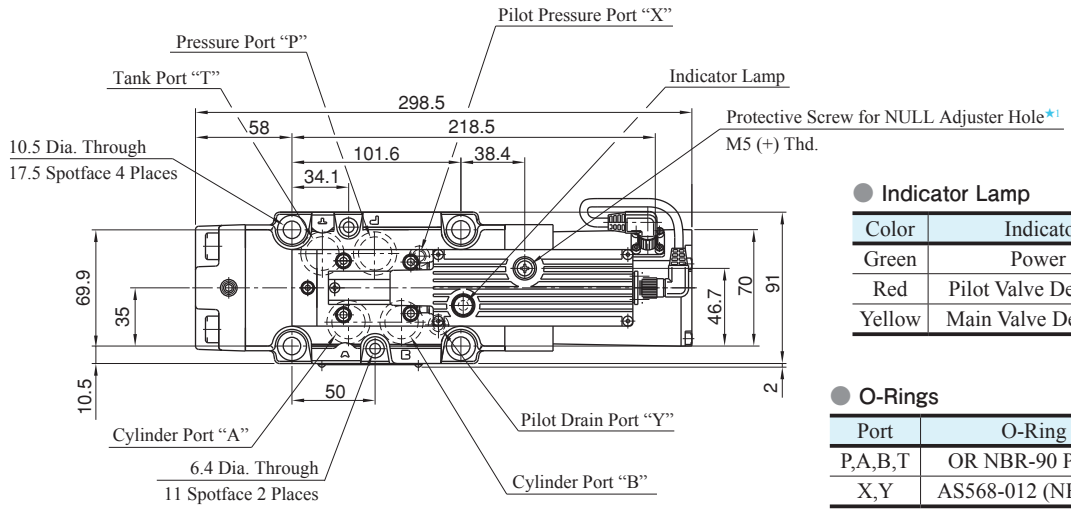
★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.

★2. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately. YUKEN parts number: TK290457-1

★3. There are two tank ports "TA" and "TB"; however, "TA" may be used alone.

ELDFHG-04EH-280-＊-XY-＊＊-＊-＊-10

Mounting Surface: ISO 4401-07-07-0-05

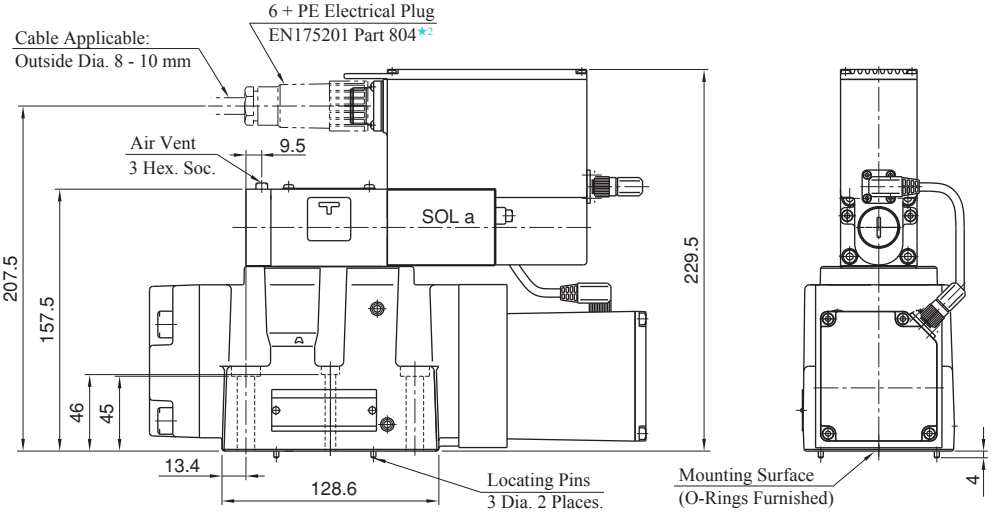


Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

O-Rings

Port	O-Ring	Qty.
P,A,B,T	OR NBR-90 P22-N	4
X,Y	AS568-012 (NBR-90)	2



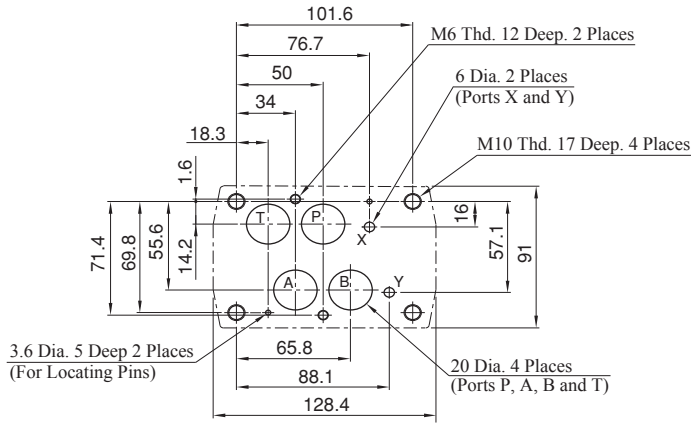
★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw.
After adjustment, be sure to attach the protective screw.

★2. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1

Dimensions of Mounting Surface

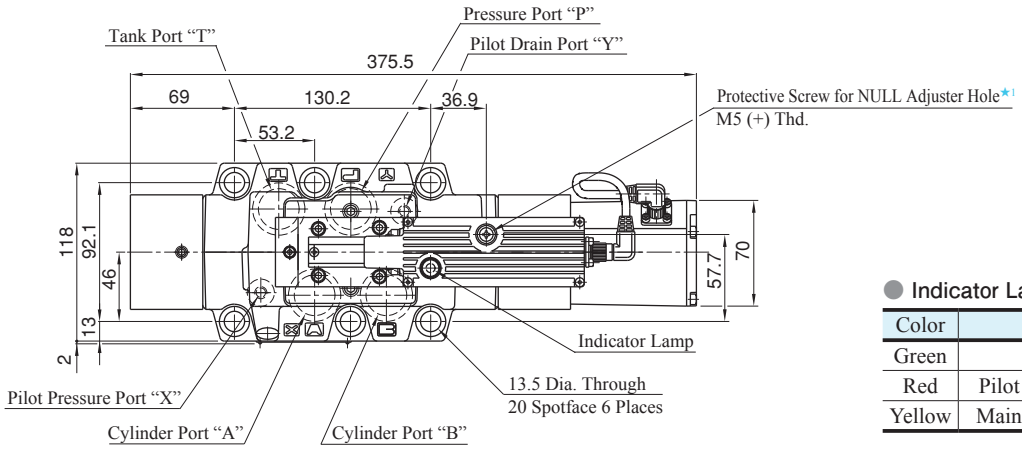
Prepare the mounting surface as shown below.

The mounting surface should have a good machined finish. (1.6▽)



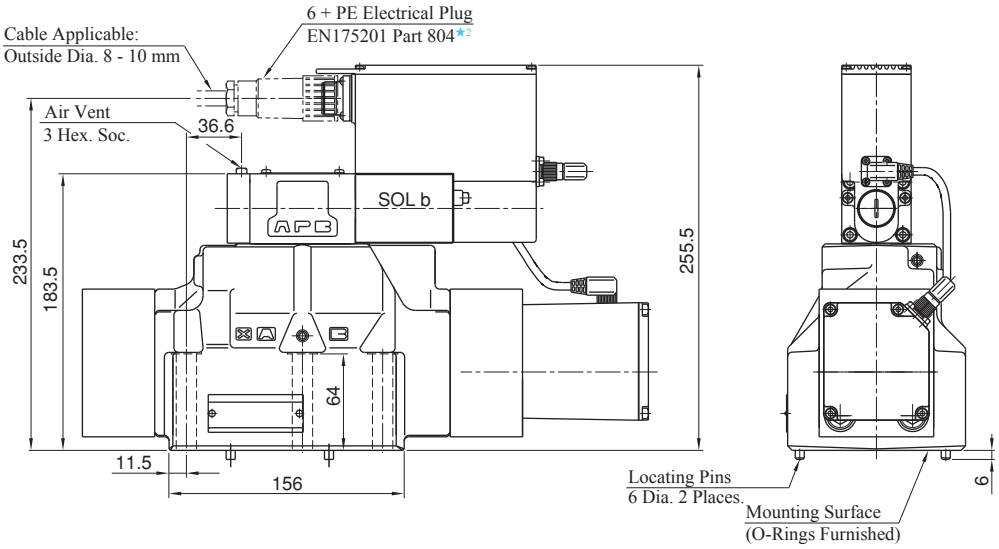
ELDFHG-06EH-350/500-＊-XY-＊＊-＊-＊-10

Mounting Surface: ISO 4401-08-08-0-05



Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm



O-Rings

Port	Model Numbers	O-Ring	Qty.
P,A,B,T	ELDFHG-06EH-350	AS568-123 (NBR-90)	4
	ELDFHG-06EH-500	AS568-126 (NBR-90)	4
X,Y	ELDFHG-06EH-350/500	OR NBR-90 P14-N	2

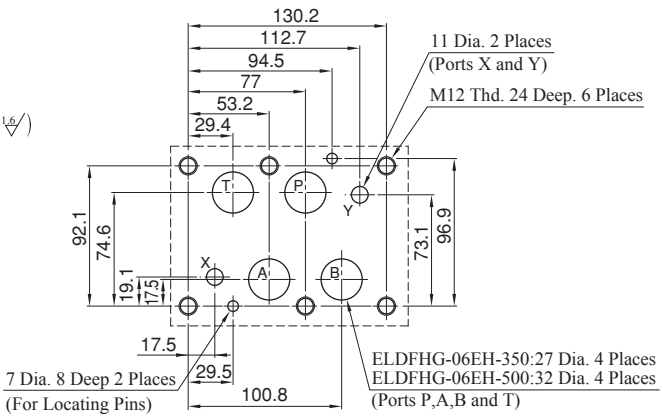
★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw.
After adjustment, be sure to attach the protective screw.

★2. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1

Dimensions of Mounting Surface

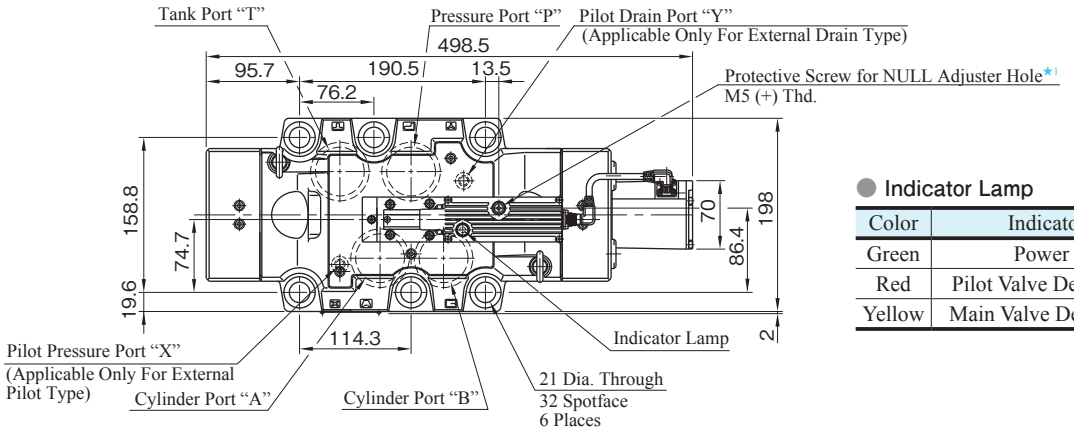
Prepare the mounting surface as shown in the right figure

The mounting surface should have a good machined finish. (1.6)



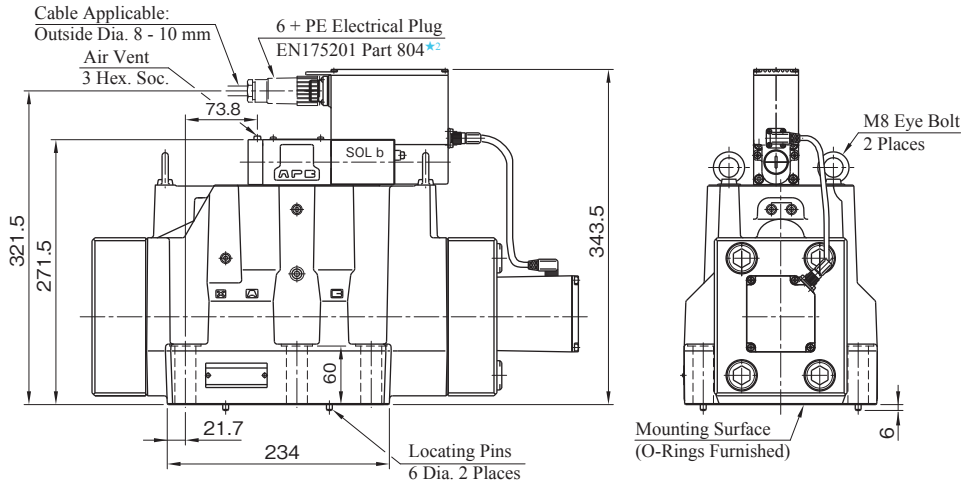
ELDFHG-10EH-1440-＊-XY-＊＊-＊-＊-10

Mounting Surface: ISO 4401-10-09-0-05



Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm



O-Rings

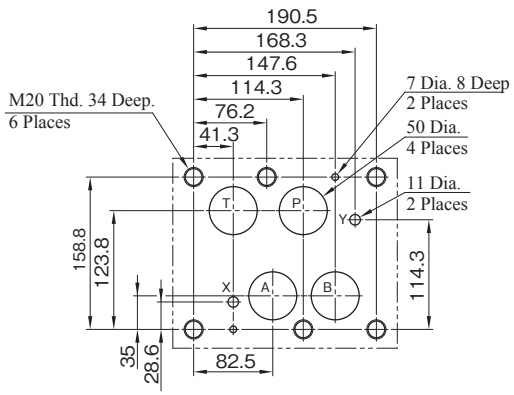
Port	O-Ring	Qty.
P,A,B,T	AS568-227 (NBR-90)	4
X,Y	AS568-015 (NBR-90)	2

★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw.
After adjustment, be sure to attach the protective screw.
★2. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1

Dimensions of Mounting Surface

Prepare the mounting surface as shown in the below figure

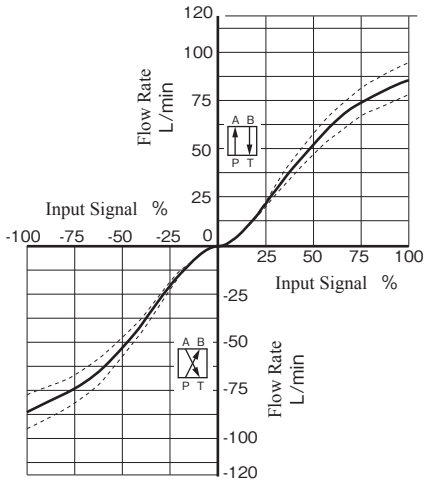
The mounting surface should have a good machined finish. (1.6▽)



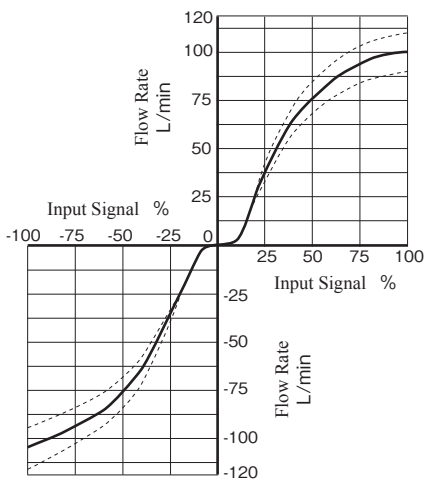
No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: 1 MPa (4-Way Valve/Pressure Difference per Land: 0.5 MPa)
●Viscosity: 30 mm^2/s

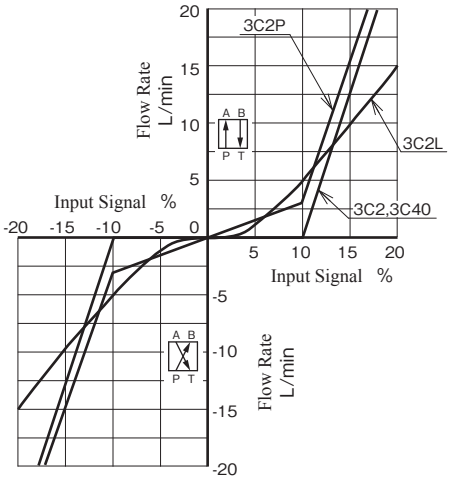
ELDFHG-03EH-100-3C2L



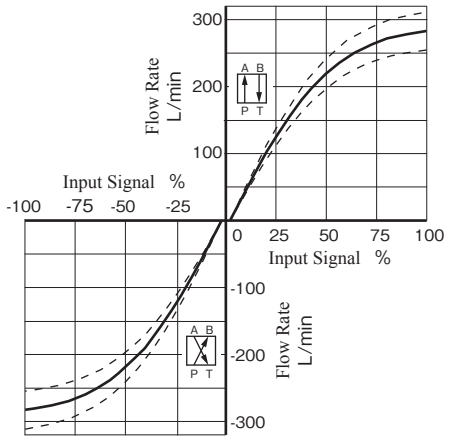
ELDFHG-03EH-100-3C2/3C40/3C2P



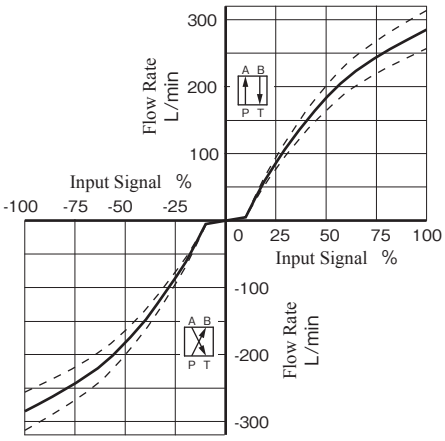
Around Null Position
Input Signal -20⇔+20%



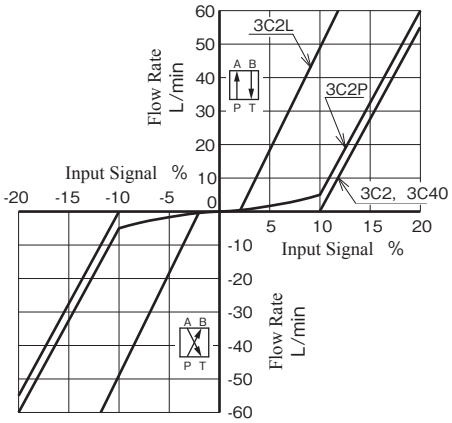
ELDFHG-04EH-280-3C2L



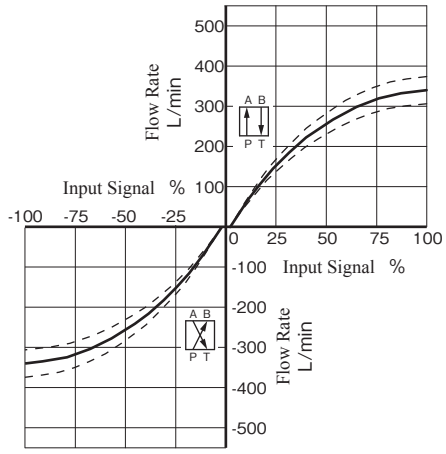
ELDFHG-04EH-280-3C2/3C40/3C2P



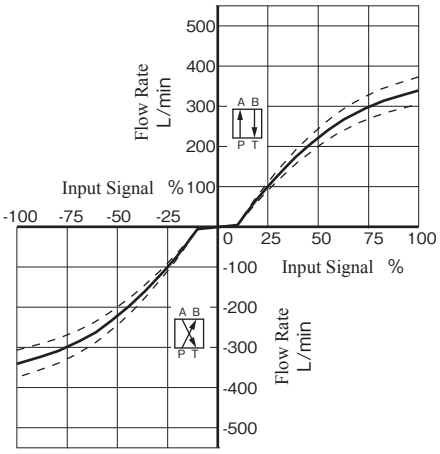
Around Null Position
Input Signal -20⇔+20%



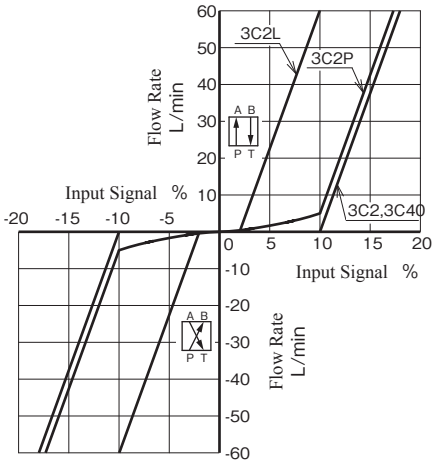
ELDFHG-06EH-350-3C2L



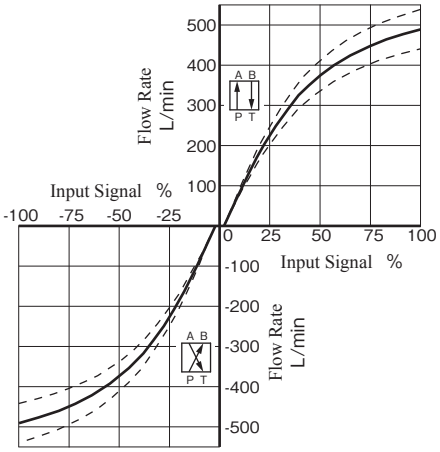
ELDFHG-06EH-350-3C2/3C40/3C2P



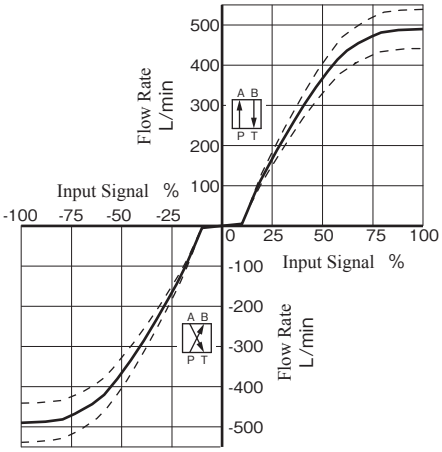
Around Null Position
Input Signal -20⇔+20%



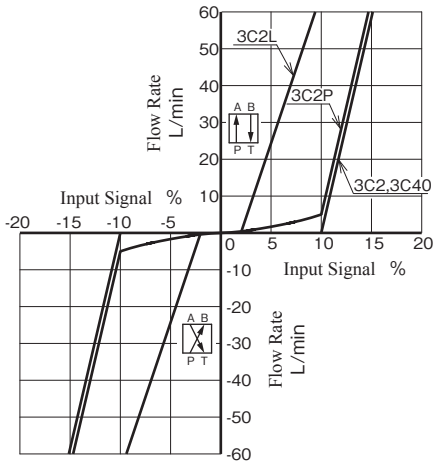
ELDFHG-06EH-500-3C2L



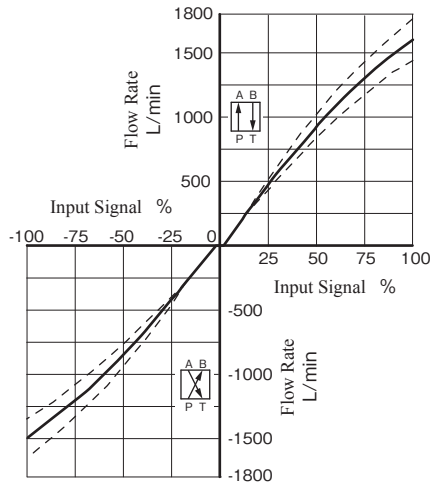
ELDFHG-06EH-500-3C2/3C40/3C2P



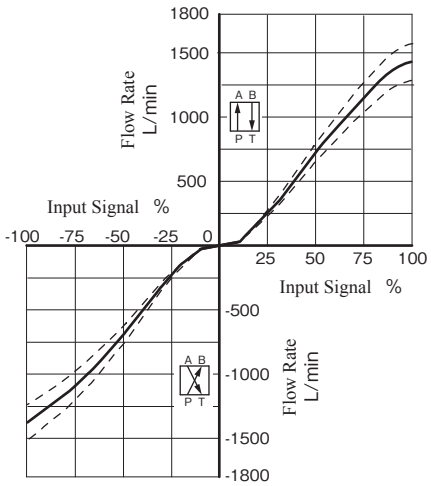
Around Null Position
Input Signal -20⇔+20%



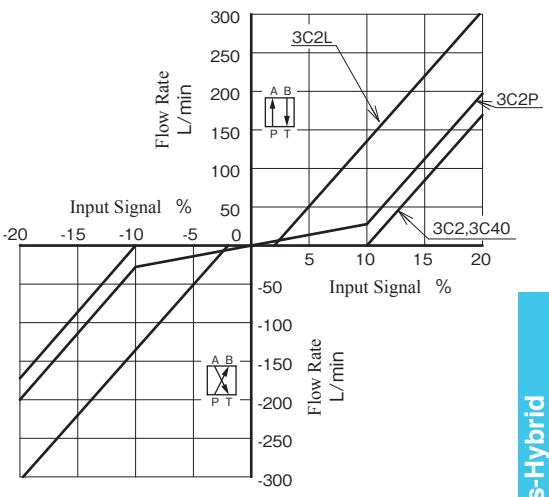
ELDFHG-10EH-1440-3C2L



ELDFHG-10EH-1440-3C2/3C40/3C2P



Around Null Position
Input Signal -20⇔+20%

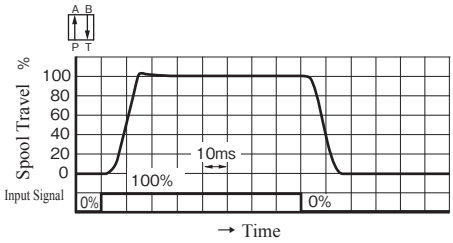


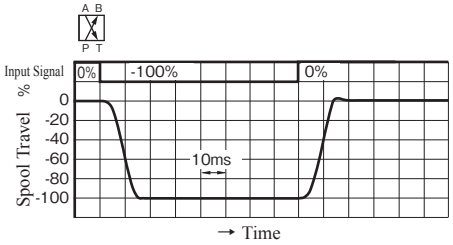
Step Response (Example)

〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply Pressure and Pilot Pressure: 14 MPa
●Input Signal: 0⇔100% ●Viscosity: 30 mm²/s

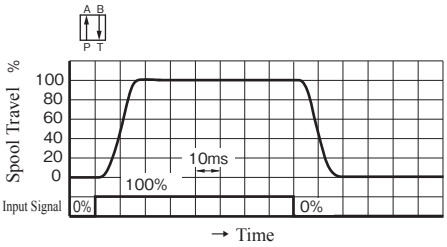
This value is measured on a per valve basis; the actual step response may differ depending on the actual circuit.

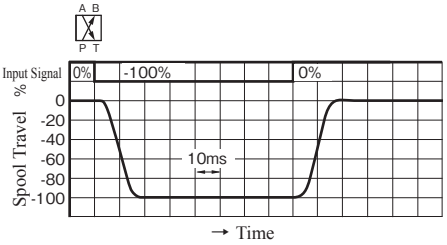
ELDFHG-03EH-100-3C2/3C40/3C2P



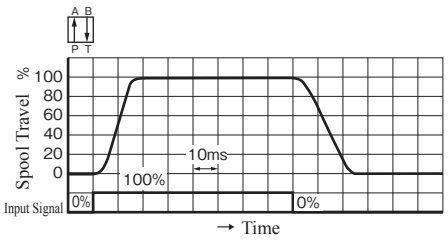


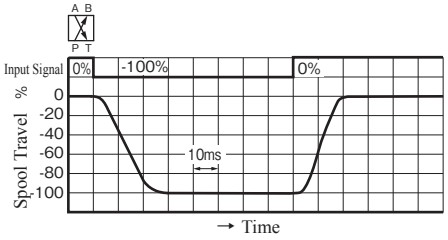
ELDFHG-03EH-100-3C2L



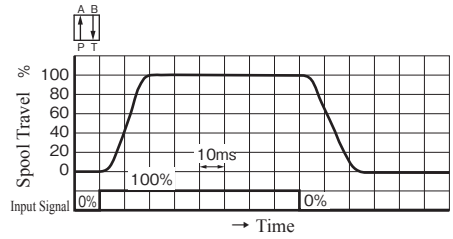


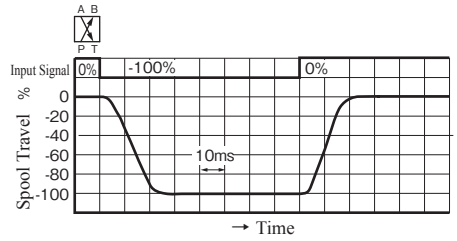
ELDFHG-04EH



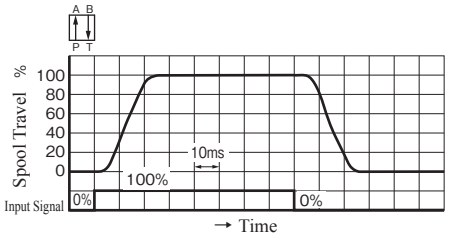


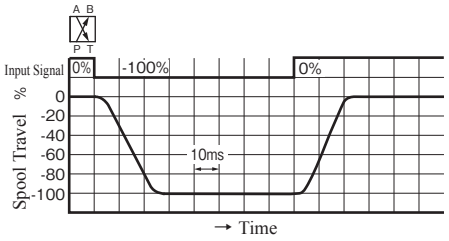
ELDFHG-06EH-350



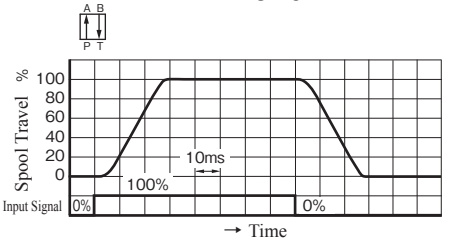


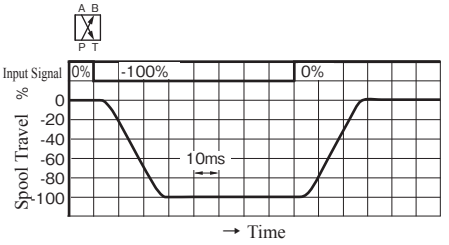
ELDFHG-06EH-500





ELDFHG-10EH



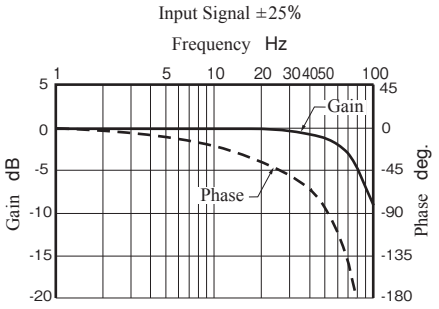


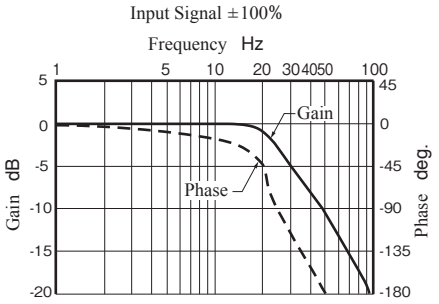
Frequency Response (Example)

〈Conditions〉 ●Hydraulic Circuit: Port A/B Closed ●Supply Pressure and Pilot Pressure: 14 MPa
●Viscosity: 30 mm²/s

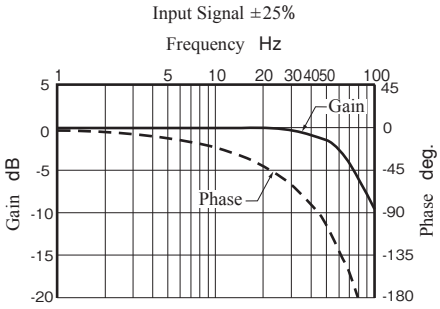
This value is measured on a per valve basis; the actual frequency response may differ depending on the actual circuit.

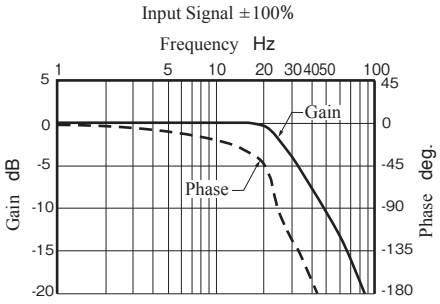
ELDFHG-03EH-100-3C2/3C40/3C2P



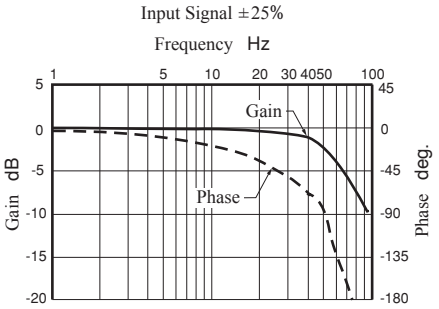


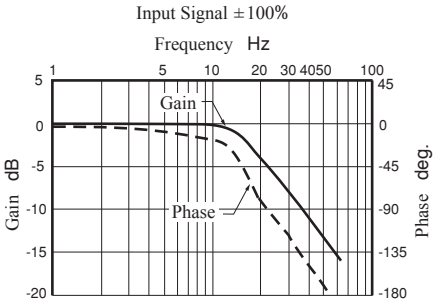
ELDFHG-03EH-100-3C2L



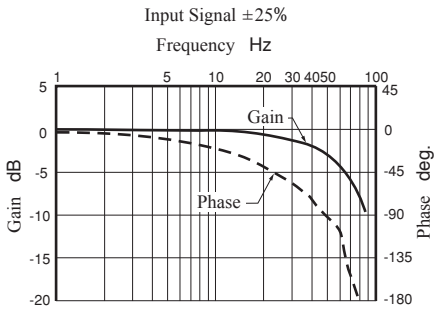


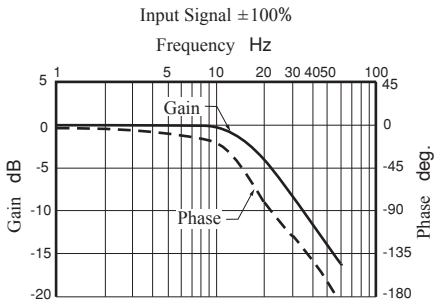
ELDFHG-04EH



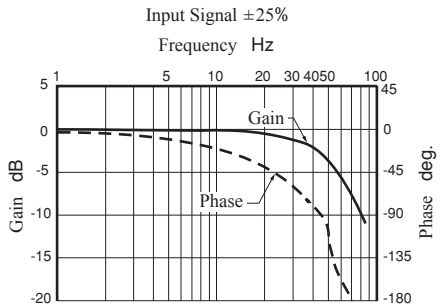


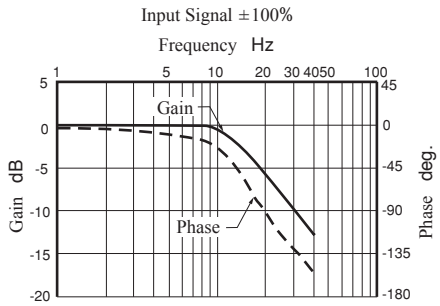
ELDFHG-06EH-350



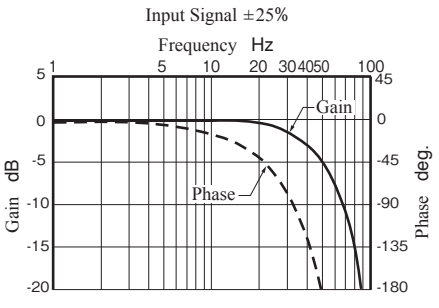


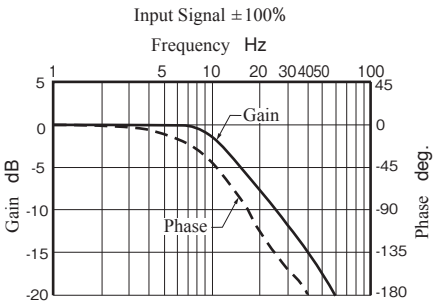
ELDFHG-06EH-500





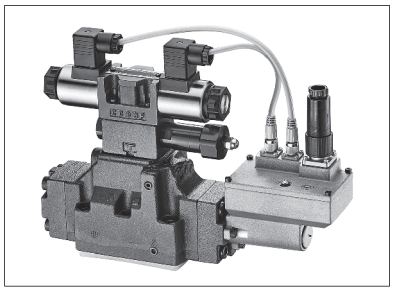
ELDFHG-10EH

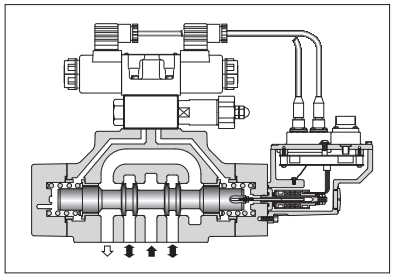




Proportional Electro-Hydraulic Directional and Flow Control Valves (with Main Valve Feedback Control)

OBE (on-board electronics) type proportional electro-hydraulic directional and flow control valve with a LVDT for spool position detection built into the main valve. High accuracy is achieved by configuring a closed loop.





Features

Simpler

Highly accurate hydraulic control can be obtained only by supplying 24 V DC power and inputting a command signal

High Accuracy

Hysteresis : 0.5 % or less

Safety

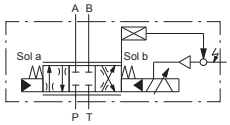
The valves support a fail-safe function to ensure safe operation in the event of electric failure (power failure, power cable disconnection, etc.).

High Flow

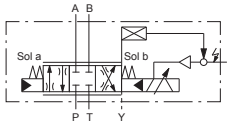
Significantly increased flow rate compared to current products

Graphic Symbols

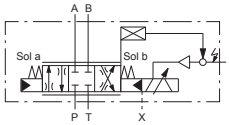
Spool Type "3C2" , "3C21, "3C22"



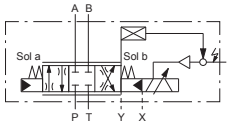
Internal Pilot
Internal Drain Type



Internal Pilot
External Drain Type

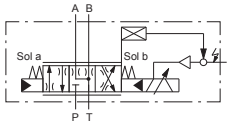


External Pilot
Internal Drain Type

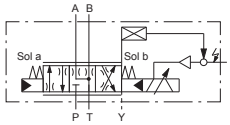


External Pilot
External Drain Type

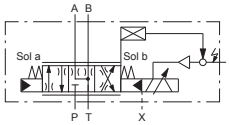
Spool Type "3C40"



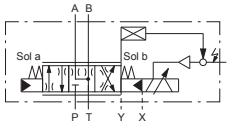
Internal Pilot
Internal Drain Type



Internal Pilot
External Drain Type



External Pilot
Internal Drain Type



External Pilot
External Drain Type

Specifications

Model Numbers			ECDFHG-04EH-150	ECDFHG-04EH-200	ECDFHG-06EH-350	ECDFHG-06EH-500
Rated Flow [ΔP=1 MPa (4-Way Valve)] ΔP = 0.5 MPa per Land		L/min	3C21(P→B, B→T) 3C22(P→A, A→T) :120	3C2, 3C40 : 200	3C21(P→B, B→T) 3C22(P→A, A→T) :230	3C2, 3C40 : 500
			3C2, 3C40 3C21(P→A, A→T) :150 3C22(P→B, B→T)		3C2, 3C40 3C21(P→A, A→T) :350 3C22(P→B, B→T)	
Max. Operating Pressure		MPa	35		31.5	
Pilot Pressure★1		MPa	2.5 - 35		2.5 - 31.5	
Pilot Flow Rate★2		L/min	5.5		7.5	
Proof Pres. at Return Port★3	External Drain T Port	MPa	31.5		25	
	External Drain Y Port	MPa	1 or less		1 or less	
	Internal Drain T&Y Ports	MPa	1 or less			
Internal Leakage★4	Pilot Valve	L/min	1.2 or less			
	Main Valve	L/min	3C2, 3C21, 3C22 : 1.0 or less	3C2 : 1.4 or less	3C2, 3C21, 3C22 : 1.5 or less	3C40 : 2.0 or less
			3C40 : 1.4 or less	3C40 : 2.8 or less	3C40 : 2.0 or less	3C40 : 4.0 or less
Step Response (0 → 100%)★5		ms	38		45	
Frequency Response ±25% Amplitude★5	Phase: -90°	Hz	26		24	
	Gain: -3 dB	Hz	30		27	
Hysteresis			0.5% or less			
Repeatability			0.5% or less			
Power Supply			21.6 - 26.4 V DC Included Ripple			
Ambient Temperature			˚C		-15 - +60	
Current		A	2 (Impulse Loud 3)			
Power Input		VA	75			
Coil Resistance at 20 ºC		Ω	4.6			
Input Signal			±10V, 4 - 20 mA, ±10 mA			
Electric Connection			6 + PE Connector [EN 175201 Part 804]			
Protection			Equivalent to IP64			
Approx. Mass		kg	13		21	

★1. Pilot pressure should be between 2.5 MPa and 35 MPa (04EH), 2.5 MPa and 31.5 MPa (06EH), and should exceed 60% of the actual supply pressure to main valve.
★2. Pilot flow is calculated with the above step response time at pilot pressure 3 MPa.
★3. Return pressure should be less than the actual supply pressure.
★4. This value is measured at a supply pressure of 14 MPa, pilot pressure of 14 MPa, and viscosity of 30 mm^2 /s; it may vary depending on the actual circuit/operation conditions.
★5. This value is measured for each valve based a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.

Details of the Valve Fail-Safe Functions

With reference to the information given below, select the option for the fail-safe function according to the use of applications.
A separate safety circuit should be provided if the hydraulic actuator must be reliably held or stopped.

No.	Model Numbers	Fail-Safe Function★	
		Spool Position	Function
1	ECDFHG-＊EH-＊-3C2-XY-＊＊-C ECDFHG-＊EH-＊-3C21-XY-＊＊-C ECDFHG-＊EH-＊-3C22-XY-＊＊-C	Neutral	All Ports Blocked 
2	ECDFHG-＊EH-＊-3C40-XY-＊＊-C		A, B, T Connection 

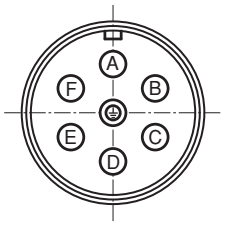
★The fail-safe function's activation time depends on the electric and hydraulic conditions.

Model Number Designation

ECDFHG	- 04	EH	- 150	- 3C2	- XY	- E	T	- C	- D	- 10
Series Number	Valve Size	Amplifier Type	Rated Flow L/min ΔP= 1 MPa (4-Way Valve)	Spool Type	Direction of Flow	Pilot Type	Drain Type	Fail-Safe Function★2	Input Signal/ Spool Travel Monitoring	Design Number
★1 ECDFHG: Proportional Electro-Hydraulic Directional and Flow Control Valves (with Main Valve Feedback Control)	04	EH: OBE Type	150 : 150 L/min	3C2 3C40 3C21 3C22	XY: Meter-in/ Meter-out	None: Internal Pilot E: External Pilot	None: External Drain T: Internal Drain	C: Neutral	D: Voltage Signal ± 10 V (PABT Flow with Positive Input) E: Current Signal 4 to 20 mA (PABT Flow with 12 to 20 mA Input) F: Current Signal ± 10 mA (PABT Flow with Positive Input)	10
			200 : 200 L/min	3C2 3C40						
	06		350 : 350 L/min	3C2 3C40 3C21 3C22						
			500 : 500 L/min	3C2 3C40						

★1. Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
★2. Refer to the previous page for details on the fail-safe function.

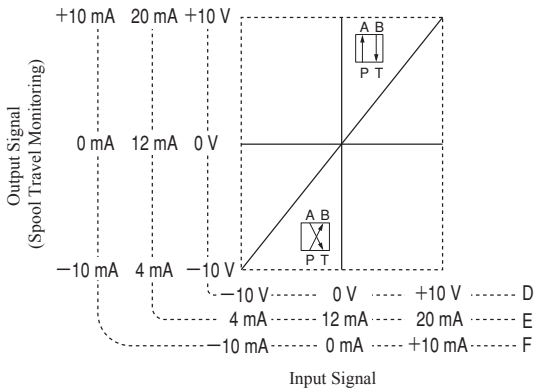
Electrical Specifications



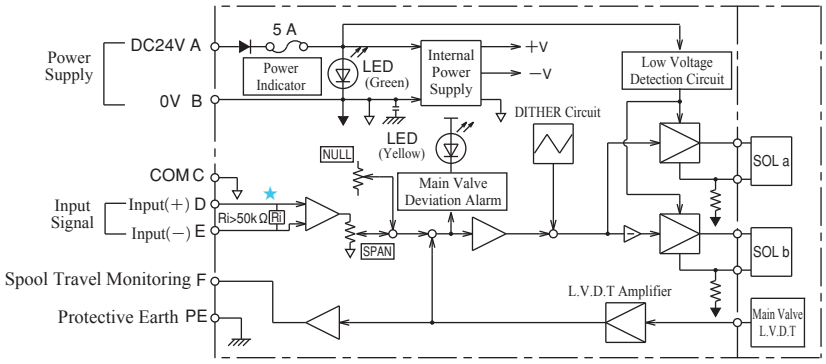
Input Signal		Voltage Signal "D"	Current Signal "E"	Current Signal "F"
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+)(Differential)★1	0 - ±10 V R i≧50 kΩ	4 - 20 mA R i=200 Ω	0 - ±10 mA R i=200 Ω
Pin E	Input (−)(Differential)★1			
Pin F	Spool Travel Monitoring	0 - ±10 V R_L≧10 kΩ	4 - 20 mA R_L=100 - 500 Ω★2	0 - ±10 mA R_L=100 - 500 Ω★2
Pin ⏚	Protective Earth	—		

★1. Differential input signals can be used only for the valves with the voltage signal specifications of ±10V. (ECDFHG-∗EH-∗-D)
★2. The recommended load resistance is 200 Ω.

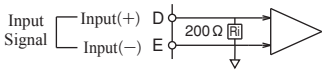
I/O Signal Characteristics



Block Diagram



★The input stage for the current signal "E" and "F" is as follows.



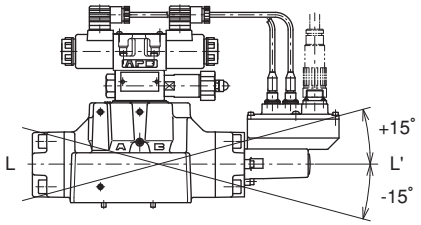
Accessories

Mounting Bolts

Valve Model Numbers	Mounting Bolt	Qty.	Tightening Torque Nm
ECDFHG-04EH	Hex. Socket Head Cap Screw: M6 × 55L	2	12.9 - 15.9
	Hex. Socket Head Cap Screw: M10×60L	4	60.6 - 74.1
ECDFHG-06EH	Hex. Socket Head Cap Screw: M12×85L	6	104 - 127

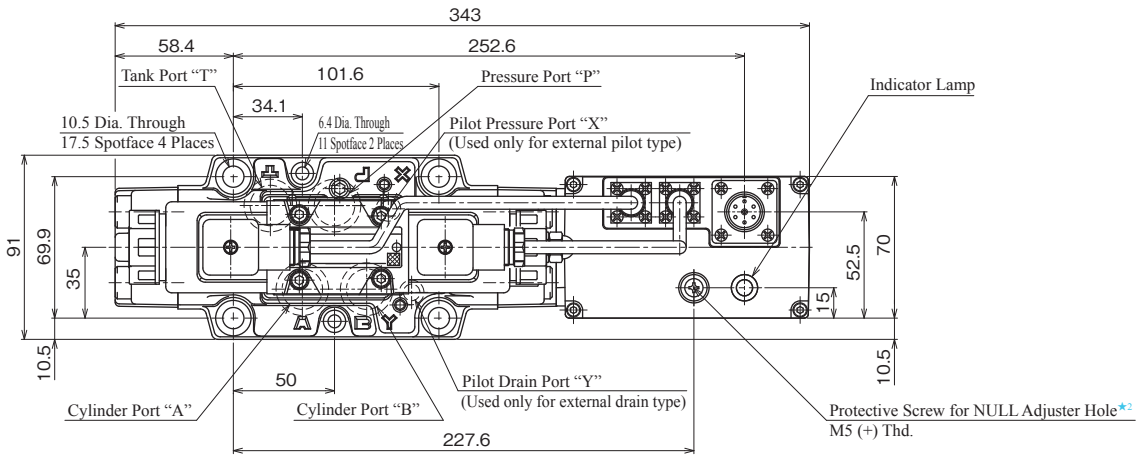
Mounting Position

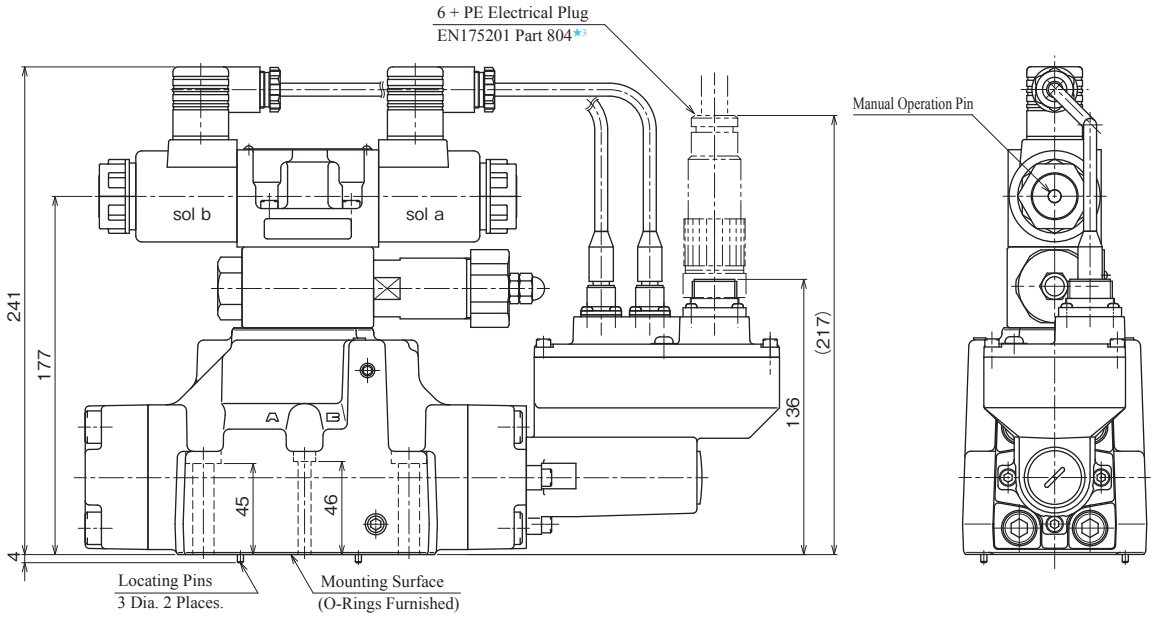
Mount the valve with the angle of the axis line L-L' within about ±15° from the horizontal plane as shown in the right figure. When the principal vibration direction is consistent with the axial direction of the spool, the spool may malfunction due to external force. Make sure that the principal vibration direction is not consistent with the axial direction of the spool.



ECDFHG-04EH

Mounting Surface: ISO 4401-07-07-0-05★1





Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Yellow	Main Valve Deviation Alarm

O-Rings

Port	O-Ring	Qty.
P,A,B,T	OR NBR-90 P22-N	4
X,Y	OR NBR-90 P9-N	2

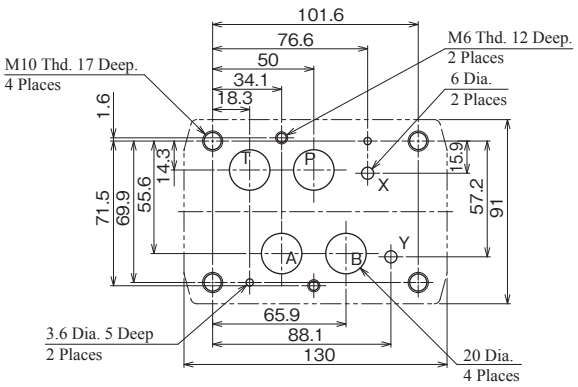
★1. This valve can be mounted on ISO mounting surface. However, in this case, the pressure loss becomes large and the rated flow rate cannot be achieved.

★2. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.

★3. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1

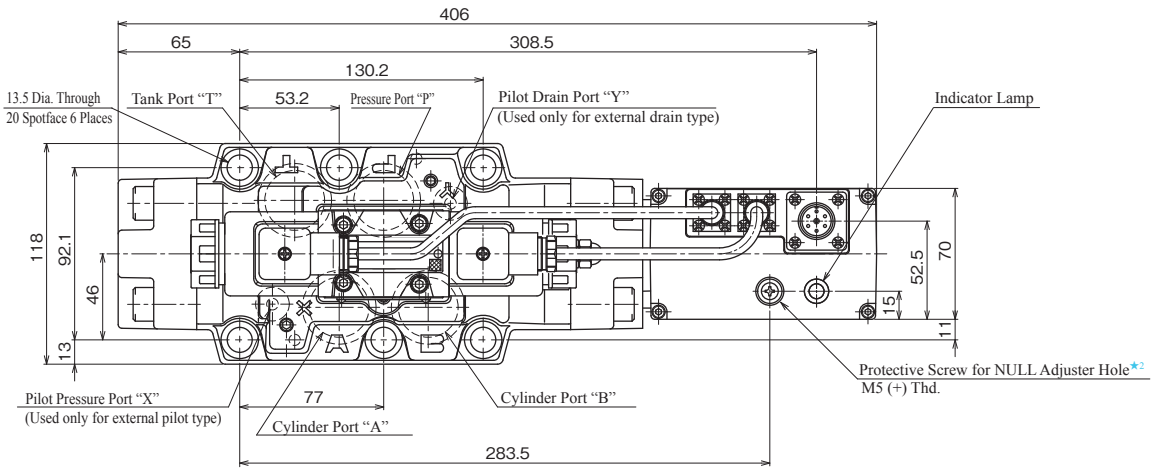
Dimensions of Mounting Surface

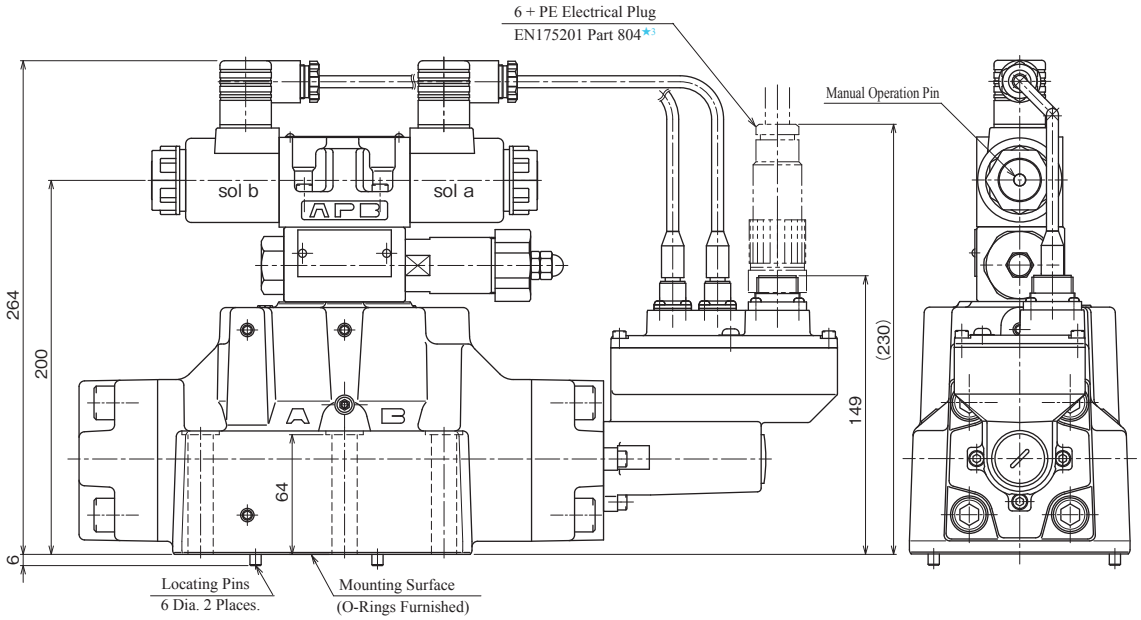
Prepare the mounting surface as shown in the figure below.
The mounting surface should have a good machined finish (▽).



ECDFHG-06EH

Mounting Surface: ISO 4401-08-08-0-05★1





Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Yellow	Main Valve Deviation Alarm

O-Rings

Port	O-Ring	Qty.
P,A,B,T	AS568-126 (NBR-90)	4
X,Y	OR NBR-90 P14-N	2

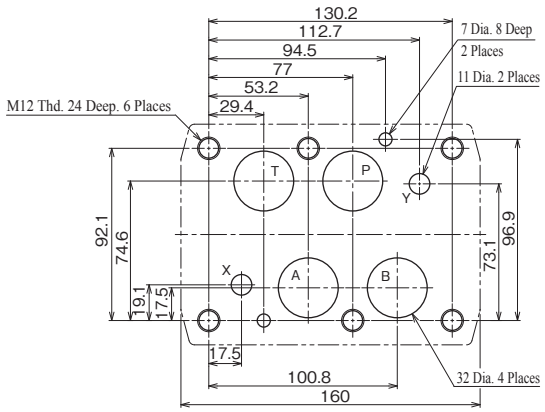
★1. This valve can be mounted on ISO mounting surface.
However, in this case, the pressure loss becomes large and the rated flow rate cannot be achieved.

★2. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.

★3. The 6 + PE Electrical Plug is not included with the valve.
Prepare it separately.
YUKEN parts number: TK290457-1

Dimensions of Mounting Surface

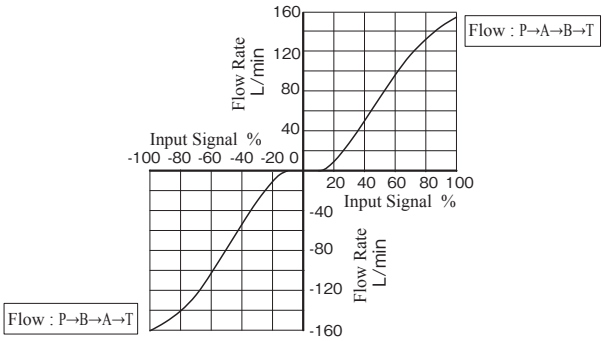
Prepare the mounting surface as shown in the figure below.
The mounting surface should have a good machined finish (▽).



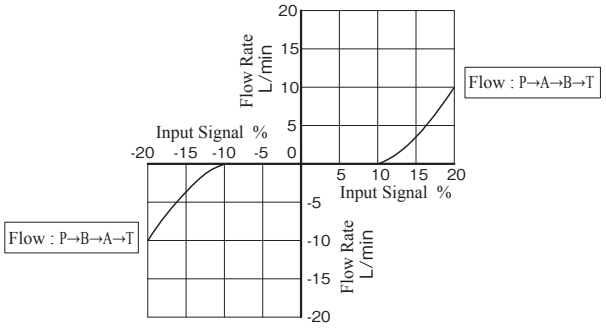
No-Load Flow Characteristics

〈Conditions〉 ●Valve Pressure Difference: 1 MPa (4-Way Valve/Pressure Difference per Land: 0.5 MPa)
●Viscosity: 30 mm^2/s

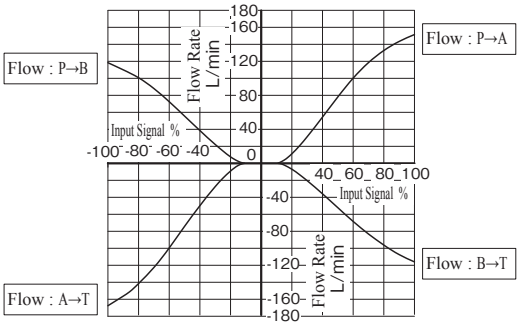
ECDFHG-04EH-150-3C2/3C40



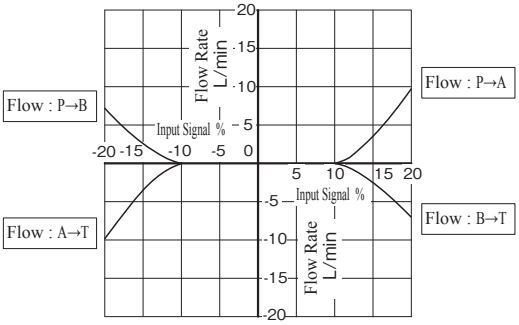
Around Null Position
Input Signal -20⇔+20%



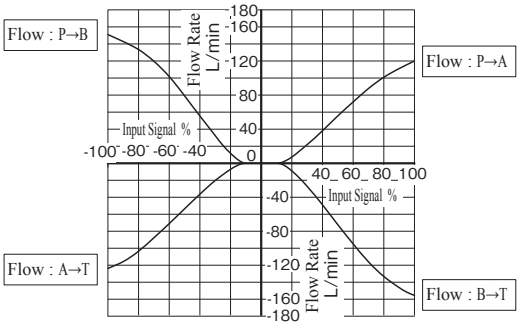
ECDFHG-04EH-150-3C21



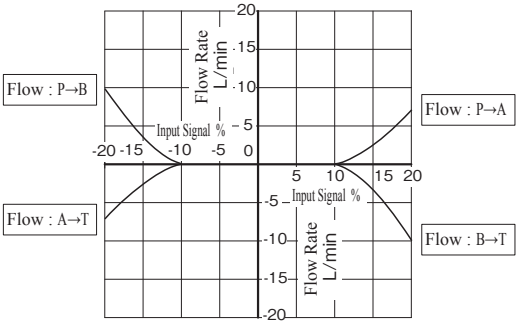
Around Null Position
Input Signal -20⇔+20%



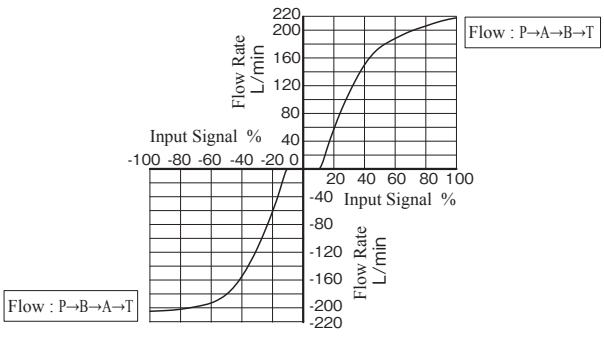
ECDFHG-04EH-150-3C22



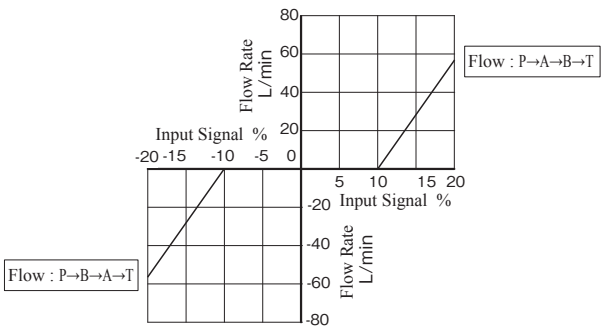
Around Null Position
Input Signal -20⇔+20%



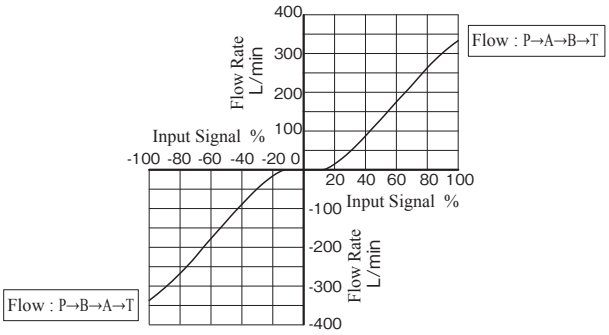
ECDFHG-04EH-200-3C2/3C40



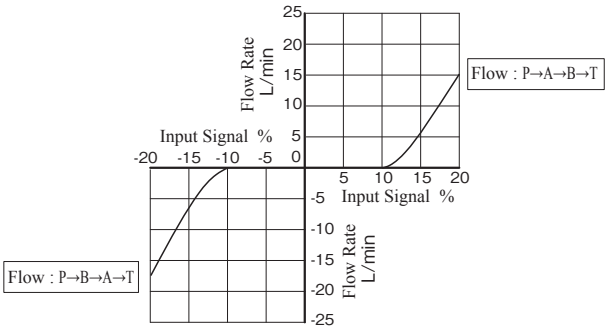
Around Null Position
Input Signal -20⇔+20%



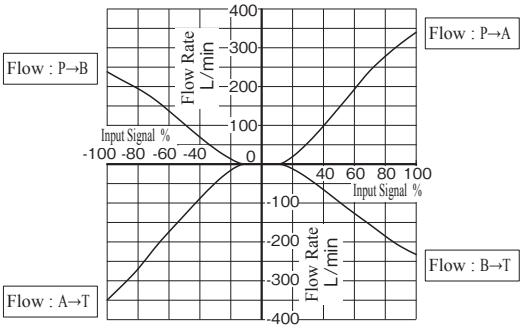
ECDFHG-06EH-350-3C2/3C40



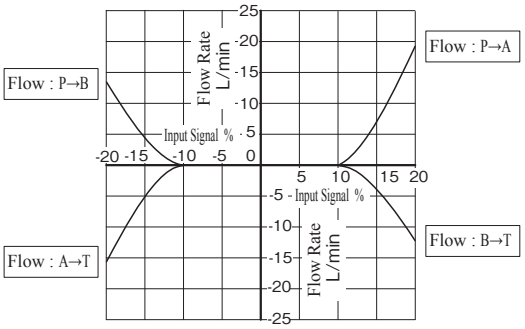
Around Null Position
Input Signal -20⇔+20%



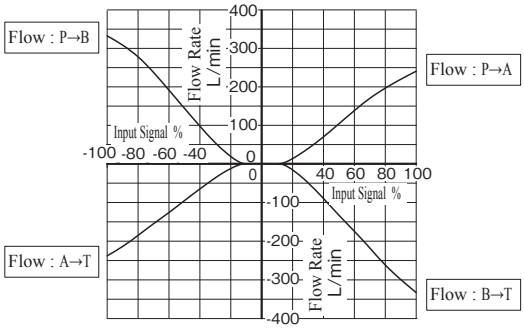
ECDFHG-06EH-350-3C21



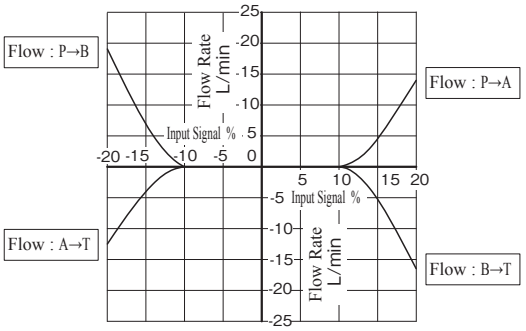
Around Null Position
Input Signal -20⇔+20%



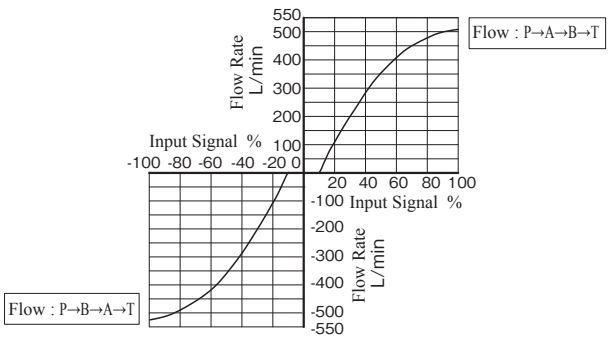
ECDFHG-06EH-350-3C22



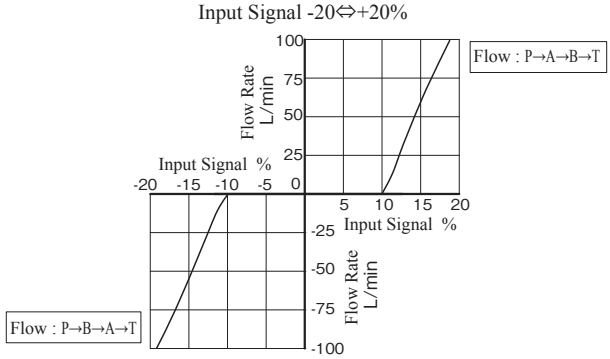
Around Null Position
Input Signal -20⇔+20%



ECDFHG-06EH-500-3C2/3C40



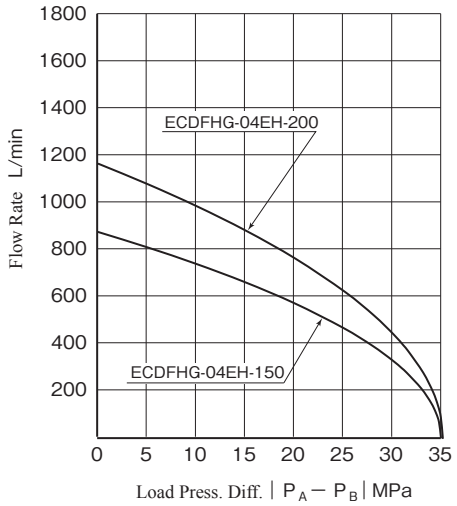
Around Null Position
Input Signal -20⇔+20%



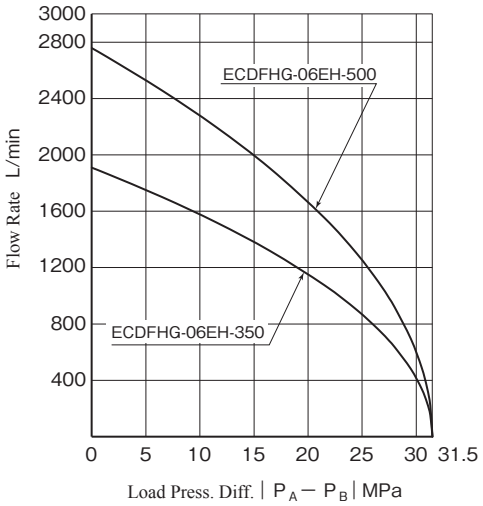
Load Flow Characteristics

〈Conditions〉●Viscosity: 30 mm²/s

ECDFHG-04EH-*-3C2/3C40



ECDFHG-06EH-*-3C2/3C40

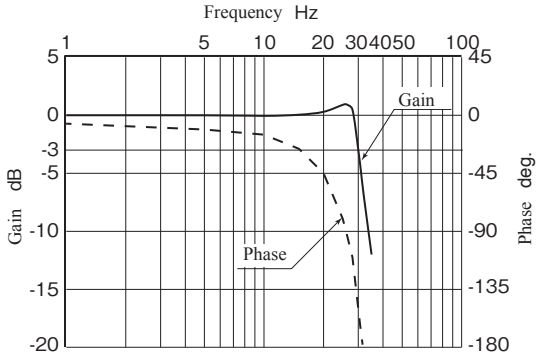


Frequency Response

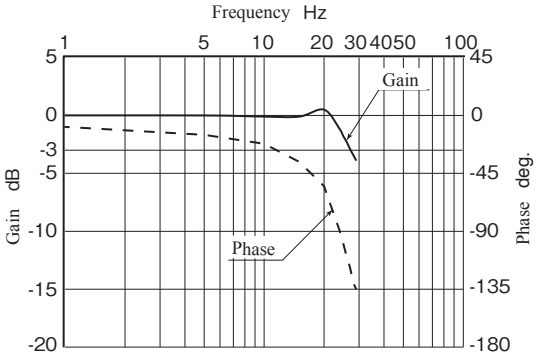
〈Conditions〉●Hydraulic Circuit: Port A/B Closed ●Supply Pressure and Pilot Pressure: 14 MPa
●Viscosity: 30 mm²/s ●Amplitude: 50±25%

This value is measured on a per valve basis; the actual frequency response may differ depending on the actual circuit.

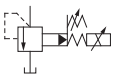
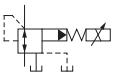
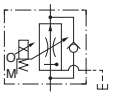
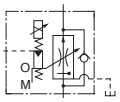
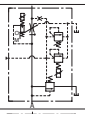
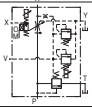
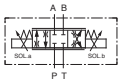
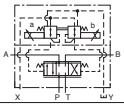
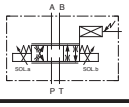
ECDFHG-04EH



ECDFHG-06EH



E Series Proportional Electro-Hydraulic Controls

Types	Graphic Symbols	Max. Operating Pressure MPa	Maximum Flow L/min (1 2 3 5 10 20 30 50 100 200 300 500 1000)	Page
Pilot Relief Valves		24.5	EDG 01	H-93
Relief Valves		24.5	EBG 03 06 10	H-99
Relieving and Reducing Valves		24.5	ERBG 06 10	H-108
40 Ω Series Flow Control (and Check) Valves		20.6	EFG EFCG 02 03 06 10	H-118
10 Ω Series Flow Control (and Check) Valves		03: 20.6 06: 24.5	EFG EFCG 03 06	H-128
10 Ω - 10 Ω Series Flow Control and Relief Valves		24.5	EFBG 03 06 10	H-135
High Flow Series Flow Control and Relief Valves		24.5	EFBG 03 06 10	H-145
Shockless Type Directional and Flow Control Valves		25	EDFG 01	H-155
Directional and Flow Control Valves		25	EDFHG 03 04 06	H-157
High Response Type Directional and Flow Control Valves		01/03: 31.5 04/06: 35	ELDFG 01 03 ELDFHG 04 06	H-163

Hydraulic Fluids

Fluid Types

Any type of hydraulic fluid listed in the table below can be used.

Petroleum Base Oils	Use fluids equivalent to ISO VG 32 or VG 46.
Synthetic Fluids	Use phosphate ester or polyol ester fluids. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
Water-containing Fluids	Use water-glycol fluid.

Note: For use with hydraulic fluids other than those listed above, please consult your Yuken representatives in advance.

Recommended Fluid Viscosity and Temperature

Use hydraulic fluids which satisfy the both recommended viscosity and oil temperatures given in the table below.

Name	Viscosity	Temperature
Pilot Relief Valves Relief Valves Relieving and Reducing Valves	15 - 400 mm^2/s	-15 - +70°C
Flow Control Valves Flow Control and Check Valves Flow Control and Relief Valves	20 - 200 mm^2/s	
Directional and Flow Control Valves	20 - 400 mm^2/s	0 - +60°C
Shockless Type Directional and Flow Control Valves High Response Type Directional and Flow Control Valves (Direct Type)	20 - 200 mm^2/s	0 - +60°C
High Response Type Directional and Flow Control Valves (Two Stage Type)	15 - 400 mm^2/s	-15 - +60°C

Control of Contamination

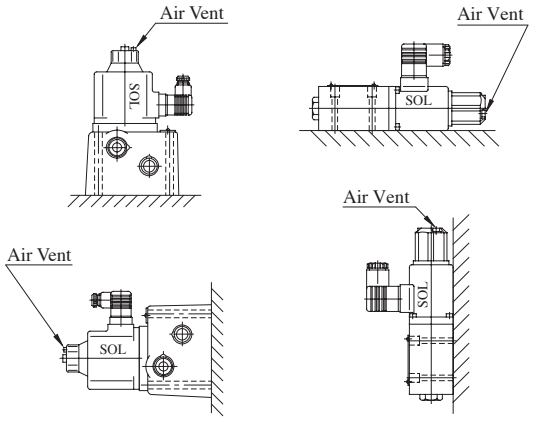
Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valve. Please maintain the degree of contamination within NAS 1638-Grade 11. Use 20 µm or finer line filter.

Instructions

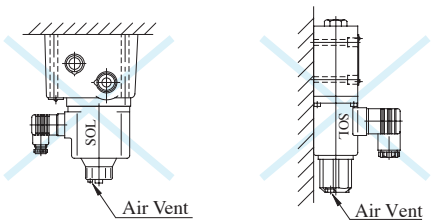
Mounting

Be sure that the air vent faces up.
In addition, if the valve is mounted vertically, the minimum adjustment pressure is 0.2 MPa or higher.

[Good example]

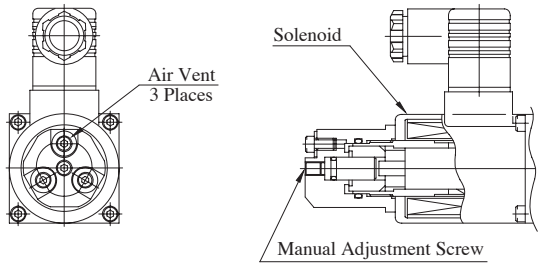


[Bad example]



Air Bleeding

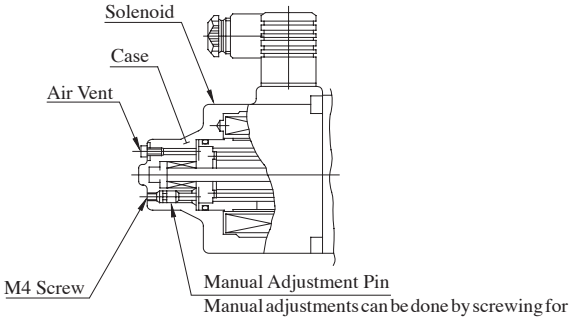
To ensure stable control, bleed the air from solenoid completely and fill its core with oil.
Bleeding can be done by slowly loosening one of the air vents at the end of the solenoid. Choose one of the three air vents which is expected to work most effectively (see the figure to the right).



10 Ω Series Solenoid

Manual Adjustment Screw

When initial adjustments are to be made or when no current is supplied to the valve due to electrical failure or other problem, turn the manual adjustment screw to temporarily set the valve pressure / flow rate. In that case, when turn the manual adjustment screw clockwise, the valve pressure / flow rate increases. Under normal condition, however, this screw must be kept in its original position (see the figure to the right).



40 Ω Series Solenoid

Tank and Drain Piping

The tank-line back pressure and drain back pressure directly affect the minimum adjustment pressure. Therefore, do not connect the tank or drain pipes to other lines, but connect them directly to the reservoir maintaining the back pressure as low as possible. Be sure that the tank and drain pipe ends are immersed in fluid.

Hysteresis and Repeatability Value Indications

The hysteresis and repeatability values indicated in the specifications for each control valve are determined under the following conditions:

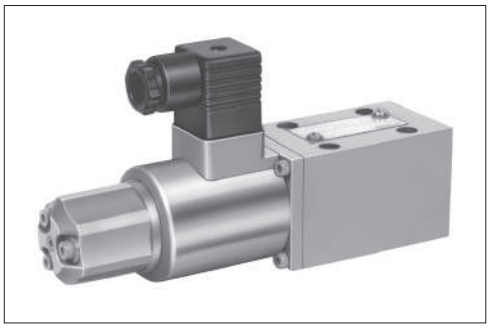
- Hysteresis Value: Obtained when Yuken's applicable power amplifier is used.
- Repeatability Value: Obtained when Yuken's applicable power amplifier is used under the same conditions.

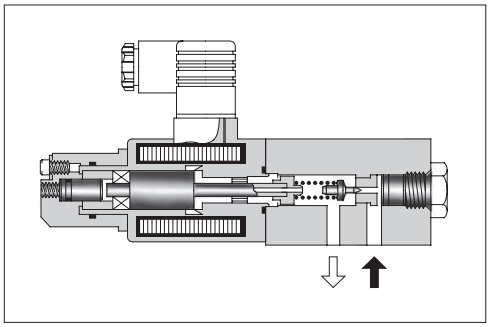
Interchangeability between Current and New Model Change Products

Name	Model Numbers	Design Number		Installation Interchangeability	Major Changes	Page
		Current	New			
Pilot Relief Valves	EDG-01	50	51	YES	● Solenoid Ass'y Change	H-98
Relief Valves	EBG-03	50	51	YES	● Pilot Valve Change EDG-01V, 50→51 Design	H-107
	EBG-06	50	51	YES		
	EBG-10	50	51	YES		
Relieving and Reducing Valves	ERBG-06	50	51	YES	● Pilot Valve Change EDG-01V, 5001→5101 Design ● No change in specifications	H-117
	ERBG-10	50	51	YES		
10Ω Series Flow Control (and Check) Valves	EFG EFCG -03	50	51	YES	● Solenoid Ass'y Change ● No change in specifications	H-133
	EFG EFCG -06	50	51	YES		
10Ω - 10Ω Series Flow Control and Relief Valves	EFBG-03	50・51	61	YES	● 03/06 : 50^{D}, 51^{D}→61^{D} ・Pilot Valve (EDG-01) is now integrated into the cover ・Solenoid Ass'y Change ● 03/06 : 60^{D}, 61^{D}, 10 : 50^{D}→51^{D} ・Solenoid Ass'y Change	H-144
		60				
	EFBG-06	50・51	61	YES		
		60				
	EFBG-10	50	51	YES		
High Flow Series Flow Control and Relief Valves	EFBG-03	50	51	YES	● Solenoid Ass'y Change	H-154
	EFBG-06	50	51	YES	● Pilot Valve Change EDG-01V, 5003→5103 Design ● Solenoid Ass'y Change	
Directional and Flow Control Valves	EDFHG-03	30	31	YES	● Solenoid Ass'y Change ● No change in specifications	H-160
	EDFHG-04	30	31	YES		
	EDFHG-06	30	31	YES		
Power Amplifiers For 40Ω Series Flow Control Valves	AME-D	41	50	YES	● Additional power supply, functions and installation	H-180
	AME-DF	22	50	YES		
Power Amplifiers For High Response Type Directional and Flow Control Valves	AMB-EL	10	20	YES	● Addition of input/output classification	H-194
Multifunction Slope Controllers	AMC-T	10	20	YES	● Compact and Lightweight ● Shockless control mode and stop mode functions added	H-200

Proportional Electro-Hydraulic Pilot Relief Valves

This valve consists of a small DC solenoid and a direct-acting relief valve. It serves as a pilot valve for a low flow rate hydraulic system or a proportional electro-hydraulic control valve and controls the pressure in proportion to the input current. Note that this valve is used in conjunction with the applicable power amplifier.

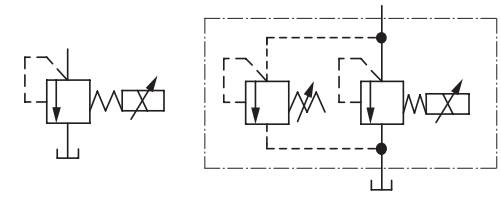




Specifications

Descriptions \ Model Numbers		EDG-01
Max. Operating Pres.	MPa	24.5
Max. Flow	L /min	2
Min. Flow	L /min	0.3
Pressure Adj. Range	MPa	Refer to Model Number Designation
Rated Current	mA	EDG-01∗-B : 800 EDG-01∗-C : 900 EDG-01∗-H : 950
Coil Resistance	Ω	10
Hysteresis		3% or less
Repeatability		1% or less
Mass	kg	2

Graphic Symbols



Without Safety Valve With Safety Valve

Model Number Designation

ED	G	-01	V	-C	-1	-PN	T13	-51
Series Number	Type of Mounting	Valve Size	Applicable Control ★1	Pressure Adj. Range MPa	Safety Valve	P-Line Orifice	T-Line★2 Orifice	Design Number
ED: Proportional Electro-Hydraulic Pilot Relief Valve	G: Sub-Plate Mounting	01	None: General Use V: Vent Control of Relief Valve (Omit if not required)	B: 0.5 - 6.9 C: 1.0 - 15.7 H: 1.2 - 24.5	None: Without Safety Valve 1: With Safety Valve	PN: Without Orifice (Standard)	T15 T13 T11	51

★1. When the valve is to be used for vent control purpose, orifice adjustment is required due to piping capacity limitations. Therefore, consult your Yuken representative in advance.

★2. Standard orifices for T-line orifices are as follows.
Pressure Adj. Range B: T15, C: T13, H: T11
The orifice used as the pilot valve may differ from the standard orifice.

Accessories

Mounting Bolts

Socket Head Cap Screw
M5 ×45 L ····· 4 pcs.

Applicable Power Amplifier

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see pages H-173, H-177 and H-183).

Model Numbers : AME-D-10-∗-20
AME-D2-1010-∗-11
SK1022-∗-∗-11
SK1015-11 (For DC power supply)
AMN-D-10 (For DC power supply)

Sub-Plate

Piping Size	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
1/8	DSGM-01-31	1/8	0.8
1/4	DSGM-01X-31	1/4	0.8
3/8	DSGM-01Y-31	3/8	0.8

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
- Sub-plates are those for 1/8 solenoid operated directional valves. For dimensoins, see page H-8.

Instructions

Tank-Line Back Pressure

Check that the tank line back pressure does not exceed 0.2 MPa.

Vent Control

When the valve is used for vent control of relief valves or others, use the pipes of 6 mm ID. 300 mm or less length for connection.

If the pressure is instable, provide a 1.0 to 1.5 mm diameter orifice to the vent port of the relief valves or others.

Circuit Pressure Control

When the pressure in a circuit is directly controlled with this valve, set the trapped oil volume being more than 40cm^3.

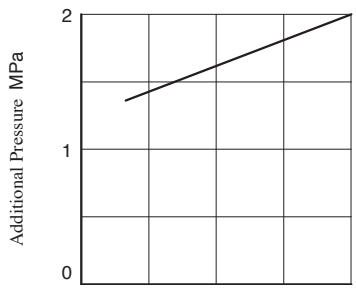
Safety Valve Pressure Setting

The pressure of the safty valve at the maximum flow is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa.

In case where the upper limit of operating pressure is low or the upper limit of flow rate to be used is different from the specified maximum flow, please adjust and determine the setting pressure of the safety valve at the value calculated from the following formula.

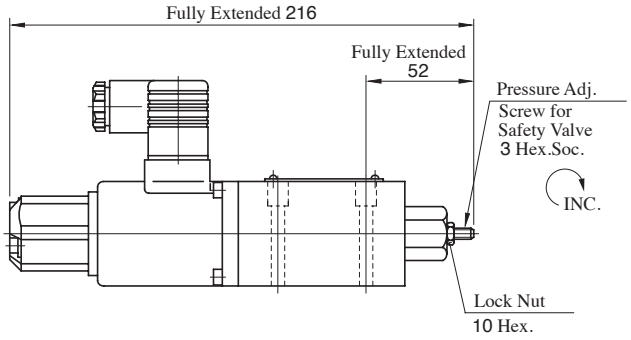
Setting pressure = (Operating pressure upper limit) + (Additional pressure indicated below)

To lower the setting pressure, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.



EDG-01∗-∗-1-PNT∗-51

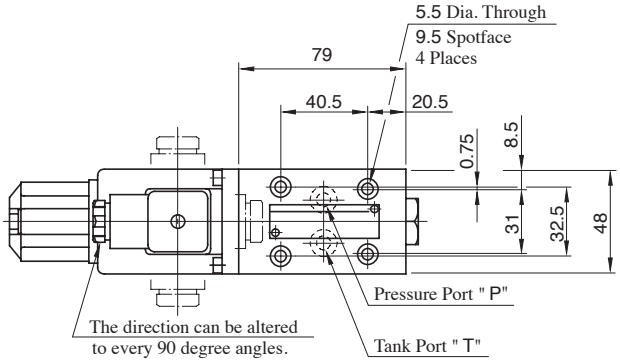
With Safety Valve

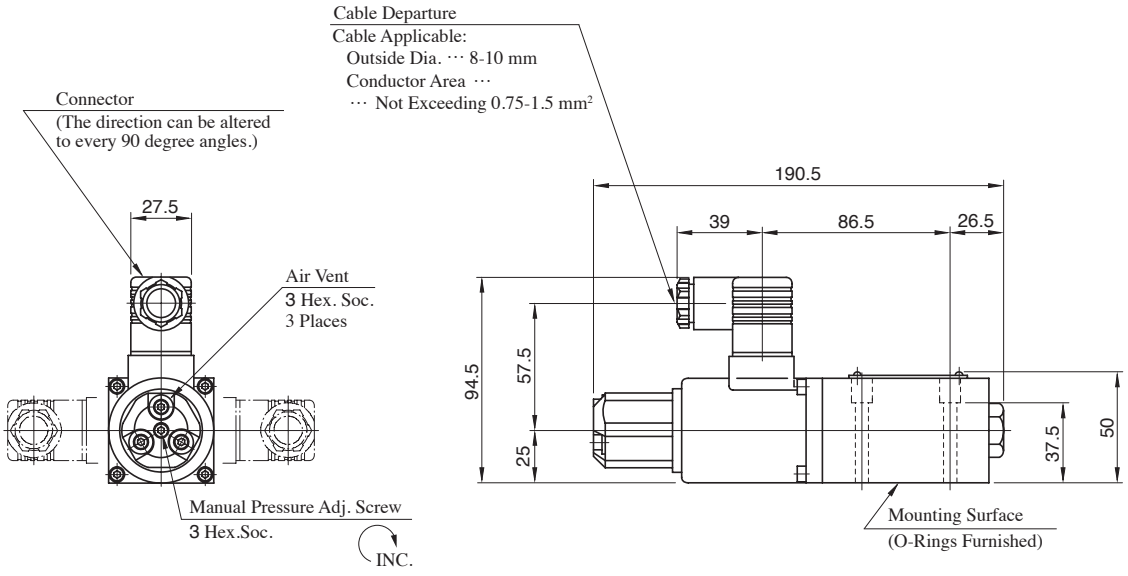


● For other dimensions, refer to the without safety valve.

EDG-01∗-∗-PNT∗-51

Without Safety Valve





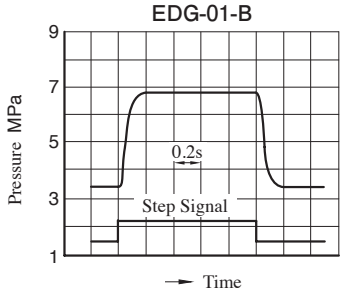
Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-8) in common use.

Step Response (Example)

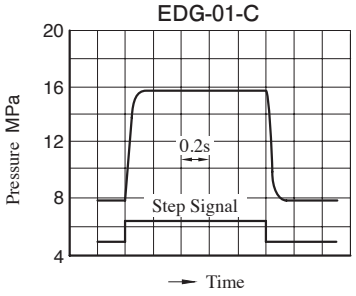
These characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

Flow Rate : 2 L/min
Trapped Oil Volume : 40 cm^3
Viscosity : 30 mm^2/s

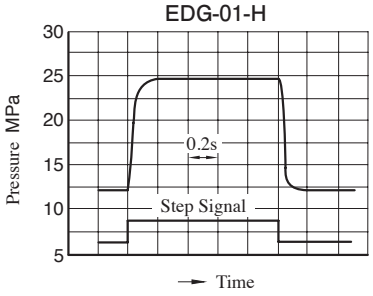
EDG-01-B



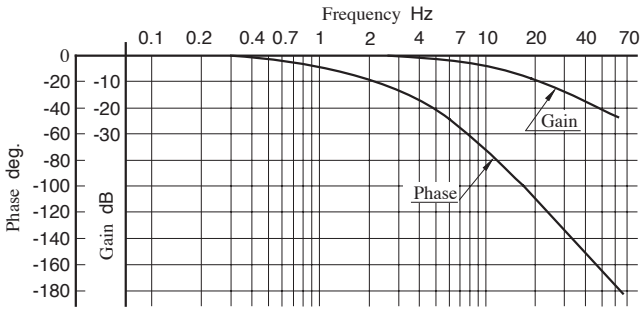
EDG-01-C



EDG-01-H



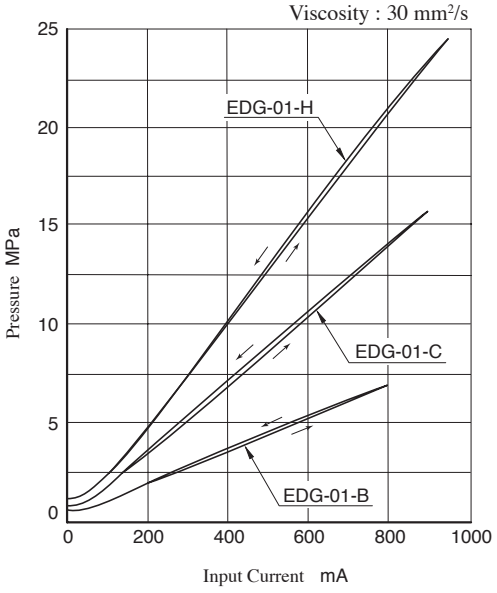
Frequency Response



Flow Rate : 2 L/min
Pressure :7.8 ± 1.6 MPa
Trapped Oil Volume : 30 cm^3
Viscosity : 30 mm^2/s

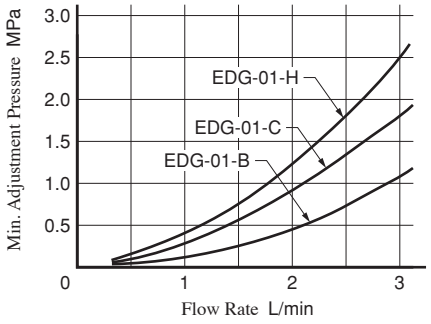
Control Pressure vs. Input Current

Viscosity : 30 mm^2/s



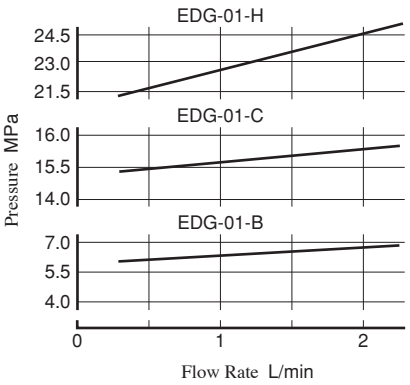
Min. Adjustment Pressure

Viscosity : 30 mm^2/s



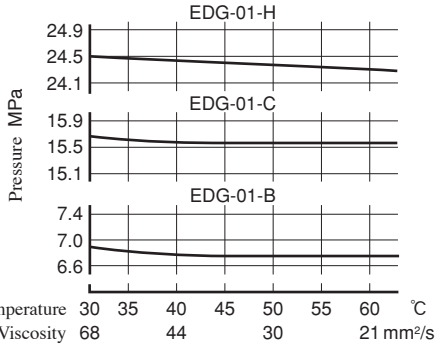
Flow Rate vs. Pressure

Viscosity : 30 mm^2/s



Viscosity vs. Pressure

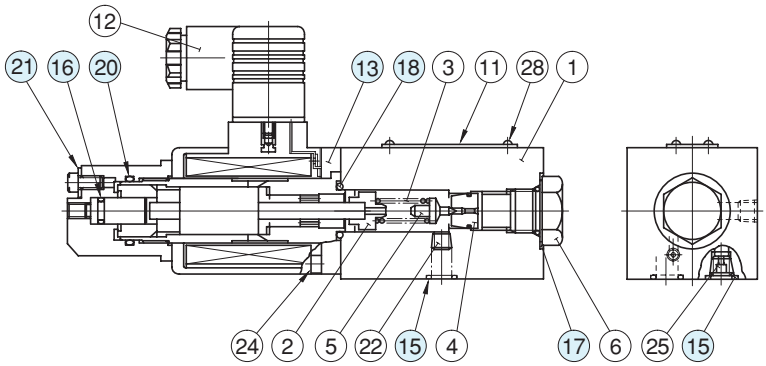
Flow Rate : 2 L/min
Oil : ISO VG 46 Oil



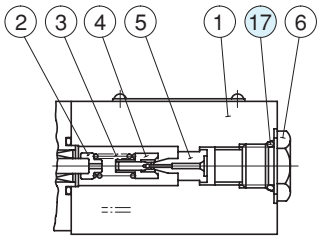
List of Seals and Solenoid Ass'y

Without Safety Valve

EDG-01∗-∗-PNT∗-51
EDG-01V-∗-PNT∗-5103

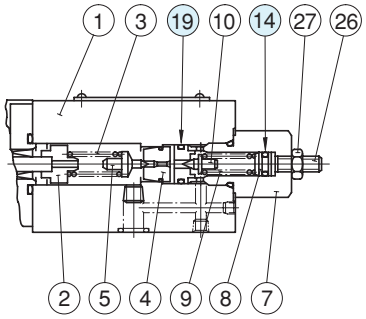


EDG-01-∗-PNT∗-5101



With Safety Valve

EDG-01∗-∗-1-PNT∗-51
EDG-01V-∗-1-PNT∗-5103
EDG-01V-∗-1-PNT20-5197



List of Seals

Item	Name of Parts	Part Numbers	Qty.
14	O-Ring	OR NBR-70-1 P6-N	1
15	O-Ring	OR NBR-90 P9-N	2
16	O-Ring	OR NBR-90 P7-N	1
17	O-Ring	OR NBR-90 P14-N	1
18	O-Ring	OR NBR-90 P18-N	1
19	O-Ring	AS568-013(NBR-90)	1
20	O-Ring	OR NBR-90 P22-N	1
21	Fastener Seal	W4	3

Note: O-ring (Item 16, 18, 20) and the fastener seal (Item 21) are included in the solenoid assembly.

Solenoid Ass'y

Valve Model Numbers	⑬ Solenoid Ass'y
EDG-01V-∗-∗-P∗T∗-51 EDG-01-∗-∗-PT-5101	E318-Y06M1-28-61
EDG-01-∗-∗-P∗T∗-51	E318-Y06M1-05-61
EDG-01V-∗-∗-PNT∗-5103	E318-Y06M1-04-61

Note: The connector assembly GDM-211-B-11 (Item 12) is not included in the solenoid assembly.

Pilot Valve

Model numbers of proportional electro-hydraulic control valves whose pilot valve is this valve (EDG-01∗) and the pilot valve are shown.

Valve Model No.	Pilot Valve Model Numbers
EBG-03-C-51	EDG-01V-C-1-PNT09-51
EBG-03-H-51	EDG-01V-H-1-PNT09-51
EBG-03-C-T-51	EDG-01V-C-PNT09-51
EBG-03-H-T-51	EDG-01V-H-PNT09-51
EBG-06-C-51	EDG-01V-C-1-PNT10-51
EBG-06-H-51	EDG-01V-H-1-PNT10-51
EBG-06-C-T-51	EDG-01V-C-PNT10-51
EBG-06-H-T-51	EDG-01V-H-PNT10-51
EBG-10-C-51	EDG-01V-C-1-PNT11-5103
EBG-10-H-51	EDG-01V-H-1-PNT11-5103
EBG-10-C-T-51	EDG-01V-C-PNT11-5103
EBG-10-H-T-51	EDG-01V-H-PNT11-5103
ERBG-06-B-51	EDG-01-B-PNTN-5101
ERBG-06-C-51	EDG-01-C-PNTN-5101
ERBG-06-H-51	EDG-01-H-PNT15-5101
ERBG-10-B-51	EDG-01-B-PNTN-5101
ERBG-10-C-51	EDG-01-C-PNTN-5101
ERBG-10-H-51	EDG-01-H-PNT15-5101
EFBG-10-500-C-∗-51	EDG-01V-C-1-PNT12-5103
EFBG-10-500-H-∗-51	EDG-01V-H-1-PNT12-5103
EFBG-06-500-C-∗-51	EDG-01V-C-1-PNT11-5103
EFBG-06-500-H-∗-51	EDG-01V-H-1-PNT11-5103
EFBG-10-1000-C-∗-51	EDG-01V-C-1-PNT20-5197
EFBG-10-1000-H-∗-51	EDG-01V-H-1-PNT20-5197

Interchangeability between Current and New Design

EDG-01 series valve has changed model from 50 to 51 design in line with the solenoid improvement.

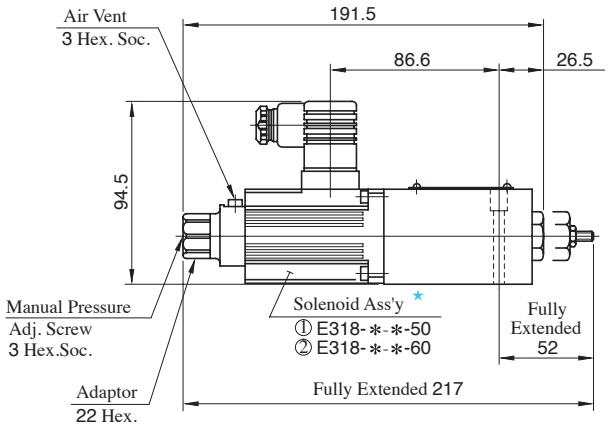
Specifications and Characteristics

Input current-pressure characteristics differ between current and new design. Please inquire separately for details.
Other specifications remain unchanged.

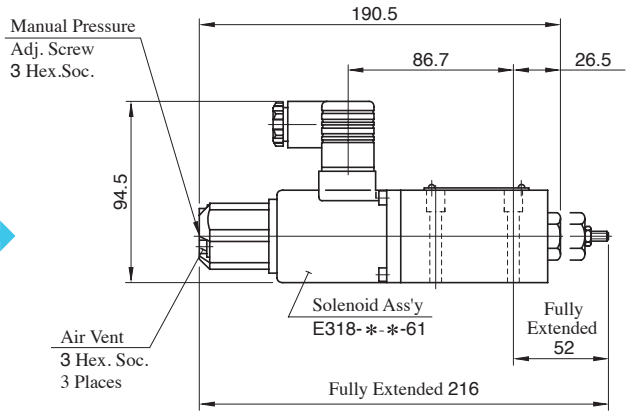
Mounting Interchangeability

There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to solenoid improvement and other modifications.

Current: Design 50



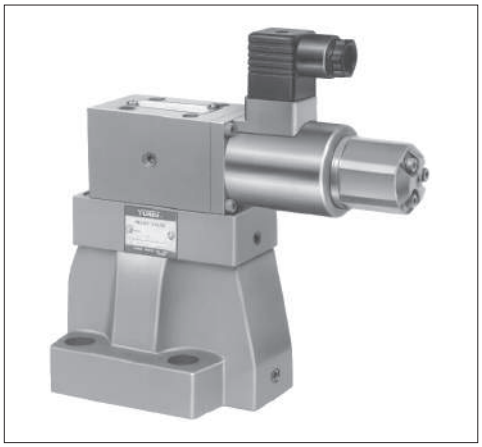
New: Design 51

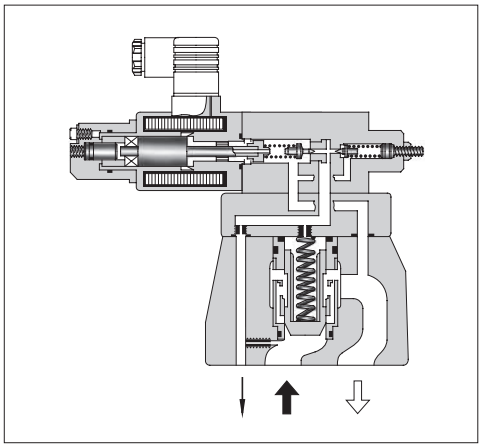


★The solenoid assembly current design comes in two types: ① E318-50 design and ② 60 design.
See the figure on the left for an external view of type ①. See the figure on the right for type ②.

Proportional Electro-Hydraulic Relief Valves

This valve is derived by combining a small, high-performance 1/8 proportional electro-hydraulic pilot relief valve with a specially developed low-noise relief valve.
With this valve, it is possible to regulate the system pressure in proportion to the input current. Note that this valve is used in conjunction with the applicable power amplifier.

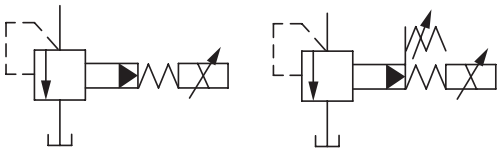




Specifications

Descriptions \ Model Numbers		EBG-03	EBG-06	EBG-10
Max. Operating Pres.	MPa	24.5	24.5	24.5
Max. Flow	L/min	100	200	400
Min. Flow	L/min	3	3	3
Pressure Adjustment Range	MPa	Refer to Model Number Designation		
Rated Current	mA	C: 770 H: 820	C: 750 H: 800	C: 730 H: 780
Coil Resistance	Ω	10	10	10
Hysteresis		3% or less	3% or less	3% or less
Repeatability		1% or less	1% or less	1% or less
Approx. Mass	kg	5.6	6.3	10

Graphic Symbols



Without Safety Valve　　With Safety Valve

Model Number Designation

EB	G	-03	-C	-T	-51
Series Number	Type of Mounting	Valve Size	Pressure Adj. Range MPa	Safety Valve	Design Number
EB: Proportional Electro-Hydraulic Relief Valve	**G:** Sub-Plate Mounting	**03** **06** **10**	**C:** ✻-15.7★1 **H:** ✻-24.5★1	**None:** With Safety Valve **T:** Without Safety Valve	**51**

★1. Min. adjustment pressure shall be referred to the curves on page H-103.

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EBG-03	M12 × 40 L	4
EBG-06	M16 × 50 L	4
EBG-10	M20 × 60 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see pages H-173, H-177 and H-183).

Model Numbers : AME-D-10-＊-20 SK1022-＊-＊-11
AME-D2-1010-11 SK1015-11 (For DC power supply)
AMN-D-10 (For DC power supply)

Sub-Plates

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
EBG-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
EBG-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7
EBG-10	BGM-10-20	1-1/4	8.4
	BGM-10X-20	1-1/2	10.3

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1.6}{\nabla}$)
- Sub-plates are those for pilot operated relief valves. For dimensions, see page H-18.

Instructions

A flow rate of 3 L/min or higher should be used to avoid preselected pressure instability.

Safety Valve

At shipment, the pressure of safety valves is set to the upper limits of the adjustable pressure ranges plus the extra as shown below.

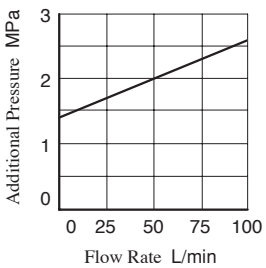
Additional Pressures for Safety Valves at Shipment

Valve Model Numbers	Additional Pressures at Shipment MPa
EBG-03	2.0 (at 50 L/min)
EBG-06	3.5 (at 100 L/min)
EBG-10	4.0 (at 200 L/min)

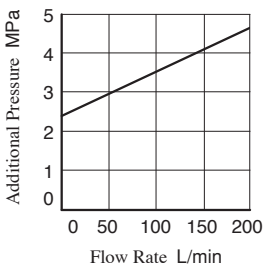
In case where the upper limit of operating pressure is low or the upper limit of flow rate to be used is different from the specified maximum flow, please adjust and determine the setting pressure of the safety valve at the value calculated from the following formula.

Setting pressure = (Operating pressure upper limit) + (Additional pressure indicated below)

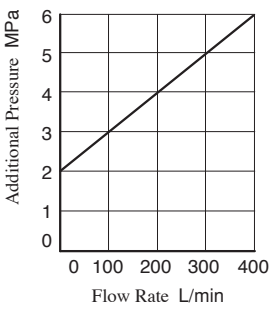
EBG-03



EBG-06



EBG-10

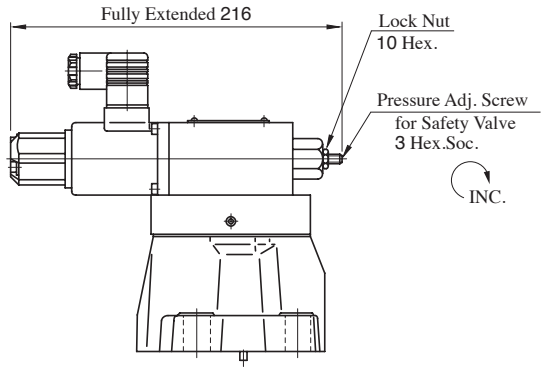


To lower the setting pressure, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

Mounting Surface
EBG-03 : ISO 6264-06-09-1-97
EBG-06 : ISO 6264-08-13-1-97

EBG-$\frac{03}{06}$-∗-51

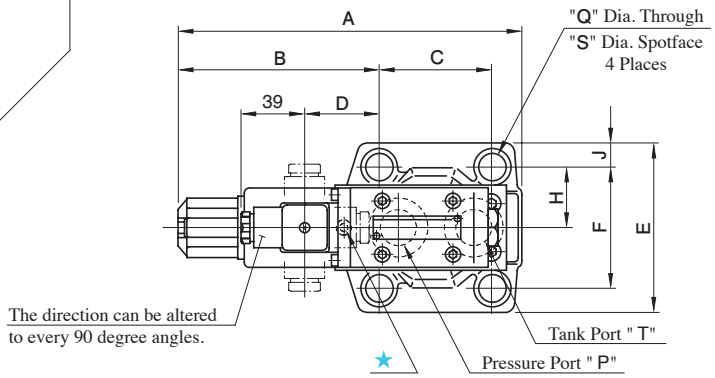
With Safety Valve

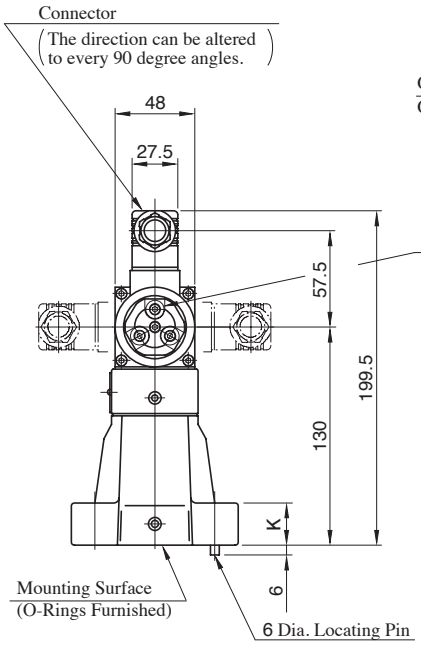


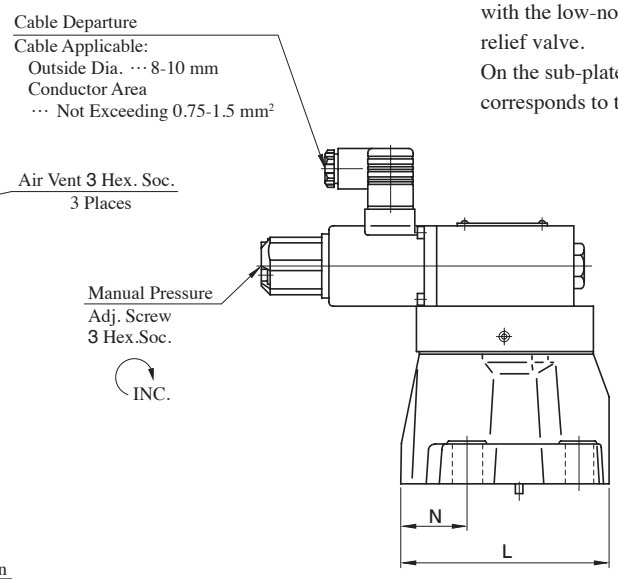
● For other dimensions, refer to the without safety valve.

EBG-$\frac{03}{06}$-∗-T-51

Without Safety Valve







★This port is not used. It is provided because of the common use of the body with the low-noise type pilot operated relief valve.
On the sub-plate, plug the port which corresponds to this port.

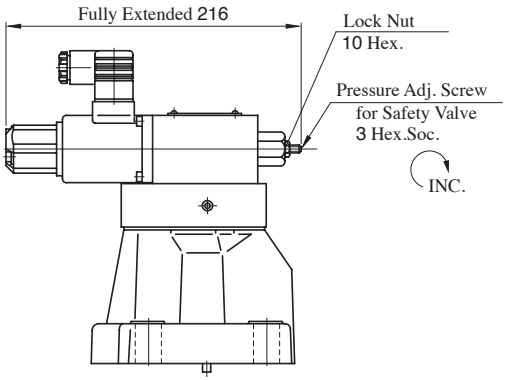
Model Numbers	Dimensions mm												
	A	B	C	D	E	F	H	J	K	L	N	Q	S
EBG-03	197.5	117.6	53.8	40.2	76	53.8	26.9	11.1	21.5	106	26.1	13.5	21
EBG-06	205.5	119.5	66.7	42.1	98	70	35	14	26	122	36	17.5	26

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-18) in common use.

Mounting Surface: ISO 6264-10-17-1-97

EBG-10-＊-51

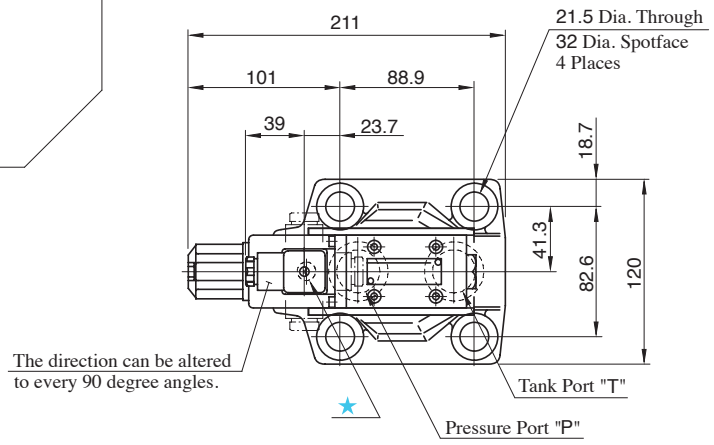
With Safety Valve



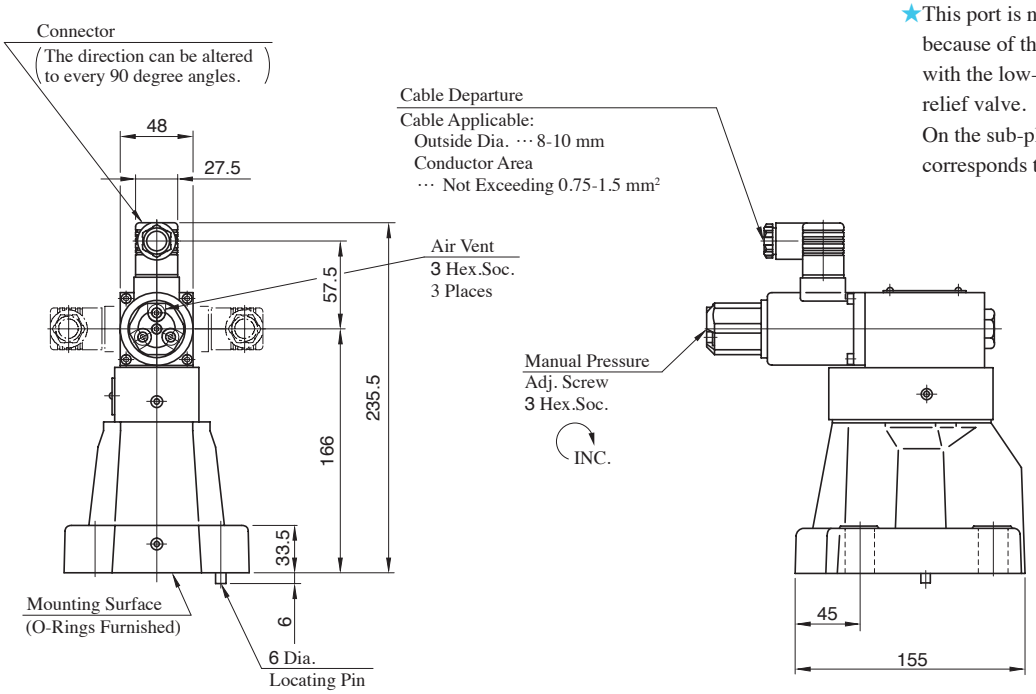
● For other dimensions, refer to the without safety valve.

EBG-10-＊-T-51

Without Safety Valve



★This port is not used. It is provided because of the common use of the body with the low-noise type pilot operated relief valve.
On the sub-plate, plug the port which corresponds to this port.

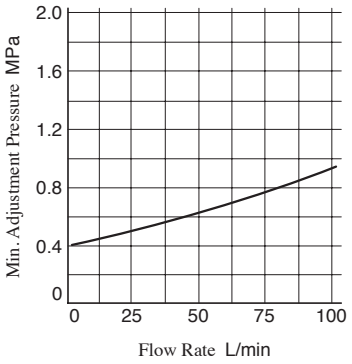


Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-18) in common use.

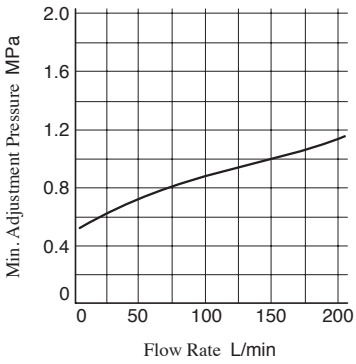
Min. Adjustment Pressure

Viscosity : 30 mm²/s

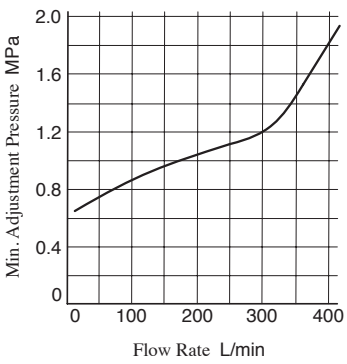
EBG-03



EBG-06



EBG-10

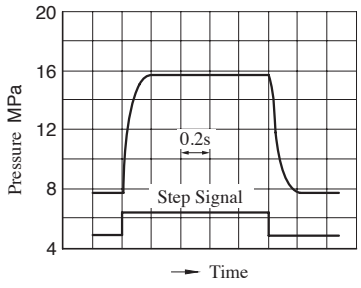


Step Response (Example)

These Characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

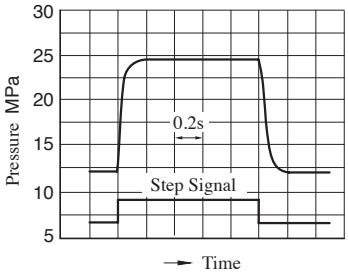
Trapped Oil Volume : 1 L
Viscosity : 30 mm²/s

EBG-03-C



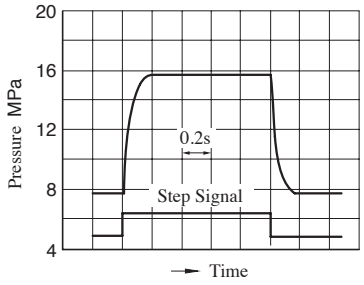
(Flow Rate : 100 L/min)

EBG-03-H



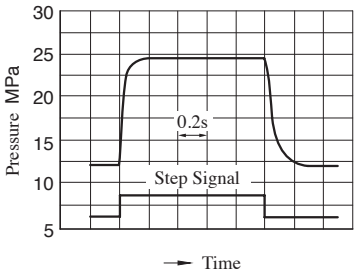
(Flow Rate : 100 L/min)

EBG-06-C



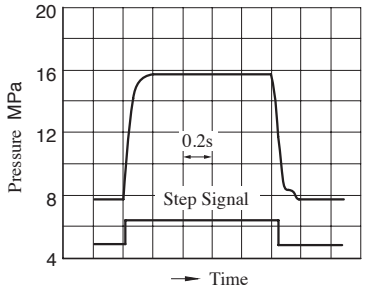
(Flow Rate : 200 L/min)

EBG-06-H



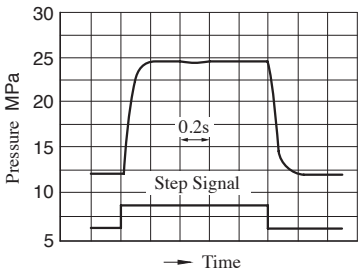
(Flow Rate : 200 L/min)

EBG-10-C



(Flow Rate : 400 L/min)

EBG-10-H

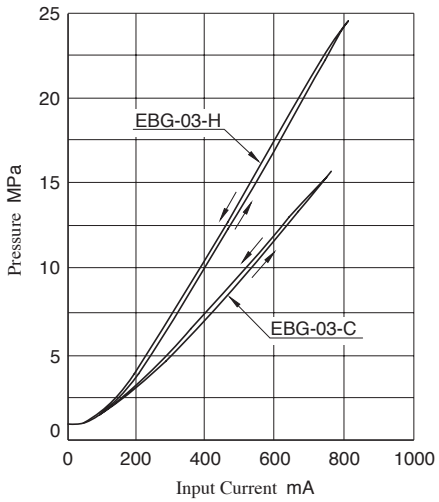


(Flow Rate : 400 L/min)

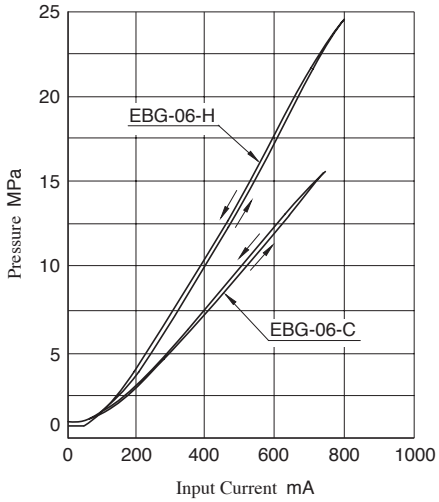
Input Current vs. Pressure

Viscosity : 30 mm²/s

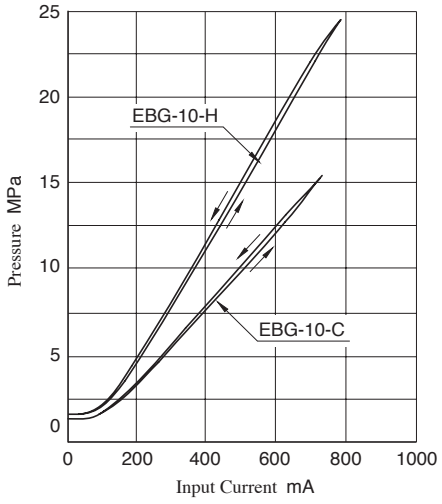
EBG-03



EBG-06



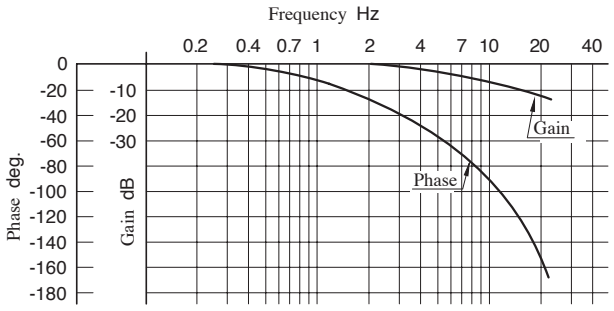
EBG-10



Frequency Response

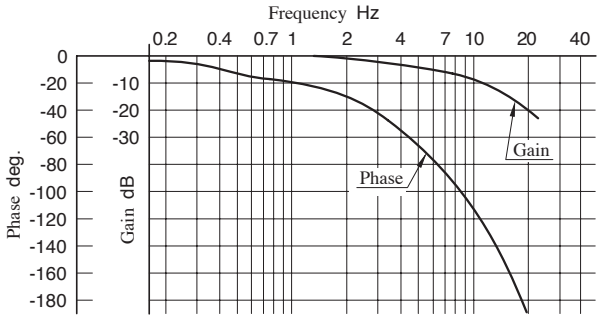
Trapped Oil Volume : 1 L
Viscosity : 30 mm²/s

EBG-03



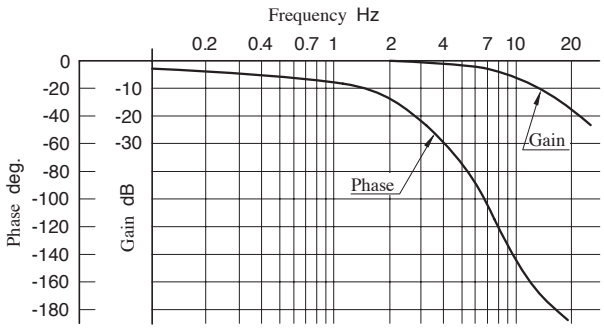
Pressure : 7.8 ± 1.6 MPa
Flow Rate : 100 L/min

EBG-06



Pressure : 7.8 ± 1.6 MPa
Flow Rate : 200 L/min

EBG-10



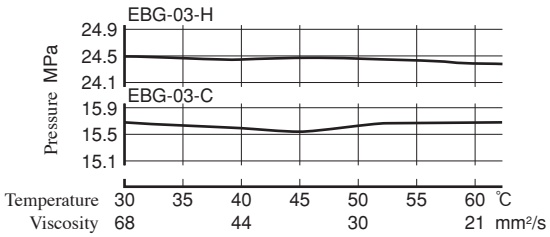
Pressure : 7.8 ± 1.6 MPa
Flow Rate : 400 L/min

Viscosity vs. Pressure

Oil : ISO VG 46

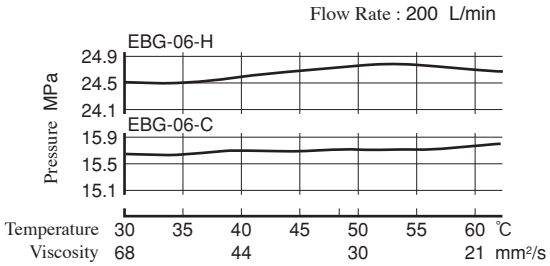
EBG-03

Flow Rate : 100 L/min



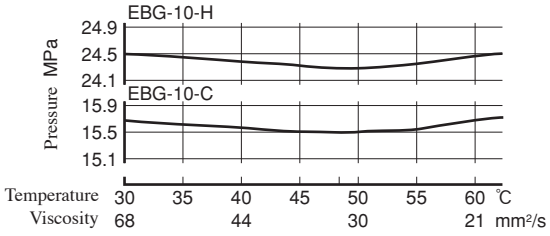
EBG-06

Flow Rate : 200 L/min



EBG-10

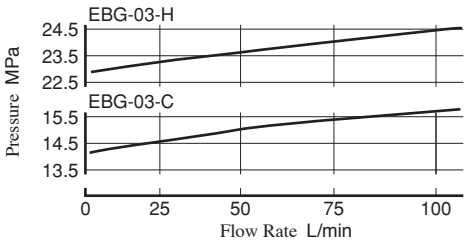
Flow Rate : 400 L/min



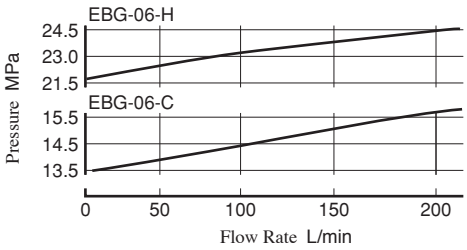
Flow Rate vs. Pressure

Viscosity : 30 mm²/s

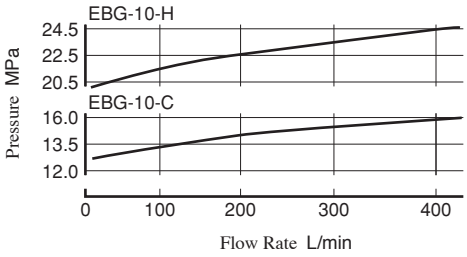
EBG-03



EBG-06

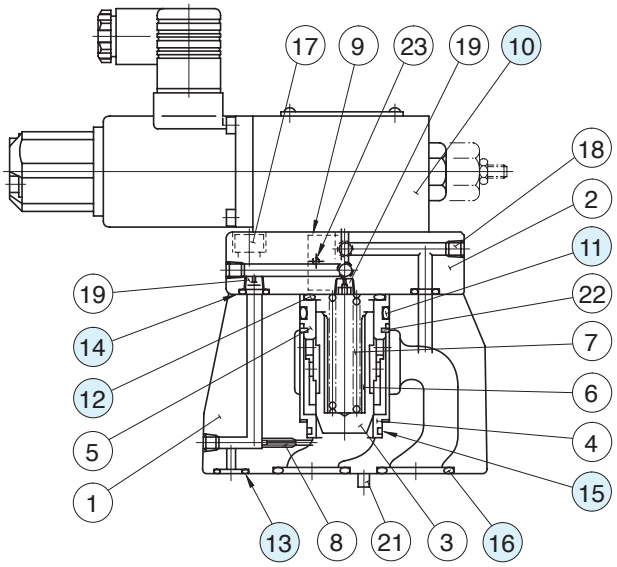


EBG-10



List of Seals and Pilot Valves

EBG-03, 06, 10



Pilot Valves

Valve Model Numbers	⑩ Pilot Valve Model Numbers
EBG-03-C-51	EDG-01V-C-1-PNT09-51
EBG-03-H-51	EDG-01V-H-1-PNT09-51
EBG-03-C-T-51	EDG-01V-C-PNT09-51
EBG-03-H-T-51	EDG-01V-H-PNT09-51
EBG-06-C-51	EDG-01V-C-1-PNT10-51
EBG-06-H-51	EDG-01V-H-1-PNT10-51
EBG-06-C-T-51	EDG-01V-C-PNT10-51
EBG-06-H-T-51	EDG-01V-H-PNT10-51
EBG-10-C-51	EDG-01V-C-1-PNT11-5103
EBG-10-H-51	EDG-01V-H-1-PNT11-5103
EBG-10-C-T-51	EDG-01V-C-PNT11-5103
EBG-10-H-T-51	EDG-01V-H-PNT11-5103

Note: For the details of pilot valves, refer to "Pilot Relief Valves" on page H-97.

List of Seals

Item	Name of Parts	Part Numbers			Qty.
		EBG-03	EBG-06	EBG-10	
11	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1
12	O-Ring	OR NBR-90 P28-N	OR NBR-90 P28-N	OR NBR-90 P28-N	1
13	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	OR NBR-90 P9-N	1
14	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	2
15	O-Ring	AS568-024(NBR-90)	AS568-024(NBR-90)	AS568-128(NBR-90)	1
16	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2

Interchangeability between Current and New Design

EBG-03/06/10 series valves have changed model from 50 to 51 design in line with the model change of pilot valve (EDG-01).

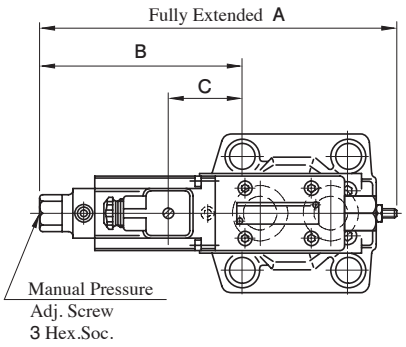
Specifications and Characteristics

Input current-pressure characteristics differ between current and new design. Please inquire separately for details.
Other specifications remain unchanged.

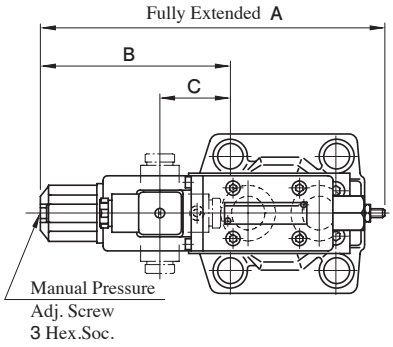
Mounting Interchangeability

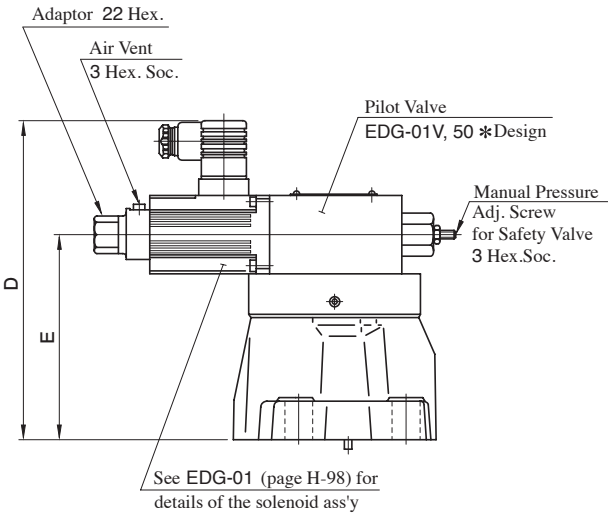
There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to pilot valve improvement and other modifications.

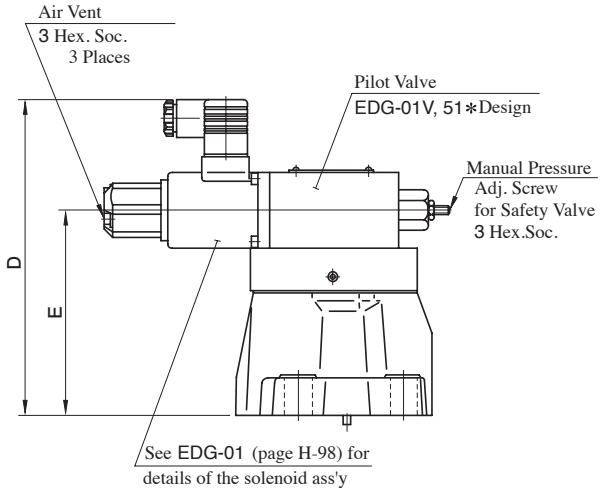
Current: Design 50



New: Design 51



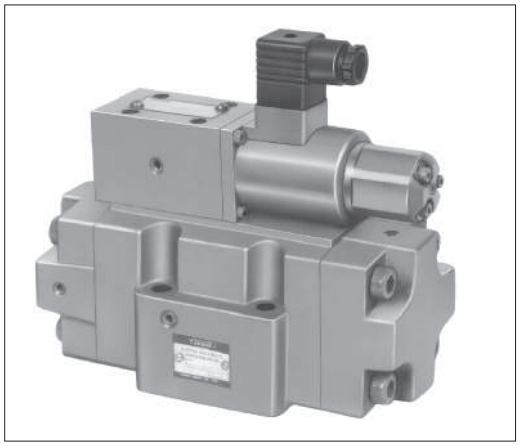


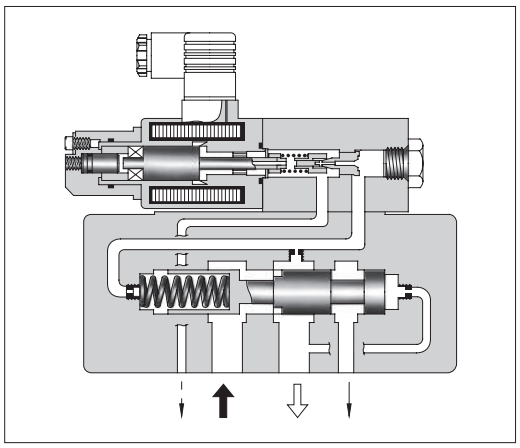


Model Numbers		A	B	C	D	E
Current	EBG-03-∗-∗-50	217	118.6	40.2	199.5	130
New	EBG-03-∗-∗-51	216	117.6	40.2		
Current	EBG-06-∗-∗-50	217	120.5	42.1	199.5	130
New	EBG-06-∗-∗-51	216	119.5	42.1		
Current	EBG-10-∗-∗-50	217	102	23.6	235.5	166
New	EBG-10-∗-∗-51	216	101	23.6		

Proportional Electro-Hydraulic Relieving and Reducing Valves

This valve is derived by combining a small, high-performance 1/8 proportional electro-hydraulic pilot relief valve with a relieving and reducing valve.
With this valve, it is possible to regulate the system pressure in proportion to the input current.
Incorporating a relief mechanism, this valve provides a good response speed and the pressure decreases even if the load is large. Note that this valve is used in conjunction with the applicable power amplifier.



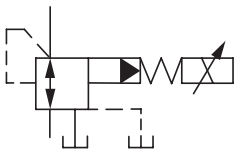


Specifications

Descriptions \ Model Numbers		ERBG-06	ERBG-10
Max. Operating Pres.	MPa	24.5	24.5
Max. Flow	L/min	100	250
Max. Relieving Flow	L/min	35	15
Secondary Pres. Adj. Range	MPa	Refer to Model Number Designation	
Rated Current	mA	B: 800 C: 800 H: 950	B: 800 C: 800 H: 950
Coil Resistance	Ω	10	10
Hysteresis		3% or less	3% or less
Repeatability		1% or less	1% or less
Mass	kg	12	13.5

★ The values shown are those obtained where the differential pressure between the secondary pressure port and tank port is 13.7 MPa.

Graphic Symbol



Model Number Designation

ERB	G	-06	-C	-51
Series Number	Type of Mounting	Valve Size	Secondary Pres. Adj. Range MPa	Design Number
ERB: Proportional Electro-Hydraulic Relieving and Reducing Valve	**G:** Sub-Plate Mounting	**06**	**B:** 0.8 - 6.9 **C:** 1.2 - 13.7 **H:** 1.5 - 20.6	**51**
		10	**B:** 0.9 - 6.9 **C:** 1.2 - 13.7 **H:** 1.5 - 20.6	

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
ERBG-06	M10 × 70 L	4
EBBG-10	M10 × 70 L	6

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see pages H-173, H-177 and H-183).

Model Numbers : AME-D-10-✻-20
AME-D2-1010-11
AMN-D-10 (For DC power supply)
SK1022-✻-✻-11
SK1015-11 (For DC power supply)

Sub-Plates

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
ERBG-06	ERBGM-06-20	3/4	3.0
ERBG-10	ERBGM-10-20	1-1/4	6.5

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽ 1.6)

Instructions

Primary Pressure Required for Preselected Pressure

The primary pressure must be 1 MPa higher than the preselected pressure.

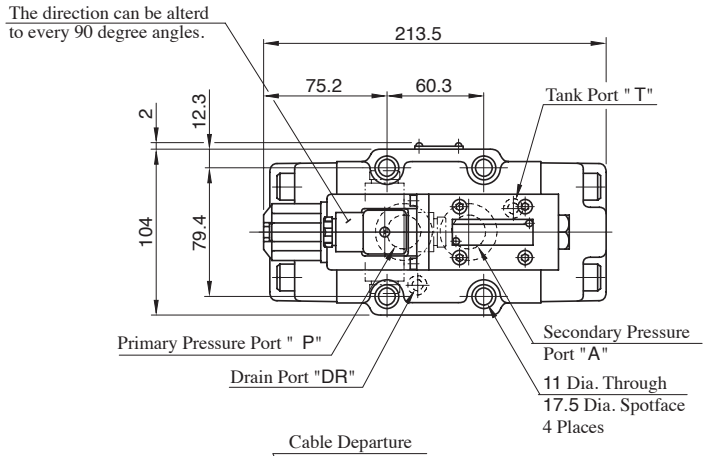
Drain Back Pressure

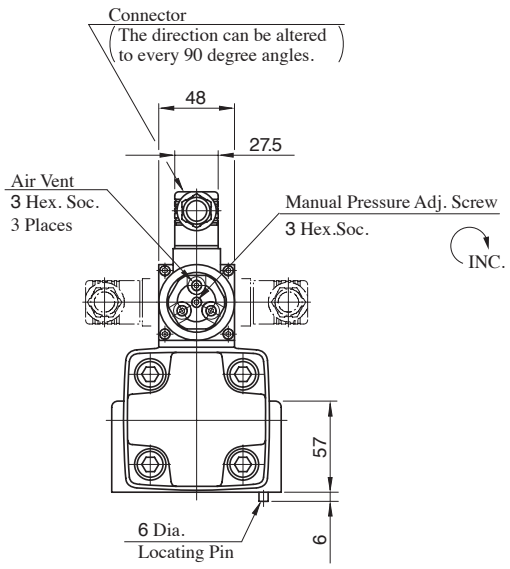
Check that the drain back pressure does not exceed 0.2 MPa.

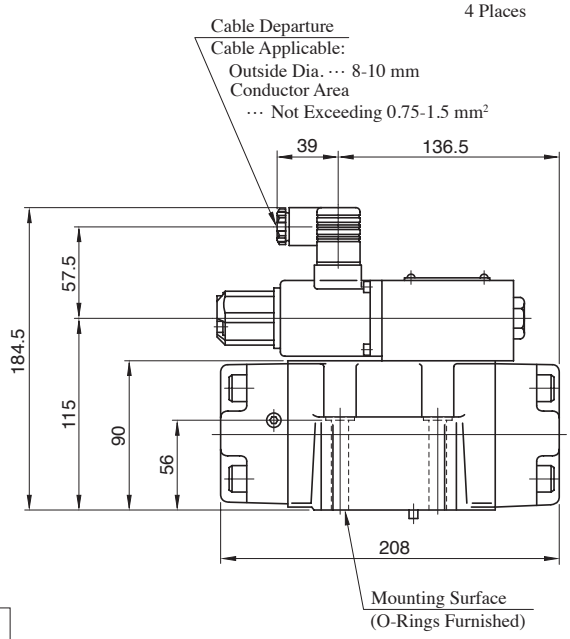
Trapped Oil Volume

The recommended secondary side trapped oil volume is about 20 liters. Note that the trapped oil volume must not be lower than 1.4 liters.

ERBG-06

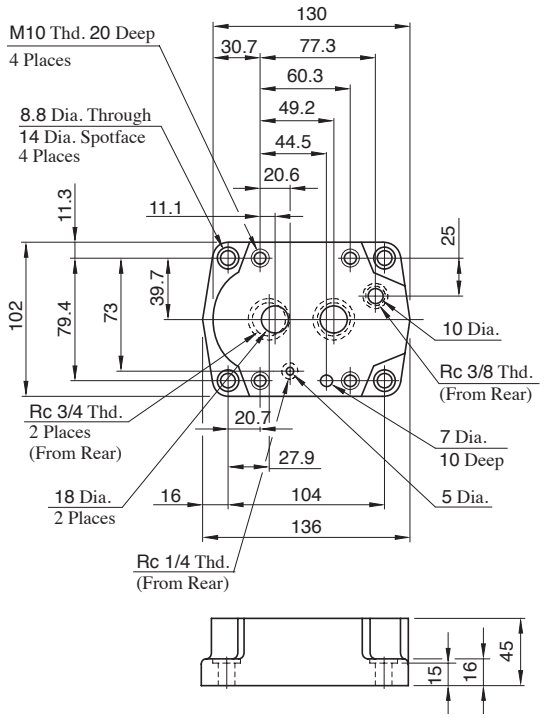




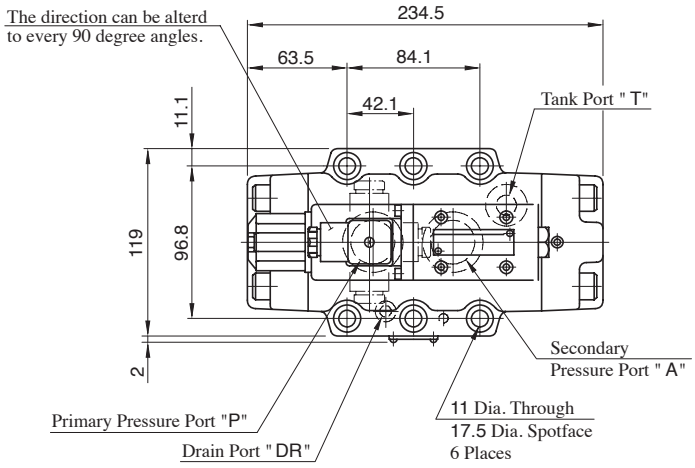


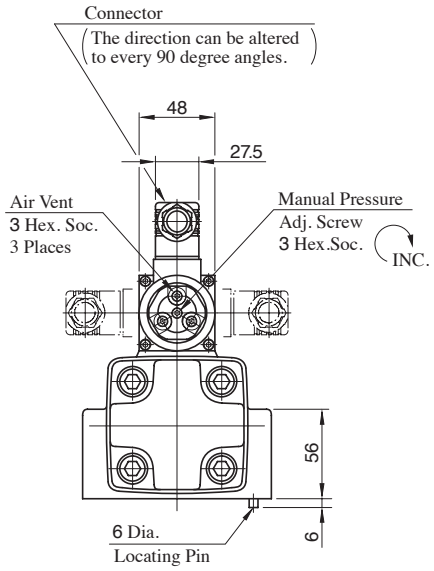
Sub-Plate

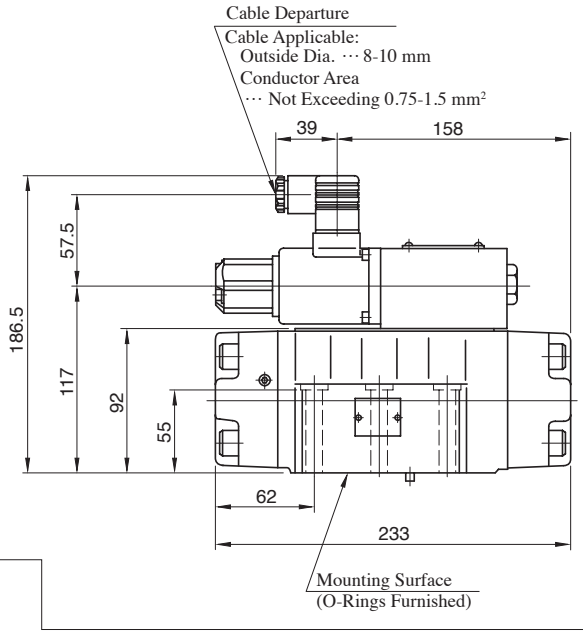
ERBGM-06



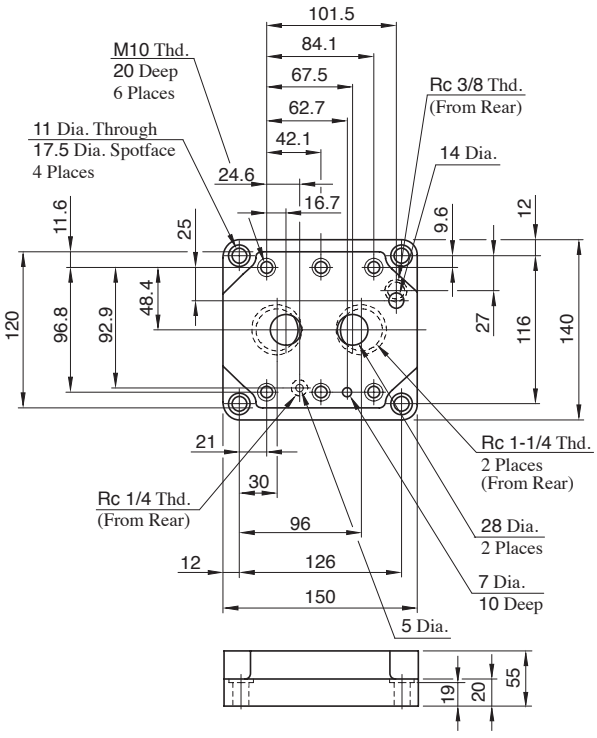
ERBG-10







Sub-Plate
ERBGM-10

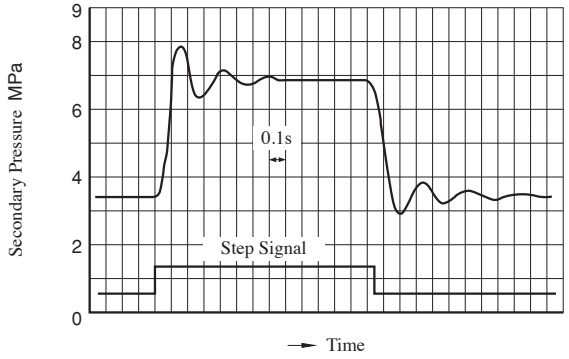


Step Response (Example)

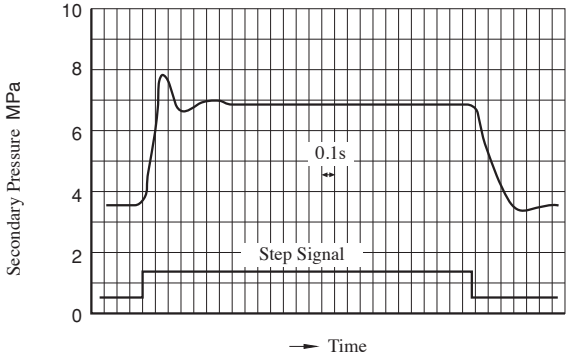
The following step response characteristics are taken when the trapped oil volume is 20 liters.
The step response varies by trapped oil volume.

Primary Pressure : 24.5 MPa
Trapped Oil Volume : 20 L
Viscosity : 30 mm^2/s

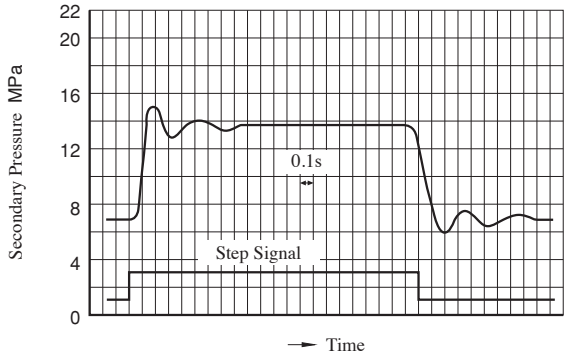
ERBG-06-B



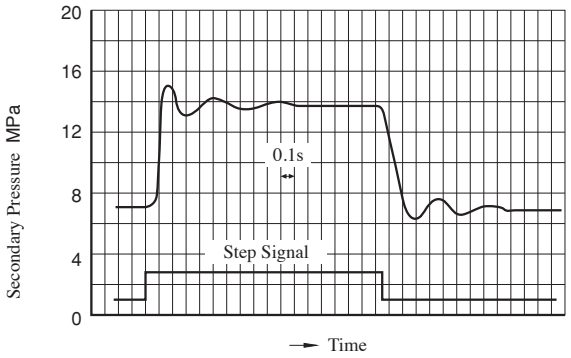
ERBG-10-B



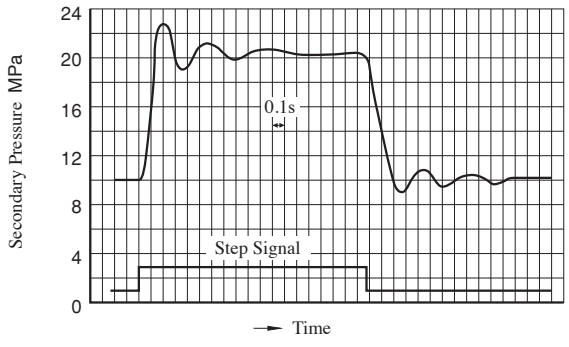
ERBG-06-C



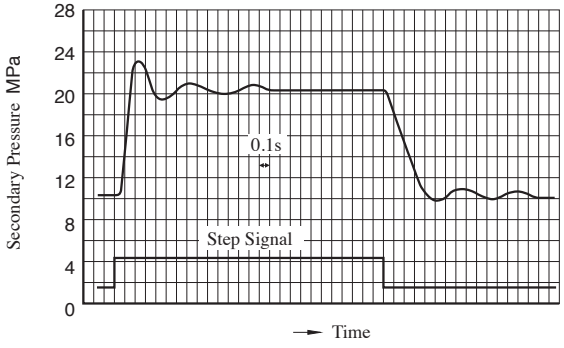
ERBG-10-C



ERBG-06-H



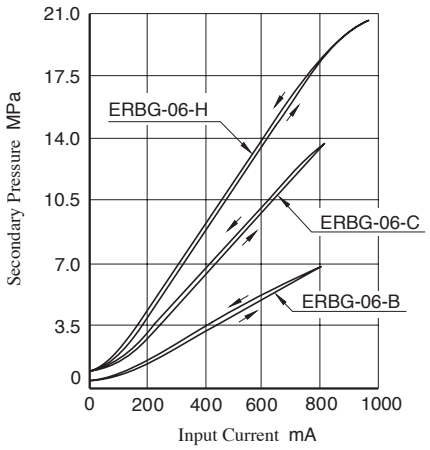
ERBG-10-H



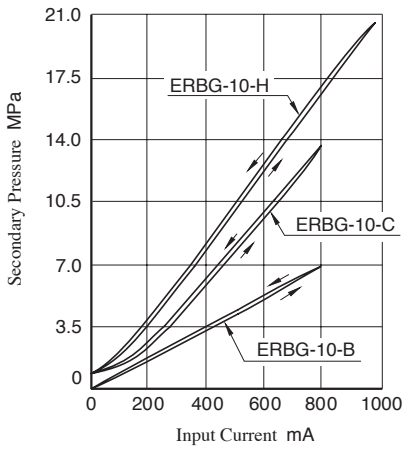
Input Current vs. Secondary Pressure

Primary Pressure : 24.5 MPa
Viscosity : 30 mm²/s

ERBG-06



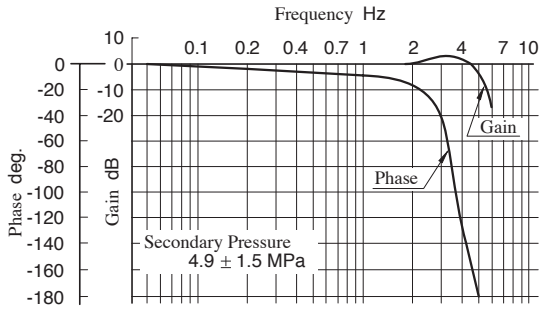
ERBG-10



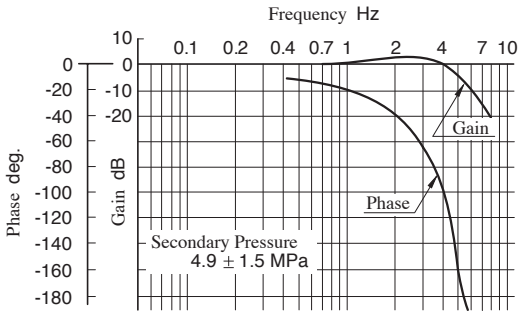
Frequency Response

Primary Pressure : 24.5 MPa
Trapped Oil Volume : 20 L
Viscosity : 30 mm²/s

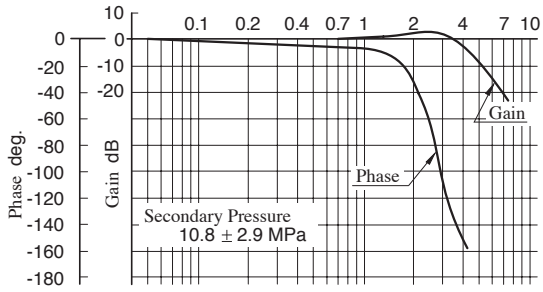
ERBG-06-B



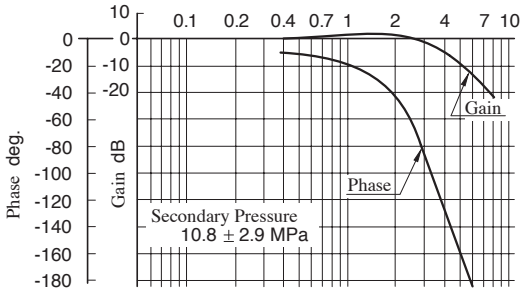
ERBG-10-B



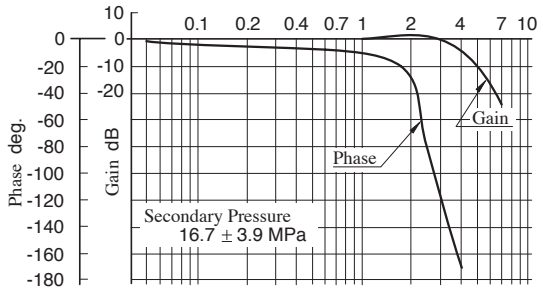
ERBG-06-C



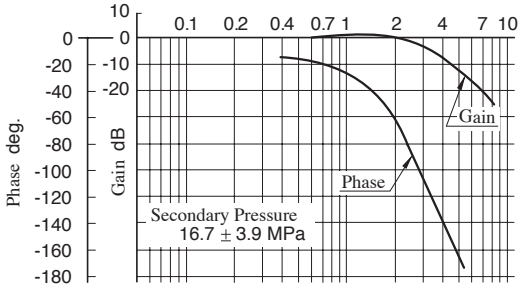
ERBG-10-C



ERBG-06-H



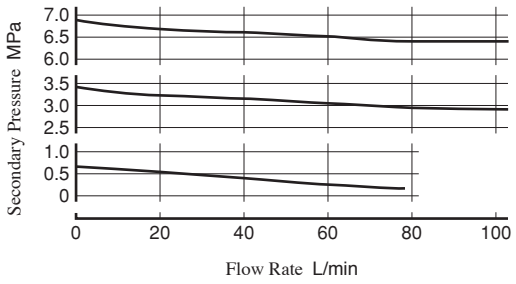
ERBG-10-H



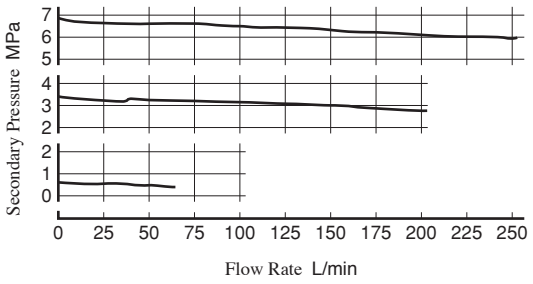
Flow Rate vs. Secondary Pressure

Viscosity : 30 mm²/s

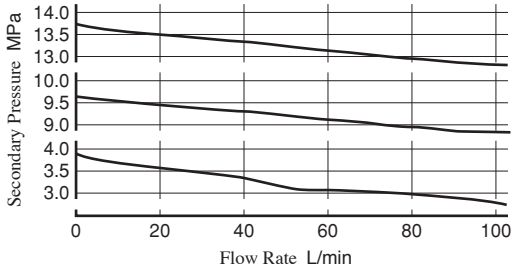
ERBG-06-B



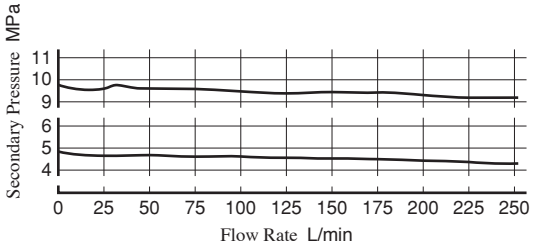
ERBG-10-B



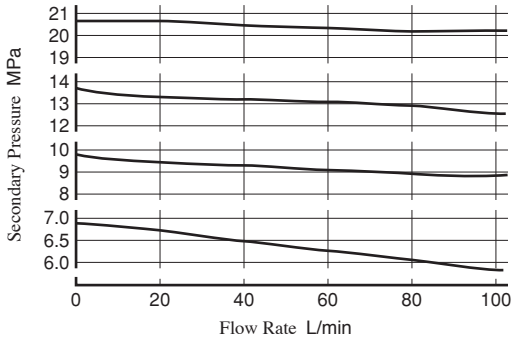
ERBG-06-C



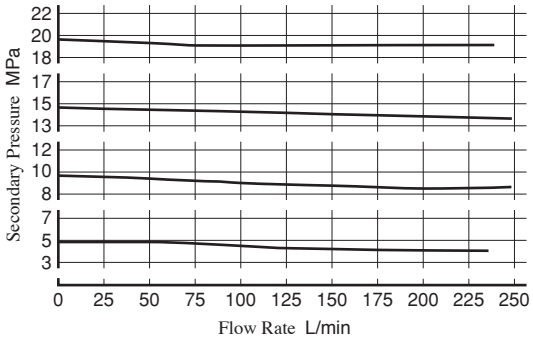
ERBG-10-C



ERBG-06-H



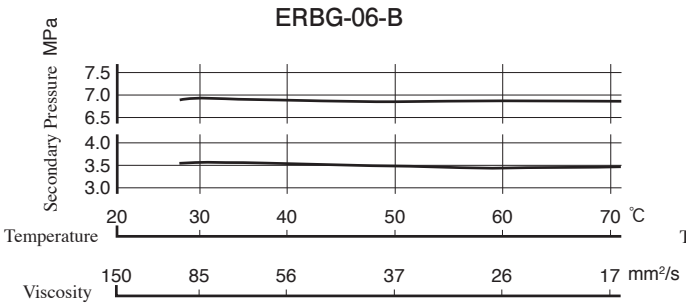
ERBG-10-H



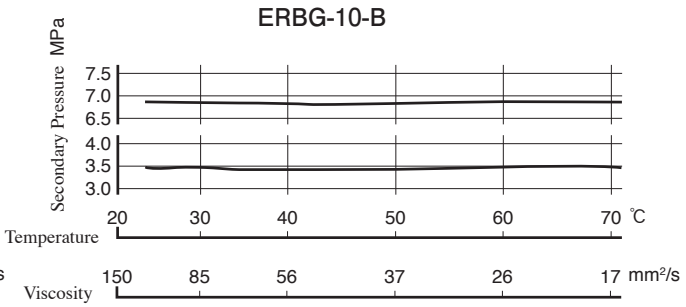
Viscosity vs. Secondary Pressure

Oil: ISO VG32

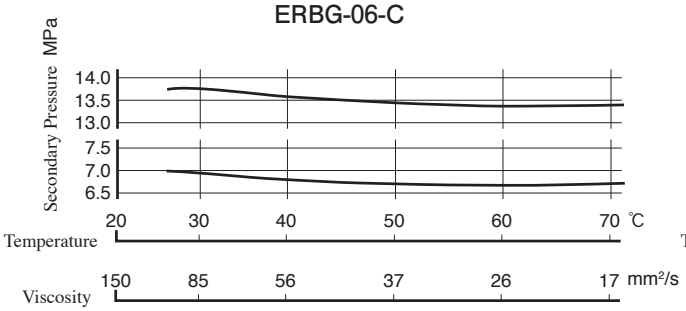
ERBG-06-B



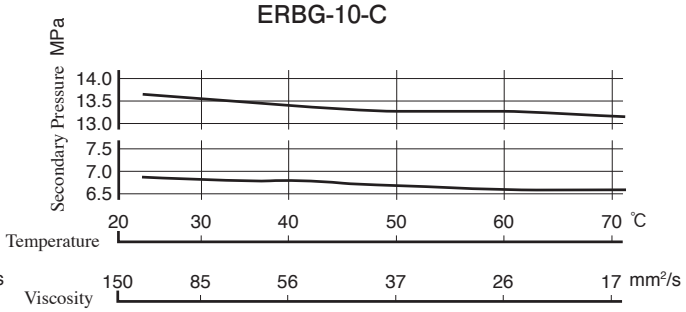
ERBG-10-B



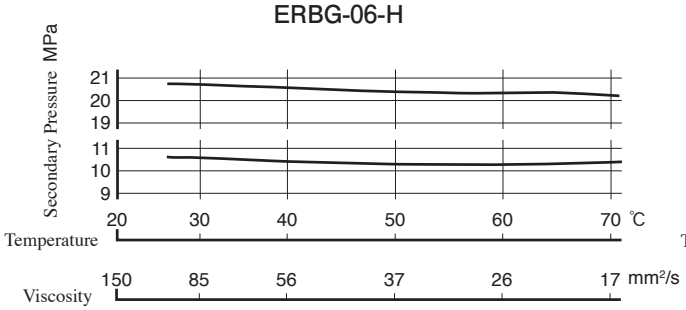
ERBG-06-C



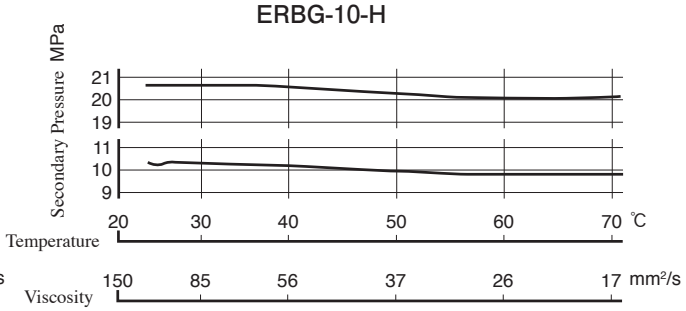
ERBG-10-C



ERBG-06-H

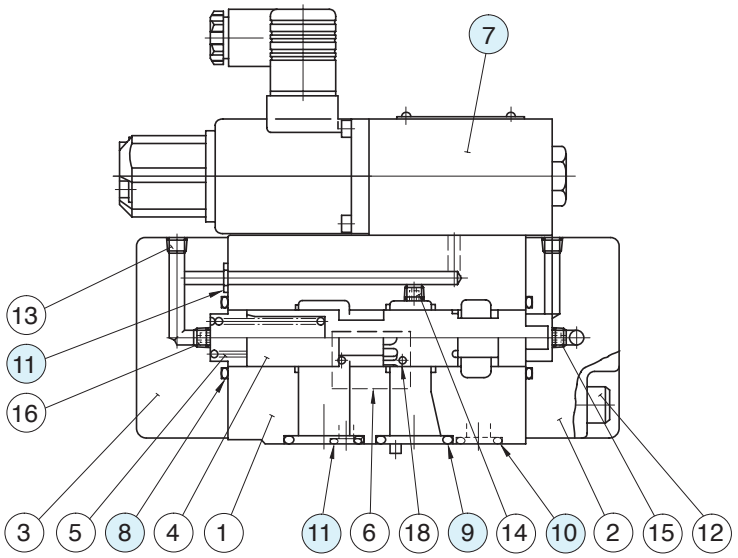


ERBG-10-H



List of Seals and Pilot Valves

ERBG- 06 / 10



List of Seals

Item	Name of Parts	Part Numbers		Qty.
		ERBG-06	ERBG-10	
8	O-Ring	OR NBR-90 G30-N	OR NBR-90 P36-N	2
9	O-Ring	OR NBR-90 P28-N	OR NBR-90 P28-N	2
10	O-Ring	OR NBR-90 P14-N	OR NBR-90 P18-N	1
11	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	3

Pilot Valves

Valve Model No.	⑦ Pilot Valve Model Numbers
ERBG-06-B-51	EDG-01-B-PNTN-5101
ERBG-06-C-51	EDG-01-C-PNTN-5101
ERBG-06-H-51	EDG-01-H-PNT15-5101
ERBG-10-B-51	EDG-01-B-PNTN-5101
ERBG-10-C-51	EDG-01-C-PNTN-5101
ERBG-10-H-51	EDG-01-H-PNT15-5101

Note: For the details of pilot valves, refer to "Pilot Relief Valves" on page H-97.

Interchangeability between Current and New Design

ERBG-06/10 series valves have changed model from 50 to 51 design in line with the model change of pilot valve (EDG-01).

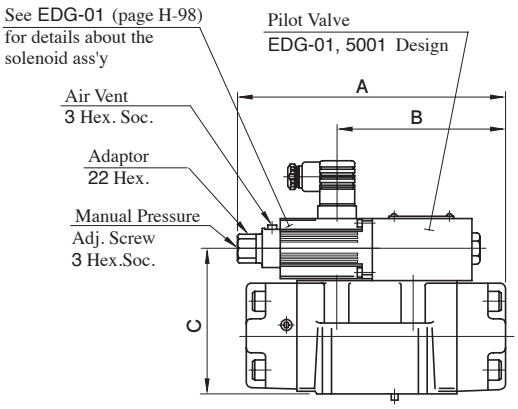
Specifications and Characteristics

Input current-secondary pressure characteristics differ between current and new design. Please inquire separately for details. Other specifications remain unchanged.

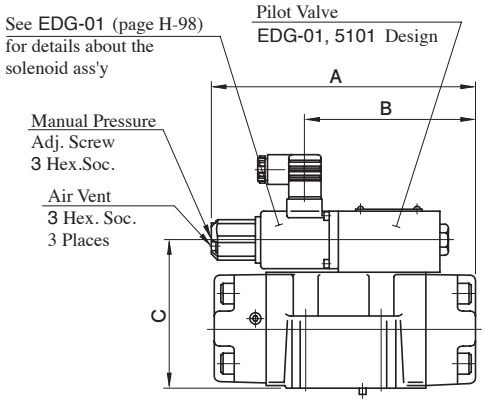
Mounting Interchangeability

There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to pilot valve improvement and other modifications.

Current: Design 50



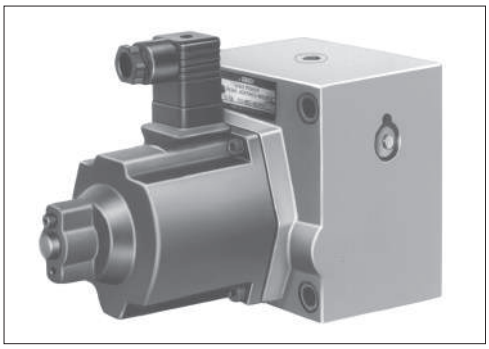
New: Design 51

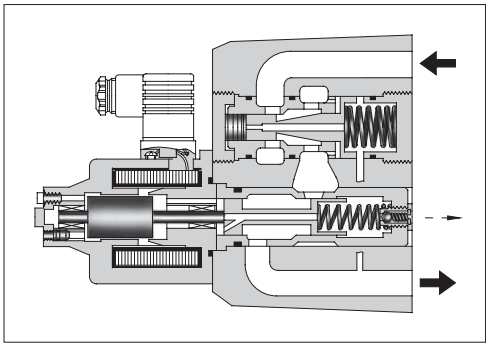


Model Numbers		A	B	C
Current	ERBG-06-＊-50	214.5	136.5	115
New	ERBG-06-＊-51	213.5	136.5	115
Current	ERBG-10-＊-50	235.5	158	117
New	ERBG-10-＊-51	234.5	158	117

40Ω Series
Proportional Electro-Hydraulic Flow Control (and Check) Valves

Since the preselected flow rate continuously varies in proportion to the current input to the valve, the system flow rate can be remote-controlled as desired by regulating the amplifier current output. Further, since pressure and temperature compensation functions are provided, the preselected flow rate is not affected by pressure (load) or temperature (fluid viscosity).
This valve is ideal for use where actuator startup, stop, and speed changes are to be implemented without producing a shock. Note that this valve is used in conjunction with the applicable power amplifier.



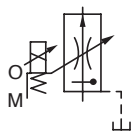


Specifications

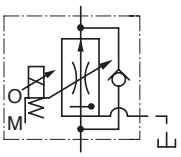
Descriptions \ Model No.	EFG/EFCG-02-10 / -02-30	EFG/EFCG-03-60 / -03-125	EFG/EFCG-06-250	EFG/EFCG-10-500
Max. Operating Pres. MPa	20.6	20.6	20.6	20.6
Metered Flow Adjustment Range L/min	10: 0.3-10 30: 0.3-30	60: 2-60 125: 2-125	3-250	5-500
Min. Differential Pres.★ MPa	0.6	1.0	1.3	2.0
Free Flow (EFCG Models Only.) L/min	40	130	280	550
Rated Current mA	600	600	600	600
Coil Resistance Ω	45	45	45	45
Hysteresis	5% or less	7% or less	7% or less	7% or less
Repeatability	1% or less	1% or less	1% or less	1% or less
Mass kg	8.2	12.5	25	51

★ Min. pressure difference required between inlet and outlet ports to maintain function as pressure compensator.

Graphic Symbols



EFG-∗



EFCG-∗

Model Number Designation

EFC	G	-02	-10	-N	-31
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pres. Compensator Stroke Adjustment	Design Number
EF: Proportional Electro-Hydraulic Flow Control Valve **EFC:** Proportional Electro-Hydraulic Flow Control and Check Valve	**G:** Sub-Plate Mounting	**02**	**10** **30**	**N:** Applicable only for Press. Compensator Stroke Adjustment (Option - Omit if not required)	**31**
		03	**60** **125**		**26, 2603**★
		06	**250**		**22**
		10	**500**		**11**

Note: If you are going to use the model with pressure compensator stroke adjustment screw, consult your Yuken representative in advance.
★ Only for the "EFG-03-∗-N," the design number is "2603."

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EFG EFCG-02	M8 × 75 L	4
EFG EFCG-03	M10 × 100 L	4
EFG EFCG-06	M16 × 130 L	4
EFG EFCG-10	M20 × 160 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-178).

Model Numbers : AME-D-＊-＊-50
AME-DF-＊-＊-52
AME-T-S-＊-22

Sub-Plates

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
EFG EFCG-02	EFGM-02X-20	3/8	2.3
	EFGM-02Y-20	1/2	3.1
EFG EFCG-03	EFGM-03Y-3001	3/4	5.7
	EFGM-03Z-3001	1	5.6
EFG EFCG-06	EFGM-06X-3001	1	12.5
	EFGM-06Y-3001	1-1/4	16
EFG EFCG-10	EFGM-10Y-10★	1-1/2, 2 Flange Mounting	37

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6S)
- When ordering the EFGM-10Y, please order “F3” Series Pipe Flange Kits separately. Please inquire separately for details on the “F3” Series Pipe Flange Kits.

Models with Pressure Compensator Stroke Adjustment Screw

A models with pressure compensator stroke adjustment screw is optionally available to minimize the actuator protrusion (jumping) at startup. For the details, please consult us or your Yuken distributors.

Instructions

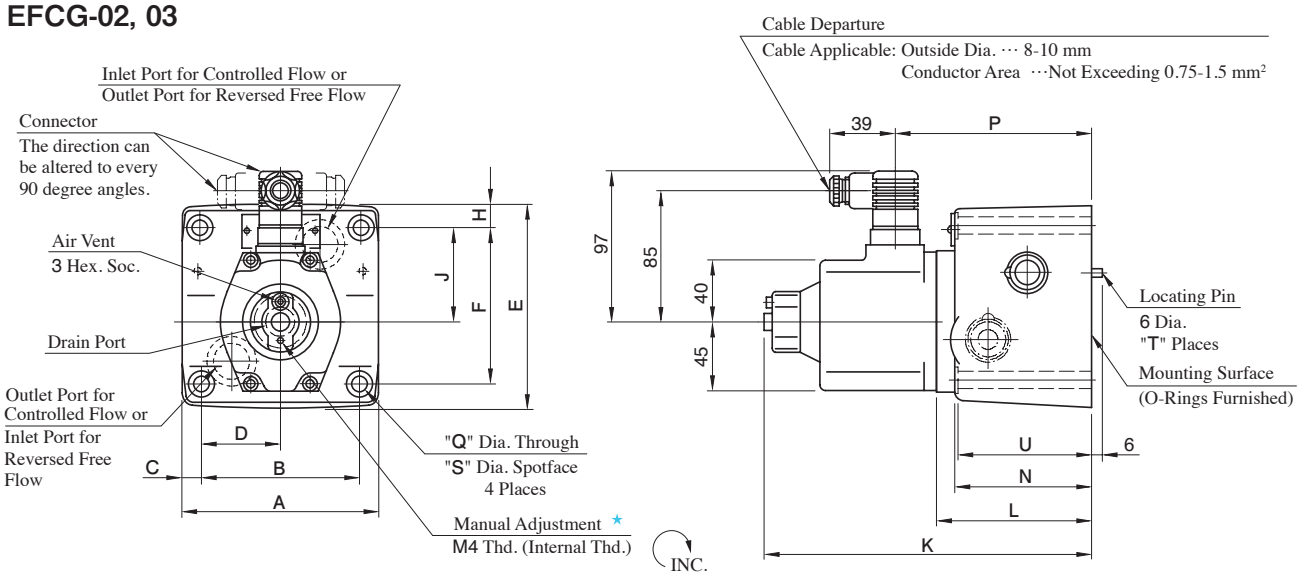
Drain Back Pressure

Check that the drain back pressure does not exceed 0.2 MPa.

Models with Check Valve

A models with check valve makes it possible to obtain a free flow in the direction opposite that of the controlled flow without respect to the input current.

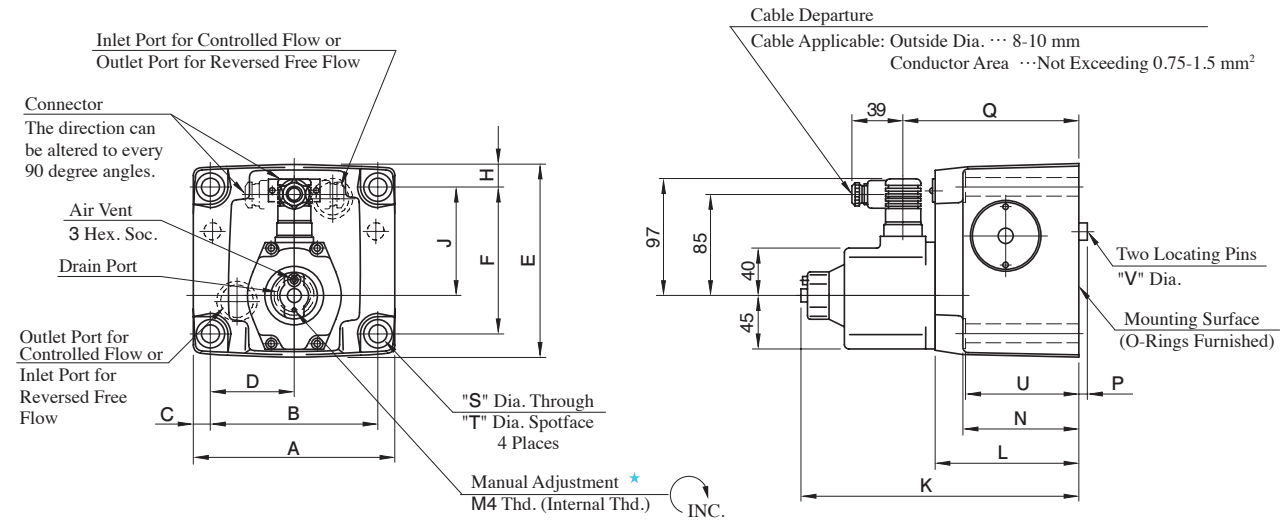
EFG-02, 03
EFCG-02, 03



★Manual adjustment can be done by screwing for example an M4 × 20 L screw in the M4 thread or pushing in a rod etc. there.

Model Numbers	Dimensions mm															U
	A	B	C	D	E	F	H	J	K	L	N	P	Q	S	T	
EF∗G-02	96	76.2	9.9	38.1	106	82.6	11.7	46.3	195	81	66	108	8.8	14	1	65
EF∗G-03	125	101.6	11.7	50.8	130	101.6	14.2	61.8	212	98	85	125	11	17.5	2	84

EFG-06, 10
EFCG-06, 10

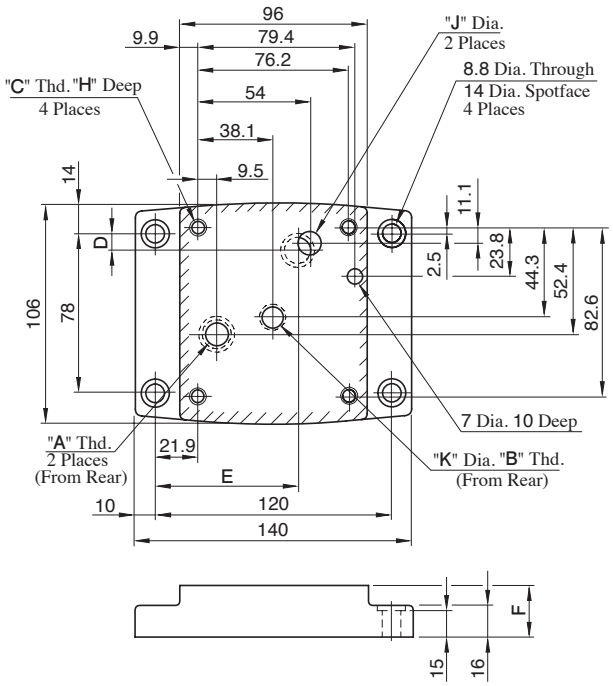


★Manual adjustment can be done by screwing for example an M4 × 20 L screw in the M4 thread or pushing in a rod etc. there.

Model Numbers	Dimensions mm																
	A	B	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V
EF∗G-06	180	146.1	17	73.1	174	133.4	20.3	99	244	130	105	7	157	17.5	26	103.5	16
EF∗G-10	244	196.9	23.5	98.5	228	177.8	25	144.5	274	160	137	10	187	21.5	32	135	18

Sub-Plate

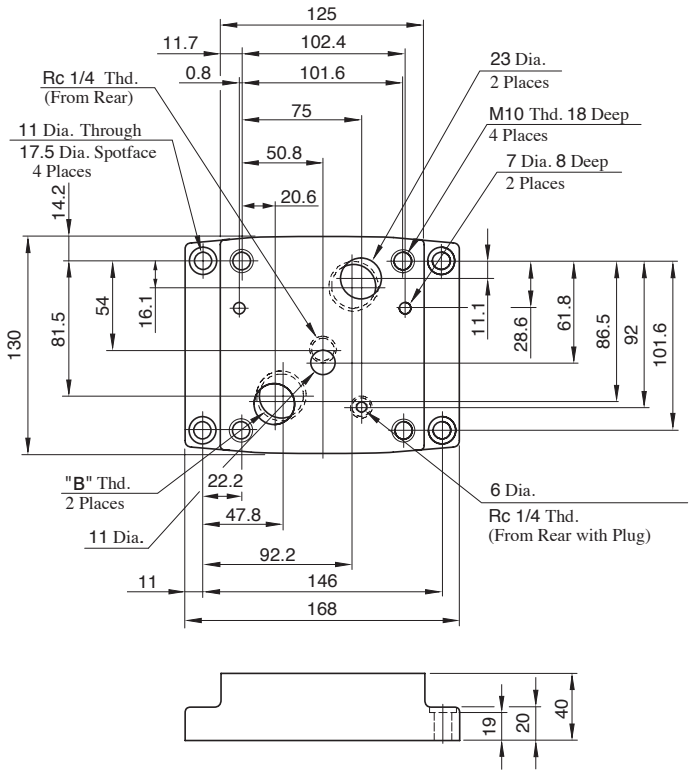
EFGM-02X, 02Y



Sub-Plate Model Numbers	Thread Size		
	"A" Thd.	"B" Thd.	"C" Thd.
EFGM-02X-20	Rc 3/8	Rc 1/4	M8
EFGM-02Y-20	Rc 1/2		

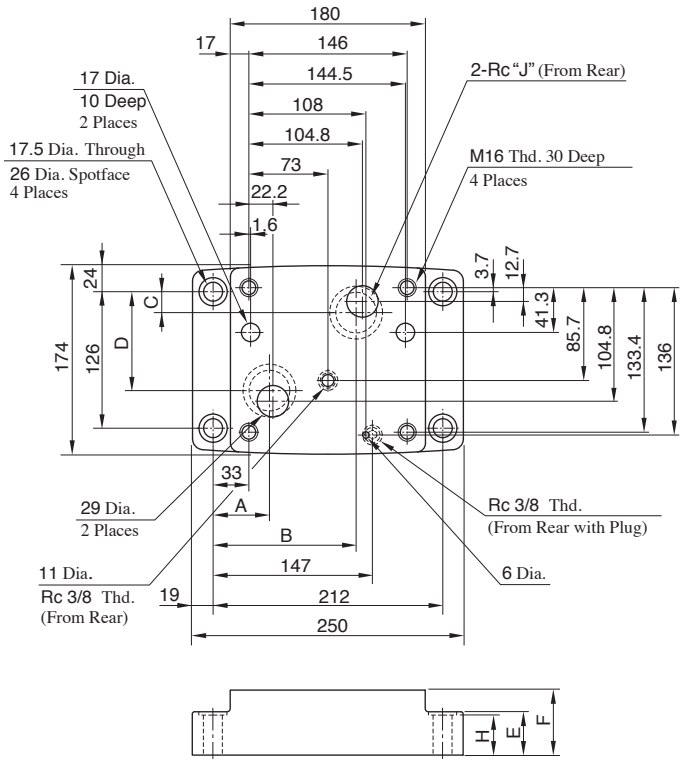
Sub-Plate Model Numbers	Dimensions mm					
	D	E	F	H	J	K
EFGM-02X-20	8.6	75.9	25	14	14	11
EFGM-02Y-20	11.5	72.9	35			

EFGM-03Y, 03Z (3001D)



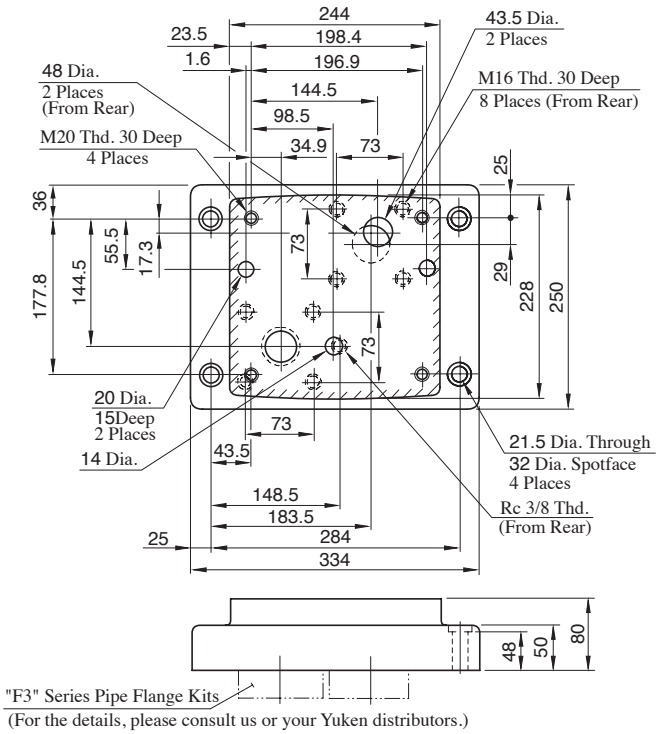
Sub-Plate Model Numbers	Thread Size
	"B" Thd.
EFGM-03Y-3001	Rc 3/4
EFGM-03Z-3001	Rc 1

Sub-Plate
EFGM-06X, 06Y (3001D)



Sub-Plate Model Numbers	A	B	C	D	E	F	H	J
EFGM-06X-3001	55.2	137.8	14.3	101.1	35	45	34	1
EFGM-06Y-3001	52	132	19.3	91.3	40	60	39	1-1/4

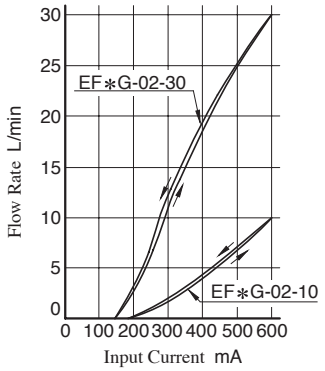
EFGM-10Y



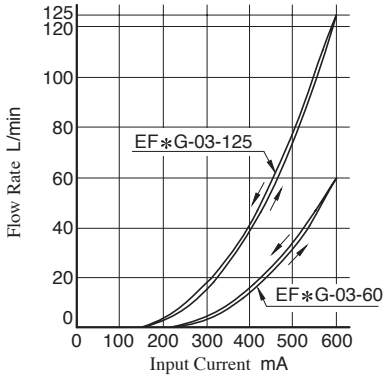
Input Current vs. Flow

Viscosity: 30 mm²/s

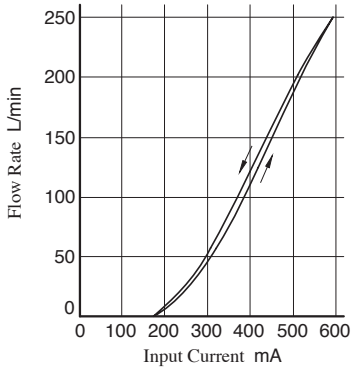
EFG EFCG-02



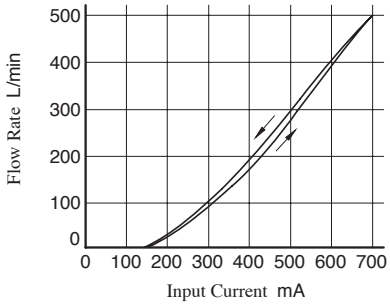
EFG EFCG-03



EFG EFCG-06



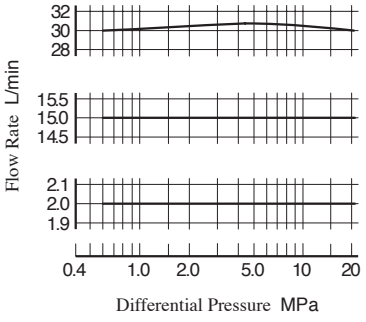
EFG EFCG-10



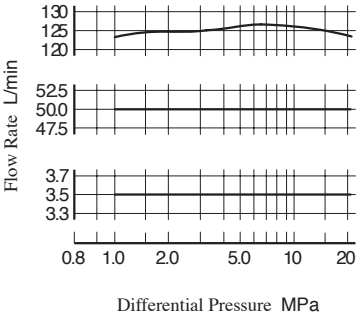
Differential Pressure vs. Metered Flow

Viscosity: 30 mm²/s

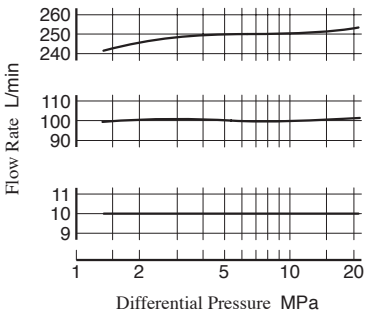
EFG EFCG-02



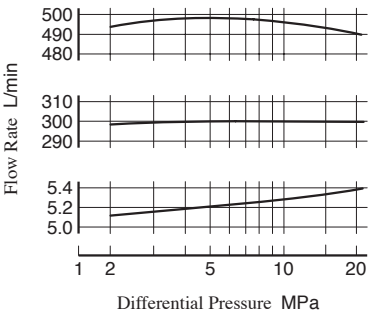
EFG EFCG-03



EFG EFCG-06



EFG EFCG-10

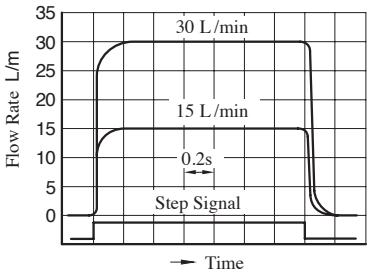


Step Response

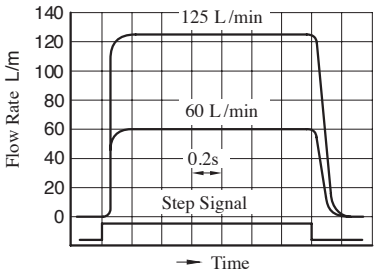
Viscosity: 30 mm²/s

These characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

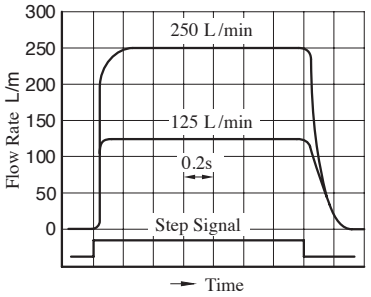
EFG EFCG-02



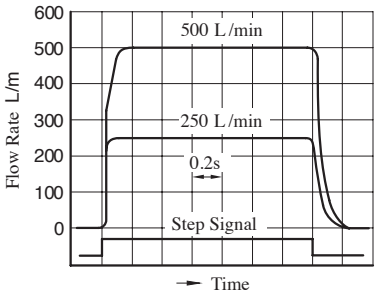
EFG EFCG-03



EFG EFCG-06



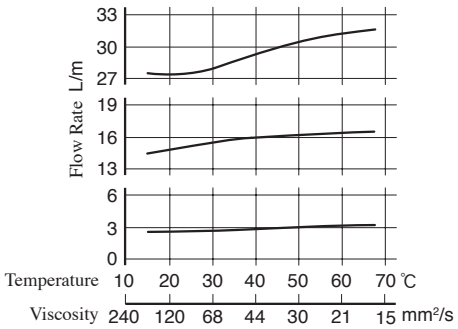
EFG EFCG-10



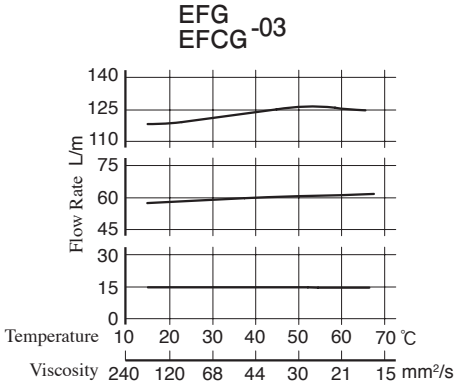
Viscosity vs. Flow

Oil: ISO VG 46

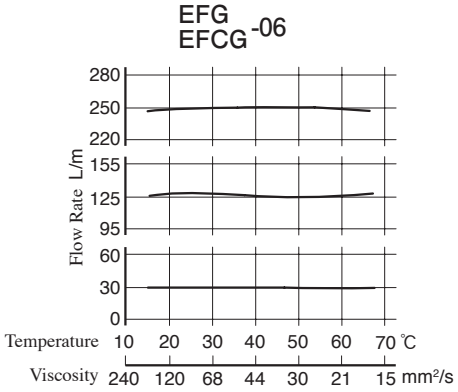
EFG EFCG-02



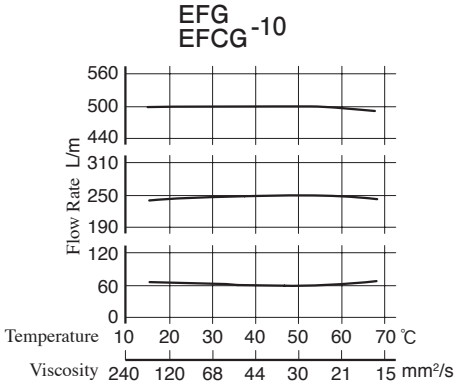
EFG EFCG-03



EFG EFCG-06



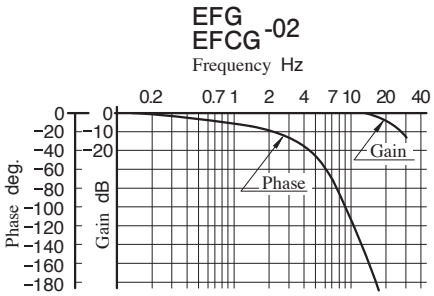
EFG EFCG-10



Frequency Response

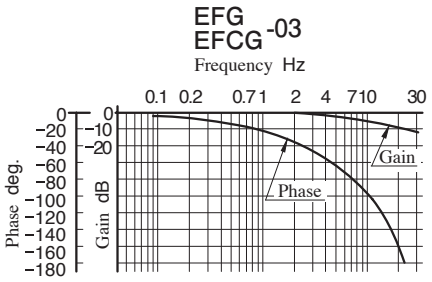
Viscosity: 30 mm²/s

EFG EFCG-02



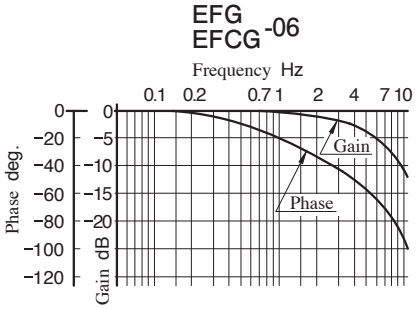
Input Current : 400 ± 100 mA
Pressure : 6.9 MPa

EFG EFCG-03



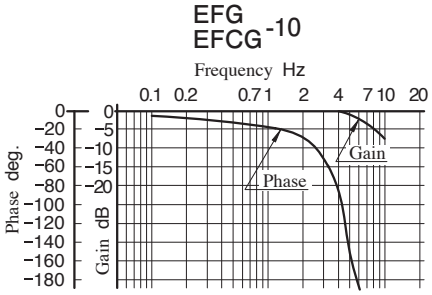
Input Current : 460 ± 70 mA
Pressure : 6.9 MPa

EFG EFCG-06



Input Current : 460 ± 70 mA
Pressure : 6.9 MPa

EFG EFCG-10

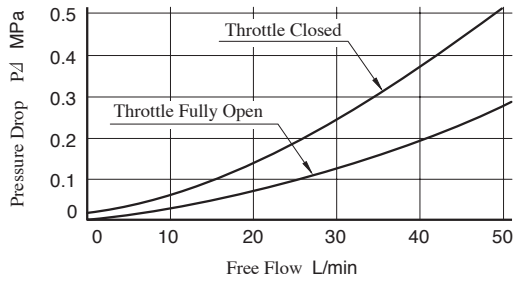


Input Current : 475 ± 125 mA
Pressure : 6.9 MPa

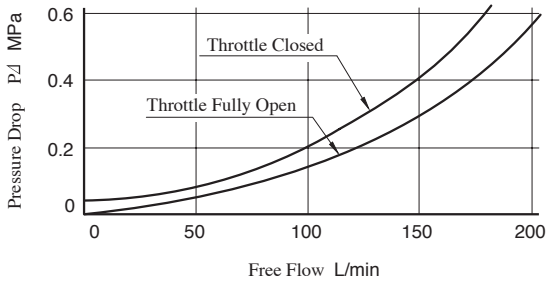
Pressure Drop for Reversed Free Flow (Only for "EFCG" Models)

Oil Viscosity: 35 mm^2/s
Specific Gravity: 0.850

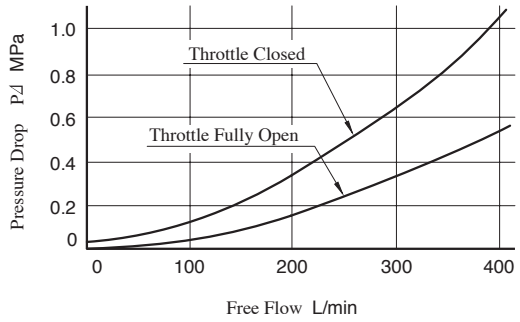
EFCG-02



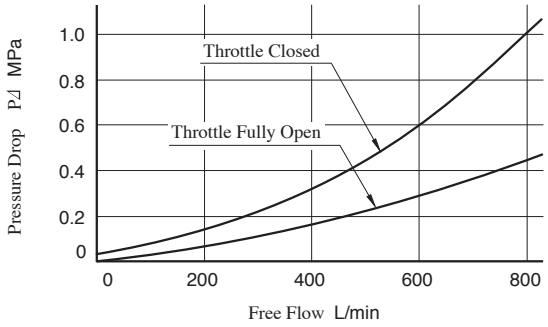
EFCG-03



EFCG-06



EFCG-10



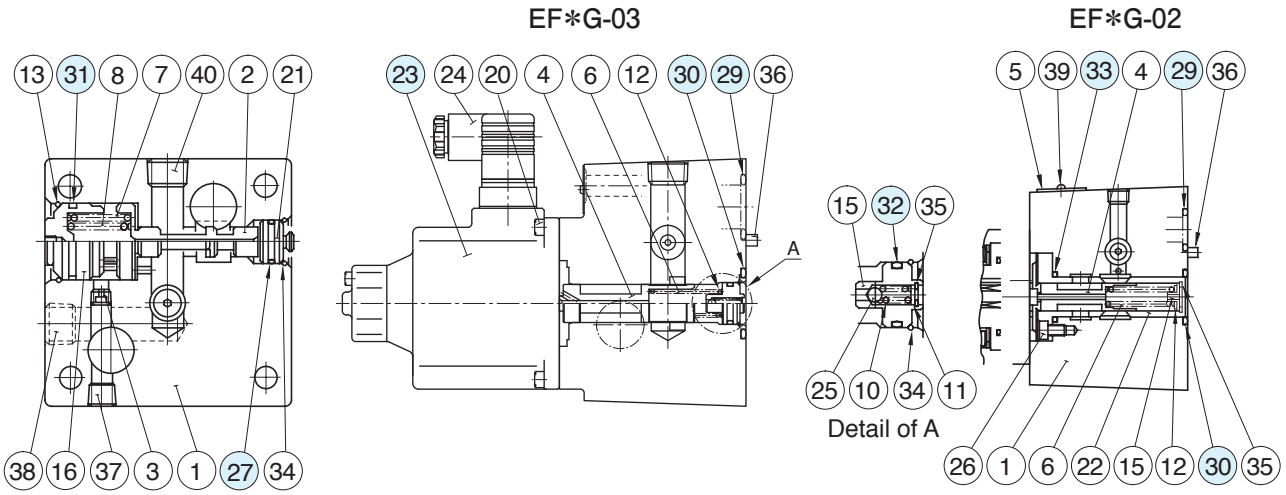
- For any other viscosity, multiply the factors in the table below.

Viscosity mm^2/s	20	40	60	80	100
Factor	0.87	1.03	1.14	1.23	1.30

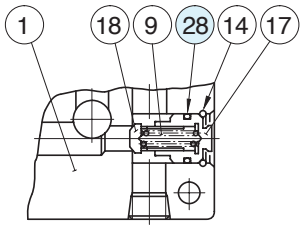
- For any other specific gravity (G'), the pressure drop (ΔP') may be obtained from the formula below.
  ΔP'= ΔP (G'/0.850)

List of Seals and Solenoid Ass'y

EFG
EFCG-02, 03



With Check Valve (EFCG-02, 03)



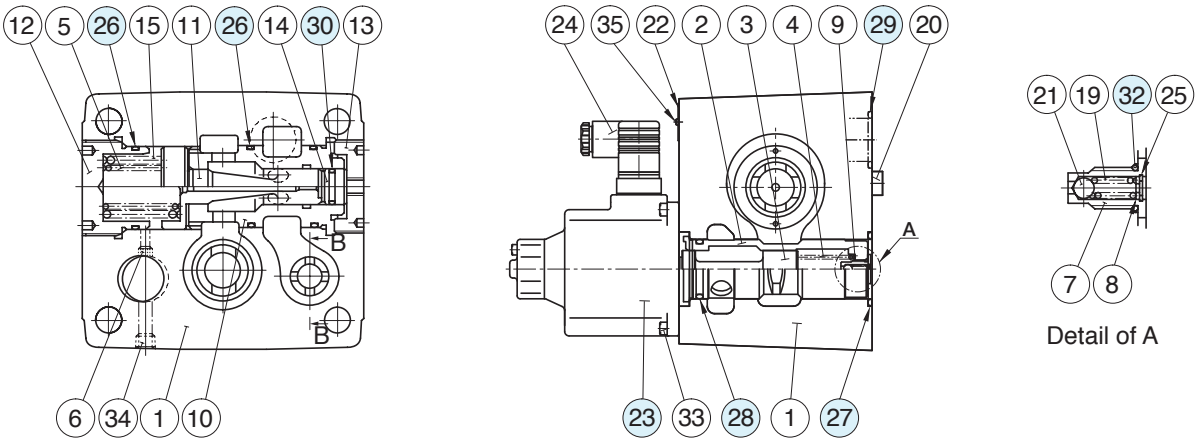
List of Seals and Solenoid Ass'y

Item	Name of Parts	Part Numbers		Qty.
		EF∗G-02	EF∗G-03	
23	Solenoid Ass'y	E321-45-20	E321-45-20	1
27	O-Ring	OR NBR-90 P18-N	OR NBR-90 P18-N	1
28	O-Ring	OR NBR-90 P10A-N	OR NBR-90 P21-N	1
29	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	2
30	O-Ring	OR NBR-90 P22-N	OR NBR-90 P31-N	1
31	O-Ring	OR NBR-90 G25-N	OR NBR-90 G35-N	1
32	O-Ring	—	OR NBR-90 P18-N	1
33	O-Ring	OR NBR-90 P22-N	—	1

Note 1: The connector assembly GDM-211-B-11 (Item 24) is not included in the solenoid assembly.

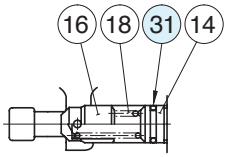
List of Seals and Solenoid Ass'y

EFG
EFCG-06, 10



Detail of A

With Check Valve (EFCG-06, 10)



Section B-B

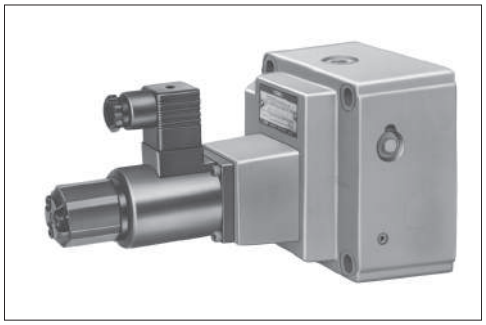
List of Seals and Solenoid Ass'y

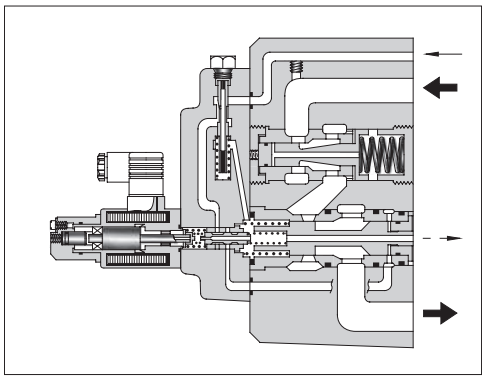
Item	Name of Parts	Part Numbers		Qty.
		EF＊G-06	EF＊G-10	
23	Solenoid Ass'y	E321-45-20	E321-45-20	1
26	O-Ring	OR NBR-90 P50-N	OR NBR-90 G75-N	3
27	O-Ring	OR NBR-90 P44-N	OR NBR-90 G60-N	1
28	O-Ring	OR NBR-90 P34-N	OR NBR-90 P50-N	1
29	O-Ring	OR NBR-90 P32-N	OR NBR-90 P48-N	2
30	O-Ring	OR NBR-90 P21-N	OR NBR-90 P34-N	1
31	O-Ring	OR NBR-90 P21-N	OR NBR-90 P26-N	1
32	O-Ring	OR NBR-70-1 P10-N	OR NBR-70-1 P10-N	1

Note 1: The connector assembly GDM-211-B-11 (Item 24) is not included in the solenoid assembly.

10Ω Series
Proportional Electro-Hydraulic Flow Control (and Check) Valves

Since the preselected flow rate continuously varies in proportion to the current input to the valve, the system flow rate can be remote-controlled as desired by regulating the current output from the amplifier. Further, since the pressure and temperature compensation functions are provided, the preselected flow rate is not be affected by pressure (load) or temperature (fluid viscosity). This valve is ideal for use where actuator startup, stop, and speed changes are to be implemented without producing a shock. Note that this valve is used in conjunction with the applicable power amplifier.





Specifications

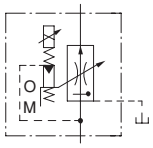
Descriptions \ Model Numbers		EFG EFCG-03-60 125	EFG EFCG-06-250
Max. Operating Pressure	MPa	20.6	24.5
Metered Flow Adj. Range	L/min	60: 1-60 125: 1-125	2.5-250
Min. Differential Pressure★1	MPa	1.0	1.0
Free Flow (EFCG Models Only)	L/min	130	280
Min. Pilot Pressure★2	MPa	1.0	1.5
Min. Pilot L/min	at Normal	0.5	1
	at Transition	2.6	4
Rated Current	mA	780	820
Coil Resistance	Ω	10	10
Hysteresis		3% or less	3% or less
Repeatability		1% or less	1% or less
Approx. Mass	kg	10	25

★1. Min. pressure difference required between inlet and outlet ports to maintain function as pressure compensator.

★2. The minimum required value for the external pilot type.

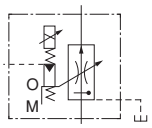
Graphic Symbols

Internal Pilot

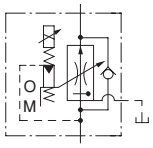


EFG-∗

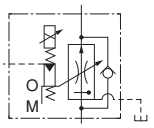
External Pilot



EFG-∗



EFCG-∗



EFCG-∗

Model Number Designation

EFC	G	-03	-125	-E	-51
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pilot Connection	Design Number
EF: Proportional Electro-Hydraulic Flow Control Valve	**G:** Sub-Plate Mounting	**03**	**60** **125**	**None:** Internal Pilot	**51**
EFC: Proportional Electro-Hydraulic Flow Control and Check Valve		**03**	**250**	**E:** External Pilot	**51**

Accessories

Mounting bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EFG EFCG-03	M10 × 80 L	4
EFG EFCG-06	M16 × 130 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-173, H-177 and H-183).

Model Numbers : AME-D-10-∗-20 AMN-D-10 (For DC power supply)
SK1022-∗-∗-11
AME-D2-1010-11 SK1015-11 (For DC power supply)

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
EFG EFCG-03	EFGM-03Y-30	3/4	5.7
	EFGM-03Z-30	1	5.6
EFG EFCG-06	EFGM-06X-30	1	12.5
	EFGM-06Y-30	1-1/4	16

- Sub-plates are available. Specify the sub-plate model number from the tabel above. When sub-ptates are not used, the mounting surface should have a good machined finish. (1.6▽)

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa.

Pilot Type Selection

This valve is constructed so as to operate at a predetermined pilot pressure. For the 03, a pilot pressure of 1 MPa or higher is required. For the 06, the requied pilot pressure is 1.5 MPa or higher.

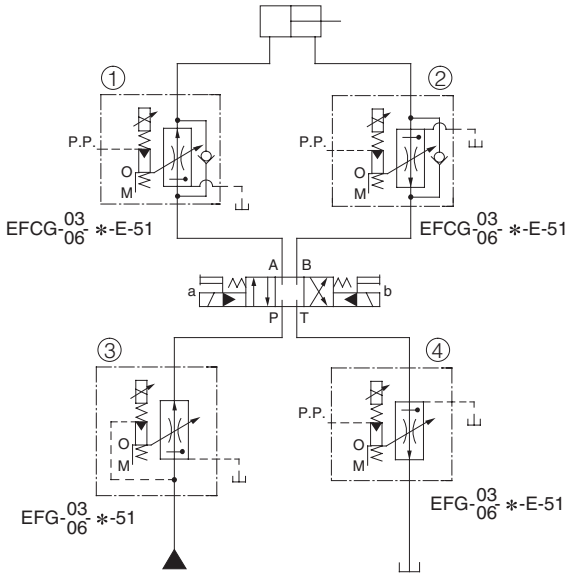
To obtain such a required pilot pressure, select the pilot type according to the circuit examples on the right.

①/②
Use the external pilot type (pilot connection code: E) whether a meter-in or meter-out circuit is employed.

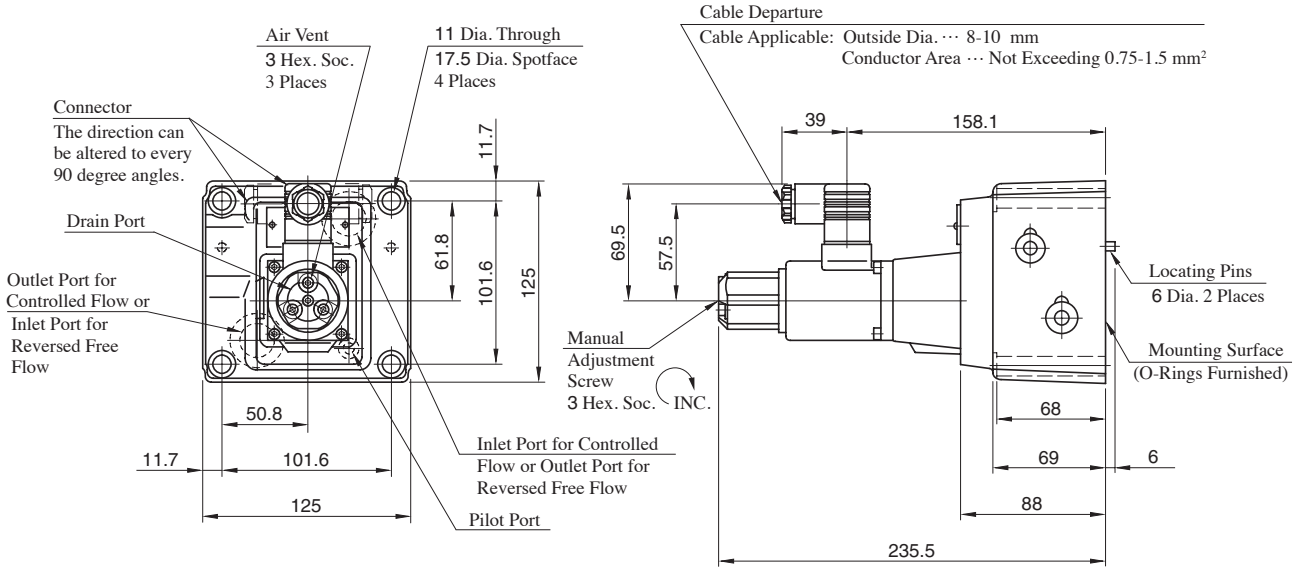
③
Use the internal pilot type (pilot connection code: None)

④
Use the external pilot type (pilot connection code: E)

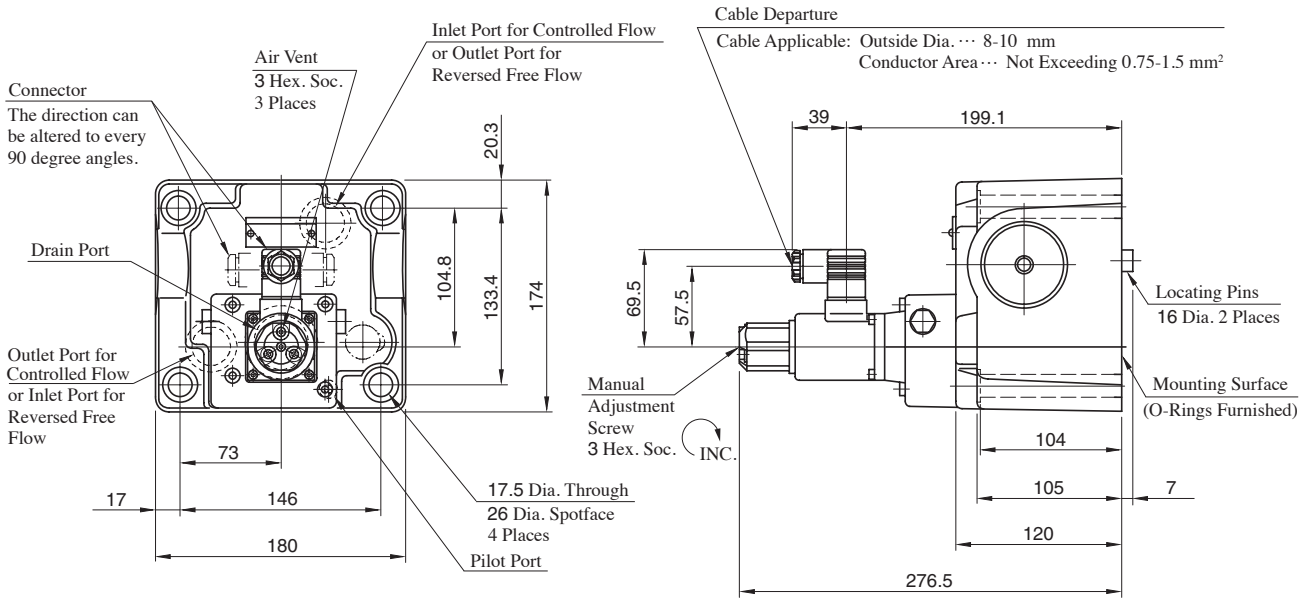
[Example of Circuit]



EFG EFCG-03

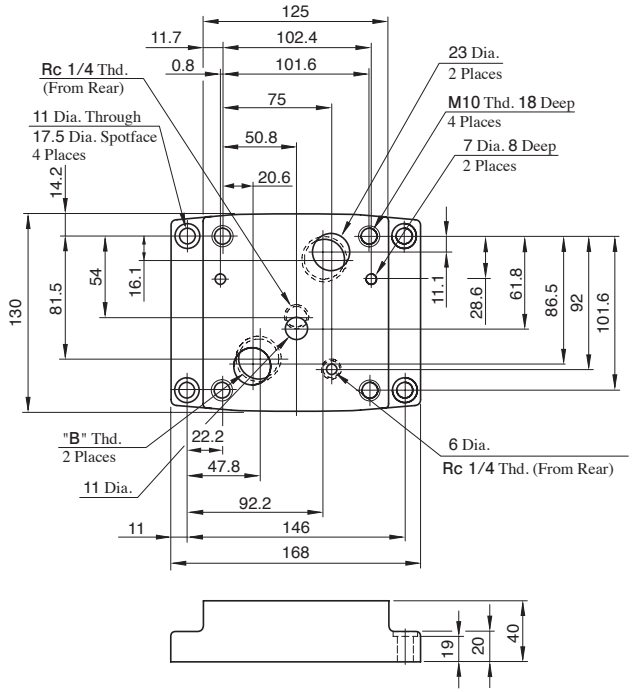


EFG EFCG-06



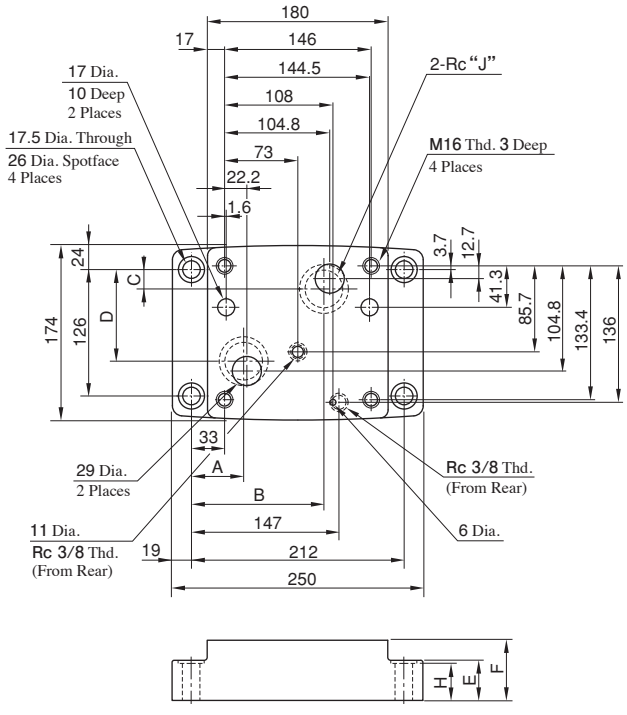
Sub-Plate

EFGM-03Y, 03Z



Sub-Plate Model Numbers	Thread Size "B" Thd.
EFGM-03Y-30	Rc 3/4
EFGM-03Z-30	Rc 1

EFGM-06X, 06Y

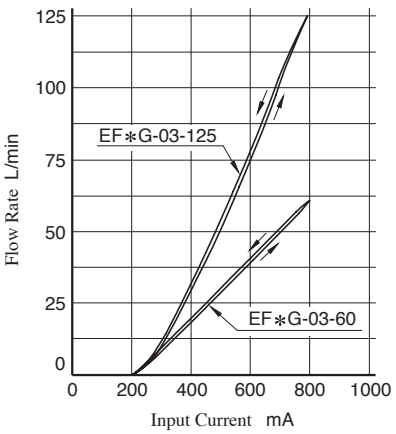


Sub-Plate Model Numbers	A	B	C	D	E	F	H	J
EFGM-06X-30	55.2	137.8	14.3	101.1	35	45	34	1
EFGM-06Y-30	52	132	19.3	91.3	40	60	39	1-1/4

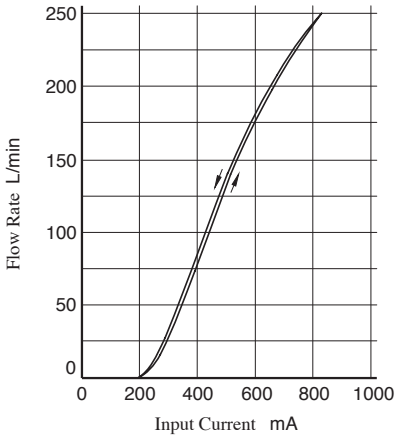
Input Current vs. Flow

Viscosity: 30 mm²/s

EFG EFCG -03



EFG EFCG -06

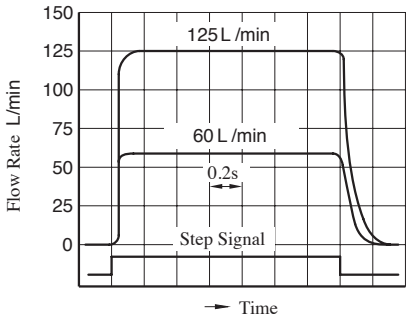


Step Response

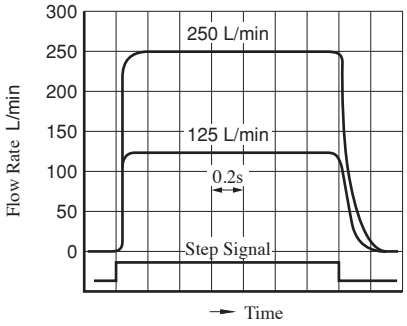
These characteristics have been obtained by measuring on each valve. Therefore , they may vary according to a hydraulic circuit to be used.

Viscosity: 30 mm²/s

EFG EFCG -03



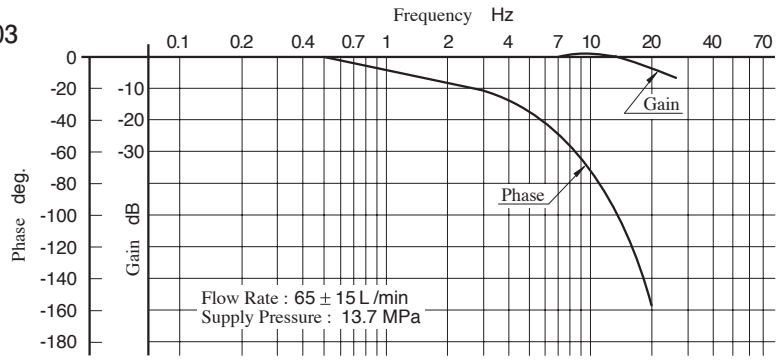
EFG EFCG -06



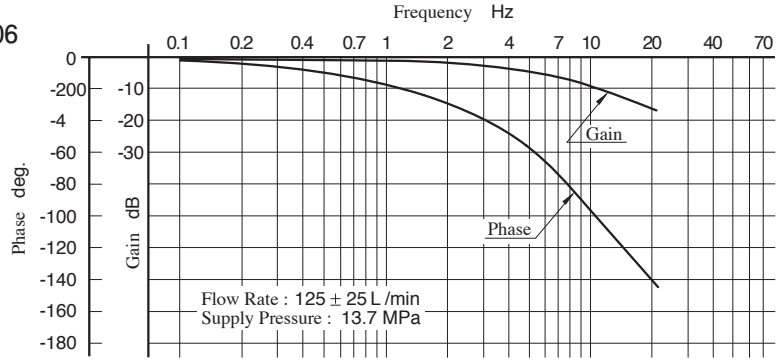
Frequency Response

Viscosity: 30 mm²/s

EFG EFCG -03

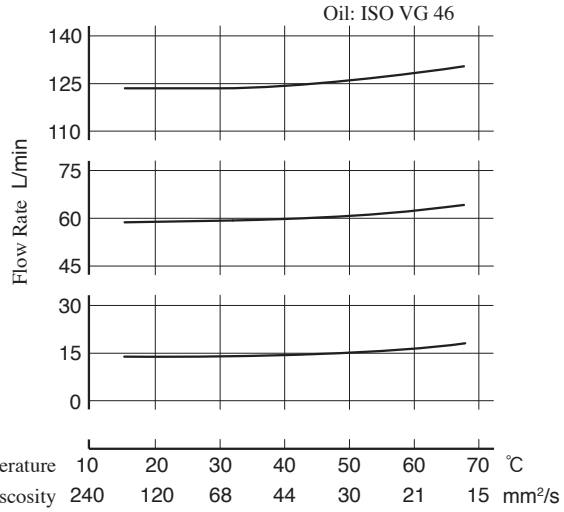


EFG EFCG -06

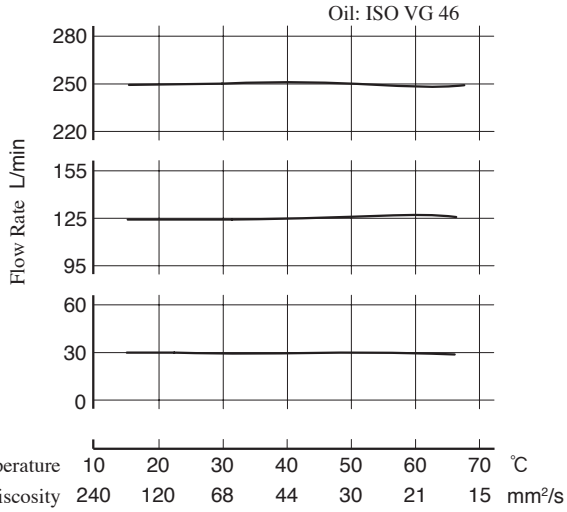


Viscosity vs. Flow

EFG EFCG -03

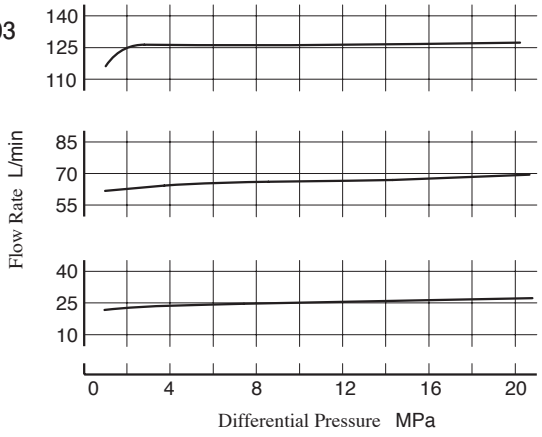


EFG EFCG -06

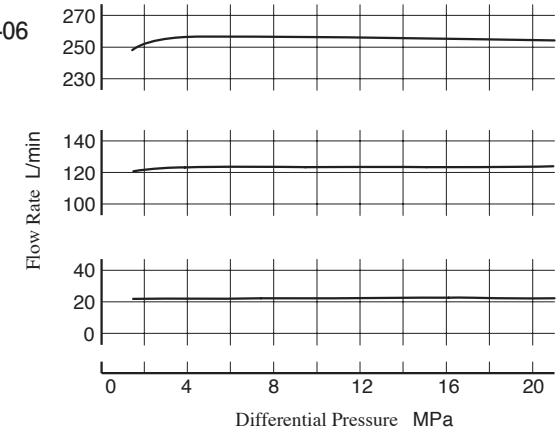


Differential Pressure vs. Metered Flow

EFG EFCG -03



EFG EFCG -06



Interchangeability between Current and New Design

Specifications and Characteristics

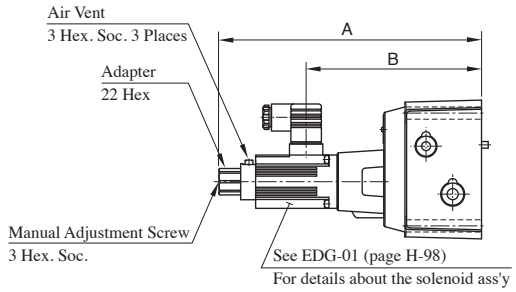
Input current-flow characteristics differ between current and new design.
Please inquire separately for details.
Other specifications remain unchanged.

Model Numbers		A	B
(Current)	EF＊G-03-＊-＊-50	236.5	158.1
(New)	EF＊G-03-＊-＊-51	235.5	158.1
(Current)	EF＊G-06-250-＊-50	277.5	199.1
(New)	EF＊G-06-250-＊-51	276.5	199.1

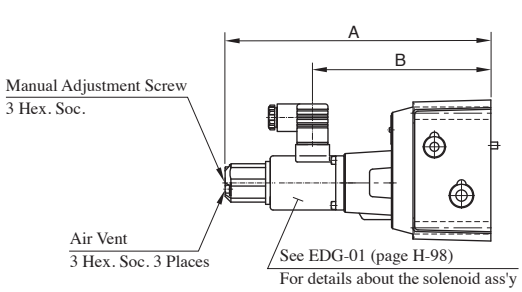
Installation Interchangeability

There is an interchangeability in the mounting dimensions between current and new design, however, note that because of improvements made on the solenoids, the overall shapes and dimensions have been changed as shown below.

Current : 50 Design

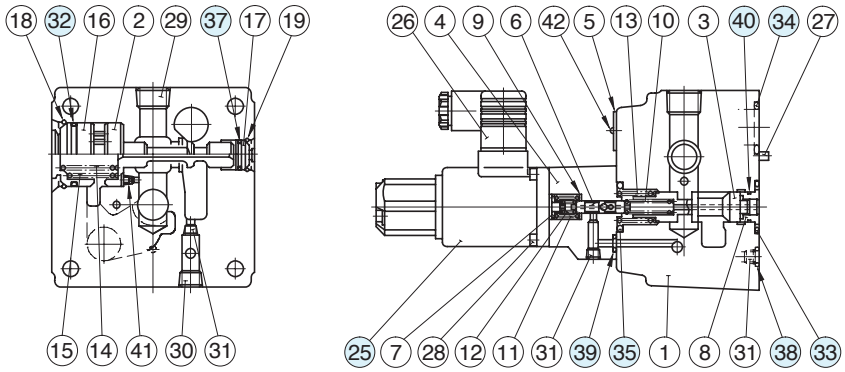


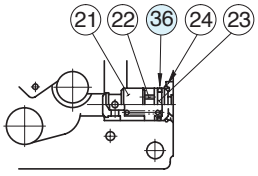
New : 51 Design



List of Seals and Solenoid Ass'y

EFG EFCG-03





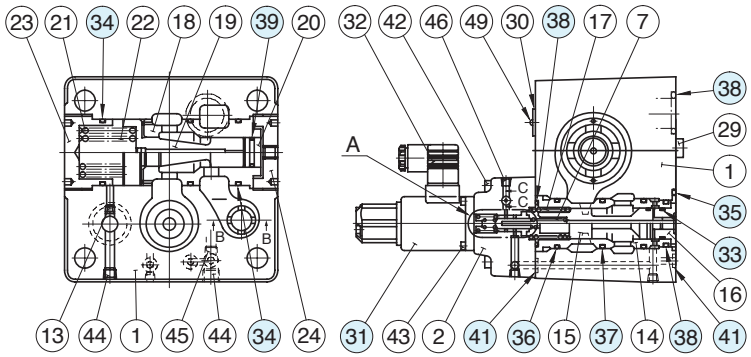
With Check Valve (EFCG-03)

Note) The connector assembly GDM-211-B-11 (Item 26) is not included in the solenoid assembly.

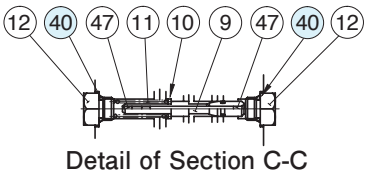
● List of Seals and Solenoid Ass'y

Item	Name of Parts	Part Numbers	Qty.
25	Solenoid Ass'y	E318-Y06M1-28-61	1
32	O-Ring	OR NBR-90 G35-N	1
33	O-Ring	OR NBR-90 P28-N	1
34	O-Ring	OR NBR-90 P28-N	2
35	O-Ring	OR NBR-90 P26-N	1
36	O-Ring	OR NBR-90 P16-N	1
37	O-Ring	OR NBR-90 P14-N	1
38	O-Ring	OR NBR-90 P9-N	1
39	O-Ring	OR NBR-90 P6-N	2
40	O-Ring	AS568-016(NBR-70-1)	1

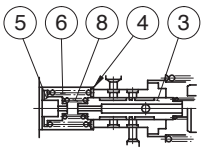
EFG EFCG-06



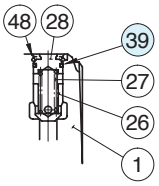
With Check Valve (EFCG-06)



Detail of Section C-C



Detail of "A"



Section B-B

Note) The connector assembly GDM-211-B-11 (Item 32) is not included in the solenoid assembly.

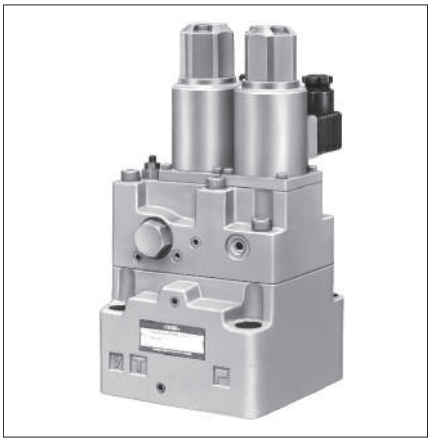
● List of Seals and Solenoid Ass'y

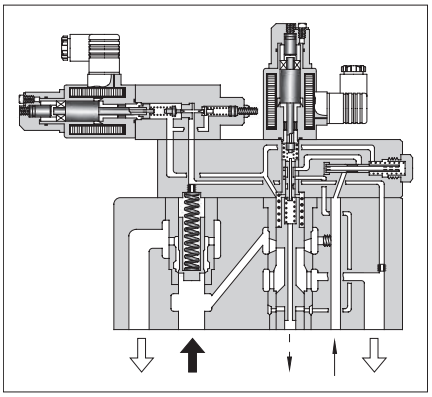
Item	Name of Parts	Part Numbers	Qty.
31	Solenoid Ass'y	E318-Y06M1-28-61	1
33	O-Ring	OR NBR-70-1 P21-N	1
34	O-Ring	OR NBR-90 P50-N	3
35	O-Ring	OR NBR-90 P46-N	1
36	O-Ring	OR NBR-90 P36-N	1
37	O-Ring	OR NBR-90 P34-N	2
38	O-Ring	OR NBR-90 P32-N	4
39	O-Ring	OR NBR-70-1 P21-N	1★
40	O-Ring	OR NBR-90 P10-N	2
41	O-Ring	OR NBR-90 P9-N	3

★Two o-rings are required for the EFCG.

10Ω–10Ω Series
Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is an energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
Since this valve controls the pump pressure by following the load pressure while keeping the differential pressure minimized, it serves as a low power-consumption energy-saving, meter-in, controlled flow control valve.
Further, since a temperature compensation function is incorporated, this valve provides consistent flow control without respect to the fluid temperature.





Specifications

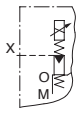
Descriptions \ Model Numbers			EFBG-03-125 -＊-＊-61	EFBG-06-250 -＊-＊-61	EFBG-10-500 -＊-＊-61
Max. Operating Pressure		MPa	24.5	24.5	24.5
Max. Flow		L/min	125	250	500
Metered Flow Adjustment Range		L/min	1-125	2.5-250	5-500
Min. Pilot Pressure		MPa	1.5	1.5	1.5
Pilot Flow L/min	at Normal		1	1	1
	at Transition		3	4	6
Flow Controls	Rated Current	mA	800	750	900
	Coil Resistance	Ω	10	10	10
	Differential Pressure	MPa	0.7	0.7	0.9
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Pressure Controls ★1	Pres. Adj. Range	MPa ★2	C: 1.4-15.7 H: 1.4-24.5	C: 1.4-15.7 H: 1.4-24.5	C: 1.5-15.7 H: 1.5-24.5
	Rated Current	mA	C: 890 H: 930	C: 820 H: 880	C: 800 H: 900
	Coil Resistance	Ω	10	10	10
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Approx. Mass		kg	Refer to pages H-137 to H-139		

★1. The specifications for pressure controls are applied to models with proportional pilot relief valve. (Ex. EFBG-03-125-C-＊-61)
★2. The maximum pressure adjustment range of the models without proportional pilot relief valves is 24.5 MPa.

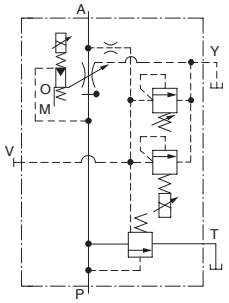
Graphic Symbols

With Proportional Pilot Relief Valve

External Pilot

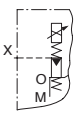


Internal Pilot

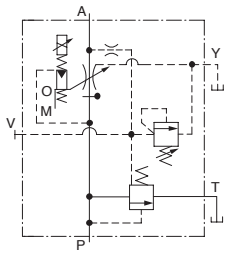


Without Proportional Pilot Relief Valve

External Pilot



Internal Pilot



Model Number Designation

EFB	G	-03	-125	-C	-E	-61
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Proportional Pilot Relief Valve Pressure Adj. Range	Pilot Connection	Design Number
EFB: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G:** Sub-Plate Mounting	**03**	**125**	**C, H:** See Specifications	**None:** Internal Pilot	**61**
		06	**250**	**None:** Without Proportional Pilot Relief Valve	**E:** External Pilot	**61**
		10	**500**			**51**

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EFBG-03	M10 × 65 L	4
EFBG-06	M16 × 100 L	4
EFBG-10	M20 × 130 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-173, H-177 and H-183).

Valve Model Numbers	Power Amplifier Model Numbers	
	For Flow Control	For Pres. Control
EFBG-03-125(-E)-61 EFBG-06-250(-E)-61 EFBG-10-500(-E)-51	AME-D-10-＊-20 AMN-D-10 (For DC Power Supply)	—
EFBG-03-125C/H(-E)-61 EFBG-06-250C/H(-E)-61 EFBG-10-500C/H-(E)-51	AME-D2-1010-11	

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
EFBG-03	EFBGM-03Y-20	3/4	6
	EFBGM-03Z-20	1	
EFBG-06	EFBGM-06X-20	1	12.5
	EFBGM-06Y-20	1-1/4	16
EFBG-10	EFBGM-10Y-20★	1-1/2, 2 Flange Mounting	37

● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽)

★When ordering the EFBGM-10Y, also order a F3 series pipe flange kit. For details on the kit, consult us.

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa.

When Relief Valve Passing Flow Rate is Low in Pressure Control State

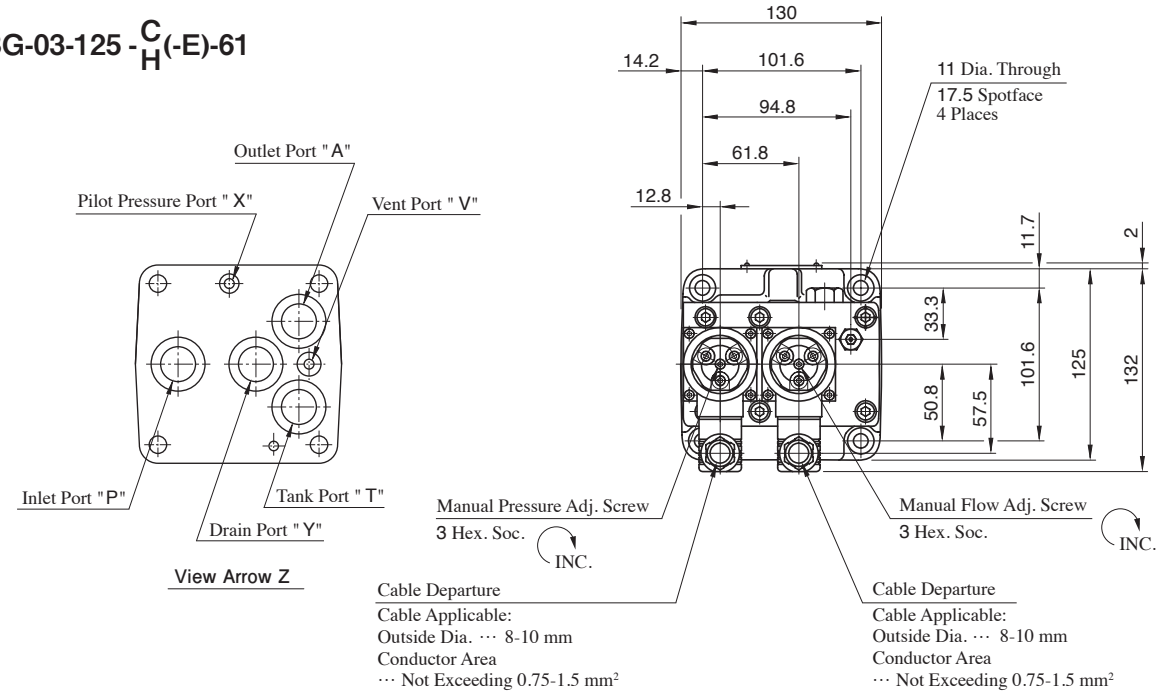
To avoid preselected pressure instability, use a passing flow rate of 15 L/min or higher.
Further, check that the tank-line back pressure dose not exceed 0.5 MPa.

Safety Valve Pressure Setting

The pressure of the safety valve is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa. Please adjust the pressure of the valve so preset to meet the pressure to be used actually.
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

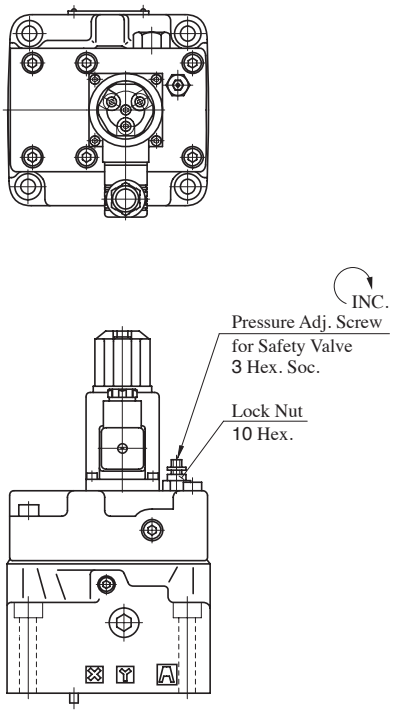
Models with Proportional Pilot Relief Valve

EFBG-03-125 -$^{C}_{H}$(-E)-61



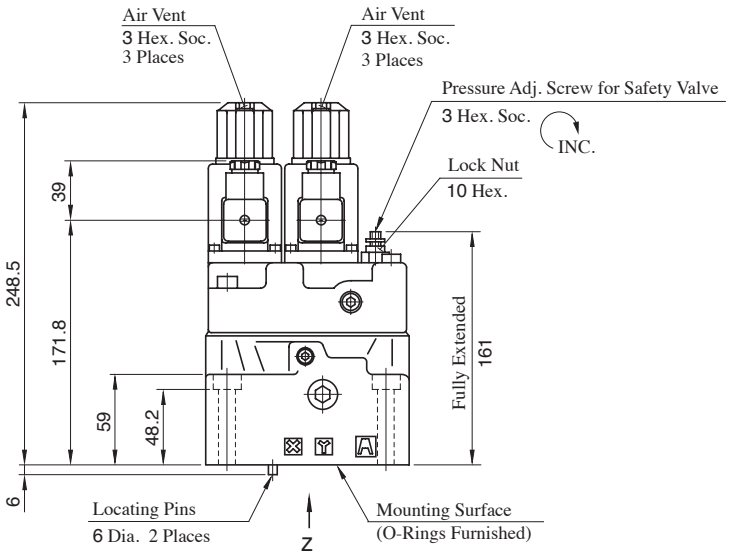
Models without Proportional Pilot Relief Valve

EFBG-03-125(-E)-61



● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

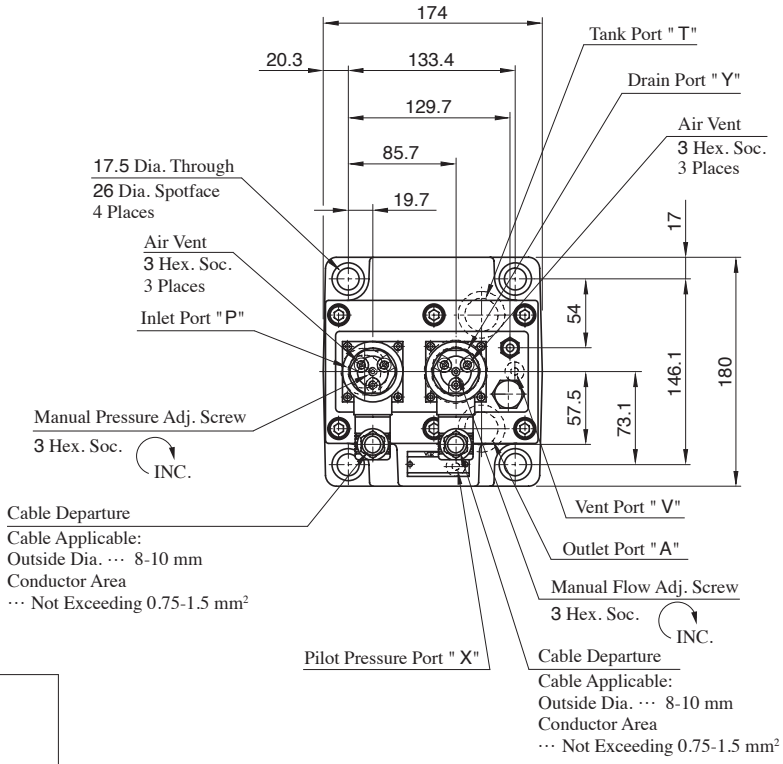
Approx. Mass ..... 13.3 kg



Approx. Mass ..... 14 kg

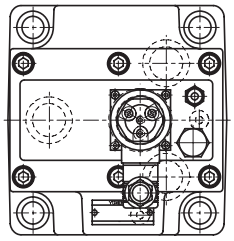
Models with Proportional Pilot Relief Valve

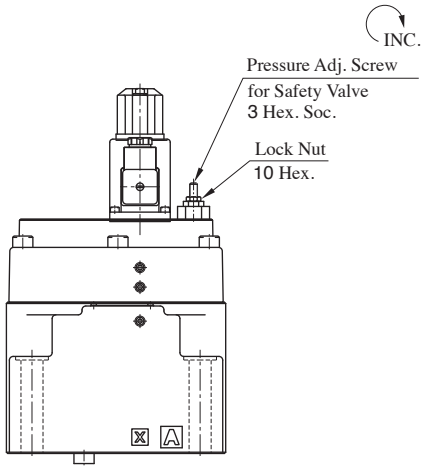
EFBG-06-250 - $^{C}_{H}$(-E)-61



Models without Proportional Pilot Relief Valve

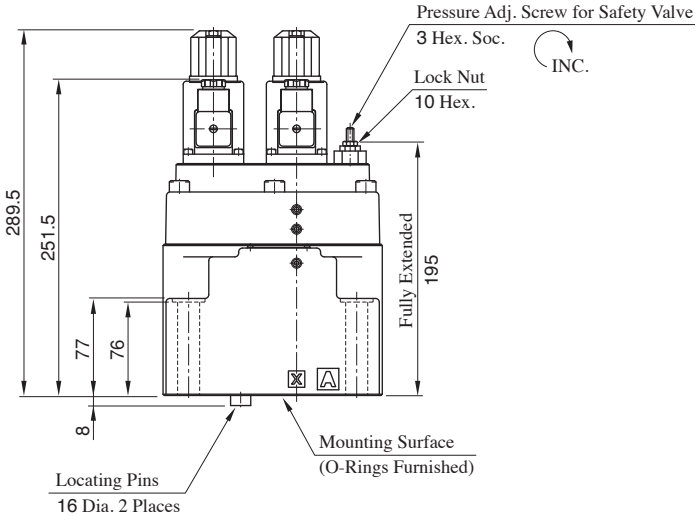
EFBG-06-250(-E)-61





● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

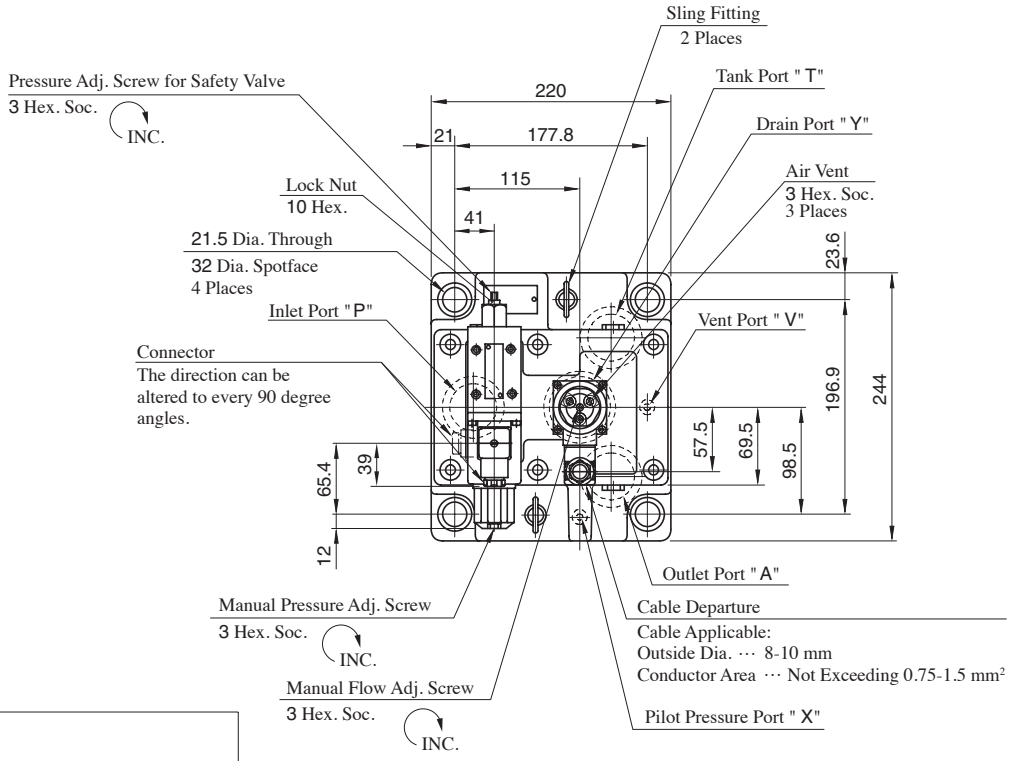
Approx. Mass ..... 21.3 kg



Approx. Mass ..... 22 kg

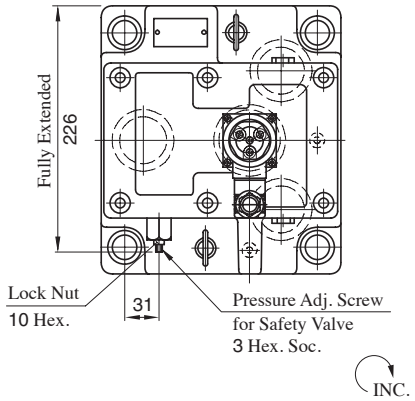
Models with Proportional Pilot Relief Valve

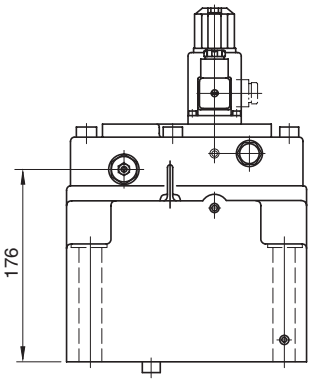
EFBG-10-500 - $\frac{C}{H}$(-E)-51



Models without Proportional Pilot Relief Valve

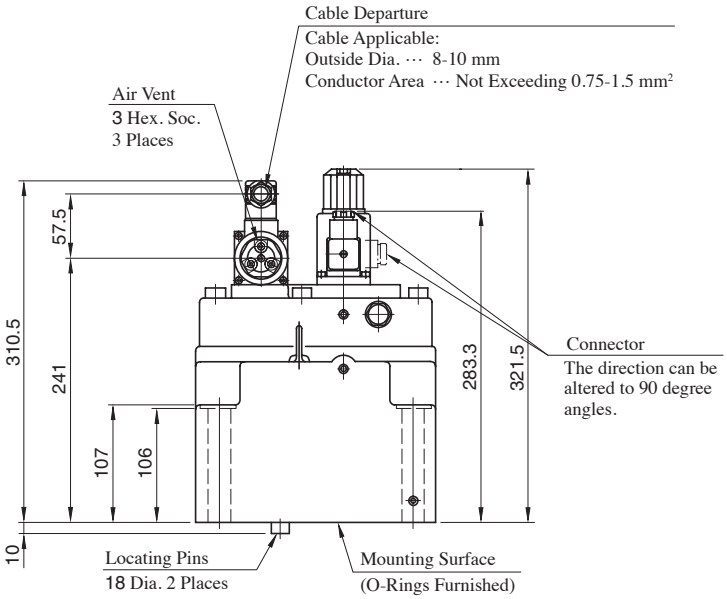
EFBG-10-500(-E)-51





● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

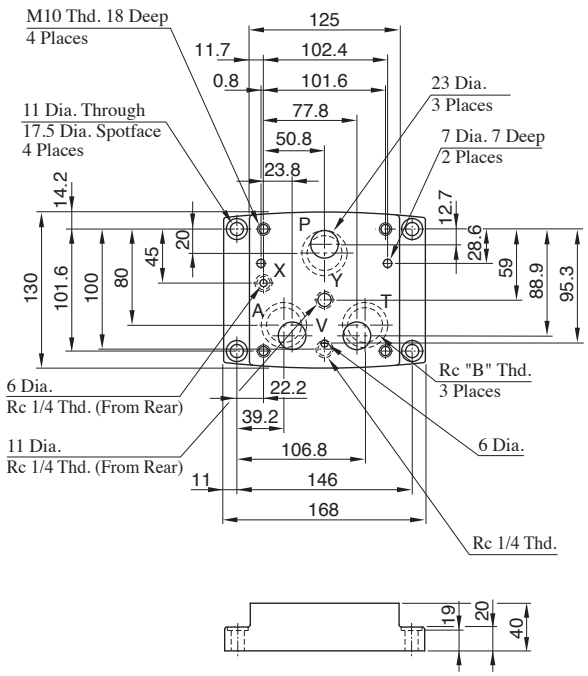
Approx. Mass ..... 60 kg



Approx. Mass ..... 62 kg

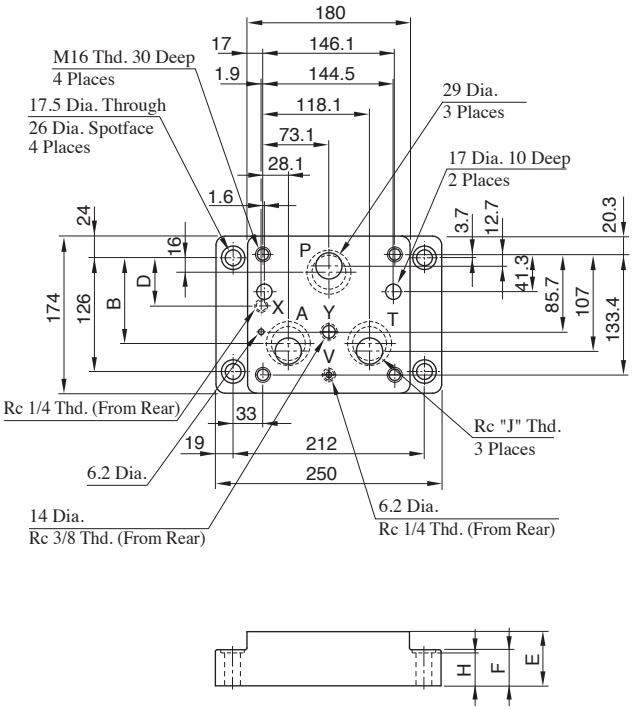
Sub Plates

EFBGM-$^{03Y}_{03Z}$-20



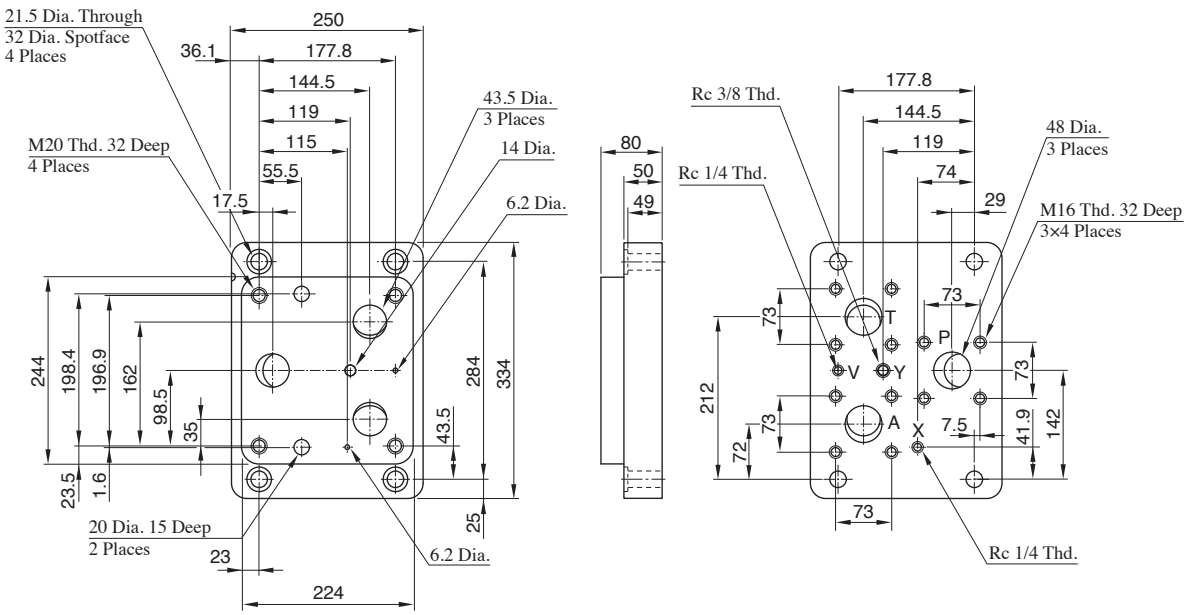
Sub-Plate Model Numbers	B
EFBGM-03Y-20	$^{3}/_{4}$
EFBGM-03Z-20	1

EFBGM-$^{06X}_{06Y}$-20



Sub-Plate Model Numbers	B	D	E	F	H	J
EFBGM-06X-20	103.3	63.3	45	35	34	1
EFBGM-06Y-20	95	53.3	60	40	39	$1\,^{1}/_{4}$

EFBGM-10Y-20



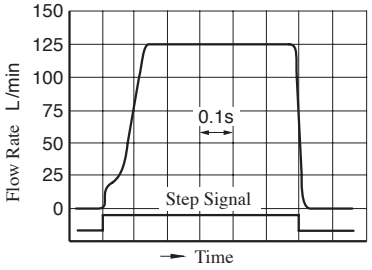
Step Response

These characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

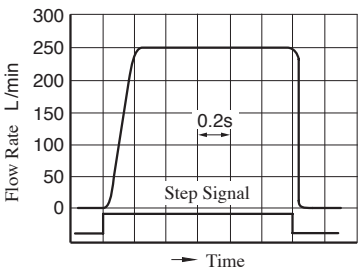
Viscosity: 30 mm²/s

Flow Controls

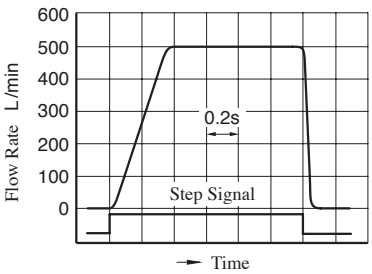
EFBG-03



EFBG-06

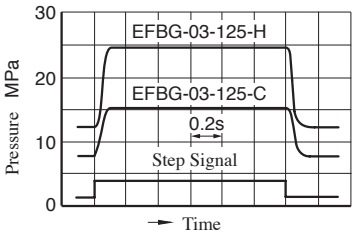


EFBG-10



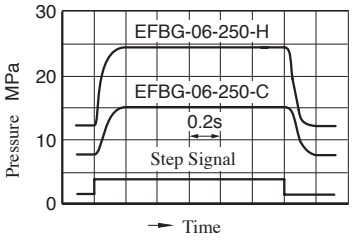
Pressure Controls

EFBG-03



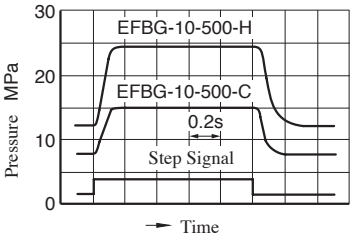
Flow Rate : 125 L/min
Trapped Oil Volume : < 1 L

EFBG-06



Flow Rate : 250 L/min
Trapped Oil Volume : < 1 L

EFBG-10

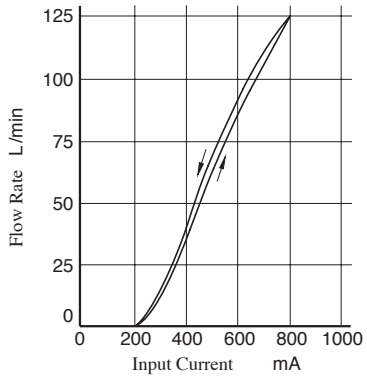


Flow Rate : 500 L/min
Trapped Oil Volume : < 1 L

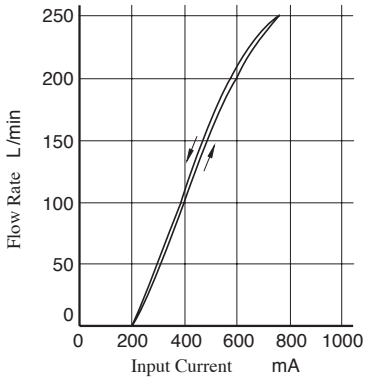
Input Current vs. Flow

Viscosity: 30 mm²/s

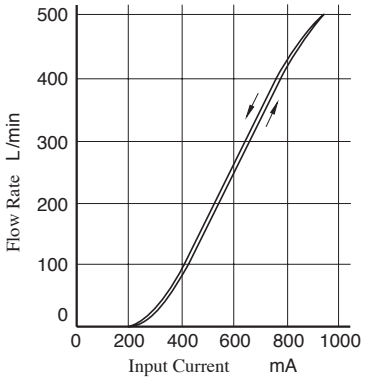
EFBG-03



EFBG-06



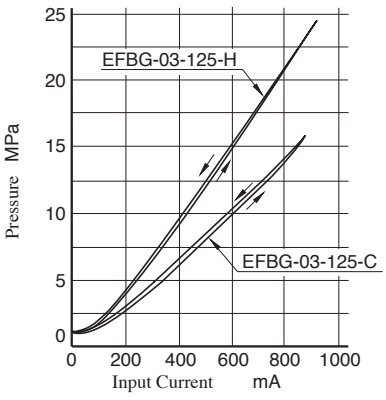
EFBG-10



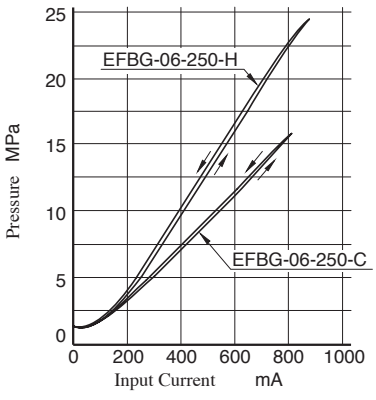
Input Current vs. Pressure

Viscosity: 30 mm²/s

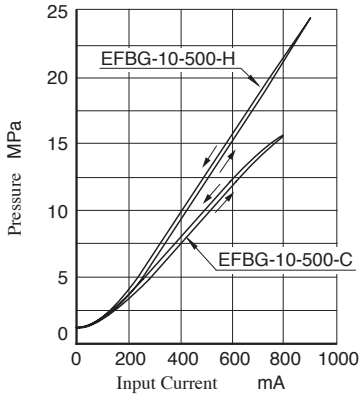
EFBG-03



EFBG-06

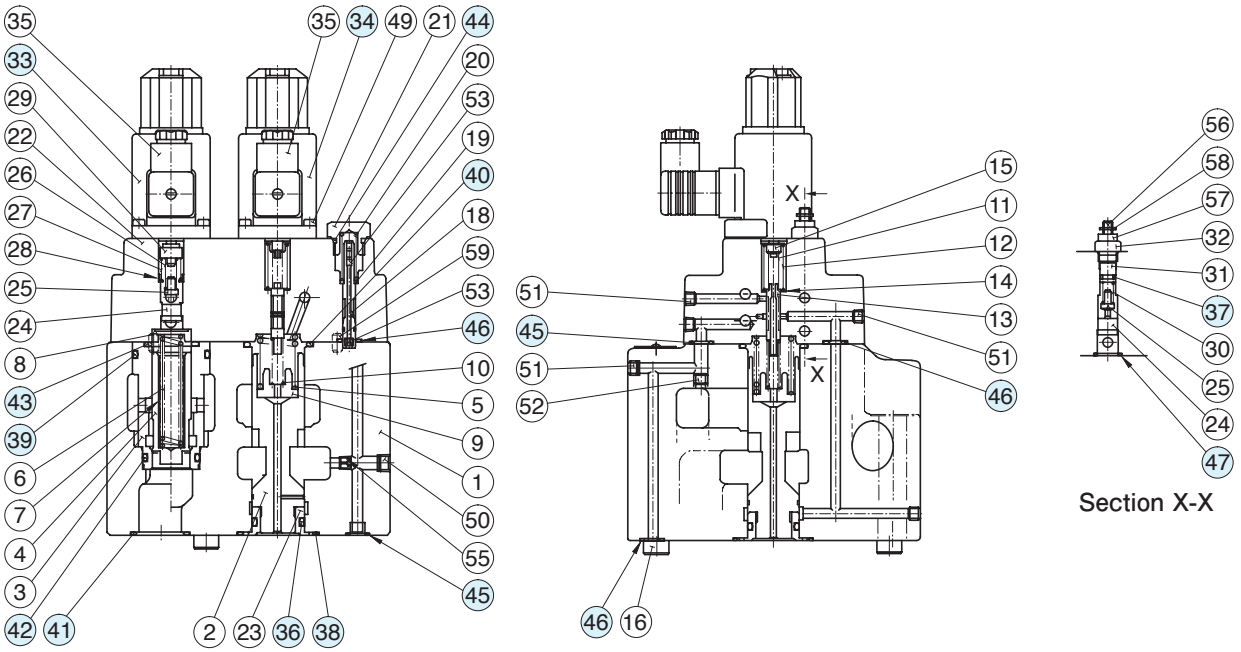


EFBG-10



List of Seals and Solenoid Ass'y

EFBG-03-125-∗-∗-61
EFBG-06-250-∗-∗-61



List of Seals and Solenoid Ass'y

Item	Name of Parts	EFBG-03		EFBG-06	
		Part Numbers	Qty.	Part Numbers	Qty.
36	O-Ring	AS568-016(NB-70-1)	1	OR NBR-70-1 P26-N	1
37	O-Ring	OR NBR-70-1 P6-N	1	OR NBR-70-1 P6-N	1
38	O-Ring	OR NBR-90 P28-N	1	OR NBR-90 P44-N	1
39	O-Ring	OR NBR-90 P32-N	1	OR NBR-90 P42-N	1
40	O-Ring	OR NBR-90 P28-N	1	OR NBR-90 P36-N	1
41	O-Ring	OR NBR-90 P28-N	3	OR NBR-90 P32-N	3
42	O-Ring	OR NBR-90 G30-N	1	OR NBR-90 P30-N	1
43	O-Ring	OR NBR-90 P28-N	1	OR NBR-90 P28-N	1
44	O-Ring	OR NBR-90 P15-N	1	OR NBR-90 P15-N	1
45	O-Ring	OR NBR-90 P11-N	2	OR NBR-90 P11-N	2
46	O-Ring	OR NBR-90 P9-N	5	OR NBR-90 P11-N	4
47	O-Ring	AS568-016(NB-70-1)	1	AS568-016(NB-90)	1

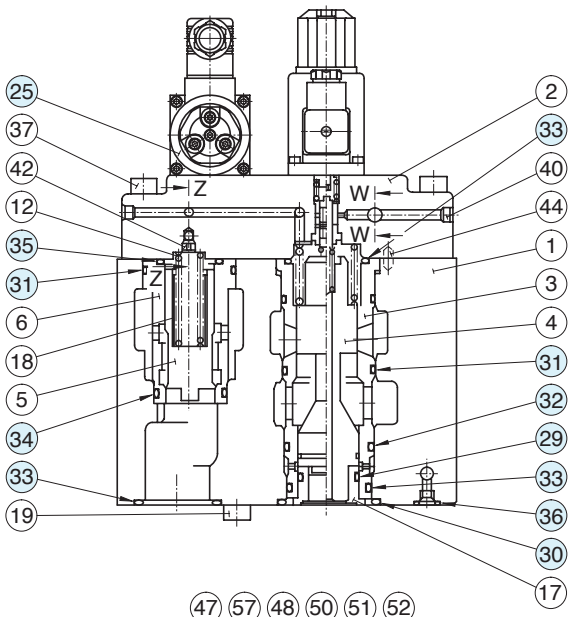
Solenoid Ass'y

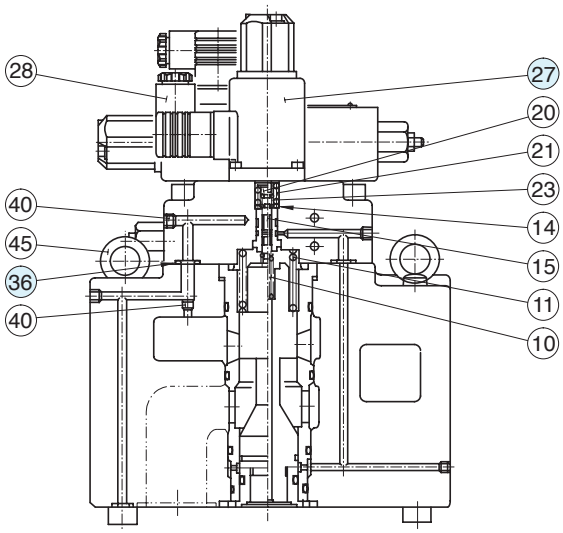
Valve Model Numbers	㉝ Solenoid Ass'y Model Numbers	㉞ Solenoid Ass'y Model Numbers
EFBG-$^{03}_{06}$-$^{125}_{250}$-C(E)-61	E318-Y06M1-04-61	E318-Y06M1-28-61
EFBG-$^{03}_{06}$-$^{125}_{250}$-E(E)-61		
EFBG-$^{03}_{06}$-$^{125}_{250}$-(E)-61	—	

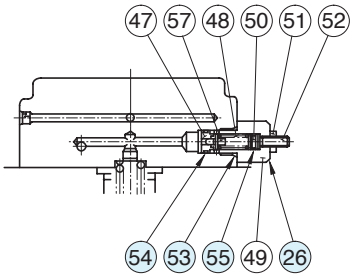
Note) The connector assembly GDM-211-B-11 (Item 35) is not included in the solenoid assembly.

List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

EFBG-10-500-∗-∗-51

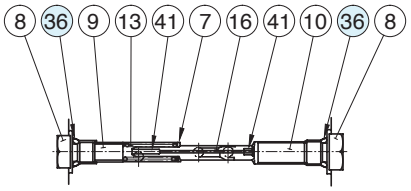






Section W-W

(Only for Models without Pilot Relief Valve)



Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.	
			Models with Pilot Relief Valve	Models without Pilot Relief Valve
29	O-Ring	OR NBR-70-1 P34-N	1	1
30	O-Ring	OR NBR-90 G60-N	1	1
31	O-Ring	OR NBR-90 G55-N	3	3
32	O-Ring	OR NBR-90 P50-N	1	1
33	O-Ring	OR NBR-90 P48-N	5	5
34	O-Ring	OR NBR-90 P42-N	1	1
35	O-Ring	OR NBR-90 P36-N	1	1
36	O-Ring	OR NBR-90 P11-N	8	8
53	O-Ring	OR NBR-90 P14-N	—	1
54	O-Ring	AS568-013(NBR-90)	—	1
55	O-Ring	OR NBR-70-1 P6-N	—	1

Pilot Valve, Solenoid Ass'y and Safety Valve

Valve Model Numbers	㉕ Pilot Valve Model Numbers	㉗ Solenoid Ass'y Model No.	㉖ Safety Valve Model No.
EFBG-10-500-C(-E)-51	EDG-01V-C-1-PNT12-5103	E318-Y06M1-28-61	—
EFBG-10-500-H(-E)-51	EDG-01V-H-1-PNT12-5103		—
EFBG-10-500(-E)-51	—		SB1094-2002

Note) The connector assembly GDM-211-B-11 (Item 28) is not included in the solenoid assembly.

Interchangeability between Current and New Design

Model changes have been made from 50, 51 to 61 design in the EFBG-03/06 because of changes in the pilot valve building-in method and model changes have been made from 50 to 51 design in the EFBG-10 because of improvement in solenoid ass'y.

Specification and Characteristics

The input current and pressure–flow characteristics differ between the new and old models. Ask Yuken for details.
No changes in specifications and characteristics between current and new design.

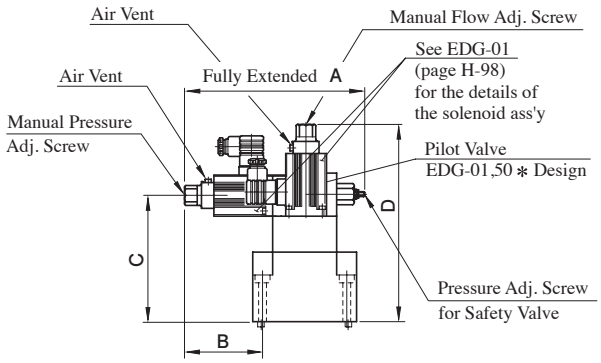
Safety Valve Pressure Setting

・EFBG-03/06

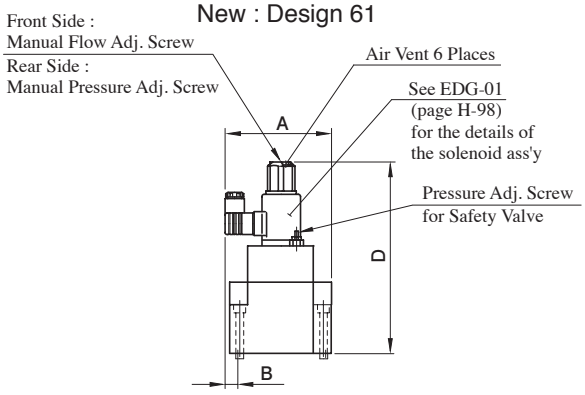
50・51 Design → 61 Design

The mounting surface are interchangeable. However, the method of building in the pilot valve has been changed, bringing about changes in the appearance shapes and dimensions as shown below.

Current : Design 50・51



New : Design 61



Valve Model Numbers		A	B	C	D
(Current)	EFBG-03-125-∗-∗-$^{50}_{51}$	217	93.2	155	2236.5
(New)	EFBG-03-125-∗-∗-61	132	18.7	—	248.5
(Current)	EFBG-06-250-∗-∗-$^{50}_{51}$	217	53.3	196	277.5
(New)	EFBG-06-125-∗-∗-61	180	16.9	—	289.5

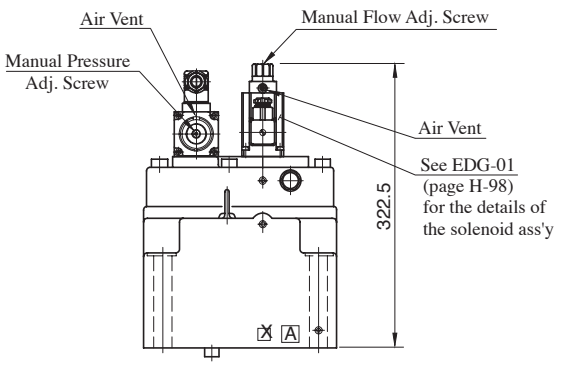
60 Design → 61 Design

The mounting surface are interchangeable. There are no changes in the appearance shapes and dimensions.

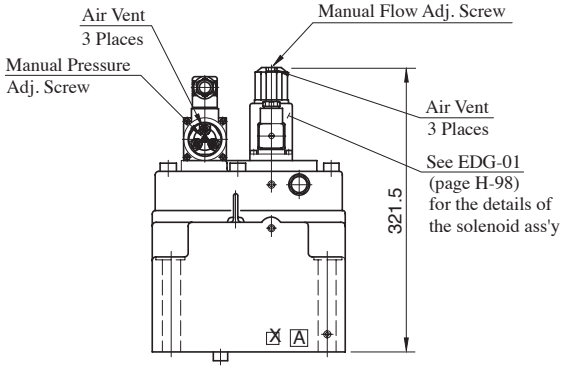
・EFBG-10

Mounting compatibility is provided.
Note that because of improvements made on the solenoids, the overall shapes have been changed as shown below.

Current : Design 50

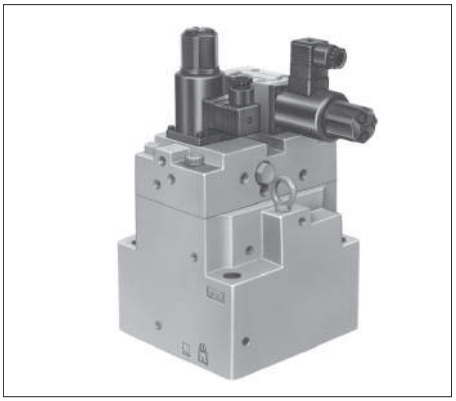


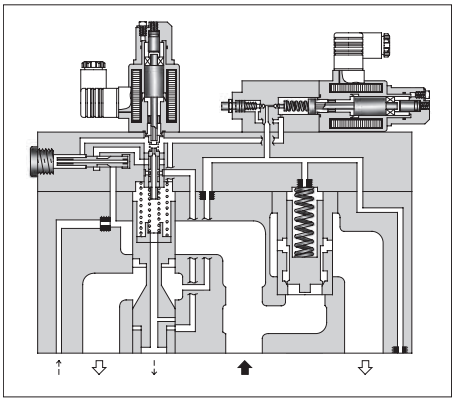
New : Design 51



High Flow Series Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is an energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
For the High Flow Series, double maximum flow rate [03 size: 125→250 L/min, 06 size: 250→500 L/min, 10 size: 500→1000 L/min] enables a smaller valve size than conventional products; compact-sized devices can be provided.





Specifications

Descriptions			Model No. EFBG-03 -250-＊-＊-51	EFBG-06 -500-＊-＊-51	EFBG-10 -1000-＊-＊-51
Max. Operating Pressure		MPa	24.5	24.5	24.5
Max. Flow		L/min	250	500	1000
Metered Flow Adjustment Range		L/min	2.5-250	5-500	10-1000
Min. Pilot Pressure		MPa	1.5	1.5	1.5
Pilot Flow	L/min	at Normal	1	1	4.5
		at Transition	4	6	10.0
Flow Controls	Rated Current	mA	830	780	830
	Coil Resistance	Ω	10	10	10
	Differential Pressure	MPa	0.8	0.9	1.2
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Pressure Controls ★1	Pres. Adj. Range	MPa ★2	C: 1.6-15.7 H: 1.8-24.5	C: 1.5-15.7 H: 1.5-24.5	C: 1.1-15.7 H: 1.1-24.5
	Rated Current	mA	C: 850 H: 870	C: 800 H: 900	C: 900 H: 950
	Coil Resistance	Ω	10	10	10
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Approx. Mass		kg	Refer to pages H-147 to H-149		

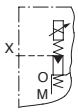
★1. The specifications for pressure controls are applied to models with proportional pilot relief valve. (Ex. EFBG-03-250-C-＊-51)

★2. The maximum pressure adjustment range of the valves without proportional pilot relief valves is 24.5 MPa.

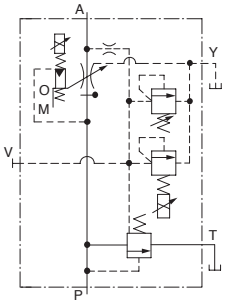
Graphic Symbols

With Proportional Pilot Relief Valve

External Pilot

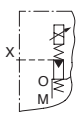


Internal Pilot

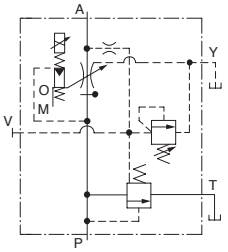


Without Proportional Pilot Relief Valve

External Pilot



Internal Pilot



Model Number Designation

EFB	G	-03	-250	-C	-E	-51
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Proportional Pilot Relief Valve Pressure Adj. Range	Pilot Connection	Design Number
EFB: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G:** Sub-Plate Mounting	**03**	**250**	**C, H:** See Specifications	**None:** Internal Pilot	**51**
		06	**500**	**None:** Without Proportional Pilot Relief Valve	**E:** External Pilot	**51**
		10	**1000**			**51**

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
EFBG-03	M12 × 120 L	4
EFBG-06	M16 × 120 L	4
EFBG-10	M20 × 150 L	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see pages H-173, H-177 and H-183).

Valve Model Numbers	Power Amplifier Model Numbers	
	For Flow Control	For Pres. Control
EFBG-03- 250(-E)-51 EFBG-06- 500(-E)-51 EFBG-10-1000(-E)-51	AME-D-10-＊-20 AMN-D-10 (For DC Power Supply)	—
EFBG-06- 500 -C/H(-E)-51 (03 125 / 10 1000)	AME-D2-1010-11	

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa.

When Relief Valve Passing Flow Rate is Low in Pressure Control State

To avoid preselected pressure instability, use a passing flow rate of 15 L/min or higher.
Further, check that the tank-line back pressure dose not exceed 0.5 MPa.

Safety Valve Pressure Setting

The pressure of the safety valve is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa. Please adjust the pressure of the valve so preset to meet the pressure to be used actually.
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

Interchangeability in Installation with Conventional Valves (10Ω-10Ω Series)

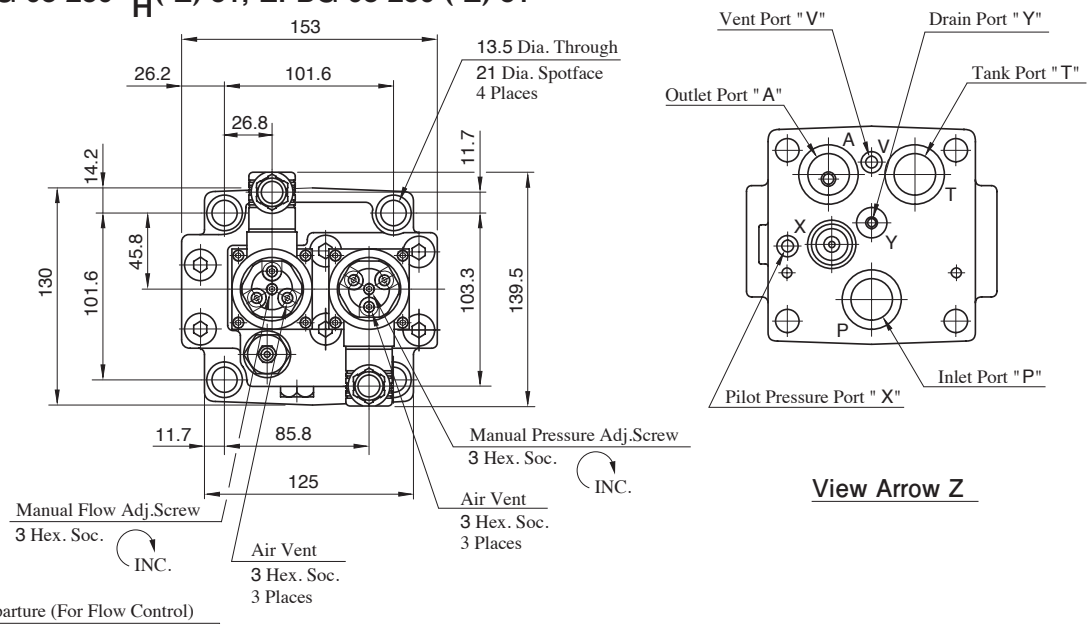
- **EFBG-03**

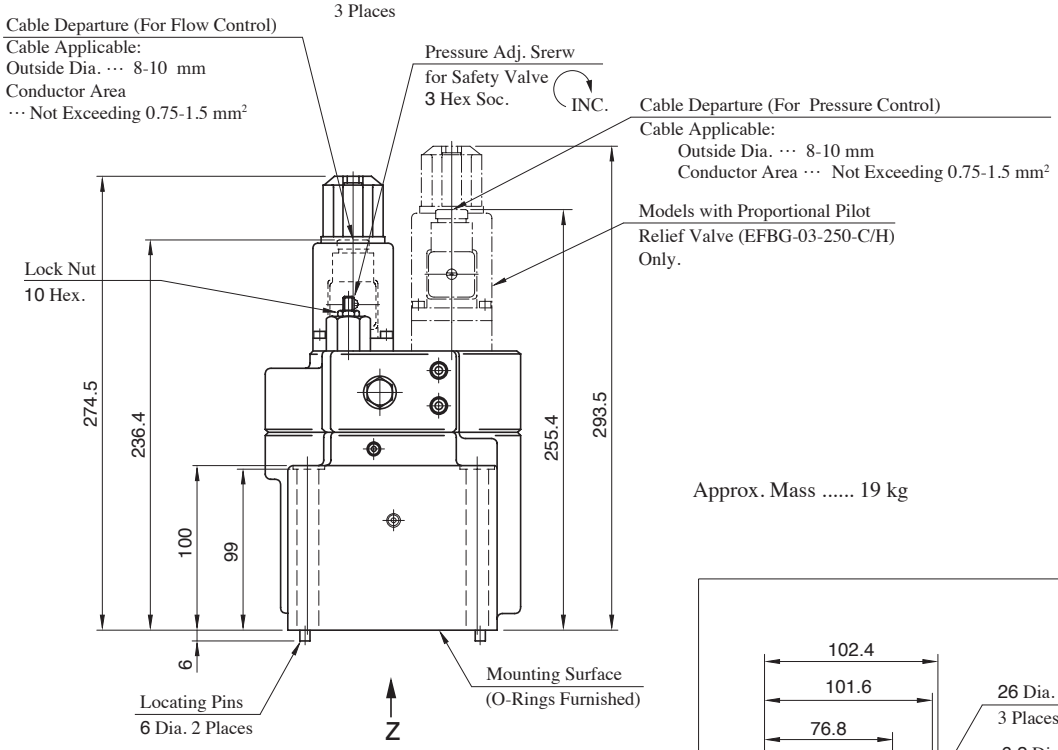
  There is no interchangeability in installation.

- **EFBG-06/10**

  A product in the high-flow series can be mounted on the conventional mounting surface but no conventional product can be mounted on the mounting surface of the high-flow series.

EFBG-03-250-$\frac{C}{H}$(-E)-51, EFBG-03-250 (-E)-51

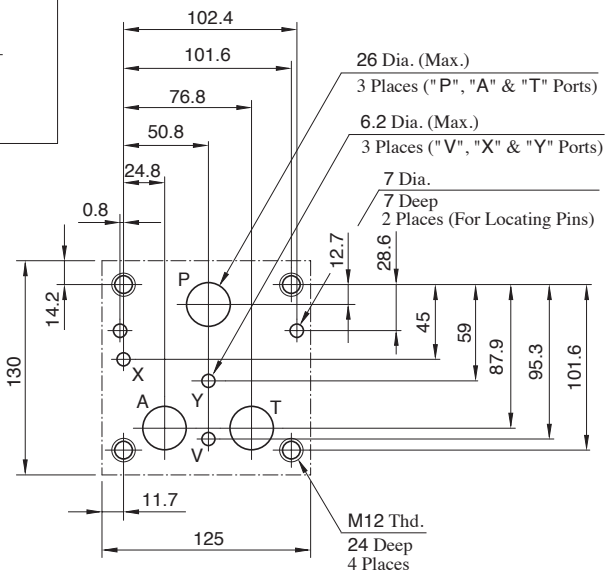




Approx. Mass ..... 19 kg

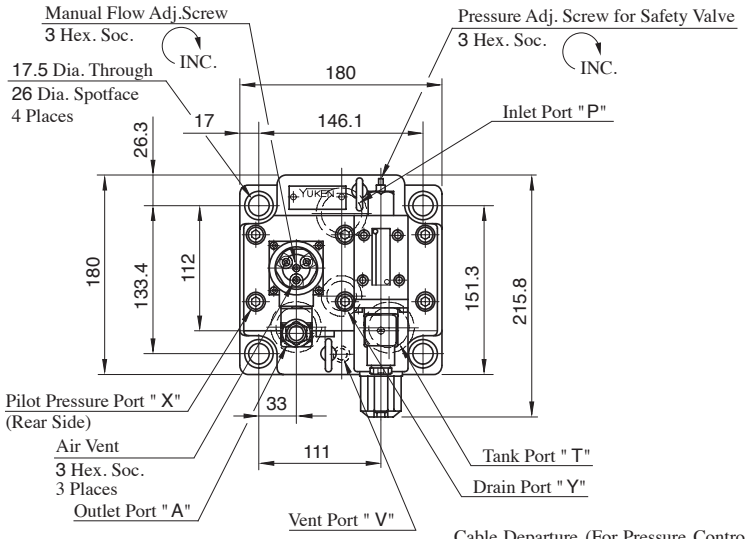
Dimensions of Valve Mounting Surface

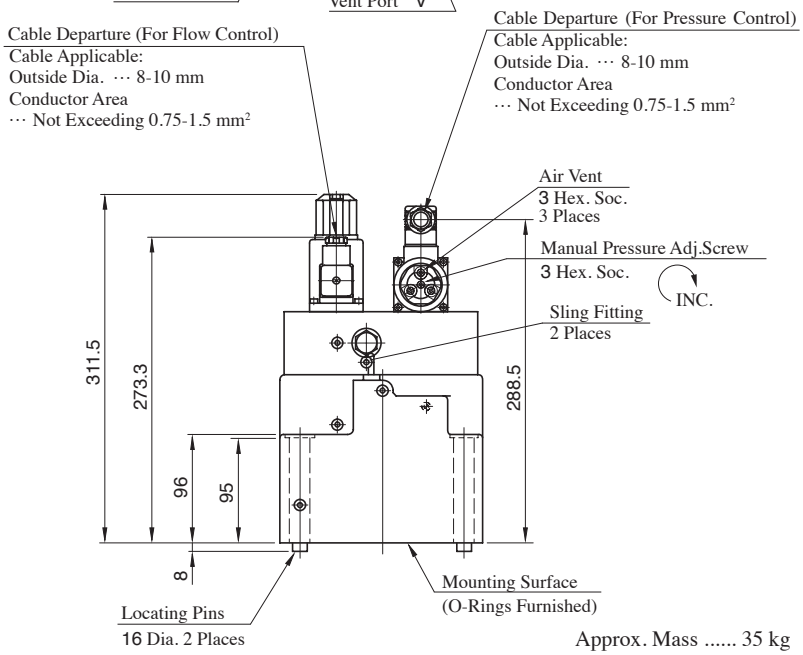
Prepare a mounting surface as shown to the right.
Also finish it finely. (1.6▽)



Models with Proportional Pilot Relief Valve

EFBG-06-500 -$\frac{C}{H}$(-E)-51

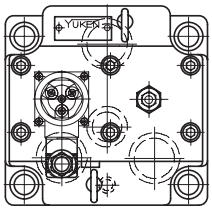


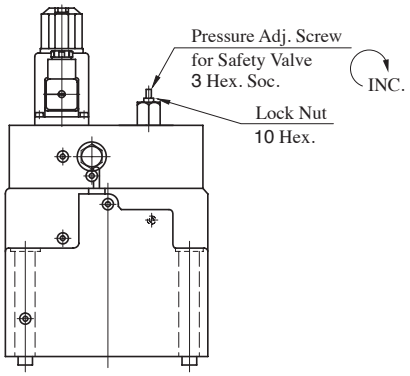


Approx. Mass ..... 35 kg

Models without Proportional Pilot Relief Valve

EFBG-06-500(-E)-51



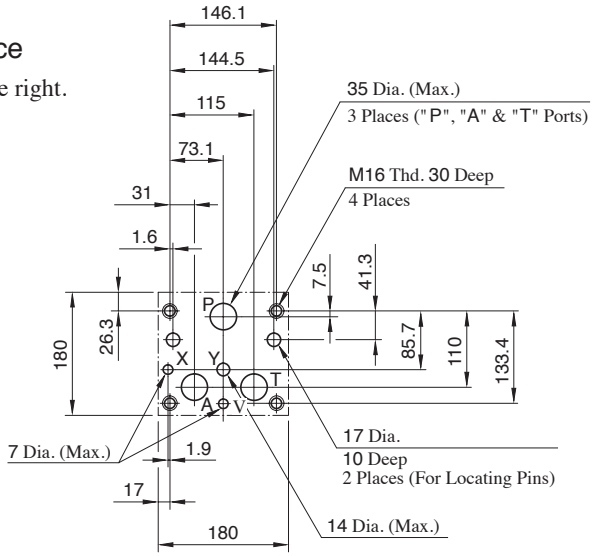


●For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass ..... 33 kg

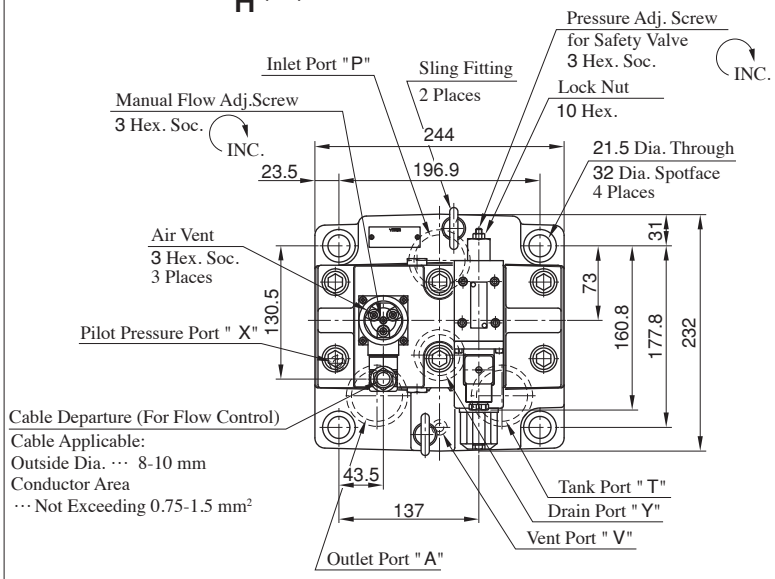
Dimensions of Valve Mounting Surface

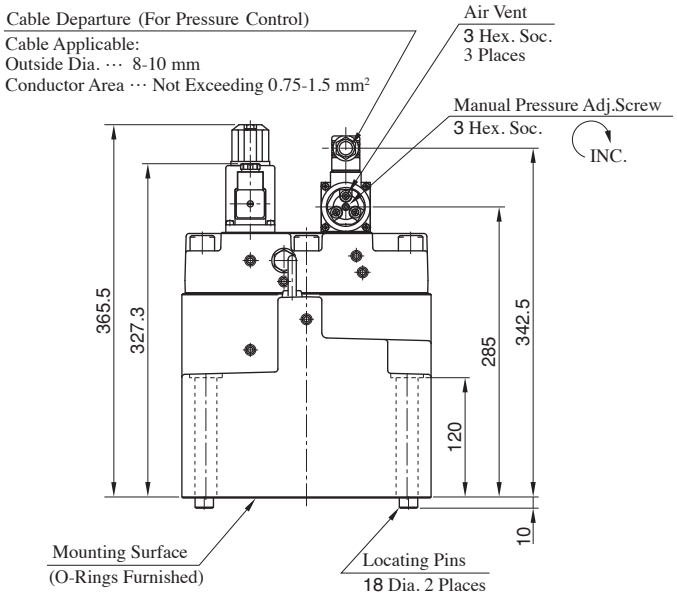
Prepare a mounting surface as shown to the right.
Also finish it finely. (1.6▽)



Models with Proportional Pilot Relief Valve

EFBG-10-1000-$\frac{C}{H}$(-E)-51

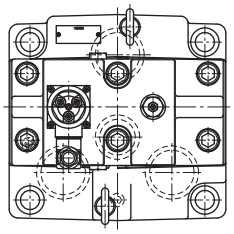


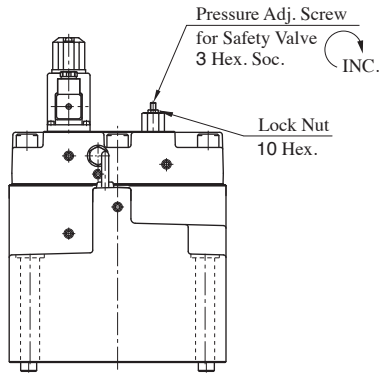


Approx. Mass ..... 76 kg

Models without Proportional Pilot Relief Valve

EFBG-10-1000(-E)-51



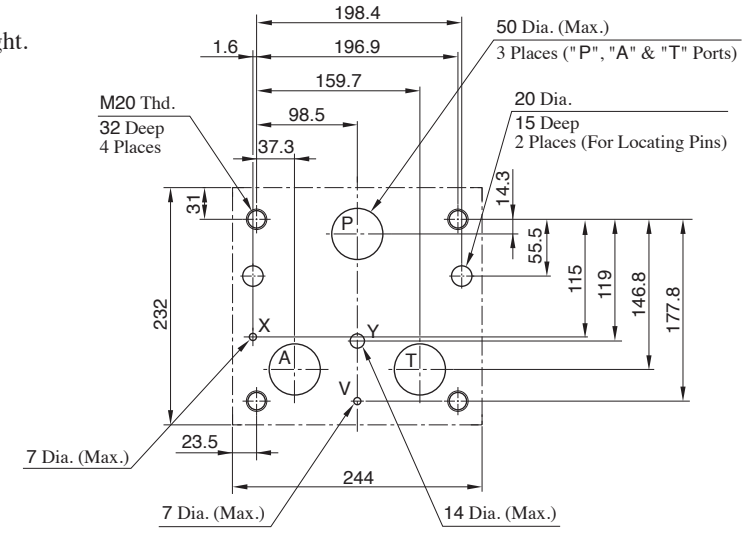


● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass ..... 74 kg

Dimensions of Valve Mounting Surface

Prepare a mounting surface as shown to the right. Also finish it finely. ($\frac{1.6}{\nabla}$)



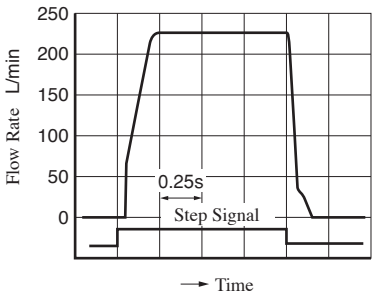
Step Response

Viscosity: 30mm²/s

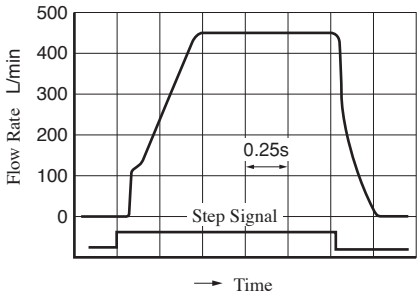
These characteristics have been obtained by measuring on each valve.
Therefore , they may vary according to a hydraulic circuit to be used.

Flow Controls

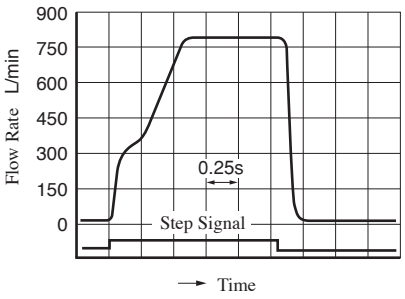
EFBG-03-250



EFBG-06-500

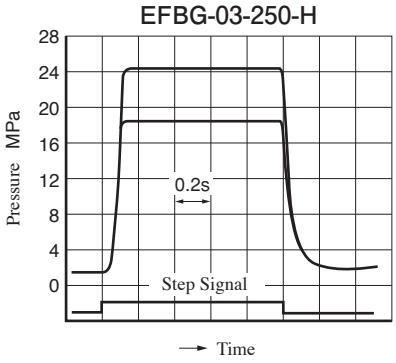


EFBG-10-1000

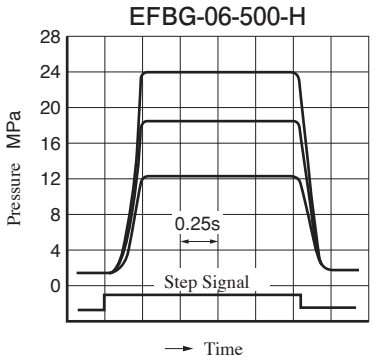


Pressure Controls

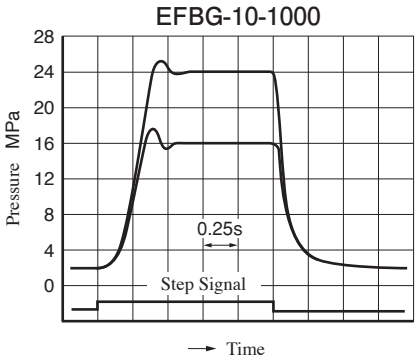
EFBG-03-250-H



EFBG-06-500-H



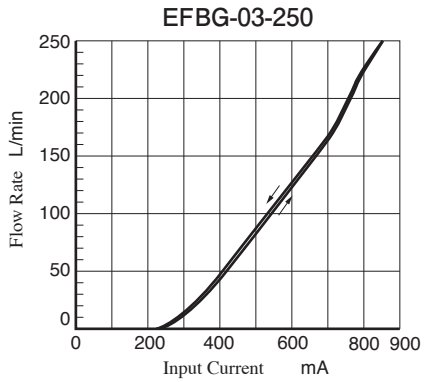
EFBG-10-1000



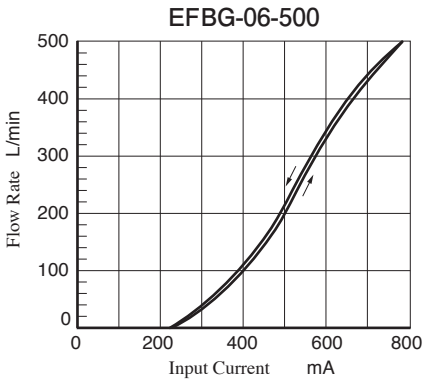
Input Current vs. Flow

Viscosity: 30mm²/s

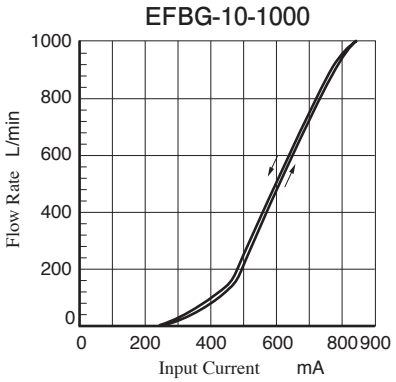
EFBG-03-250



EFBG-06-500



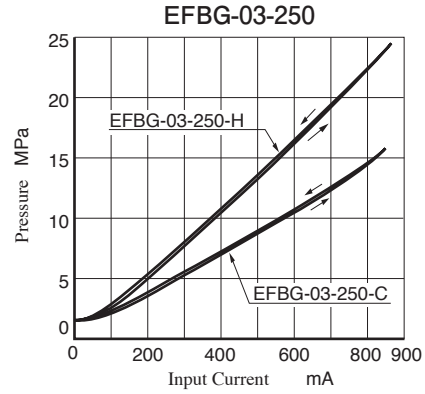
EFBG-10-1000



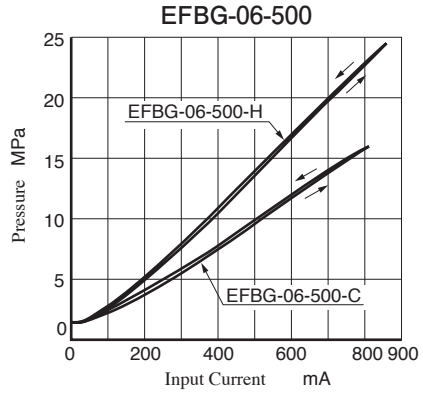
Input Current vs. Pressure

Viscosity: 30mm²/s

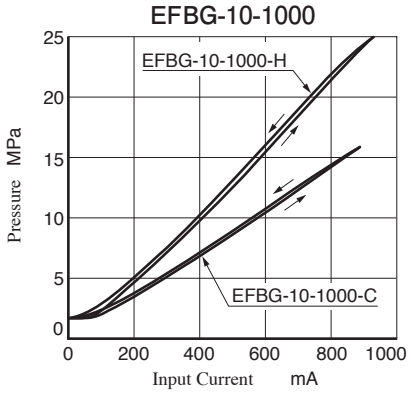
EFBG-03-250



EFBG-06-500

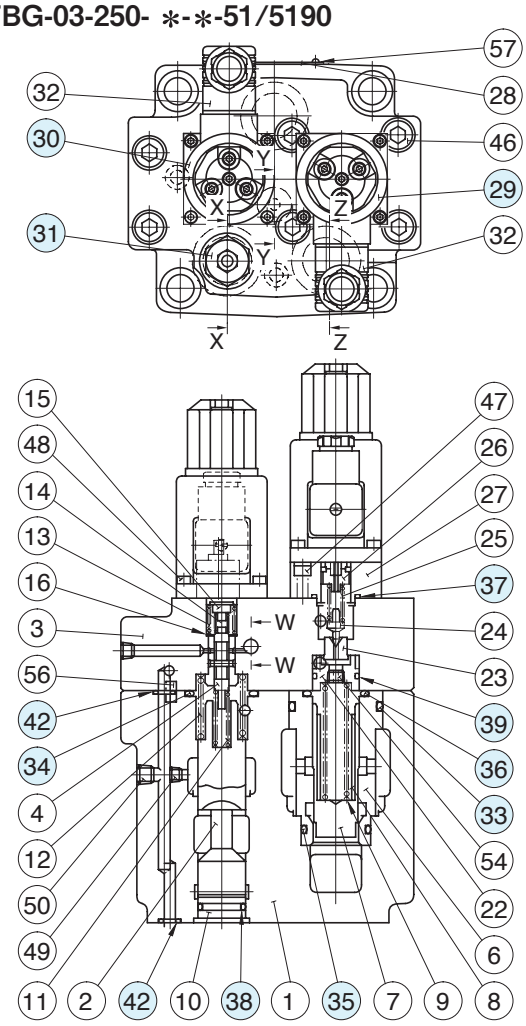


EFBG-10-1000

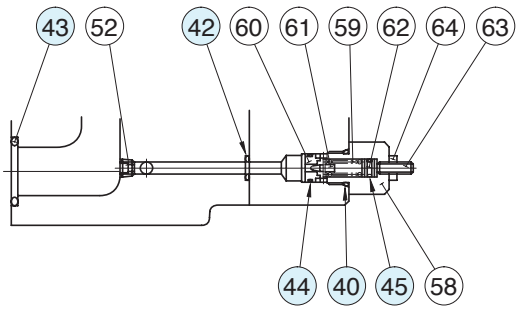


List of Seals, Solenoid Ass'y and Safety Valve

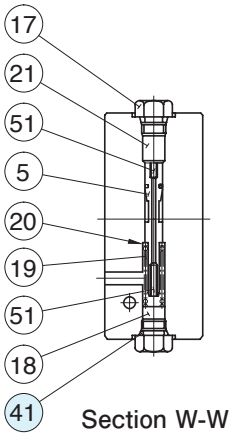
EFBG-03-250- ∗-∗-51/5190



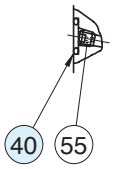
Detail of Safety Valve
(Item 31)



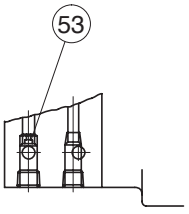
Section X-X



Section W-W



Section Y-Y



Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.
33	O-Ring	OR NBR-90 P42-N	1
34	O-Ring	OR NBR-90 P32-N	1
35	O-Ring	OR NBR-90 P30-N	1
36	O-Ring	OR NBR-90 P28-N	1
37	O-Ring	OR NBR-90 P22-N	1★
38	O-Ring	OR NBR-90 P21-N	1
39	O-Ring	OR NBR-90 P20-N	1★
40	O-Ring	OR NBR-90 P14-N	2
41	O-Ring	OR NBR-90 P11-N	2
42	O-Ring	OR NBR-90 P9-N	6
43	O-Ring	OR NBR-90 G30-N	3
44	O-Ring	AS568-013(NBR-90)	1
45	O-Ring	OR NBR-70-1 P6-N	1

★O-rings, item 37 and 39, are used only with the proportional pilot relief valve (EFBG-03-250-C/H).

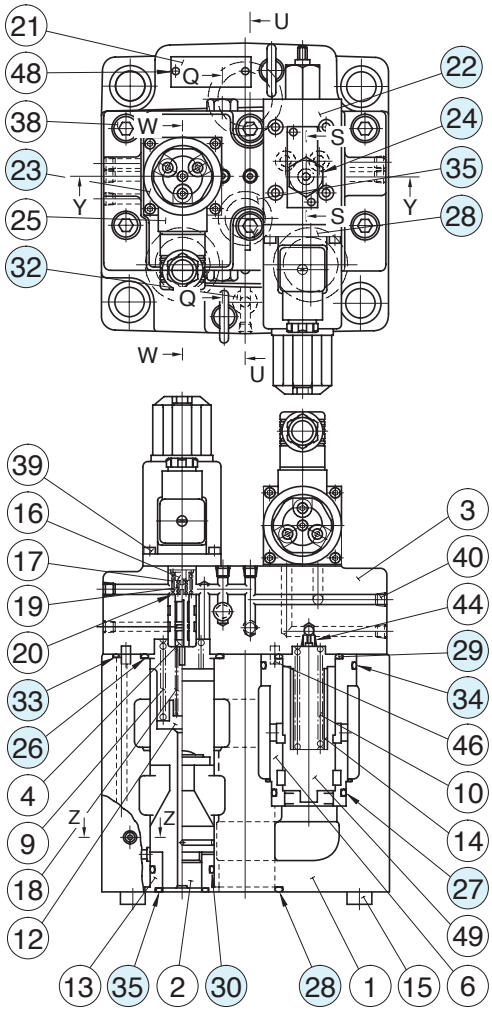
Solenoid Ass'y and Safety Valve

Valve Model Numbers	㉙ Solenoid Ass'y Model No.	㉚ Solenoid Ass'y Model No.	㉛ Safety Valve Model No.
EFBG-03-250-C/H(-E)-51	E318-Y06M1-04-61	E318-Y06M1-28-61	SB1094-2002
EFBG-03-250(-E)-51	—		

Note 1) For details on the solenoid ass'y, refer to proportional pilot relief valve (page H-97).
Note 2) The connector assembly GDM-211-B-11 (Item 32) is not included in the solenoid assembly.

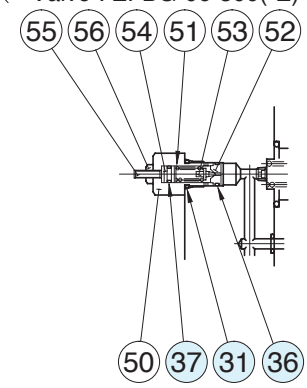
List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

EFBG-06-500- ∗-∗-51/5190

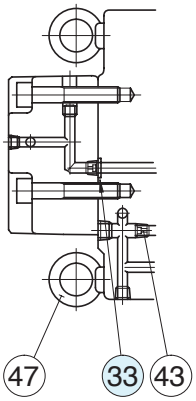


Detail of Safety Valve (Item 24)

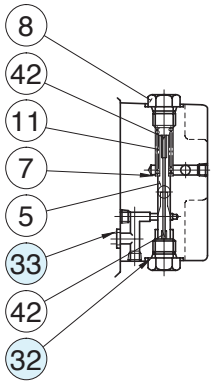
Models Without Pilot Relief Valve : EFBG-06-500(-E)



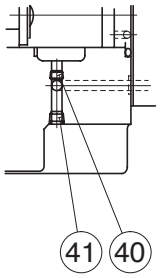
Section S-S



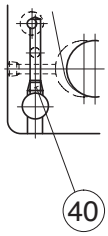
Section U-U



Section Q-Q



Section W-W



Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.
26	O-Ring	OR NBR-90 P46-N	1
27	O-Ring	OR NBR-90 P42-N	1
28	O-Ring	OR NBR-90 P40-N	3
29	O-Ring	OR NBR-90 P36-N	1
30	O-Ring	OR NBR-90 P34-N	1
31	O-Ring	OR NBR-90 P14-N	1★
32	O-Ring	OR NBR-90 P11-N	4
33	O-Ring	OR NBR-90 P9-N	4
34	O-Ring	OR NBR-90 G55-N	1
35	O-Ring	OR NBR-90 G30-N	2
36	O-Ring	AS568-013(NBR-90)	1★
37	O-Ring	OR NBR-70-1 P6-N	1★

★O-rings, item 31, 36 and 37, are used only without the proportional pilot relief valve [(EFBG-06-500(-E)].

Pilot Valve, Solenoid Ass'y and Sefety Valve

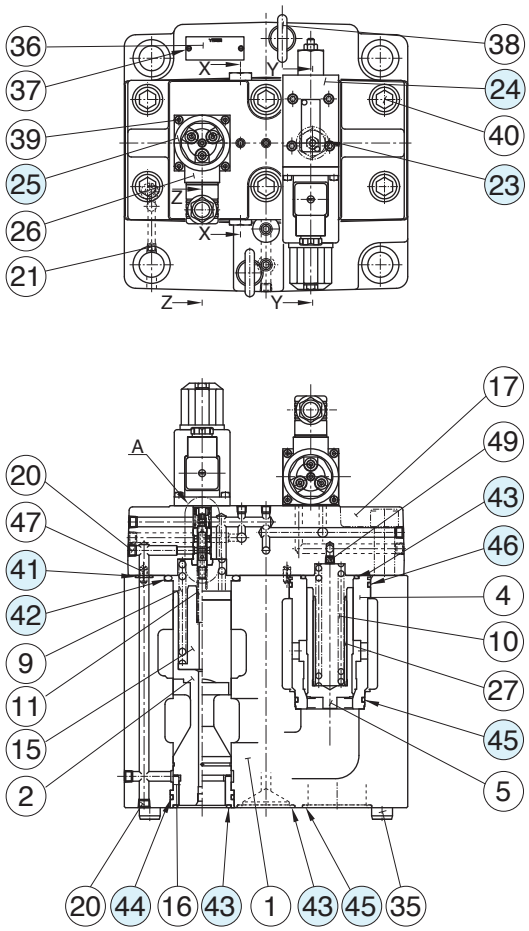
Valve Model Numbers	㉒ Pilot Valve Model Numbers	㉓ Solenoid Ass'y Model No.	㉔ Safety Valve Model No.
EFBG-06-500-C(-E)-51	EDG-01V-C-1-PNT11-5103	E318-Y06M1-28-61	—
EFBG-06-500-H(-E)-51	EDG-01V-H-1-PNT11-5103		—
EFBG-06-500(-E)-51	—		SB1094-2002

Note 1) For details on the pilot valves, refer to proportional pilot relief valve (page H-97).

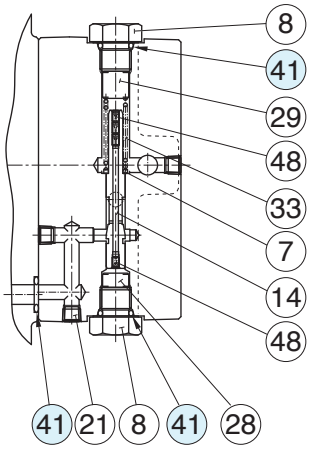
Note 2) The connector assembly GDM-211-B-11 (Item 25) is not included in the solenoid assembly.

List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

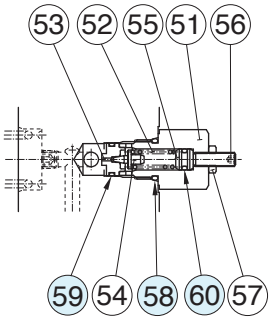
EFBG-10-1000-∗-∗-51



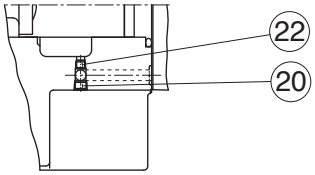
Detail of SafetyValve (Item 23)
〔Models Without Pilot Relief Valve : EFBG-10-1000(-E)〕



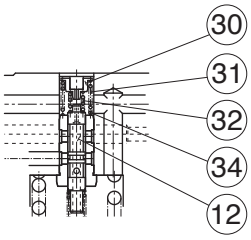
Section X-X



Section Y-Y



Section Z-Z



Detail A

List of Seals

Item	Name of Parts	Part Numbers	Qty.
41	O-Ring	OR NBR-90 P11-N	8
42	O-Ring	OR NBR-90 P55-N	1
43	O-Ring	OR NBR-90 G45-N	3
44	O-Ring	OR NBR-90 G50-N	1
45	O-Ring	OR NBR-90 G55-N	4
46	O-Ring	OR NBR-90 G65-N	1
58	O-Ring	OR NBR-90 P14-N	1★
59	O-Ring	AS568-013(NBR-90)	1★
60	O-Ring	OR NBR-70-1 P6-N	1★

★ O-rings, item 58, 59 and 60, are used only without the proportional pilot relief valve [EFBG-10-1000(-E)].

Pilot Valve, Solenoid Ass'y and Safety Valve

Valve Model Numbers	㉔ Pilot Valve Model Numbers	㉕ Solenoid Ass'y Model No.	㉓ Safety Valve Model No.
EFBG-10-1000-C(-E)-51	EDG-01V-C-1-PNT20-5197	E318-Y06M1-28-61	—
EFBG-10-1000-H(-E)-51	EDG-01V-H-1-PNT20-5197		—
EFBG-10-1000(-E)-51	—		SB1094-2002

Note 1) For details on the pilot valves, refer to proportional pilot relief valve (page H-97).
Note 2) The connector assembly GDM-211-B-11 (Item 25) is not included in the solenoid assembly.

Interchangeability between Current and New Design

EFBG-03/06/10 series valves have changed model from 50 to 51 design in line with the model change of solenoid ass'y.

Specifications and Characteristics

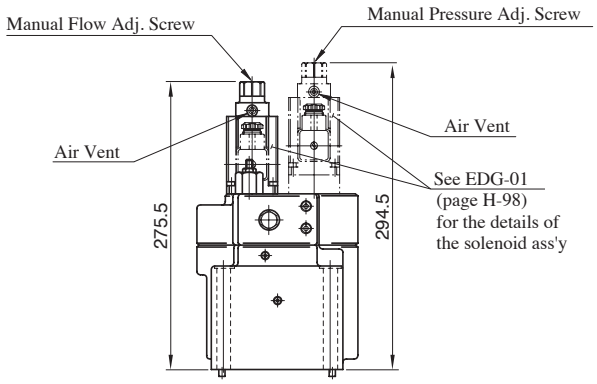
The input current and pressure–flow characteristics differ between the new and old models. Ask Yuken for details.
No changes in specifications and characteristics between current and new design.

Mounting Interchangeability

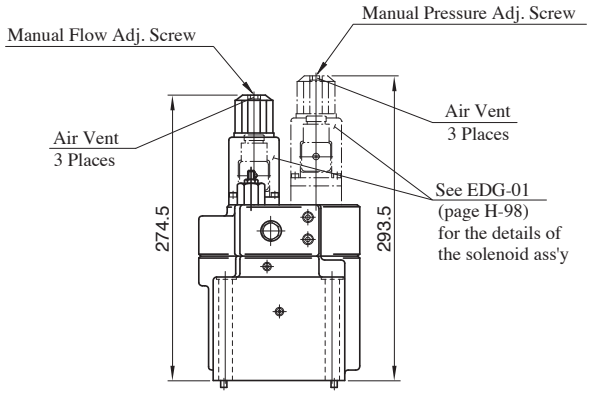
There is an interchangeability in the mounting dimensions between current and new design, however, note that because of improvements made on the solenoids, the overall shapes have been changed as shown below.

・EFBG-03

Current : Design 50

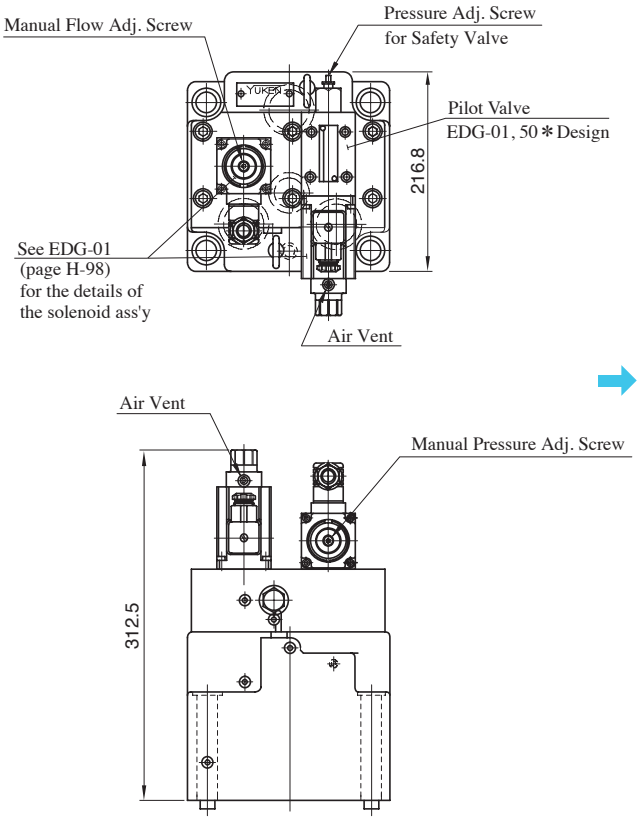


New : Design 51

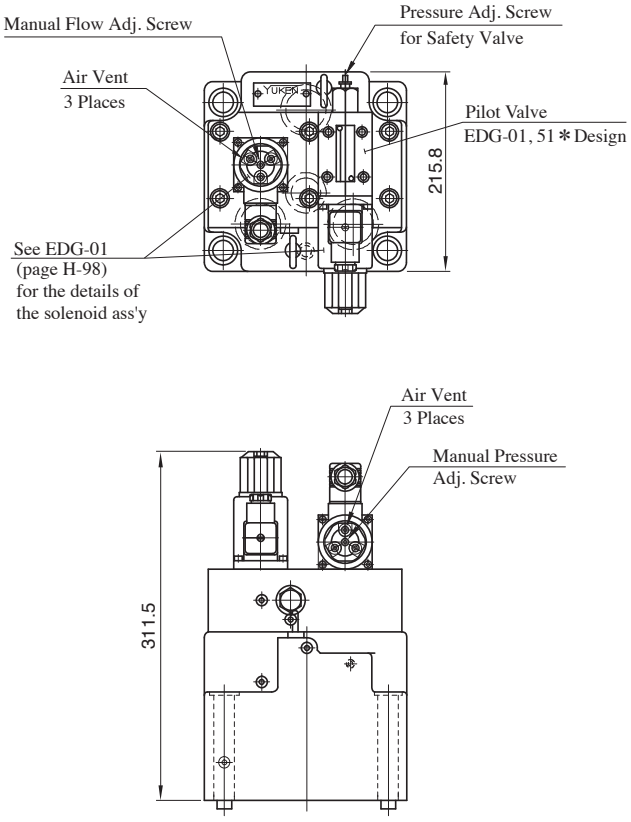


・EFBG-06/10

Current : Design 50



New : Design 51

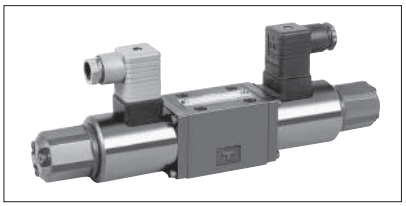


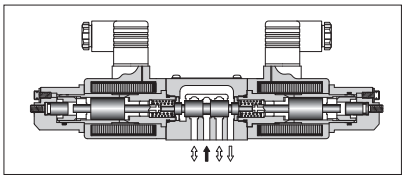
Shockless Type Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves are well accepted by industrial users as shifting time adjustable type shockless valves. By employing the basic design concept of the "G series solenoid operated directional valves", we have been successful developing the shifting time adjustable shockless valves with high performance which makes the speed setting possible at any high speed operation.
In combination with the newly developed digital amplifiers, the further enhancement of maneuverability and repeatability of the valves can be realized.

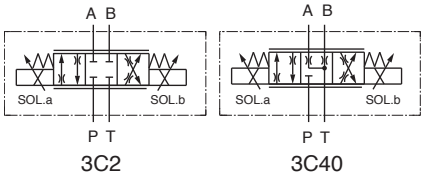
Specifications

Descriptions \ Model No.		EDFG-01
Max. Operating Pressure	MPa	25
Max. Flow	L/min	30
Max. Tank Line Back Pressure	MPa	14
Rated Current	mA	1100
Coil Resistance	Ω	10.8
Hysteresis		5% or less
Repeatability		1% or less
Step Response (Typical Rating) (0 ⇔ 100%)		100 ms or less
Frequency Response (50% ±25%)	Phase	20 Hz (–90 degree)
	Gain	25 Hz (–3 dB)
Approx. Mass	kg	2.4





Graphic Symbols



Model Number Designation

EDF	G	-01	-30	-3C2	-XY	-50
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type	Direction of Flow	Design Number
EDF: Shockless Type Proportional Directional and Flow Control Valve	**G:** Sub-Plate Mounting	**01**	**30**	**3C2**  **3C40** 	**XY:** Meter - in Meter - out	**50**

Accessories

Mounting Bolts

Soc. Hd. Cap Screw	Qty.	Tightening Torque Nm
M5 × 45 L	4	5~7

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-186).

Control Type	Model No.
Pattern Control	AMN-G-10
Analog Control	AMN-W-10

Sub-Plate

Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSGM-01-31	1/8	0.8
DSGM-01X-31	1/4	
DSGM-01Y-31	3/8	

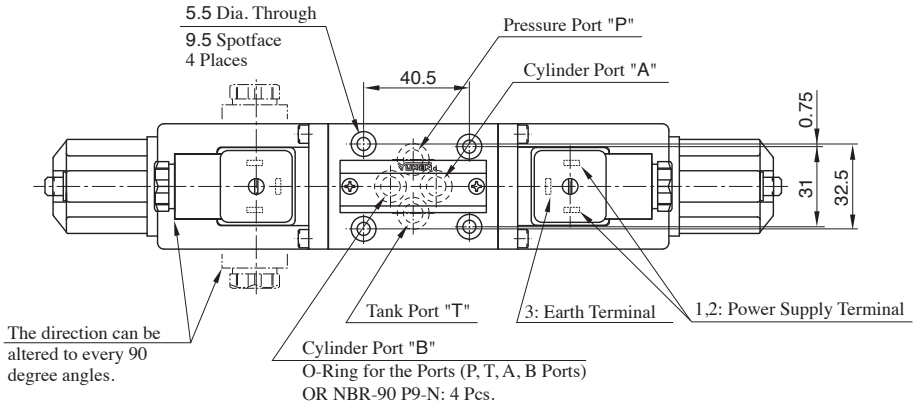
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)
- Sub-plates are those for 1/8 solenoid operated directional valves. For dimensoins, see page H-8.

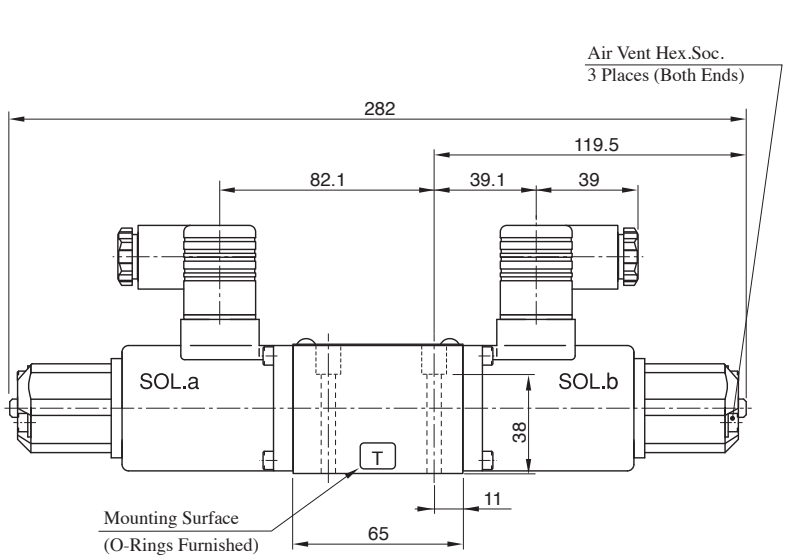
Instructions

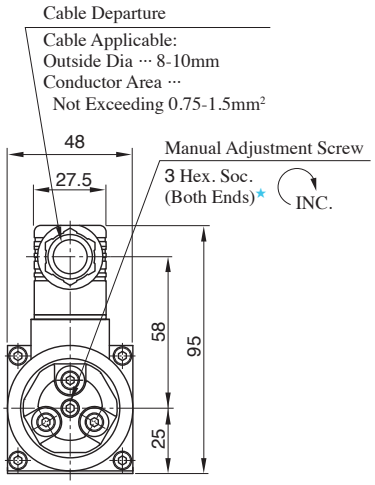
- During piping work, special care should be taken so that the tank port "T" is constantly filled with hydraulic fluid. Because back pressure is applied, using a check valve whose cracking pressure is about 0.04 MPa is recommended. Also, connect the tank port piping directly to the oil tank, but do not connect it other piping. For this reason, be sure to immerse the pipe end in fluid.
- In the event of an electrical failure or other emergency, the flow rate and oil flow direction can be switched by screwing in the manual adjustment screw. After operation, be sure to return the manual adjustment screw completely to the original position.

EDFG-01-30-3C∗-XY-50

Mounting Surface
ISO 4401-03-02-0-05





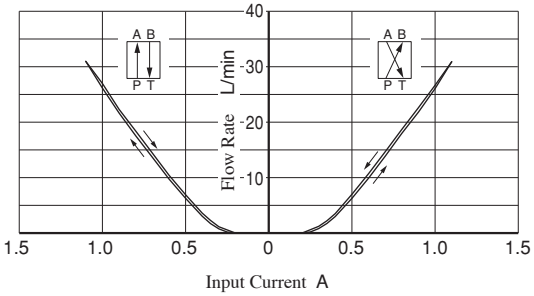


★ Under normal conditions, however, this screw must be kept in its original position.

Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-8) in common use.

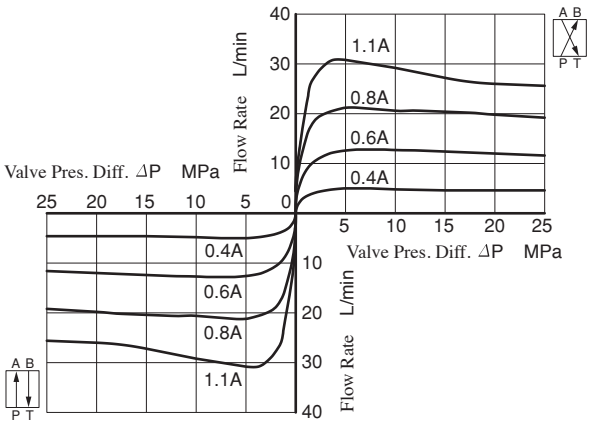
Input Current vs. Flow

Viscosity: 30mm²/s
Valve Pres. Difference: 7 MPa



Valve Pressure Difference vs. Flow

Viscosity: 30mm²/s



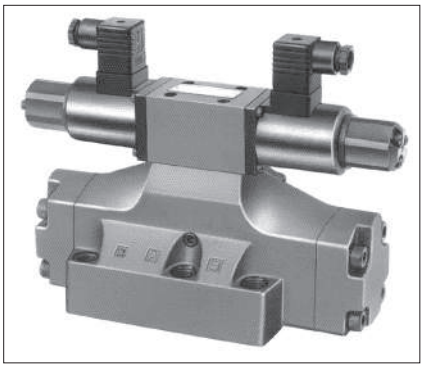
Proportional Electro-Hydraulic Directional and Flow Control Valves

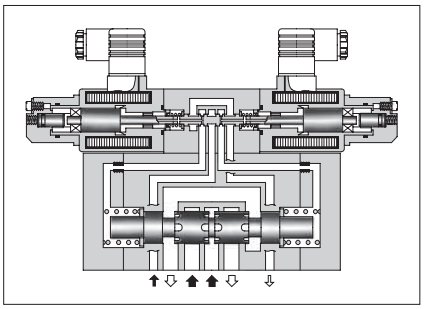
These valves are double-deck directional and flow control valves employing as their pilot the electro-hydraulic proportional pressure reducing valves with two proportional solenoids. The flow rate can be controlled by changing an input current to the solenoids and the direction of the flow can be controlled by providing the current to either solenoid of the two.
By combining the valves with the power amplifiers specially designed for the valves, the speed control, acceleration, deceleration and directional control can be done with a single valve, which eventually makes the hydraulic circuits simple and contributes the cost of the hydraulic systems.

Specifications

Descriptions \ Model No.		EDFHG-03	EDFHG-04	EDFHG-06
Max. Operating Pressure	MPa	25		
Rated Flow ★1 at Valve Pressure Difference: 1.0 MPa	L/min	100	140	280
Pilot Pressure ★2	MPa	1.5 - 16		
Pilot Flow L/min	at Normal	1	1	1
	at Transition	3	4	6
Max. Tank Line Back Pressure	MPa	16	21	21
Max. Drain Line Back Pressure ★3	MPa	3.0		
Rated Current	mA	800	980	900
Coil Resistance	Ω	10		
Hysteresis		5% or less ★4		
Repeatability		1% or less ★4		
Approx. Mass	kg	11	12	15

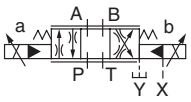
★1. The rated flow rate is valid at a differential pressure of 1.0 MPa of "P→A(B)" or "A(B)→T."
★2. Take care to keep the difference between the pilot pressure and drain port back pressure consistently greater than 1.5 MPa.
★3. To obtain stable performance, keep the drain port back pressure low and minimize its fluctuations.
★4. The hysteresis and repeatability values indicated in the specifications for each control valve are determined under the following conditions:
- Hysteresis Value: Obtained when Yuken's applicable power amplifier is used.
- Repeatability Value: Obtained when Yuken's applicable power amplifier is used under the same conditions.



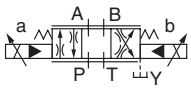


Graphic Symbols

External Pilot Type



Internal Pilot Type



Model Number Designation

EDFH	G	-03	-100	-3C2	-XY	-E	-31
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type★1	Direction of Flow	Pilot Connection	Design Number
EDFH: Proportional Electro-Hydraulic Directional and Flow Control Valves	**G:** Sub-Plate Mounting	**03**	**100**	**3C2**  **3C40** 	**XY:** Meter-in Meter-out	**E:** External Pilot **None:** Internal Pilot	**31**
		04	**140**				**31**
		06	**280**				**31**

★1. Spool type shown in the column is for the center position.

Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw	Qty.	Tightening Torque Nm
EDFHG-03	M6 × 35 L	4	12 - 15
EDFHG-04	M6 × 45 L	2	12 - 15
	M10 × 50 L	4	58 - 72
EDFHG-06	M12 × 60 L	6	100 - 123

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
EDFHG-03	DHGM-03Y-10	3/4	4.7
EDFHG-04	DHGM-04-20	1/2	4.4
	DHGM-04X-20	3/4	4.1
EDFHG-06	DHGM-06-50	3/4	7.4
	DHGM-06X-50	1	

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (▽6.3)
- Sub-plates are those for solenoid controlled pilot operated directional valves. For details, contuct us.

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-188).
Model Numbers: SK1091-D24-10

Instructions

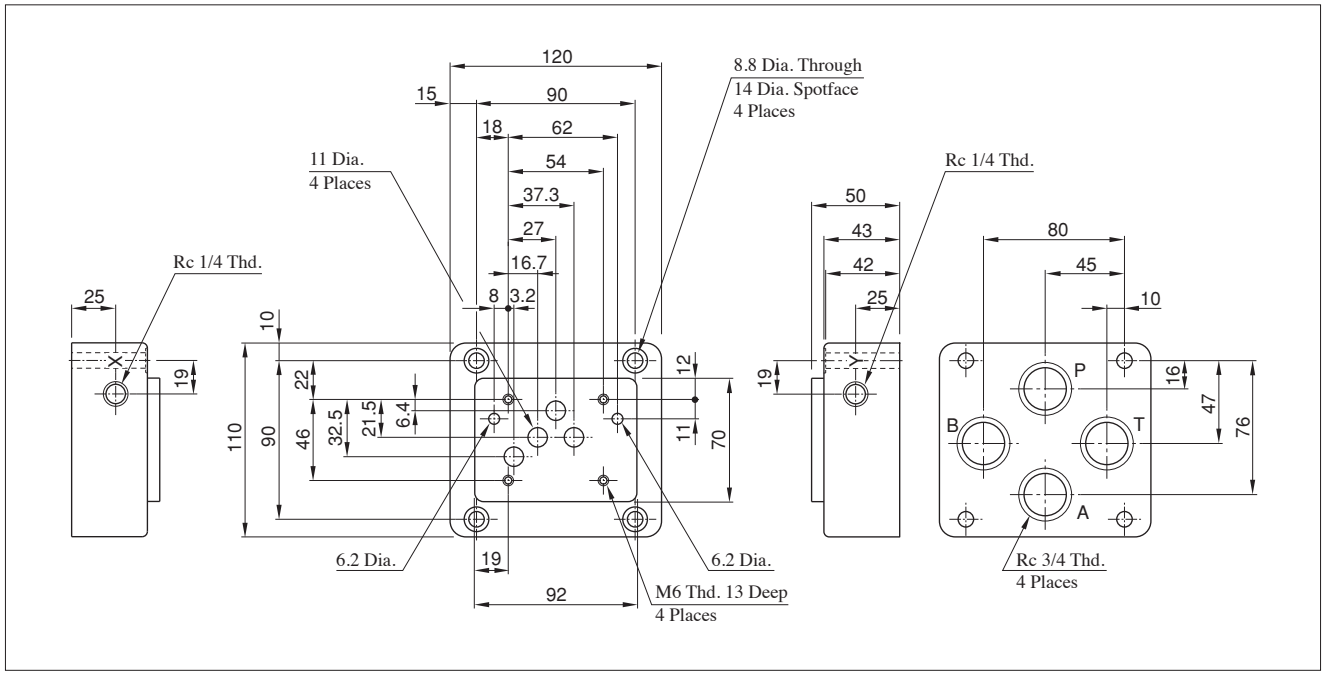
Manual Adjustment

In the event of an electric fault or emergency, a manual shift can be made by screwing in the manual adjustment screw.
Take care, however, that this manual shift has no flows adjusting function.
For this operation, set the pilot pressure (or P-port pressure on an internal-pilot model) below 7 MPa.
After operation, be sure to return the manual adjustment screw completely to the original position.

During Piping

During piping work, special care should be taken so that the tank port “T” is constantly filled with hydraulic fluid.
Because back pressure is applied, using a check valve whose cracking pressure is about 0.04 MPa is recommended.
Also, connect the tank port piping directly to the oil tank, but do not connect it other piping. For this reason, be sure to immerse the pipe end in fluid.

Sub Plates: DHGM-03Y

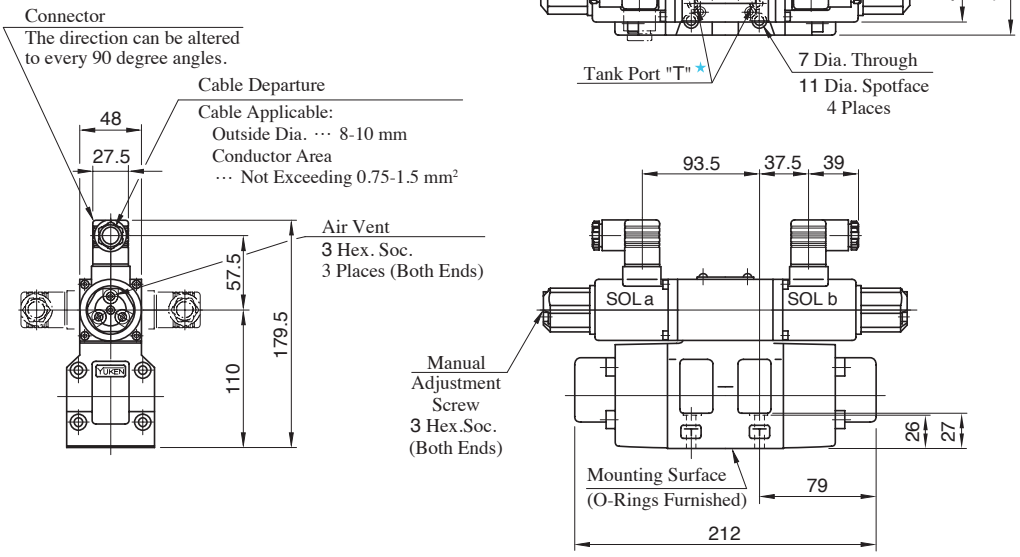


Mounting Surface: Conform to ISO 4401-05-05-0-05

EDFHG-03

★ Of the two tank ports "T", the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-158) in common use.

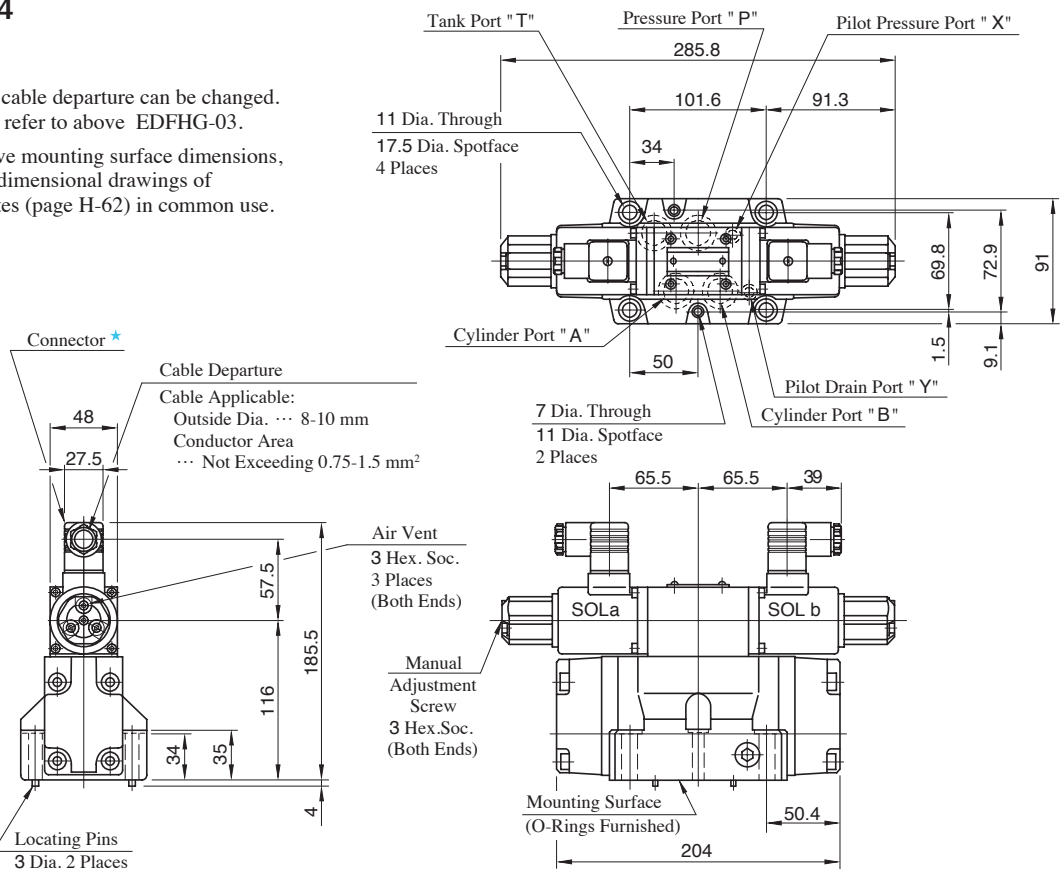


Mounting Surface: Conform to ISO 4401-07-07-0-05

EDFHG-04

★ Position of cable departure can be changed. For details, refer to above EDFHG-03.

Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-62) in common use.

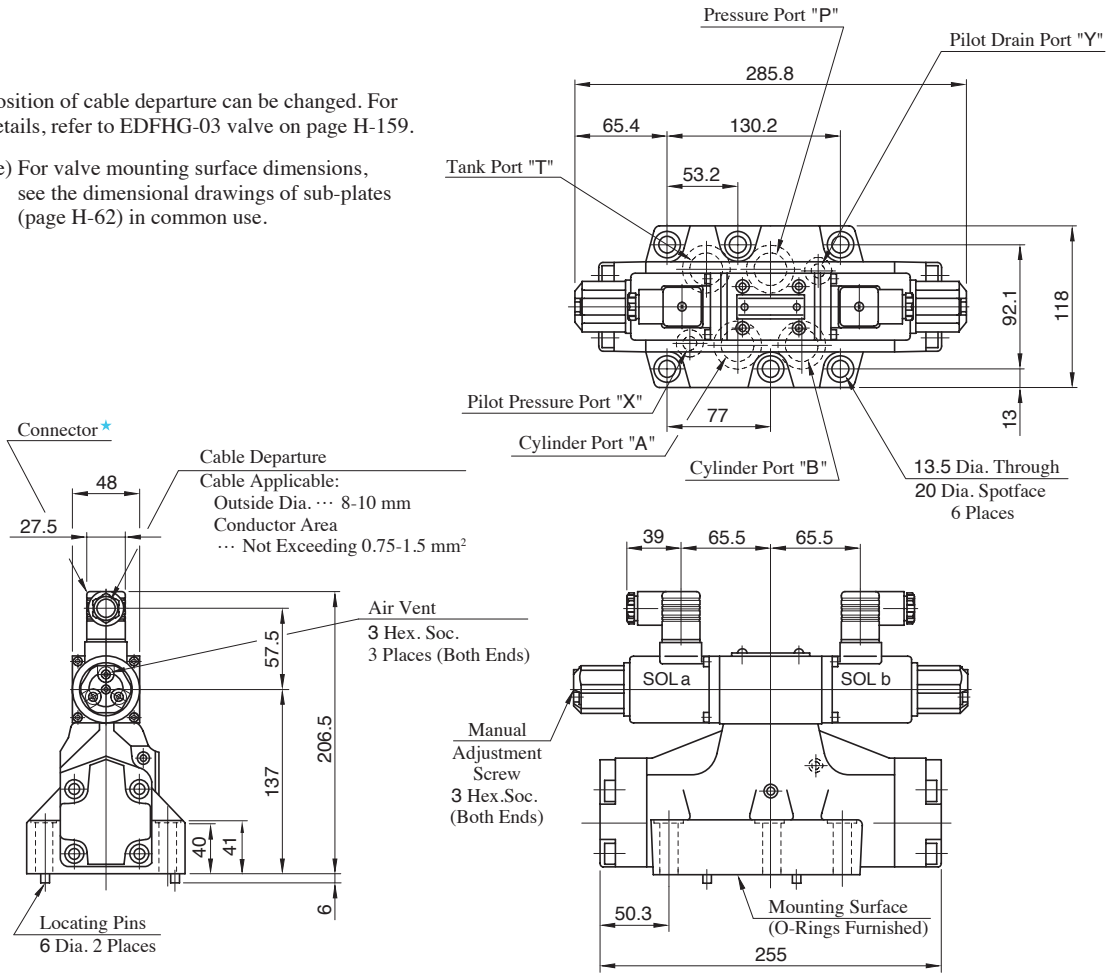


EDFHG-06

Mounting Surface: Conform to ISO 4401-08-08-0-05

★Position of cable departure can be changed. For details, refer to EDFHG-03 valve on page H-159.

Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-62) in common use.



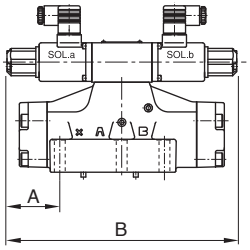
Interchangeability between Current and New Design

Specifications and Characteristics

The input current and flow characteristics differ between the new and old models. Consult Yuken for details.
Also, There is no change in specifications and characteristics between current and new design.

Installation Interchangeability

There is an interchangeability in the mounting dimensions between current and new design, however, note that because of improvements made on the solenoids, the overall shapes and dimensions have been changed as shown below.

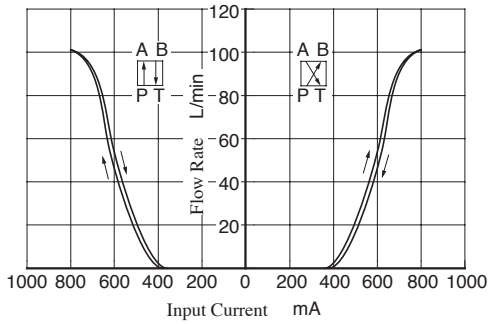


Model Numbers		A	B
(Current)	EDFHG-03-100-＊-＊-＊-30	117.9	287.8
(New)	EDFHG-03-100-＊-＊-＊-31	116.9	285.8
(Current)	EDFHG-04-140-＊-＊-＊-30	93.9	287.8
(New)	EDFHG-04-140-＊-＊-＊-31	92.9	285.8
(Current)	EDFHG-06-280-＊-＊-＊-30	66.4	287.8
(New)	EDFHG-06-280-＊-＊-＊-31	65.4	285.8

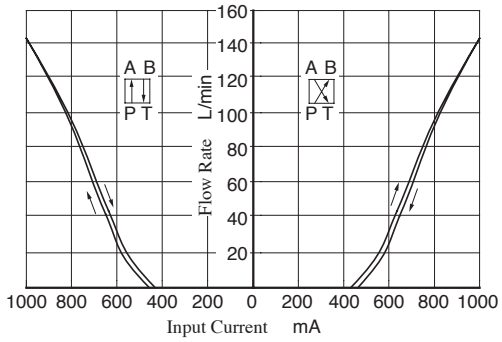
Input Current vs. Flow

Viscosity : 30 mm²/s
Valve Pres. Difference : P→A (B), B (A) →T 1 MPa

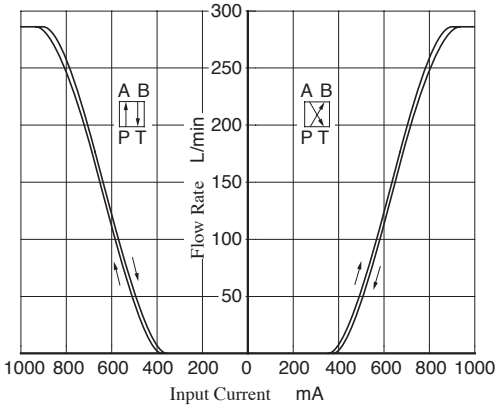
EDFHG-03



EDFHG-04



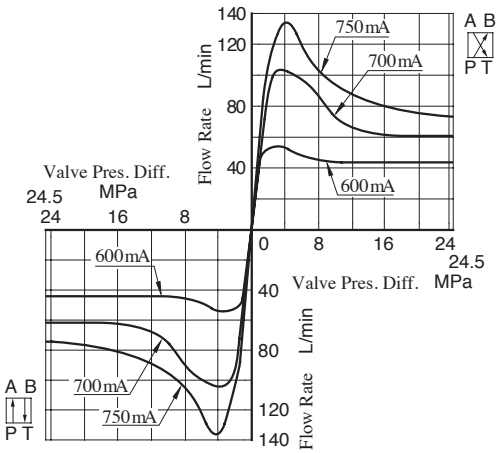
EDFHG-06



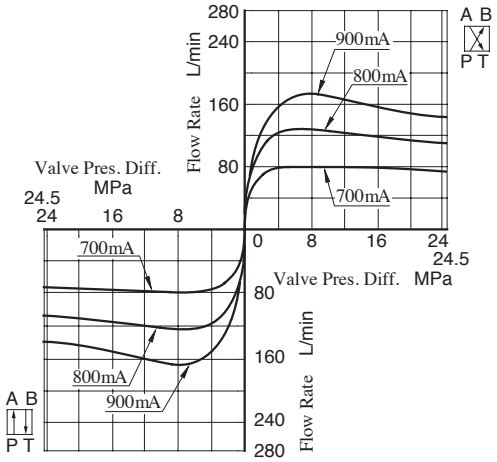
Valve Pressure Difference vs. Flow

Viscosity : 30 mm²/s

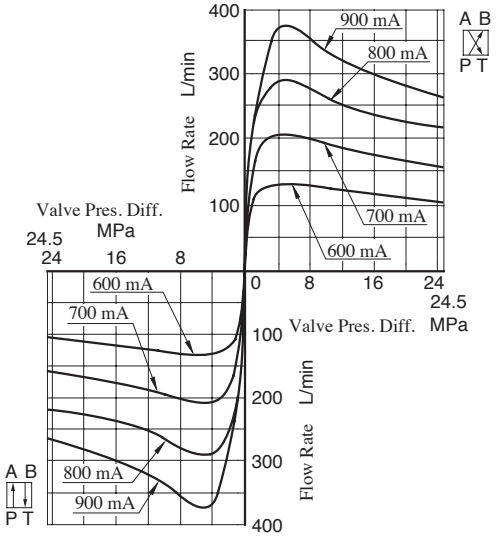
EDFHG-03



EDFHG-04

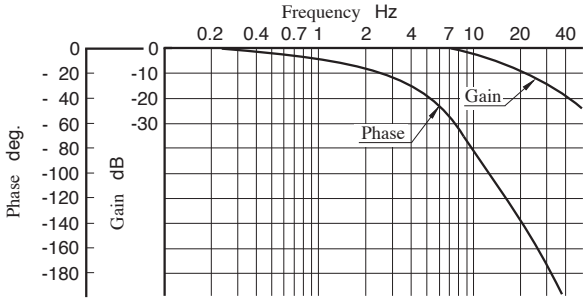


EDFHG-06



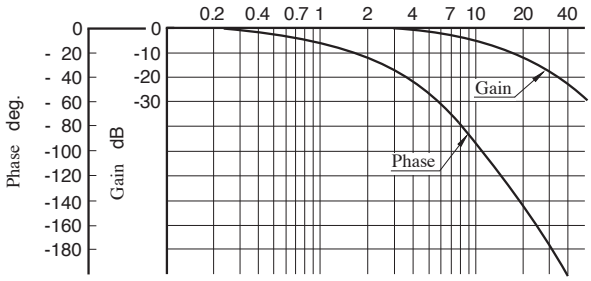
Frequency Response

EDFHG-03



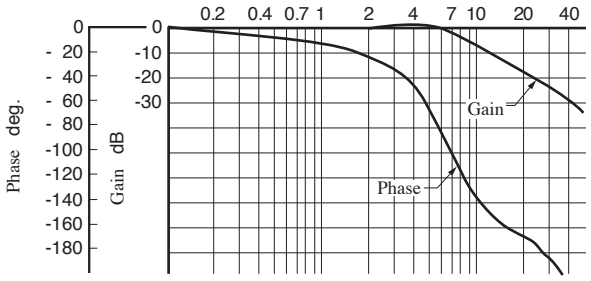
Model Number : EDFHG-03-100-3C2-E-31
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Maximum Stroke

EDFHG-04



Model Number : EDFHG-04-140-3C2-E-31
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Maximum Stroke

EDFHG-06



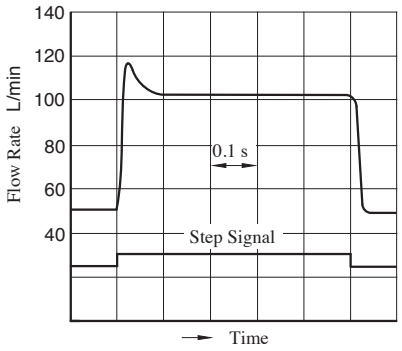
Model Number : EDFHG-06-280-3C2-E-31
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Maximum Stroke

Step Response

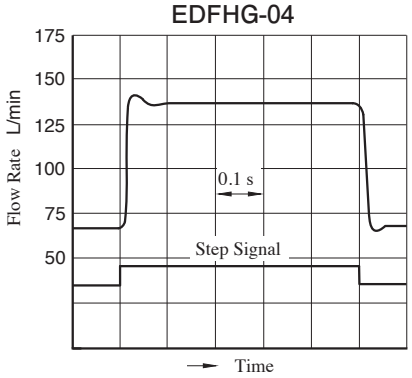
These characteristics have been obtained by measuring on each valve. Therefore, they may vary according to a hydraulic circuit to be used.

Viscosity : 30 mm²/s
Supply Pressure : 15.7 MPa

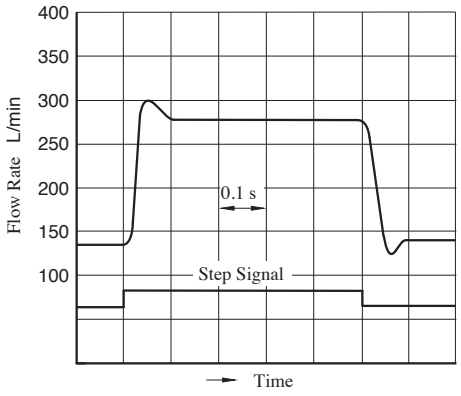
EDFHG-03



EDFHG-04



EDFHG-06



High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

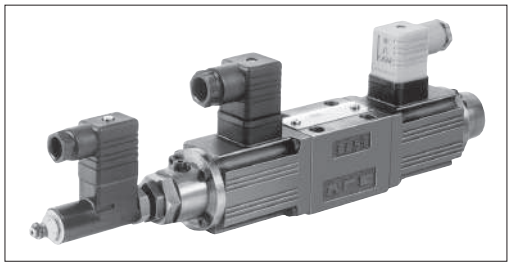
High response, high precision and high reliability are achieved by a combination of a compact and powerful solenoid and a spool-position-detection LVDT.
Direct type ELDFG-01/03 and two stage type ELDFG-04/06 (which use the ELDFG-01 as a pilot) are available.

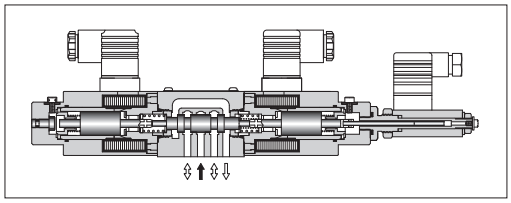
Direct Operated Type Directional and Flow Control Valves

This product can be interchanged with the simplified servo valve to perform position control and pressure control.
Compared to nozzle flapper type servo valve, this product has excellent contamination-related problems.

Specifications

Descriptions \ Model No.			ELDFG-01	ELDFG-03
Max. Operating Pressure		MPa	31.5	
Max. Tank Line Back Pressure		MPa	21	
Rated Flow Valve Pres. Diff. : 1.5 MPa		L/min	**10**: 10 **20**: 20 **35**: 35	**40**: 40 **80**: 80
Hysteresis			0.5% or less	
Repeatability			0.5% or less	
Step Response (Typical Rating)	0 → 100%		30 ms	**3C2, 3C40**: 29 ms **3C2P**: 25 ms
	100 → 0%		—	**3C2, 3C40**: 26 ms **3C2P**: 23 ms
Frequency Response (0 ± 25 %V)	Phase -90 degree		48 Hz	**3C2, 3C40**: 36 Hz **3C2P**: 41 Hz
	Gain -3 dB		52 Hz	**3C2, 3C40**: 35 Hz **3C2P**: 38 Hz
Rated Current		A	Max. 2.5	Max. 3
Coil Resistance [20°C]		Ω	3.9	3
Power Input		W	Max. 25	Max. 27
Approx. Mass		kg	3.2	7.5

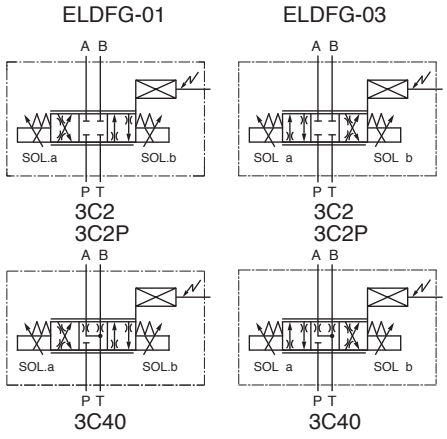




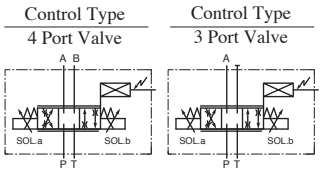
Range of Flow Control

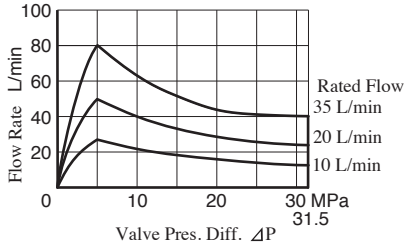
See “Valve Pres. Difference vs. Flow Rate” below charactristics for the appropriate range.

Graphic Symbols

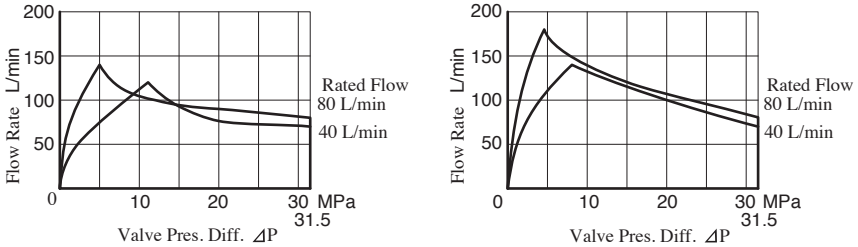


ELDFG-01



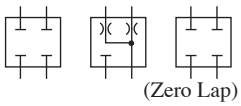


ELDFG-03



★ Valve pressure difference “⊿P” is reference by follows. In addition, “P”, “A”, “B”, “T”, are pressure of each port.
4 Port Valve: ⊿P = [(P–A) + (B–T)] or [(P–B) + (A–T)]
3 Port Valve: ⊿P = (P–A) or (A–T)

Model Number Designation

ELDF	G	-01	-35	-3C2	-XY	-10
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type	Direction of Flow	Design Number
ELDF: High Response (Direct) Type Proportional Electro-Hydraulic Directional and Flow Control Valves	**G:** Sub-Plate Mounting	**01**	**10** **20** **35**	3C2 3C40 3C2P  (Zero Lap)	**XY:** Meter-in Meter-out	**10**
		03	**40** **80**			**10**

Accessories

Mounting Bolts

Four socket head cap screws in the table below are included.

Model No.	Socket Head Cap Screw	Qty.	Tightening Torque
ELDFG-01	M5 × 45 L	4	5 - 7 Nm [Applicable to working pressure more than 25 MPa: 6 - 7 Nm]
ELDFG-03	M6 × 35 L	4	12 - 15 Nm

Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Approx. Mass kg
ELDFG-01	DSGM-01-31	1/8	0.8
	DSGM-01X-31	1/4	
	DSGM-01Y-31	3/8	
ELDFG-03	DSGM-03-40	3/8	3.0
	DSGM-03X-40	1/2	
	DSGM-03Y-40	3/4	4.7

- Sub-plates are available. Specify the sub-plate model number from the table above.
  When sub-plates are not used, the mounting surface should have a good machined finish. (1.6▽)
- The Sub-plates are those for 1/8 and 3/8 solenoid operated directional valves. For dimensions, see pages H-8 and H-53.

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-190).

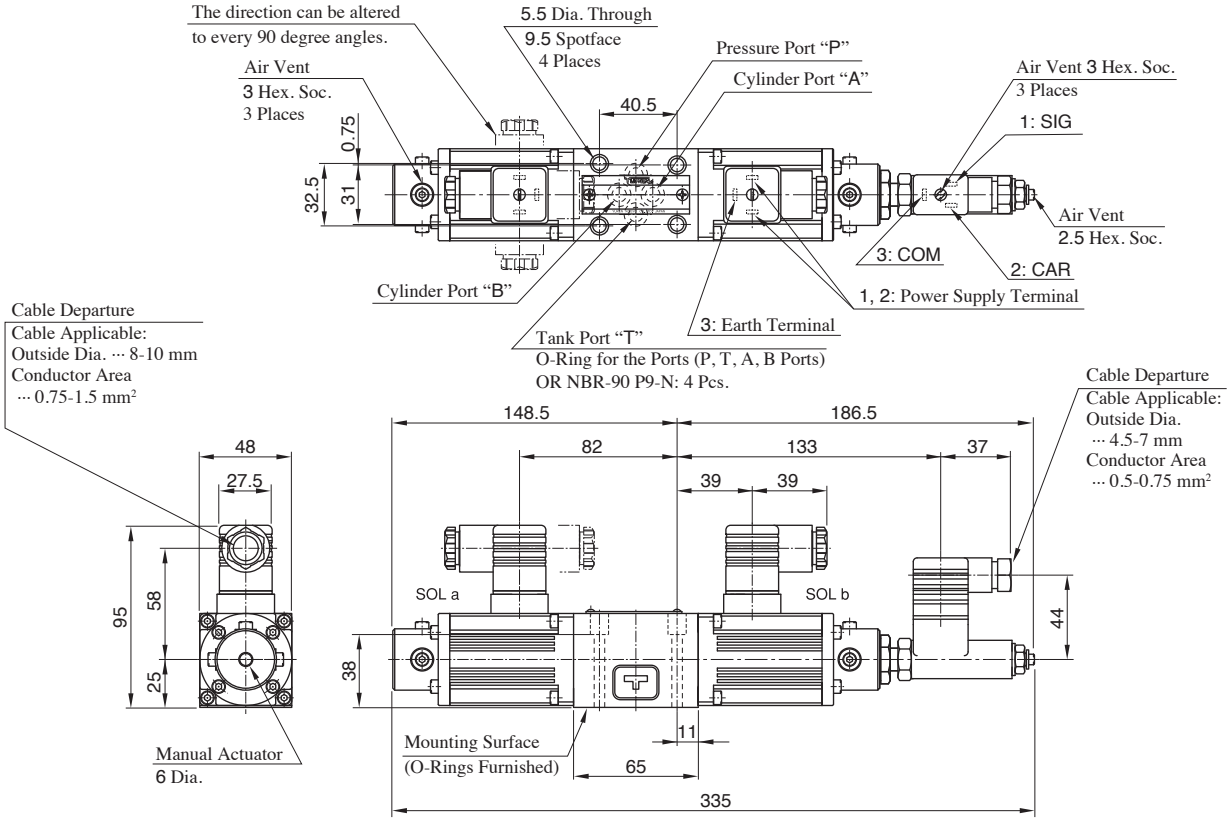
Valve Model Numbers	Power Amplifier Model Numbers
ELDFG-01-∗-3C2 3C40	AMN-L-01-1-10 AMB-EL-01-★-∗-20
ELDFG-01-∗-3C2P	AMN-L-01-3-2P-10 AMB-EL-01-2P-★-∗-20
ELDFG-03-∗-3C2 3C40	AMB-EL-03-1-∗-20
ELDFG-03-∗-3C2P	AMB-EL-03-2P-1-∗-20

Instructions

During piping work, special care should be taken so that the tank port "T" is constantly filled with hydraulic fluid. Because back pressure is applied, using a check valve whose cracking pressure is about 0.04 MPa is recommended. Also, connect the tank port piping directly to the oil tank, but do not connect it other piping. For this reason, be sure to immerse the pipe end in fluid.

ELDFG-01-∗-∗ -XY-10

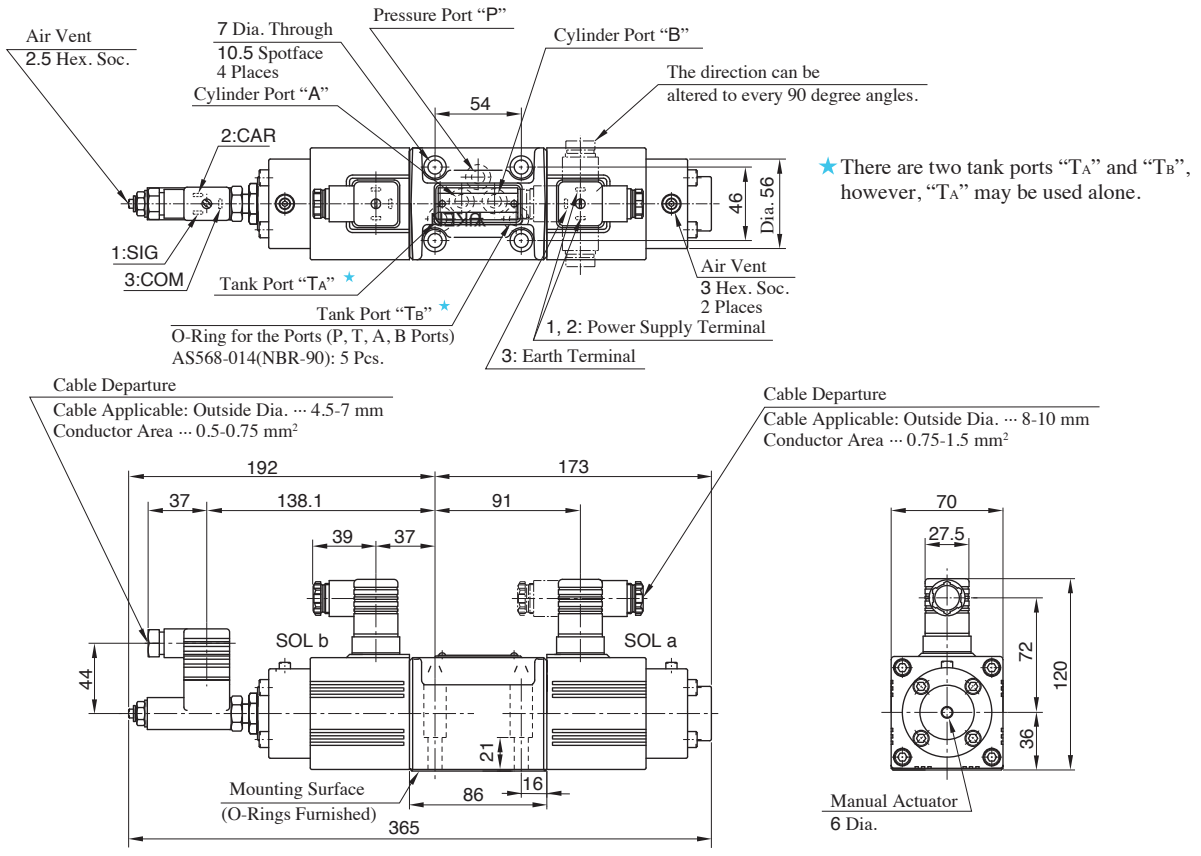
Mounting Surface: Conform to ISO4401-03-02-0-05



Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-8) in common use.

ELDFG-03-∗-∗ -XY-10

Mounting Surface: Conform to ISO4401-05-04-0-05

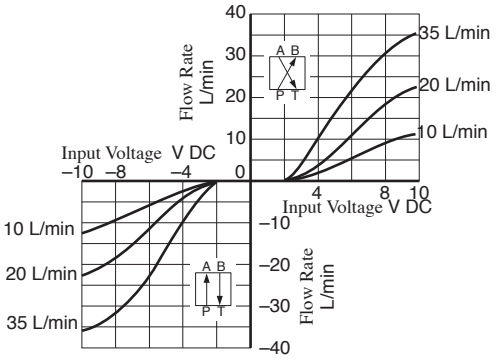


Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-53) in common use.

Input Voltage vs. Flow Rate

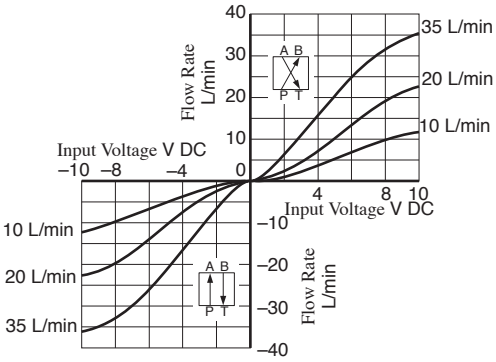
ELDFG-01-∗-3C2/3C40

Valve Pres. Diff. : 1.2 MPa
Viscosity : 30 mm²/s



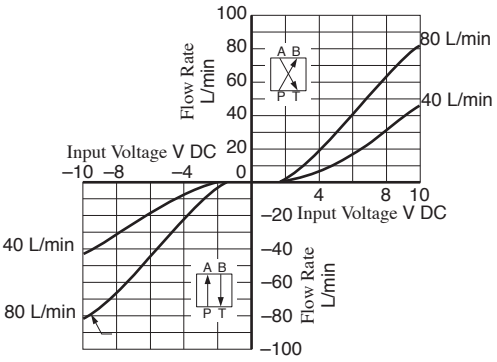
ELDFG-01-∗-3C2P

Valve Pres. Diff. : 1.2 MPa
Viscosity : 30 mm²/s



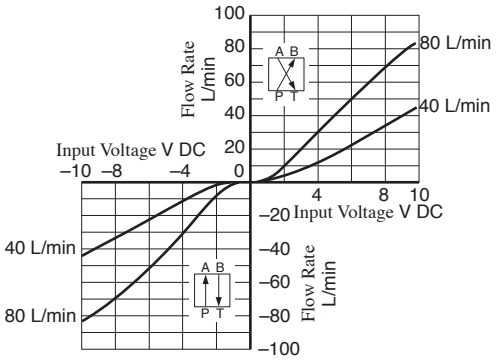
ELDFG-03-∗-3C2/3C40

Valve Pres. Diff. : 1.5 MPa
Viscosity : 30 mm²/s



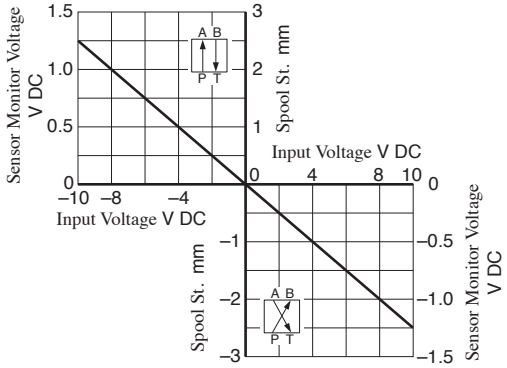
ELDFG-03-∗-3C2P

Valve Pres. Diff. : 1.5 MPa
Viscosity : 30 mm²/s

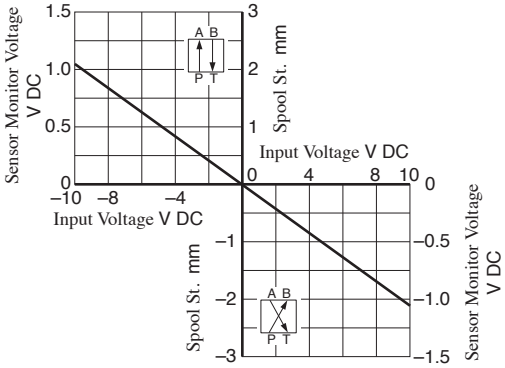


Input Voltage vs. Spool St.

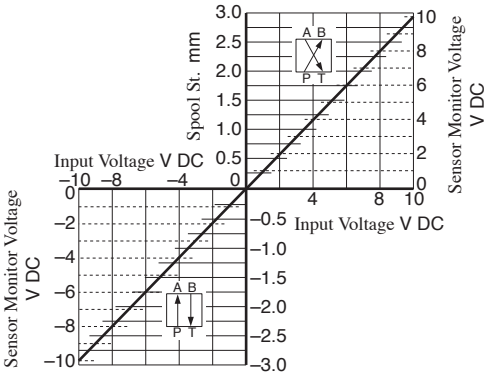
ELDFG-01-∗-3C2/3C40



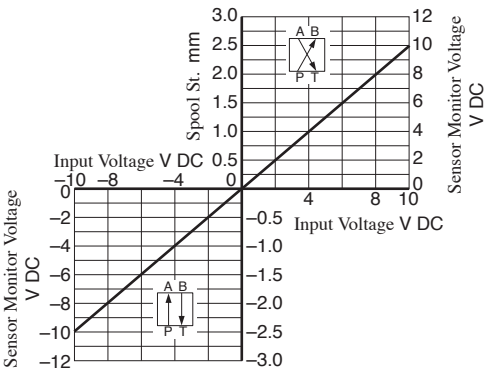
ELDFG-01-∗-3C2P



ELDFG-03-∗-3C2/3C40



ELDFG-03-∗-3C2P



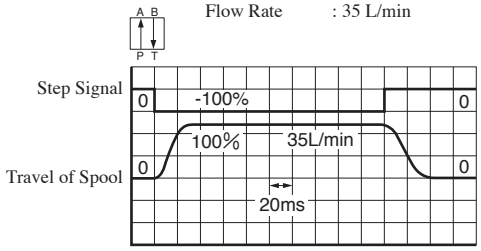
Step Response (Example)

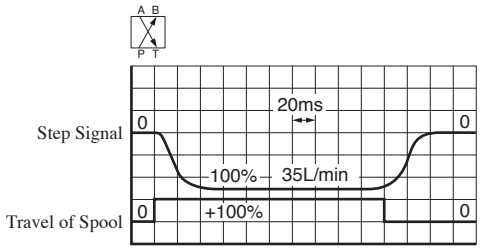
Viscosity : 30 mm²/s

The values were measured on independent valves. They vary by circuit.

ELDFG-01-35-3C2/3C40

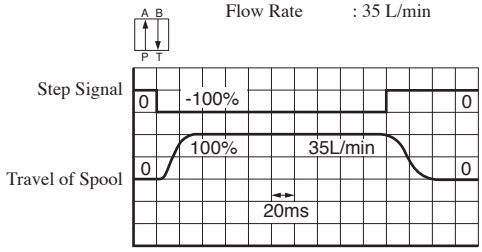
Supply Pressure : 2 MPa
Flow Rate : 35 L/min

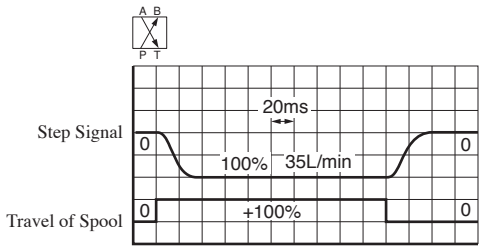




ELDFG-01-35-3C2P

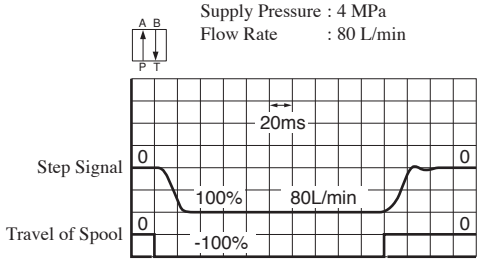
Supply Pressure : 2 MPa
Flow Rate : 35 L/min

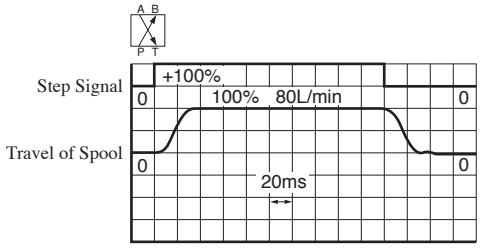




ELDFG-03-80-3C2/3C40

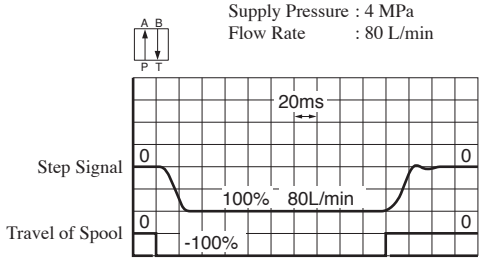
Supply Pressure : 4 MPa
Flow Rate : 80 L/min

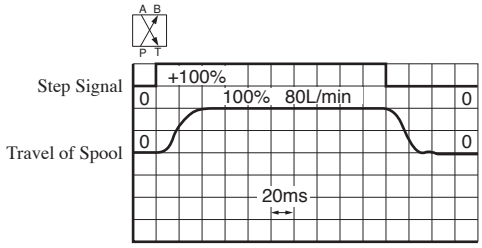




ELDFG-03-80-3C2P

Supply Pressure : 4 MPa
Flow Rate : 80 L/min

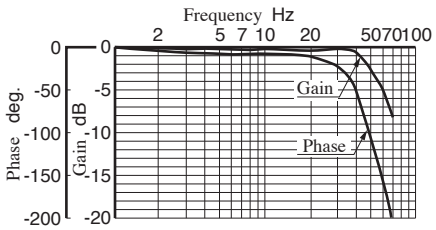




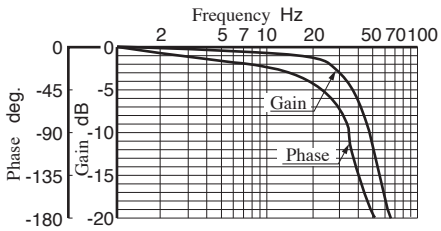
Frequency Response

Input Signal : 0 ± 25 %V
Primary Pressure : 14 PMa
Viscosity : 30 mm²/s

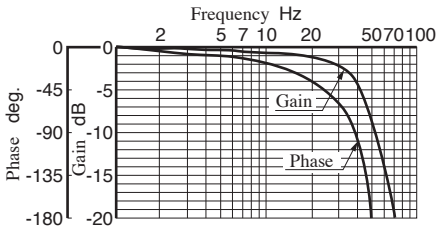
ELDFG-01-35-3C2/3C40/3C2P



ELDFG-03-80-3C2/3C40



ELDFG-03-80-3C2P

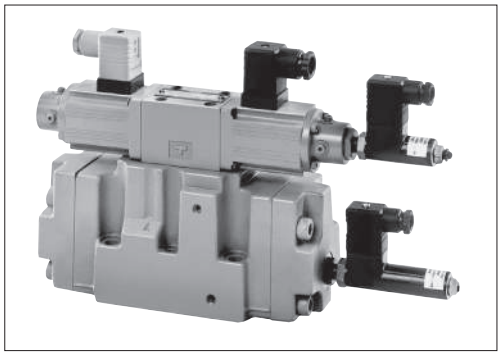


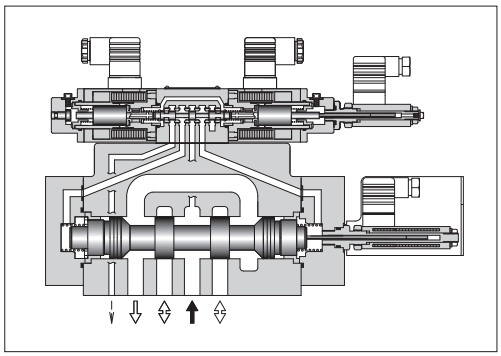
Two Stage Type Directional and Flow Control Valves

Specifications

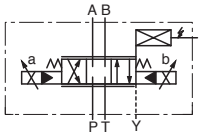
Descriptions \ Model No.		ELDFHG-04	ELDFHG-06
Rated Flow Valve Pres. Diff. : 1 MPa	L/min	280	350 500
Max. Operating Pressure	MPa	35	350: 35 500: 31.5
Proof Pressure at Return Port ★1 (External Drain)	MPa	"T" Port : 31.5 "Y" Port : 21	350 "T" Port : 35 "Y" Port : 21 500 "T" Port : 25 "Y" Port : 21
Proof Pressure at Return Port (Internal Drain)	MPa	21	
Pilot Pressure ★2	MPa	1.5-31.5	
Pilot Flow ★3		16 L/min or more	350: 16 L/min or more 500: 19 L/min or more
Null Leakage ★4	Ps=14 MPa, Pp=14 MPa	3C2: 3 L/min or less 3C2P: 10 L/min or less	3C40: 4 L/min or less
Step Response (0↔100%)	(Typical Rating) Pp=14 MPa	13 ms	350: 15 ms 500: 18 ms
Frequency Response (0±25%V, Phase) Pp=14 MPa		46 Hz (–90 degree)	350: 40 Hz 500: 39 Hz (–90 degree)
Water - Proofness		IP64	
Operating Temperature Range		–15 - +60 °C	
Spool Type		3C2:  3C2P: (Zero Rap)  3C40: 	
Approximate Spool Stroke to Stops		±5 mm	350: ±5 mm 500: ±7 mm
Main Spool End Area	cm^2	7.1	8
Rated Current	A	Max. 2.5	
Coil Resistance [20 °C]	Ω	3.9	
Approx. Mass	kg	10	350: 18 500: 19

★1. Return pressure should be less than the actual supply pressure.
★2. Pilot pressure should be between 1.5 MPa and 31.5 MPa, and should exceed 60% of the actual supply pressure to main valve.
★3. Pilot flow is calculated with the above step response time at pilot pressure 14 MPa.
★4. Added up leakage of main and pilot spools are stated.

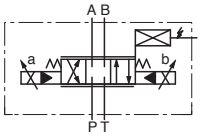




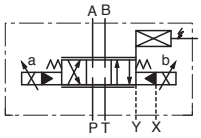
Graphic Symbols



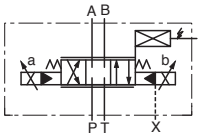
Internal Pilot / External Drain Type



Internal Pilot / Internal Drain Type

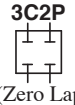


External Pilot / External Drain Type



External Pilot / Internal Drain Type

Model Number Designation

ELDFH	G	-04	-280	-3C2P	-XY	-E	T	-10
Series Number	Type of Mounting	Valve Size	Rated Flow L/min	Spool Type	Direction of Flow	Pilot Connection	Drain Connection	Design Number
ELDFH: High Response (Two Stage) Type Proportional Electro-Hydraulic Directional and Flow Control Valves	**G**: Sub-Plate Mounting	**04**	**280**	**3C2**  **3C40** 	**XY** : Meter-in Meter-out	**None**: Internal Pilot	**None**: External Drain	**10**
		06	**350** **500**	**3C2P**  (Zero Lap)		**E**: External Pilot	**T**: Internal Drain	**10**

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page H-190).

Model Numbers	Power Amplifier Model Numbers
ELDFHG-04-280-3C2 / 3C40	AMB-EL-04-2-∗-20
ELDFHG-04-280-3C2P	AMB-EL-04-2P-2-∗-20
ELDFHG-06-350-3C2 / 3C40	AMB-EL-06-3-∗-20
ELDFHG-06-350-3C2P	AMB-EL-06-2P-3-∗-20
ELDFHG-06-500-3C2 / 3C40	AMB-EL-06-4-∗-20
ELDFHG-06-500-3C2P	AMB-EL-06-2P-4-∗-20

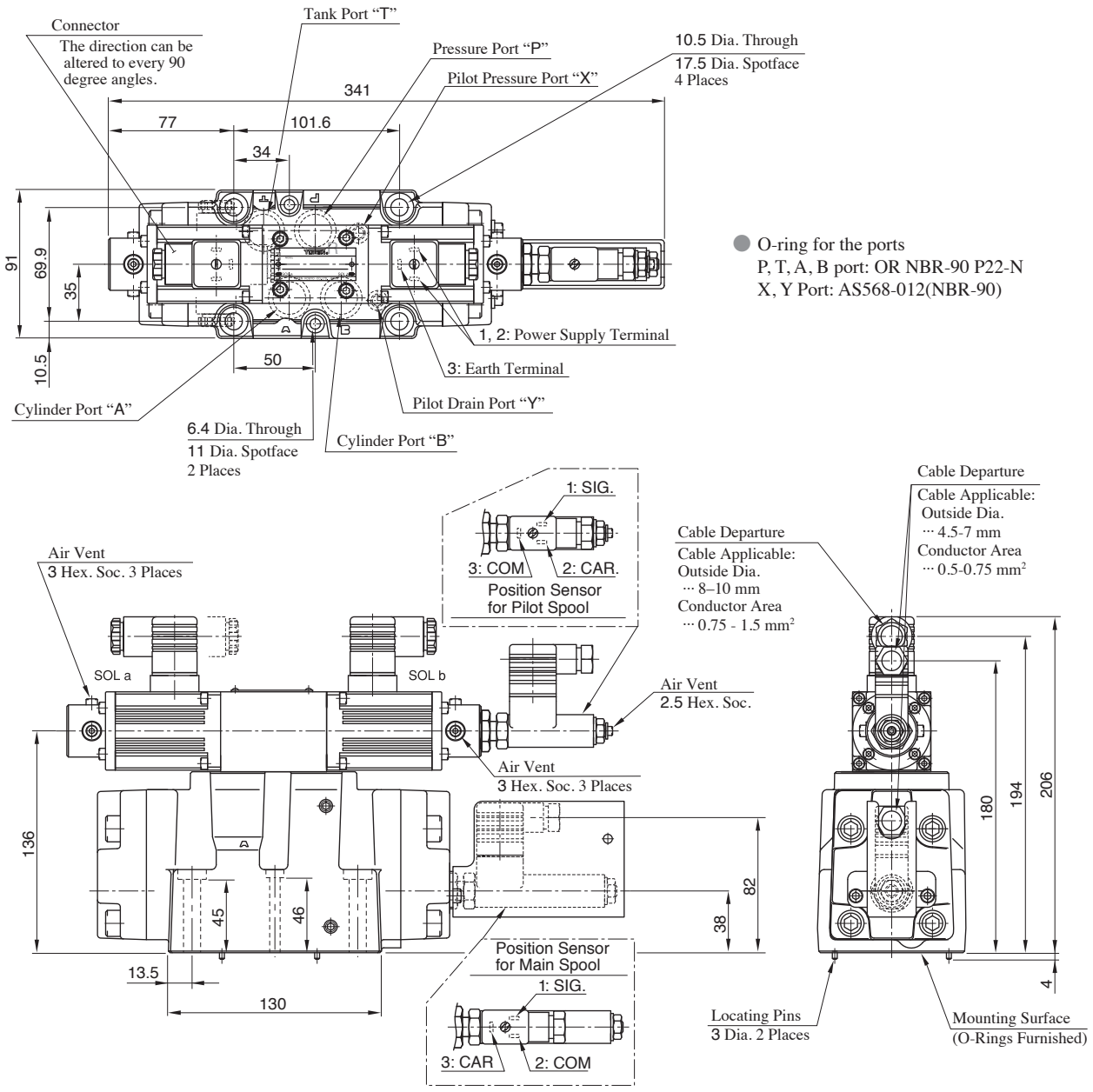
Accessories

Mounting Bolts

Model Numbers	Socket Head Cap Screw	Qty.
ELDFHG-04	M6 × 55 L M10 × 60 L	2 4
ELDFHG-06	M12 × 85 L	6

ELDFHG-04-280-∗-XY-∗-∗ -10

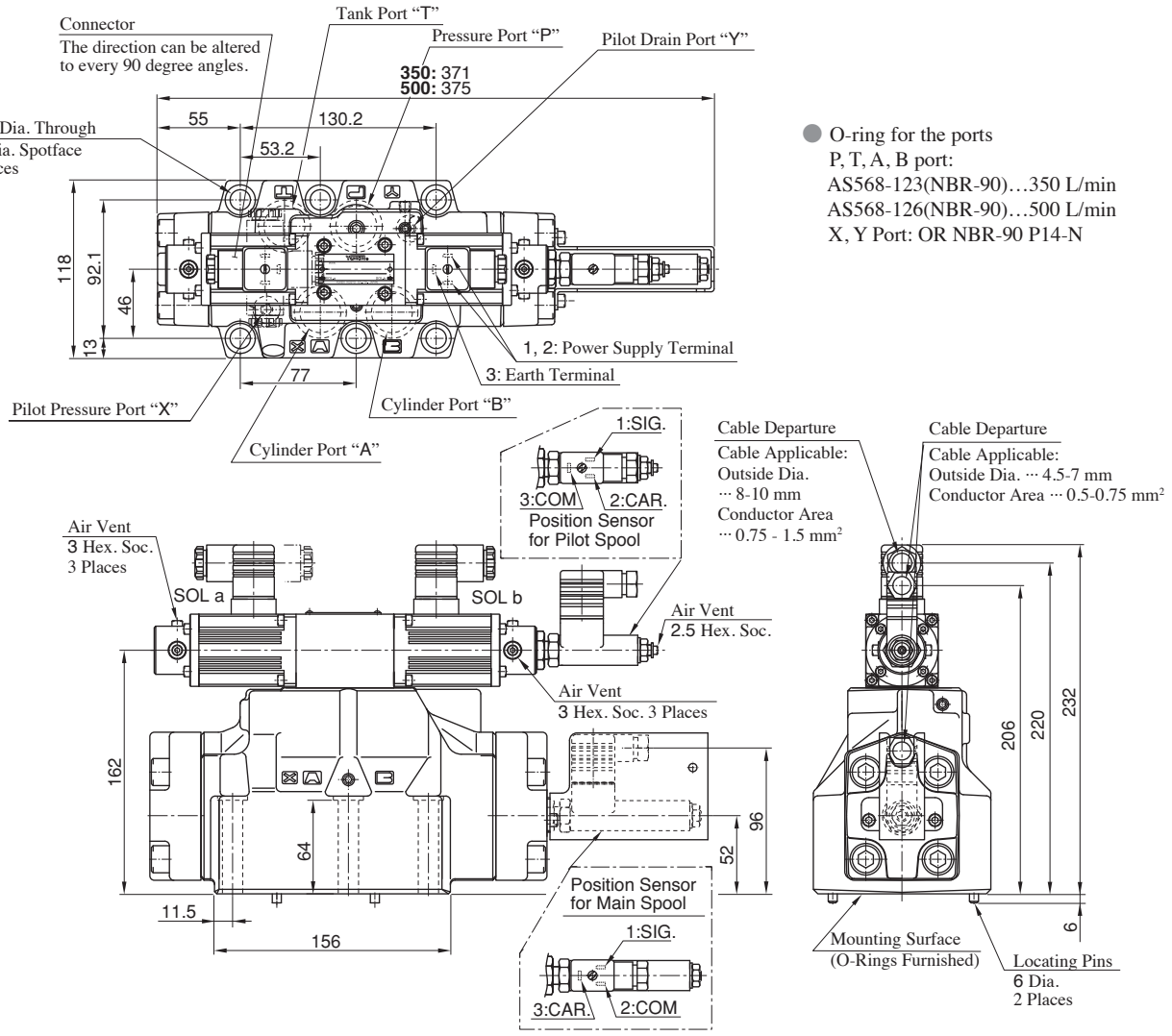
Mounting Surface: Conform to ISO4401-07-07-0-05



Note) For valve mounting surface dimensions, refer to page H-170.

ELDFHG-06-∗-∗-XY-∗-∗-10

Mounting Surface: Conform to ISO4401-08-08-0-05

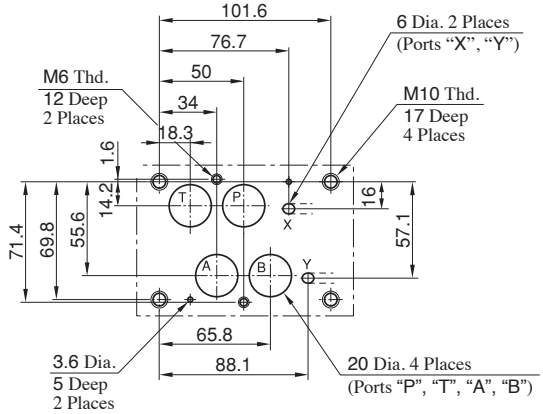


- O-ring for the ports
  P, T, A, B port:
  AS568-123(NBR-90)…350 L/min
  AS568-126(NBR-90)…500 L/min
  X, Y Port: OR NBR-90 P14-N

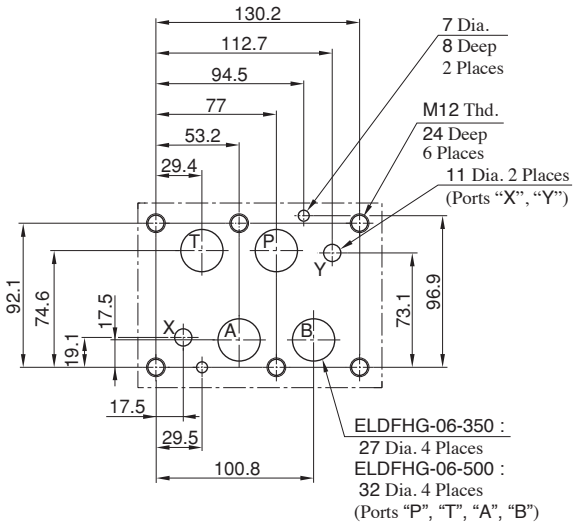
Dimensions of Valve Mounting Surface

Prepare a mounting surface as shown to the below.
Also finish it finely.

ELDFHG-04



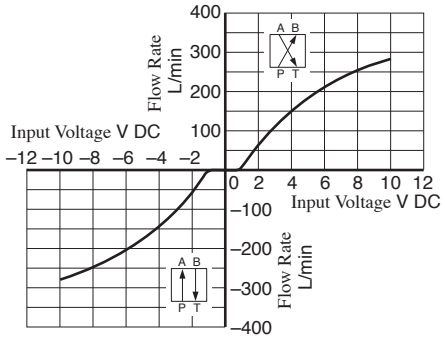
ELDFHG-06



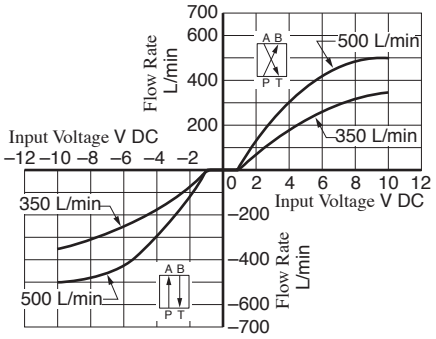
Input Voltage vs. Flow Rate

Valve Pres. Diff. : 1 MPa
Viscosity : 30 mm²/s

ELDFHG-04



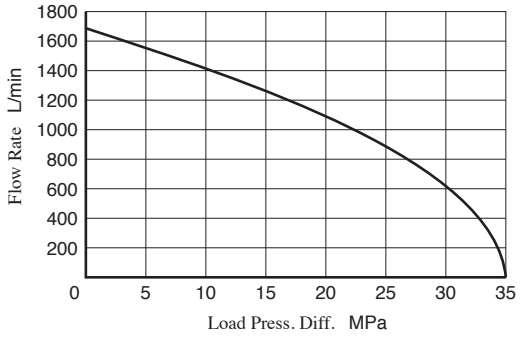
ELDFHG-06



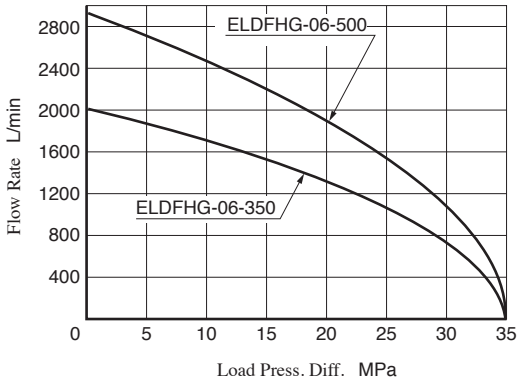
Load Flow Characteristics

Viscosity : 30 mm²/s

ELDFHG-04



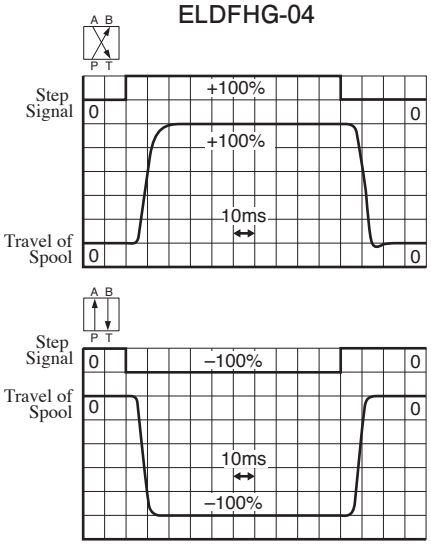
ELDFHG-06



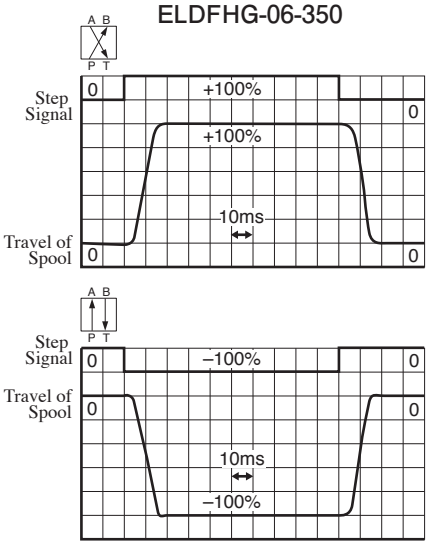
Step Response (Example)

Viscosity : 30 mm²/s

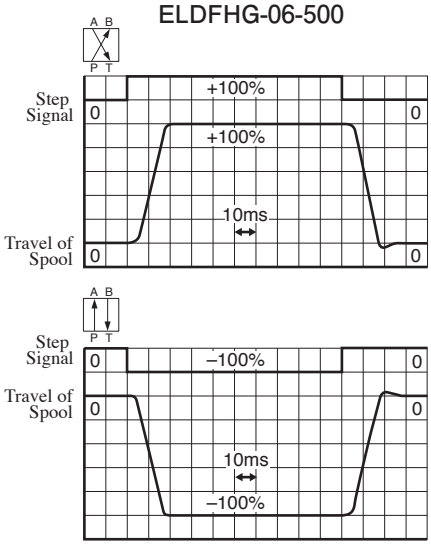
ELDFHG-04



ELDFHG-06-350



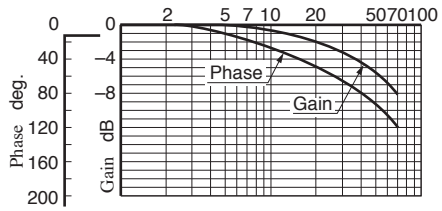
ELDFHG-06-500



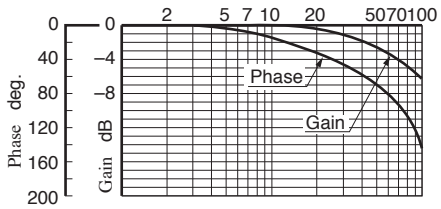
Frequency Response

Input Signal : 0 ± 25 %
Hydrauric Circuit : Port A/B Closed
Supply and Pilot Pressure : 14 PMa
Viscosity : 30 mm²/s

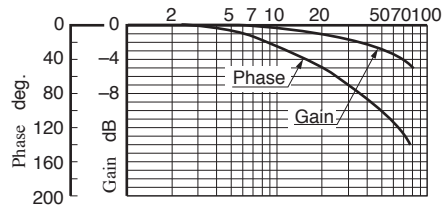
ELDFHG-04



ELDFHG-06-350

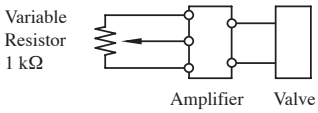
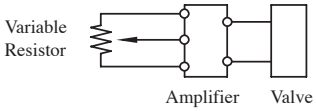


ELDFHG-06-500



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

These are power amplifiers to be used exclusively to operate the electro-hydraulic proportional valves. Various type and models on available for a variety of applications.

Type	Model Numbers	Applicable to Control Valve	Function
DC Input	AME-D-10-∗-20	Pressure or Flow Control (For 10 Ω Sol.)	By giving the command of DC voltage (0 -10 V) to the amplifier, current in proportion to that voltage will flow into the solenoid of the control valve in order to control pressure or flow rate. An external setting unit which makes the command voltage of 0 -10 V and a DC power supply (or a function generator) are necessary, but if a variable resistor for external setting is only one, the internal power supply for amplifier can be used. 
	AME-D-S-∗-50	Flow Control (For 40 Ω Sol.)	
	AME-D2-1010-∗-11	Flow Control and Relief (For 10 Ω -10 Ω Sol.)	
DC Input-Feedback	SK1022-∗-∗-11	Pressure or Flow Control (For 10 Ω Sol.)	Basically, this is a DC input type with a feedback operating unit. This is for high-accuracy control and used to feedback the pressure or flow rate converted to electric signals.
	AME-DF-S-∗-50	Flow Control (For 40 Ω Sol.)	
Slow Up-Down	AME-T-S-∗-22	Flow Control (For 40 Ω Sol.)	A slow up-down signal generator and the functions of a DC input type are incorporated. This is used to control the pressure or flow rate by slow up-down pattern and the command signals are given by relay contacts, limit switches, timer contacts, etc.
DC Input For DC Power 24 V DC	SK1015-11 AMN-D-10	Pressure or Flow Control (For 10 Ω Sol.)	An amplifier which is operated by a battery power supply (24 V). By giving the command of DC voltage to the amplifier, current in proportion to that voltage will flow in the solenoid of the control valve in order to control pressure or flow rate. An external setting unit which makes the command voltage and a DC power supply (or a function generator) are necessary, but if a variable resistor for external setting is only one, the internal power supply for amplifier can be used.  SK1015 amplifier can be used in automobile construction machine.
	AMN-W-10 SK1091-D24-10	Directional and Flow Control	
DC Input with Minor Feedback	SK1115-∗-20	Flow Control (For 10 Ω Sol.)	An amplifier which is operated by a battery power supply (24V). This is for high-response, high-accuracy control and used to feedback the pressure or flow rate converted to electric signals.
	AMN-L-01-∗-∗-10	High Response Type Directional and Flow Control	
	AMB-EL-∗-∗-∗-∗-20		
Shockless	AMN-G-10	Shockless Directional and Flow Control	Outputs shockless patterns, low speed (Level 1) high-speed (Level 2) low speed (Level 3). Shockless speed control is enabled just by providing SOL a and SOL b only contact signals in the same control mode as the mode for the "G" series of shifting time adjustable type shockless valves.

Instructions

- The power amplifiers should be kept away from hot and humid conditions which may deteriorate some components of the power amplifiers. They also should be installed in the clean and dry place where the vibration is minimal.
  Please avoid to install the power amplifiers in the complete enclosure or get them enclosed totally as they need to radiate the heat from semiconductors or ICs inside.
- Please use shielded wires for input signal transmission to prevent the amplifiers from any interference such as noise from outside.

Power Amplifiers For 10Ω Series Control Valves

These power amplifiers are used to drive the 10 Ω series proportional electro-hydraulic pressure or flow control valves.

Model Number Designation

AME	-D	-10	-100	-20
Series Number	Type of Function	Coil Resistance of Valve	Power Supply	Design Number
AME	**D**: DC Input Type	**10**: 10 Ω	**100**: 100 V AC **200**: 200 V AC	**20**

SK1022	-A	-100	-11
Series Number	Type of Function	Power Supply	Design Number
SK1022: DC Input-Feedback Type	**A**: Polarity of Feedback Voltage...(–) **B**: Polarity of Feedback Voltage...(+)	**100**: 100 V AC **200**: 200/220 V AC	**11**
SK1015: DC Input Type for DC Power Supply	———	———★	**11**

★Use with 24 V DC since this is for a battery power supply.

Applicable to Valve

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

Specifications

Descriptions \ Model No.	AME-D-10-∗-20	SK1022-A-∗-11	SK1022-B-∗-11	SK1015-11
Type of Function	DC Input Type	DC Input Feedback Type	DC Input Feedback Type	DC Input Type
Max. Output Current	1 A (10 Ω Solenoid)	1 A (10 Ω Solenoid)	1 A (10 Ω Solenoid)	0.9 A (10 Ω Solenoid)
Max. Input Voltage	+ 10 V DC	+ 10 V DC	+ 10 V DC	+ 10 V DC
Feedback Voltage	—	0 to –10V	0 to +10V	—
Input Impedance	10 kΩ	50 kΩ	50 kΩ	50 kΩ
Max. Gain	1 A / 5 V	1 A / 0.5 V	1 A / 0.5 V	0.9 A / 5 V
Dither	Variable	Fix	Fix	Fix
Temperature Drift (Max.)	0.2 mA /°C	0.2 mA /°C	0.2 mA /°C	1 mA /°C
Power Supply	100 V AC, 200 V AC (50/60 Hz)★	100 V AC, 200/220 V AC ±10% (50/60 Hz)		22-30 V DC
Power Input (Max.)	55 VA	45 VA	45 VA	25 VA
Ambient Temperature	0 - 50°C	0 - 50°C	0 - 50°C	0 - 50°C
External Setting Resistance	1 kΩ	1 kΩ	1 kΩ	10 kΩ
Mass	2.1 kg	4.5 kg	4.5 kg	0.4 kg

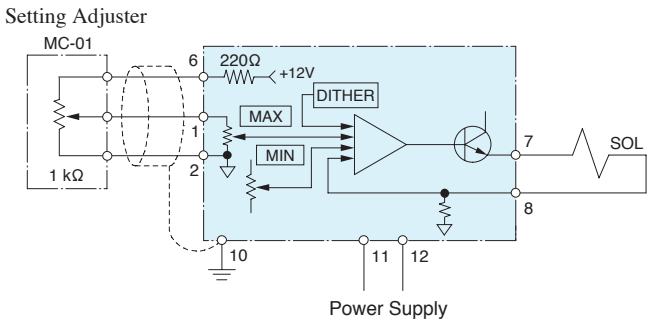
★Serviceable Range: 100 V AC can be used from 90 to 132 V AC, 200 V AC can be used from 180 to 264 V AC.

Instructions

Power supply for the setting adjuster can be provided from this power amplifier, but for only one.
However, please use the variable resistor or potentiometer of which impedance is 1 kΩ (in case of model SK1015, use 10 kΩ) for the setting adjuster.

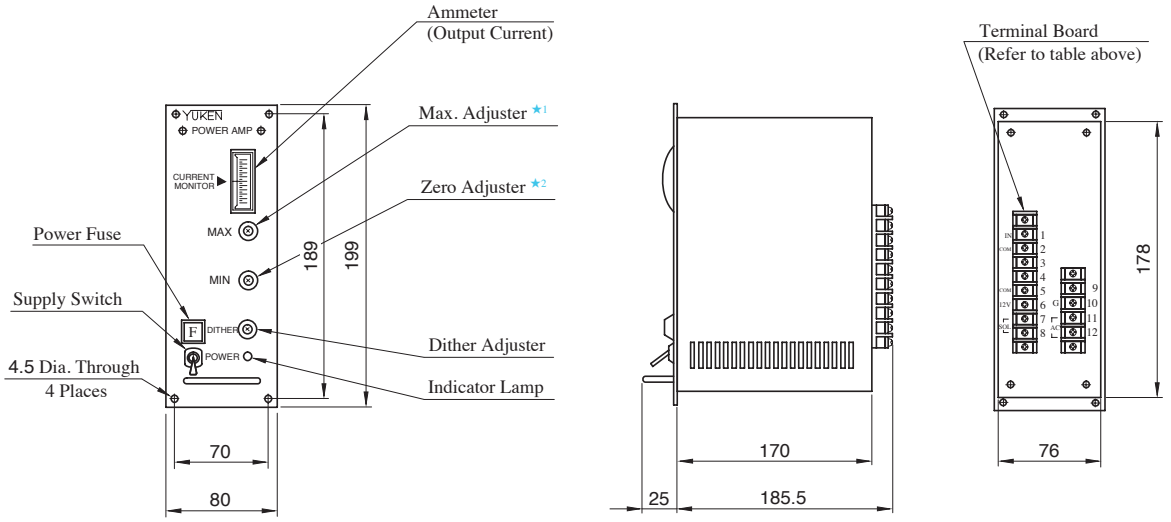
AME-D-10

[Example Diagram]



● Detail of Terminal Board

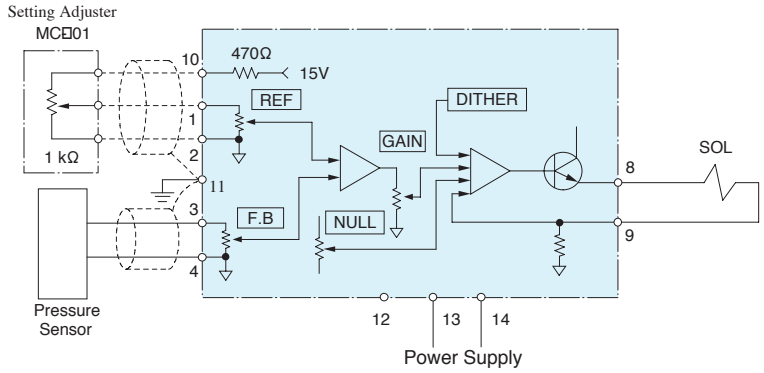
Terminal Number	Name	
1	Input Signal	IN
2	Input Signal	COM
3	—	
4	—	
5	Input Signal	COM
6	Internal Power Supply	+12 V
7	Output to Valve Solenoid	SOL
8		
9	—	
10	Ground	G
11	Power Supply 100/200 VAC	
12		



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

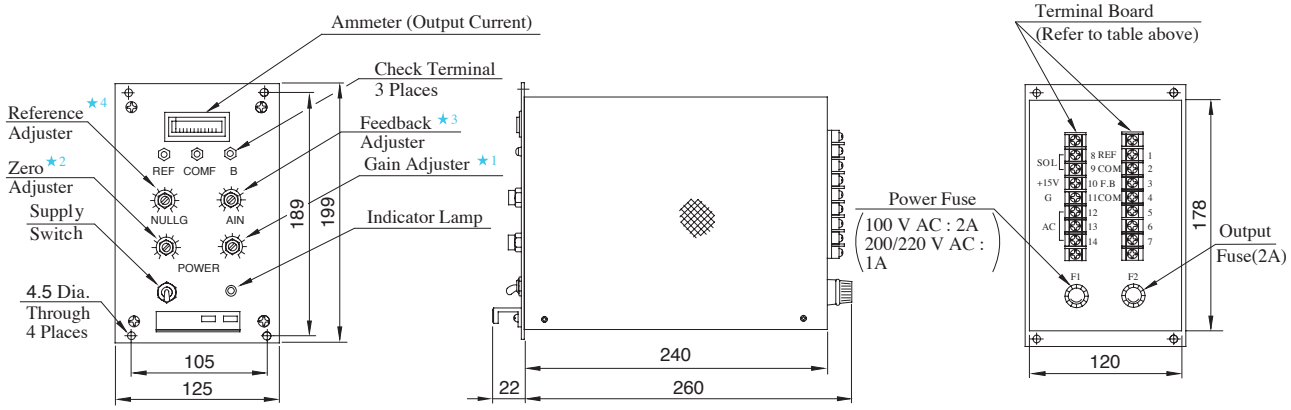
SK1022-A/B

[Example Diagram]



Detail of Terminal Board

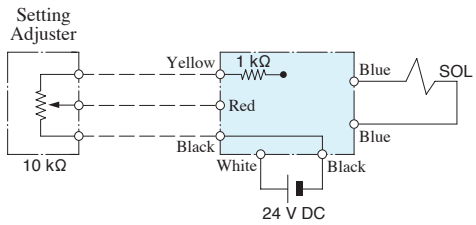
Terminal Number	Name	
1	Input Signal	REF
2	Input Signal	COM
3	Feedback Signal	F.B
4	Feedback Signal	COM
5	—	
6	—	
7	—	
8	Output to Valve Solenoid	SOL
9		
10	Power Supply for Setting Adjuster (10 V at 1 kΩ)	+15V
11	Ground	G
12	Power Supply 100 V AC, 200V AC : 13, 14 220 V AC : 12, 14	
13		
14		

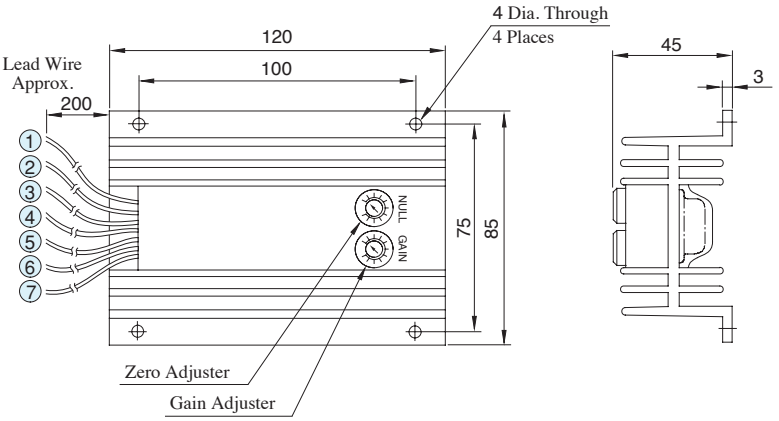


★1. Adjustment of upper limit of usable range
★2. Adjustment of lower limit of usable range
★3. Adjustment of feedback voltage ratio
★4. Adjustment of input voltage ratio

SK1015

[Example Diagram]





Lead Wire Detail

① White.....Plus of 24 V DC
② Black.....Zero of 24 V DC
③ Blue..... } Output to Valve Solenoid
④ Blue..... }
⑤ Yellow.....15 V Power Supply for Setting Adjuster (10 V at 10 kΩ)
⑥ Red.....Input Signal
⑦ Black.....Zero of Input Signal

Instructions

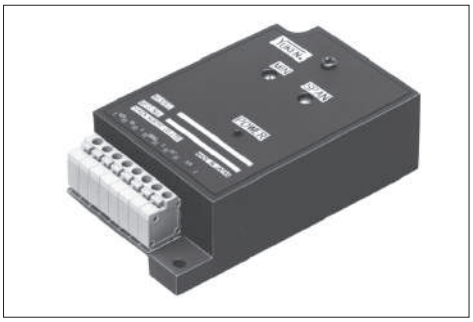
Supply Switch

The power amplifier has no power supply switch.

As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

Compact Power Amplifiers For 10Ω Series Control Valves

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



Model Number Designation

AMN	-D	-10
Series Number	Type of Function	Design Number
AMN	**D** : DC Input Type	**10**

Specifications

Descriptions \ Model No.	AMN-D-10
Type of Function	DC Input Type
Max. Output Current	1 A (10 Ω Solenoid)
Power Input (Max.)	+ 10 V DC
Input Impedance	10 kΩ
Max. Gain	1 A / 5 V
Dither	Variable
Temperature Drift (Max.)	0.2 mA /°C
Power Supply	24 V DC (20 - 30 V DC)
Max. Input Power	25 W
Ambient Temperature	0 - 50°C
External Setting Resistance	1 kΩ
Approx. Mass	0.2 kg

Applicable to Valve

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

Instructions

Power Supply of the Outside Setting Adjuster

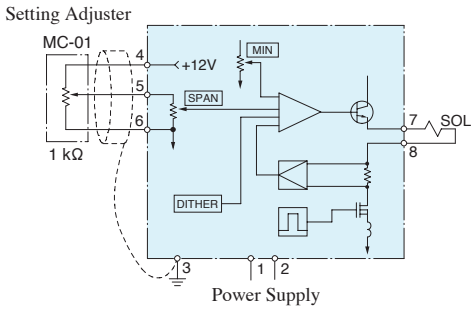
When the power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 1 kΩ for the setting adjuster.

Supply Switch

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

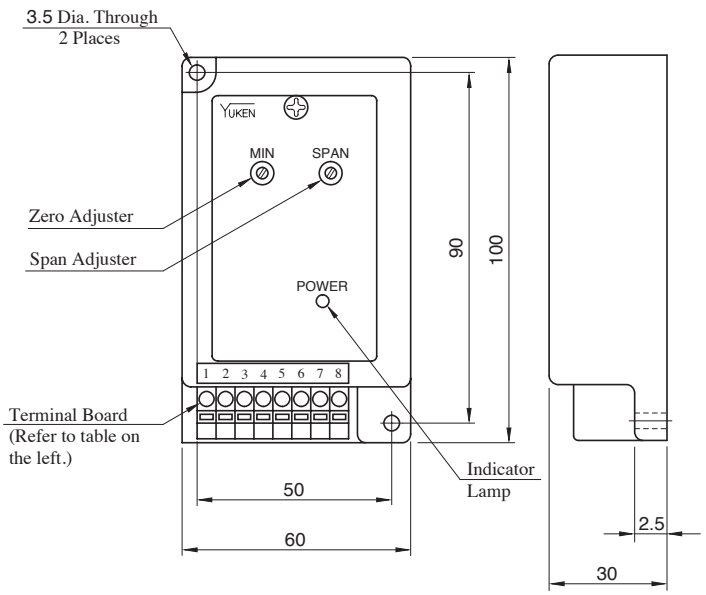
AMN-D

[Example Diagram]



Detail of Terminal Board

Terminal Number	Name	
1	Power Supply	+24 V
2	Power Supply	0 V
3	Ground	G
4	Internal Power Supply	+12 V
5	Input Signal	IN
6	Input Signal	COM
7	Output to Valve Solenoid	SOL
8		



Power Amplifiers For 40Ω Series Flow Control Valves

These power amplifiers are used to drive the 40W series proportional electro-hydraulic flow control valves.

Model Number Designation

AME	-D	-S	-AC	-50
Series Number	Type of Function	Type of Mounting	Power Supply	Design Number
AME	**D:** DC Input Type **DF:** DC Input Feedback Type	**None:** Wall Mount Type **S:** Panel Mount Type	**AC:** 85 - 230 V AC **DC:** 20 - 55 V DC	50

★No wall mount types (None) are available for DC input feedback types (DF).

AME	-T	-S	-100	-22
Series Number	Type of Function	Type of Mounting	Power Supply	Design Number
AME	**T:** Slow Up Down Type	**S:** Panel Mounting Type	**100:** 100 V AC **200:** 200/220 V AC	22

Applicable to Valve

Name of Valve	Model Numbers
40Ω Series Flow Control Valves	EFG EFCG-02 (31 Design)
	EFG EFCG-03 (26 Design)
	EFG EFCG-06 (22 Design)
	EFG EFCG-10 (11 Design)

Specifications

Descriptions \ Model Numbers	AME-D-AC-50	AME-D-DC-50	AME-D-S-AC-50	AME-D-S-DC-50	AME-DF-S-AC-50	AME-DF-S-DC-50	AME-T-S-*-22
Type of Fuction	DC Input Type				DC Input Feedback Type		Slow Up Down Type
Max. Output Current	0.8 A (40 Ω Solenoid) / 1.0 A (10 Ω Solenoid) ★						0.8A (40Ω Solenoid)
Max. Input Voltage	+10V DC (Single-Ended Input)						—
Feedback Voltage	—				±10 V DC (Differential Input)		—
Input Impedance	10 kΩ						—
Slow Up Down Range	5 V / A						0.05 - 1 s/100 mA
Max. Gain	0.25 A/ V		0.16 A / V		1.6 A / V		—
Max. Gain of Feedback	—				2 A / V		—
Dither	Variable						Fix
Temperature Drift (Max.)	0.2 mA /°C						
Power Supply	85-230 V AC	20-55 V DC	85-230 V AC	20-55 V DC	85-230 V AC	20-55 V DC	100 V AC, 200/220 V AC 10% (50/60 Hz)
Power Input (Max.)	50 W						90 VA
Ambient Temperature	0 ~ 50 °C/90% RH or less (without condensation)						0 - 50°C
External Setting Resistance	1 kΩ						—
Approx. Mass	1.1 kg		2.1 kg		2.2 kg		4.5 kg

★Before shipment, the max. output current is set to 0.8 A.

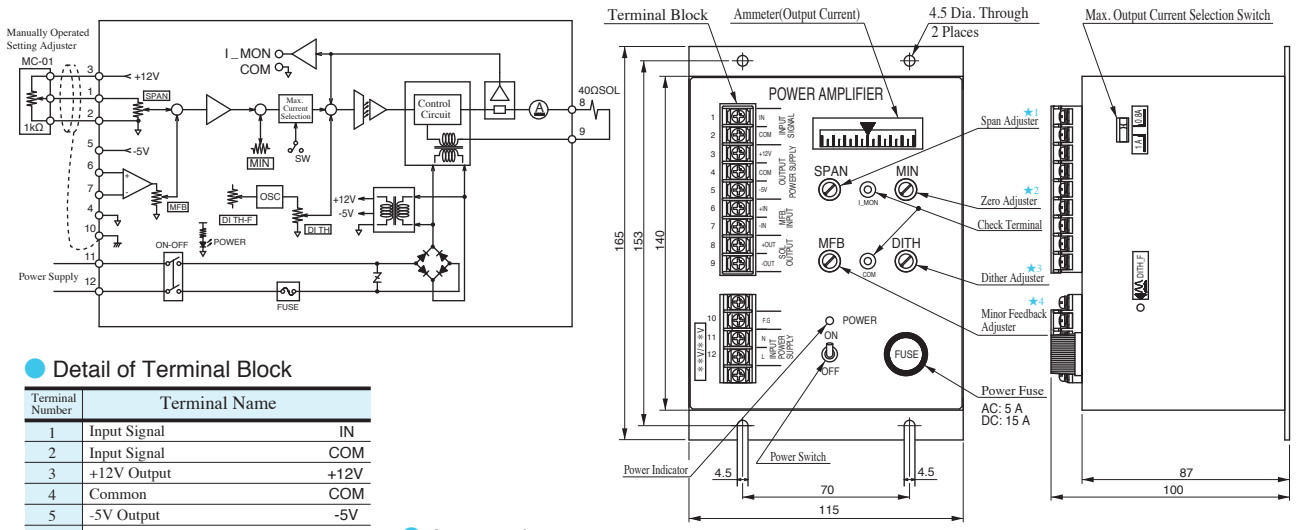
Instructions

Power Supply of the Outside Setting Adjuster

When DC input type (AME-D-40) or DC input-feedback type (AME-DF-S) power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 1 kΩ for the setting adjuster.

AME-D-＊-50

[Example Diagram]



Detail of Terminal Block

Terminal Number	Terminal Name	
1	Input Signal	IN
2	Input Signal	COM
3	+12V Output	+12V
4	Common	COM
5	-5V Output	-5V
6	Minor Feedback Input (+)	+IN
7	Minor Feedback Input (-)	-IN
8	Output to Valve (+)	+OUT
9	Output to Valve (-)	-OUT
10	Frame Ground	F.G
11	Power Supply(No Polarity)	N
12	Power Supply(No Polarity)	L

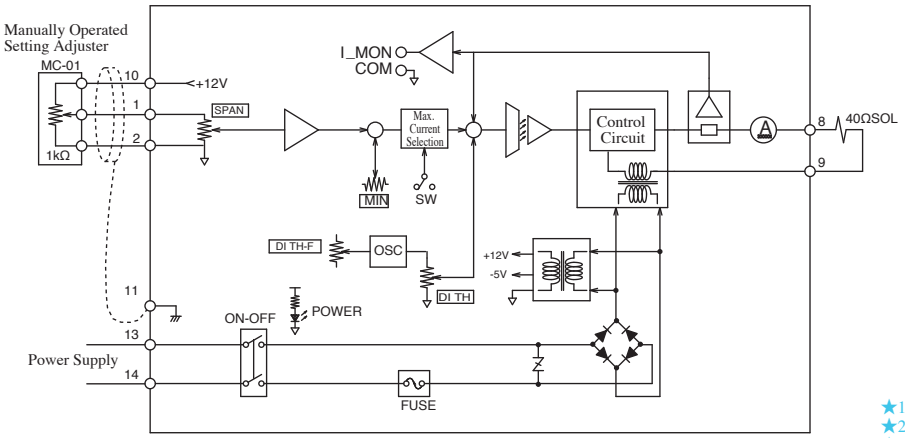
Accessories

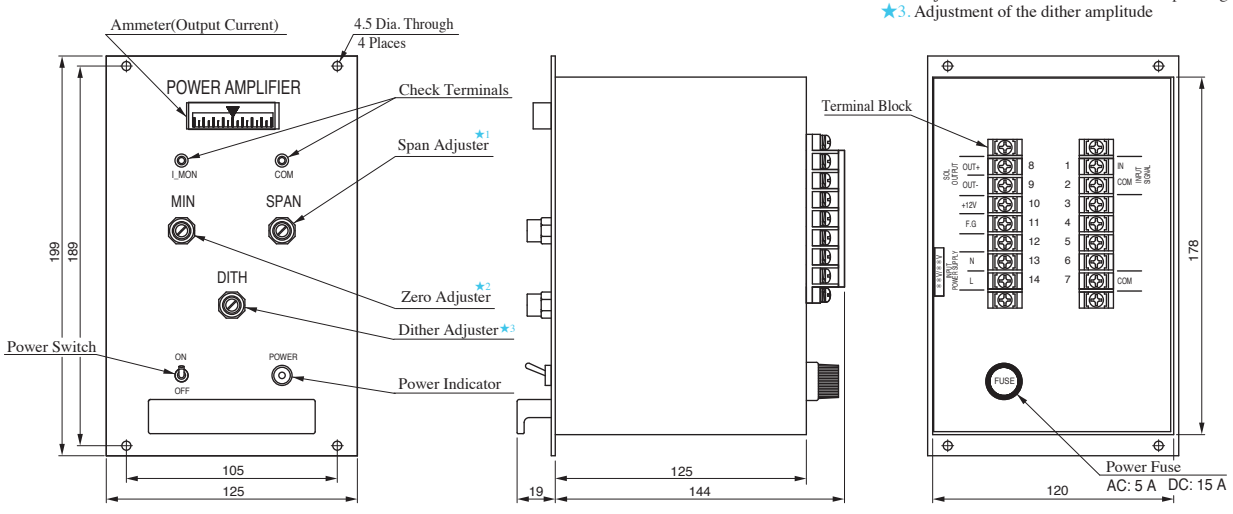
Spare Fuses
AC specifications: 5A 250V (Dia. 6.4×30 mm) 1 pc
DC specifications: 15A 250V (Dia. 6.4×30 mm) 1 pc
Test Pins (Manufactured by MAC8)
OP6-1 (Red) 1 pc
OP6-1 (Black) 1 pc

★1. Adjustment of the upper limit of the operating range
★2. Adjustment of the lower limit of the operating range
★3. Adjustment of the dither amplitude
★4. Adjustment of the minor feedback voltage ratio

AME-D-S-＊-50

[Example Diagram]





Detail of Terminal Block

Terminal Number	Terminal Name	
1	Input Signal	IN
2	Input Signal	COM
3	———	
4	———	
5	———	
6	———	
7	Common	COM
8	Output to Valve (+)	+OUT
9	Output to Valve (-)	-OUT
10	+12V Output	+12V
11	Frame Ground(Case Earth)	F.G
12	———	
13	Power Supply(No Polarity)	N
14	Power Supply(No Polarity)	L

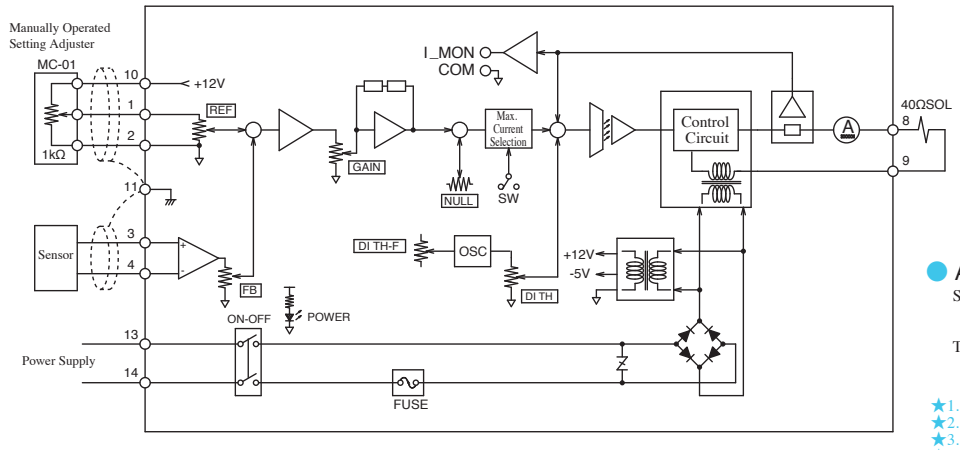
Accessories

Spare Fuses
AC specifications: 5A 250V (Dia. 6.4×30 mm) 1 pc
DC specifications: 15A 250V (Dia. 6.4×30 mm) 1 pc
Test Pins (Manufactured by MAC8)
OP6-1 (Red) 3 pcs.
OP6-1 (Black) 1 pc

★1. Adjustment of the upper limit of the operating range
★2. Adjustment of the lower limit of the operating range
★3. Adjustment of the dither amplitude

AME-DF-S＊-50

[Example Diagram]



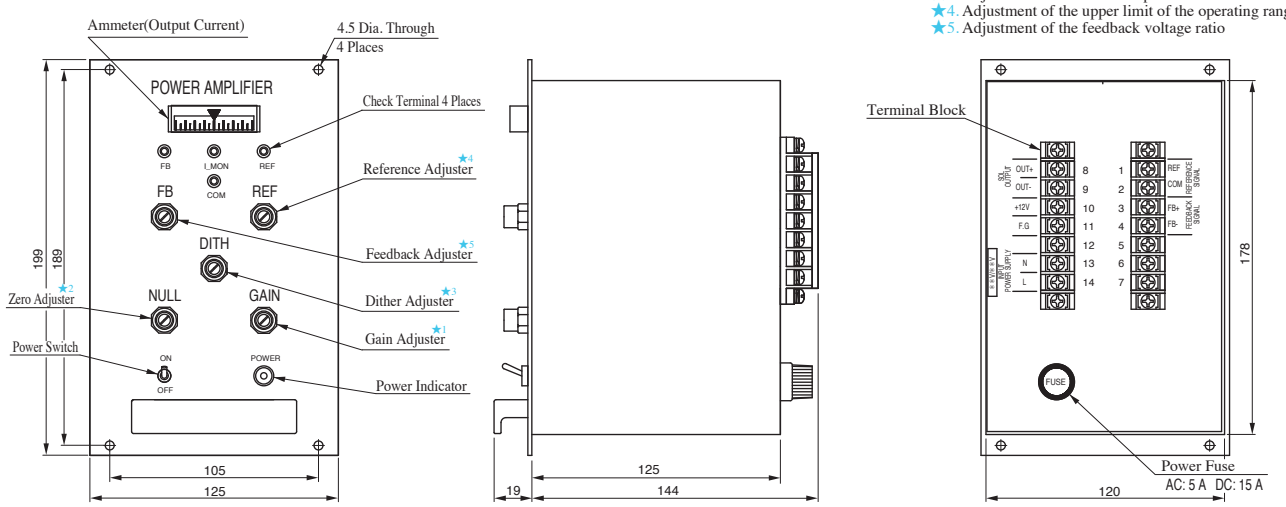
Detail of Terminal Block

Terminal Number	Terminal Name	
1	Input Signal	REF
2	Input Signal	COM
3	Feedback Input (+)	FB+
4	Feedback Input (-)	FB-
5	———	
6	———	
7	———	
8	Output to Valve (+)	+OUT
9	Output to Valve (-)	-OUT
10	+12V Output	+12V
11	Frame Ground(Case Earth)	F.G
12	———	
13	Power Supply(No Polarity)	N
14	Power Supply(No Polarity)	L

Accessories

Spare Fuses
AC specifications: 5A 250V (Dia. 6.4×30 mm) 1 pc
DC specifications: 15A 250V (Dia. 6.4×30 mm) 1 pc
Test Pins (Manufactured by MAC8)
OP6-1 (Red) 3 pcs.
OP6-1 (Black) 1 pc

★1. Adjustment of the responsiveness waveform
★2. Adjustment of the lower limit of the operating range
★3. Adjustment of the dither amplitude
★4. Adjustment of the upper limit of the operating range
★5. Adjustment of the feedback voltage ratio



Interchangeability between Current and New Design

Some models of power amplifiers for 40Ω series flow control valves have undergone a model change from 22,41 to 50 design with additional power supply, functions and installation.

Affected Models

Name	New Model Numbers	Old Model Numbers
Power Amplifiers for 40Ω Series Flow Control Valves (DC input type)	AME-D-DC-50 AME-D-AC-50	AME-D-40-200-41 AME-D-40-100-41
Power Amplifiers for 40Ω Series Flow Control Valves (DC input-feedback type)	AME-DF-S-DC-50 AME-DF-S-AC-50	AME-DF-S-220-50 AME-DF-S-200-50 AME-DF-S-100-50

Changes

[AME-D/AME-DF]

・Compatible with DC power (formerly AC power only)
・Adoption of variable dithering. Install dither adjustment trimmer (formerly fixed dithering)
・The max. output current is switchable [0.8 A or 1 A].(formerly fixed to 0.8 A)
・Output current monitor terminals installed on the front cover

[AME-D]

・A minor feedback adjustment trimmer installed on the front cover
・Panel mounting type newly added

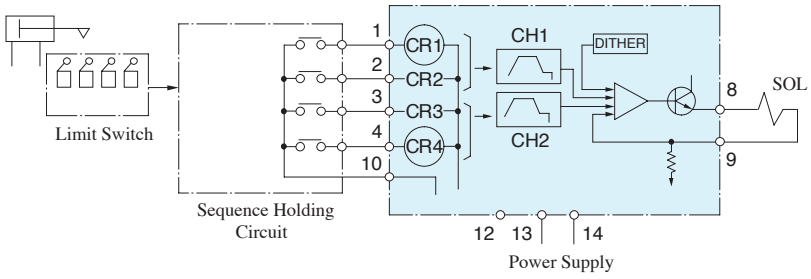
Installation Interchangeability

Yes

There are no changes in mounting dimensions of both panel mount and wall mount models (but the depth of each housing is shorter than that of the previous models).

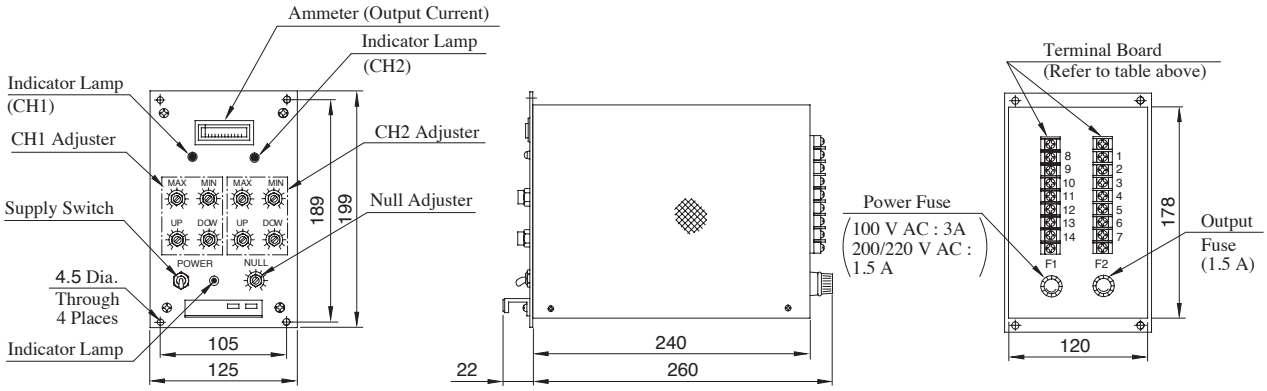
AME-T-S

[Example Diagram]

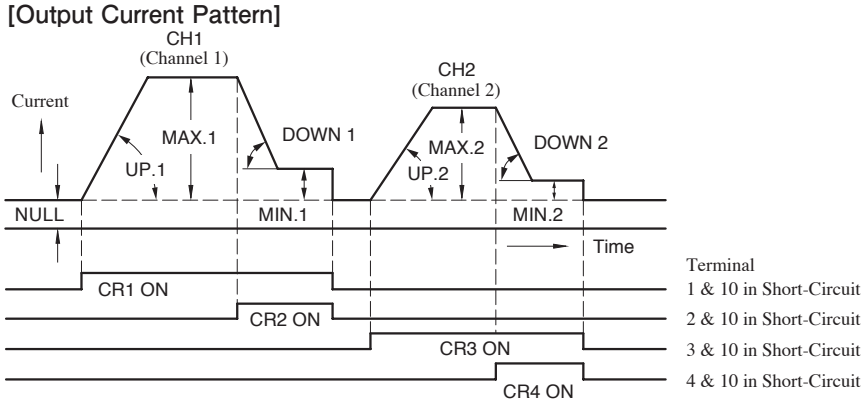


Detail of Terminal Board

Trminal Number	Name	
1	Input Command	CR1
2	Input Command	CR2
3	Input Command	CR3
4	Input Command	CR4
5	—	
6	—	
7	—	
8	Output to Valve Solenoid	SOL
9		
10	Input Command	CR. COM
11	Ground	G
12	Power Supply 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).

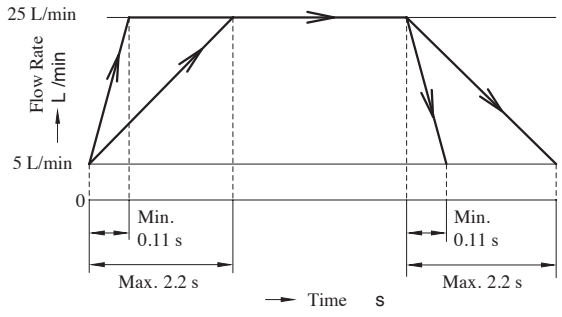
Therefore, the minimum and maximum adjustable time can be obtained as follows:

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

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

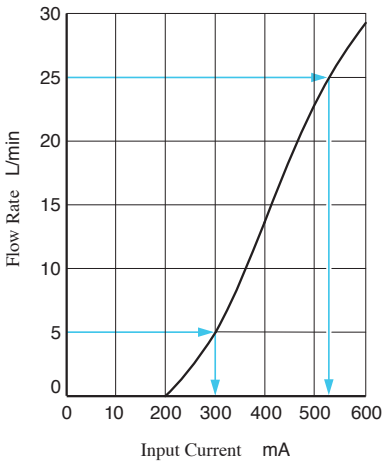
The result above are as illustrated on the below.

[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

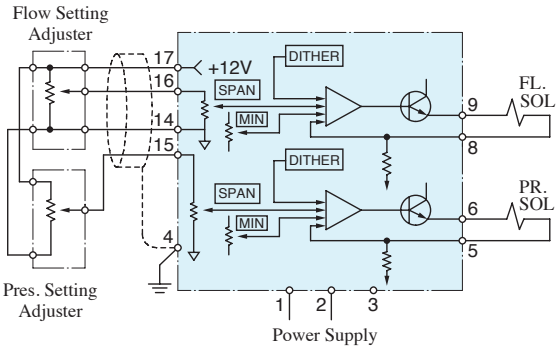
Name of Pump	Model Numbers
"A" Series Variable Displacement Piston Pump (Proportional Electro-Hydraulic Load Sensing Type)	A16 A22 A37-∗R-04 A56 Also, double pumps combined with the models listed above and fixed displacement vane pumps.

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.

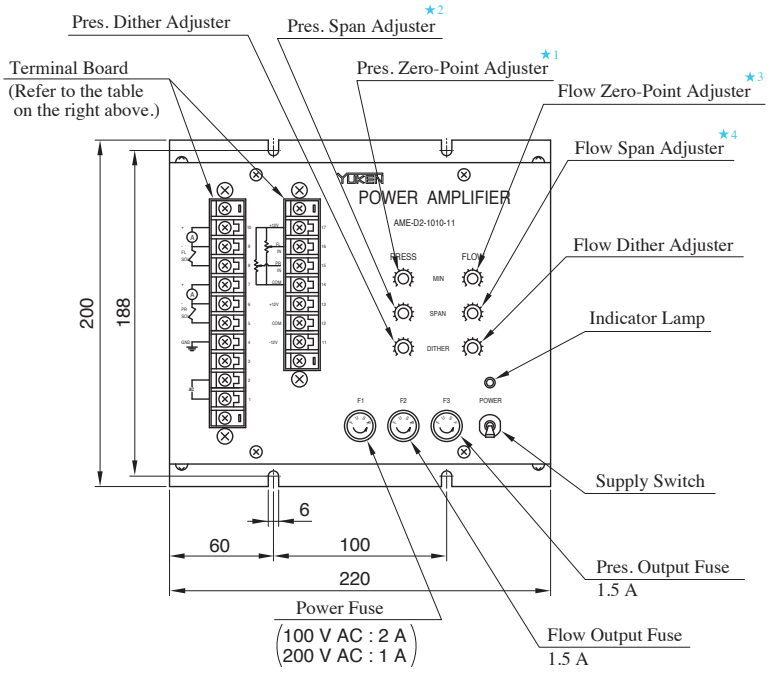
AME-D2-1010-11

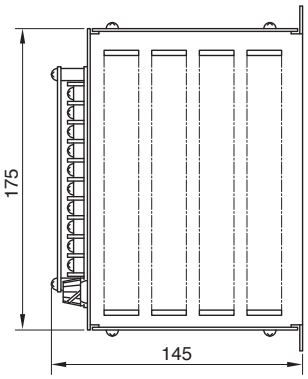
[Example Diagram]



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

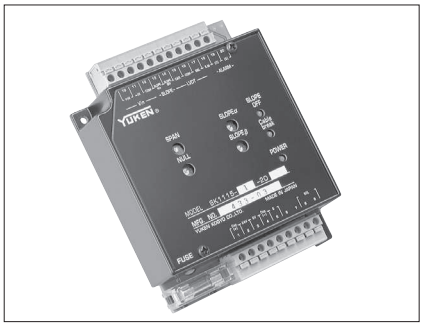




★1. Minimum Pressure Setting
★2. Variable Pressure Range Setting
★3. Minimum Flow Setting
★4. Variable Flow Range Setting

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

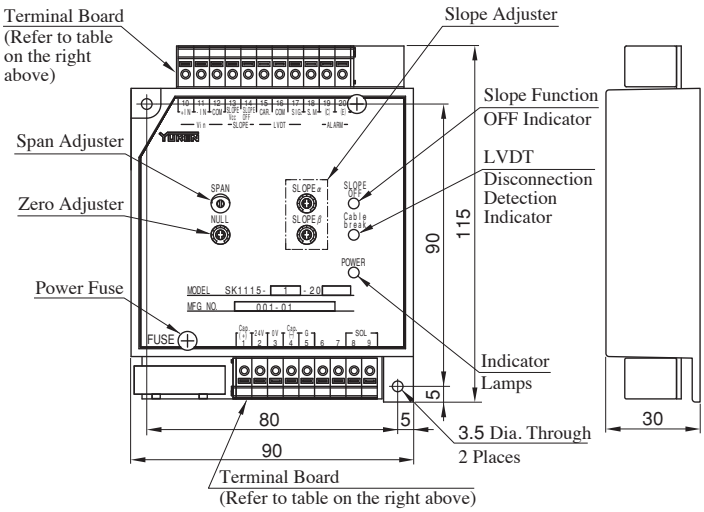
Name of Valve	Model Number
Proportional Elecctro-Hydraulic Flow Control and Relief Valves	ELFBG-03

Instructions

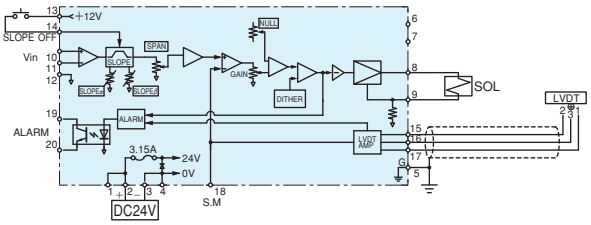
Supply Switch

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



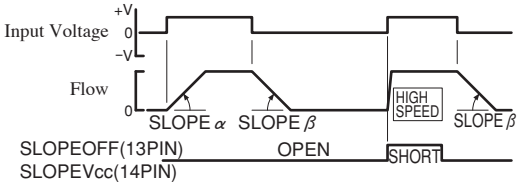
[Example Diagram]



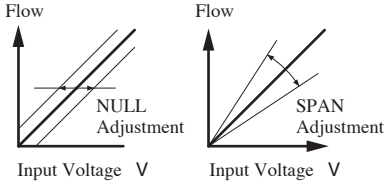
Detail of Terminal Board

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

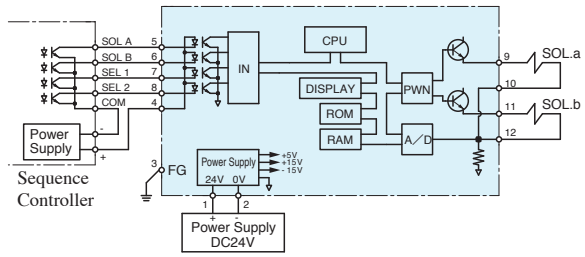
When DC input type (AMN-W) power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 2 kΩ for the setting adjuster.

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.

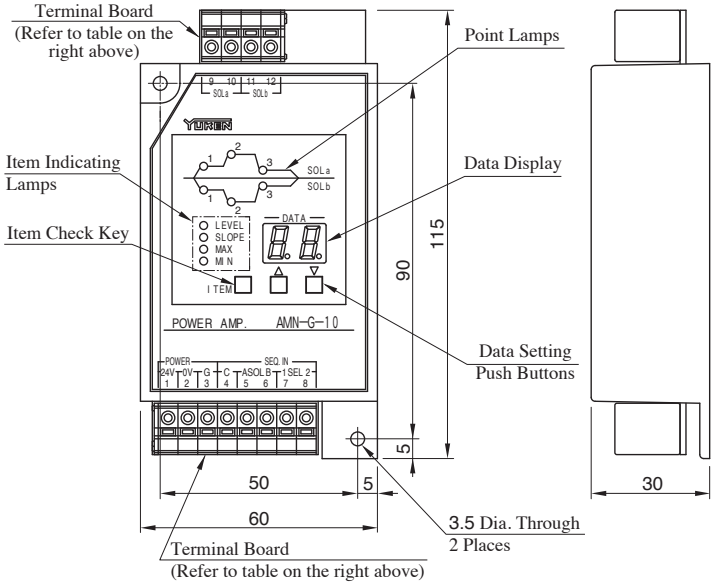
AMN-G-10

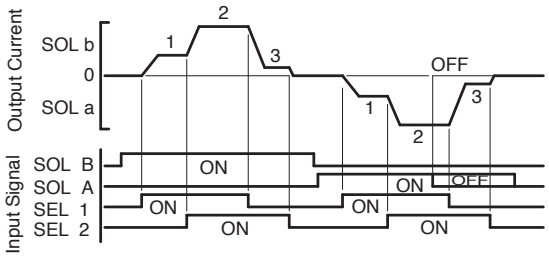
[Example Diagram]



Detail of Terminal Board

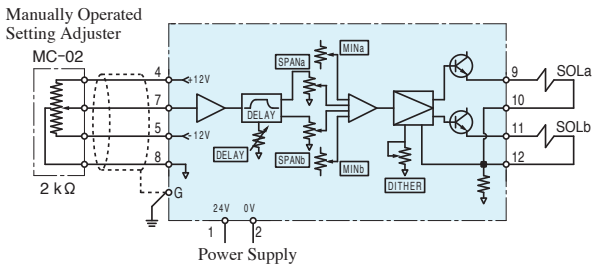
Terminal Number	Name		Terminal Number	Name	
1	Power Supply	+24V	7	Sequence Input	SEL 1
2	Power Supply	0V	8	Sequence Input	SEL 2
3	Ground	G	9	Output to Valve Solenoid	SOL a
4	Sequence Input	IN COM	10		
5	Sequence Input	SOL A	11	Output to Valve Solenoid	SOL b
6	Sequence Input	SOL B	12		





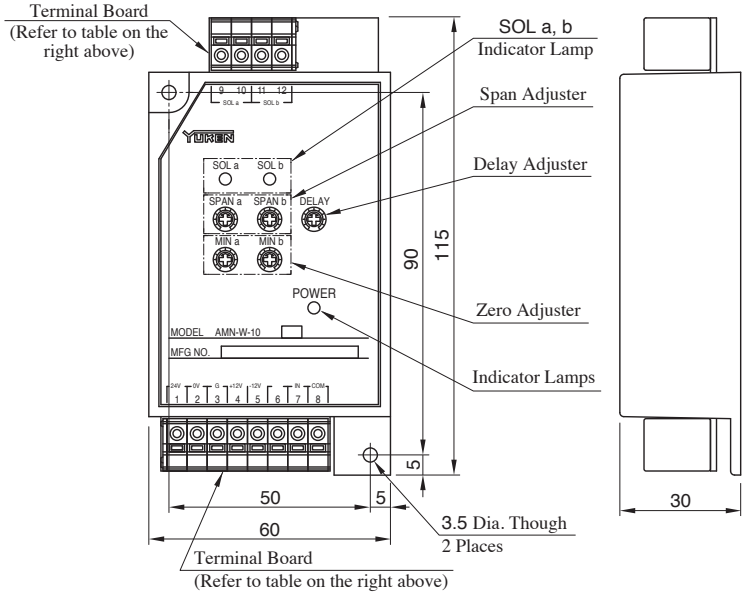
AMN-W-10

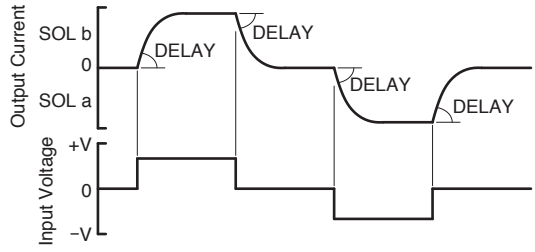
[Example Diagram]



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

Model No. / Descriptions	SK1091-D24-10
Max. Output Current	1 A (10 Ω Solenoid)
Max. Input Voltage	–10 V DC for SOL a +10 V DC for SOL b
Input Impedance	10 kΩ
Max. Gain	1 A / ±5 V
Dither	Variable
Delay Time Adjustment Range	0.15 - 3 s
Temperature Drift (Max.)	0.2 mA /°C
Power Supply	24 V DC (21-28 V Included Ripple)
Required Current	1.5 A or more
Power Input (Max.)	25 W
Ambient Temperature	0 - 50°C
Ambient Humidity	90 % RH or less
External Setting Resistance	2 kΩ
Approx. Mass	1.0 kg

Instructions

Power Supply for the Setting Adjuster

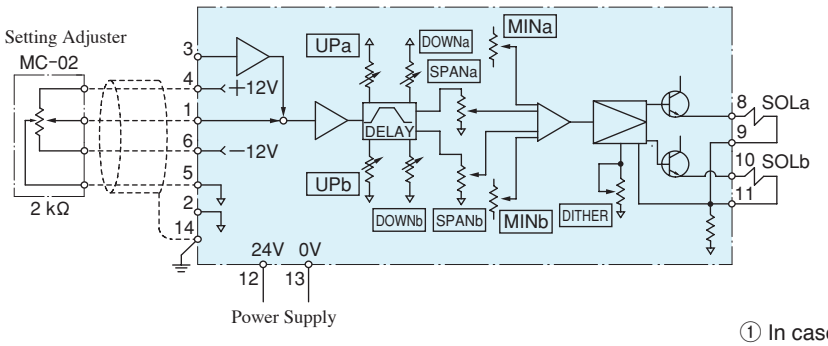
Power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 2 kΩ for the setting adjuster.

Power Switch

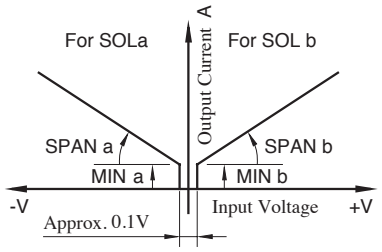
The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

SK1091-D24-10

[Example Diagram]

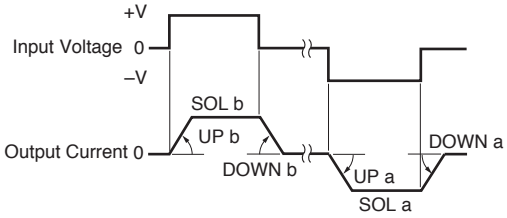


[Input-Output Characteristics]

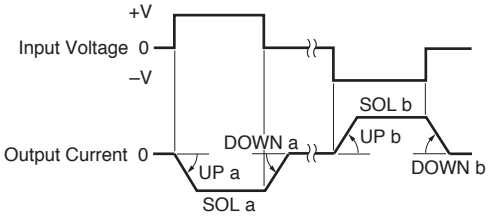


[Delay Function]

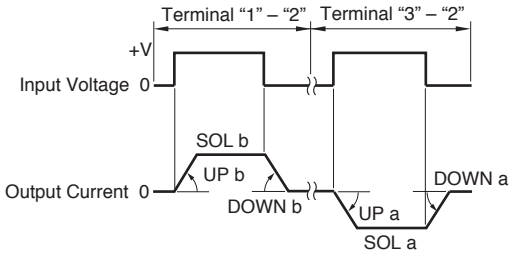
① In case "1" and "2" Input signal terminals are used.



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



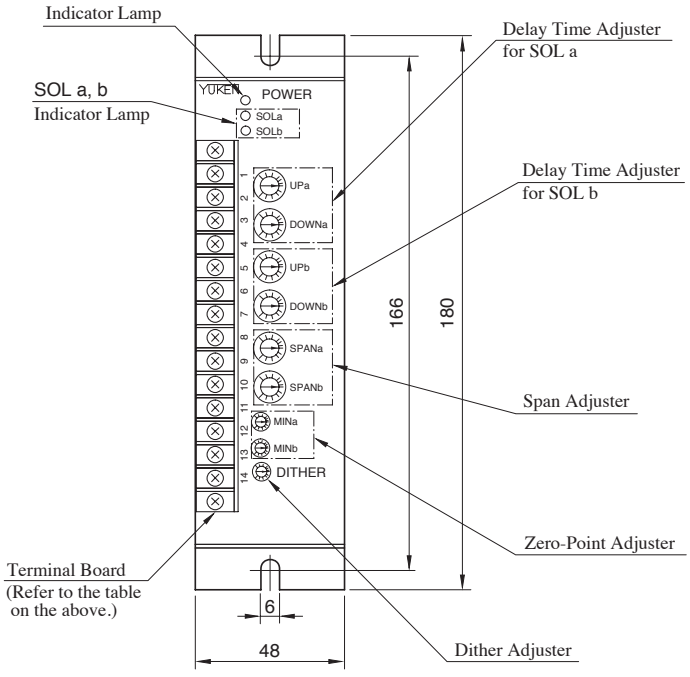
③ In case "1" , "2" and "3" Input signal terminals are used.

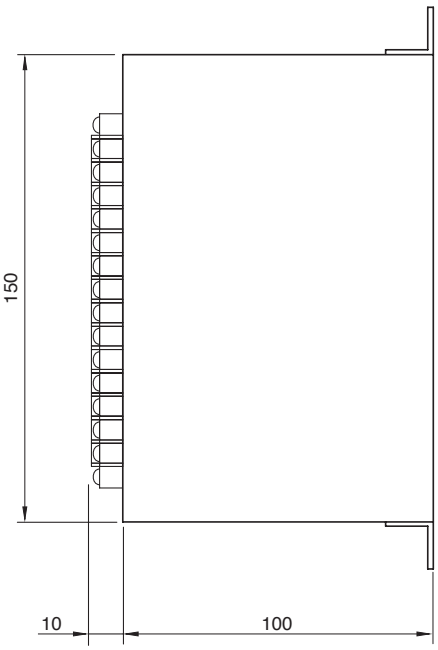


Detail of Terminal Board

Terminal Number	Name	
1	Input Signal	IN★
2	Input Signal	COM
3	Input Signal	IN★
4	Power Supply for Setting Adjuster	+12V
5	Power Supply for Setting Adjuster	COM
6	Power Supply for Setting Adjuster	–12V
7	—	
8	Output to Valve Solenoid	SOL a
9		
10	Output to Valve Solenoid	SOL b
11		
12	Power Supply	24 V
13	Power Supply	0 V
14	Frame Ground	FG

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





Power Amplifiers
For High Response Type Directional and Flow Control Valves

These power amplifiers are used to drive the high response type proportional electro-hydraulic directional and flow control valves.
A compact AMN-L model and a euro card type AMB-EL model are available.
The single height [3U: 100 × 160 mm] is employed for the euro card size of the AMB-EL model.

AMN-L

AMB-EL

Model Number Designation

AMN-L

AMN	-L	-01	-3	-2P	-10
Series Number	Type of Function	Size of Applicable Valve	Compensation	Applicable Spool Type	Design Number
AMN	**L:** DC Input Type Directional and Flow Control with Miner feedback	**01:** 01 Size	**1:** Type 1	**None:** 3C2, 3C40	**10**
			3: Type 3	**2P:** 3C2P	

AMB-EL

AMB	-EL	-03	-2P	-1	-A	-20
Series Number	Type of Function	Size of Applicable Valve	Applicable Spool Type	Compensation	I/O signal type	Design Number
AMB	**EL:** DC Input Type Directional and Flow Control with Miner feedback	**01:** 01 Size	**None:** 3C2, 3C40 **2P:** 3C2P	★1	**A:** Voltage Signal ±10 V (P→B→A→T Flow with Input Signal (+)) **B:** Current Signal 4 - 20 mA (P→B→A→T Flow with Current 12 - 20 mA) **C:** Current Signal ±10 mA (P→B→A→T Flow with Input Signal (+)) **D:** Voltage Signal ±10 V (P→A→B→T Flow with Input Signal (+)) **E:** Current Signal 4 - 20 mA (P→A→B→T Flow with Current 12 - 20 mA) **F:** Current Signal ±10 mA (P→A→B→T Flow with Input Signal (+))	**20**
		03: 03 Size		**1:** For flow rate 40/80 L/min		
		04: 04 Size		**1:** For flow rate 280 L/min		
		06: 06 Size		**3:** For flow rate 350 L/min **4:** For flow rate 500 L/min		

Please refer to us for ★1.

Specifications

Descriptions \ Model Numbers	AMN-L-01-1	AMN-L-01-3-2P	AMB-EL-01	AMB-EL-03	AMB-EL-04	AMB-EL-06
Max. Output Current	2.5 A (3.9 Ω Solenoid)		2.5 A (3.9 Ω Solenoid)	3.0 A (3 Ω Solenoid)	2.5 A (3.9 Ω Solenoid)	
Max. Input Voltage	+10 V DC: P→B→A→T –10 V DC: P→A→B→T		Voltage Signal Type (A, D) : ±10 V/±5 V Current Signal Type (B, E) : 4-20 mA Current Signal Type (C, F) : ±10 mA			
Input Impedance	10 kΩ or more		Voltage Signal Type (A, D) : 100 kΩ (50 kΩ in single-ended mode) Current Signal Type (B, C, E, F) : 200 Ω			
Slope-off input	Terminal Number 13-14 Short	—	4 - 28 V DC			
Slope Adjust Time	0.03 - 5 s	—	0.05 - 5 s (Slope adjustment function is not available with "AMB-EL-✻-2P")			
Monitor Voltage	1.5 V /±3 mm st.		Voltage Signal Type (A, D) : ±10 V / rated st (RL≧10kΩ) Current Signal Type (B, E) : 4-20 mA/ rated st (RL 100-500Ω) Current Signal Type (C, F) : ±10 mA/ rated st (RL 100-500Ω)			
Alarm	Open Collector (30 V DC, 10 mA Max.)		Open Collector (30 V DC, 10 mA Max.)			
Supply Voltage Range	24 V DC (20 - 30 V DC)		24 V DC (21 - 28 V DC)			
Power Input	75 W		30 W	40 W	30 W	
Ambient Temperature	0 - 50°C		0 – 50°C			
Ambient Humidity	90 % RH or less		85 % RH or less			
Connector	—		DIN 41612 - F32			
Approx. Mass	0.3 kg		0.28 kg		0.34 kg	

★1. The input signal voltage can be switched between ±10 V and ±5 V by the "input sensitivity selection jumper plug" in the amplifier.
★2. For AMB-EL-04/06, the value corresponds to the monitoring of the main spool stroke; the monitor signal for the pilot spool stroke is ±10 V/rated stroke.

Applicable to Valve

Power Amplifiers Model Numbers	Valve Model Numbers
AMN-L	ELDFG-01
AMB-EL	ELDFG-01/03 ELDFHG-04/06

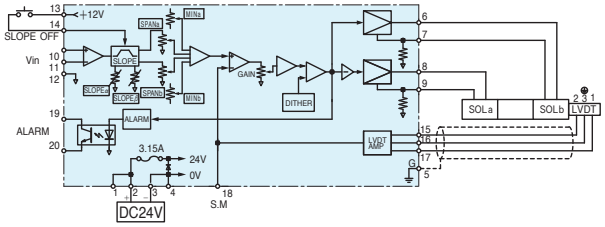
Instructions

Power Switch

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

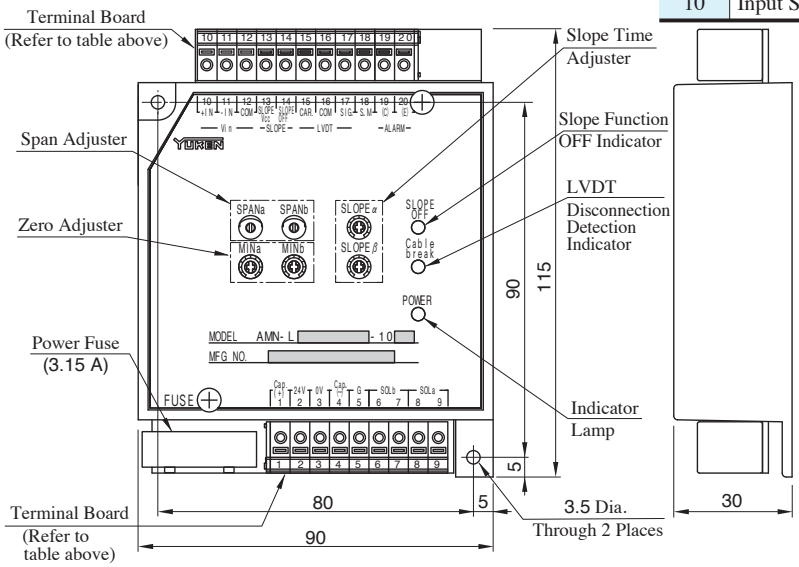
AMN-L-01-1-10

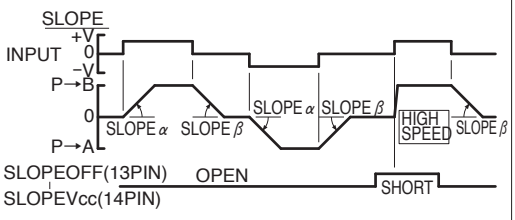
[Example Diagram]



Detail of Terminal Board

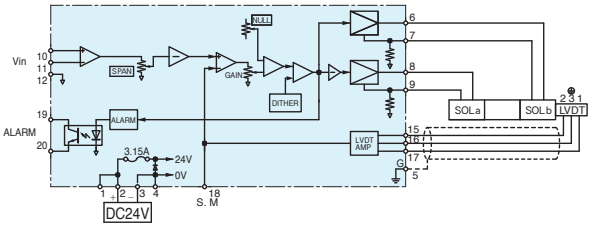
Terminal Number	Name		Terminal Number	Name	
1	Power Supply	CAPACITOR(+)	11	Input Signal	–IN
2	Power Supply	+24V	12	Input Signal	COM
3	Power Supply	0V	13	Slope Control ON/OFF Terminal	SLOPE Vcc
4	Power Supply	CAPACITOR(–)	14	Slope Control ON/OFF Terminal	SLOPE OFF
5	Frame Ground	G	15	LVDT Terminal	CAR.
6	Output to Valve Solenoid	SOL b	16	LVDT Terminal	COM
7			17	LVDT Terminal	SIG.
8	Output to Valve Solenoid	SOL a	18	Sensor Moniter Output	S.M
9			19	Alarm Output	ALM(C)
10	Input Signal	+IN	20	Alarm Output	ALM(E)





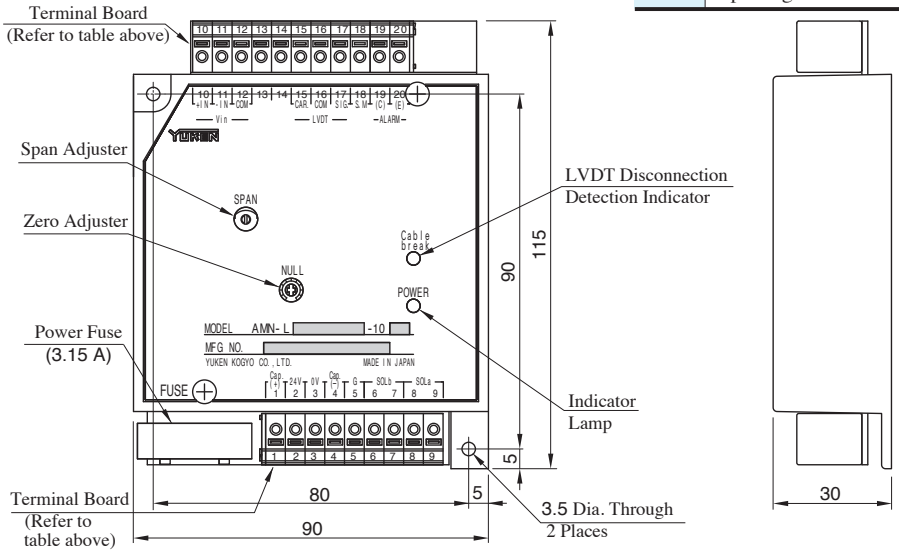
AMN-L-01-3-2P-10

[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	CAPACITOR(+)	11	Input Signal	–IN
2	Power Supply	+24V	12	Input Signal	COM
3	Power Supply	0V	13	———	
4	Power Supply	CAPACITOR(–)	14	———	
5	Frame Ground	G	15	LVDT Terminal	CAR.
6	Output to Valve Solenoid	SOL b	16	LVDT Terminal	COM
7			17	LVDT Terminal	SIG.
8	Output to Valve Solenoid	SOL a	18	Sensor Moniter Output	S.M
9			19	Alarm Output	ALM(C)
10	Input Signal	+IN	20	Alarm Output	ALM(E)



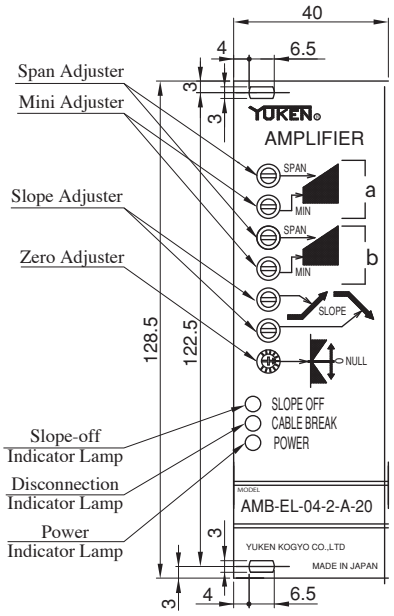
AMB-EL-∗-∗-∗-20

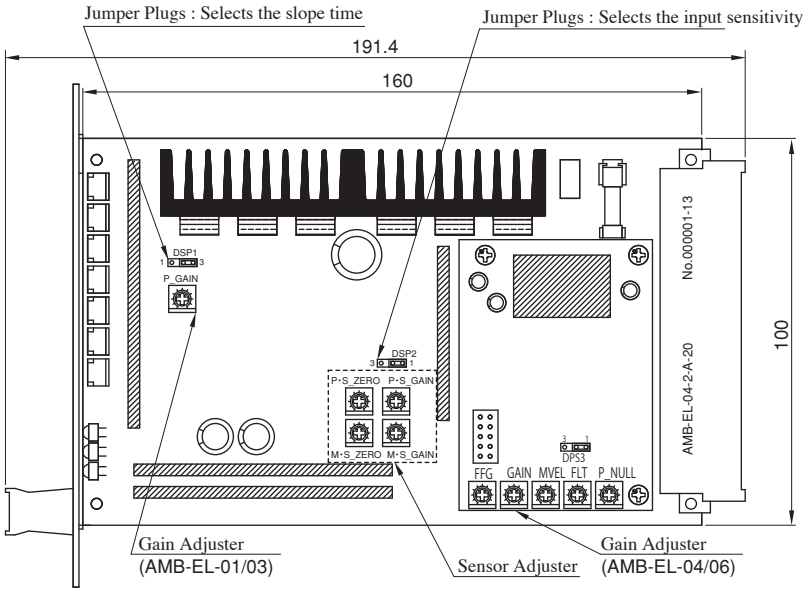
This power amplifier requires connector cards for connection. A connector card attached model is also available.
Please ask for details if interested.

Pin Connections and Functions

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

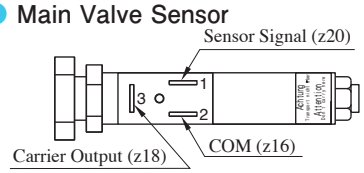
See the "Sensor Connection" diagram on the bottom left.
- (according to the I/O signal type)
- Pilot spool travel monitoring (fixed to ±10 V)



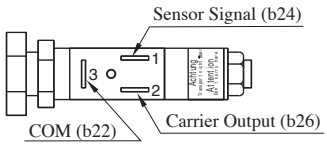


Sensor Connection

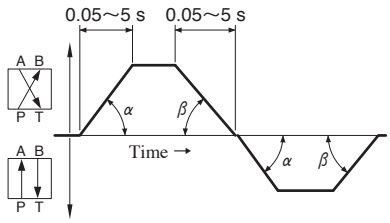
Main Valve Sensor



Pilot Valve Sensor

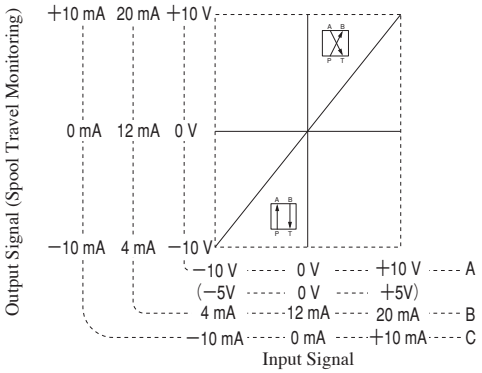


Lamp Pattern

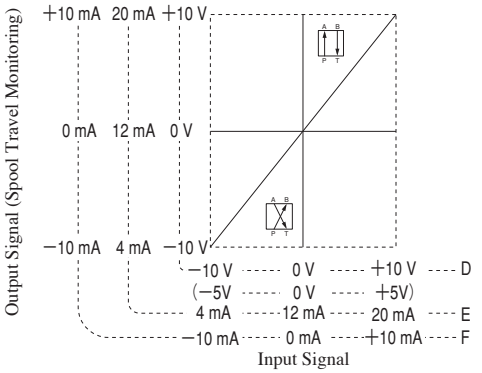


I/O Signal Characteristics

AMB-EL-∗-∗-∗-A/B/C



AMB-EL-∗-∗-∗-D/E/F



Interchangeability in Installation Current and New Design

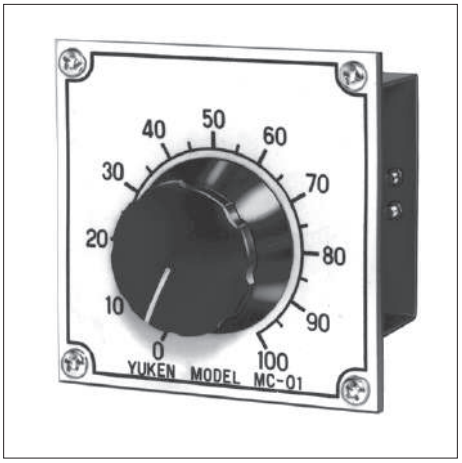
The power amplifier AMB-EL models were remodeled because I/O signal types were added, and the design number was changed from 10 to 20.

There are no changes to external dimensions and installation.

Setting Adjusters

The setting adjuster supplies the command signal voltage to the power amplifier. Since the setting adjuster is closely related to actual machine operating procedure, the user generally provides this device.

Yuken makes the following standard setting adjusters for general use and designs and manufactures special setting adjusters to order.

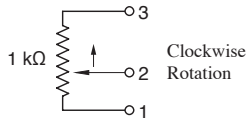


Type	Model Number	Function
Manually Operated Setting Adjuster	MC-01	This is the simplest setting adjuster, consisting of a trimmer (1 kΩ) and a dial.
	MC-02	Consisting of a center-tapped trimmer (1 kΩ - 1 kΩ) and a dial, this setting adjuster is ideal for a servo system.
6-point Setting Adjuster	AMC-V6-S-∗-10	Six trimmers are incorporated, so it is possible to set six points.
Multifunction Slope Controller	AMC-T-20	This multifunction slope controller generates any desired two-channel analog voltage patttern outputs. It can also be used with slope-proportional and time-proportional systems.
Slope Controller	AMN-T-10	Slope and output can be set optionally 4-bit signal.

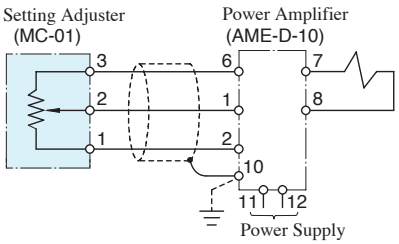
Manually Operated Setting Adjuster

MC-01

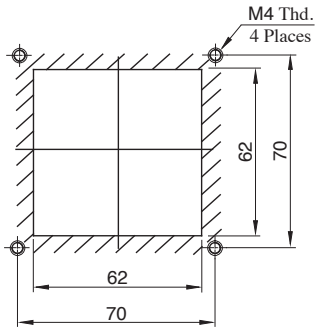
[Electric Circuit]

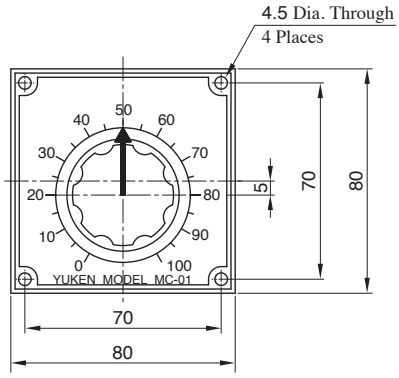


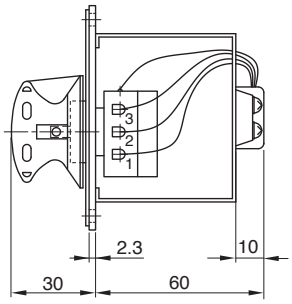
[Example Diagram]

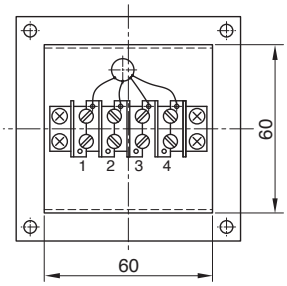


[Mounting Panel]









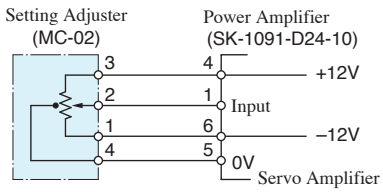
Approx. Mass.....0.5 kg

MC-02

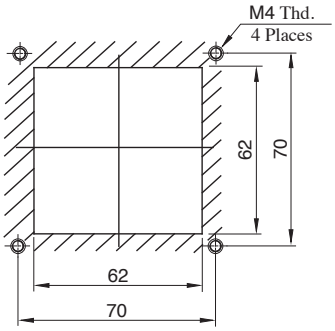
[How to Use]

This setting adjuster is for using positive and negative voltages to the right and left of the zero point. Most suitable for servo systems. Please contact us for usage details.

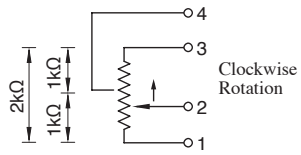
[Example Diagram]

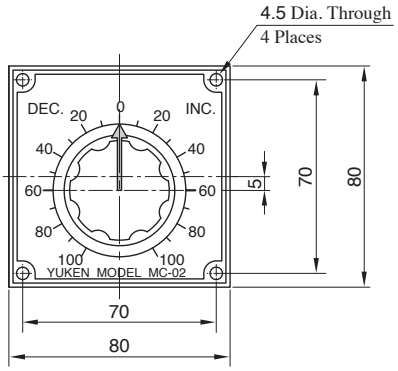


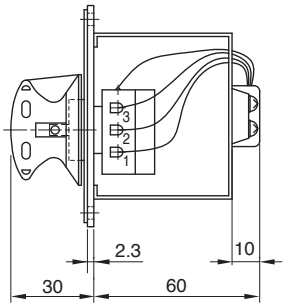
[Mounting Panel]

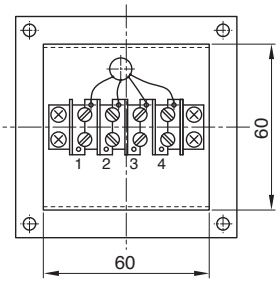


[Electric Circuit]









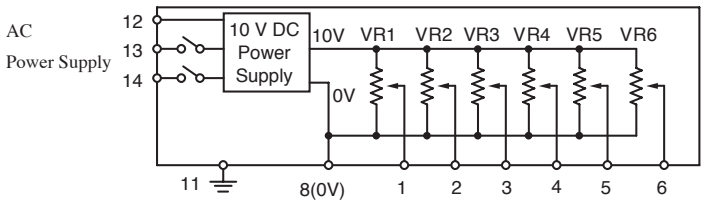
Approx. Mass.....0.5 kg

6-Point Setting Adjuster

AMC-V6-S-∗-10

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

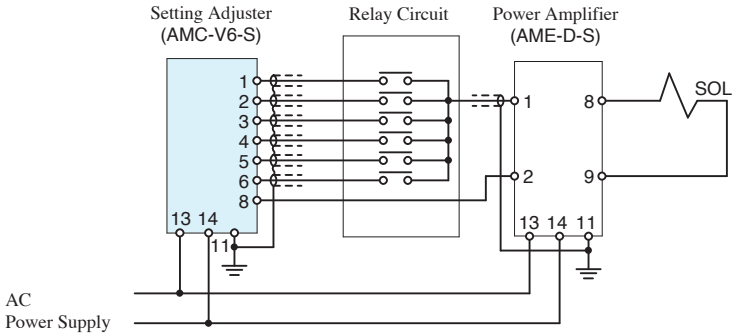
[Electric Circuit]

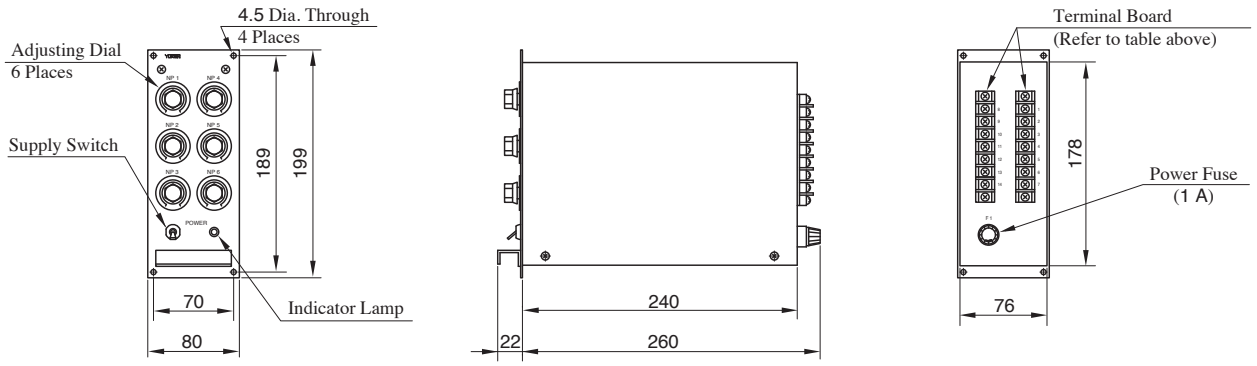


Detail of Terminal Board

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

[Example Diagram]

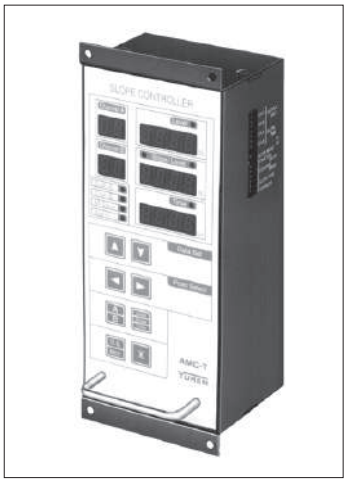




Approx. Mass.....1.6 kg

Multifunction Slope Controllers

This controller can generate any desired two-channel analog voltage pattern outputs and can be used with slope-constant and time-constant systems. Although two-channel outputs can be used independently, this controller can also be used as a setting adjuster for the EH Series variable piston pumps.



Model Number Designation

AMC	-T	-20
Series Number	Type of Function	Design Number
AMC: Setting Adjuster	**T**: Acceleration/Deceleration Signal Type (Slope Controller)	**20**

Specifications

Model No. / Descriptions	AMC-T-20
Number of Output Channels	2 Channels (A, B)
Maximum Output Range	0 - +5 V ★, 0 - ±5 V, 0 - +10 V, 0 - ±10 V (The settings are DIP switch selectable)
Two Categories of Slopes	Slope-constant ★ 5s/Max. output voltage With a level change, the slope will not change (but arrival time changes.) Time-constant 5s With a level change, the time will not change (but the slope changes.) } (to be selected by DIP switch)
Acceleration/Deceleration Signal Type	4 Types Polygonal Line Signal ★ : 1 Type Curve Compensation Signal : 3 Types (to be selected by DIP switch)
Max. Slope Time	5 s ★, 20 s, 50 s, 100 s (The settings are DIP switch selectable)
Setting Resolution	The level and slope settings are variable in 0.1% units from 0 to ±99.9%
Control Mode Number of Preselected Patterns	Mode 1, 4-bit binary code input, 15 patterns Mode 2, 6-bit binary code input, 63 patterns Mode 3, Timer control, 9 patterns (4 variations)
Stop Mode (Applicable Only for Control Mode 1)	ON : The stop mode is to retain the state of controller output at the instant an external input signal is interrupted. When the external signal is input again, the operation is resumed from the retained state. OFF ★ : When external input signal is interrupted, function goes back to the initial setting (Pattern No.0).
Control Input Signal	Current input type, 10 mA /bit max. Usable as a voltage input type (voltage range: 8 to 48 V DC) Photocoupler insulation input
Control Output Signal	Output from transister open collector Max. 30 V, 50 mA
Data Save	EEP-ROM (Battery not needed)
Power Supply	100/200 V AC, 50/60 Hz (85 - 260 V AC)
Power Input	10 VA or less
Ambient Temperature	0 - 50°C
Ambient Humidity	85%RH or less (Bedewing must be avoided)
Approx. Mass	1 kg

Note) ★ Indicates preset conditions.

Instructions

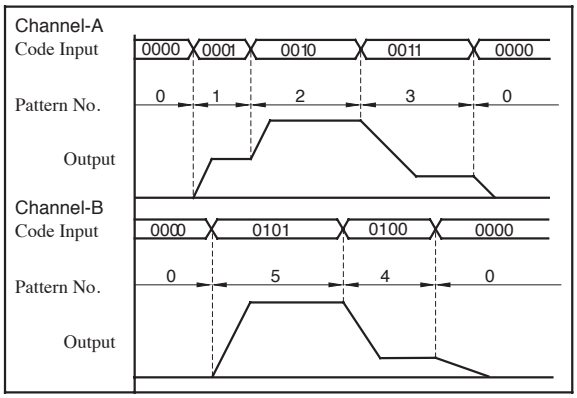
- Since this controller incorporates a micro computer, do subject it to undue electrical noise.

Control Modes

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

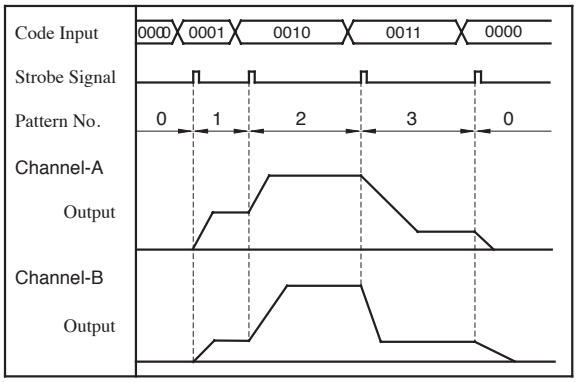
Control Mode 1

Channels A and B generate optional slopes independently each other.



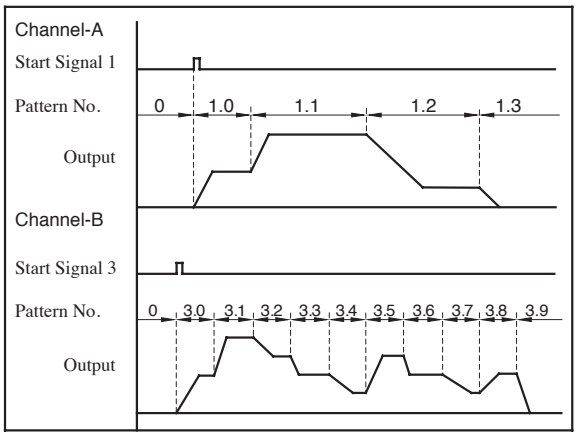
Control Mode 2

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



Control Mode 3

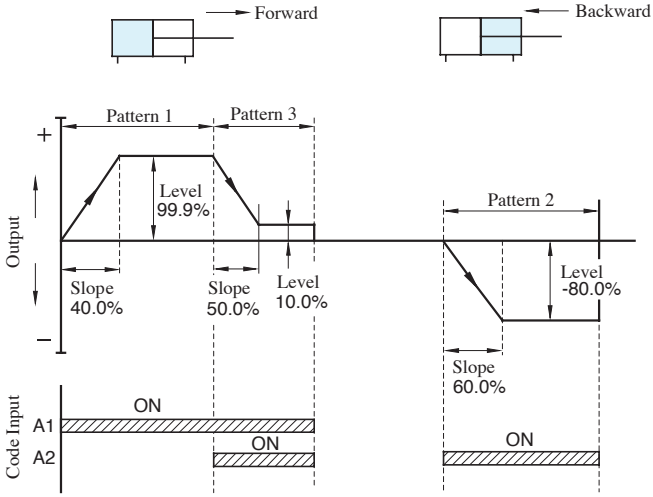
The internal timer is activated by a start signal, causing the slopes to be generated successively in memory. Channels A and B operate independently.



Setting Example

Control Mode 1 Channel - A

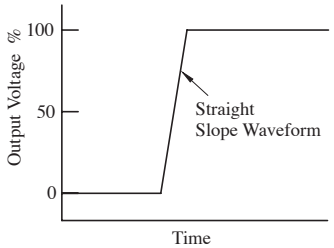
Code Input				Pattern No.	Setting %		Remarks
A8	A4	A2	A1		Level	Slope	
OFF	OFF	OFF	OFF	0	0	0	Stop
OFF	OFF	OFF	ON	1	99.9	40.0	Cylinder forward acceleration
OFF	OFF	ON	OFF	2	-80.0	60.0	Cylinder backward acceleration
OFF	OFF	ON	ON	3	10.0	50.0	Cylinder forward deceleration
ON	ON	ON	ON	15	10.0	10.0	



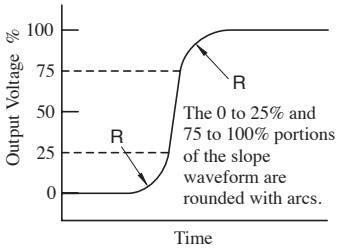
Slope Type

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

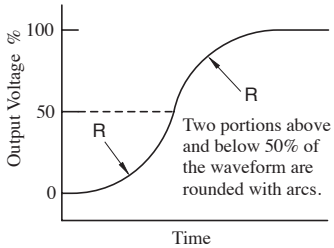
Type 1



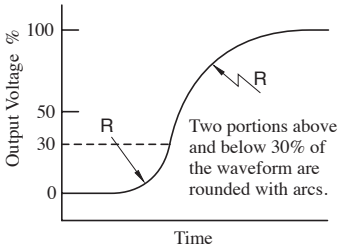
Type 2



Type 3

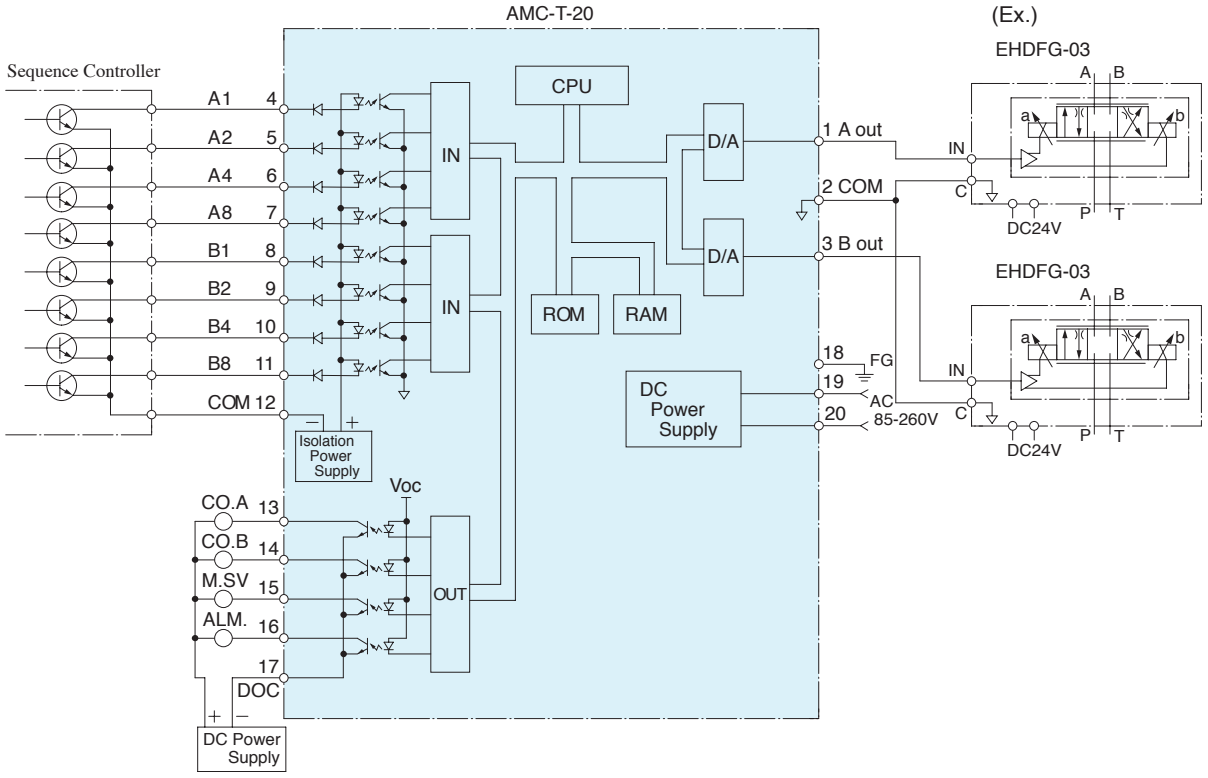


Type 4



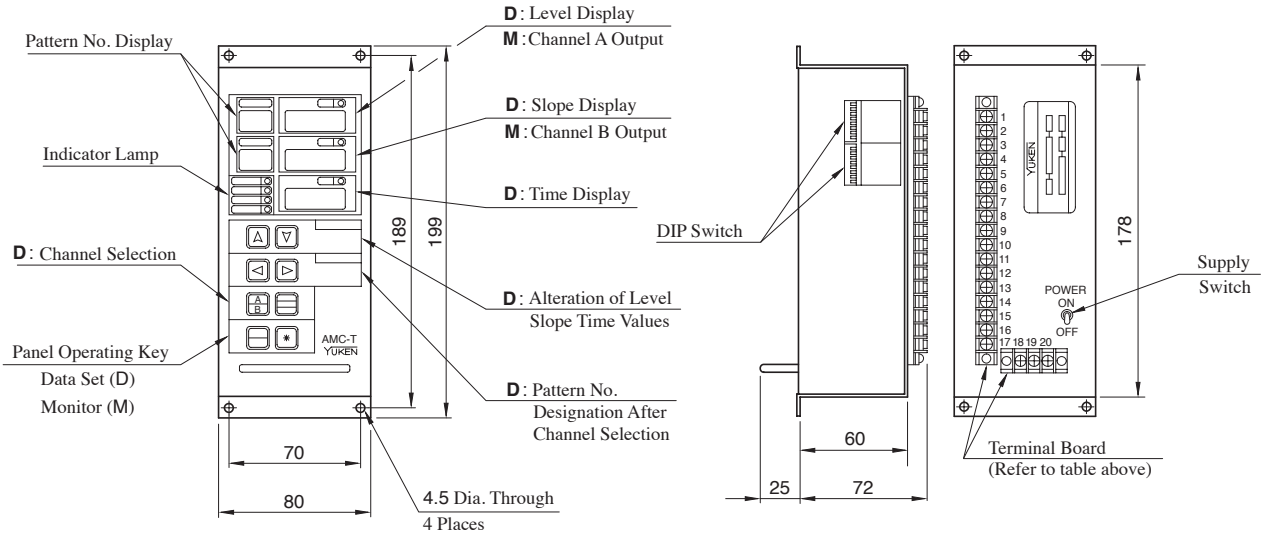
AMC-T-20

[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Channel A Output	A out	11	Code Input	B8
2	Common	COM	12	Code Input Common	DCOM
3	Channel B Output	B out	13	Coincidental Output Signal with "A"	CO.A
4	Code Input	A1	14	Coincidental Output Signal with "B"	CO.B
5	Code Input	A2	15	Data Save Signal	M.SV
6	Code Input	A4	16	Alarm Signal Output	ALM.
7	Code Input	A8	17	Output Common	DOC
8	Code Input	B1	18	Frame Ground	FG
9	Code Input	B2	19	Power Supply	AC
10	Code Input	B4	20		



Interchangeability between Current and New Design

Specifications

Specifications unchanged unless specified below.

Descriptions \ Model No.	New : AMC-T-20	Current : AMC-T-10
Control Output Signal	Output from transister open collector Max. 30 V, 50 mA	Output from transister open collector Max. 30 V, 10 mA
Slope Types	4 Types (Polygonal Line Signal : 1 Type, Curve Compensation Signal : 3 Types) to be selected by DIP switch	1 Type : Polygonal Line Signal
Stop Mode (Applicable only for Control Mode 1)	ON, OFF	——
Data Save	EEP-ROM Battery not needed	Battery Required
Approx. Mass	1 kg	1.8 kg

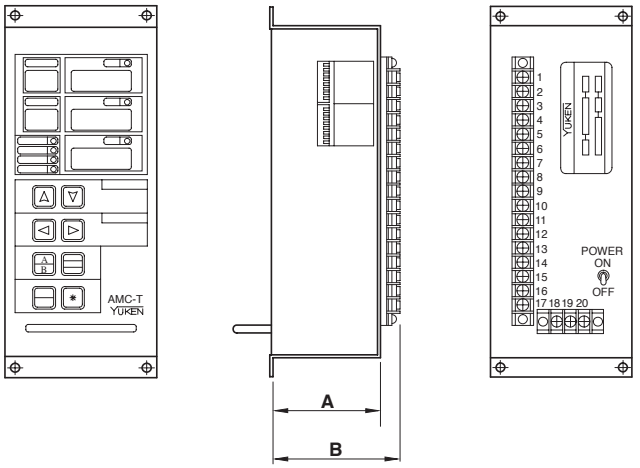
Terminal

The following are differences between current and new.

Terminal Number	Name		Remarks
	New : Design 20	Current : Design 10	
13	Coincidental Output Signal with "A" "CO.A"	Coincidental Output Signal with "A" "DO1"	Abbreviation of the terminals are changed, though functionally the same.
14	Coincidental Output Signal with "B" "CO.B"	Coincidental Output Signal with "B" "DO2"	
15	Data Save Signal "M.SV"	——	Added new functions.
16	Alarm Signal Output "ALM."	——	

Interchangeability in Installation

There is an interchangeability in installation, although depths (dimensions "**A**" and "**B**") are different.



Model Numbers		mm	
		A	B
Current	AMC-T-10	185	200
New	AMC-T-20	60	72

Slope Controllers

This slope controller is considerably smaller and lighter compared to conventional slope controllers.
4-bit switching signals allow the pattern output of given levels and acceleration/deceleration times. One-touch disconnection is supported.
The mass and the volume have been reduced to one-fifth and one-fourth, respectively.

Model Number Designation

AMN	-T	-10
Series Number	Type of Function	Design Number
AMN	T: Slope Controller	10

Specifications

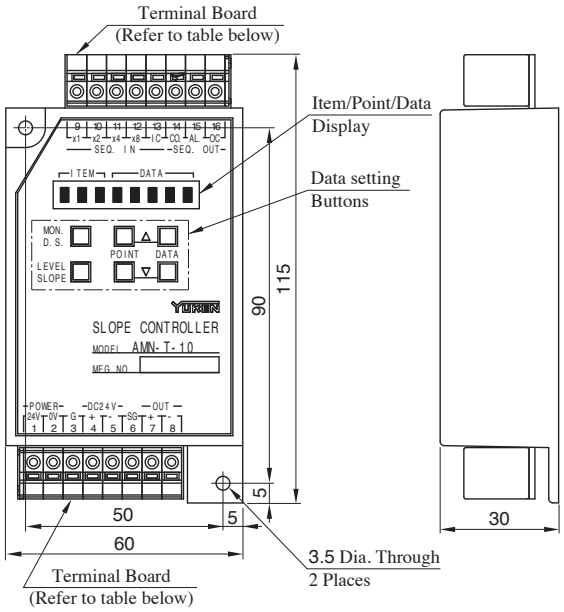
Model Numbers / Descriptions	AMN-T-10
Number of Output Channels	1 Channel
Maximum Output Range	0 - +5 V (Factory Preset) 0 - +10 V 5 V 10 V
Maximum Slope Time	● Slope-constant type: ★1 1-9999 s/Max. Output Signal (Factory Setting, 5 s) ● Time-constant type: ★2 1-9999 s (Can be set in 1 second increments)
Acceleration/Deceleration Signal Type ★3	Polygonal Line Signal: 1 Type (Factory Setting) Curve Compensation Signal: 3 Type
Setting Resolution	The level and slope setting are variable in 0.1 % units from 0 to 99.9%
Number of Preselected Patterns	4-bit binary code input 15 patterns
Sequence Input	Input Current: 10 mA/24 V Voltage Range: 10 - 28 V
Sequence Output	Load Current: Max. 50 mA Supply Voltage: Max. 32 V
Power Supply Voltage	24 VDC (20 - 30 VDC)
Power Input	3 W
Ambient Temperature	0 - 50°C
Ambient Humidity	90 % RH or less
Approx. Mass	0.2 kg

★1. A fixed slope means that the slope endpoint time changes while the slope gradient remains unchanged when the level is changed.
★2. A fixed time means that the slope endpoint time remains unchanged when the level is changed.
★3. The same slope types as those for the multifunction slope controller are supported. See page H-198 for details.

Instructions

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

AMN-T-10



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	+24V	9	Sequence Input	×1
2	Power Supply	0V	10	Sequence Input	×2
3	Frame Ground	G	11	Sequence Input	×4
4	Internal Power Supply	+24V	12	Sequence Input	×8
5	Internal Power Supply	0V	13	Sequence Input	IN COM
6	Signal Ground	SG	14	Sequence Output	COL N.
7	Output Signal	+	15	Sequence Output	ALARM
8	Output Signal	−	16	Sequence Output	OUT COM

[Example Diagram]