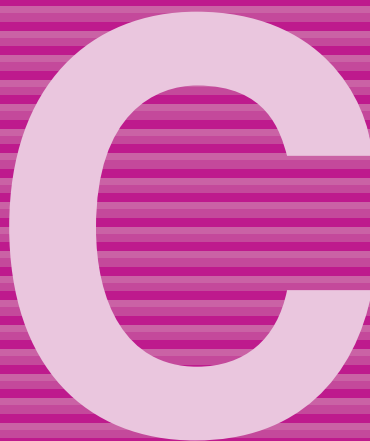




PRESSURE CONTROLS

Valve Type	Graphic Symbols	Max. Operating Pressure MPa	Max. Flow L/min														Page
			1	2	3	5	10	20	30	50	100	200	300	500	1000	2000	
Remote Control Relief Valves		25	DT/DG01														C-3
Direct Type Relief Valves		21	DT/DG				02										C-5
Pilot Operated Relief Valves		25					BT/BG			03	06	10					C-7
Low Noise Type Pilot Operated Relief Valves		25					S-BG			03	06	10					C-11
Relief Valves (High Pressure Type)		35					B3G				03	06					C-14
Solenoid Controlled Relief Valves		25					BST/BSG			03	06	10					C-17
Solenoid Controlled Relief Valves (High Pressure Type)		35					B3SG				03	06					C-22
H/HC Type Pressure Control Valves		21	HT/HG				HCT/HCG			03	06	10	HF16				C-25
Pres. Reducing Valves Pres. Reducing and Check Valves		21	RT/RG				RCT/RCG			03	06	10	RF				C-36
Pressure Reducing and Relieving Valves		03 : 14 06 : 25					RBG			03	06						C-43
Brake Valves		25					UBGR			03	06	10					C-47
Unloading Relief Valves		21					BUCG				06	10					C-47
Semiconductor Type Pressure Switches		35	JT-02														C-48
Pressure Monitoring System		20 35															C-50

Hydraulic Fluids

Fluid Types

Any type of hydraulic fluids listed in the table below can be used.
Use any type of fluids, no change in specifications.

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

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

Standard model of Semiconductor Type Pressure Switches can use with phosphate ester and W/O emulsion type fluids.

Recommended Fluid Viscosity and Temperature

Use under conditions where the viscosity and temperature of the hydraulic fluid remain in the ranges indicated in the following table.

Name		Viscosity	Temperature
Remote Control Relief Valves Direct Type Relief Valves Pilot Operated Relief Valves Low Noise Type Pilot Operated Relief Valves Relief Valves Solenoid Controlled Relief Valves*	H Type Pressure Control Valves HC Type Pressure Control Valves Pressure Reducing Valves Pressure Reducing and Check Valves Pressure Reducing and Relieving Valves	15 - 400 mm ² /s	-15 - +70°C
Semiconductor Type Pressure Switches		15 - 400 mm ² /s	-20 - +70°C

★ If the valve is provided with a vent restrictor (ex. : A-BSG/B3SG), the viscosity range should be 15 - 200 mm²/s.

Control of Contamination

Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valves. Please maintain the degree of contamination within NAS 1638-Grade 12. Use 25 μm or finer line filter.

Instructions

Drain Piping

It is necessary to connect the drain port directly to the reservoir with a back pressure close to the atmospheric pressure.
If neglect this process, there is the risks that system pressure will increase unlimitedly and occur serious accident.

Interchangeability in Installation between Current and New Design

Model change has been made on the following products.

Name	Model Numbers		Mounting Interchangeability	Major Changes	Page
	Current	New			
Solenoid Controlled Relief Valve	BS *-03,-47	BS *-03,-48	Yes	- Pilot valves (DSG-01) have been changed in the design numbers 70. - There are no changes in specifications and mounting dimensions.	—
	BS *-06,-47	BS *-06,-48			
	BS *-10,-47	BS *-10,-48			

Remote Control Relief Valves

This valve is used as a remote control valve for pilot operated type pressure control valves.

Specifications

Model Numbers		Max. Operating Pressure MPa	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting		DT Type	DG Type
DT-01-22	DG-01-22	25	1.6	1.4

Model Number Designation

D	T	-01	-22
Series Number	Type of Mounting	Valve Size	Design Number
D : Remote Control Relief Valves	T : Threaded Connection	01	22
	G : Sub-plate Mounting		22

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
DG-01	M5×45L.....4 Pcs.

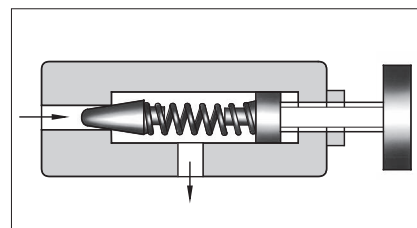
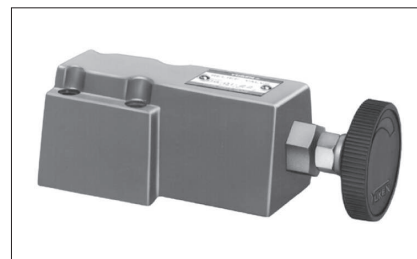
Sub-plate

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DG-01	DGM-02-20	1/4	0.7

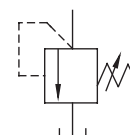
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (✓)

Instructions

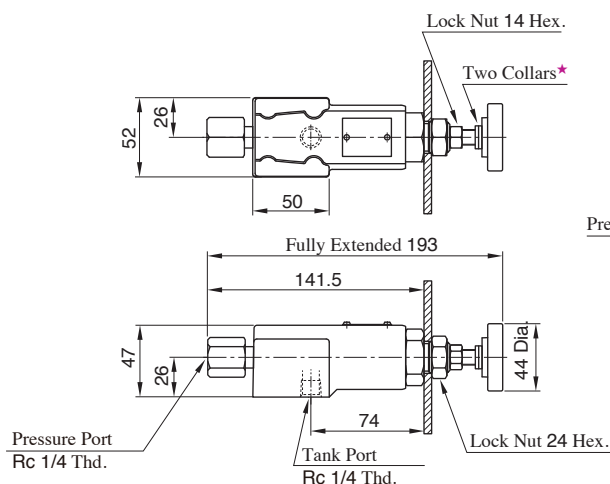
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- If the internal volume of the vent line is too large, chattering is likely to occur, so please use the pipes with 4mm inside diameter.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- In case of using for vent control, if pilot relief valve fully closed, the pressure of system is equal to the setting pressure of main valve.



Graphic Symbol

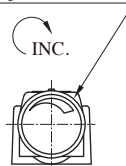


DT-01

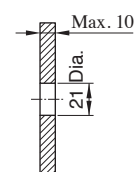


- ★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

Pressure Adjustment Handle

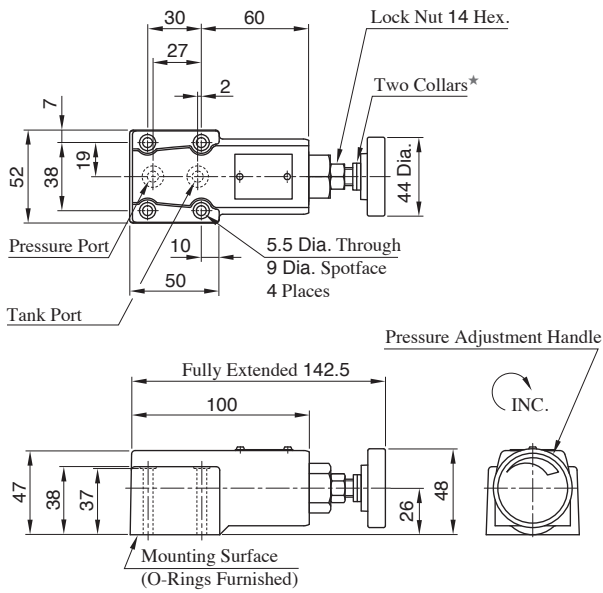


Dimensions of The Panel Mounting Hole

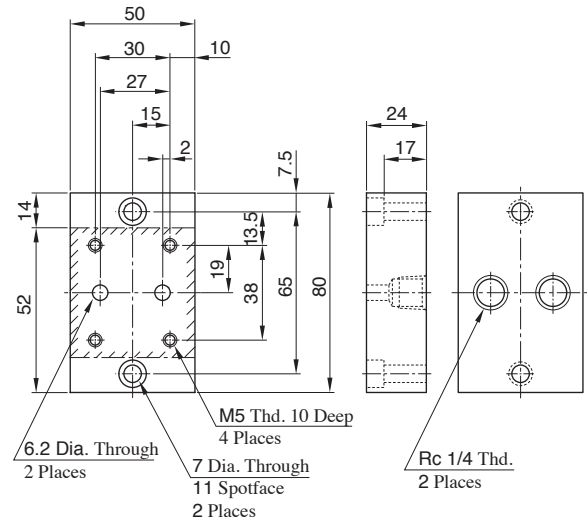


DG-01

★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

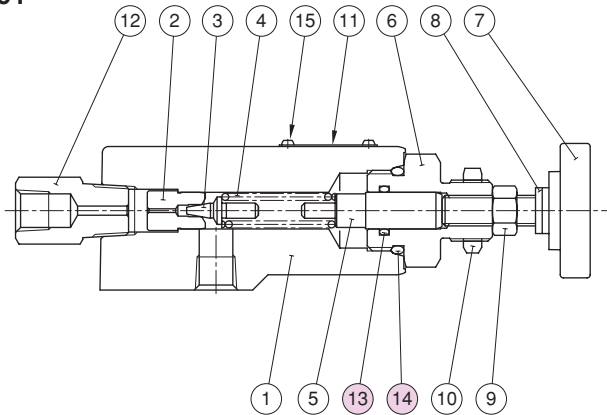


Sub-plate : DGM-02



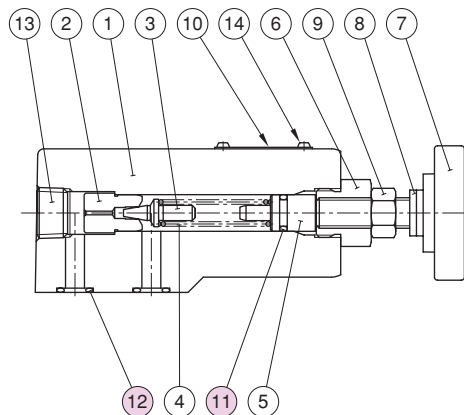
List of Seals

DT-01



Item	Name of Parts	Part Numbers	Qty.
13	O-Ring	OR NBR-70-1 P12-N	1
14	O-Ring	OR NBR-90 P22.4-N	1

DG-01



Item	Name of Parts	Part Numbers	Qty.
11	O-Ring	OR NBR-70-1 P9-N	1
12	O-Ring	OR NBR-90 P9-N	2

Direct Type Relief Valves

This valve is used in a hydraulic circuit to prevent damage due to over pressure and to adjust the maximum circuit pressure of small capacity.

Specifications

Model Numbers		Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting				DT Type	DG Type
DT-02- *-22	DG-02- *-22	21	★	16	1.5	1.5

★ Refer to the model number designation.

Model Number Designation

D	T	-02	- B	-22
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range	Design Number
D : Direct Type Relief Valves	T : Threaded Connection	02	B : ★ - 7	22
	G : Sub-plate Mounting		C : 3.5 - 14 H : 7 - 21	22

★ Refer to the minimum adjustment pressure characteristics.

Instructions

- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.

Accessories

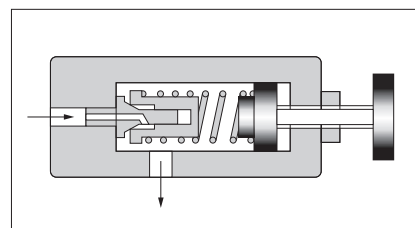
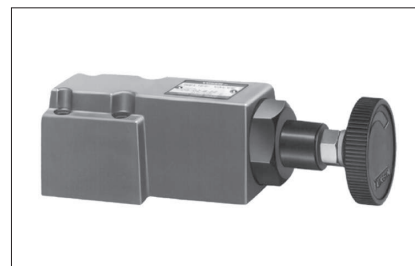
Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
DG-02	M5×45L.....4 Pcs.

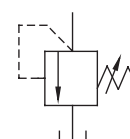
Sub-plate

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DG-02	DGM-02-20	1/4	0.7

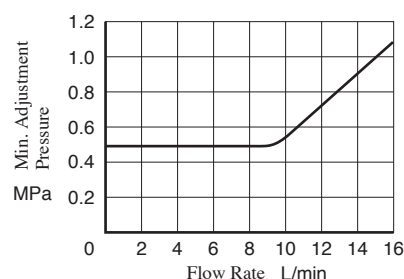
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\sqrt[16]{}$)
- The sub-plates are those for remote control relief valves. For dimensions, see page C-4.



Graphic Symbol

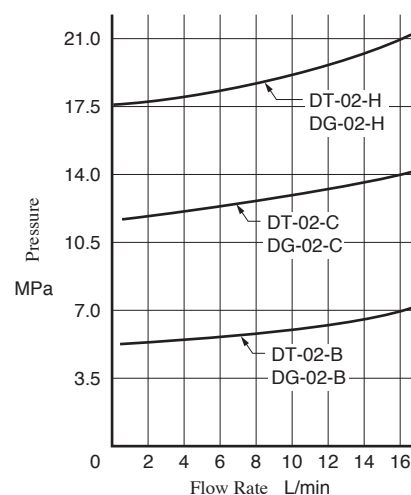


Min. Adjustment Pressure

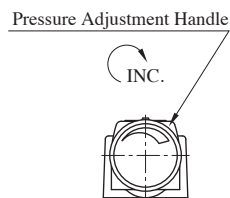
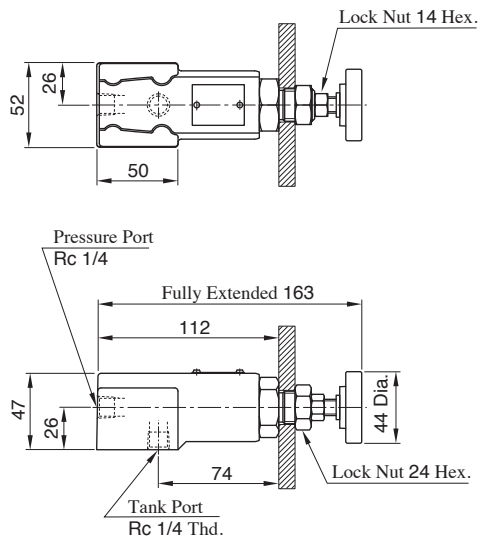


Nominal Override Characteristics

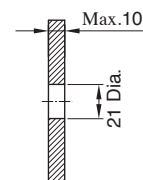
Hydraulic fluid
Viscosity : 35 mm²/s
Specific Gravity : 0.850



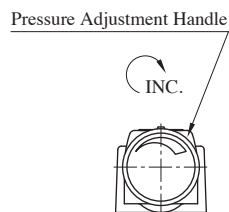
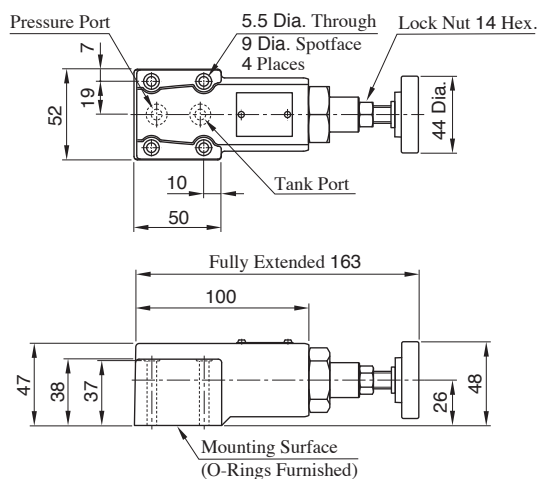
DT-02



Dimensions of The Panel Mounting Hole



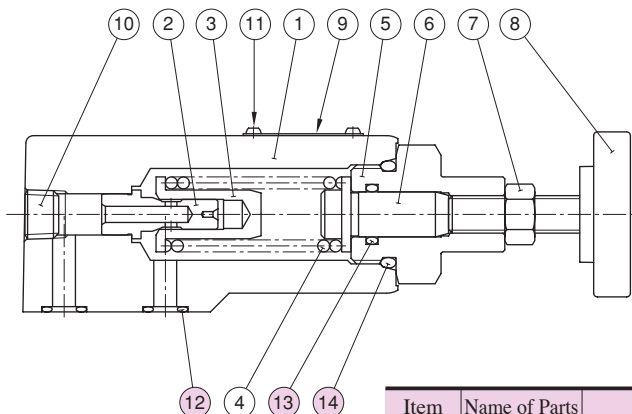
DG-02



Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-4) of the sub-plate used together.

List of Seals

**DT-02
DG-02**



Item	Name of Parts	Part Numbers	Qty.	Remarks
12	O-Ring	OR NBR-90 P9-N	2	Use only for DG-02
13	O-Ring	OR NBR-70-1 P12-N	1	
14	O-Ring	OR NBR-90 P22.4-N	1	

Pilot Operated Relief Valves

These valves protect the hydraulic system from excessive pressure, and can be used to maintain constant pressure in a hydraulic system. Remote control and unloading are permitted by using vent circuits.

Specifications

Model Numbers		Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting				BT Type	BG Type
BT-03- *-32	BG-03- *-32	25	★ - 25	100	5.0	4.7
BT-06- *-32	BG-06- *-32			200	5.0	5.6
BT-10- *-32	BG-10- *-32			400	8.5	8.7

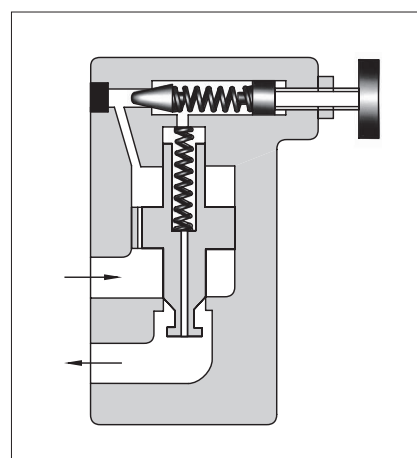
★ Refer to the minimum adjustment pressure characteristics on page C-10.

● For large flow valves (flange connect type), please contact us.

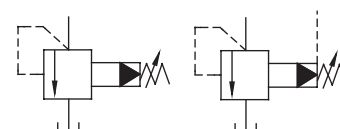
Model Number Designation

B	T	-03	-V	-32
Series Number	Type of Mounting	Valve Size	High Venting ★ Pres. Feature	Design Number
B : Pilot Operated Relief Valves	T : Threaded Connection	03	V : For High Venting Pressure Feature (Omit if not required)	32
		06		32
		10		32
	G : Sub-plate Mounting	03		32
		06		32
		10		32

★ Use high venting pressure type to reduce the changeover time from unload to onload.



Graphic Symbols



Vent Connection

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
BG-03	M12×70L...2 Pcs., M12×95L...2 Pcs.
BG-06	M16×60L...2 Pcs., M16×80L...2 Pcs.
BG-10	M20×70L...2 Pcs., M20×90L...2 Pcs.

Sub-plates

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

● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1/64)

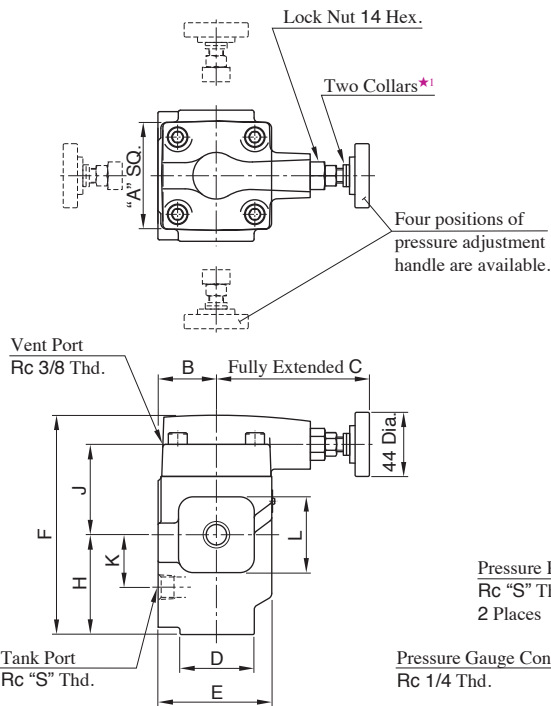
Instructions

- If a remote control relief valve is used in the vent circuit, see page C-5. In addition, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.

- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with a flow rate above the minimum flow as the right chart.

Valve Size	Min. Flow
03	8 L/min
06	
10	15 L/min

BT-03, 06, 10



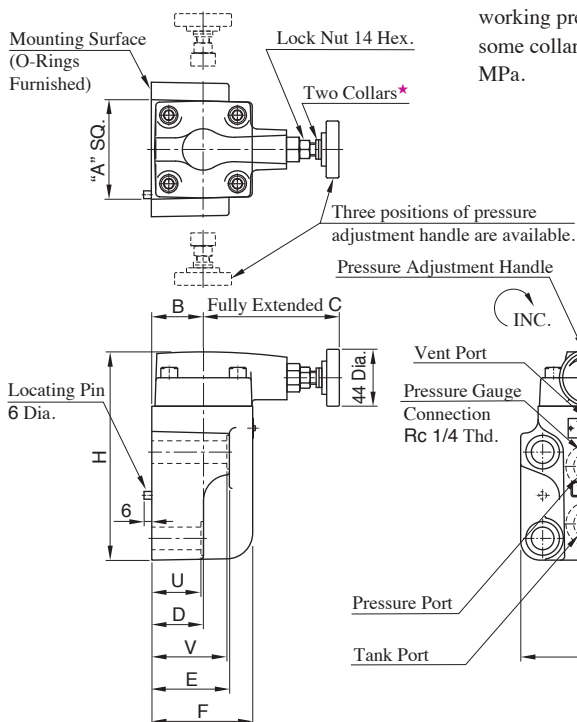
Model Numbers	A	B	C	D	E	F
BT-03	75	40	105	52	78	150.5
BT-06						
BT-10	85	50	101	80	96	183

Model Numbers	H	J	K	L	N	Q	S
BT-03	68.5	62	36	52	90	45	3/8
BT-06							3/4
BT-10	89	74	49	80	120	60	1 1/4

★1. Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

★2. There are two threaded connection pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

BG-03, 06, 10



★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

Mounting Surface

BG-03 : ISO 6264-06-09-1-97
BG-06 : ISO 6264-08-13-1-97
BG-10 : ISO 6264-10-17-1-97

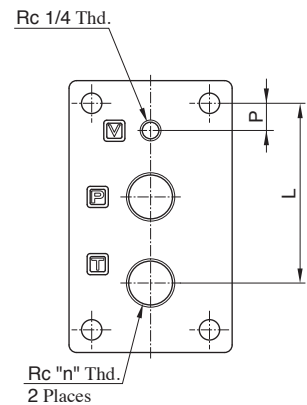
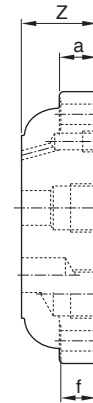
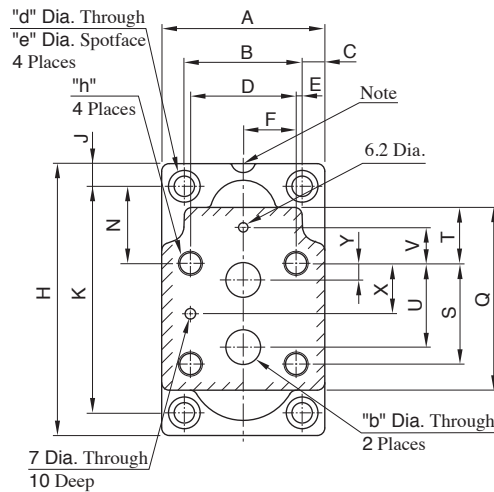
Model Numbers	A	B	C	D	E	F	H
BG-03	75	40	105	57	78	78	137
BG-06	75	40	105	40	60	78	161
BG-10	85	45	101	47	67	84	195

Model Numbers	J	K	L	N	P
BG-03	14.1	41	82	117	77
BG-06	17	52	104	141	83.5
BG-10	20.7	62	124	175	110

Model Numbers	Q	S	T	U	V
BG-03	22	13.5	21	55	77
BG-06	4.5	17.5	26	38	58
BG-10	6	21.5	32	45	65

"S" Dia. Through
"T" Dia. Spotface
4 Places

Sub-plate BGM-03, 03X 06, 06X 10, 10X



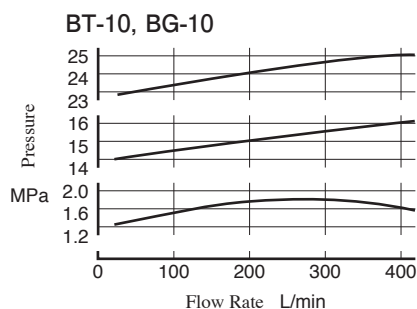
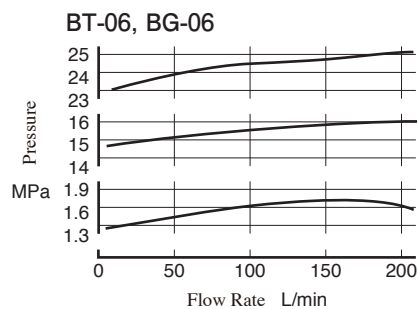
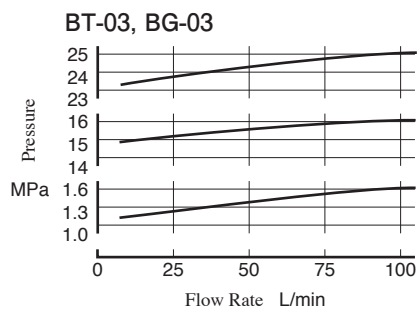
Note) There is the cavity only for BGM- * X.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	P	Q	S
BGM-03	86	60	13	53.8	3.1	26.9	149	13	123	86	32	26	97	53.8
BGM-03X										95		21		
BGM-06	108	78	15	70	4	35	180	15	150	106.5	51	27.2	121	66.7
BGM-06X										119		18		
BGM-10	126	94	16	82.6	5.7	41.3	227	16	195	138.2	62	30.2	154	88.9
BGM-10X										158		17		

Model Numbers	T	U	V	X	Y	Z	a	b	d	e	f	h	n
BGM-03	19	47.4	0	22	22	32	20	14.5	11	17.5	19	M12 Thd. 20 Deep	3/8
BGM-03X						40							1/2
BGM-06	37	55.5	23.8	33.4	11	40	25	23	13.5	21	24	M16 Thd. 25 Deep	3/4
BGM-06X						50							1
BGM-10	42	76.2	31.8	44.5	12.7	50	32	28	17.5	26	31	M20 Thd. 28 Deep	1 1/4
BGM-10X						63							1 1/2

Nominal Override Characteristics

Hydraulic Fluid: Viscosity : 35 mm²/s
Specific Gravity : 0.850

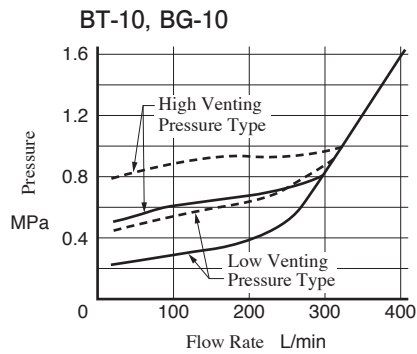
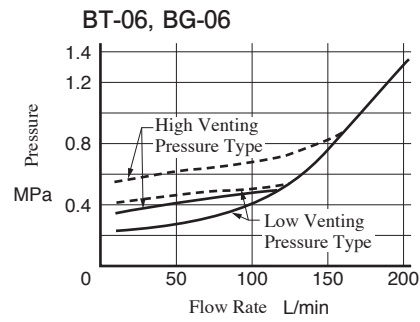
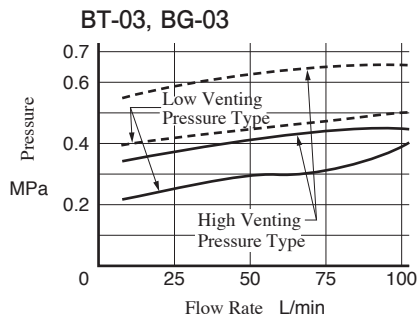


Min. Adj. Pressure & Vent Pressure vs. Flow

Hydraulic Fluid: Viscosity : 35 mm²/s

Specific Gravity : 0.850

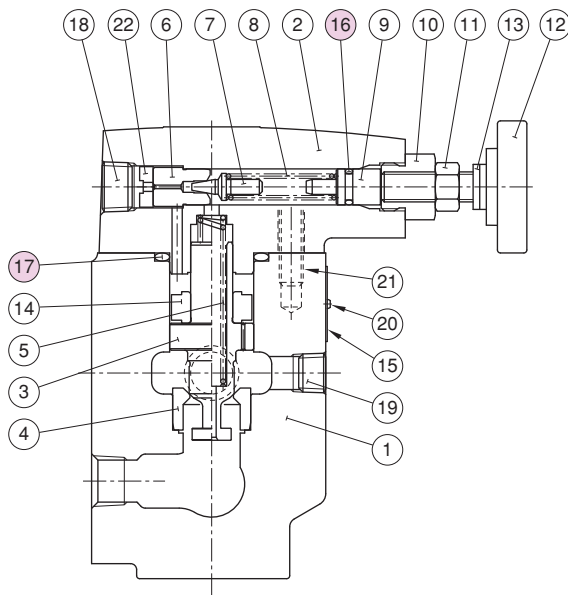
— Vent Pressure
- - - Min. Adjustment Pressure



Note) Venting Pressure is the relieving pressure when the vent port open to tank port.

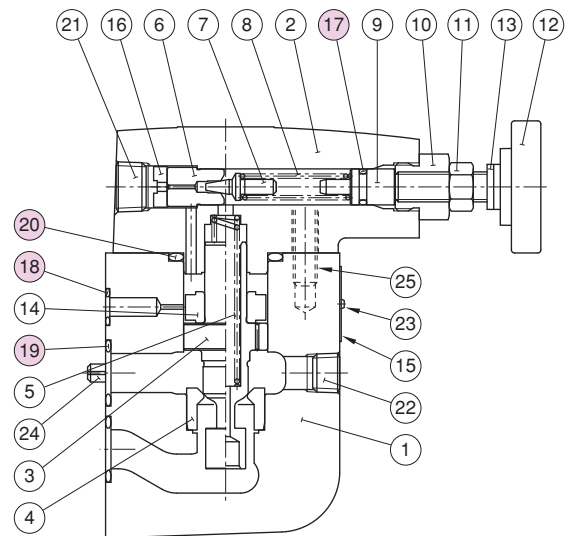
List of Seals

BT-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.
		BT-03	BT-06	BT-10	
16	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
17	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P32-N	1

BG-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.
		BG-03	BG-06	BG-10	
17	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
18	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	OR NBR-90 P9-N	1
19	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2
20	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1

Low Noise Type Pilot Operated Relief Valves

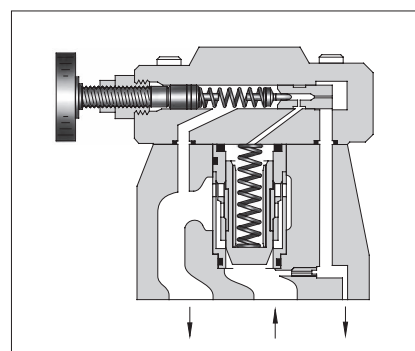
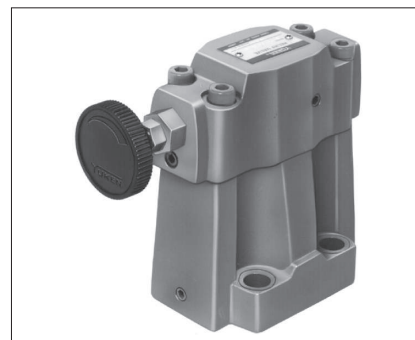
Pilot operated relief valves here have been particularly developed as low-noise types. Able to protect pumps and control valves against excessive pressures, they are used to control the pressure in the hydraulic system to a constant level.

Remote control and unloading are permitted by using vent circuits.

Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg
S-BG-03- *- *-40	25	★ - 25	100	4.1
S-BG-06- *- *-40			200	5.0
S-BG-10- *- *-40			400	10.5

★ See minimum adjustment pressure characteristics on page C-12.



C
Low Noise Type

Model Number Designation

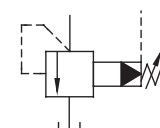
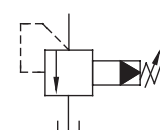
S—	B	G	—03	—V	—L	—40
Low Noise Type	Series Number	Type of Mounting	Valve Size	High Venting Pres. Feature★	Direction of Handle	Design Number
S : Low Noise Type	B : Pilot Operated Relief Valves	G : Sub-plate Mounting	03	V : For High Venting Pressure Feature (Omit if not required)	(Viewed from pressure gauge connection) L: Left (Normal) R: Right	40
			06			40
			10			40

★ Use the high venting pressure type where it is necessary to reduce the changeover time from unloading to onloading.

We also product The Low Noise Type Solenoid Controlled Relief Valves as below. For more details, please contact us.

Model Numbers	Max. Operating Pres. MPa	Max. Flow L/min
S-BSG-03- *- *- *- *-53	25	100
S-BSG-06- *- *- *- *- *-53		200
S-BSG-10- *- *- *- *- *-53		400

Graphic Symbols



Vent Connection

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
S-BG-03	M12x40L 4 Pcs.
S-BG-06	M16x50L 4 Pcs.
S-BG-10	M20x60L 4 Pcs.

Sub-plates

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

Instructions

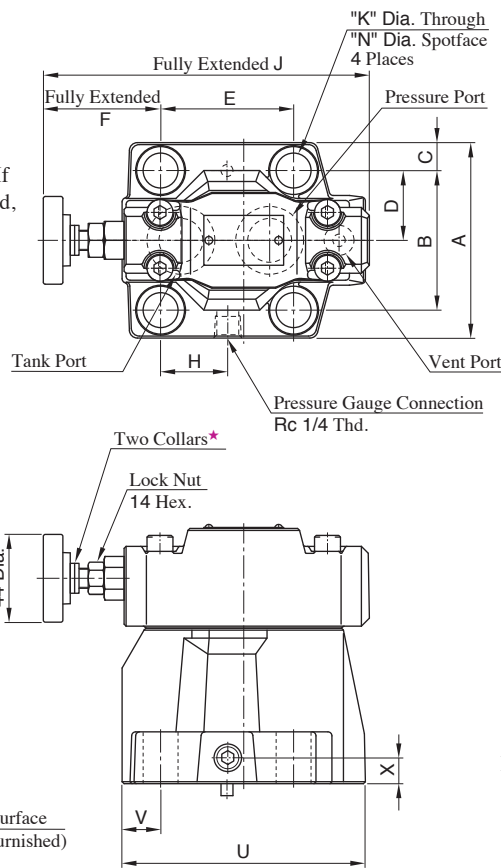
- If a remote control relief valve is used in the vent circuit, see page C-5. In addition, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with minimum flow rate as the table below.

Valve Size	Min. Flow
03	5 L/min
06	
10	8 L/min

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1/6)
- The sub-plates are those for pilot operated relief valves. For dimensions, see page C-9.

S-BG-03-06-* -L-40 S-BG-10-* -40

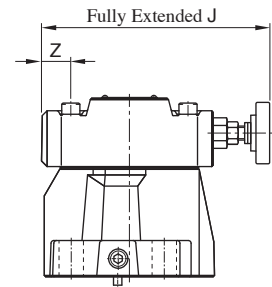
★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.



Mounting Surface
S-BG-03 : ISO 6264-06-09-1-97
S-BG-06 : ISO 6264-08-13-1-97
S-BG-10 : ISO 6264-10-17-1-97

Opposite Handle Position

S-BG-03-06-* -R



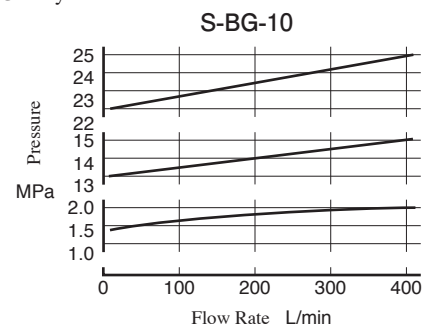
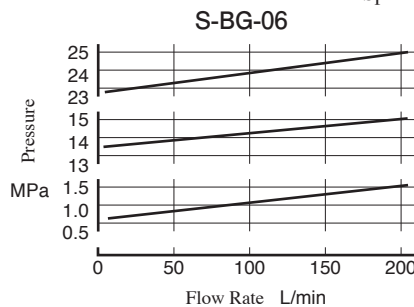
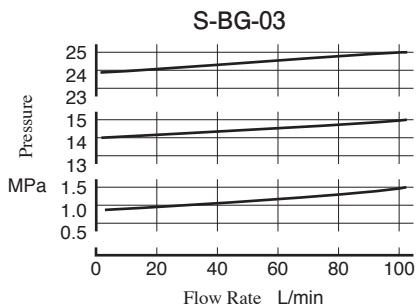
For other dimensions, see the figures shown left.

Note: For dimensions of the valve mounting surface, see the dimensional drawing (Page C-9) of the sub-plate used together.

Model Numbers	A	B	C	D	E	F	H	J	K	N	P	Q	S	T	U	V	X	Z
S-BG-03	76	53.8	11.1	26.9	53.8	73.6	26.9	163.5	13.5	21	50	130	103	21.5	106	26.1	13	36.1
S-BG-06	98	70	14	35	66.7	58.8	33.7	163.5	17.5	26	50	130	103	26	122	19.3	13	21.3
S-BG-10	120	82.6	18.7	41.3	88.9	46.1	44.9	180	21.5	32	65	167	135	33.5	155	21.1	18	—

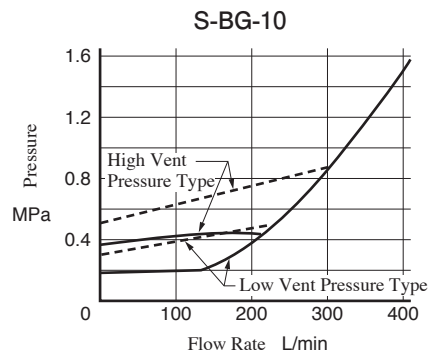
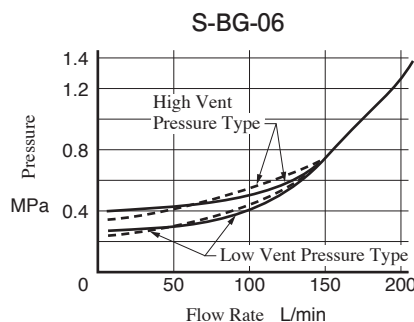
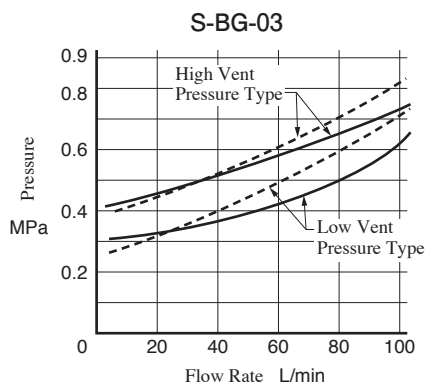
Nominal Override Characteristics

Hydraulic Fluid : Viscosity : 35 mm²/s
Specific Gravity : 0.850



Min. Adj. Pressure and Vent Pressure vs. Flow

Hydraulic Fluid: Viscosity : 35 mm²/s
Specific Gravity : 0.850



Note: Vent Pressure means the relief pressure when the vent part open to the tank line.

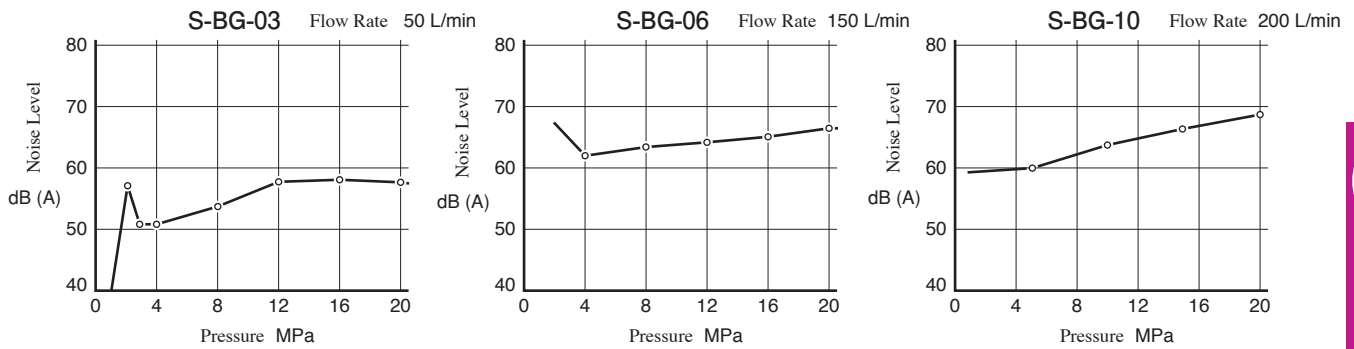
Noise Level

Measuring Condition

Back Pressure : 0.1 MPa

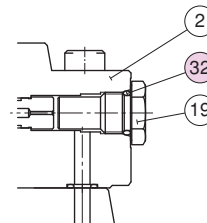
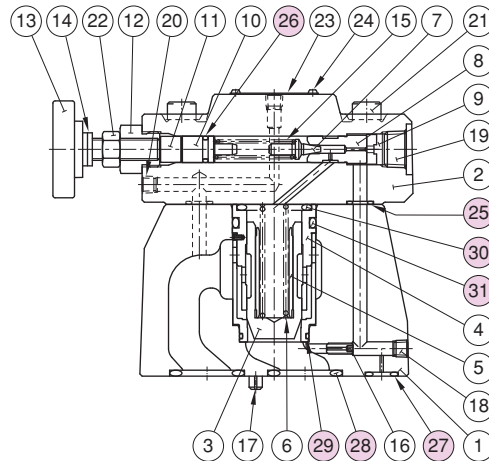
Viscosity : 35 mm²/s

Measuring Position : At 1m back from the valve front.



List of Seals

S-BG-03, 06, 10



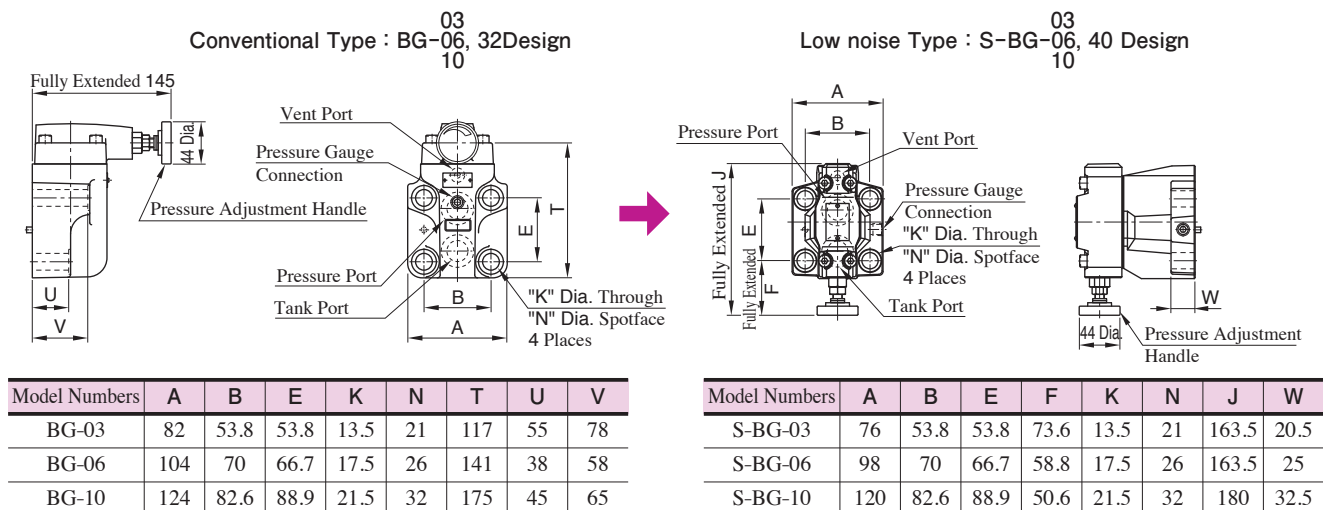
S-BG-10

Item	Name of Parts	Part Numbers			Qty.
		S-BG-03	S-BG-06	S-BG-10	
25	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	2
26	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
27	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	OR NBR-90 P9-N	1
28	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2
29	O-Ring	AS 568-024 (NBR-90)	AS 568-024 (NBR-90)	AS 568-128 (NBR-90)	1
30	O-Ring	OR NBR-90 P28-N	OR NBR-90 P28-N	OR NBR-90 P36-N	1
31	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1
32	O-Ring			OR NBR-90 P14-N	1

Interchangeability Between Conventional Type and Low Noise Type

The 40 design of low noise type S-BG-03, 06, 10 has mounting interchangeability with the 32 design of conventional type BG-03, 06, 10.

But the outside shape is different, for example the direction of pressure adjustment handle.



Relief Valves (High Pressure Type)

Relief valves here have been particularly developed those be able to adjust pressure to high level of 35 MPa. Able to protect pumps and control valves against excessive pressures, they are used to control the pressure in the hydraulic system to a constant level. Remote control and unloading are permitted by using vent circuits.

Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg
B3G-03- *-10	35	★ - 35	250	4.1
B3G-06- *-10			500	5.1

★ See minimum adjustment pressure characteristics on page C-15.

Model Number Designation

B3	G	-03	-V	-10
Series Number	Type of Mounting	Valve Size	High Venting★ Pres. Feature	Design Number
B3 : Relief Valves (High Pressure Type)	G : Sub-plate Mounting	03	V : For High Venting Pressure Feature (Omit if not required)	10
		06		10

★ Use the high venting pressure type where it is necessary to reduce the changeover time from unloading to onloading.

Accessories

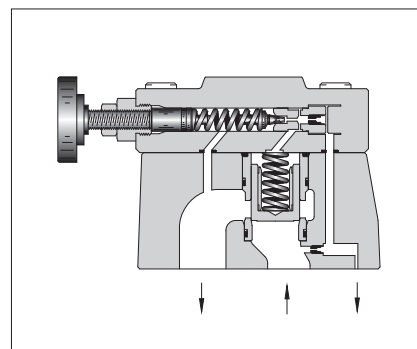
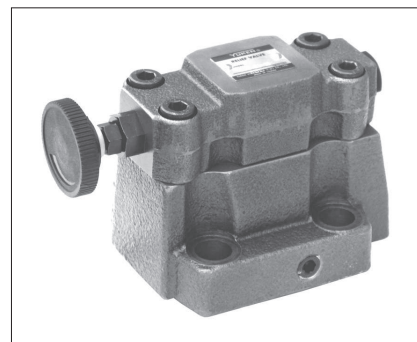
Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
B3G-03	M12×40L 4 Pcs.
B3G-06	M16×50L 4 Pcs.

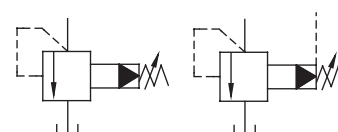
Instructions

- When control in the vent circuit, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with the minimum flow rate as the below chart.

Valve Size	Min. Flow
03	5 L/min
06	



Graphic Symbols



Vent Connection

Sub-plates

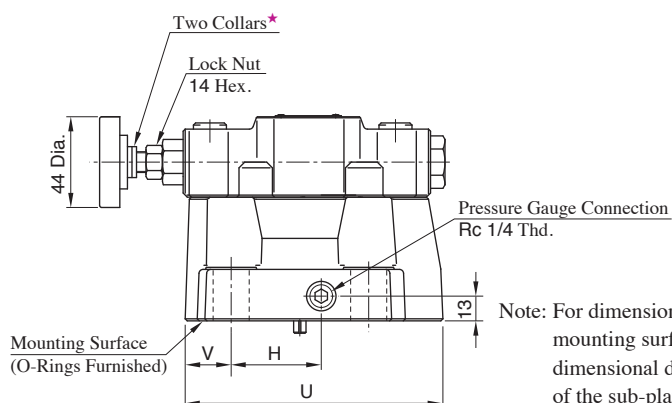
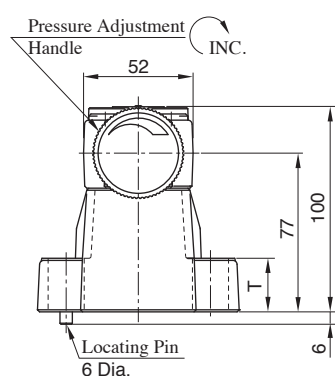
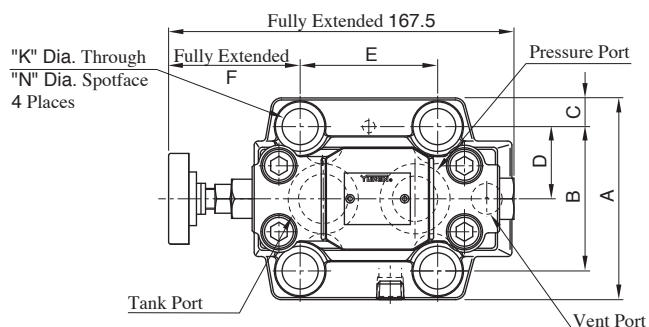
Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
B3G-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
B3G-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1/6)
- The sub-plates are those for pilot operated relief valves. For dimensions, see page C-9.

B3G-03-06-* -10

Mounting Surface
B3G-03 : ISO 6264-06-09-1-97
B3G-06 : ISO 6264-08-13-1-97

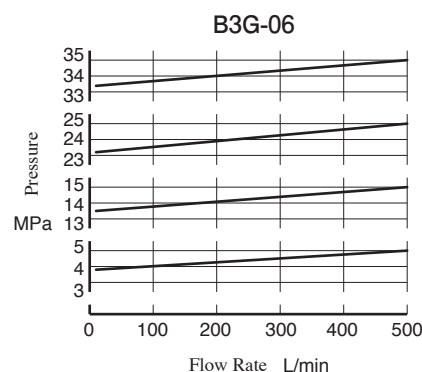
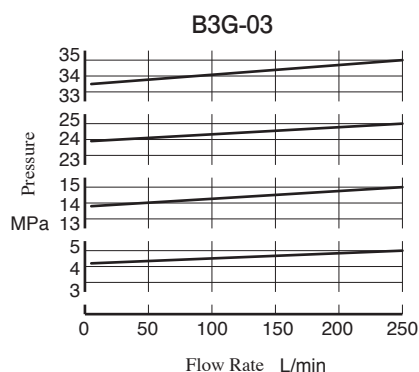
★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 14 MPa.



Model Numbers	A	B	C	D	E	F	H	K	N	T	U	V
B3G-03	76	53.8	11.1	26.9	53.8	74.6	29.3	13.5	21	21.5	111	31.2
B3G-06	100	70	15	35	66.7	63.8	43.7	17.5	27	26	125	22.3

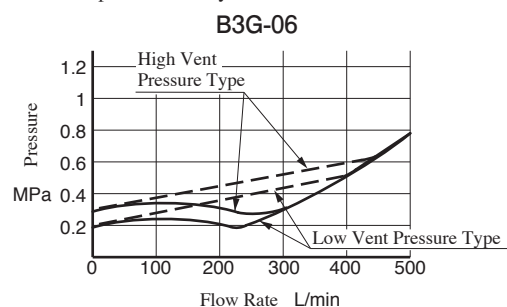
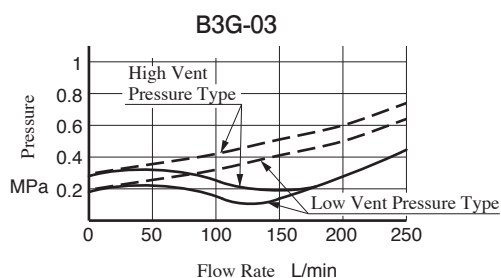
Nominal Override Characteristics

Hydraulic Fluid: Viscosity : 35 mm²/s
Specific Gravity : 0.850



Min. Adj. Pressure and Vent Pressure vs. Flow

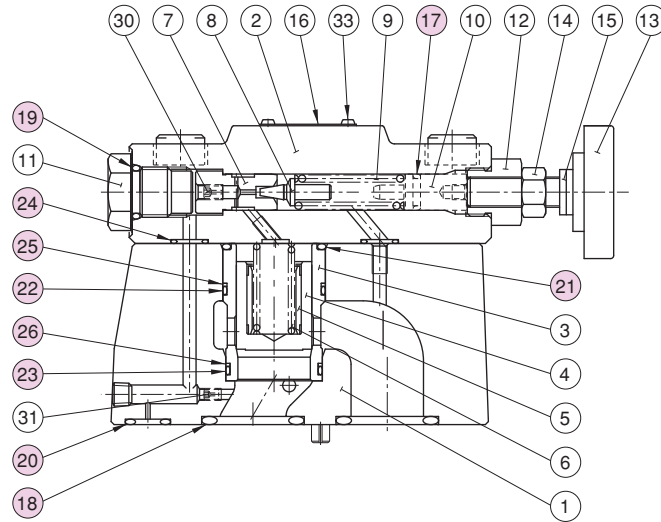
Hydraulic Fluid: Viscosity : 35 mm²/s
Specific Gravity : 0.850



Note: Vent Pressure means the relief pressure when the vent part open to the tank line.

List of Seals

B3G-03, 06



Item	Name of Parts	Part Numbers		Qty.
		B3G-03	B3G-06	
17	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
18	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	2
19	O-Ring	OR NBR-90 P14-N	OR NBR-90 P14-N	1
20	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	1
21	O-Ring	AS568-123 (NBR-90)	AS568-123 (NBR-90)	1
22	O-Ring	AS568-025 (NBR-90)	AS568-025 (NBR-90)	1
23	O-Ring	AS568-024 (NBR-90)	AS568-024 (NBR-90)	1
24	O-Ring	AS568-012 (NBR-90)	AS568-012 (NBR-90)	2
25	Back-up Ring	SO-BRB-34	SO-BRB-34	1
26	Back-up Ring	SO-BRB-32	SO-BRB-32	1

Solenoid Controlled Relief Valves

The solenoid controlled relief valve is a combination of a pilot operated relief valve and a solenoid operated directional valve. It is used for no-load pump operation by using electric signals or, together with a remote control relief valve, for two or three pressure control of the hydraulic system.

Specifications

Model Numbers		Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min	Approx. Mass kg
Threaded Connection	Sub-plate Mounting				
BST-03-**-**-48	BSG-03-**-**-48	25	★ - 25	100	See the chart below.
BST-06-**-**-48	BSG-06-**-**-48			200	
BST-10-**-**-48	BSG-10-**-**-48			400	

★ For relief valves, standard pilot operated relief valves are used.

For minimum adjustment pressures and other characteristics, see pages C-9 & C-10.

● For large flow valves (flange connection type), please contact us.

Approx. Mass

Model Numbers	Double Sol.	Single Sol.	With Vent Restrictor
BST-03	7.1 kg	6.6 kg	7.6 kg
BST-06	7.1 kg	6.6 kg	7.6 kg
BST-10	10.8 kg	10.3 kg	11.3 kg
BSG-03	6.8 kg	6.3 kg	7.3 kg
BSG-06	7.7 kg	7.2 kg	8.2 kg
BSG-10	11.0 kg	10.5 kg	11.5 kg

Model Number Designation

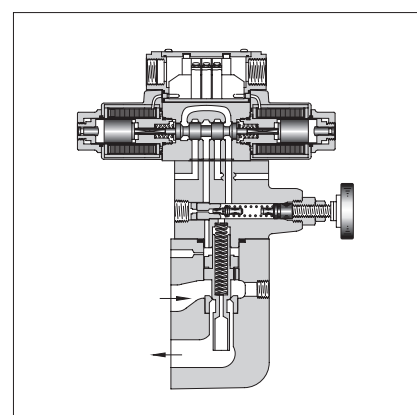
A—	BS	T	—03	—V	—2B3A	—A100	—N	—48
With Vent Restrictor	Series Number	Type of Mounting	Valve Size	High Venting Pres. Feature	Vent Type	Coil Type	Type of Electrical Con.	Design Number
A : With Vent Restrictor (Option) (Omit if not required)	BS : Solenoid Controlled Relief Valves	T : Threaded Connection	03	V : For High Venting Pressure Feature (Omit if not required)	2B3A	AC :	None: Terminal Box Type N : With Plug-in Connector (DIN) (Option)	48
			06		2B3B	A100, A120, A200, A240		48
			10		2B2B	DC :		48
		G : Sub-plate Mounting	03		2B2	D12, D24, D48		48
			06		3C2	AC→DC Rectified :		48
			10		3C3	R100, R200		48

★1. Models with vent restrictor are applicable only for the vent type 2B3A and 2B3B. For details, see page C-19.

★2. Use high venting pressure types to reduce changeover time from unloading to onloading.

★3. For the details of the vent types, see the following page.

★4. The coil codes are the same as for solenoid operated directional valve DSG-01. See the Solenoid Ratings on page C-52.



Low Noise Type Solenoid Controlled Relief Valves

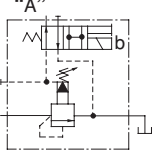
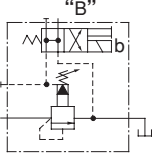
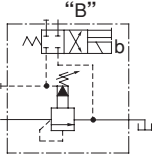
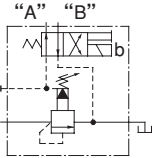
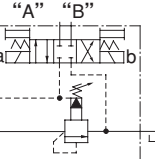
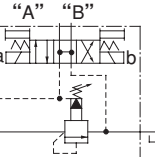
Low Noise Type Solenoid Controlled Relief Valves are also available. For details, please contact us.

Request

The coil type numbers in the shaded column are handled as optional extras.

In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Vent Types

Vent Type	Graphic Symbols	Solenoid Operated Directional Valve Model Numbers	Operation		
			SOL "a"	SOL "b"	Vent Connecting
2B3A		DSG-01-2B3A	—	OFF	Connected to port "A".
				ON	Connected to tank (no-load)
2B3B		DSG-01-2B3B	—	OFF	Connected to tank (no-load)
				ON	Connected to port "B".
2B2B		DSG-01-2B2B	—	OFF	Closed state (relief valve setting pressure)
				ON	Connected to port "B".
2B2		DSG-01-2B2	—	OFF	Connected to port "A".
				ON	Connected to port "B".
3C2		DSG-01-3C2	OFF	OFF	Closed state (relief valve setting pressure)
			ON	OFF	Connected to port "A".
			OFF	ON	Connected to port "B".
3C3		DSG-01-3C3	OFF	OFF	Connected to tank (no-load)
			ON	OFF	Connected to port "A".
			OFF	ON	Connected to port "B".

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
BSG-03	M12×70L...2 Pcs. M12×95L...2 Pcs.
BSG-06	M16×60L...2 Pcs. M16×80L...2 Pcs.
BSG-10	M20×70L...2 Pcs. M20×90L...2 Pcs.

Type of Electrical Conduit Connection

Type of electrical conduit connection is same as solenoid operated directional valve DSG-01. For details, see page C-51.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
BSG-03	BGM-03-20	$\frac{3}{8}$	2.4
	BGM-03X-20	$\frac{1}{2}$	3.1
BSG-06	BGM-06-20	$\frac{3}{4}$	4.7
	BGM-06X-20	1	5.7
BSG-10	BGM-10-20	1 $\frac{1}{4}$	8.4
	BGM-10X-20	1 $\frac{1}{2}$	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. ($\frac{1}{16}$)
- The sub-plates are those for pilot operated relief valves. For dimensions, see page C-9.

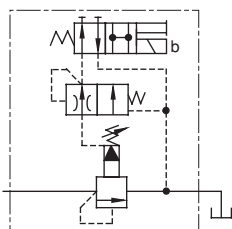
Option

Models with Vent Restrictor

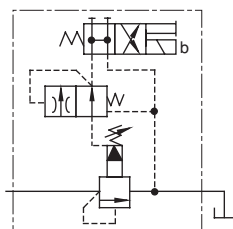
The type with a vent restrictor has a vent restrictor in vent types 2B3A and 2B3B added between a relief valve and a solenoid operated directional valve. It prevents shock to the main circuit by gradually lowering the venting pressure in the shift from the set pressure to unloading.

Unloading pressure are the same as without a vent restrictor.

A-BS*-*-2B3A



A-BS*-*-2B3B

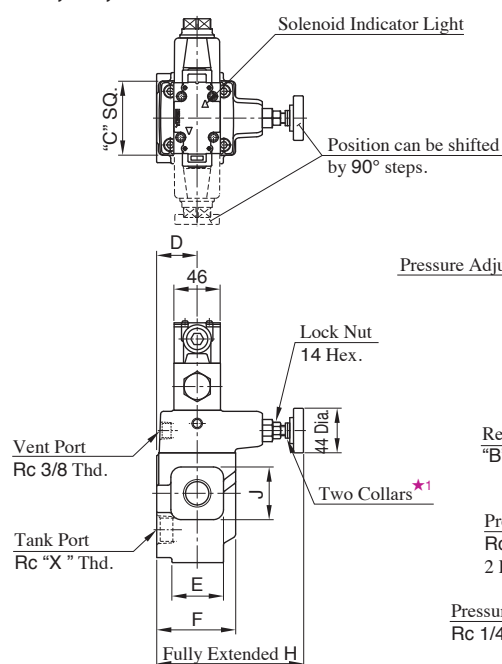


Instructions

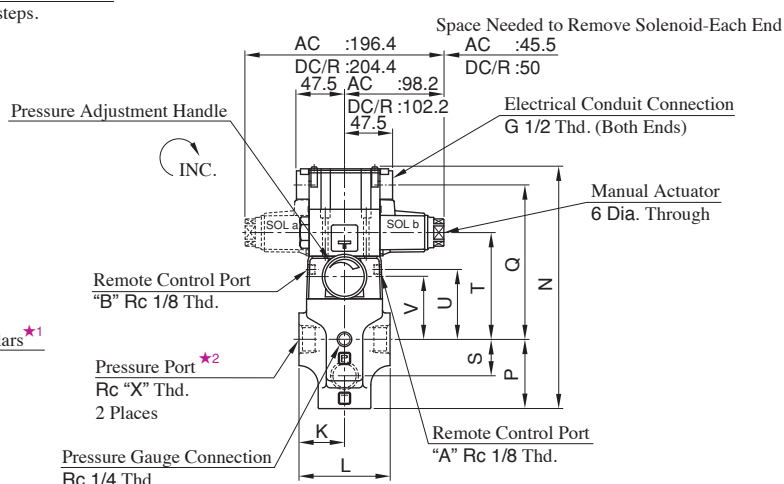
- If a remote control relief valve is used in the vent circuit, see page C-3. In addition, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. Pressure change of one handle revolution is about 5 MPa. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with the minimum flow rate as the below chart.

Valve Size	Min. Flow
03	8 L/min
06	
10	15 L/min

BST-03, 06, 10



- ★1. Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.
- ★2. There are two threaded connection pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

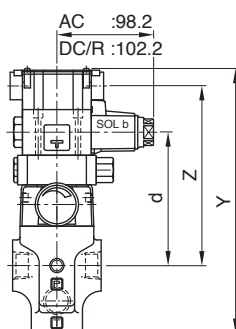


Model Numbers	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	X
BST-03	75	40	52	78	145	52	45	90	239.3	68.5	152.5	36	105.5	69	62	3/8
BST-06																3/4
BST-10	85	50	80	96	151	80	60	120	271.8	89	164.5	49	117.5	81	74	1 1/4

Models with Vent Restrictor (Option) A-BST-03, 06, 10

Model Numbers	Y	Z	d
A-BST-03	269.3	182.5	135.5
A-BST-06			
A-BST-10	301.8	194.5	147.5

For other dimensions, see the above figure.

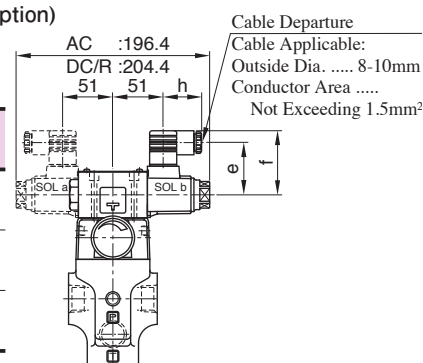


Models with Plug-in Connector (Option)

03
BST-06-***-N
10

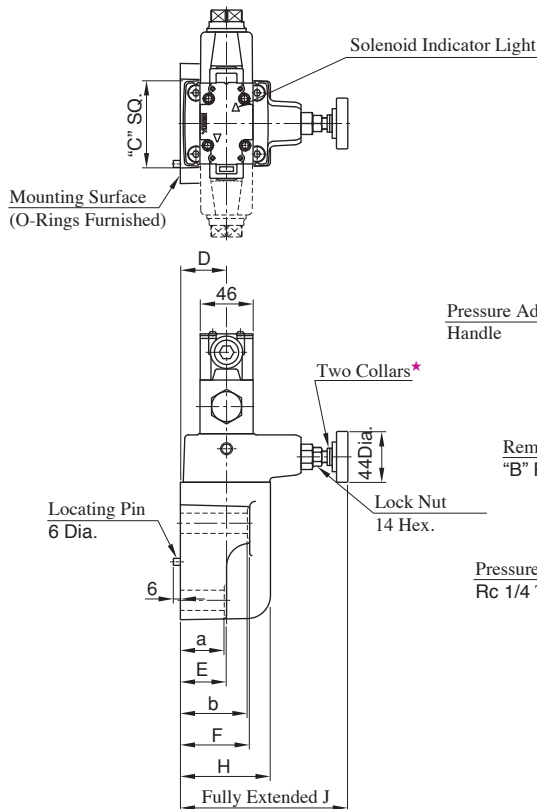
Name	Coil Type	e	f	h
AC Solenoid	A *	53	65	39
DC Solenoid	D *	64	76	39
R (AC→DC) Solenoid	R *	57.2	79	53

For other dimensions, see the above figure.

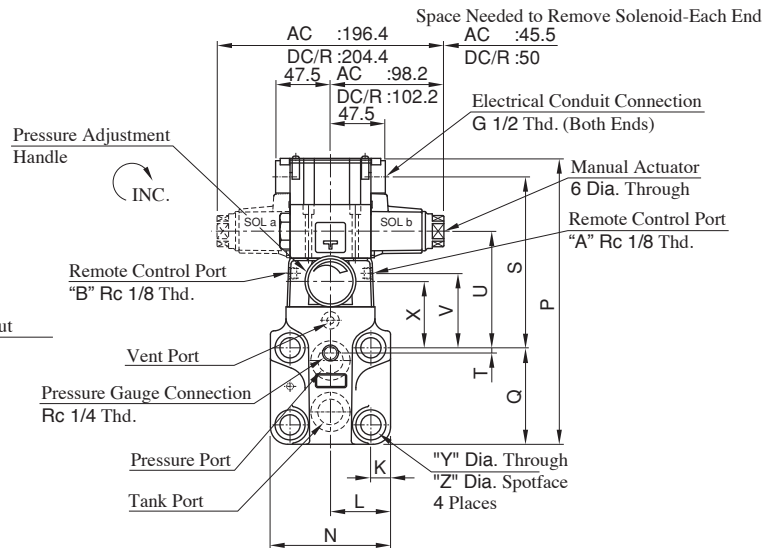


BSG-03, 06, 10

Mounting Surface
BSG-03 : ISO 6264-06-09-1-97
BSG-06 : ISO 6264-08-13-1-97
BSG-10 : ISO 6264-10-17-1-97



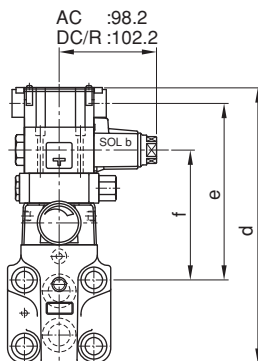
★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.



Model Numbers	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	X	Y	Z	a	b
BSG-03	75	40	57	78	78	145	14.1	41	82	225.8	77	130.5	22	83.5	47	40	13.5	21	55	77
BSG-06	75	40	40	60	78	145	17	52	104	249.8	83.5	148	4.5	101	64.5	57.5	17.5	26	38	58
BSG-10	85	45	47	67	84	146	20.7	62	124	283.8	110	155.5	6	108.5	72	65	21.5	32	45	65

Note :For dimensions of the valve mounting surface, see the dimensional drawing (page C-9) of the sub-plate used together.

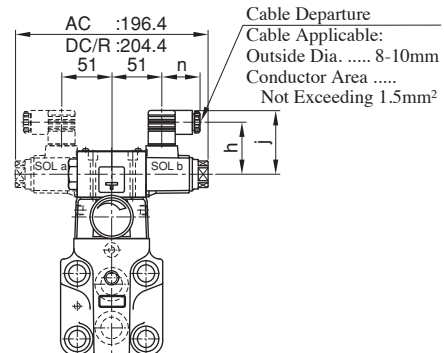
Models with Vent Restrictor (Option)
A-BSG-03, 06, 10



Model Numbers	d	e	f
A-BSG-03	255.8	160.5	113.5
A-BSG-06	279.8	178	131
A-BSG-10	313.8	185.5	138.5

For other dimensions, see the above figure.

Models with Plug-in Connector (Option)
BSG-03, 06, 10

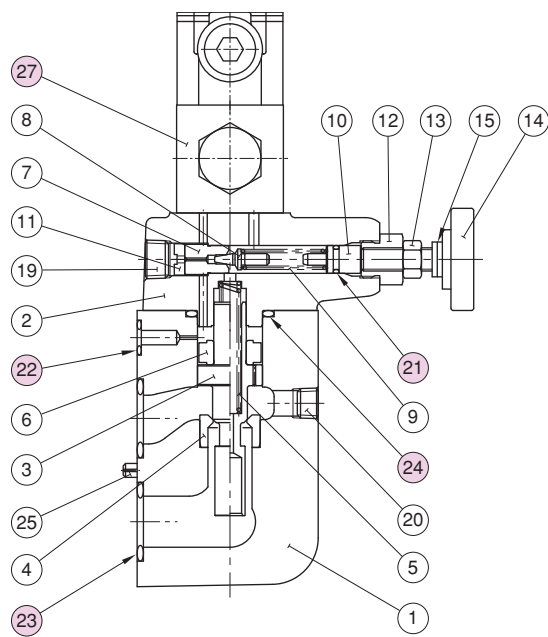


Name	Coil Type	h	j	n
AC Solenoid	A *	53	65	39
DC Solenoid	D *	64	76	39
R (AC→DC) Solenoid	R *	57.2	79	53

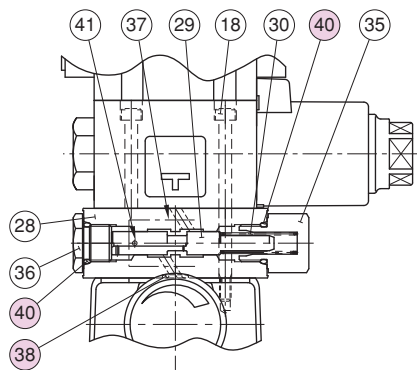
For other dimensions, see the above figure.

List of Seals

BST
BSG -03, 06, 10



A- BST
BSG -03, 06, 10
(Models with Vent Restrictor)



BST-03, 06, 10

Item	Name of Parts	Part Numbers			Qty.
		BST-03	BST-06	BST-10	
21	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
24	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P32-N	1

BSG-03, 06, 10

Item	Name of Parts	Part Numbers			Qty.
		BSG-03	BSG-06	BSG-10	
21	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
22	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	OR NBR-90 P9-N	1
23	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2
24	O-Ring	OR NBR-90 P32-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1

Note: The Pilot Valve for item ②①, see “DSG-01 Series Solenoid Operated Directional Valves” of the catalogue “E: Directional Controls”.

A- BST
BSG -03, 06, 10

Item	Name of Parts	Part Numbers	Qty.
38	O-Ring	OR NBR-90 P8-N	2
40	O-Ring	OR NBR-90 P14-N	2

Solenoid Controlled Relief Valves (High Pressure Type)

The solenoid controlled relief valve is a combination of a pilot operated relief valve and a solenoid operated directional valve. It is used for no-load pump operation by using electric signals or, together with a remote control relief valve, for two or three pressure control of the hydraulic system. This valve is able to adjust pressure up to maximum 35 MPa.

Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min
B3SG-03-**-**-**-10	35	★ - 35	250
B3SG-06-**-**-**-10			500

★ For minimum adjustment pressures and other characteristics, see page C-15.

Approx. Mass

Model Numbers	Double Sol.	Single Sol.	With Vent Restrictor
B3SG-03	6.0 kg	5.5 kg	6.6 kg
B3SG-06	7.0 kg	6.5 kg	7.6 kg

Model Number Designation

A—	B3S	G	—03	—V	—2B3A	—A100	—N	—10
With Vent* ¹ Restrictor	Series Number	Type of Mounting	Valve Size	High Venting* ² Pres. Feature	Vent Type* ³	Coil Type* ⁴	Type of Electrical Con.	Design Number
A : With Vent Restrictor (Option) (Omit if not required)	B3S : Solenoid Controlled Relief Valves (High Pressure Type)	G : Sub-plate Mounting	03	V : For High Venting Pressure Feature (Omit if not required)	2B3A	AC : A100, A120 A200, A240 DC : D12 , D24 D48 AC→DC Rectified : R100 , R200	None: Terminal Box Type N : With Plug-in Connector (DIN) (Option)	10
			06		2B3B 2B2B 2B2 3C2 3C3			10

★1. Models with vent restrictor are applicable only for the vent type 2B3A and 2B3B. For details, see page C-23 “Option”.

★2. Use high venting pressure types to reduce changeover time from unloading to onloading.

★3. The details of the vent types are the same as for solenoid controlled relief valves BST/BSG. See page C-18 “Vent Types”.

★4. The coil codes are the same as for solenoid operated directional valve DSG-01. See the Solenoid Ratings on page C-52.

Request

The coil type numbers in the shaded column are handled as optional extras.

In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
B3SG-03	M12×40L 4 Pcs.
B3SG-06	M16×50L 4 Pcs.

Type of Electrical Conduit Connection

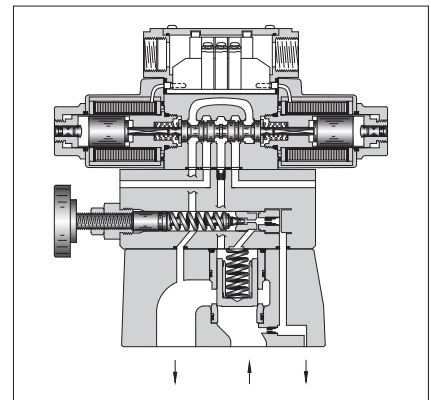
Electrical conduit connection is same as solenoid operated directional valve DSG-01. For details, see page C-51.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
B3SG-03	BGM-03-20	3/8	2.4
	BGM-03X-20	1/2	3.1
B3SG-06	BGM-06-20	3/4	4.7
	BGM-06X-20	1	5.7

● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1/6)

● The sub-plates are those for pilot operated relief valves. For dimensions, see page C-9.



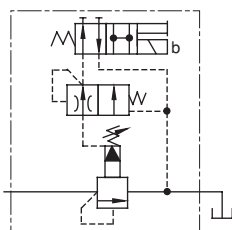
Option

Models with Vent Restrictor

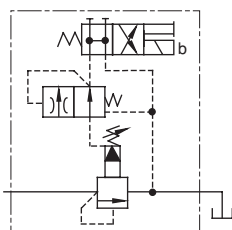
The type with a vent restrictor has a vent restrictor in vent types 2B3A and 2B3B added between a relief valve and a solenoid operated directional valve. It prevents shock to the main circuit by gradually lowering the venting pressure in the shift from the set pressure to unloading.

Unloading pressure are the same as without a vent restrictor.

A-B3SG- *-2B3A



A-B3SG- *-2B3B



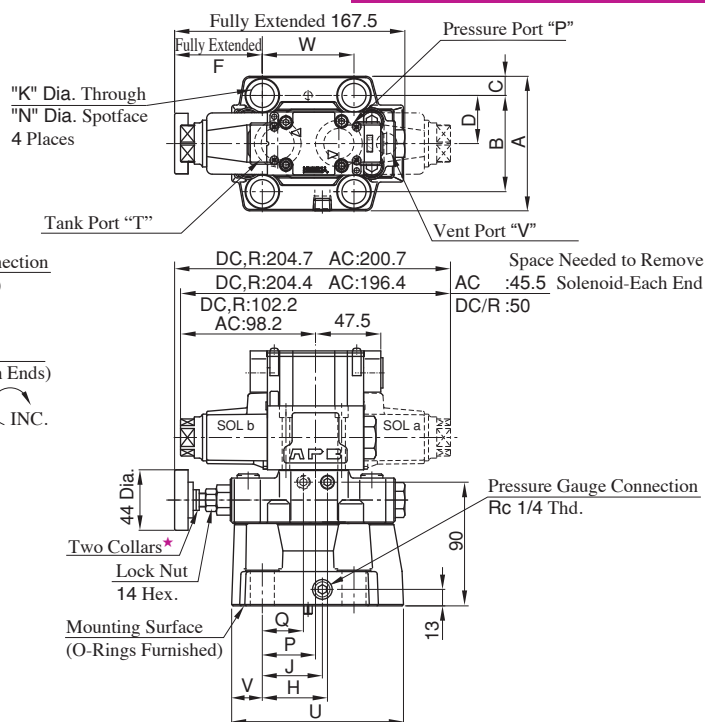
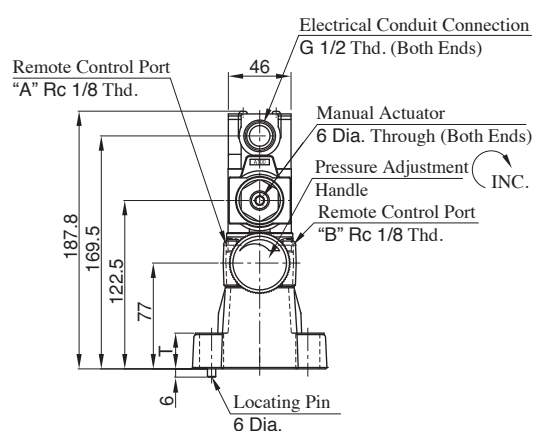
Instructions

- When control in the vent circuit, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. Pressure change of one handle revolution is about 7 MPa. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the reservoir.
- With a small flow, the setting pressure may be unstable. Use with the minimum flow rate as the below chart.

Valve Size	Min. Flow
03	8 L/min
06	

B3SG-03, 06

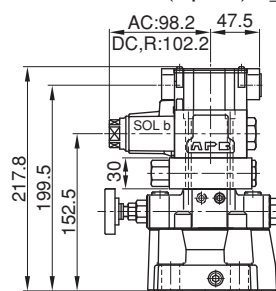
- ★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 14 MPa.



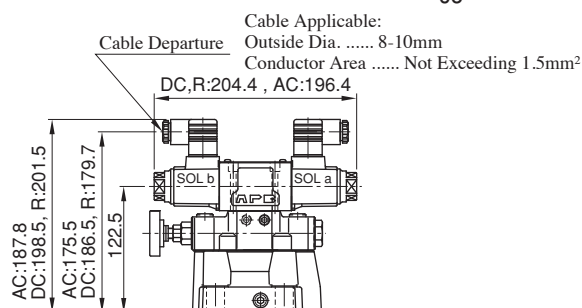
Model Numbers	A	B	C	D	E	F	H	J	K	N	P	Q	T	U	V	W
B3SG-03	76	53.8	11.1	26.9	53.8	74.6	36.6	29.3	13.5	21	27.9	19.1	21.5	111	31.2	53.8
B3SG-06	100	70	15	35	66.7	63.8	47.4	43.7	17.5	27	38.7	29.9	26	125	22.3	66.7

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-9) of the sub-plate used together.

Models with Vent Restrictor (Option) A-B3SG-03, 06

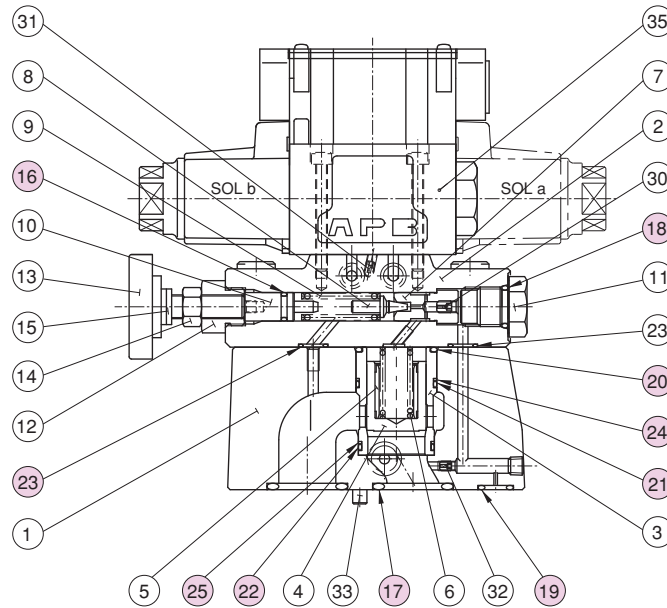


Models with Plug-in Connector (Option) B3SG-03-06- *- *- *- *-N



List of Seals

B3SG-03, 06

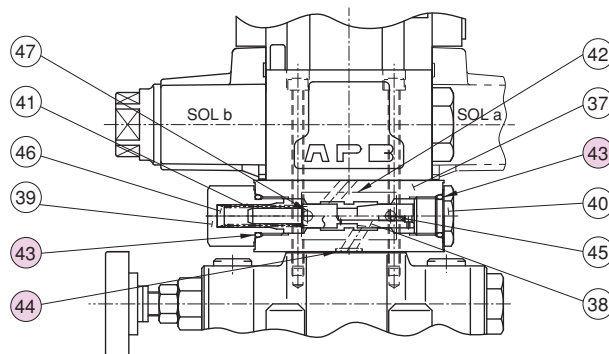


B3SG-03, 06

Item	Name of Parts	Part Numbers		Qty.
		B3SG-03	B3SG-06	
16	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1
17	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	2
18	O-Ring	OR NBR-90 P14-N	OR NBR-90 P14-N	1
19	O-Ring	OR NBR-90 P9-N	OR NBR-90 P11-N	1
20	O-Ring	AS568-123 (NBR-90)	AS568-123 (NBR-90)	1
21	O-Ring	AS568-025 (NBR-90)	AS568-025 (NBR-90)	1
22	O-Ring	AS568-024 (NBR-90)	AS568-024 (NBR-90)	1
23	O-Ring	AS568-012 (NBR-90)	AS568-012 (NBR-90)	2
24	Back-up Ring	SO-BRB-34	SO-BRB-34	1
25	Back-up Ring	SO-BRB-32	SO-BRB-32	1

Note: The Pilot Valve for item 35, see "Solenoid Operated Directional Valves, DSG-01 Series" of the catalogue "E: Directional Controls".

**A-B3SG-03, 06
(Models with Vent
Restrictor)**



A-B3SG-03, 06

Item	Name of Parts	Part Numbers	Qty.
43	O-Ring	OR NBR-90 P14-N	2
44	O-Ring	OR NBR-90 P8-N	2

H/HC Type Pressure Control Valves

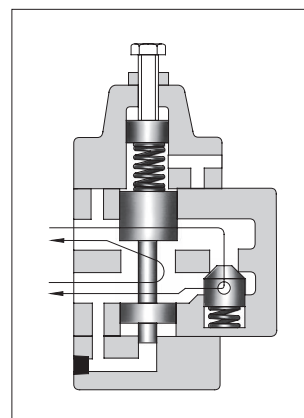
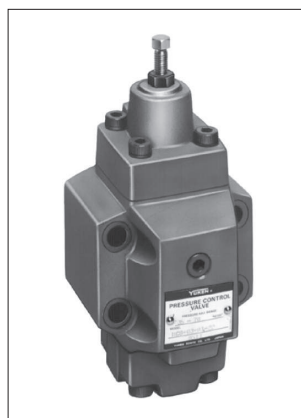
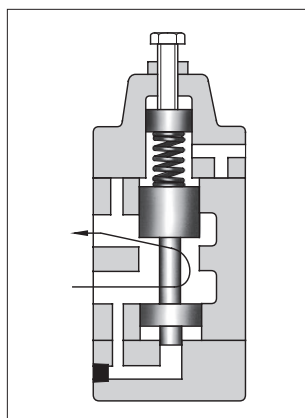
These valves are hydraulically damped, direct operated, pressure control valves which can be actuated by internal or external pilot pressure.

H Type Pressure Control Valves

There are various types of valve including sequence, unloading and low pressure relief valves.

HC Type Pressure Control Valves

They are available with integral check valves for use when free reverse flow from secondary port to the primary port is desired. There are various types of valve including sequence with check and counterbalance valves.



C
H/HC Type

Specifications

Series	Model Numbers		Max. Operating Pres. MPa	Max. Flow L/min	Approx. Mass kg	
	Threaded Connection	Sub-plate Mounting			H/HC Type	HG/HCG Type
H Type Pressure Control Valves	HT-03- * - * -22	HG-03- * - * -22	21	50	3.7	4.0
	HT-06- * - * -22	HG-06- * - * -22		125	6.2	6.1
	HT-10- * - * -22	HG-10- * - * -22		250	12.0	11.0
HC Type Pressure Control Valves	HCT-03- * - * -22	HCG-03- * - * -22	21	50	4.1	4.8
	HCT-06- * - * -22	HCG-06- * - * -22		125	7.1	7.4
	HCT-10- * - * -22	HCG-10- * - * -22		250	13.8	13.8

● For check valve pressure drops of HC type, see free flow pressure drop characteristics.

Yuken can offer flanged connection valves described below.
For details, contact us and request information.

Model Numbers	Max. Operating Pres. MPa	Max. Flow L/min
HF/HCF-10- * - * -22	21	250
HF/HCF-16- * - * -20		500

Model Number Designation

H	T	－03	－C	3	－P	－22	
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa	Valve Type★ ¹	With Auxiliary Pilot Pressure★ ²	Design Number	
H : H Type Pressure Control Valves	T : Threaded Connection	03	L : 0.25 - 0.45 M : 0.45 - 0.9 N : 0.9 - 1.8 A : 1.8 - 3.5 B : 3.5 - 7.0 C : 7.0 - 14	1	P : With Auxiliary Pilot Pressure	22	
		06				22	
		10				22	
	G : Sub-plate Mounting	03				22	
		06				22	
		10				22	
HC : HC Type Pressure Control Valves	T : Threaded Connection	03		2		P : With Auxiliary Pilot Pressure	22
		06					22
		10					22
	G : Sub-plate Mounting	03	22				
		06	22				
		10	22				

★1. For the details of valve types, see the following page.

★2. Models with auxiliary pilots are used where valves must be operated under a lower external pilot pressure than the adjusted pressure (types N, A, and B: about 1/8 of adjusted pressure; type C: about 1/16).

For combinations, see the chart below.

Combination List of Pres. Adj. Range and "P" Auxiliary Pilots.

Valve Type Pres. Adj. Range	Type 1				Type 2		Type 3		Type 4	
	HT, HG		HCT, HCG							
	Without P	With P	Without P	With P	Without P	With P	Without P	With P	Without P	With P
L	○	—	○	—	○	—	○	—	○	—
M	○	—	○	—	○	—	○	—	○	—
N	—	—	○	○	○	○	○	○	○	○
A	—	—	○	○	○	○	○	○	○	○
B	—	—	○	○	○	○	○	○	○	○
C	—	—	○	○	○	○	○	○	○	○

Instructions

- To adjust the pressure, loosen the lock nut and turn the pressure adjustment screw slowly clockwise to increase pressures or anti-clockwise to decrease pressures. After adjustments, do not forget to tighten the lock nut.
- Connect the secondary side pressure ports of types 1 and 4 (internal drain) and the drain ports of types 2 and 3 (external drain) directly to the reservoir with a back pressure close to the atmospheric pressure.

Accessories

Mounting Bolts

Valve Size Valve Model Numbers	03	06	10
HG	M10×50L : 4 Pcs.		M10×50L : 6 Pcs.
HCG	M10×70L : 4 Pcs.	M10×80L : 4 Pcs.	M10×100L : 6 Pcs.

Sub-plates

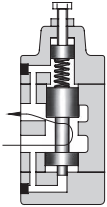
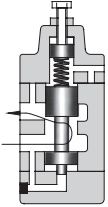
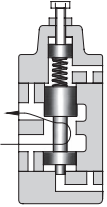
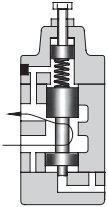
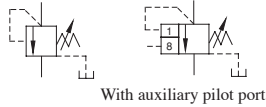
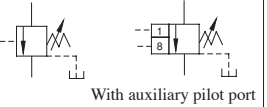
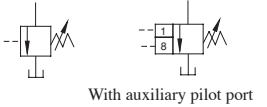
Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
HG/HCG-03- * *-22	HGM-03-20	3/8	1.6
	HGM-03X-20	1/2	
HG/HCG-03- * *-P-22	HGM-03-P-20	3/8	2.0
	HGM-03X-P-20	1/2	
HG/HCG-06- * *-22	HGM-06-20	3/4	2.4
	HGM-06X-20	1	3.0
HG/HCG-06- * *-P-22	HGM-06-P-20	3/4	2.4
	HGM-06X-P-20	1	3.0
HG/HCG-10- * *-22	HGM-10-20	1 1/4	4.8
	HGM-10X-20	1 1/2	5.7
HG/HCG-10- * *-P-22	HGM-10-P-20	1 1/4	4.8
	HGM-10X-P-20	1 1/2	5.7

● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1/16")

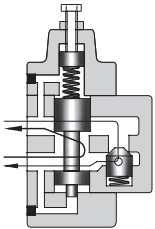
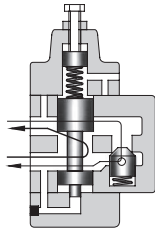
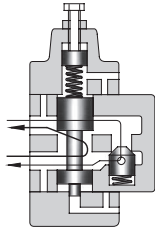
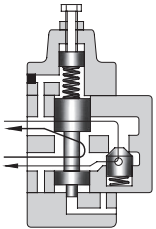
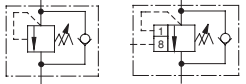
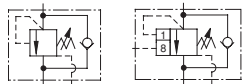
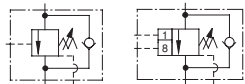
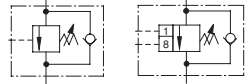
● The sub-plates are those for H Type Pressure Control Valves. For dimensions, see page C-32.

Valve Types

H Type

Valve Type	Type 1: Low Pressure Relief Valve	Type 2: Sequence Valve	Type 3: Sequence Valve	Type 4: Unloading Valve
Pilot-Drain Type	Internal Pilot-Internal Drain	Internal Pilot-External Drain	External Pilot-External Drain	External Pilot-Internal Drain
Operations				
Graphic Symbols		 With auxiliary pilot port	 With auxiliary pilot port	 With auxiliary pilot port
Descriptions	Can be used as low pressure relief valve, but be careful to occurrence of surge pressure.	Used to control the operational sequence of two or more actuators. If primary pressure exceeds the pressure setting, effective fluid is delivered to the secondary side.	Used for the same purpose as for the type 2. Operated by external pilot pressure irrespective of primary pressure.	Used as unloading valve. If external pilot pressure exceeds the pressure setting, the pump is turned no-load by releasing all fluid to the tank.

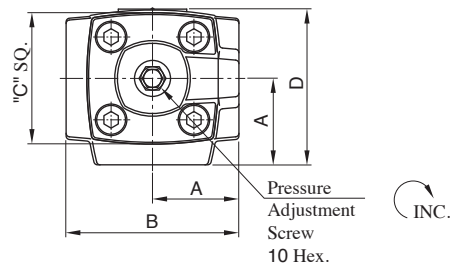
HC Type

Valve Type	Type 1: Counterbalance Valve	Type 2: Sequence and Check Valve	Type 3: Sequence and Check Valve	Type 4: Counterbalance Valve
Pilot-Drain Type	Internal Pilot-Internal Drain	Internal Pilot-External Drain	External Pilot-External Drain	External Pilot-Internal Drain
Operations				
Graphic Symbols	 With auxiliary pilot port	 With auxiliary pilot port	 With auxiliary pilot port	 With auxiliary pilot port
Descriptions	Used to prevent gravitational falls by generating a pressure on the actuator return side. If primary pressure exceeds the pressure setting, fluid is released to keep the pressure constant. Reversed flow is free by a check valve.	Used to control the operating sequence of two or more actuators. If primary pressure exceeds the pressure setting, effective fluid is delivered to the secondary side. Reversed flow is free by a check valve.	Used for the same purpose as for type 2. Operated by external pilot pressure irrespective of primary pressure. Reversed flow is free by a check valve.	Used for the same purpose as for type 1. Operated by external pilot pressure irrespective of primary pressure. Reversed flow is free by a check valve.

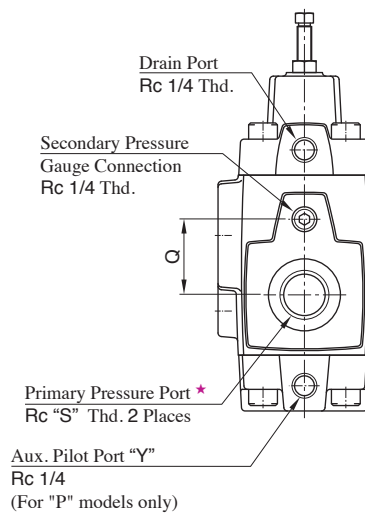
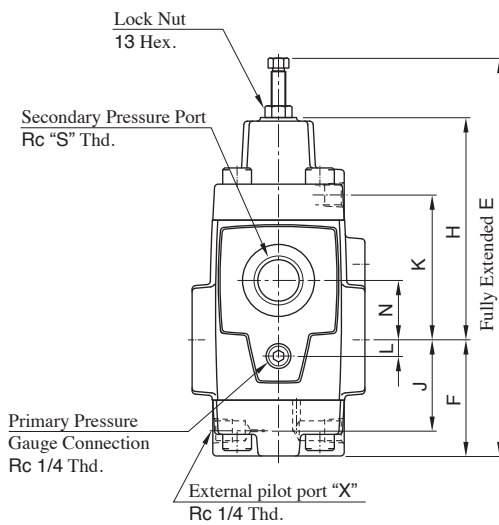
HT-03, 06, 10

Type 3: Sequence Valve

(External Pilot - External Drain)

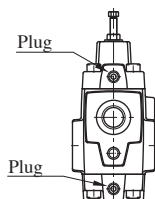


★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

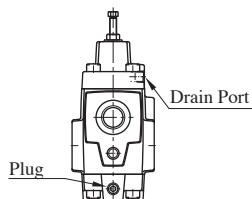


Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Q	S
HT-03	41	82	60	74	191	57	106	43	70	0	28	28	3/8
HT-06	48	96	73	87	221	64.5	123.5	50.5	80.5	9	33	42	3/4
HT-10	66	132	86	112	272	84	149	66	98	12	40	52	1 1/4

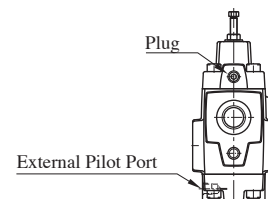
Type 1: Low Pressure Relief Valve (Internal Pilot - Internal Drain)



Type 2: Sequence Valve (Internal Pilot - External Drain)



Type 4: Unloading Valve (External Pilot - Internal Drain)

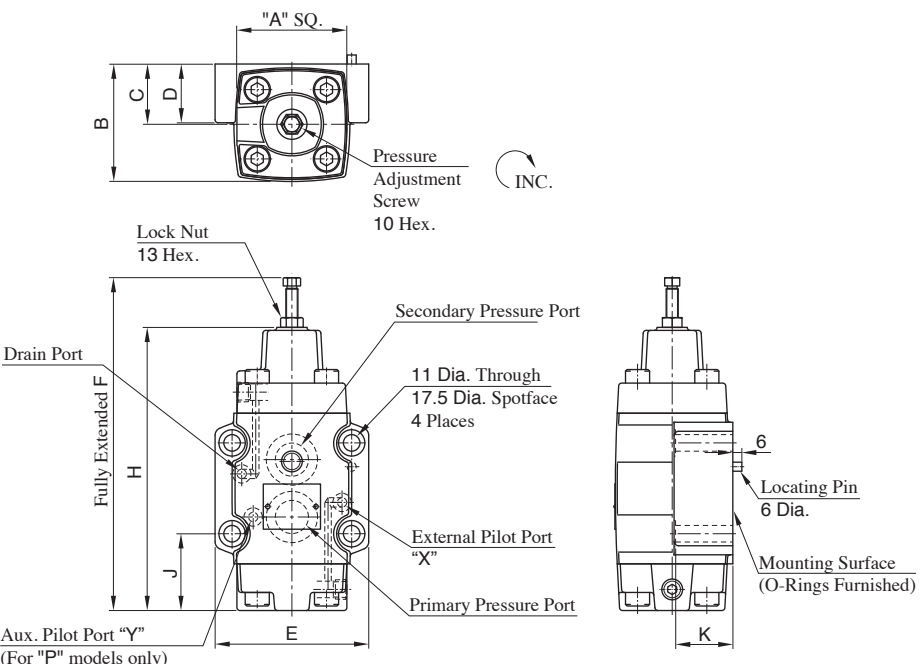


HG-03, 06

Type 3: Sequence Valve

(External Pilot - External Drain)

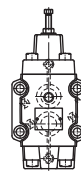
Mounting Surface
HG-03 : ISO 5781-06-07-0-00
HG-06 : ISO 5781-08-10-0-00



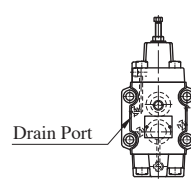
Model Numbers	A	B	C	D	E	F	H	J	K
HG-03	60	67	35	39	89	191	163	49.6	38
HG-06	73	79	40	39	102	221	188	51	38

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

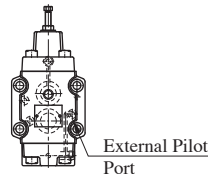
Type 1: Low Pressure Relief Valve
(Internal Pilot - Internal Drain)



Type 2: Sequence Valve
(Internal Pilot - External Drain)



Type 4: Unloading Valve
(External Pilot - Internal Drain)

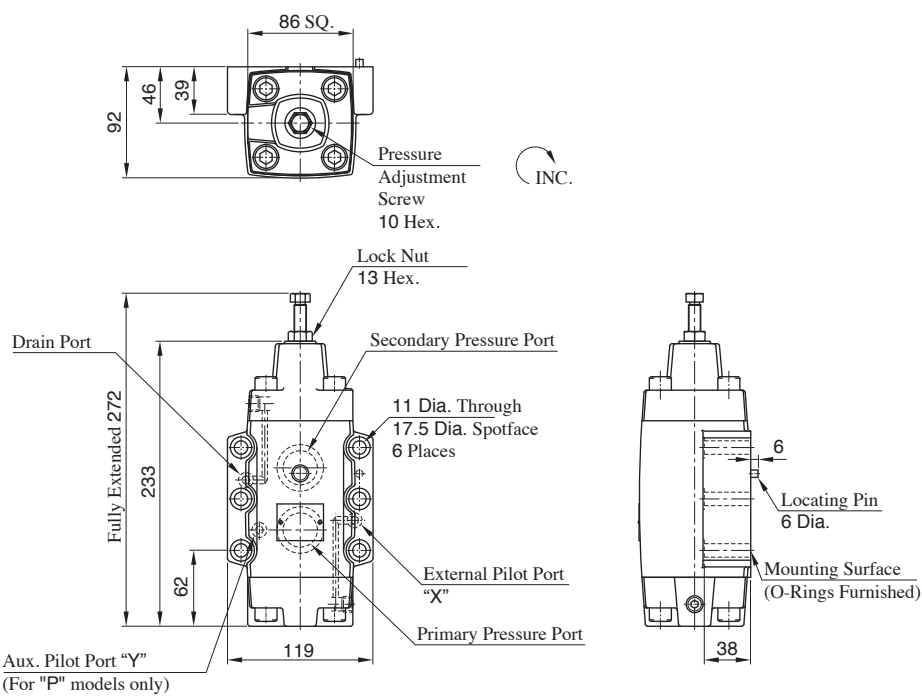


HG-10

Type 3: Sequence Valve

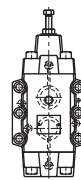
(External Pilot - External Drain)

Mounting Surface : ISO 5781-10-13-0-00

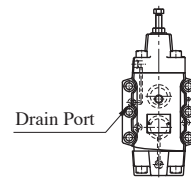


Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

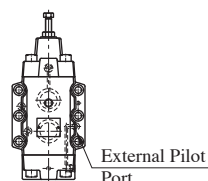
Type 1: Low Pressure Relief Valve
(Internal Pilot - Internal Drain)



Type 2: Sequence Valve
(Internal Pilot - External Drain)



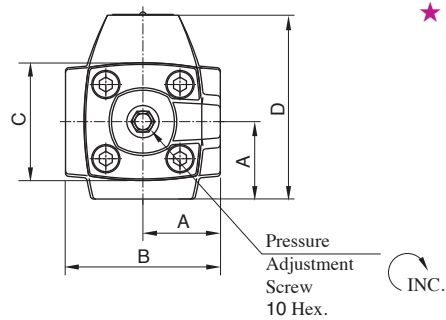
Type 4: Unloading Valve
(External Pilot - Internal Drain)



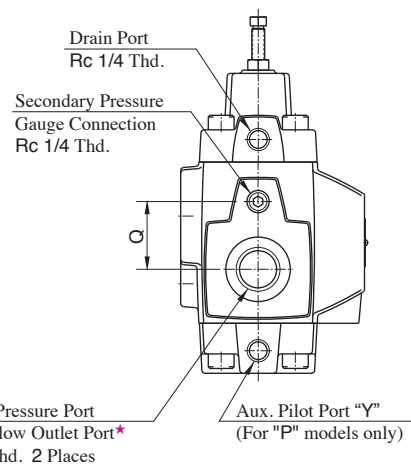
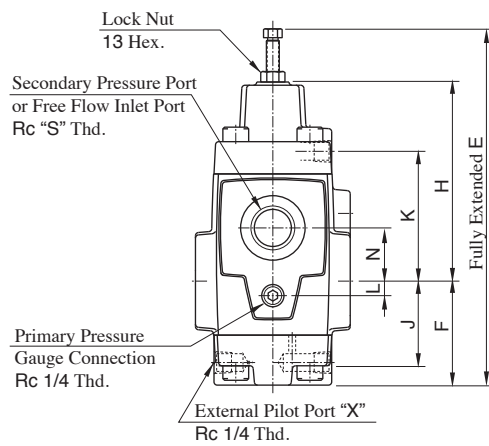
HCT-03, 06, 10

Type 3: Sequence and Check Valve

(External Pilot - External Drain)



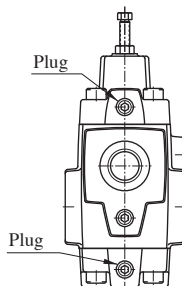
★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.



Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Q	S
HCT-03	41	82	60	96	191	57	106	43	70	0	28	28	3/8
HCT-06	48	96	73	116	221	64.5	123.5	50.5	80.5	9	33	42	3/4
HCT-10	66	132	86	152	272	84	149	66	98	12	40	52	1 1/4

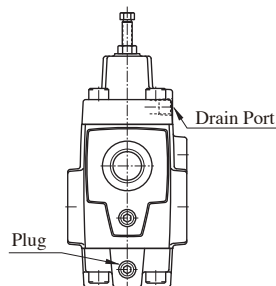
Type 1: Counterbalance Valve

(Internal Pilot - Internal Drain)



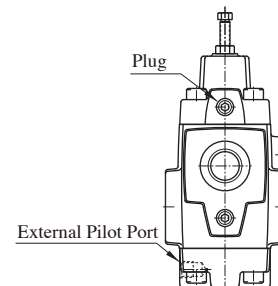
Type 2: Sequence and Check Valve

(Internal Pilot - External Drain)



Type 4: Counterbalance Valve

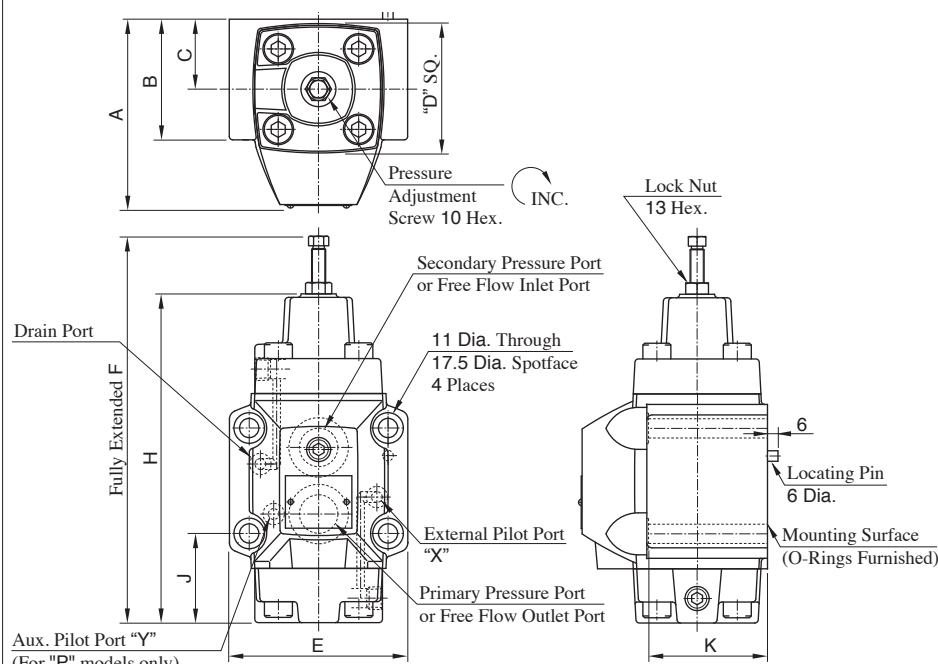
(External Pilot - Internal Drain)



HCG-03, 06

Type 3: Sequence and Check Valve
(External Pilot - External Drain)

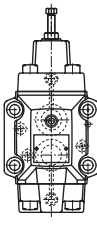
Mounting Surface
HCG-03 : ISO 5781-06-07-0-00
HCG-06 : ISO 5781-08-10-0-00



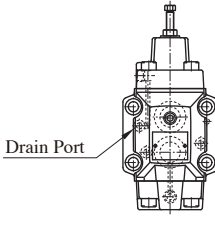
Model Numbers	A	B	C	D	E	F	H	J	K
HCG-03	90	59	35	60	89	191	163	49.6	58
HCG-06	108	69	40	73	102	221	188	51	68

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

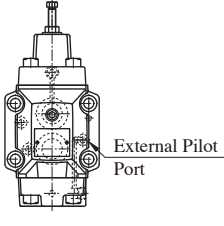
Type 1: Counterbalance Valve
(Internal Pilot - Internal Drain)



Type 2: Sequence and Check Valve
(Internal Pilot - External Drain)



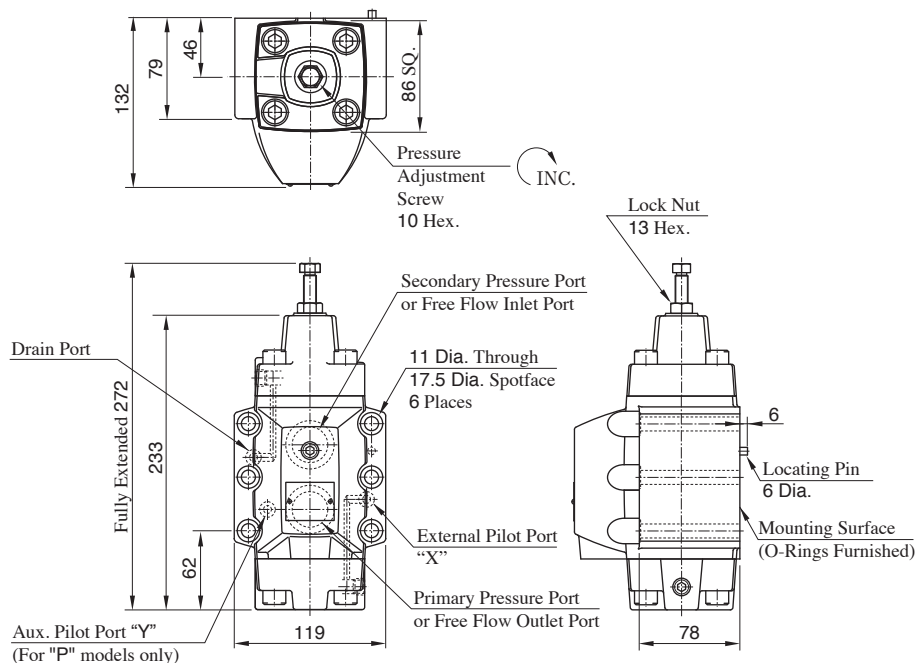
Type 4: Counterbalance Valve
(External Pilot - Internal Drain)



HCG-10

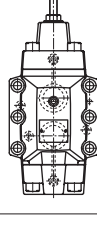
Type 3: Sequence Valve
(External Pilot - External Drain)

Mounting Surface : ISO 5781-10-13-0-00

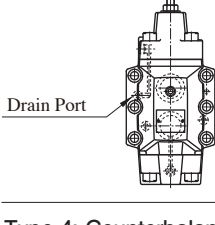


Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

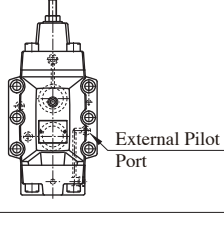
Type 1: Counterbalance Valve
(Internal Pilot - Internal Drain)



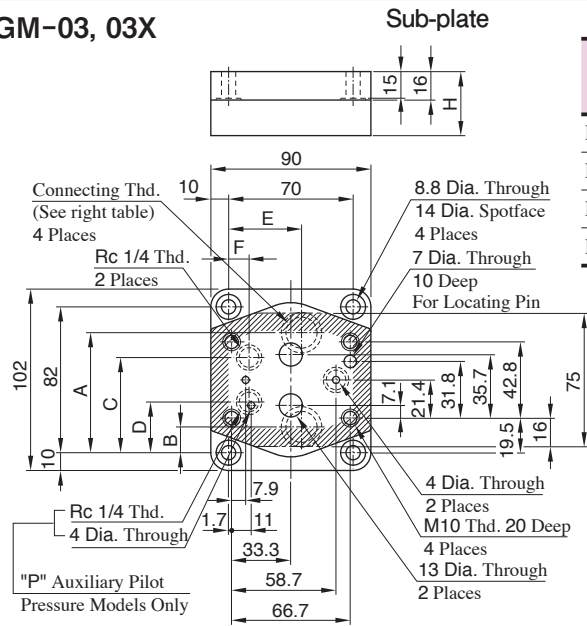
Type 2: Sequence and Check Valve
(Internal Pilot - External Drain)



Type 4: Counterbalance Valve
(External Pilot - Internal Drain)

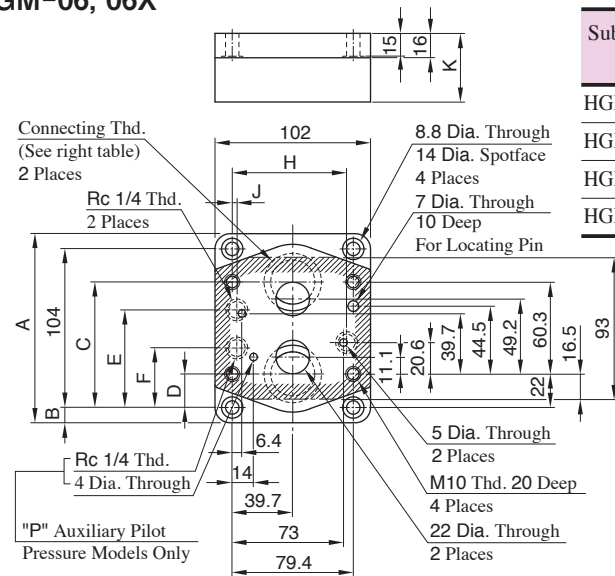


HGM-03, 03X



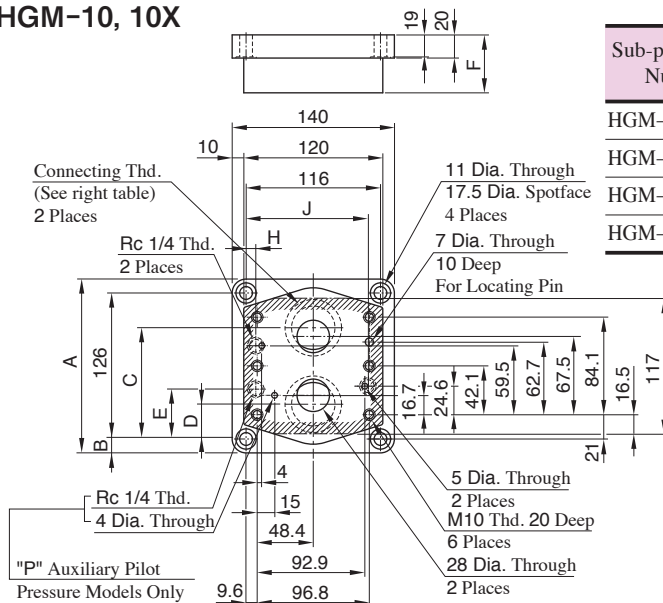
Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H
HGM-03-20	$\frac{3}{8}$	61	21	40.9	—	35	9.6	32
HGM-03X-20	$\frac{1}{2}$							
HGM-03-P-20	$\frac{3}{8}$	69.5	12.5	53.5	28.5	35	11.5	36
HGM-03X-P-20	$\frac{1}{2}$	67.5	14.5			41		

HGM-06, 06X



Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H	J	K
HGM-06-20	$\frac{3}{4}$	124	10	77	27	61.7	—	73	6.4	36
HGM-06X-20	1	136	16	82.3	22	61.7	—	75	6.4	45
HGM-06-P-20	$\frac{3}{4}$	124	10	77	27	64	39	73	3	36
HGM-06X-P-20	1	136	16	82.3	22	64	39	75	3	45

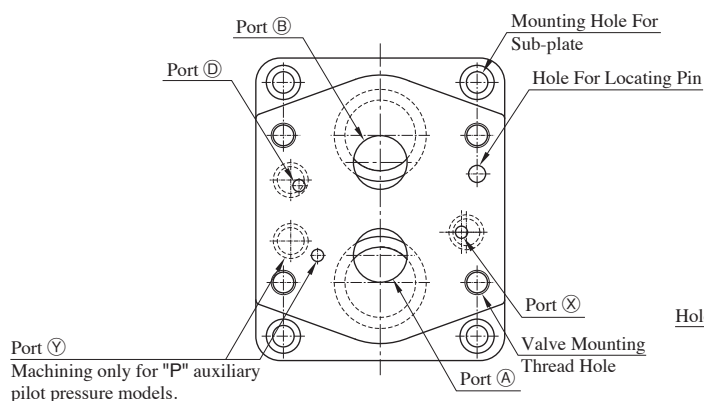
HGM-10, 10X



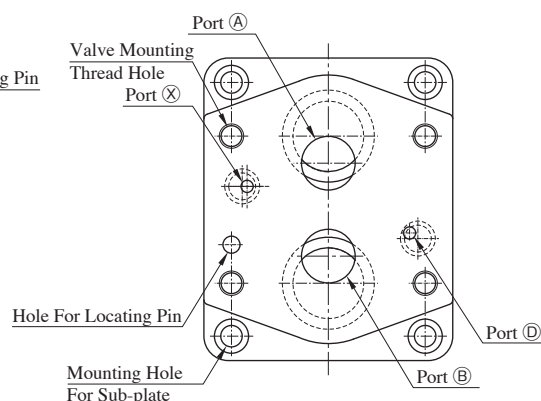
Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H	J
HGM-10-20	$1\frac{1}{4}$	150	12	96	30	—	45	13.6	102.5
HGM-10X-20	$1\frac{1}{2}$	177	25.5	104	22	—	50	13.6	102.5
HGM-10-P-20	$1\frac{1}{4}$	150	12	96	30	43	45	9.6	102.5
HGM-10X-P-20	$1\frac{1}{2}$	177	25.5	104	22	43	50	9.6	106

Instructions of HGM Type Sub-plates for Each Control Valves

HGM Type Sub-plates are used for H/HC Type Pressure Control Valves, and for Poppet Type Pressure Control Valves, Pressure Reducing Valves, Pressure Reducing and Check Valves, Pilot Operated Check Valves. See the table below about the connection between each ports and control valves, please use by these indications.



For HG · HCG · CP*G



For RG · RCG

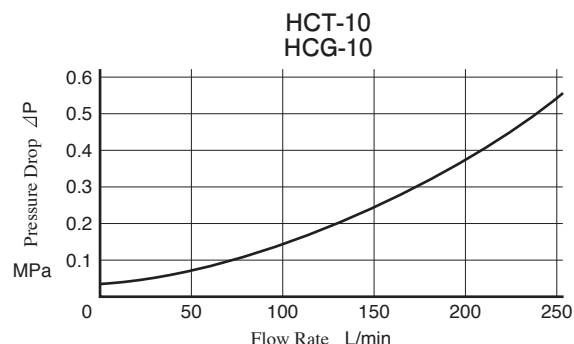
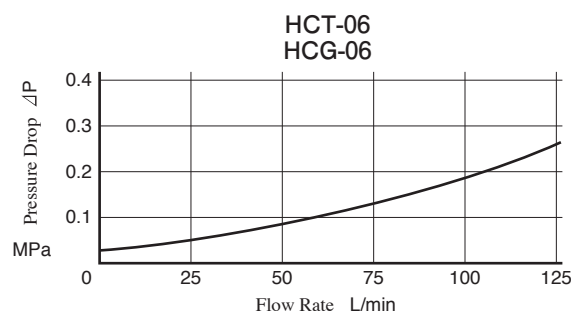
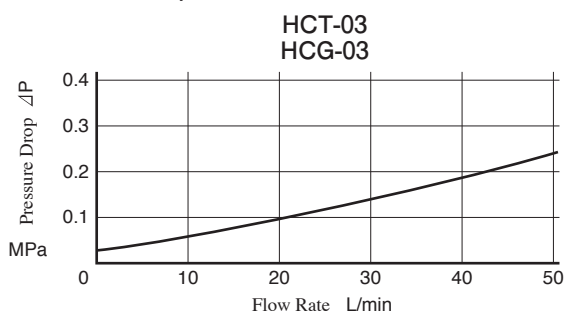
Name of Ports and Instructions

Name of Valves	Valve Model Numbers	Name of Ports				
		Port (A)	Port (B)	Port (D)	Port (X)	Port (Y)
H Type Pressure Control Valves	HG 03-06-10	Primary Pressure Port	Secondary Pressure Port	Drain Port	External Pilot Port	Auxiliary Pilot Port (For "P" models only)
HC Type Pressure Control Valves	HCG 03-06-10	Primary Pressure Port or Free Flow Outlet Port	Secondary Pressure Port or Free Flow Inlet Port	Drain Port	External Pilot Port	Auxiliary Pilot Port (For "P" models only)
Pressure Reducing Valves	RG 03-06-10	Primary Pressure Port	Secondary Pressure Port	Not Use	Drain Port	_____
Pressure Reducing and Check Valves	RCG 03-06-10	Primary Pressure Port or Free Flow Outlet Port	Secondary Pressure Port or Free Flow Inlet Port	Not Use	Drain Port	_____
Pilot Operated Check Valves	CP*G 03-06-10	Free Flow Inlet Port or Reversed Free Flow Outlet Port	Free Flow Inlet Port or Reversed Free Flow Outlet Port	Drain Port *	Pilot Port	_____

★ If use internal drain type valves, have to plug on the drain port (D) of sub-plates.

Pressure Drop for Reversed Free Flow

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



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

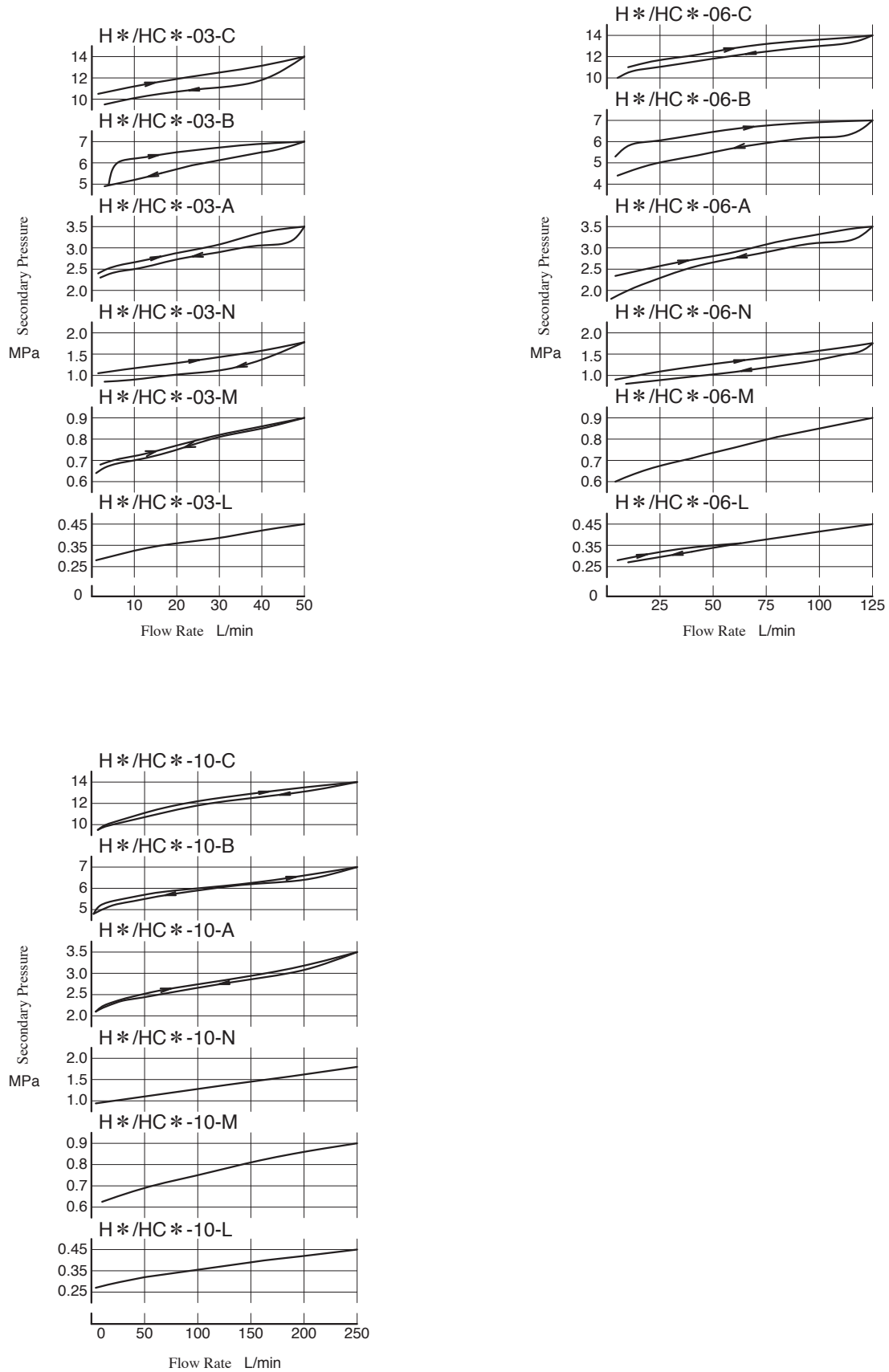
Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

● For any other specific gravity (G'), the pressure drop (P') may be obtained from the formula below.

$$\Delta P' = \Delta P (G'/0.850)$$

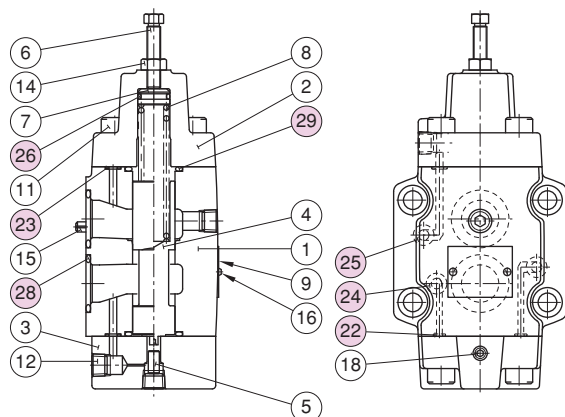
Nominal Override Characteristics

Hydraulic Fluid:
Viscosity 35 mm²/s, Specific Gravity 0.850



List of Seals

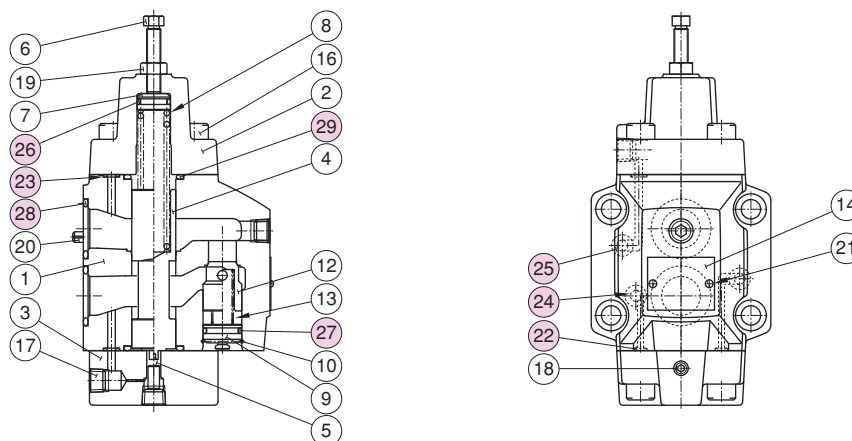
HT-03, 06, 10 HG-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.	
		HT HG -03	HT HG -06	HT HG -10	HT- *	HG- *
22	O-Ring	OR NBR-90 P4-N	OR NBR-90 P4-N	OR NBR-90 P4-N	—	3 *
23	O-Ring	OR NBR-90 P6-N	OR NBR-90 P6-N	OR NBR-90 P6-N	4	4
24	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	—	1 *
25	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	—	2
26	O-Ring	OR NBR-70-1 P11-N	OR NBR-70-1 P15-N	OR NBR-70-1 P20-N	1	1
28	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	—	2
29	O-Ring	OR NBR-90 P22-N	OR NBR-90 P28-N	OR NBR-90 P36-N	2	2

★ Used only for models with auxiliary pilot pressure (P).

HCT-03, 06, 10 HCG-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.	
		HCT HCG -03	HCT HCG -06	HCT HCG -10	HCT- *	HCG- *
22	O-Ring	OR NBR-90 P4-N	OR NBR-90 P4-N	OR NBR-90 P4-N	—	3 *
23	O-Ring	OR NBR-90 P6-N	OR NBR-90 P6-N	OR NBR-90 P6-N	4	4
24	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	—	1 *
25	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	—	2
26	O-Ring	OR NBR-70-1 P11-N	OR NBR-70-1 P15-N	OR NBR-70-1 P20-N	1	1
27	O-Ring	OR NBR-90 P12-N	OR NBR-90 P18-N	OR NBR-90 P22A-N	1	1
28	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	—	2
29	O-Ring	OR NBR-90 P22-N	OR NBR-90 P28-N	OR NBR-90 P36-N	2	2

★ Used only for models with auxiliary pilot pressure (P).

Pressure Reducing Valves

Pressure Reducing and Check Valves

Pressure reducing valves are used to set the pressure of a hydraulic circuit below that of the main circuit. In addition, operation under remote control is possible by using the remote control port. Pressure reducing and check valves have check valves, which allow a free flow from the secondary side to the primary.

Specifications

Model Numbers		Max. Operating Pres. MPa	Max. Flow* ¹		Drain* ² Flow L/min	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting		Setting Pressure MPa	Max. Flow L/min		R * T Type	R * G Type
RT RCT	-03- * -22	RG RCG	0.7 - 1.0	40	0.8 - 1.0	RT : 4.3 RCT : 4.8	RG : 4.5 RCG : 5.4
			1.0 - 20.5	50			
RT RCT	-06- * -22	RG RCG	0.7 - 1.0	50	0.8 - 1.1	RT : 6.9 RCT : 7.8	RG : 6.8 RCG : 8.1
			1.0 - 1.5	100			
			1.5 - 20.5	125			
RT RCT	-10- * -22	RG RCG	0.7 - 1.0	130	1.2 - 1.5	RT : 12.0 RCT : 13.8	RG : 11.0 RCG : 13.8
			1.0 - 1.5	180			
			1.5 - 10.5	220			
			10.5 - 20.5	250			

★1. The max. flow rates are those shown at the primary pressure at 21 MPa.

★2. The drain flow rates are equal to pilot flow rates when differential pressure between primary and secondary pressure is at 20.5 MPa.

Yuken can offer flanged connection valves described below.
For details, contact us.

Model Numbers	Max. Operating Pres. MPa	Max. Flow L/min
RF RCF	21	250
-10- * -22		
RF RCF	21	500
-16- * -20		

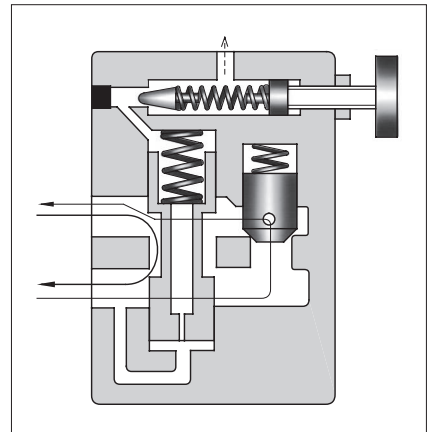
Model Number Designation

RC	T	-03	-B	-22
Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa	Design Number
R : Pressure Reducing Valves	T : Threaded Connection	03	B : 0.7 - 7 C : 3.5 - 14 H : 7 - 20.5	22
		06		22
		10		22
RC : Pressure Reducing and Check Valves	G : Sub-plate Mounting	03		22
		06		22
		10		22

Sub-plates

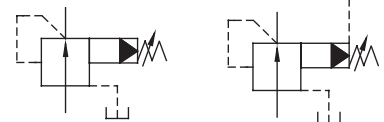
Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
RG RCG	HGM-03-20	3/8	1.6
	HGM-03X-20	1/2	
RG RCG	HGM-06-20	3/4	2.4
	HGM-06X-20	1	3.0
RG RCG	HGM-10-20	1 1/4	4.8
	HGM-10X-20	1 1/2	5.7

- Sub-plates are available. Specify the sub-plate model number from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. (1/8")
- The sub-plates are the same as those for H type pressure control valves. With the reducing and check valve, the sub-plate is used in a position 180° turned (upside down) from the normal position. When mounting the sub-plate, be sure to bring the valve locating pin to the sub-plate pin hole. For dimensions, see page C-32. For instruction details, see page C-33.



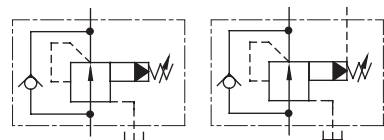
Graphic Symbols

RT · RG



Remote control connection

RCT · RCG



Remote control connection

Instructions

- To adjust the pressure, loosen the lock nut and turn the pressure adjustment handle slowly clockwise for higher pressures and anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Connect the drain port directly to the reservoir in which case the pressure at the drain port should be kept at a low back pressure close to the atmospheric pressure.

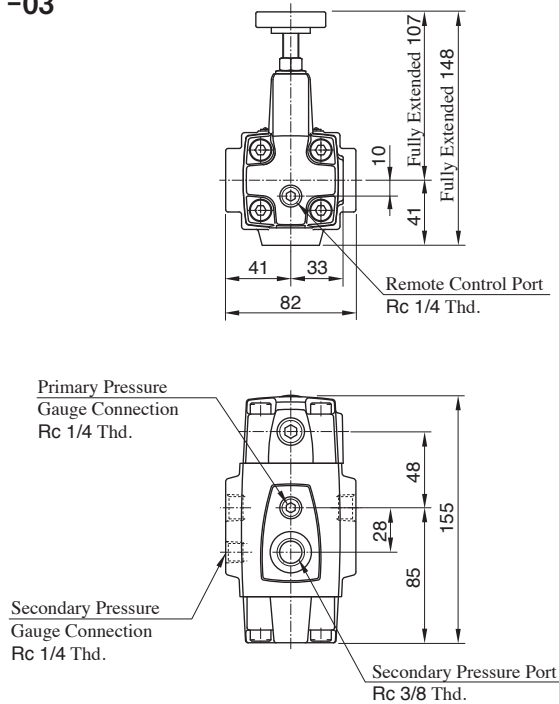
Accessories

Mounting Bolts

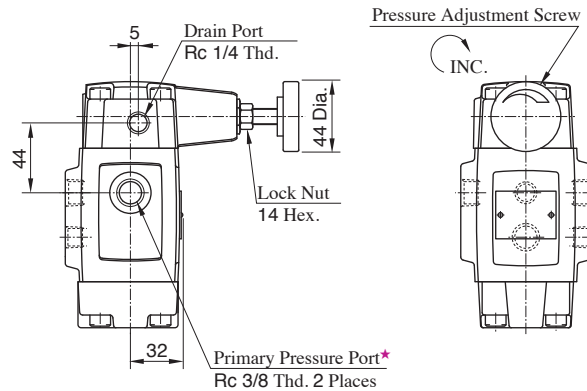
Valve Model Numbers	Socket Head Cap Screw
RG-03	M10x50L...4 Pcs.
RG-06	M10x50L...4 Pcs.
RG-10	M10x50L...6 Pcs.

Valve Model Numbers	Socket Head Cap Screw
RCG-03	M10x70L...4 Pcs.
RCG-06	M10x80L...4 Pcs.
RCG-10	M10x90L...6 Pcs.

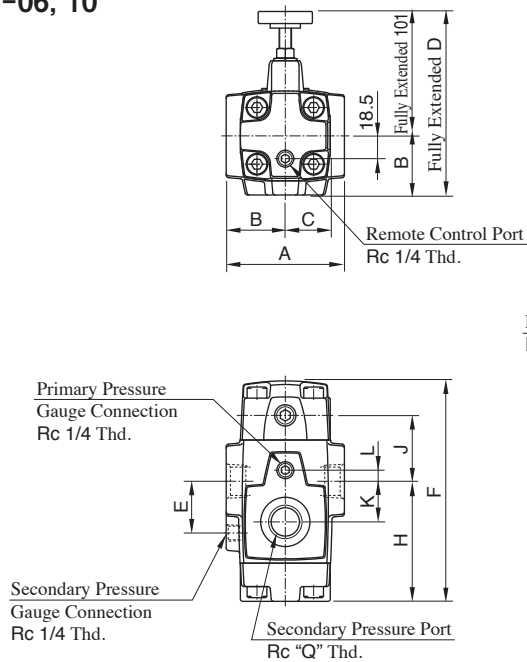
RT-03



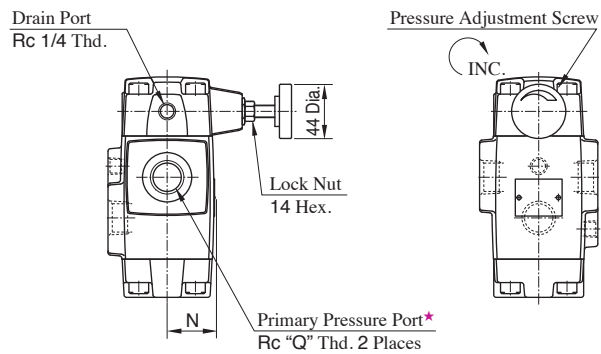
- ★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.



RT-06, 10

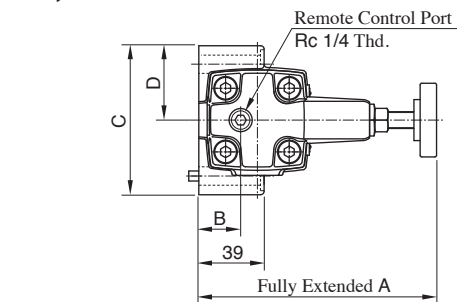


- ★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

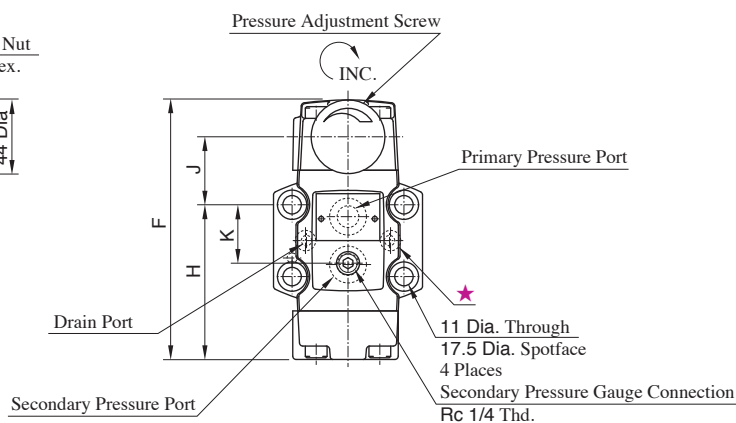
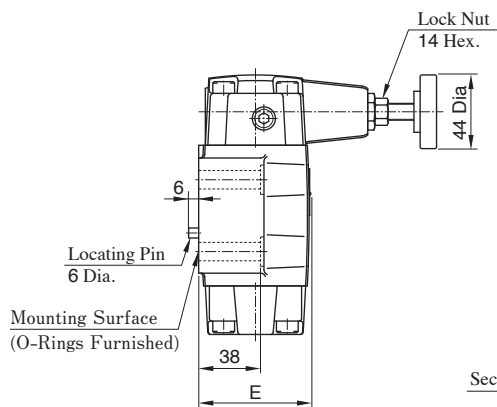


Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Q
RT-06	96	48	36.5	149	42	179	97.5	53.5	33	9	39	3/4
RT-10	132	66	43	167	52	216	124	64	40	12	46	1 1/4

RG-03, 06



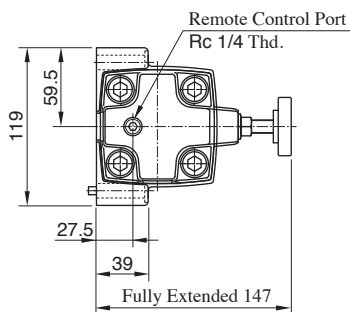
★ This port is well machined, but not required.
Because the body is used together with H type
pressure control valves.



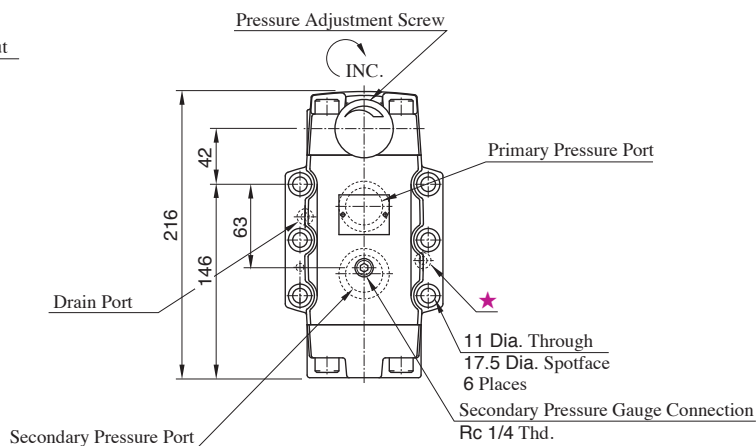
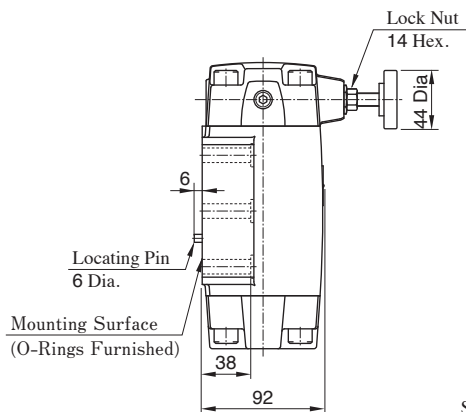
Model Numbers	A	B	C	D	E	F	H	J	K
RG-03	142	25	89	44.5	67	155.5	92.4	40.6	34.9
RG-06	141	21.5	102	51	79	179	111	40	48

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

RG-10

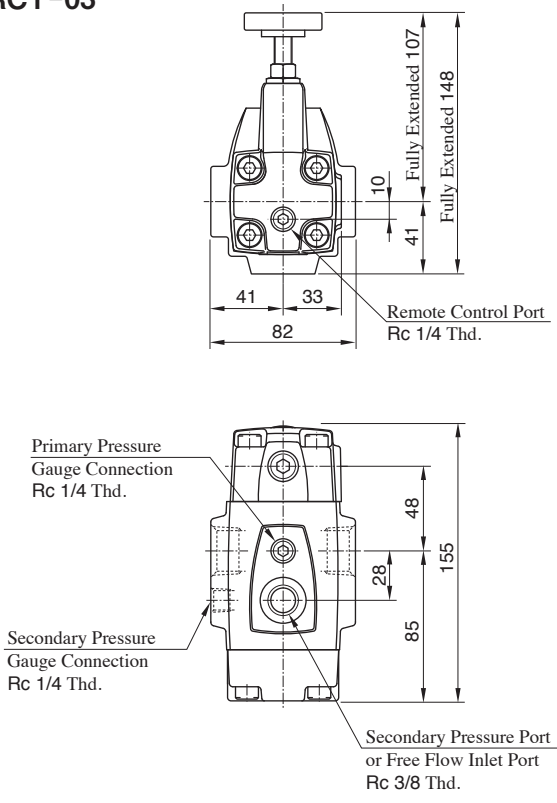


★ This port is well machined, but not required.
Because the body is used together with H type
pressure control valves.



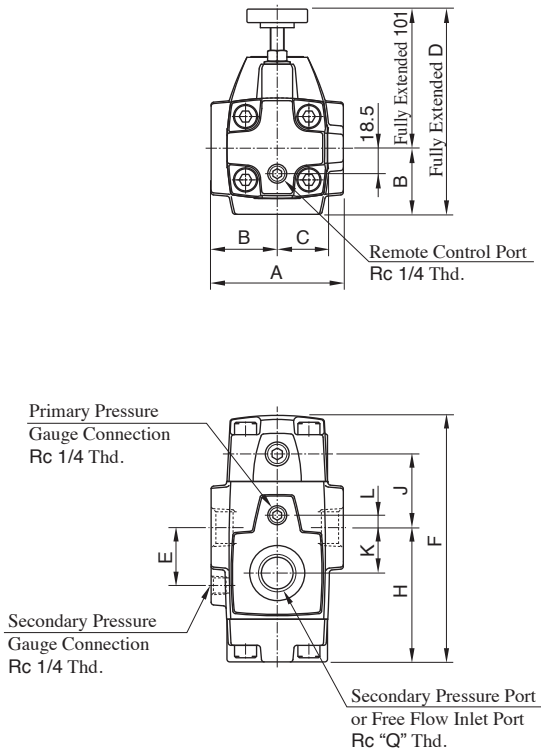
Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

RCT-03



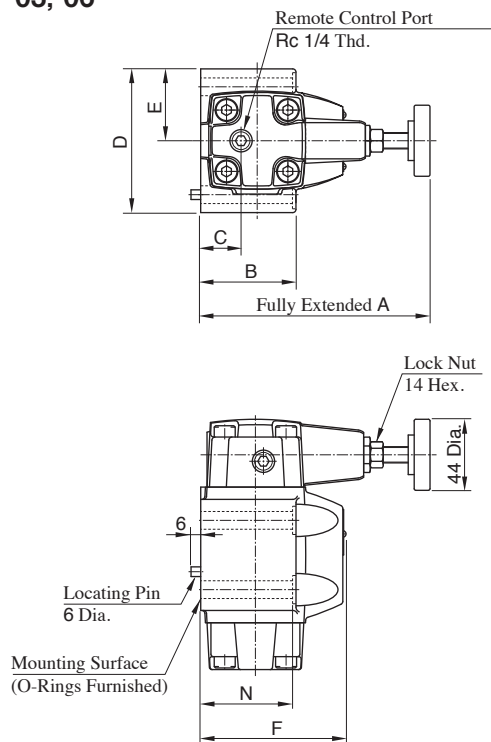
★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

RCT-06, 10

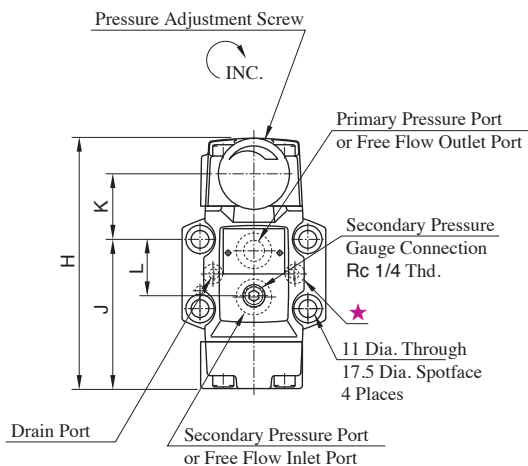


★ There are two threaded connection primary pressure ports. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

Model Numbers	A	B	C	D	E	F	H	J	K	L	N	Q
RCT-06	96	48	36.5	149	42	179	97.5	53.5	33	9	68	3/4
RCT-10	132	66	43	167	52	216	124	64	40	12	86	1 1/4

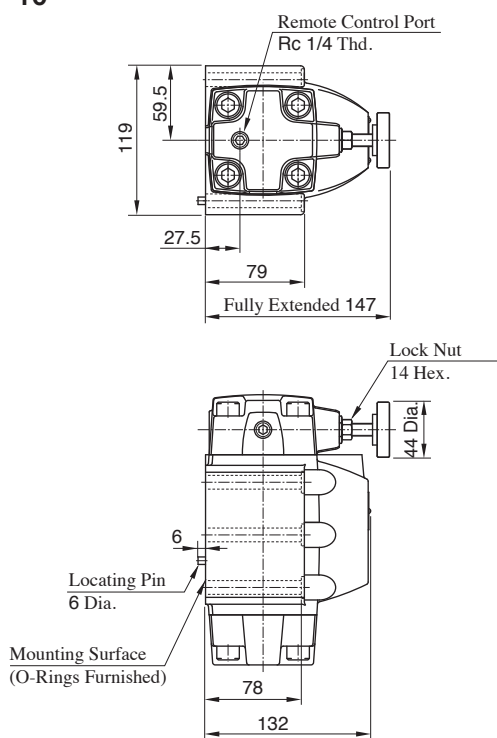
RCG-03, 06


★ This port is well machined, but not required.
Because the body is used together with HC type
pressure control valves.

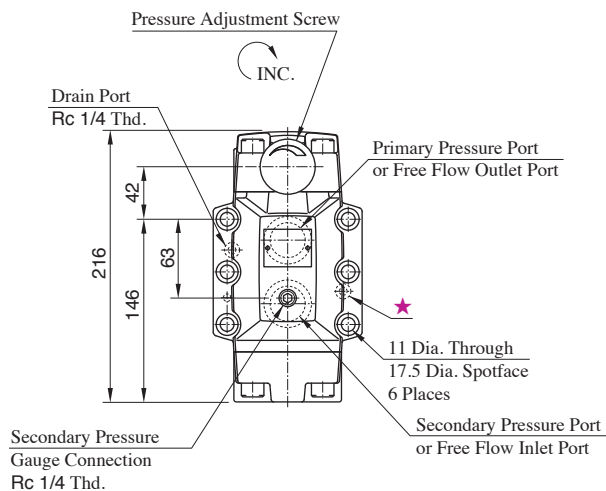


Model Numbers	A	B	C	D	E	F	H	J	K	L	N
RCG-03	142	59	25	89	44.5	90	155.5	92.4	40.6	34.9	58
RCG-06	141	69	21.5	102	51	108	179	111	40	48	68

Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

RCG-10


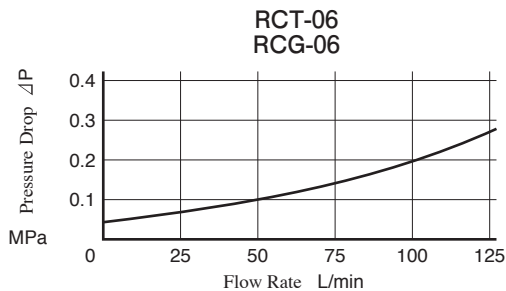
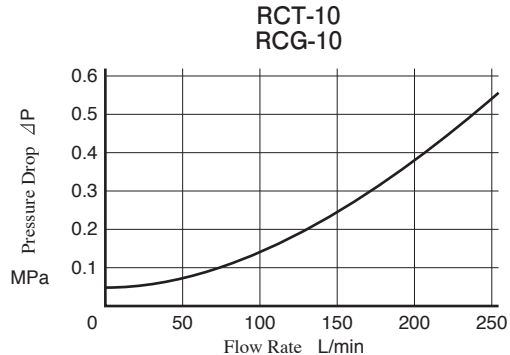
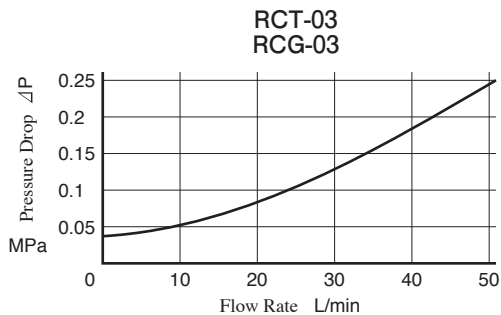
★ This port is well machined, but not required.
Because the body is used together with HC type
pressure control valves.



Note: For dimensions of the valve mounting surface, see the dimensional drawing (page C-32) of the sub-plate used together.

Pressure Drop for Reversed Free Flow

Hydraulic Fluid:
Viscosity 35 mm²/s, Specific Gravity 0.850



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

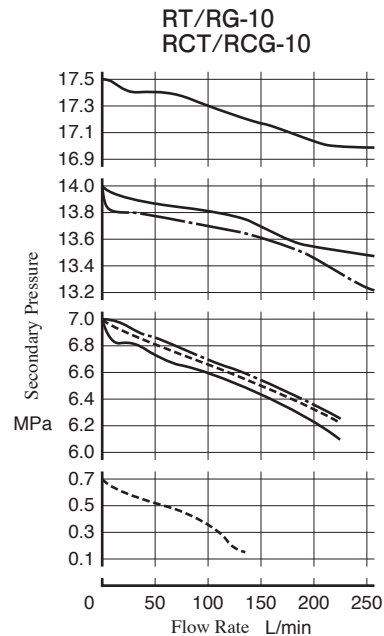
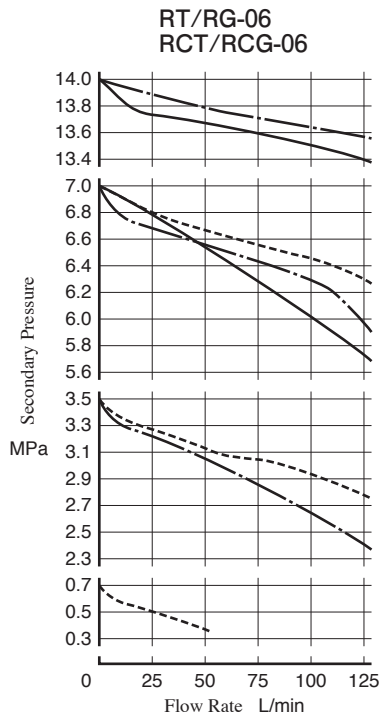
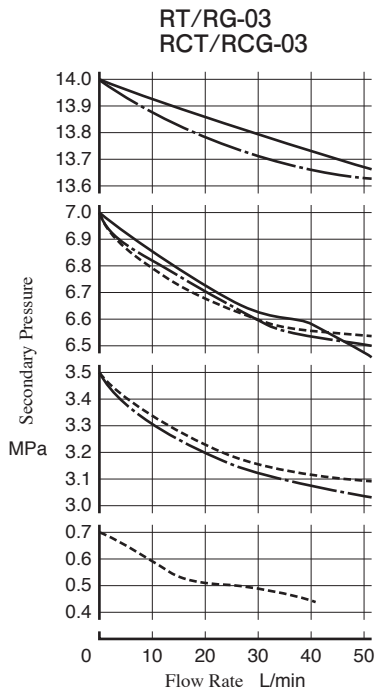
Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

● For any other specific gravity (G'), the pressure drop (P') may be obtained from the formula below.
 $\Delta P' = \Delta P (G'/0.850)$

Flow Rate vs. Secondary Pressure

Primary Pressure : 21 MPa

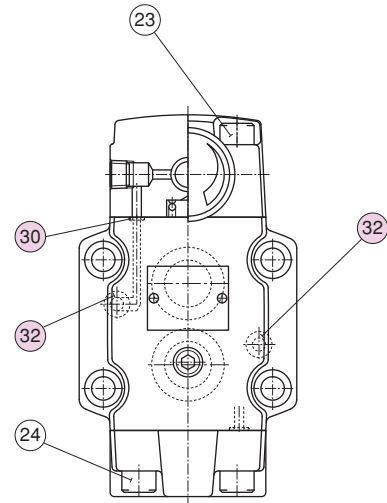
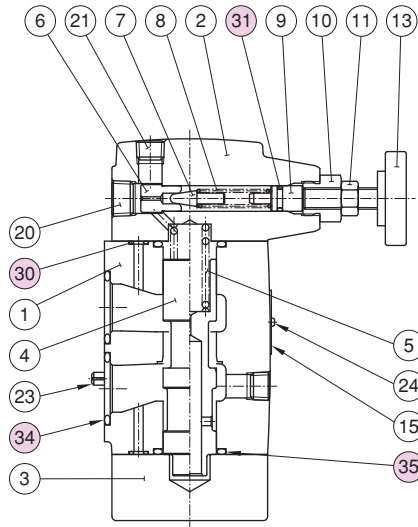
Hydraulic Fluid : Viscosity 35 mm²/s



Pressure Adj. Range
 - - - - - : "B"
 - · - · - : "C"
 ——— : "H"

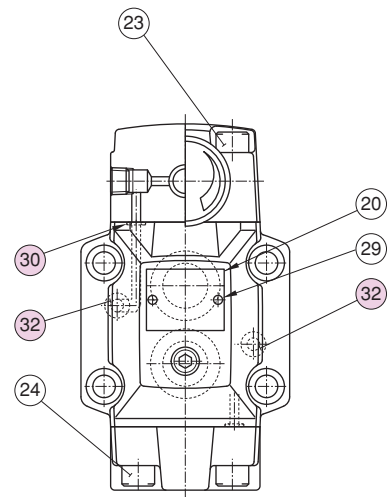
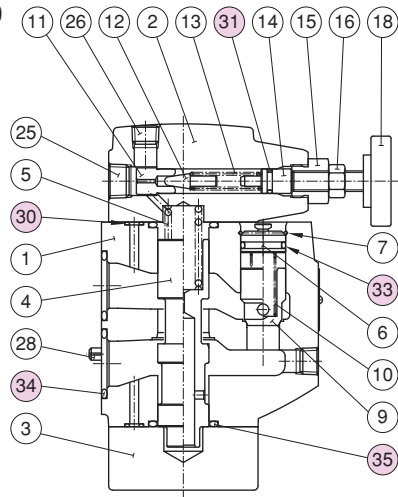
List of Seals

RT-03, 06, 10
RG-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.	
		RT RG -03	RT RG -06	RT RG -10	RT- *	RG- *
30	O-Ring	OR NBR-90 P6-N	OR NBR-90 P6-N	OR NBR-90 P6-N	4	4
31	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1	1
32	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	—	2
34	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	—	2
35	O-Ring	OR NBR-90 P22-N	OR NBR-90 P28-N	OR NBR-90 P36-N	2	2

RCT-03, 06, 10
RCG-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.	
		RCT RCG -03	RCT RCG -06	RCT RCG -10	RCT- *	RCG- *
30	O-Ring	OR NBR-90 P6-N	OR NBR-90 P6-N	OR NBR-90 P6-N	4	4
31	O-Ring	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	OR NBR-70-1 P9-N	1	1
32	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	—	2
33	O-Ring	OR NBR-90 P12-N	OR NBR-90 P18-N	OR NBR-90 P22A-N	1	1
34	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	—	2
35	O-Ring	OR NBR-90 P22-N	OR NBR-90 P28-N	OR NBR-90 P36-N	2	2

Pressure Reducing and Relieving Valves

Pressure reducing and relieving valves are composite pressure control valves having pressure reducing and counterbalancing functions developed for hydraulic balancing circuits.

Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min	Relieving Flow L/min	Drain Flow L/min	Approx. Mass kg
RBG-03- *-10	14	0.6 - 13.5	50	50	0.6 - 1	4.2
RBG-06- *-10	25	0.8 - 24.5	125	125	1.5 - 2	11

Model Number Designation

RB	G	-03	-R	-10
Series Number	Type of Mounting	Valve Size	Drain Type	Design Number
RB : Pressure Reducing and Relieving Valves	G : Sub-plate Mounting	03 06	None: Internal Drain R : External Drain	10

Instructions

- To use remote control relief valve in the venting circuit, see page C-3. If the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside diameter and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the pressure adjustment handle slowly clockwise for higher pressures and anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Connect the tank pipe not to any other line but directly to the reservoir.

Sub-plates

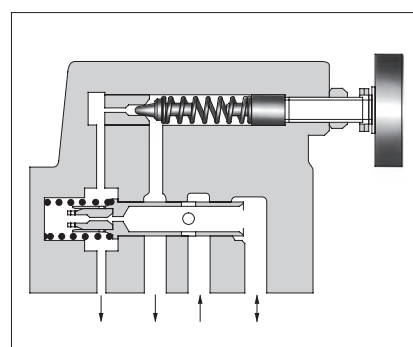
Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
RBG-03	RBGM-03-10	$\frac{3}{8}$	1.6
	RBGM-03X-10	$\frac{1}{2}$	
RBG-06	RBGM-06-10	$\frac{3}{4}$	4.8
	RBGM-06X-10	1	

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1}{16}$)

Accessories

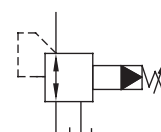
Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
RBG-03	M10×65L 4 pcs.
RBG-06	M10×70L 4 pcs.

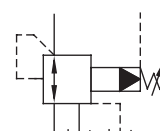
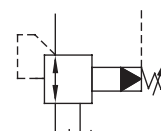
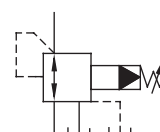


Graphic Symbols

Internal Drain

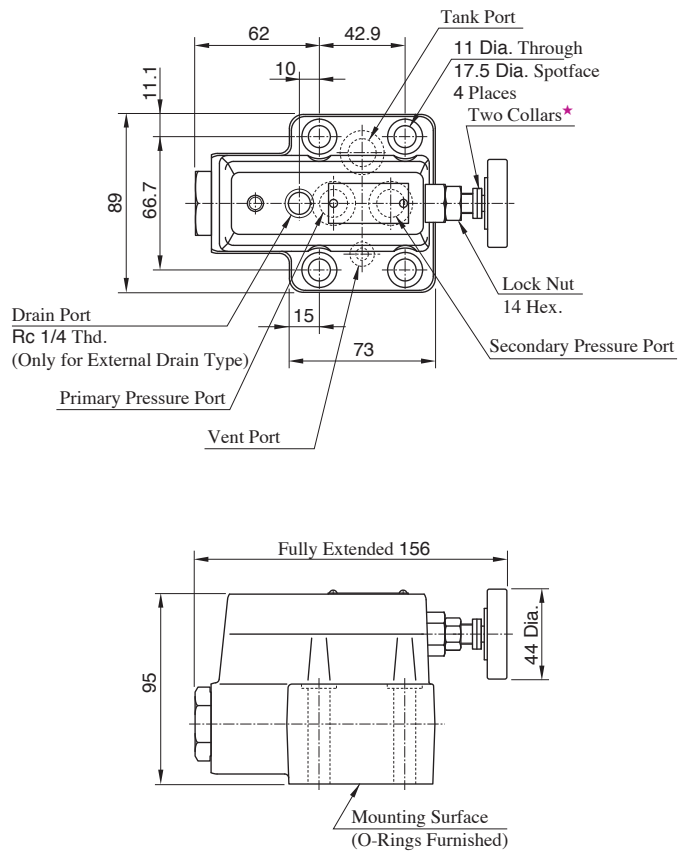


External Drain



Vent Connection

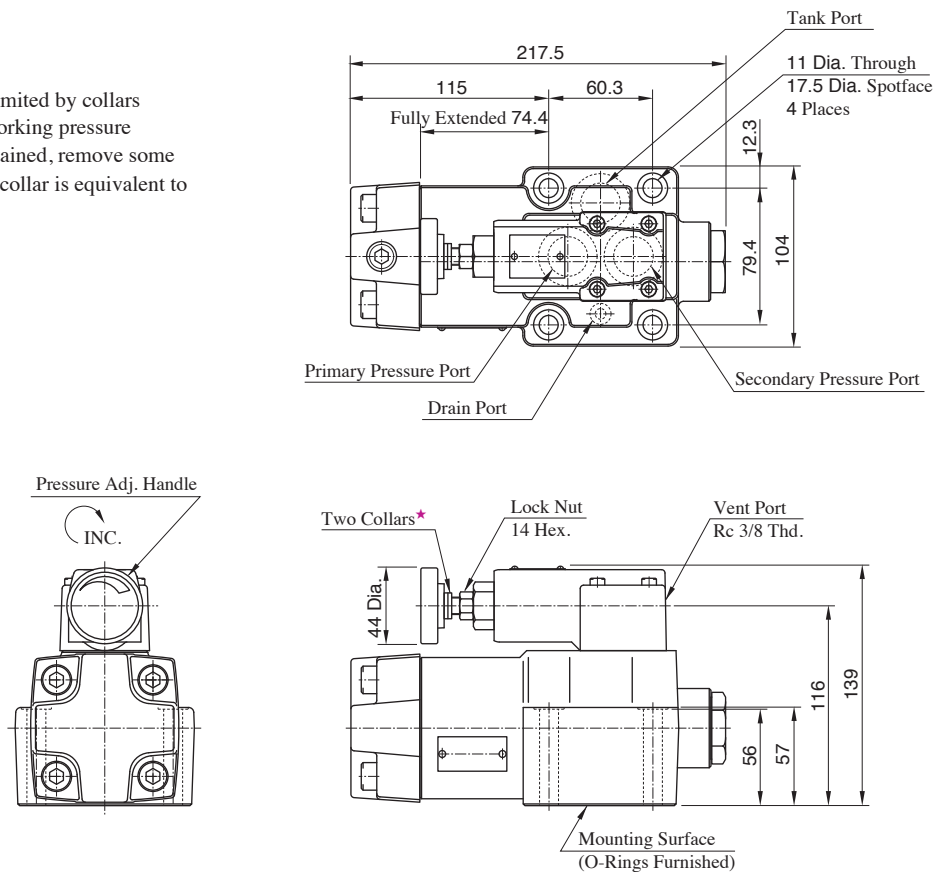
RBG-03



★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.

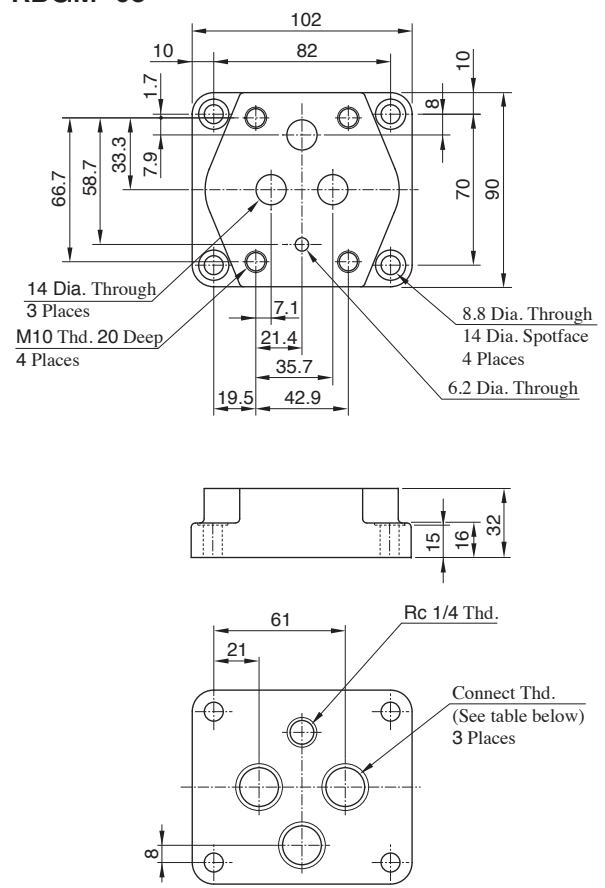
RBG-06

★ Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 10 MPa.



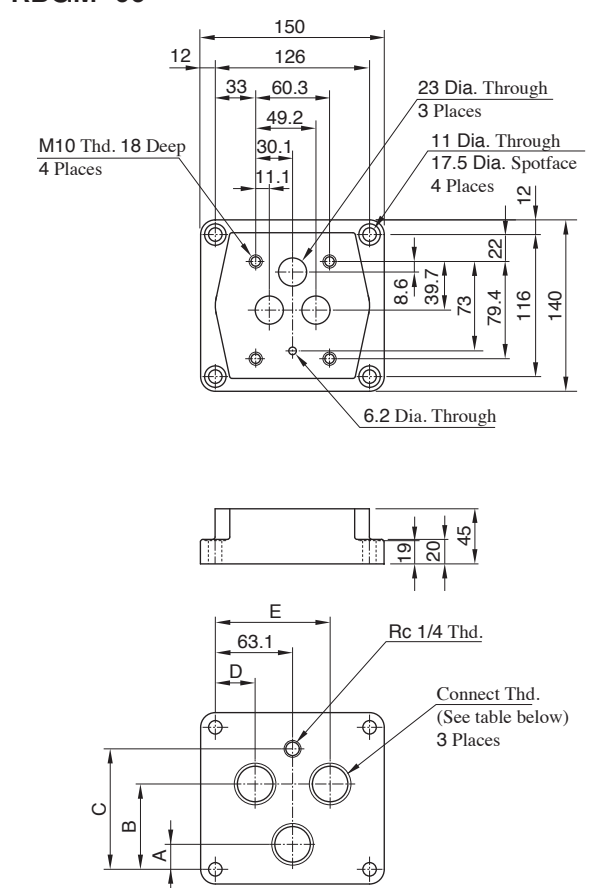
Sub-plate

RBGM-03 *



Sub-plate Model Numbers	Thread Size Rc
RBGM-03-10	3/8
RBGM-03X-10	1/2

RBGM-06 *

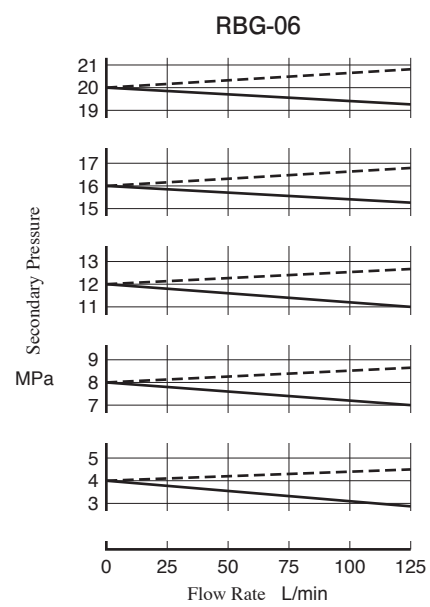
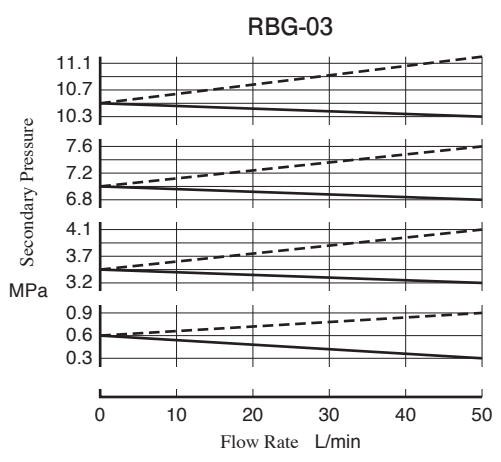


Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E
RBGM-06-10	3/4	20.7	65.7	95	37.1	89.1
RBGM-06X-10	1	20.4	69.7	98.4	32.5	93.8

Nominal Override Characteristics

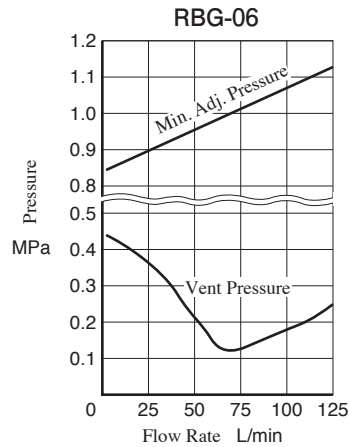
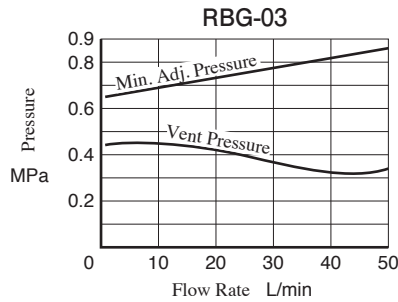
Hydraulic Fluid: Viscosity 35 mm²/s
Specific Gravity 0.850

--- Relieving
— Reducing



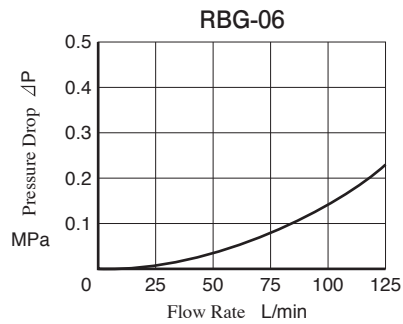
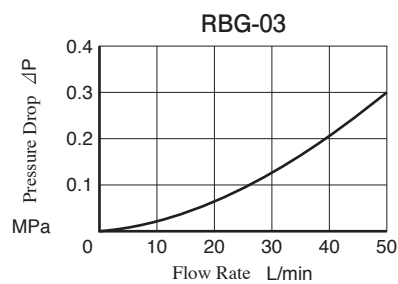
Min. Adj. Pressure & Vent Pressure

Hydraulic Fluid: Viscosity 35 mm²/s
Specific Gravity 0.850



Pressure Drop

Hydraulic Fluid: Viscosity 35 mm²/s
Specific Gravity 0.850

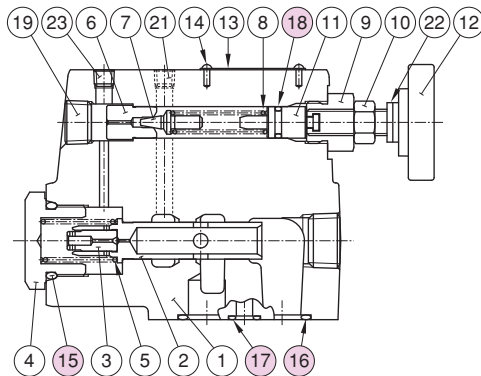


- For any other viscosity, multiply the factors in the table right.
- For any other specific gravity (G'), the pressure drop (P') may be obtained from the formula below.
 $\Delta P' = \Delta P (G'/0.850)$

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

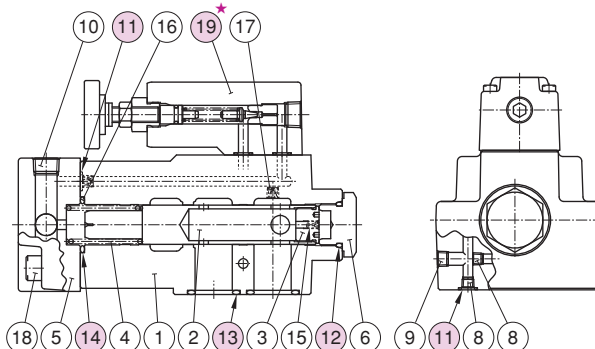
List of Seals

RBG-03



Item	Name of Parts	Part Numbers	Qty.
15	O-Ring	OR NBR-90 P24-N	1
16	O-Ring	OR NBR-90 P18-N	3
17	O-Ring	OR NBR-90 P9-N	1
18	O-Ring	OR NBR-70-1 P9-N	1

RBG-06



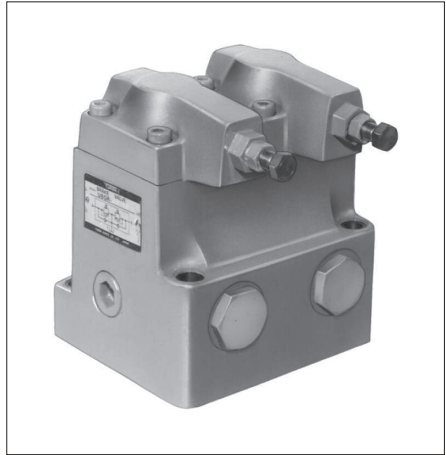
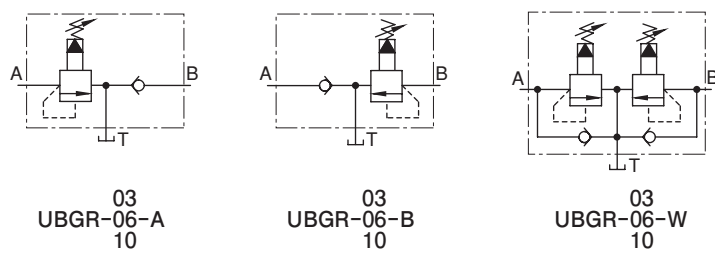
Item	Name of Parts	Part Numbers	Qty.
11	O-Ring	OR NBR-90 P9-N	2
12	O-Ring	OR NBR-90 P24-N	1
13	O-Ring	OR NBR-90 P28-N	3
14	O-Ring	OR NBR-90 P30-N	1

★ For details of pilot relief valves item 19, see page C-4, DG-01.

Brake Valves

Brake valves are used on hydraulic cylinders and in brake circuits of hydraulic motors. They can brake with any pressure, permitting smooth stopping.

Graphic Symbols



Specifications

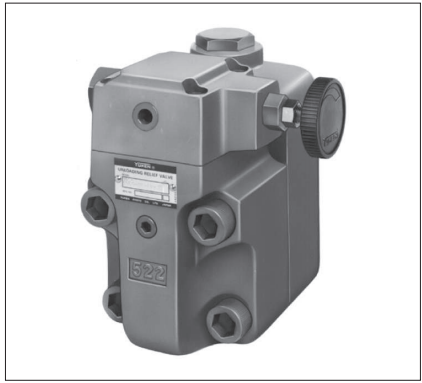
Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min
UBGR-03-* -B-20	25	0.7 - 7.0	50
UBGR-03-* -H-20		3.5 - 25	
UBGR-06-* -20		0.7 - 25	125
UBGR-10-* -20		0.7 - 25	200

Unloading Relief Valves

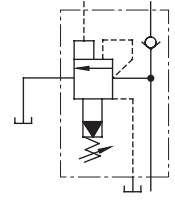
These valves are used to operate the pumps with minimum load in accumulator circuits or in high-low pump circuits.

Specifications

Model Numbers	Max. Operating Pres. MPa	Pres. Adj. Range MPa	Max. Flow L/min
BUCG-06-* *-30	21	B : 2.5 - 7.0	125
		C : 3.5 - 14	
BUCG-10-* *-25		H : 7.0 - 21	250



Graphic Symbol



———— For details about Brake Valves and Unloading Relief Valves, please contact us. ————

Semiconductor Type Pressure Switches

These pressure switches have built-in electronic circuit on a semiconductor pressure sensor and an open collector insulated by a photocoupler has been used as output. As the use of semiconductor has put movable parts away from the sensor section, high reliability and durability can be obtained.

These pressure switches are suitable for the applications not only compact, light weight and vibration-proof are required but also better substitute to conventional pressure switches.

Model Number Designation

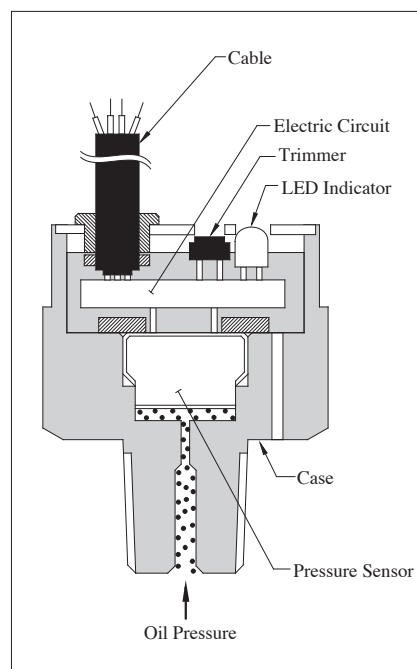
J	T	-02	-100	-11
Series Number	Type of Mounting	Valve Size	Max. Setting Pressure MPa	Design Number
J : Semiconductor Type Pressure Switch	T : Threaded Connection	02	35 : 3.5 100 : 10 200 : 20 350 : 35	11

Model Numbers		JT-02 -35-11	JT-02 -100-11	JT-02 -200-11	JT-02 -350-11
Descriptions					
Max. Operating Pressure	MPa	10	10	20	35
Proof Pressure	MPa	20	20	40	50
Pressure Setting Range	MPa	0.1 - 3.5	1 - 10	2 - 20	3.5 - 35
Pressure Setting (ON Pressure Setting)		Single adjustment: ON trimmer setting (variable resistor)*			
Differential Pressure Setting (OFF Pressure Setting)		Single adjustment: DIFF trimmer setting * (-1 to -10% of the ON pressure setting)			
Sign on act		When the ON pressure, the LED indicator lights.			
Output System		Open collector (photocoupler insulated) Maximum operating voltage : 35 VDC; maximum current: 100 mA			
Power Source		10 to 28 VDC (ripple included). A constant-voltage power supply must be used. Current consumption: 10 mA.			
Insulation Resistance		100 MΩ or more			
Response Time		1.5ms (no damper)	20 ms (damper contained)		
Repeatability		Approx. 0.5 %			
Operating Temperature Range		-20 - +70℃			
Setting Fluctuation with Temperature Drift		1% or less of the maximum operating pressure relative to 10 °C change			
Storage Temperature Range		-40 - +105℃			
Dust-proofness / Water-Proofness		IEC Pub. 529 IP54			
Vibration-resistance		98m/s ² (10 - 55 Hz) X direction : 2h, Y direction : 2h, Z direction : 2h			
Shock-resistance		98 m/s ²			
Mass		175g			

★ Trimmer Rotation Angle: 0 to 260°

Instructions

Voltage-proof test should not be carried out as semiconductor has been used.



Graphic Symbol

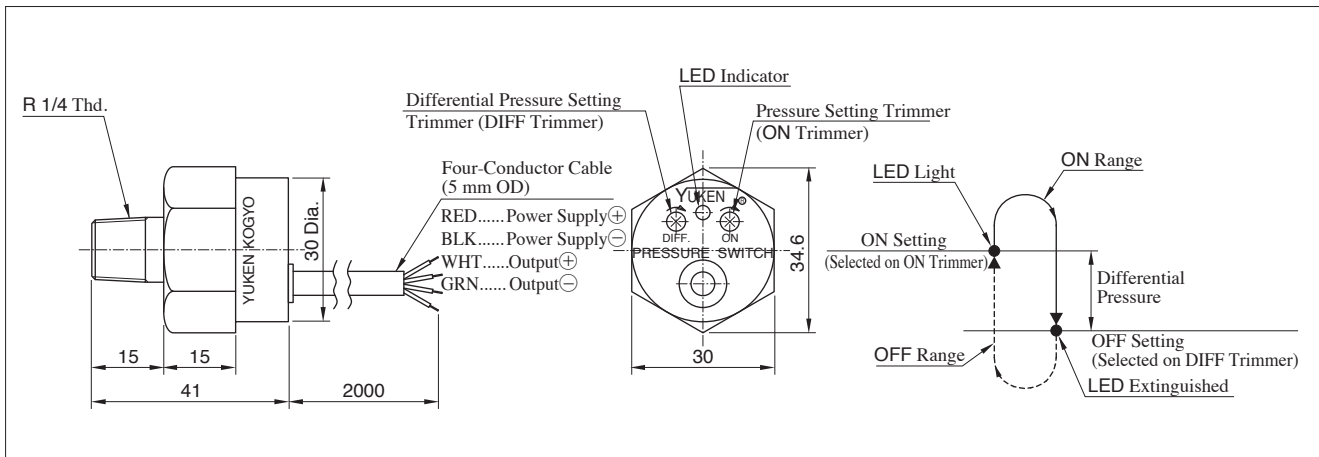


With Protect Cover

The models with protect cover those dust-proofness / water-proofness grade up to IP65 level is available.
(Example) JT-02-35-S-11

With Protect Cover

For details of the models with protect cover, please contact us.



Adjustment

1. Before starting, turn the ON and DIFF trimmers fully clockwise. (Trimmer Rotation Angle: 0 – 260°)
2. Turn on the power.
3. < ON pressure setting >
Apply required pressure to the switch. Turn ON trimmer slowly anti-clockwise and stop it when LED indicator lights, ON setting obtained.

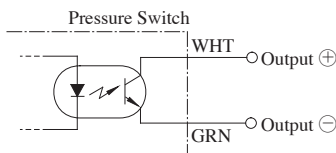
4. < Differential pressure setting >

Gradually reduce pressure to obtain the required OFF pressure. Then, turn DIFF trimmer anti-clockwise slowly and stop it when LED indicator goes off. The OFF setting is now obtained.

5. Make sure if "ON" or "OFF" setting is correct by working of LED indicator when applying or reducing pressure repeatedly several times.

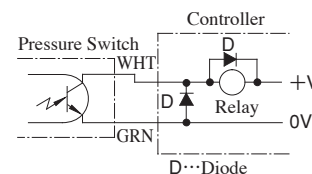
Application Examples of Electrical Circuit

Output Circuit of Semiconductor Type Pressure Switch (Internal Circuit)



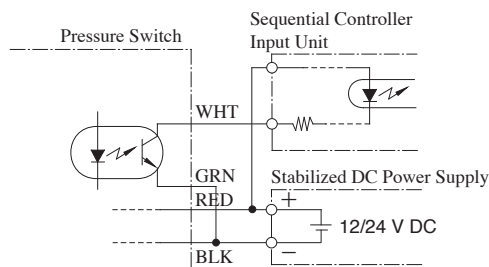
Direct Relay Drive

- Use relay operatable at 100 mA or lower.
- Connect surge voltage absorption diode (D) in parallel with the relay coil.
- Connect protective diode (D) between the white and green wires.

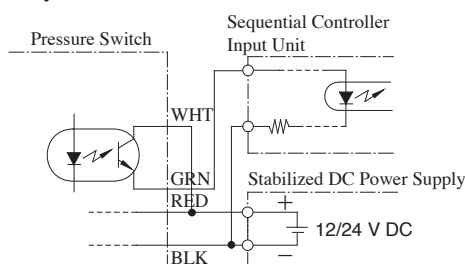


Connection to Sequential Controller

1. Sink System



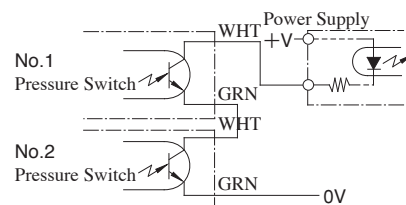
2. Source System



The usage below is possible because output circuit is insulated by a photocoupler.

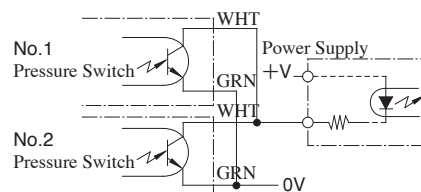
1. When AND circuit Two Pressures

The sequential controller is signaled only when pressure switches No. 1 and 2 are both ON.



2. When OR circuit two pressures

The sequential controller is signaled when either of pressure switches No. 1 and 2 is ON.



Pressure Monitoring System

The pressure monitoring system is for watching hydraulic system pressure and is composed of highly reliable pressure sensor (SJT*-02-10) and easy-to-use digital pressure monitor (DP*-*-10). There is no specific model number code for the pressure monitoring system itself, therefore, when ordering, specify the digital pressure monitor and pressure sensor with respective model number code.

Remote Pressure Indication

Even if the monitor is located away from the unit, remote pressure indication can be obtained by combination with special sensors.

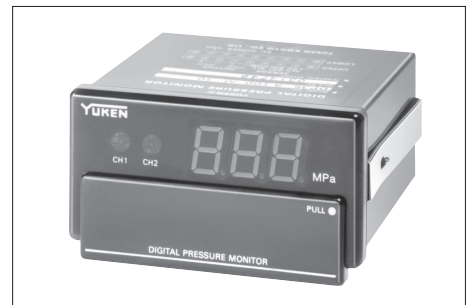
Remote-Setting Pressure Switches

The pressure sensor can be used as a pressure switch with two contacts: top and bottom. Pressure can be set and checked without using any other pressure gauge, moreover, such pressure setting and pressure check can be made when no pressure is applied in the hydraulic system.



Digital Pressure Monitors

The digital pressure monitor indicates the system pressure and also dispatches signals when the system pressure reaches to the preset pressure. The monitor can be separated from the sensor and installed away from the sensor. The monitor and the sensor so separately installed can be connected by wire, therefore, a long hydraulic piping is not required. The digital pressure monitor provides high accuracy when it is used with a special pressure sensor (SJT*-02-10).



Specifications

Model Numbers	Input Voltage	Output System	Pressure Setting
DP20-*-*-10	0 - 4.5V/0 - 19.6 MPa	Open-collection output × 2 40 V - 100 mA (max.)	Total 4 points: high (HI) and low (LO) limits for 2 channels (each set independently)
DP35-*-*-10	0 - 4.5V/0 - 34.3 MPa		

Pressure Sensors

The pressure sensor uses semiconductors and has no moving parts for high reliability and durability.

It provides high accuracy when combined with the special monitor (DP*-*-10)

Specifications

Model Numbers	Rated Pres. Range	Output Range [★]	Power Supply
SJT20-02-10	0 - 20 MPa	0.5 - 4.5V	DC 5.0±0.5V
SJT35-02-10	0 - 35 MPa		

★ Proportional to supply voltage if this voltage is 5.00 V



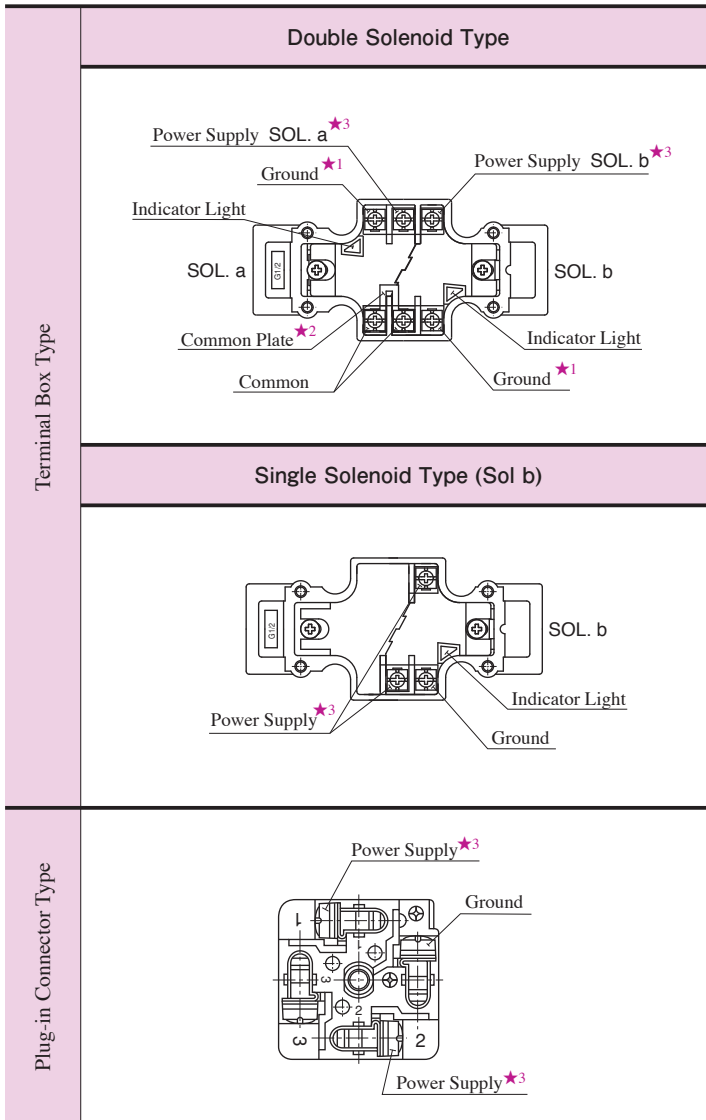
Graphic Symbol



—— For details about Pressure Monitoring System, please contact us. ——

Electrical Conduit Connection

Details of Receptacle

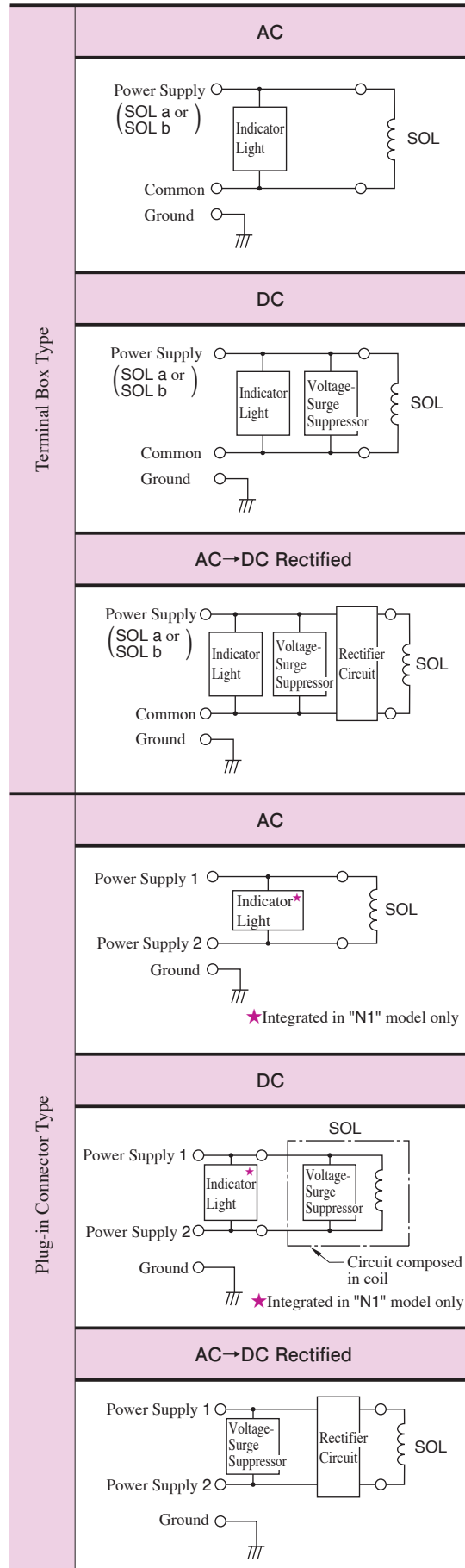


- ★1. There are two grounding terminals. You can use either one.
- ★2. If you do not need the common plate, remove it.
- ★3. With DC solenoids, polarity is no question.

DANGER

- Do not perform wiring while the power is on.
Doing so may result in electric shock, burns or death.
- Make the wiring properly. Improper wiring will cause an irregular movement of the machine, resulting in a grave accident.

Electrical Circuit (In Case of Single Solenoid Type)



Solenoid Ratings

Valve Type	Electric Source	Coil Type ^{★3}	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
				Source Rating	Serviceable Range	Inrush ^{★2} (A)	Holding (A)	Power (W)
Standard Type	AC ^{★1}	A100	50	100	80 - 110	2.42	0.51	—
			60	100	90 - 120	2.14	0.37	
				110		2.35	0.44	
		A120	50	120	96 - 132	2.02	0.42	
			60		108 - 144	1.78	0.31	
		A200	50	200	160 - 220	1.21	0.25	
			60	200	180 - 240	1.07	0.19	
				220		1.18	0.22	
		A240	50	240	192 - 264	1.01	0.21	
			60		216 - 288	0.89	0.15	
Shockless Type	DC (K Series)	D12	—	12	10.8 - 13.2	—	2.45	29
		D24		24	21.6 - 26.4		1.23	
		D48		48	43.2 - 52.8		0.61	
	AC→DC Rectified	R100	50/60	100	90 - 110	—	0.33	29
		R200		200	180 - 220		0.16	

★1. AC Solenoid

AC solenoid is not available in shockless type.

R type models with built-in current rectifier is recommended for shockless operation with AC power.

★2. Inrush Current

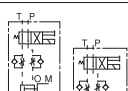
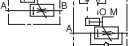
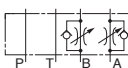
Inrush current in the above table show rms values at maximum stroke.

★3. There are more coil types other than the above. For details, please make inquiries.

The coil type numbers in the shaded column are handled as optional extras. In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

D

FLOW CONTROLS

Valve Type	Graphic Symbols	Maximum Operating Pressure MPa	Maximum Flow L/min														Page	
			1	2	3	5	10	20	30	50	100	200	300	500	1000	2000		3000
Flow Control Valves		21	FG	01	02	03	06	10										D-3
Flow Control and Check Valves		21	FCG	01	02	03	06	10										D-3
Pilot Operated Flow Control Valves		21	FHG	02	03	06	10											D-12
Pilot Operated Flow Control and Check Valves		21	FHCG	02	03	06	10											D-12
Restrictors		25	SRT/SRG	03	06	10	(Rated Flow)*											D-13
One Way Restrictors		25	SRCT/SRCG	03	06	10	(Rated Flow)*											D-13
Throttle Modules		25	TC1G	01	03													D-18
Throttle & Check Modules		25	TC2G	01	03													D-18
Deceleration Valves		21	ZT/ZG	03	06	10												D-22
Deceleration & Check Valves		21	ZCT/ZCG	03	06	10												D-22
Feed Control Valves		14	UCF1G/UCF2G	01	03	04												D-23
Needle Valves		35	GCT GCTR	02														D-24

★ Rated flow stands for approximate flow rate when the pressure drop between inlet and outlet ports of the valve in fully opened condition becomes 0.3 MPa maximum at fluid's specific gravity of 0.85 and viscosity of 20 mm²/s.

Hydraulic Fluids

Fluid Types

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

Regardless of which hydraulic fluid is used, the specifications, etc., remain the same.

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

Note: Please consult us separately when using hydraulic fluids other than those listed above.

Standard products of restrictors and one-way restrictors valves respectively can be used for W/O type emulsion hydraulic oil.

Recommended Viscosity and Oil Temperatures

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

Name	Viscosity	Temperature
Flow Control Valves Flow Control and Check Valves Pilot Operated Flow Control Valves Pilot Operated Flow Control and Check Valves Feed Control Valves	20 - 200 mm ² /s	-15 - +70°C
Restrictors One Way Restrictors Throttle Modules Throttle and Check Modules Deceleration Valves Deceleration and Check Valves Needle Valves	15 - 400 mm ² /s	

Control of Contamination

Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valves. Please maintain the degree of contamination within NAS 1638-Grade 12. Use 25 μm or finer line filter.

Interchangeability in Installation between Current and New Design

The model change is as follows.

Name	Model Numbers	Design Number		Interchangeability in Installation	Major Changes
		Current	New		
Needle Valves	GCT-02 GCTR-02	33	34	Yes	Improved assembly workability

Flow Control Valves / Flow Control and Check Valves

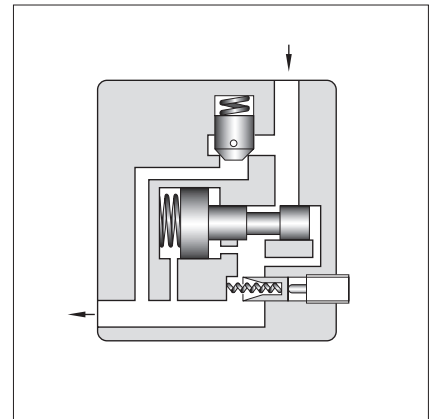
These valves are pressure and temperature compensating type valves and maintain a constant flow rate independent of change in system pressure (load) and temperature (viscosity of the fluid). They control flow rate of the hydraulic circuit and eventually control speed of the actuator precisely.

Valves with an integral check valve allow a controlled flow and reverse free flow. Repeated resetting can be made easily with a digital readout. (Valve size "01" is excluded)

Specifications

Model Numbers	Max. Metered Flow Capacity L/min	Min. Metered Flow Capacity L/min	Max. Operating Pressure MPa	Approx. Mass kg
FG FCG -01- 4/8-* -11	4 8	0.02 (0.04)★	14	1.3
FG FCG -02-30-* -30	30	0.05	21	3.8
FG FCG -03-125-* -30	125	0.2		7.9
FG FCG -06-250-* -30	250	2		23
FG FCG -10-500-* -30	500	4		52

★The figures in parentheses are for pressures above 7 MPa.



Model Number Designation

FC	G	-01	-8	-N	-11
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pres. Compensator★ Stroke Adjustment	Design Number
F : Flow Control Valves FC : Flow Control and Check Valves	G : Sub-Plate Mounting	01	4·8	N : Applicable only for Pres. Compensator Stroke Adjustment (Option)	11
		02	30		30
		03	125		30
		06	250		30
		10	500		30

★Pres. Compensator Stroke Adjustment : This is used to reduce the jumping phenomenon at actuator startup.

Accessories

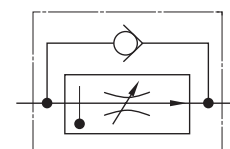
Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
FG FCG -01	M 5 × 55L.....4pcs.
FG FCG -02	M 8 × 50L.....4pcs.
FG FCG -03	M10× 75L.....4pcs.
FG FCG -06	M16×130L.....4pcs.
FG FCG -10	M20×160L.....4pcs.

Graphic Symbols



FG



FCG

Sub-Plates

Valve Model Numbers	Sub-Plate Model No.	Thread Size Rc	Mass kg
FG FCG -01	FGM-01X-10	$\frac{1}{4}$	0.8
FG FCG -02	FGM-02-20	$\frac{1}{4}$	2.3
	FGM-02X-20	$\frac{3}{8}$	2.3
	FGM-02Y-20	$\frac{1}{2}$	3.1
FG FCG -03	FGM-03-20	$\frac{3}{8}$	3.9
	FGM-03X-20	$\frac{1}{2}$	3.9
	FGM-03Y-20	$\frac{3}{4}$	5.7
	FGM-03Z-20	1	5.7
FG FCG -06	FGM-06X-20	1	12.5
	FGM-06Y-20	$1\frac{1}{4}$	16
	FGM-06Z-20	$1\frac{1}{2}$	16
FG FCG -10	FGM-10Y-20	$1\frac{1}{2}$, 2, (used with pipe flange)	37

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish ($\frac{1}{6}$).
- When ordering FGM-10Y, please order F3 pipe flange kit separately also. Please consult your Yuken representatives in advance separately for details on F3 pipe flange kit.

Instructions

Min. Required Pressure Difference

The minimum differential pressure between inlet and outlet port is required to obtain the optimum pressure compensation. It varies according to the flow rate to be set. For details, please refer to the performance curves.

Flow Adjustment

[F * G-01]

Loosen the locking screw and turn the flow adjustment dial clockwise for increase, and anti-clockwise for decrease. The dial makes about 4 revolutions from zero to full flow and the valve opening is indicated on the revolution indicator.

(Refer to characteristics of "Dial Position vs. Flow").

After flow adjustments, be sure to tighten the locking screw to the specified torque.

[F * G-02, 03, 06, 10]

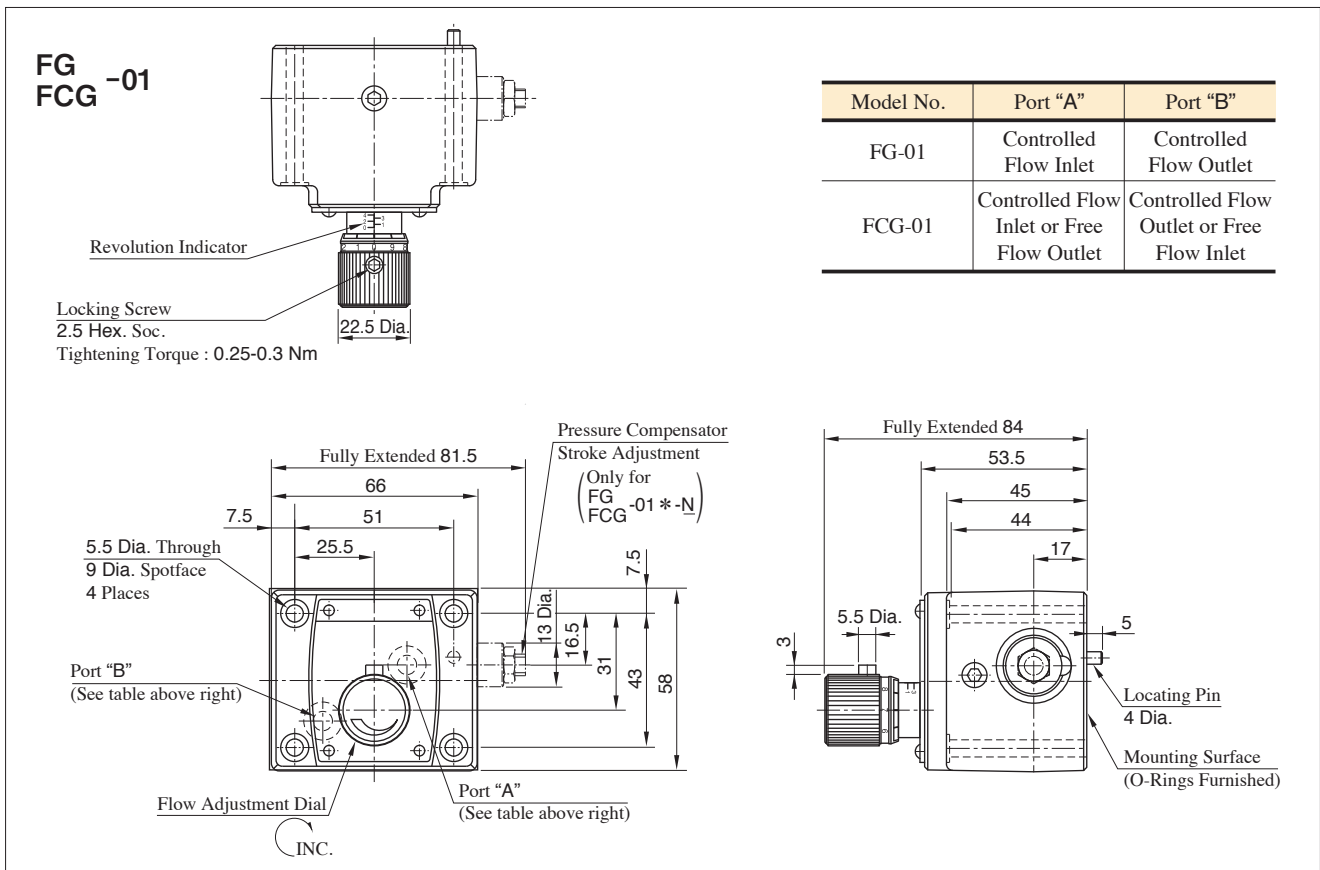
Loosen the locking screw and turn the flow adjustment handle clockwise for increase, and anti-clockwise for decrease.

Open condition is indicated in digital-scale in built-in revolution indicator and each rotation of handle increase or decrease the number by 100 (Refer to the characteristics of "Dial Position vs. Flow").

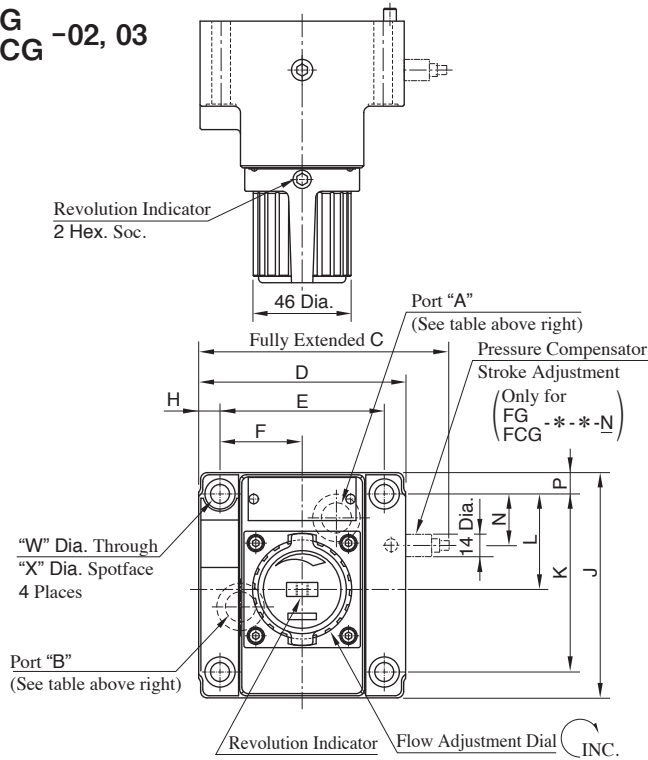
After flow adjustments, be sure to tighten the locking screw.

Line Filter

To carry out flow adjustments by as small degree as 2 L/min or less, be sure to use a line filter of 10 μ m or finer and install it near the valve inlet.



FG FCG -02, 03

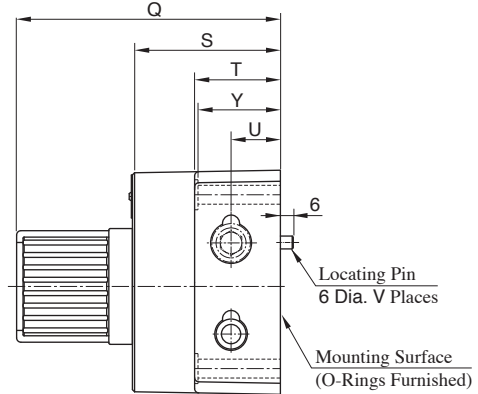


Mounting Surface :

F * G-02:ISO 6263-06-05-0-97

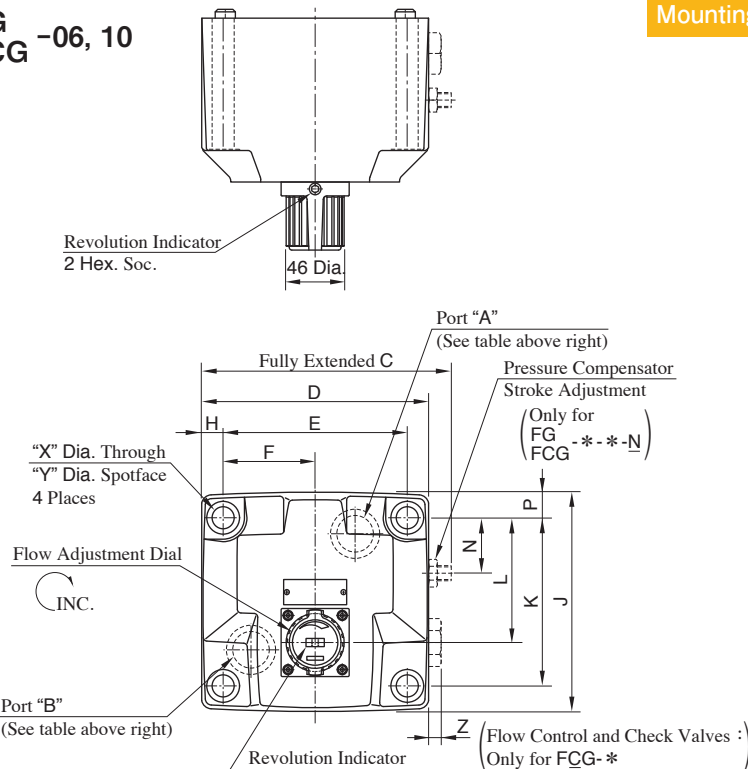
F * G-03:ISO 6263-07-09-0-97

Model No.	Port "A"	Port "B"
FG-02, 03	Controlled Flow Inlet	Controlled Flow Outlet
FCG-02, 03	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet



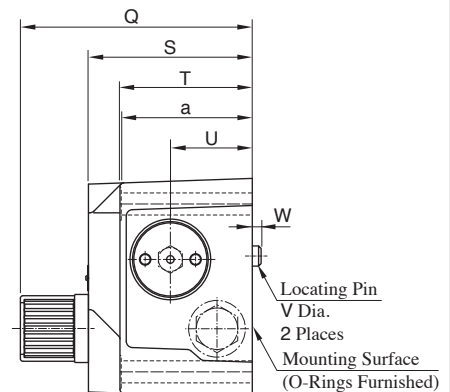
Model No.	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	W	X	Y
FG FCG -02	116	96	76.2	38.1	9.9	104.5	82.6	44.3	24	9.9	123	69	40	23	1	8.8	14	39
FG FCG -03	145	125	101.6	50.8	11.7	125	101.6	61.8	29.8	11.7	152	98	64	41	2	11	17.5	63

FG FCG -06, 10



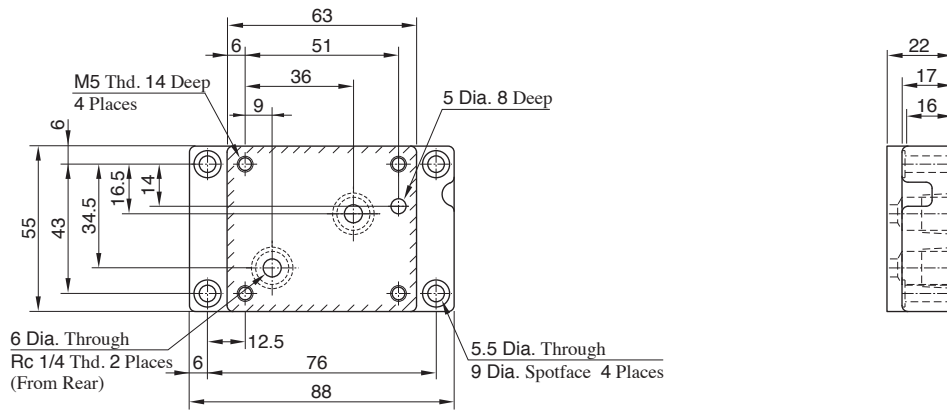
Mounting Surface in F * G-06 : ISO 6263-08-13-0-97

Model No.	Port "A"	Port "B"
FG-06, 10	Controlled Flow Inlet	Controlled Flow Outlet
FCG-06, 10	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet

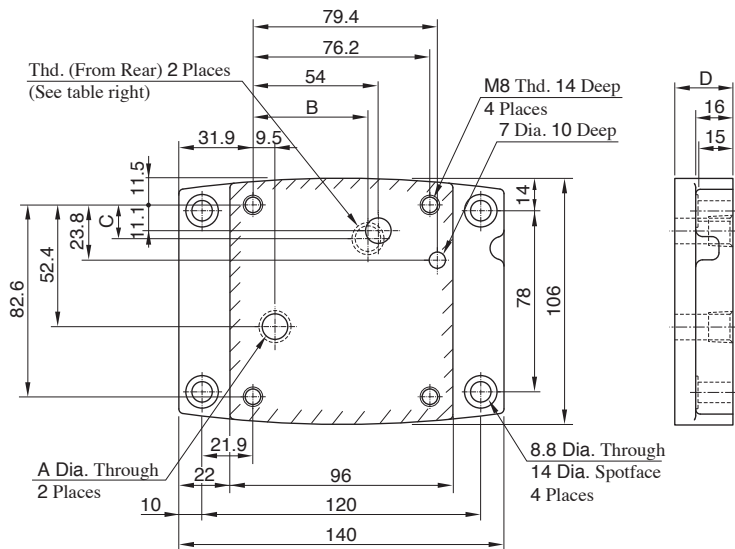


Model No.	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	W	X	Y	Z	a
FG FCG -06	198	180	146.1	73	17	174	133.4	99	44	20.3	184	130	105	65	16	7	17.5	26	10	103
FG FCG -10	267	244	196.9	98.5	23.5	228	177.8	144.5	61	25	214	160	137	85	18	10	21.5	32	7.5	135

Sub-Plate:FGM-01X

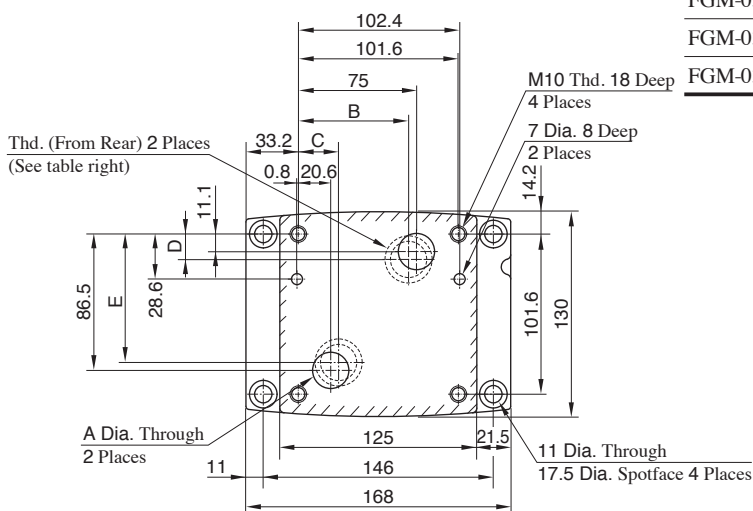


Sub-Plate:FGM-02, 02X, 02Y



Sub-Plate Model Numbers	Thread Size Rc	A	B	C	D
FGM-02-20	1/4	11	54	11.1	25
FGM-02X-20	3/8	14	54	11.1	25
FGM-02Y-20	1/2	14	51	14	35

Sub-Plate:FGM-03, 03X, 03Y, 03Z



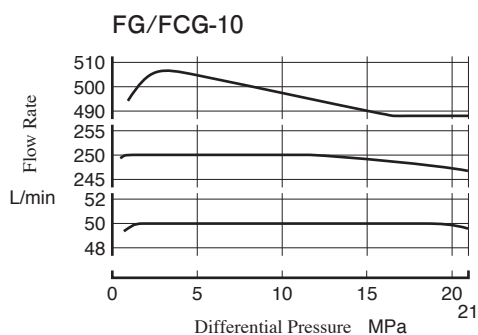
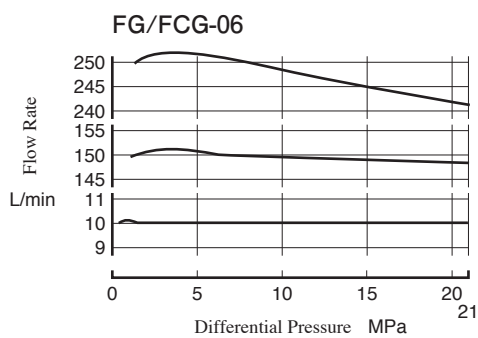
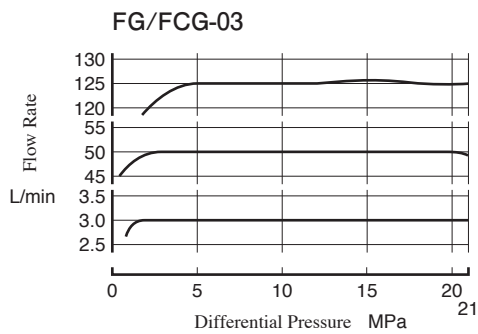
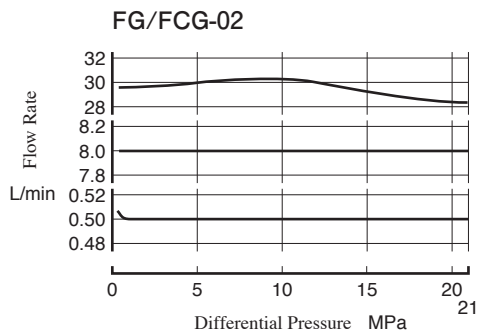
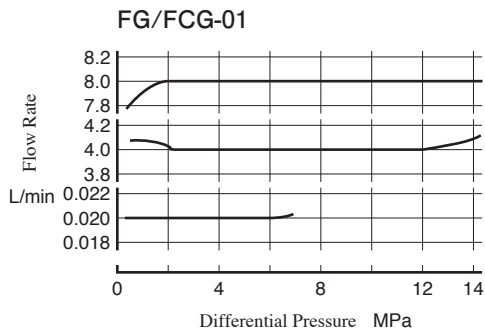
Sub-Plate Model Numbers	Thread Size Rc	A	B	C	D	D	F
FGM-03-20	3/8	14	75	20.6	11.1	86.5	25
FGM-03X-20	1/2	17.5	75	20.6	11.1	86.5	25
FGM-03Y-20	3/4	23	70	25.6	16.1	81.5	40
FGM-03Z-20	1	23	70	25.6	16.1	81.5	40



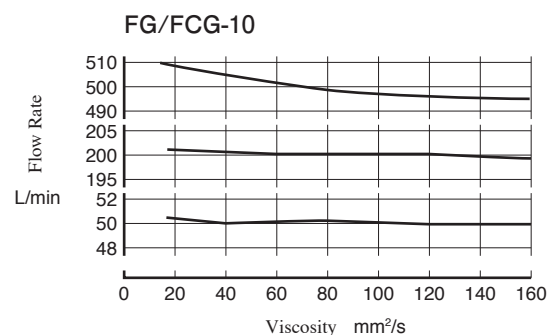
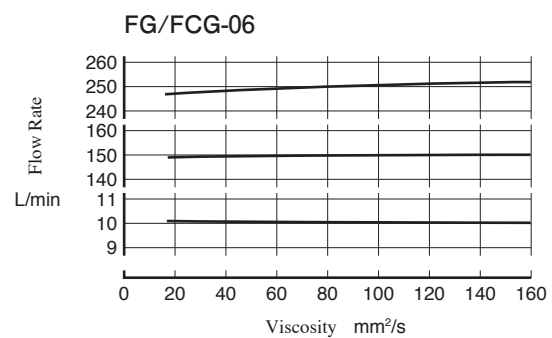
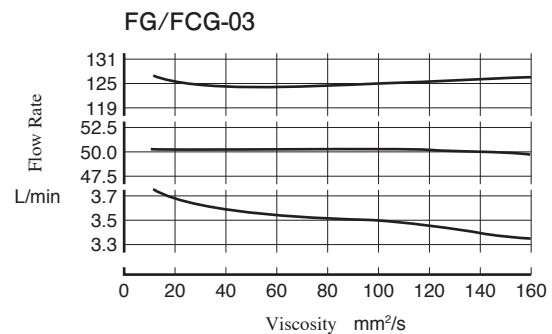
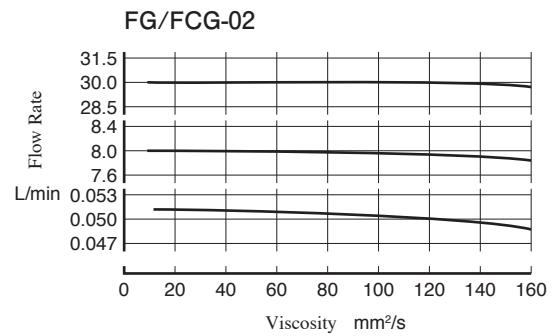
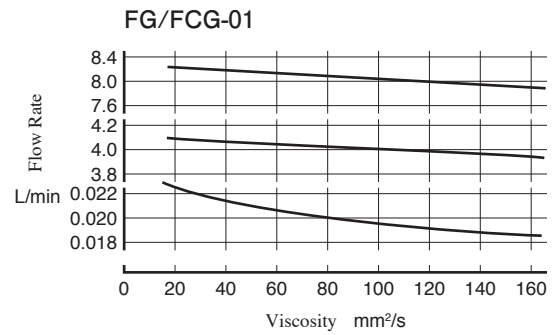
Sub-Plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H
FGM-06X-20	1	104.8	22.2	104.8	18	45	35	34
FGM-06Y-20	1 $\frac{1}{4}$	99	34	99	23	60	40	39
FGM-06Z-20	1 $\frac{1}{2}$	99	34	99	23	60	40	39



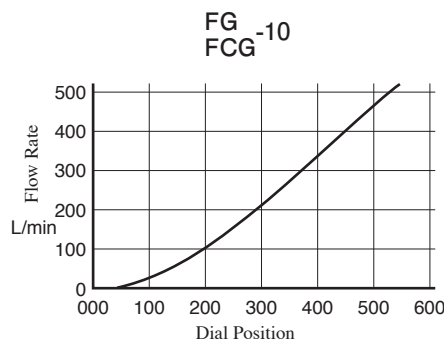
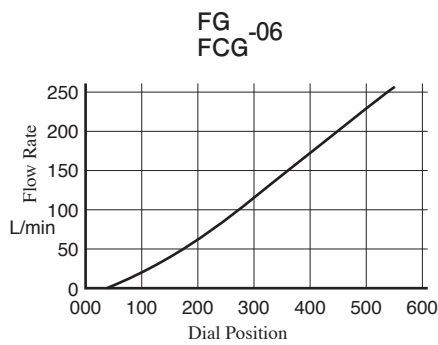
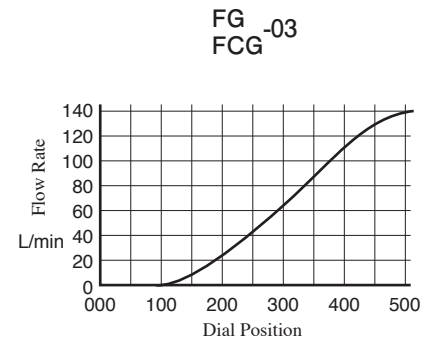
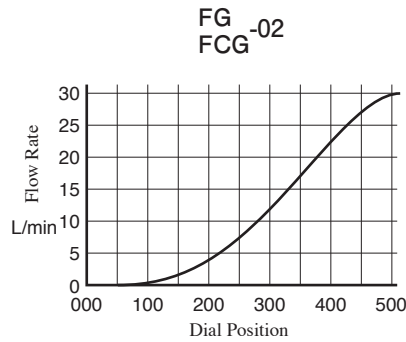
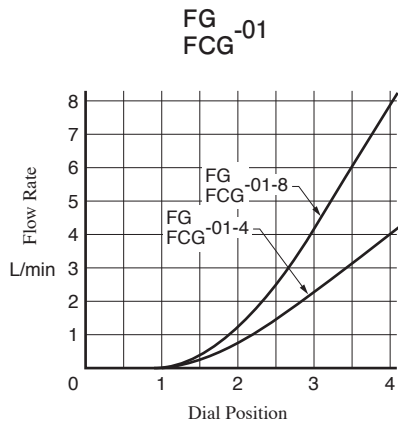
Differential Pressure vs. Flow



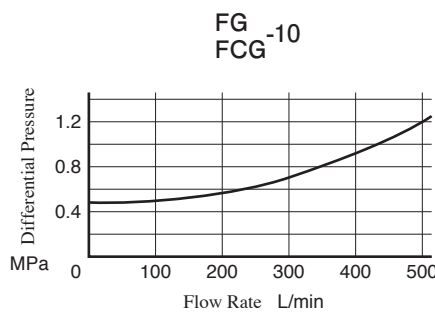
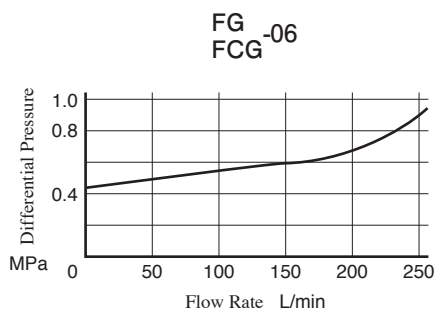
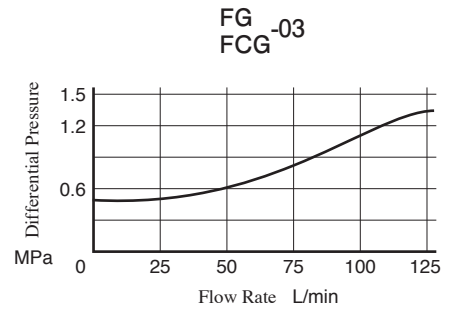
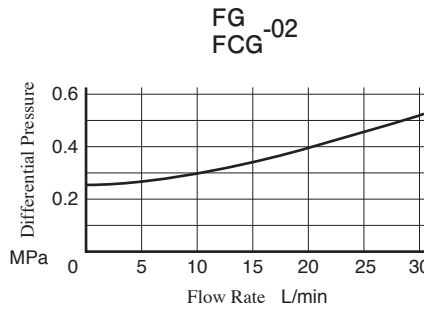
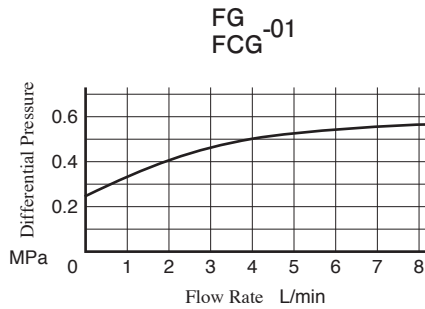
Viscosity vs. Flow



Dial Position vs. Flow

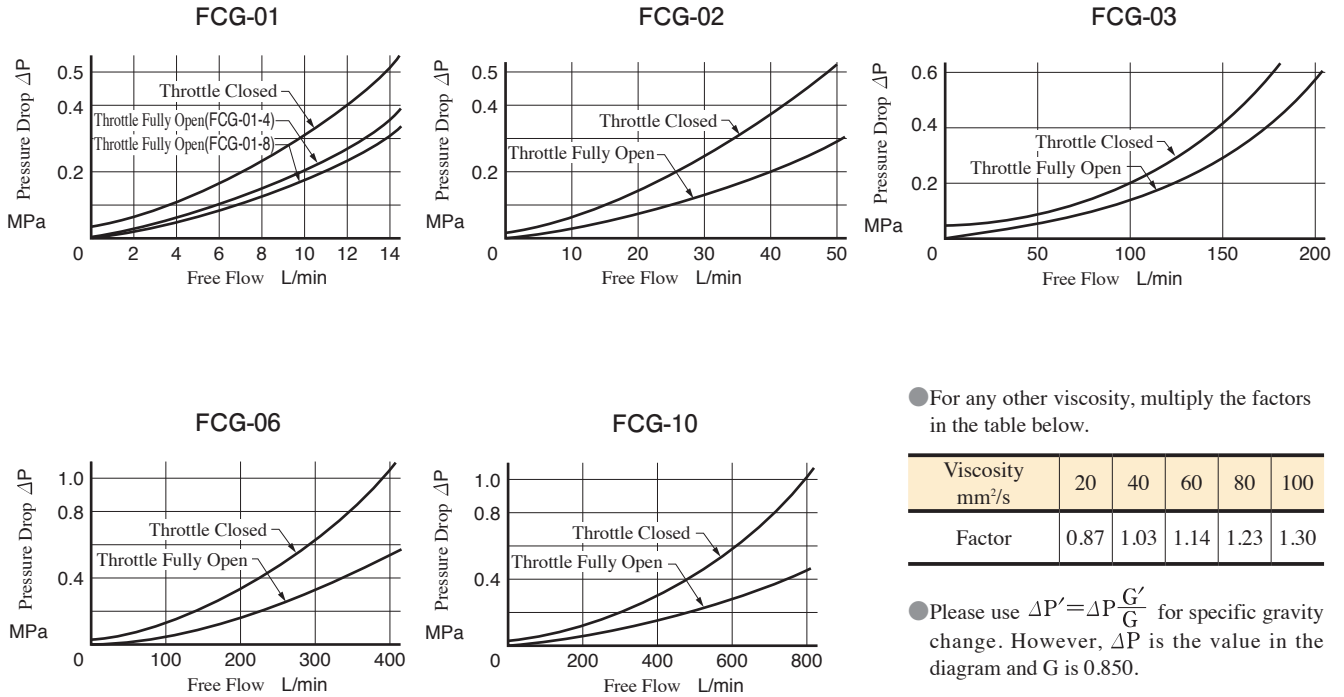


Min. Required Pressure Difference



Pressure Drop for Free Flow (Only for with check valve)

Hydraulic Fluid : Viscosity 35 mm²/s, Specific Gravity 0.850



List of Seals

FG FCG -01

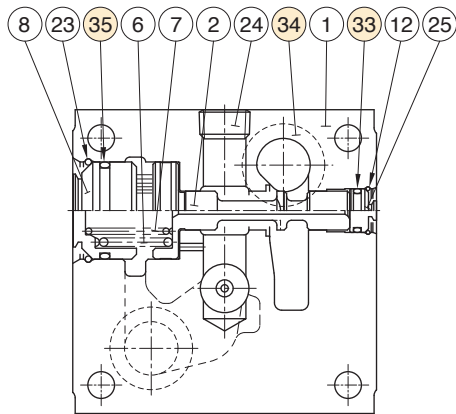
Section X-X (FG-01)

Section Y-Y (FCG-01)

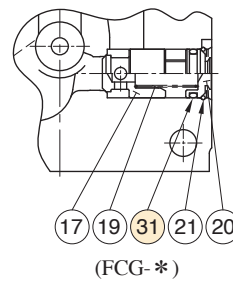
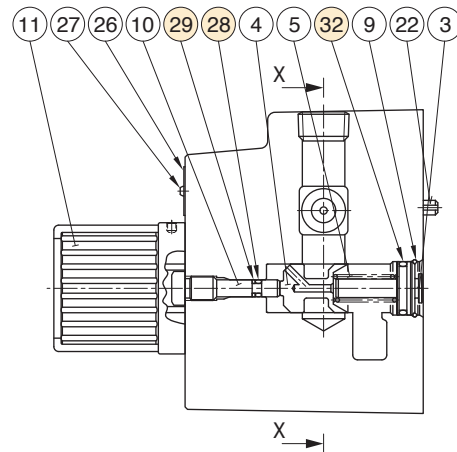
Section X-X (FG FCG -01-*N)

Item	Name of Parts	Part Numbers	Qty.
23	O-Ring	OR NBR-70-1 P4-N	1
24	O-Ring	OR NBR-90 P9-N	2
25	O-Ring	OR NBR-90 P10-N	1
26	O-Ring	OR NBR-90 P16-N	1
27	O-Ring	OR NBR-90 P14-N	1
32	O-Ring	OR NBR-70-1 P5-N	1
38	O-Ring	OR NBR-90 P7-N	1

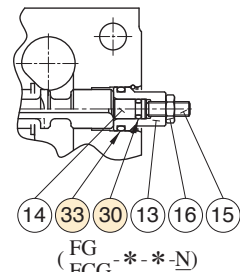
FG
FCG -02, 03



Section X-X
(FG-*)



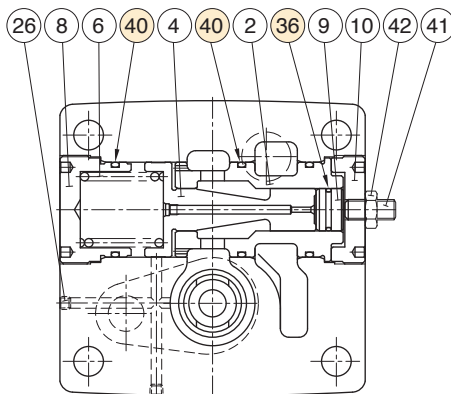
(FCG-*)



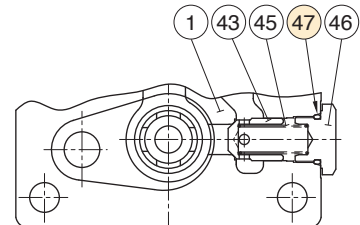
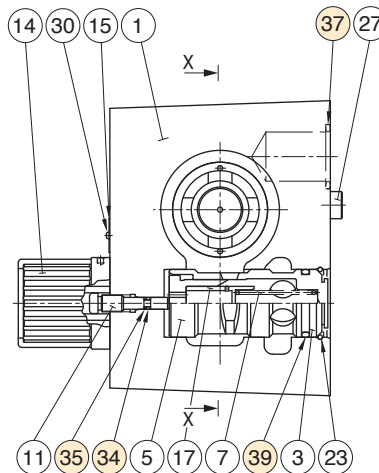
Section X-X
(FG FCG-*-*N)

Item	Name of Parts	Part Numbers		Qty.
		FG FCG -02	FG FCG -03	
28	O-Ring	OR NBR-70-1 P4-N	OR NBR-70-1 P4-N	1
29	Back Up Ring	BR JIS B 2401-4-T2-P4	BR JIS B 2401-4-T2-P4	1
30	O-Ring	OR NBR-90 P5-N	OR NBR-90 P5-N	1
31	O-Ring	OR NBR-90 P10A-N	OR NBR-90 P16-N	1
32	O-Ring	OR NBR-90 P12-N	OR NBR-90 P18-N	1
33	O-Ring	OR NBR-90 P14-N	OR NBR-90 P14-N	1
34	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	2
35	O-Ring	OR NBR-90 G25-N	OR NBR-90 G35-N	1

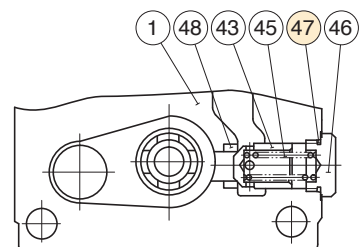
FG
FCG -06, 10



Section X-X
(FG-*)



Section X-X
(FCG-06)

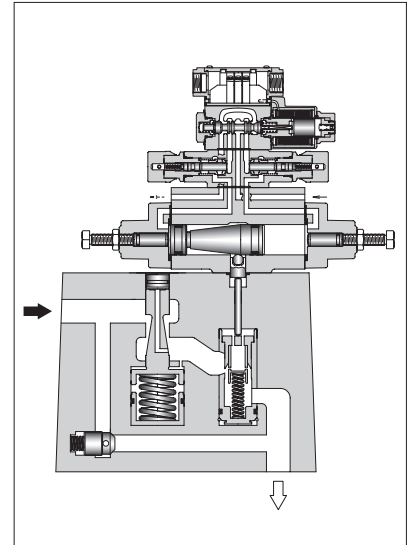
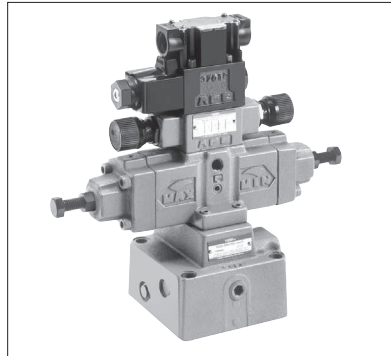


Section X-X
(FCG-10)

Item	Name of Parts	Part Numbers		Qty.
		FG FCG -06	FG FCG -10	
34	O-Ring	OR NBR-70-1 P4-N	OR NBR-70-1 P4-N	1
35	Back Up Ring	BR JIS B 2401-4-T2-P4	BR JIS B 2401-4-T2-P4	1
36	O-Ring	OR NBR-90 P21-N	OR NBR-90 P34-N	1
37	O-Ring	OR NBR-90 P32-N	OR NBR-90 P48-N	2
39	O-Ring	OR NBR-90 P34-N	OR NBR-90 P50-N	1
40	O-Ring	OR NBR-90 P50-N	OR NBR-90 P75-N	3
47	O-Ring	AS568-020 (NBR-90)	OR NBR-90 P32-N	1

Pilot Operated Flow Control Valves / Pilot Operated Flow Control and Check Valves

The function of the flow control handle of the flow control valve is performed by a hydraulic cylinder. With these valves, smooth flow characteristics allow control without shocks during acceleration and deceleration. With the compensator for the pressure and temperature, stable flow control can be obtained regardless of the changes in the pressure (load) and temperature (oil viscosity).



Specifications

Model Numbers	Max. Metered Flow L/min	Min. Metered Flow L/min	Max. Operating Pressure MPa	Min. Pilot Pressure MPa	Mass kg
FH * G-02-30- *-13	30	0.05	21	1.5	13
FH * G-03-125- *-13	125	0.2			17
FH * G-06-250- *-13	250	2			32
FH * G-10-500- *-13	500	4			61

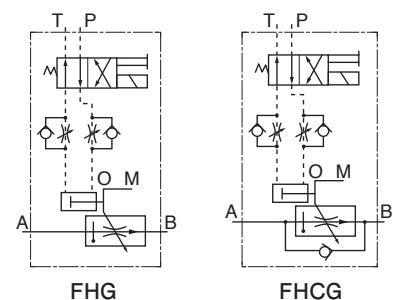
Model Number Designation

FHC	G	-02	-30	-N	-O	-A100	-N	-13
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pressure Compensator Stroke Adj. ★ ³	With No Pilot Valve ★ ¹	Coil Type ★ ²	Type of Electrical Connections	Design Number
FH : Pilot Operated Flow Control Valves	G : Sub-Plate Mounting	02	30	N : Applicable only for Pres. Compensator Stroke Adjustment (Option)	O : Applicable only for Without Pilot Valve	AC : A100, A120 A200, A240 DC : D12 , D24 D48 AC→DC Rectified : R 100, R200	None : Terminal Box Type N : With Plug-in Connector Type (Option)	13
		03	125					13
FHC : Pilot Operated Flow Cont. & Check Valves		06	250					13
		10	500					13

- ★¹. Both solenoid operated directional valve (DSG-01) and throttle check modular valve (MSW-01) can be used as a pilot valve.
If no pilot valve is required, there is no need to specify the coil type and the electrical connection type of solenoid operated directional valve.
- ★². The coil types are same as those for DSG-01 Series solenoid operated directional valves. See page D-27.
- ★³. Pres. Compensator Stroke Adjustment : This is used to reduce the jumping phenomenon at actuator startup.

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

Graphic Symbols



● Please contact us separately for the details of Pilot Operated Flow Control Valves / Pilot Operated Flow Control and Check Valves.

Restrictors / One Way Restrictors

This valve is used to regulate an actuator speed in a circuit where line pressure is almost steady and small fluctuation of oil flow due to pressure changes is permitted. Integrated check valve allows reversed free flow from outlet to inlet port. Pressure balanced construction provides less effort in adjustment at high pressure.

Specifications

	Model Numbers		Rated Flow★ L/min	Max. Operating Pres. MPa	Mass kg
	Restrictor	One Way Restrictor			
Threaded Connection	SRT-03-50	SRCT-03-50	30	25	1.5
	SRT-06-50	SRCT-06-50	85		3.8
	SRT-10-50	SRCT-10-50	230		9.1
Sub-Plate Mounting	SRG-03-50	SRCG-03-50	30	25	2.5
	SRG-06-50	SRCG-06-50	85		3.9
	SRG-10-50	SRCG-10-50	230		7.5

★Rated flow stands for approximate flow rate when the pressure drop between inlet and outlet ports of the valve in fully opened condition becomes 0.3 MPa maximum at fluid's specific gravity of 0.85 and viscosity of 20 mm²/s.

Yuken can offer flanged connection valves described below.
For details, contact us.

Model Numbers	Rated Flow L/min	Max. Operating Pressure MPa
SRF SRCF -10-50	230	25
SRF SRCF -16-50	500	

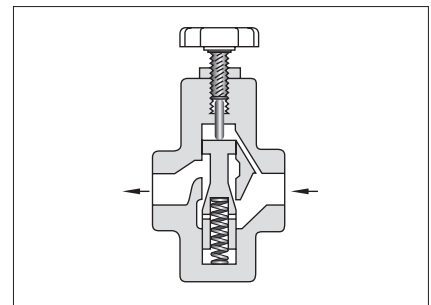
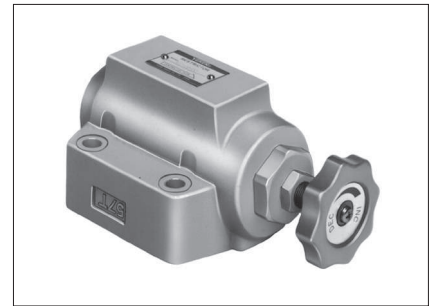
Model Number Designation

SR	T	-03	-50
Series Number	Type of Mounting	Valve Size	Design Number
SR : Restrictor	T : Threaded Connection	03	50
		06	50
		10	50
SRC : One Way Restrictor	G : Sub-Plate Mounting	03	50
		06	50
		10	50

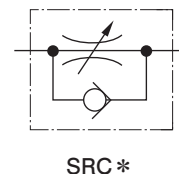
Sub-Plates

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
SRG SRCG -03	CRGM-03-50	$\frac{3}{8}$	1.6
	CRGM-03X-50	$\frac{1}{2}$	1.6
SRG SRCG -06	CRGM-06-50	$\frac{3}{4}$	2.4
	CRGM-06X-50	1	3.0
SRG SRCG -10	CRGM-10-50	$1\frac{1}{4}$	4.8
	CRGM-10X-50	$1\frac{1}{2}$	5.7

- Sub-plates are available. Specify the sub-plate model number from the left table. When sub-plates are not used, the mounting surface should have a good machined finish ($\frac{1.6}{\sqrt{6}}$).
- Sub-plates are common with right angle check valves. For dimensions, see page D-26.



Graphic Symbols



Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
SRG SRCG -03	M10×45L	4
SRG SRCG -06	M10×50L	4
SRG SRCG -10	M10×55L	6

Instructions

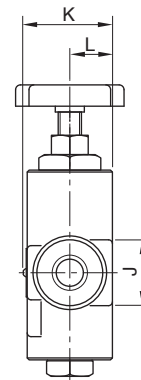
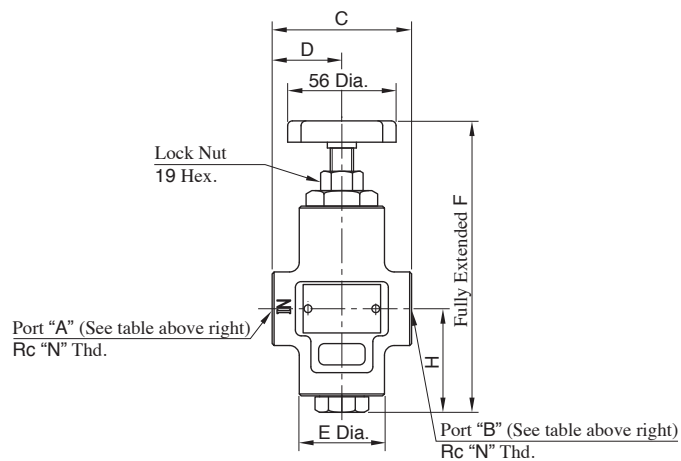
Flow Adjustment

Loosen the lock nut and turn the flow adjustment handle clockwise to increase. After adjustment, be sure to tighten the lock nut.

SRT SRCT -03, 06, 10

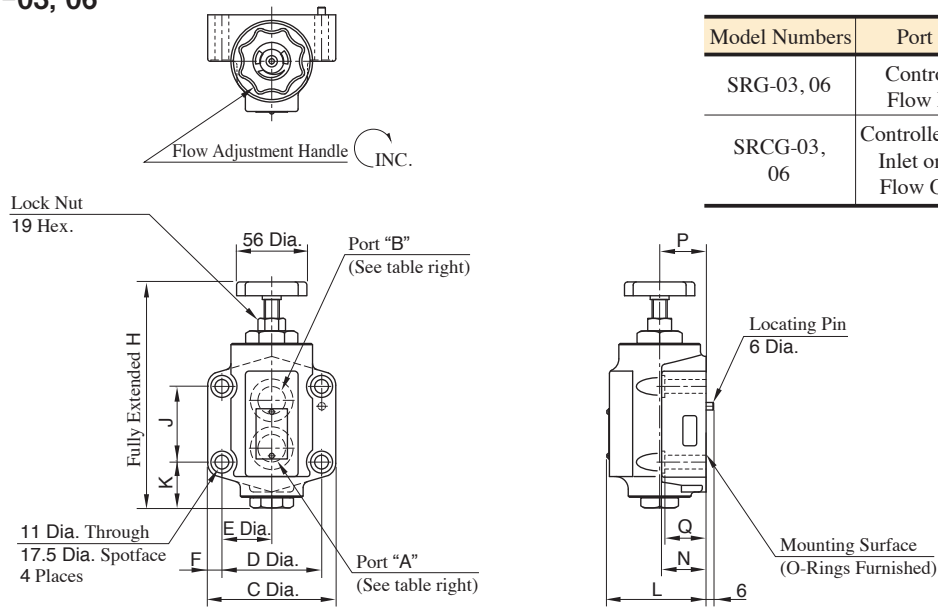


Model Numbers	Port "A"	Port "B"
SRT-*	Controlled Flow Inlet	Controlled Flow Outlet
SRCT-*	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet



Model Numbers	C	D	E	F	H	J	K	L	N
SRT SRCT -03	72	36	44	150.5	53.5	38 Dia.	46	22	$\frac{3}{8}$
SRT SRCT -06	100	50	58	180	66.5	62 Sq.	64	31	$\frac{3}{4}$
SRT SRCT -10	138	69	80	227	86	80 Sq.	82	40	$1\frac{1}{4}$

SRG SRCG -03, 06

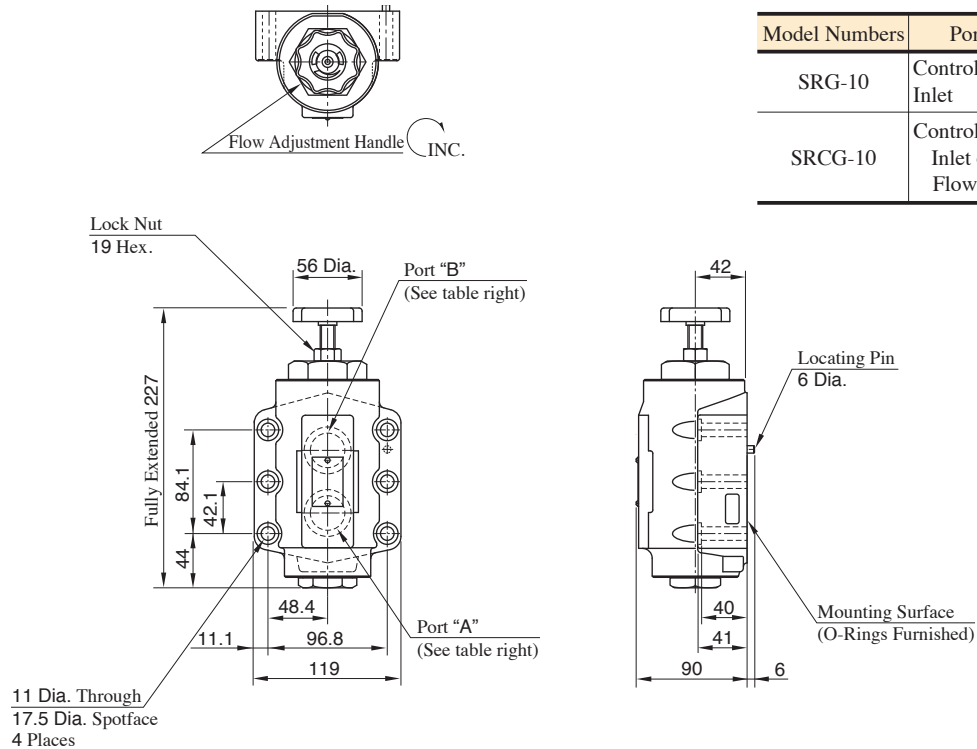


Model Numbers	C	D	E	F	H	J	K	L	N	P	Q	Mounting Surface
SRG SRCG -03	90	66.7	33.3	11.7	150.5	42.9	32	64	31	31	30	ISO 5781-06-07-0-00
SRG SRCG -06	102	79.4	39.7	11.3	180	60.3	36.5	79	36	37	35	ISO 5781-08-10-0-00

Note: For dimensions of the valve mounting surface, see the page D-26.

SRG SRCG -10

Mounting Surface : ISO 5781-10-13-0-00

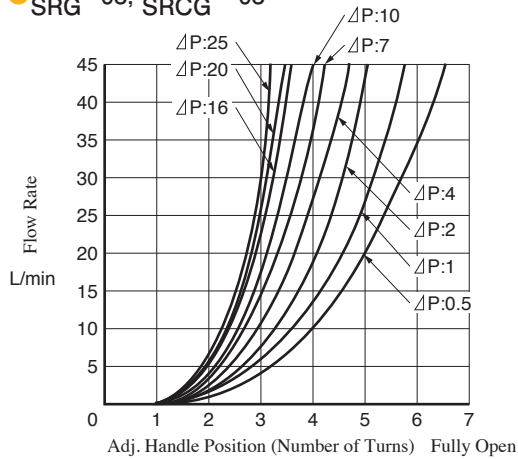


Note: For dimensions of the valve mounting surface, see the page D-26.

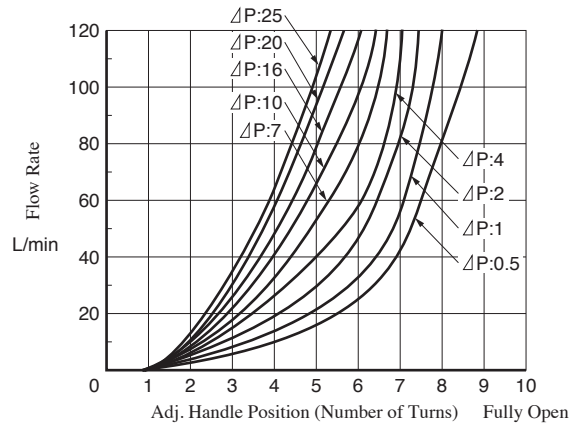
Adjustment Handle Position vs. Flow

Viscosity : 30 mm²/s [ΔP : Differential Pressure (MPa)]

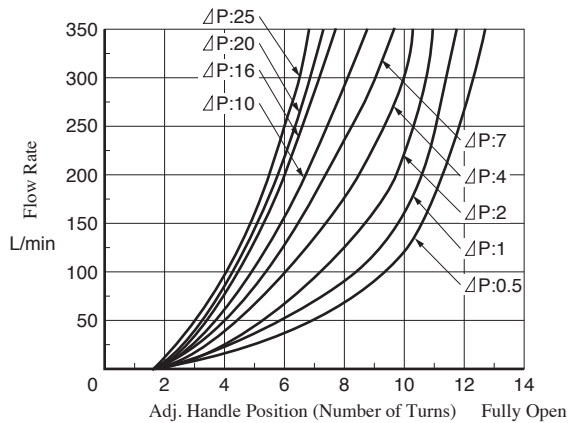
SRT SRG -03, SRCT SRCG -03



SRT SRG -06, SRCT SRCG -06



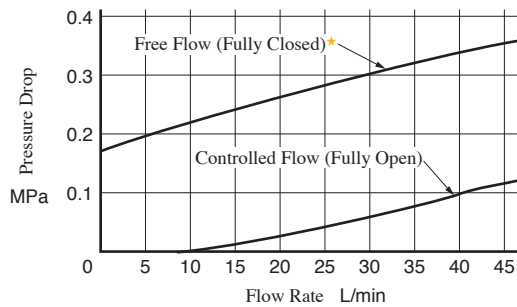
SRT SRG -10, SRCT SRCG -10



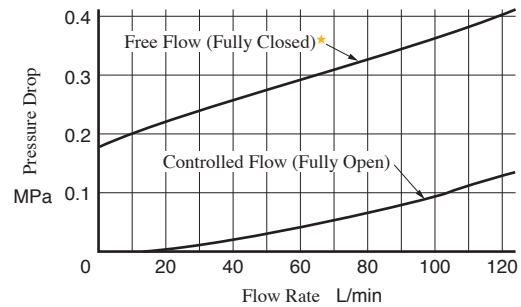
Pressure Drop

Viscosity : 30 mm²/s

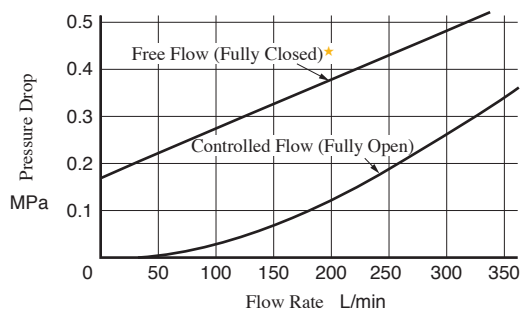
SRT SRG -03, SRCT SRCG -03



SRT SRG -06, SRCT SRCG -06



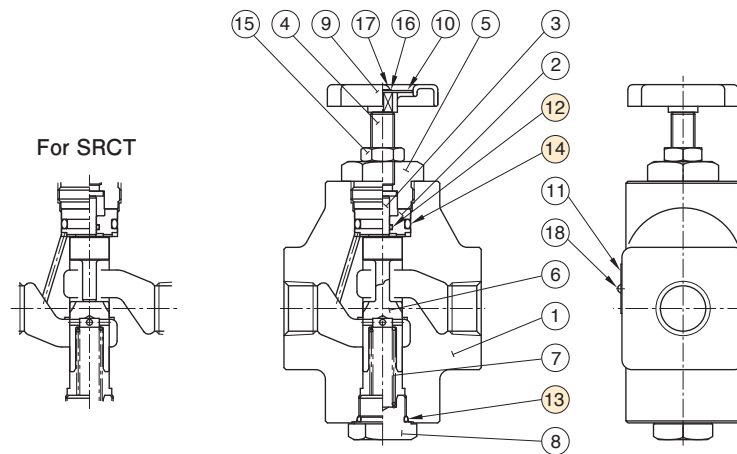
SRT SRG -10, SRCT SRCG -10



★ Applicable only for one way restrictor (Model No. SRC*)

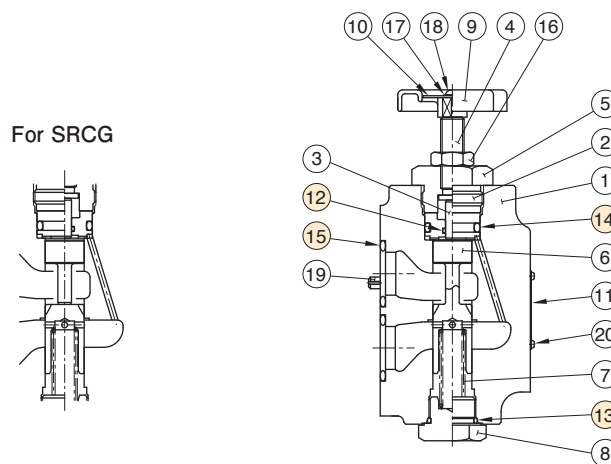
List of Seals

**SRT
SRCT -03, 06, 10**



Item	Name of Parts	Part Numbers			Qty.
		SRT SRCT -03	SRT SRCT -06	SRT SRCT -10	
12	O-Ring	OR NBR-90 P7-N	OR NBR-90 P7-N	OR NBR-90 P7-N	1
13	O-Ring	OR NBR-90 P15-N	OR NBR-90 P21-N	OR NBR-90 P29-N	1
14	O-Ring	OR NBR-90 P20-N	OR NBR-90 P22.4-N	OR NBR-90 P36-N	1

**SRG
SRCG -03, 06, 10**



Item	Name of Parts	Part Numbers			Qty.
		SRG SRCG -03	SRG SRCG -06	SRG SRCG -10	
12	O-Ring	OR NBR-90 P7-N	OR NBR-90 P7-N	OR NBR-90 P7-N	1
13	O-Ring	OR NBR-90 P15-N	OR NBR-90 P21-N	OR NBR-90 P29-N	1
14	O-Ring	OR NBR-90 P20-N	OR NBR-90 P22.4-N	OR NBR-90 P36-N	1
15	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2

Throttle Module / Throttle and Check Module

Used as pilot choke valves for solenoid controlled pilot operated directional valves and pilot operated directional valves.

Specifications

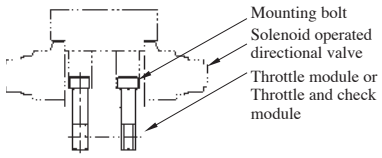
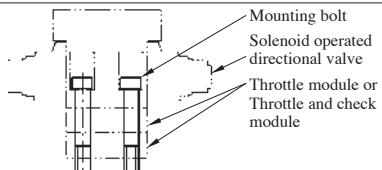
Model Numbers	Nominal Flow L/min	Max. Operating Pressure MPa	Mass kg
TC1G-01-40	30	25	0.6
TC2G-01-40			0.65
TC1G-03- *-40	80		1.6
TC2G-03- *-40			1.8

Model Number Designation

TC1	G	-03	-C	-40
Series Number	Type of Mounting	Valve Size	Valve Type	Design Number
TC1 : Throttle Module	G : Gasket Mounting	01	—	40
TC2 : Throttle and Check Module				
TC1 : Throttle Module		03	None : Std. C : With Check Valve	40
TC1 : Throttle and Check Module			None : Std. (Meter-Out) A : Meter-In	

Mounting Bolts

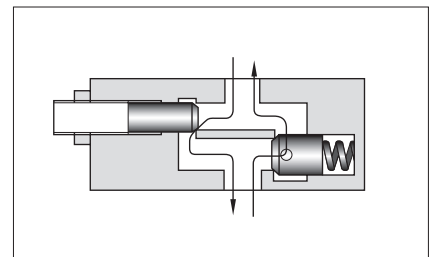
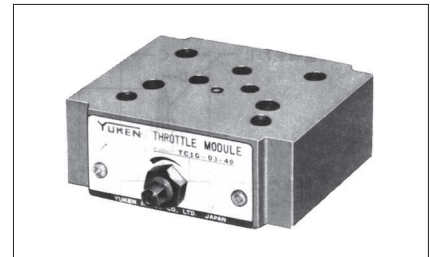
If mounting bolts are necessary, order suitable ones selected from the table below. If mounting bolts from other companies are used, their strength must be 8.8 or up JIS B1176 standards.

Solenoid Operated Directional Valve	Socket Head Cap Screw	
	TC * G-01	TC * G-03
	M5×70L (4pcs.)	M6×70L (4pcs.)
	M5×95L (4pcs.)	M6×100L (4pcs.)

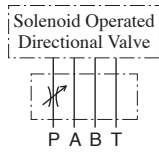
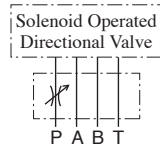
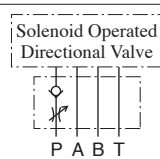
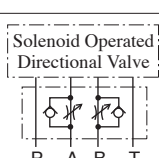
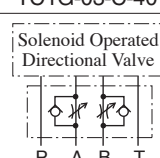
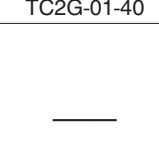
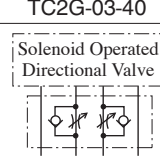
Instructions

Flow Adjustment

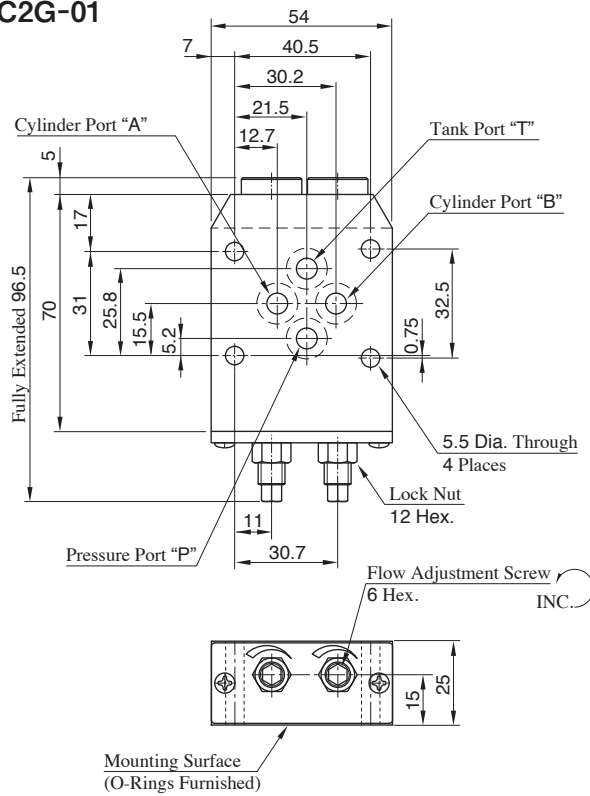
Loosen the lock nut and turn the flow adjustment handle clockwise to increase. After adjustment, be sure to tighten the lock nut.



Graphic Symbols

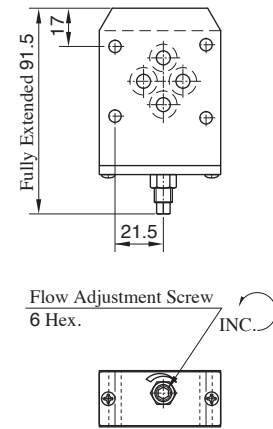
Valve Size 01	Valve Size 03
 P A B T TC1G-01-40	 P A B T TC1G-03-40
 P A B T TC2G-01-40	 P A B T TC1G-03-C-40
 P A B T TC2G-01-40	 P A B T TC2G-03-40
 P A B T TC2G-03-A-40	 P A B T TC2G-03-A-40

TC2G-01



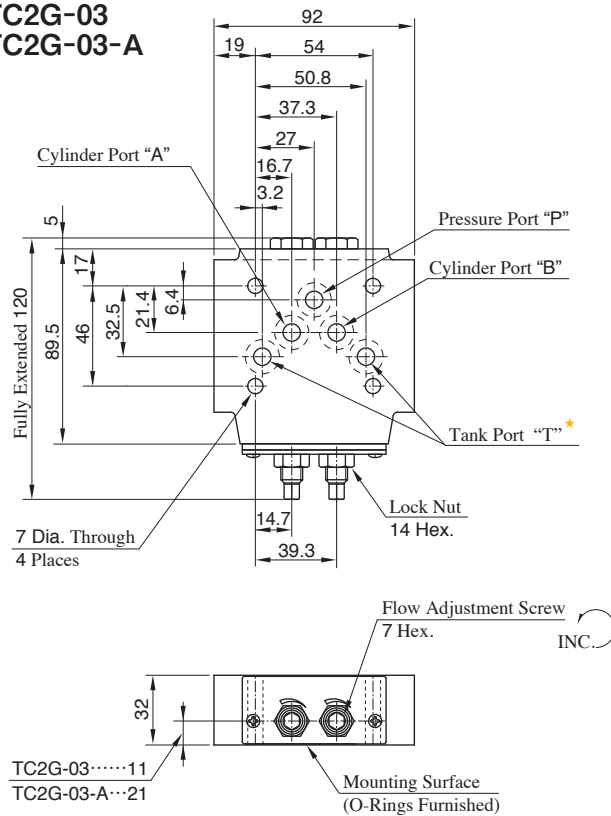
Mounting Surface : ISO 4401-03-02-0-05

TC1G-01



For other dimensions, see the figures shown TC2G-01.

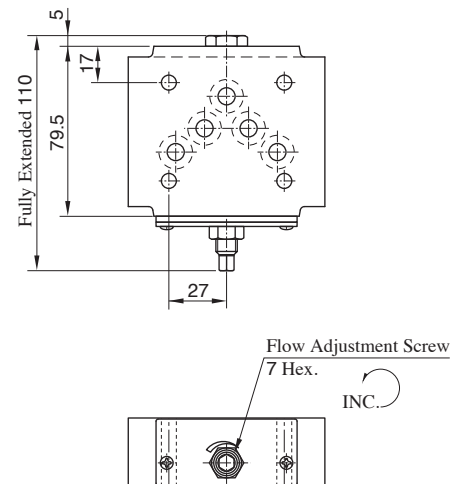
TC2G-03 TC2G-03-A



★ With standard sub-plate, the left one of the two tank ports "T" is used but either one may be used.

Mounting Surface : ISO 4401-05-04-0-05

TC1G-03 TC1G-03-C

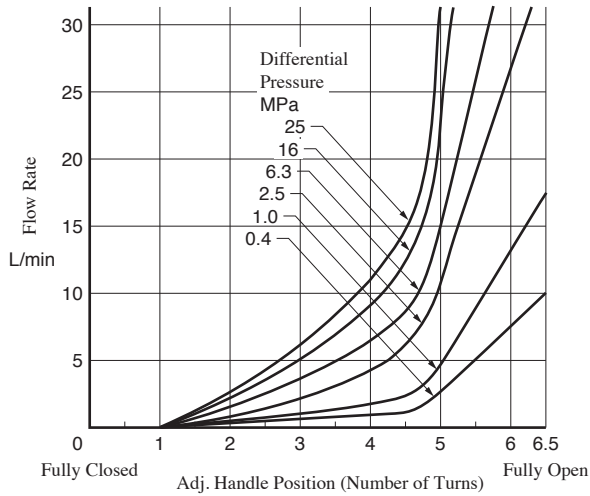


For other dimensions, see the figures shown TC2G-03.

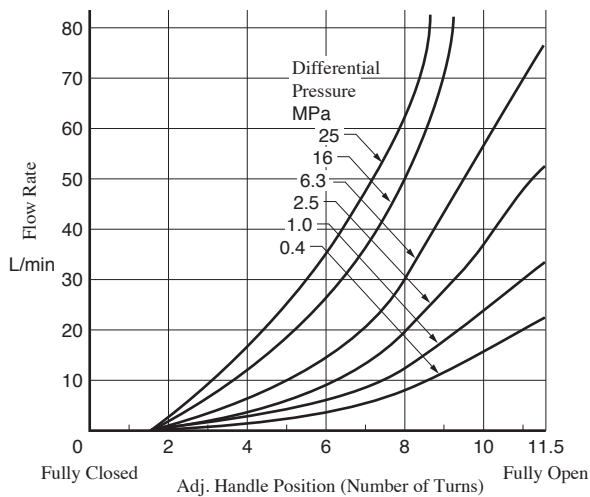
Adjustment Handle Position vs. Flow

Viscosity : 35 mm²/s

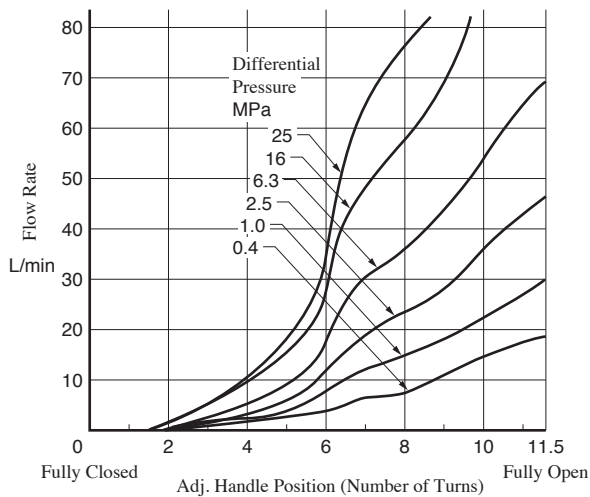
TC1G-01
TC2G-01



TC1G-03
TC2G-03



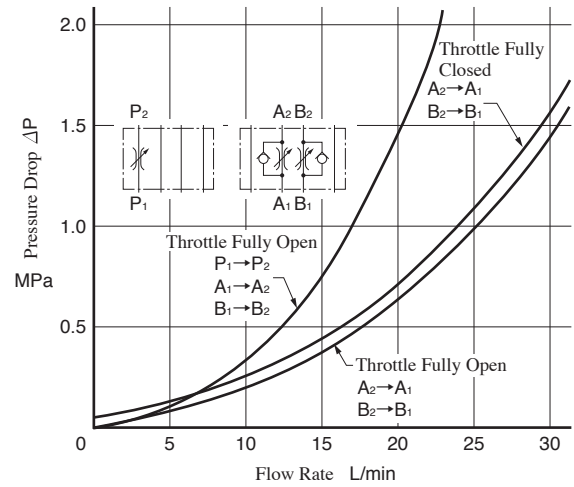
TC1G-03-C



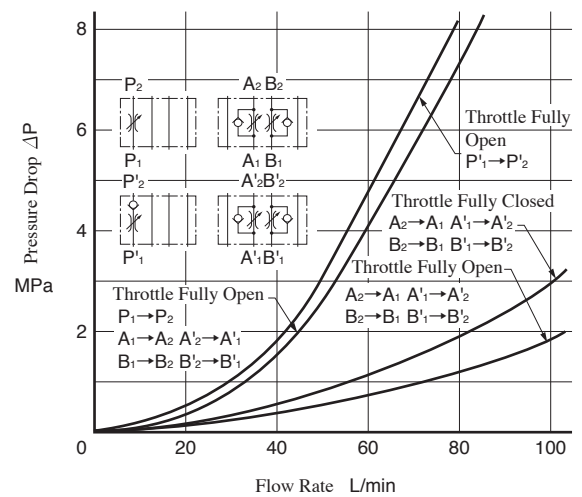
Pressure Drop

Viscosity : 35 mm²/s

TC1G-01
TC2G-01



TC1G-03-
TC2G-03-*



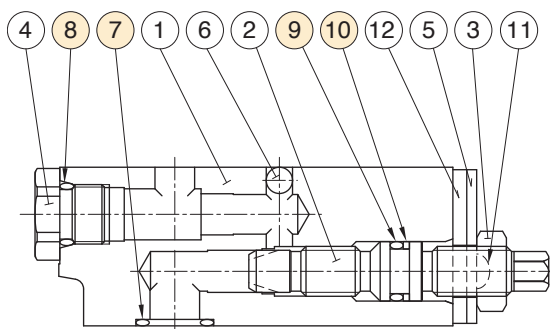
● For any other viscosity, multiply the factors in the table below.

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

● Please use $\Delta P' = \Delta P \frac{G'}{G}$ for specific gravity change. However, ΔP is the value in the diagram and G is 0.850.

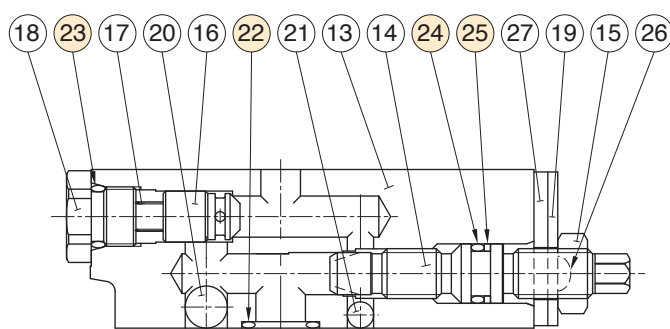
List of Seals

TC1G-01, 03



Item	Name of Parts	Part Numbers		Qty.	
		TC1G-01	TC1G-03	TC1G-01	TC1G-03
7	O-Ring	OR NBR-90 P9-N	AS 568-014 (NBR-90)	4	5
8	O-Ring	—	OR NBR-90 P10-N	—	1
9	O-Ring	OR NBR-70-1 P7-N	OR NBR-70-1 P9-N	1	1
10	Back Up Ring	BR JIS B 2401-4-T2-P7	BR JIS B 2401-4-T2-P9	1	1

TC2G-01, 03



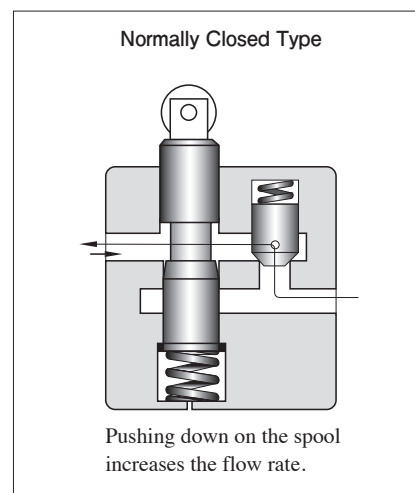
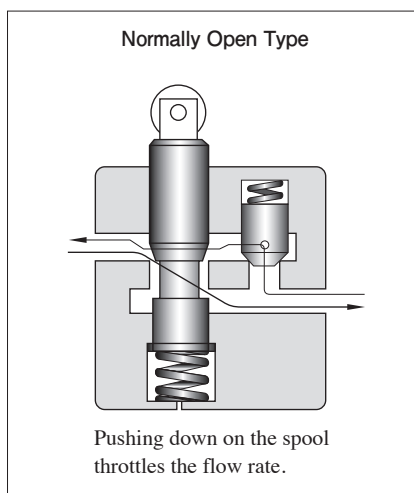
Item	Name of Parts	Part Numbers		Qty.	
		TC2G-01	TC2G-03	TC2G-01	TC2G-03
22	O-Ring	OR NBR-90 P9-N	AS 568-014 (NBR-90)	4	5
23	O-Ring	OR NBR-90 P10-N	OR NBR-90 P10-N	2	2
24	O-Ring	OR NBR-70-1 P7-N	OR NBR-70-1 P9-N	2	2
25	Back Up Ring	BR JIS B 2401-4-T2-P7	BR JIS B 2401-4-T2-P9	2	2

Deceleration Valves / Deceleration and Check Valves

Cam operation easily increases or decreases the flow rate and opens or closes the valve's internal passageway.

This valve is used when you want the actuator to perform acceleration/deceleration and stop necessary for machine tool table feed, etc.

The check valve allows free flow in the opposite direction of the controlled flow regardless of the cam position.



Specifications

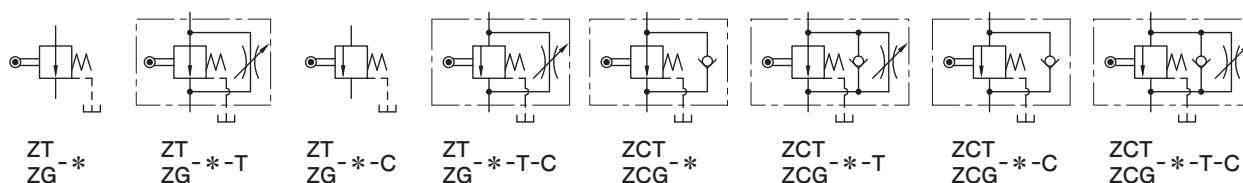
Model Numbers		Max. Flow L/min	Max. Operating Pressure MPa	Mass kg	
Threaded Connection	Sub-Plate Mounting			Z * T	Z * G
Z * T-03- * - * -22	Z * G-03- * - * -22	30	21	4.3	4.3
Z * T-06- * - * -22	Z * G-06- * - * -22	80		8.7	8.7
Z * T-10- * - * -22	Z * G-10- * - * -22	200		17	17

Model Number Designation

ZC	T	-03	-T	-C	-22
Series Number	Type of Mounting	Valve Size	With Adjustable Needle Valve for By-Pass Line	Spool Type	Design Number
Z : Deceleration Valve	T : Threaded Connection	03	T : Applicable only with Adjustable Needle Valve for By-Pass Line (Option)	None : Normally Open Type	22
		06			22
		10			22
ZC : Deceleration and Check Valve	G : Sub-Plate Mounting	03		C : Normally Closed Type	22
		06			22
		10			22

★ The throttle valve for By-Pass Line allows the actuator to be fed at a low speed by allowing regulated flow between the ports even when the passage is blocked by a spool.

Graphic Symbols



● Please contact us separately for the details of Deceleration Valves / Deceleration and Check Valves.

Feed Control Valves

This valve is a compact combination of a flow control valve with check valve and a deceleration valve, and is mainly used for machine tools. The switching from rapid feed to cutting feed is done by a cam, and the cutting feed speed can be adjusted as desired. Since this is a pressure/temperature compensated type, the set flow rate is constant regardless of changes in pressure (load) and temperature (hydraulic oil viscosity). Therefore, precise speed control is possible. The valve size "04" is digitally graduated for easy flow reproduction. The return can be quickened regardless of the position of the cam.

Specifications

Model Numbers	★ ¹ Max. Flow L/min	Metered Flow Range L/min		Max. Reversed Free Flow L/min	Max. Operating Pressure MPa	Mass kg	
		Feed	Fine Feed				
UCF1G-01-4-A-★-11	16 (12)	0.03 - 4 (0.05 - 4)★ ²	—	20	14	1.6	
UCF1G-01-4-B-★-11	12 (8)						
UCF1G-01-4-C-★-11	8 (4)						
UCF1G-01-8-A-★-11	20 (12)	0.03 - 8 (0.05 - 8)★ ²	—				
UCF1G-01-8-B-★-11	16 (8)						
UCF1G-01-8-C-★-11	12 (4)						
UCF1G-03-4-★-10	40 (40)	0.05 - 4	—	40			2.6
UCF1G-03-8-★-10		0.05 - 8	—				
UCF2G-03-4-★-10	40 (40)	0.1 - 4	0.05 - 4	40			2.7
UCF2G-03-8-★-10		0.1 - 8	0.05 - 4				
UCF1G-04-30-30	80 (40)	0.1 - 22	—	80			6.5
UCF2G-04-30-30		0.1 - 22	0.1 - 17				

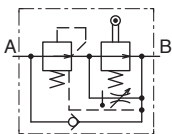
★1. The maximum flow rates are values with the deceleration valve and the flow control valve fully open. The values in parentheses are maximum flow rates with the deceleration valve fully open and the flow control valve fully closed.

★2. The values in parentheses are for pressures above 7 MPa .

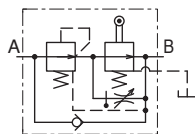
Model Number Designation

UCF1	G	—01	—4	—A	—E	—11
Series Number	Type of Mounting	Valve Size	Nominal Metered Flow L/min	Deceleration Valve Max. Flow L/min	Drain Connection	Design Number
UCF1 : Single Feed Control	G : Gasket Mounting	01	4•8	A : 12, B : 8, C : 4	None : Internal Drain, E : External Drain	11
		03	4•8	—		10
		04	30	—	None : External Drain	30
UCF2 : Double Feed Control		03	4•8	—	None : Internal Drain, E : External Drain	10
		04	30	—	None : External Drain	30

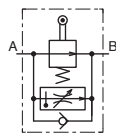
Graphic Symbols



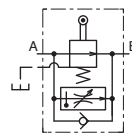
UCF1G-01-*-11



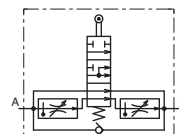
UCF1G-01-*-E-11



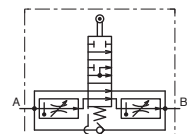
UCF1G-03-*-10



UCF1G-03-*-E-10
UCF1G-04-30-30

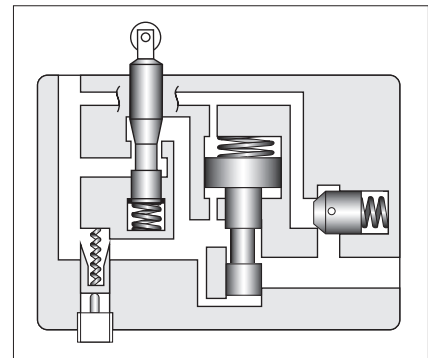
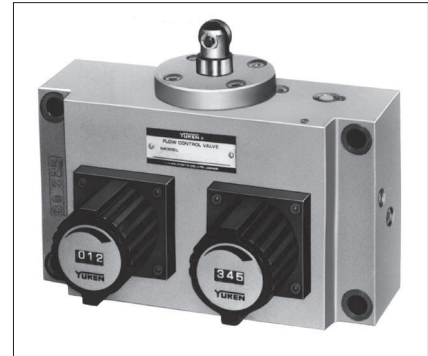
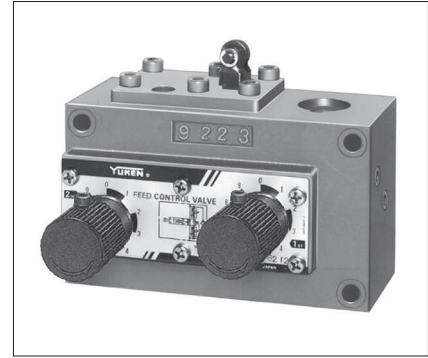


UCF2G-03-*-10



UCF2G-03-*-E-10
UCF2G-04-30-30

● Please contact us separately for the details of Feed Control Valves.



D

Feed Control Valves

Needle Valves

Used as stop valves for pressure gauge lines and small-capacity line. Also can be used as restrictors for regulating flow rates in pilot lines.

Specifications

Model Numbers		Max. Flow L/min	Max. Operating Pressure MPa	Mass kg
In-Line Type	Angle Type			
GCT-02-34	GCTR-02-34	★	35	0.34

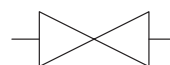
★ Depends on allowable pressure drops. See Adjustment Handle Position vs. Flow characteristics and Pressure Drop at Fully Open characteristics.

Model Number Designation

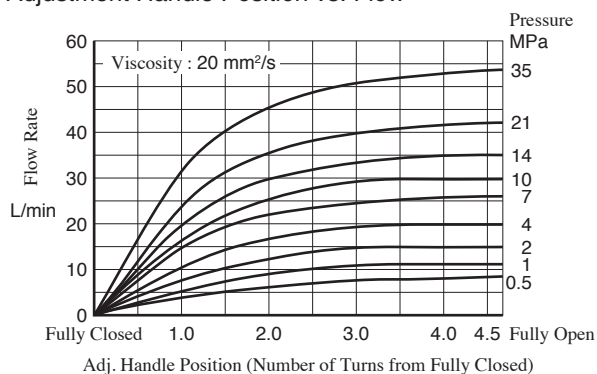
GCT	-02	-34
Series Number	Valve Size	Design Number
GCT : In-line Type Needle Valve, Threaded Connection	02	34
GCTR : Angle Type Needle Valve, Threaded Connection		



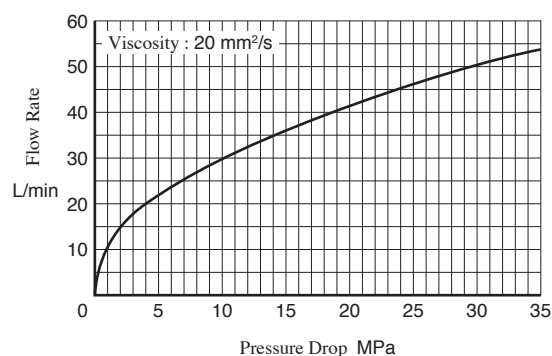
Graphic Symbol



Adjustment Handle Position vs. Flow



Pressure Drop at Fully Open

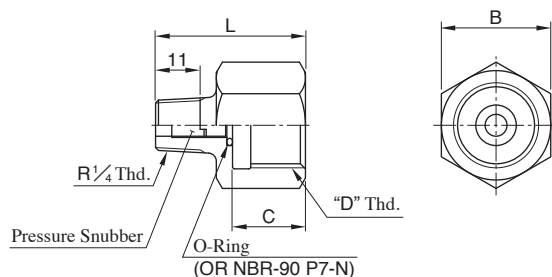


Adapter

Used where pressure gauges are attached directly to needle valves. Equipped with pressure snubber for reducing harmful surges to protect pressure gauges. Adapters are not accessories to needle valves. Order them referring to the table below.

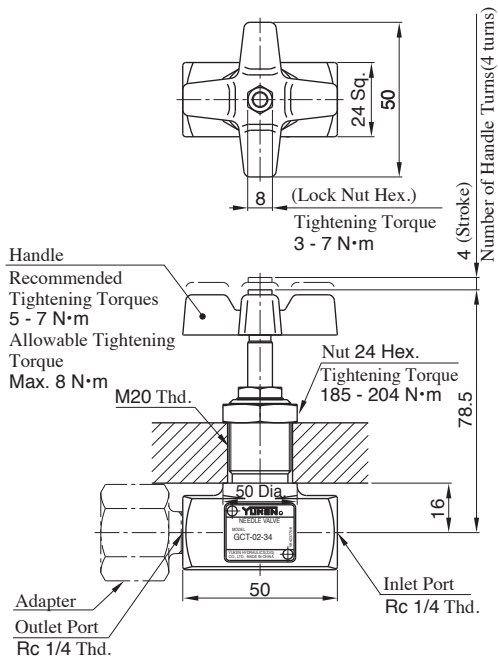
Adapter Type	Thread Size "D" Thd.	B	C	L	Mass kg
AG-02S	G $\frac{1}{4}$	24	14	32	0.075
AG-03S	G $\frac{3}{8}$	24	16	35	0.075
AG-04S	G $\frac{1}{2}$	27	18	37	0.08

AG-02S, 03S, 04S

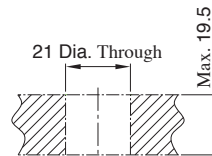
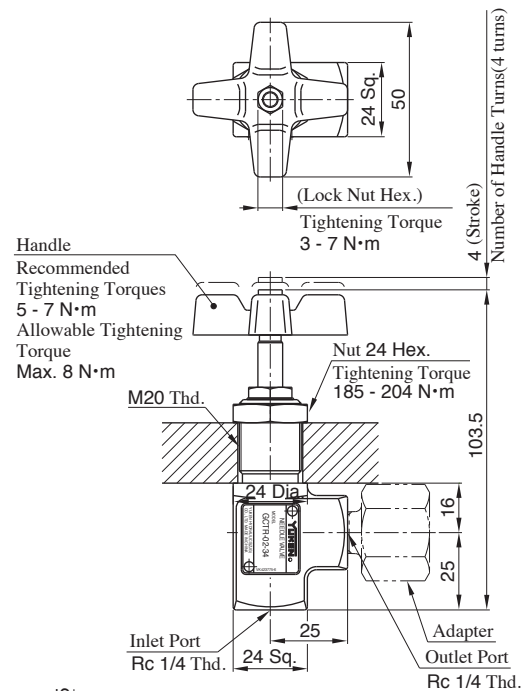


Note: See table above for dimensions.

GCT-02



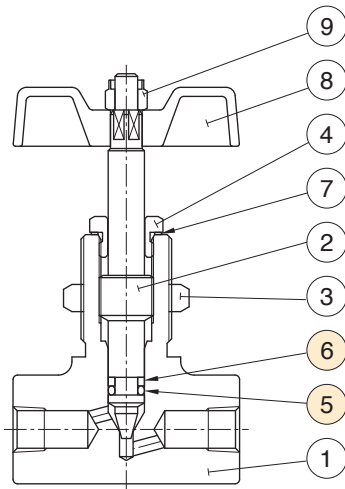
GCTR-02



Panel Mounting Dimensions

List of Seals

GCT
GCTR -02



Item	Name of Parts	Part Numbers	Qty.
5	O-Ring	OR NBR-70-1 P5-N	1
6	Back Up Ring	BR JIS B 2401-4-T2-P5	1

Installation

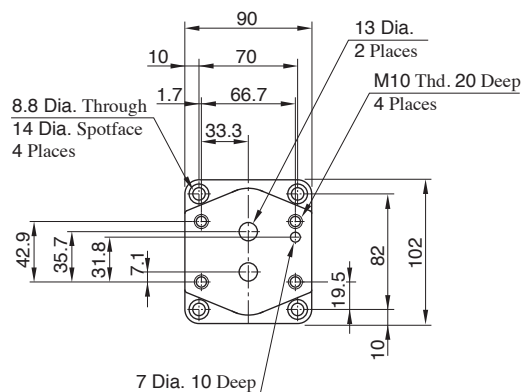
Refer to the following procedures to fit the valve with a panel. Figure in a circle below is shown on the left drawing.

1. Remove the nut ⑨ then take off the handle ⑧.
2. Take off the nut ③.
3. Insert the needle valve to a panel hole.
4. Screw the nut ③ on to the valve and fix the valve with the panel.
5. Fit the handle ⑧ and fix it with the nut ⑨.

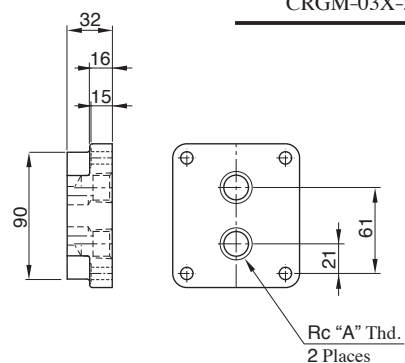
Interchangeability in Installation between Current and New Design

The needle valve has changed model from a 33 to a 34 design to improve assembly workability. There are no changes in specifications, external dimensions, or installation. The nameplate mounting position is on the opposite face of the current design.

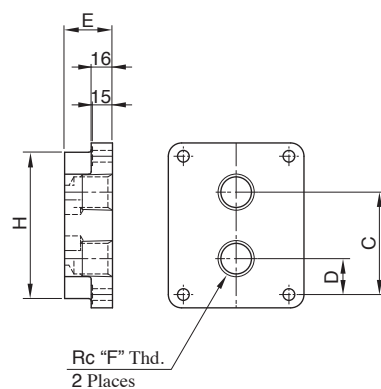
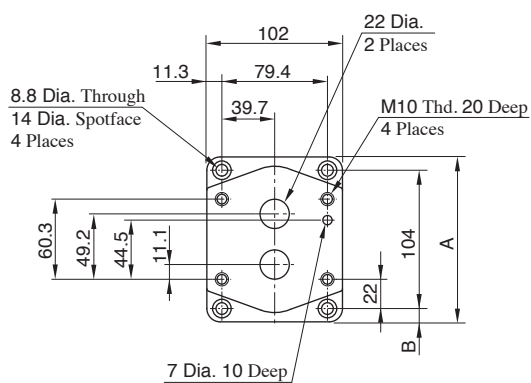
● Sub-Plate
CRGM - 03, 03X



Sub-Plate Model Numbers	A
CRGM-03-50	$\frac{3}{8}$
CRGM-03X-50	$\frac{1}{2}$

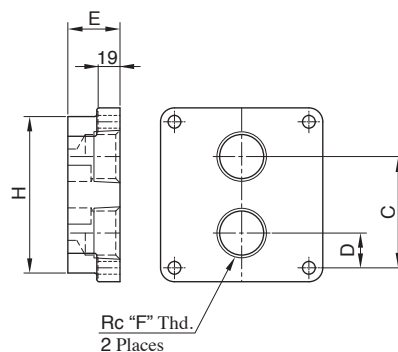
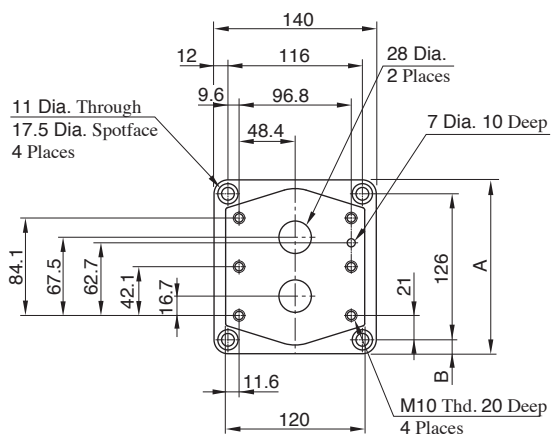


CRGM - 06, 06X



Sub-Plate Model Numbers	A	B	C	D	E	F	H
CRGM-06-50	124	10	77	27	36	$\frac{3}{4}$	110
CRGM-06X-50	136	16	82.3	22	45	1	130

CRGM - 10, 10X



Sub-Plate Model Numbers	A	B	C	D	E	F	H
CRGM-10-50	150	12	96	30	45	$1\frac{1}{4}$	135
CRGM-10X-50	177	25.5	104	22	50	$1\frac{1}{2}$	167

Solenoid Ratings

Valve Type	Electric Source	Coil Type ^{★3}	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
				Source Rating	Serviceable Range	Inrush ^{★2} (A)	Holding (A)	Power (W)
Standard Type	AC ^{★1}	A 100	50	100	80 - 110	2.42	0.51	—
			60	100	90 - 120	2.14	0.37	
				110		2.35	0.44	
		A 120	50	120	96 - 132	2.02	0.42	
			60		108 - 144	1.78	0.31	
		A 200	50	200	160 - 220	1.21	0.25	
			60	200	180 - 240	1.07	0.19	
				220		1.18	0.22	
		A 240	50	240	192 - 264	1.01	0.21	
			60		216 - 288	0.89	0.15	
Shockless Type	DC (K Series)	D 12	—	12	10.8 - 13.2	—	2.45	29
		D 24		24	21.6 - 26.4		1.23	
		D 48		48	43.2 - 52.8		0.61	
	AC→DC Rectified (R)	R 100	50/60	100	90 - 110	—	0.33	29
		R 200		200	180 - 220		0.16	

★1. AC solenoid is not available in shockless type.

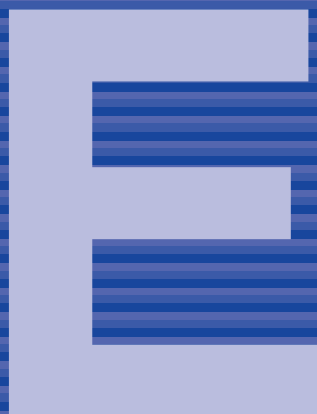
R type models with built-in current rectifier is recommended for shockless operation with AC power.

★2. Inrush current in the above table show rms values at maximum stroke.

★3. There are more coil types other than the above. For details, please make inquiries.

The coil type numbers in the shaded column are handled as optional extras.

In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.



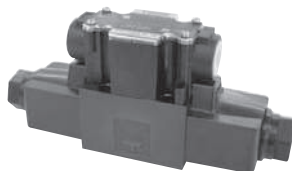
DIRECTIONAL CONTROLS

● Solenoid Operated Directional Valves.....	Page E-5
● Solenoid Controlled Pilot Operated Directional Valves.....	Page E-5
● "G" Series Shockless Type Directional Valves	Page E-5
● Pilot /Manually/ Mechanically Operated Directional Valves	Page E-5
● Poppet Type Directional Valves	Page E-100
● Check /Pilot Controlled Check Valves	Page E-136

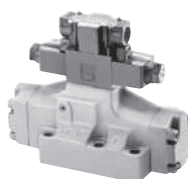
■ Directional Valves

These valves are used for shifting oil flow direction of hydraulic circuit and for actuator starting/stopping as well as the operating direction shifting of actuator.

● Solenoid Operated Directional Valves



● Solenoid Controlled Pilot Operated Directional Valves



● "G" Series Shockless Type Directional Valves



● Pilot/Manually/Mechanically Operated Directional Valves



● Poppet Type Directional Valves



● Check/Pilot Controlled Check Valves



Hydraulic Fluids

Type of Fluids

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

Type of Fluids	Remarks
Petroleum Base Oils	Use fluids equivalent to ISO VG32 or VG46.
Synthetic Fluids	Use phosphate ester or polyol ester type. When phosphate ester type fluid is to be used, prefix "F-" to the model number because a special seal (fluororubber) will be used.
Water Containing Fluids	Use water-glycol fluids or W/O emulsion type fluids.

Notes 1: Synthetic fluids not applicable with G-DSG and G-DSHG series valves.

2: For two types of manually operated directional valves, DMT- $\frac{06}{06*}$ and DMT- $\frac{10}{10*}$, only petroleum base oils and polyol ester type fluids are available.

3: Water-glycol fluids cannot be used for two types of solenoid operated poppet type two-way valves; CDST-03* and CDSG-03.

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

Recommended Viscosity and Oil Temperature

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

Name	Viscosity	Oil Temperature	Contamination Degree
DSG-005 series Solenoid Operated Directional Valves DSG-007 series Solenoid Operated Directional Valves	20 - 200 mm ² /s	-15 - +60°C	Within NAS Grade 11
Solenoid Operated Directional Valves (Except for DSG-005/007 Series) Solenoid Controlled Pilot Operated Directional Valves Manually Operated Directional Valves Mechanically Operated Directional Valves Poppet Type Solenoid Operated Directional Valves Shut-off Type Solenoid Operated Directional Valves Check Valves Pilot Controlled Check Valves In-Line Prefill Valves	15 - 400 mm ² /s	-15 - +70°C	Within NAS Grade 12
G Series Shockless Type Solenoid Operated Directional Valves Shockless Type Solenoid Controlled Pilot Operated Directional Valves	15 - 200 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 shorter the life of the valve. Please maintain the degree of contamination above and use 25 μ m or finer line filter (In case of DSG-005/007 series Solenoid Operated Directional Valves use 20 μ m or finer line filter).

Water-Proof, Dust-Proof and Vibration-Resistance

Item	Standard	Type	Descriptions	Compliance					
				DSG-005 DSG-007	(L-/S-/T-)DSG-01 E-DSG-01 DSHG-01 DSHG-03 (S-)DSHG-04 (S-)DSHG-06 (S-)DSHG-10	(L-/S-/E-/T-)DSG-03	G-DSG-01 G-DSG-03 G-DSHG-04 G-DSHG-06	DSL DSLHG DSP *	CDS *
Water-proof ★ ²	Current JIS F 8001 Water-proof test for marine electric appliance	Class 1 water spray	Drip-proof construction	○	○	○	○	○	○
		Class 2 water spray	Froth-proof construction	×	○	○	○	○	○
	JIS D 0203 Damp-proof and Water-proof test for automobile parts	Damp-proof test M1	Test to examine damp-resistance of parts	×	○	○	○	○	○
		Damp-proof test M2	Test to examine functions of part under high temperature and high humidity	×	○	○	○	○	○
		Splash-proof test R1	Test to examine functions of parts which are likely to be exposed to water splash.	○	○	○	○	○	○
		Splash-proof test R2	Test to examine functions of parts which are indirectly exposed to stormy weather or water splash.	×	○	○	○	○	○
	International Electrotechnical Commission (I.E.C) Pub. 529 JIS C 0920 Water-proof test for electromechanical parts and protection level against the ingress of solid objects	Protection Class 2: Drip-proof type (2)	Not affected by water drip falling at vertical angle of 15 degrees or less.	○	○	○	○	○	○
		Protection Class 3: Rain-proof type	Not affected by rain falling at vertical angle of 60 degrees or less.	×	○	○	○	○	○
		Protection Class 4: Froth-proof type	Not affected by water drip from any direction.	×	○	○	○	○	○
		Protection Class 5: Jet-flow proof type	Not affected by jet flow from any direction.	×	○	×	×	○★ ³	×
Dust-proof ★ ²	International Electrotechnical Commission (I.E.C) Pub. 529 JIS C 0920 Water-proof test for electromechanical parts and protection level against the ingress of solid objects	Protection Class 6	Fully protected from entry of dust.	○	○	○	○	○	○
Vibration-resistance	JIS C 0911 Vibration test for small electric appliances	Resonance test (IC)	Vibration range: 7-59.5 Hz Duplex amplitude: 0.1 m	×	○	○	○	○	○
		Fixed frequency resistance test (IIC)	Frequency: 20 Hz	Grade 1: duplex amplitude-0.5 mm	×	○	○	○	○
				Grade 2: duplex amplitude-1.2 mm	×	○★ ¹	○★ ¹	○★ ¹	○
				Grade 3: duplex amplitude-1.8 mm	×	○★ ¹	○★ ¹	○★ ¹	○
				Grade 4: duplex amplitude-2.4 mm	×	○★ ¹	○★ ¹	○★ ¹	○
		Variable frequency resistance test (IIIC)	Frequency range: 7-59.5 Hz	Grade 1: duplex amplitude-0.3 mm	×	○★ ¹	○★ ¹	○★ ¹	○
				Grade 2: duplex amplitude-0.5 mm	×	○★ ¹	○★ ¹	○★ ¹	×
				Grade 3: duplex amplitude-0.75 mm	×	○★ ¹	○★ ¹	○★ ¹	×
	JIS D 1601 Vibration test for automobile parts	Class 1: mainly for parts of passenger car	Grade A: Parts mounted on spring of body or chassis having relatively high vibration.	×	○	○	○	○	×
			Grade B: Parts mounted on spring of body or chassis having relatively high vibration.	×	○	○	○	○	×
			Grade C: Parts mounted on spring of body or chassis having relatively low vibration.	×	○	○	×	○	×

★1. No-spring detented type (2D*) and No-spring type (2N*) can be used when energised continuous for position holding.

★2. For outdoor use, protect equipment with a cover, etc., to prevent direct exposure to water.

For the terminal-box type connecting port for electric wire tube, use each standard tube and make bushing construction.

★3. DSP*-01 can be used.

Solenoid Operated Directional Valves

Solenoid Controlled Pilot Operated Directional Valves

"G" Series Shockless Type Directional Valves

Pilot/Manually/Mechanically Operated Directional Valves

Valve Type	Graphic Symbols	Max. Operating Pressure MPa	Max. Flow L/min																Page
			1	2	5	10	20	50	100	200	500	1000	2000	5000					
Solenoid Operated Directional Valves		25	DSG-005																E-10
		25	DSG-007																E-16
		16	L-DSG-01																E-22
		25	S-DSG-01																
		35	DSG-01																
		16	L-DSG-03																E-37
		25	S-DSG-03																
		31.5	DSG-03																
Low Wattage (5W) Type Solenoid Operated Directional Valves		16	E-DSG-01																E-53
			E-DSG-03																
Electronic Relay Incorporated Solenoid Operated Directional Valves		25	T-S-DSG-01																E-62
		35	T-DSG-01																
		25	T-S-DSG-03																E-62
		31.5	T-DSG-03																
Explosion Proof (Flameproof) Type Solenoid Operated Directional Valves		31.5	DSG-01-***-**X*																E-66
			DSG-03-***-**X*																
Explosion Proof (Increased Safety) Type Solenoid Operated Directional Valves		31.5	DSG-01-***-**Y*																E-68
			DSG-03-***-**Y*																
Solenoid Controlled Pilot Operated Directional Valves		21	DSHG-01																E-69
		25	DSHG-03																
		31.5	DSHG-04/S-DSHG-04																
			DSHG-06/S-DSHG-06																
			DSHG-10/S-DSHG-10																
G Series Shockless Type Solenoid Operated Directional Valves		25	G-DSG-01																E-94
			G-DSG-03																
G Series Shockless Type Solenoid Controlled Pilot Operated Directional Valves		25	G-DSHG-04																E-94
			G-DSHG-06																
Pilot Operated Directional Valves		31.5	DHG-04 06 10																E-97
Manually Operated Directional Valves		21	Thread Connection (DMT) 03 06 10																E-98
		31.5	Sub-plate Connection (DMG) 01 03 04 06 10																
Mechanically Operated Directional Valves		7	Rotary (DR ^T _G) 02																E-99
		25	Cam Operated (DC ^T _G) 01 03																

Spool Types

Spool types are classified to the condition of flow at the neutral position.

Spool Types	Graphic Symbols	Schematic Drawing (Center Position)	Functions and Applications
"2" Closed Center All Ports			Holds pump pressure and cylinder position at neutral. Care should be paid if used as a 2-position type because shock occurs when each port is blocked in transit.
"3" Open Center All Ports			Pump can be unloaded and actuator is floating at neutral. If a 2-position type is used, shock is reduced as each ports is released to tank in transit.
"4" Open Center A, B&T			Pump pressure is held and actuator is floating at neutral. 2-position type is used when system pressure is required to be held in transit. Shock during transit is less compared to spool type "2".
"40" Open Center A, B&T Restricted Flow			In a variation of spool type "4", a restrictor is provided in A-T and B-T ports. Making it faster at stopping the actuator.
"5" Open Center P, A&T			It can be used when a pump is unloading at neutral and actuator is halted at one way flow.
"6" Open Center P&T (Closed Crossover)			Pump is unloading and actuator position held at neutral. Suitable for series operation.
"60" Open Center P&T (Open Crossover)			It is a variation of spool type "6". Shock is reduced as each port is released to tank on transit.
"7" Open Center All Ports Restricted Flow			Mainly used as a 2-position type. Shock is reduced on transit.
"8" 2-Way			Pump pressure and cylinder position is held at neutral in the same way as spool type "2". It is used as 2 way type.
"9" Open Center P, A&B			Regenerative circuit is provided at neutral.
"10" Open Center B&T			Prevent actuator from one direction drift by leakage of P port at neutral.
"11" Open Center P&A			Halt actuator movement positively at B, T ports blocked P, A ports connected at neutral.
"12" Open Center A&T			Prevent actuator from one direction drift by leakage of P port at neutral.

Mounting Surface

Mounting surface dimensions conform to ISO 4401, Hydraulic fluid power-Four-Port directional control valves mounting surfaces.

Model Numbers	ISO Code of Mounting Surface
DSG-007	ISO 4401-02-01-0-05
(L-/S-/E-/HE-/T-/G-) DSG-01 DSHG-01 DMG-01 DCG-01	ISO 4401-03-02-0-05
(L-/S-/E-/T-/G-) DSG-03 DMG-03 DCG-03	ISO 4401-05-04-0-05
DSHG-03	ISO 4401-05-05-0-05
(S-/G-) DSHG-04 DHG-04 DMG-04	ISO 4401-07-07-0-05
(S-/G-) DSHG-06 DHG-06 DMG-06	ISO 4401-08-08-0-05
(S-) DSHG-10 DHG-10 DMG-10	ISO 4401-10-09-0-05

Note: Mounting surface of DSG-005 is YUKEN original standard.

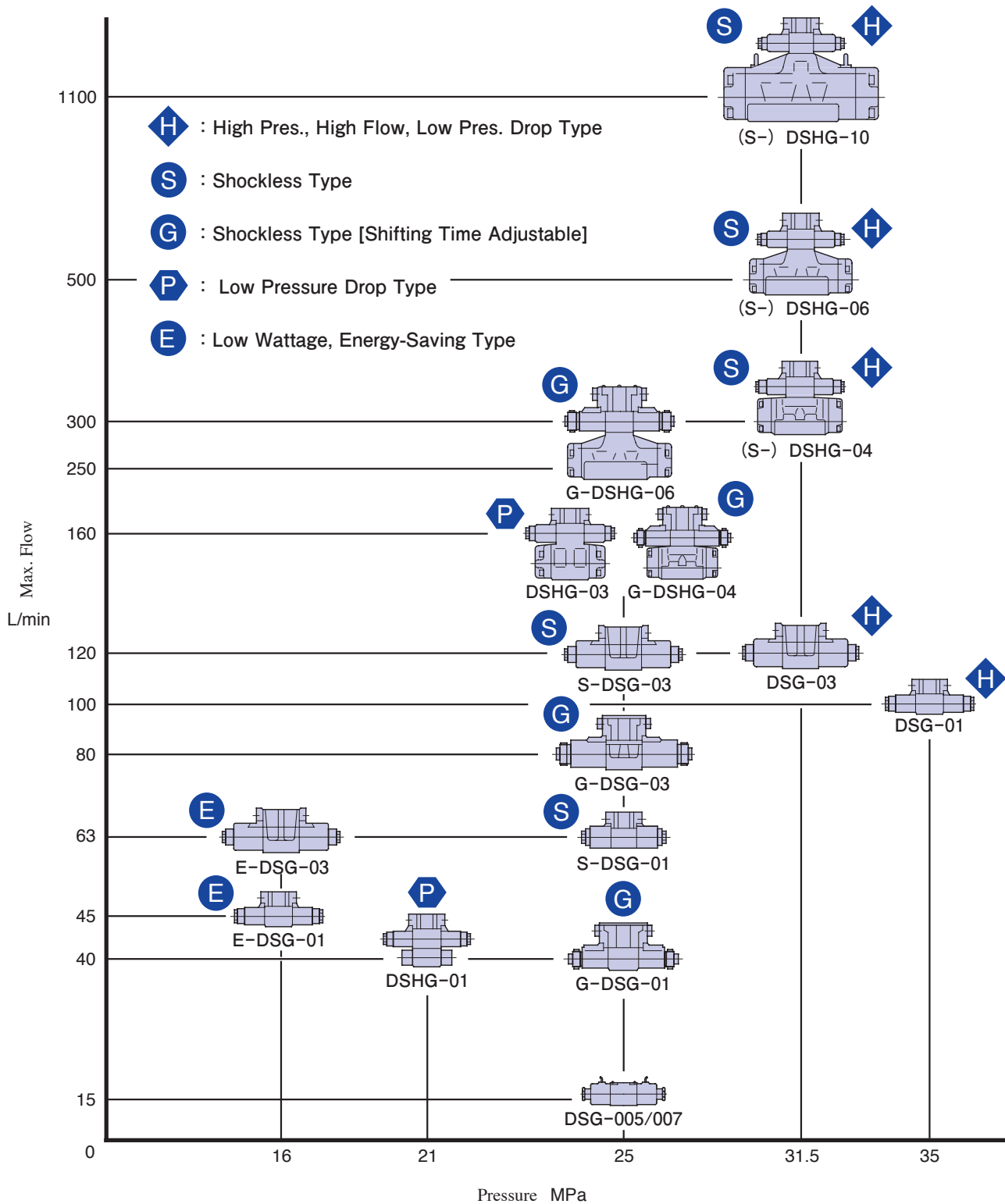
Interchangeability in Installation between Current and New Design

Model change has been made on the following product.

The difference between current and new design has been described on the paragraph of “Interchangeability in Installation between Current and New Design.” Refer to relevant pages on each series.

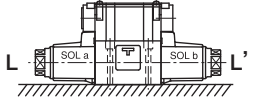
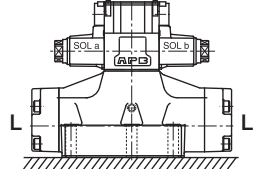
Name	Model Numbers		Interchangeability in Installation	Related Page	Major Changes
	Current	New			
DSG-005 Series Solenoid Operated Directional Valves	DSG-005- * * * - * -30	DSG-005- * * * - * -40 DSG-005- * * * - * - $\frac{N}{N1}$ -40	Yes	—	● High Flow ● Low Pressure Drop ● Din-connector type solenoid in addition
DSG-01 Series Solenoid Operated Directional Valves	($\frac{S-}{T-}$) DSG-01- * * * - * -60	($\frac{S-}{T-}$) DSG-01- * * * - * -70	Yes	E-32	● High Pressure ● High Flow ● High Max. T-Line Back Pressure ● Low Pressure Drop ● Small Mass
Low Wattage (5W) Type Solenoid Operated Directional Valves	E-DSG-01- * * * - * -60	E-DSG-01- * * * - * -70	Yes	E-61	● High Flow
Explosion Proof (Flameproof) Type Solenoid Operated Directional Valves	DSG-01- * * * - * X * -50 DSG-03- * * * - * X * -50	DSG-01- * * * - * X * -70 DSG-03- * * * - * X * -51	Yes	E-67	● Change Cable Lead-in Port ● High Pressure ● High Flow
Solenoid Controlled Pilot Operated Directional Valves	DSHG-01- * * * - * -13 DSHG-03- * * * - * -13 (S-) DSHG-04- * * * - * -51 (S-) DSHG-06- * * * - * -52 (S-) DSHG-10- * * * - * -42	DSHG-01- * * * - * -14 DSHG-03- * * * - * -14 (S-) DSHG-04- * * * - * -52 (S-) DSHG-06- * * * - * -53 (S-) DSHG-10- * * * - * -43	Yes	—	● Pilot valve has been changed from DSG-01, 60 design to 70 design.
G Series Shockless Type Solenoid Operated Directional Valves	G-DSG-01- * * * - * -50 G-DSG-03- * * * - * -50	G-DSG-01- * * * - * -51 G-DSG-03- * * * - * -51	Yes	E-96	● Use Digital Control Amplifier

Wide Range of Models – Choose the optimum valve to meet your needs from a large selection available.



Instructions

● Mounting

DSG-005 DSG-007	No mounting restrictions for any model.	
*-DSG-01 *-DSG-03	No-spring detented models not energised continuously must be installed so that the spool axis L-L' is horizontal. Otherwise there is no mounting restrictions.	 *-DSG-01/03
DSHG-01 DSHG-03 (S-) DSHG-04 (S-) DSHG-06 (S-) DSHG-10	No-spring models not energised continuously must be installed so that the spool axis L-L' is horizontal. Otherwise there is no mounting restrictions.	 *-DSHG

● Energisation

1. On double solenoid valves do not energise both at the same time as it will result in coils burning out.
2. If use No-Spring Type, one of two solenoids should be energised continuously to avoid malfunction.

● Valve Tank Port 【Solenoid Operated / Solenoid Controlled Pilot Operated Directional Valves (Internal Drain Type)】

Avoid connecting the valve tank port to a line with possible surge pressure.

Solenoid Operated Directional Valve is wet type, so piping have to constantly fill the tank line with operating oil.

Piping end of tank line should be submerged in oil.

● Pilot Drain Port for Solenoid Controlled Pilot Operated Directional Valve

Avoid connecting the valve pilot drain port to a line with possible surge pressure.

Solenoid Controlled Pilot Operated Directional Valve is wet type, so piping have to constantly fill the Pilot Operated Directional valve with operating oil.

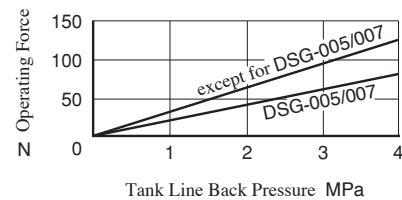
● Shockless Type

In order to benefit from a shockless operation, it is necessary to fill the tank line with operating oil.

Only after the tank line has been filled with operating oil should the valve be used on a regular basis.

● Operating Force by Manual Actuator

Take care as the operating force by the manual actuator increases in proportion to the tank line back pressure. (See the graph right.)



Solenoid

■ Solenoid connector (DIN connector)

The solenoid connector is in accordance with the international standard ISO 4400 (Fluid power systems and components-Three-pin electrical plug connectors characteristics and requirements).

■ AC Solenoid

50-60 Hz common service solenoids do not require rewiring when the applied frequency is changed.

■ DC Solenoid

DC Solenoid is K-series with good reputation.

★Three Characteristics of K-series★

1. Avoid malfunction of computers.
(The surge voltage is low, so these valves do not give bad influences like noise to electronic devices)
2. The relays last for long time.
(The spark between the relay contacts has been eliminated and therefore drastically decrease damages of contacts)
3. Time lag on de-energisation is reduced.

■ R type Models with Current Rectifier and DC Solenoid

Specially designed DC solenoid and receptacle (or connector) containing AC-DC rectifier and transient peak suppressor are provided. Connection to be made to AC power source as with conventional AC solenoid.

Remarkably high reliability and long life and other advantages including quiet valve operation. No overheating of coil due to the spool sticking and protection against transient voltage peaks are assured.

■ RQ type Models with Current rectifier and Quick Return Solenoid

Valve characteristics are identical to R type except for the fast return time of the spool after deenergisation.

■ Insulation Class of Solenoid

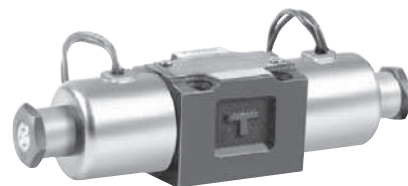
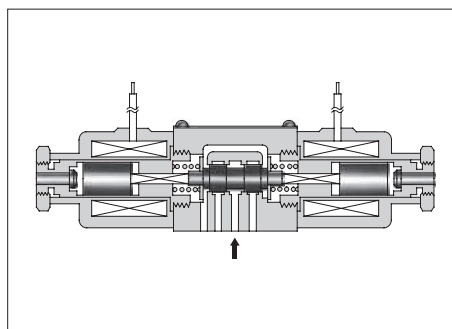
Model Numbers	Insulation Class
DSG-005, DSG-007 (S-/E-/T-) DSG-01 DSG-03, S-DSG-03, E-DSG-03, T-DSG-03 DSHG-01/03/04/06/10 S-DSHG-04/06/10	Class H

DSG-005 Series Solenoid Operated Directional Valves

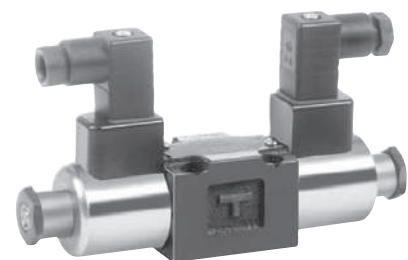
These DSG-005 series solenoid directional valves are the products newly developed as a “Mini-series”.

The valves are much more compactly manufactured but enjoy a maximum operating pressure of 25 MPa and a maximum flow rate of 15 L/min, while contributing further to a space saving requirement.

Moreover, using wet armature solenoids, the valves ensure the long life and low noise.



Flying Lead Wire Type



Plug-in Connector Type

Specifications

Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. Tank-Line Back Pressure MPa	Max. Changeover Frequency min ⁻¹	Approx. Mass kg
DSG-005-3C * - * -40	15	25	7	120	0.5
DSG-005-2B * - * -40					0.4

★ The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.

The maximum flow differs according to the type and operating conditions. For details, please refer to the “List of Standard Models and The Maximum Flow” on page E-12.

Solenoid Ratings

Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
			Source Rating	Serviceable Range	Inrush★ ¹ (A)	Holding (A)	Power (W)
AC	A 100	50	100	80 - 110	0.36	0.16	—
		60		90 - 120	0.34	0.11	
	A 200	50	200	160 - 220	0.18	0.08	
		60		180 - 240	0.17	0.05	
DC★ ²	D12	—	12	10.8 - 13.2	—	1.2	15
	D24		24	21.6 - 26.4		0.6	

★1. Inrush current in the above table shows rms values at maximum stroke.

★2. The Plug-in Connector Type DC solenoid has a built-in surge absorber.

The Flying Lead Wire type has no surge absorber equipped. Install a surge absorber separately.

Model Number Designation

DSG	-005	-3	C	2	-D24	-N	-40
Series Number	Valve Size	Number of Valve Positions	Spool-Spring Arrangement	Spool Type	Coil Type	Electrical Conduit Connection	Design Number
DSG : Solenoid Operated Directional Valve (Sub-plate Mount Type)	005	3	C: Spring Centered	2, 3 40	AC A100 A200 DC D12 D24	None : Flying Lead Wire Type N : Plug-in Connector Type N1: Plug-in Connector with Indicator Light	40
		2	B: Spring Offset	2, 3			

Note: Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Sub-plates

Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSGM-005X-20	1/8	0.8
DSGM-005Y-20	1/4	

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1}{16}$)
And the port hole diameter should below 4.3 Dia..

Accessories

Mounting Bolts	Tightening Torque
Soc. Hd. Cap Screw : M4×35L...4Pcs.	2.5 - 3.5 Nm

Electrical Conduit Connection

The solenoid common use 50 & 60 Hz, so no need to change connection by difference of frequency.
The solenoid polarity is irrelevant with connection.

Typical Changeover Time (Example)

Changeover time varies according to oil viscosity, spool type and hydraulic circuit.

[Test Conditions]

Pressure : 16 MPa

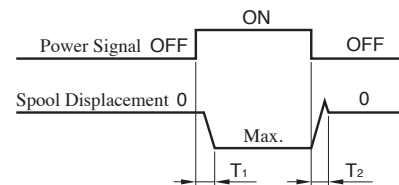
Flow Rate : 7.5 L/min

Viscosity : 30 mm²/s

Voltage : Rated Voltage (After coil temperature rise and saturated)

Direction of Flow : P $\begin{cases} \rightarrow A \rightarrow B \\ \rightarrow B \rightarrow A \end{cases} \rightarrow T$

[Result of Measurement]



Model Numbers	Time ms	
	T1	T2
DSG-005-3C2-A *	16	60
DSG-005-3C2-D *	23	40
DSG-005-2B2-A *	14	45
DSG-005-2B2-D *	15	33

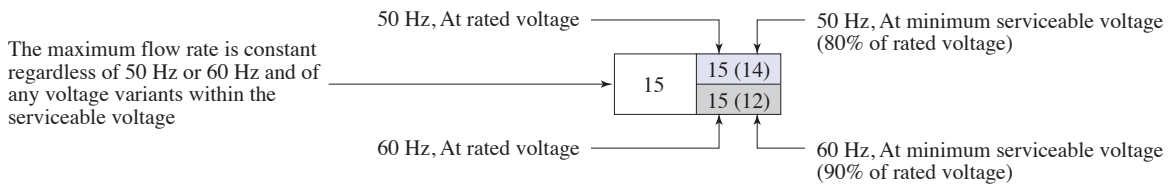
■ List of Standard Models

● Models with AC Solenoids : DSG-005- * * * -A *

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P → A → B → T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	DSG-005-3C2		15	15	15	15	15 (14) 15 (12)	15 (7) 12 (3)	12 (3) 5 (1)	4 (0.5) 1 (0.5)	15 (14) 15 (12)	15 (7) 12 (3)	12 (3) 5 (1)	4 (0.5) 1 (0.5)
		DSG-005-3C3		12	12	12	12	15	15	15	15	15	15	15	15
		DSG-005-3C40		15	15	15	15	15 (14) 15 (10)	15 (6) 12 (5)	12 (2) 5 (2)	4 (0.5) 1 (0.5)	15 (14) 15 (10)	15 (6) 12 (5)	12 (2) 5 (2)	4 (0.5) 1 (0.5)
Two Positions	Spring Offset	DSG-005-2B2		14	14	14	14	2	1	1	1	15 (14) 15 (14)	15 (10) 14 (9)	13 (5) 8 (4)	6 (0.5) 4 (0.5)
		DSG-005-2B3		13.5	13.5	13.5	13.5	3	3	3	3	15	15 (14) 15 (14)	15 (11) 15 (11)	15 (9) 15 (9)

Notes: The relation between the maximum flow in the table above and the frequency/voltage (within the serviceable voltage) is as shown below.

(Example)

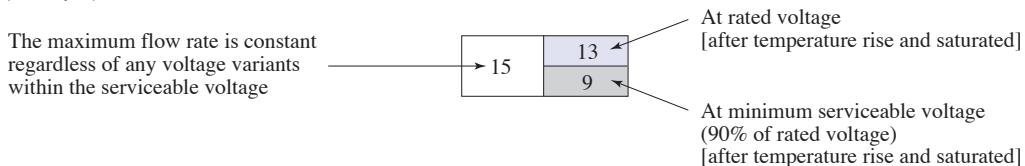


● Models with DC Solenoids : DSG-005- * * * -D *

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P → A → B → T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	DSG-005-3C2		15	15	15	15	15 12	8 5	5 3	3 2	15 12	8 5	5 3	3 2
		DSG-005-3C3		15	15	15	15	15	15	15	15	15	15	15	15
		DSG-005-3C40		15	15	15	15	15	13 9	8 5.5	5 3.5	15	13 9	8 5.5	5 3.5
Two Positions	Spring Offset	DSG-005-2B2		14	14	14	14	8.5	4.5	6.5	6.5	15	15 11	11 7.5	9 5.5
		DSG-005-2B3		13.5	13.5	13.5	13.5	8	7	8	9	15	15	15	13.5 10.5

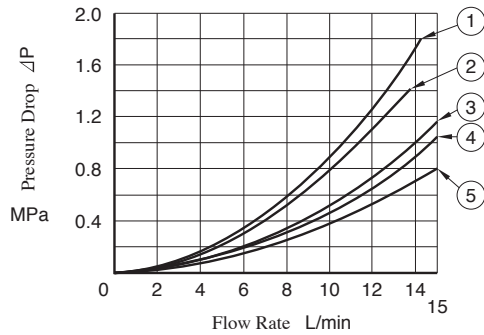
Notes: The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)



Pressure Drop

Pressure drop curves based on viscosity of 30 mm²/s and specific gravity of 0.850.



Model Numbers	Pressure Drop Curve Numbers				
	P → A	B → T	P → B	A → T	P → T
DSG-005-3C2	④	④	④	④	—
DSG-005-3C3	⑤	⑤	⑤	⑤	③
DSG-005-3C40	④	④	④	④	—
DSG-005-2B2	①	①	④	④	—
DSG-005-2B3	②	②	④	④	—

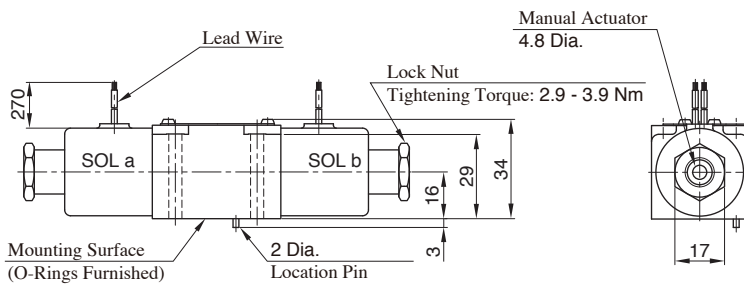
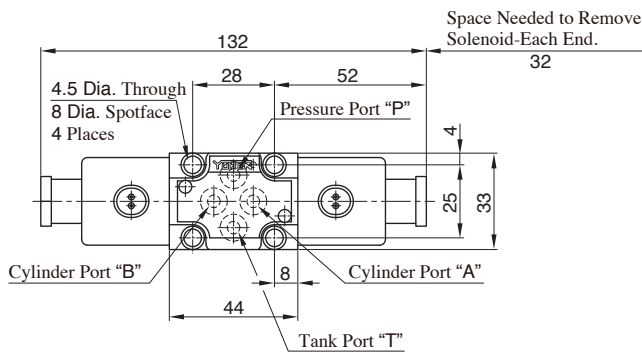
● For any other viscosity, multiply the factors in the table below.

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.84	0.91	1.00	1.07	1.14	1.19	1.24	1.28	1.32	1.35

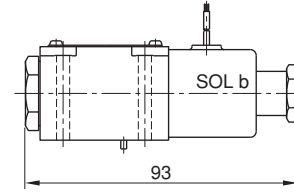
● For any other specific gravity (G'), the pressure drop (ΔP) may be obtained from the formula below.
 $\Delta P' = \Delta P (G' / 0.850)$

■ Flying Lead Wire Type

- Spring Centered : **DSG-005-3C*** - $\frac{A}{D}$ *



- Spring Offset : **DSG-005-2B*** - $\frac{A}{D}$ *

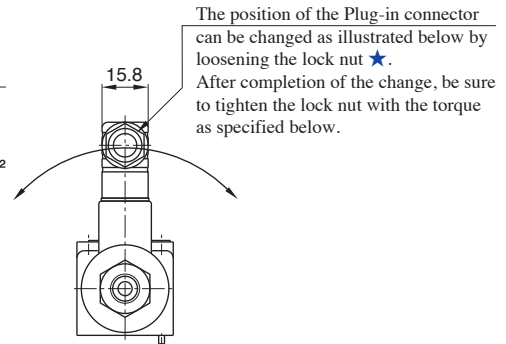
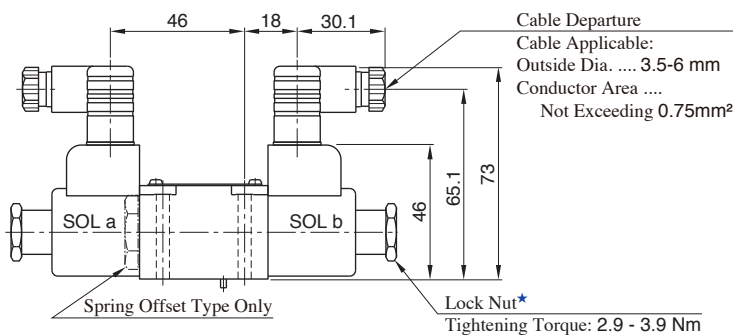


- For other dimensions, refer to "Spring Centered" type.

■ DIN Connector Type / DIN Connector with Indicator Light

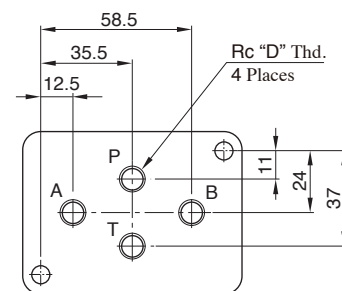
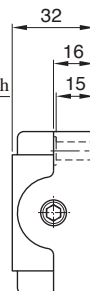
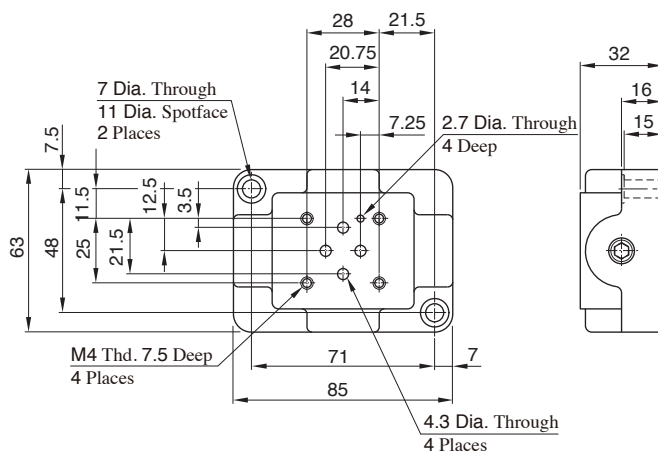
- Spring Centered : **DSG-005-3C*** - $\frac{A}{D}$ * - N/N1

- Spring Offset : **DSG-005-2B*** - $\frac{A}{D}$ * - N/N1



- For other dimensions, refer to "Flying Lead Wire Type".

■ Sub-plate : DSGM-005X, 005Y

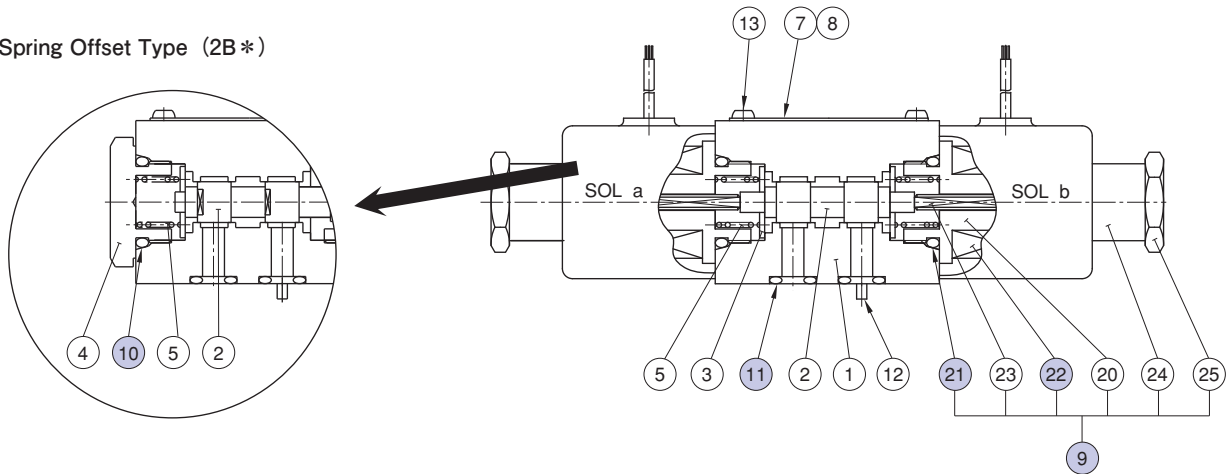


Sub-plate Model Numbers	D	Approx. Mass kg
DSGM-005X-20	1/8	0.8
DSGM-005Y-20	1/4	

List of Seals, Solenoid Ass'y

DSG-005

Spring Offset Type (2B*)



List of Seals

Item	Name of Parts	Part Numbers	Qty.		Remarks
			3C *	2B *	
10	O-Ring	OR NBR-90 P14-N	—	1	
11	O-Ring	OR NBR-90 P6-N	4	4	
21	O-Ring	OR NBR-90 P14-N	2	1	Included in Solenoid Ass'y ⑨

Solenoid Ass'y, Coil Ass'y No.

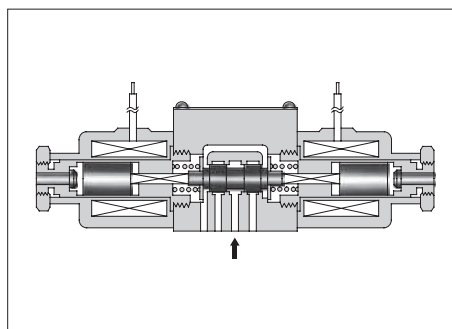
Valve Model Numbers	⑨ Solenoid Ass'y No.	⑫ Coil Ass'y No.	Remarks
DSG-005-***-A100	SA05-100-40	C-SA05-100-40	Flying Lead Wire Type
DSG-005-***-A200	SA05-200-40	C-SA05-200-40	
DSG-005-***-D12	SD05-12-40	C-SD05-12-40	
DSG-005-***-D24	SD05-24-40	C-SD05-24-40	
DSG-005-***-A100-N/N1	SA05-100-N-40	C-SA05-100-N-40	Plug-in Connector Type /Plug-in Connector with Indicator Light
DSG-005-***-A200-N/N1	SA05-200-N-40	C-SA05-200-N-40	
DSG-005-***-D 12-N/N1	SD05- 12-N-40	C-SD05- 12-N-40	
DSG-005-***-D 24-N/N1	SD05- 24-N-40	C-SD05- 24-N-40	

DSG-007 Series Solenoid Operated Directional Valves

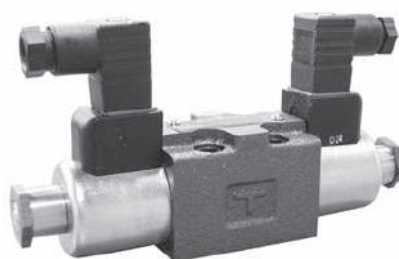
These DSG-007 series solenoid directional valves are the products based on the DSG-005 series and mounting surface dimensions are suit for ISO standard.

The valves are much more compactly manufactured but enjoy a maximum operating pressure of 25 MPa and a maximum flow rate of 15 L/min, while contributing further to a space saving requirement.

Moreover, using wet armature solenoids, the valves ensure the long life and low noise.



Flying Lead Wire Type



Plug-in Connector Type

Specifications

Model Numbers	Max. Flow [★] L/min	Max. Operating Pressure MPa	Max. Tank-Line Back Pressure MPa	Max. Changeover Frequency min ⁻¹	Approx. Mass kg
DSG-007-3C * - * -10	15	25	7	120	0.7
DSG-007-2B * - * -10					0.57

★ The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.

The maximum flow differs according to the type and operating conditions. For details, please refer to the “List of Standard Models and Maximum Flow” on pages E-18 to E-19.

Solenoid Ratings

Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
			Source Rating	Serviceable Range	Inrush ^{★1} (A)	Holding (A)	Power (W)
AC	A 100	50	100	80 - 110	0.36	0.16	—
		60		90 - 120	0.34	0.11	
	A 200	50	200	160 - 220	0.18	0.08	
		60		180 - 240	0.17	0.05	
DC ^{★2}	D12	—	12	10.8 - 13.2	—	1.2	15
	D24		24	21.6 - 26.4		0.6	

★ 1. Inrush current in the above table shows rms values at maximum stroke.

★ 2. The Plug-in Connector Type DC solenoid has a built-in surge absorber.

The Flying Lead Wire type has no surge absorber equipped. Install a surge absorber separately.

Model Number Designation

DSG	-007	-3	C	2	-D24	-N	-10
Series Number	Valve Size	Number of Valve Positions	Spool-Spring Arrangement	Spool Type	Coil Type	Electrical Conduit Connection	Design Number
DSG : Solenoid Operated Directional Valve (Sub-plate Mount Type)	007	3	C : Spring Centered	2, 3 4, 40	AC A100 A200	None: Flying Lead Wire Type N: Plug-in Connector Type N1: Plug-in Connector with Indicator Light	10
		2	B : Spring Offset	2, 3, 8	DC D12 D24		

Note: Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Sub-plates

Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSGM-007X-10	1/8	0.8
DSGM-007Y-10	1/4	

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\sqrt{6}$)
And the port hole diameter should below 4.3 Dia..

Accessories

Mounting Bolts	Tightening Torque
Soc. Hd. Cap Screw : M5×40L...4Pcs.	5.0 - 7.0 Nm

Electrical Conduit Connection

The solenoid common use 50 & 60 Hz, so no need to change connection by difference of frequency.
The solenoid polarity is irrelevant with connection.

Typical Changeover Time (Example)

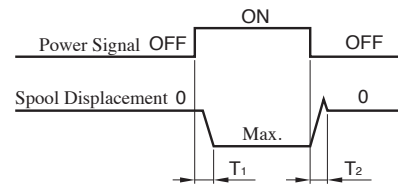
Changeover time varies according to oil viscosity, spool type and hydraulic circuit.

[Test Conditions]

Pressure : 16 MPa
Flow Rate : 7.5 L/min
Viscosity : 30 mm²/s
Voltage : Rated Voltage (After coil temperature rise and saturated)

Direction of Flow : P $\begin{matrix} \nearrow A \rightarrow B \\ \searrow B \rightarrow A \end{matrix}$ T

[Result of Measurement]



Model Numbers	Time ms	
	T ₁	T ₂
DSG-007-3C2-A *	16	60
DSG-007-3C2-D *	23	40
DSG-007-2B2-A *	14	45
DSG-007-2B2-D *	15	33

■ List of Standard Models

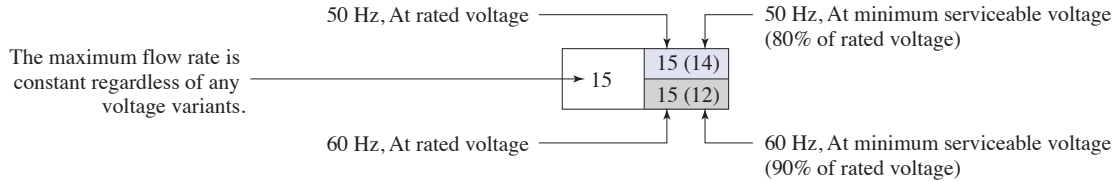
● Models with AC Solenoids : DSG-007- * * * - A *

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P → A → B → T P → B → A → T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	DSG-007-3C2		15	15	15	15	15(14) 15(12)	15(7) 12(3)	12(3) 5(1)	4(0.5) 1(0.5)	15(14) 15(12)	15(7) 12(3)	12(3) 5(1)	4(0.5) 1(0.5)
		DSG-007-3C3		12	12	12	12	15	15	15	15	15	15	15	15
		DSG-007-3C4		13	13	13(6) 9(4)	8(2) 4(1)	15(14) 15(10)	15(6) 12(5)	12(2) 5(2)	4(0.5) 1(0.5)	15(14) 15(10)	15(6) 12(5)	12(2) 5(2)	4(0.5) 1(0.5)
		DSG-007-3C40		15	15	15	15	15(14) 15(10)	15(6) 12(5)	12(2) 5(2)	4(0.5) 1(0.5)	15(14) 15(10)	15(6) 12(5)	12(2) 5(2)	4(0.5) 1(0.5)
Two Positions	Spring Offset	DSG-007-2B2		14	14	14	14	2	1	1	1	15(14) 15(14)	15(10) 14(9)	13(5) 8(4)	6(0.5) 4(0.5)
		DSG-007-2B3		13.5	13.5	13.5	13.5	3	3	3	3	15 15(14)	15(14) 15(11)	15(11) 15(9)	15(9) 15(9)
		DSG-007-2B8		—	—	—	—	3	1	1	0.5	15(5) 14(5)	14(1) 3(1)	6(0.5) 1(0.5)	2(0.5) 1(0.5)

Notes: The table above based on viscosity of 30mm²/s.

The relation between the maximum flow and the voltage (within the serviceable voltage) is as shown below.

(Example)



Models with DC Solenoids : DSG-007-***-D*

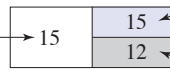
No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P → A → B → T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	DSG-007-3C2		15	15	15	15	15	8	5	3	15	8	5	3
		DSG-007-3C3		15	15	15	15	15	15	15	15	15	15	15	15
		DSG-007-3C4		15	15	8.5	4.5	15	9.5	5.5	3.5	15	9.5	5.5	3.5
		DSG-007-3C40		15	15	7.5	3.5	14.5	6	3.5	2	14.5	6	3.5	2
Two Positions	Spring Offset	DSG-007-2B2		14	14	14	14	8.5	4.5	6.5	6.5	15	15	11	9
		DSG-007-2B3		13.5	13.5	13.5	13.5	8	7	8	9	15	15	15	13.5
		DSG-007-2B8		—	—	—	—	15	3.5	2	1.5	15	4	2.5	2

Notes: The table above based on viscosity of 30mm²/s.

The relation between the maximum flow and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants

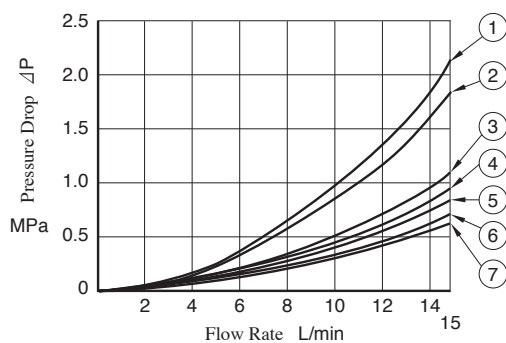


At rated voltage
[after temperature rise and saturated]

At minimum serviceable voltage (90% of rated voltage)
[after temperature rise and saturated]

Pressure Drop

Pressure drop curves based on viscosity of 30 mm²/s and specific gravity of 0.850.



Model Numbers	Pressure Drop Curve Numbers				
	P → A	B → T	P → B	A → T	P → T
DSG-007-3C2	⑤	⑤	⑤	⑤	—
DSG-007-3C3	⑥	⑥	⑥	⑥	③
DSG-007-3C4	⑤	⑦	⑤	⑦	—
DSG-007-3C40	⑤	⑤	⑤	⑤	—
DSG-007-2B2	①	①	④	④	—
DSG-007-2B3	②	②	⑤	⑥	—
DSG-007-2B8	⑤	—	④	—	—

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

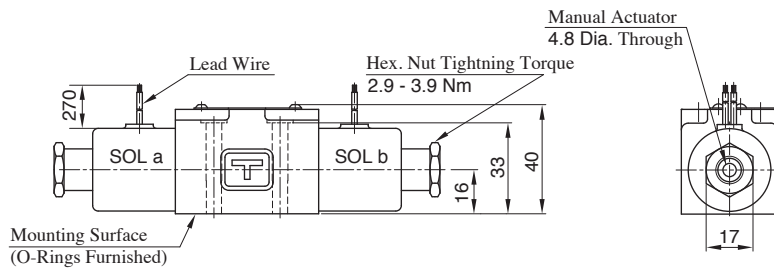
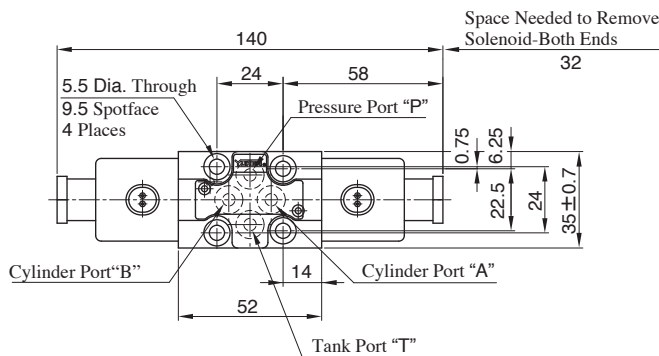
Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.84	0.91	1.00	1.07	1.14	1.19	1.24	1.28	1.32	1.35

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

$$\Delta P' = \Delta P (G' / 0.850)$$

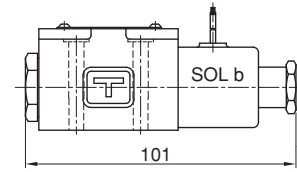
■ Flying Lead Wire Type

- Spring Centered : DSG-007-3C* - $\frac{A^*}{D^*}$



- Spring Offset :

DSG-007-2B* - $\frac{A^*}{D^*}$

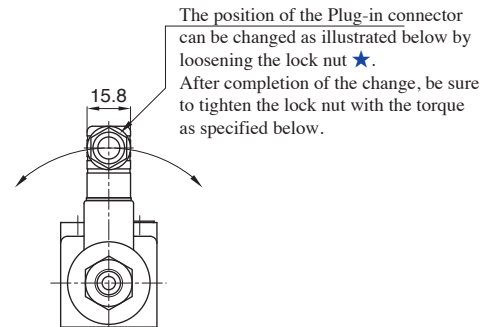
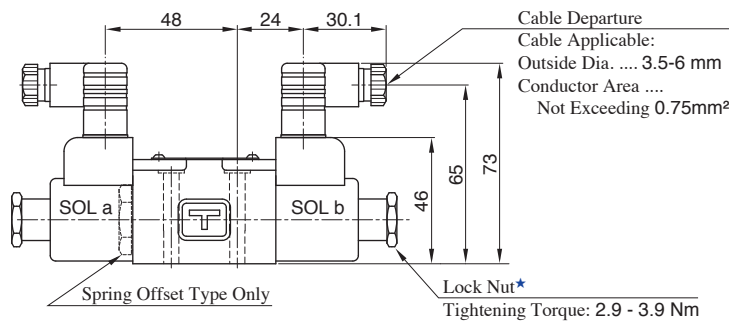


- For other dimensions, refer to "Spring Centered" type.

■ DIN Connector Type / DIN Connector with Indicator Light

- Spring Centered : DSG-007-3C* - $\frac{A^*}{D^*}$ - N/N1

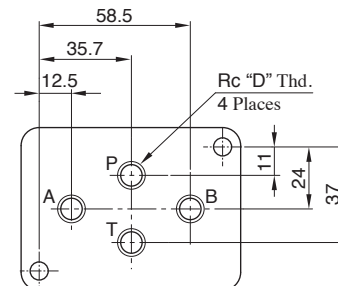
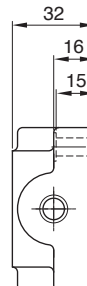
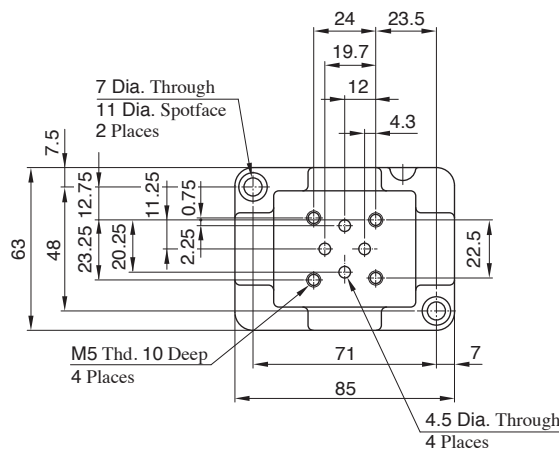
- Spring Offset : DSG-007-2B* - $\frac{A^*}{D^*}$ - N/N1



The position of the Plug-in connector can be changed as illustrated below by loosening the lock nut ★. After completion of the change, be sure to tighten the lock nut with the torque as specified below.

- For other dimensions, refer to "Flying Lead Wire Type".

■ Sub-plate : DSGM-007X, 007Y

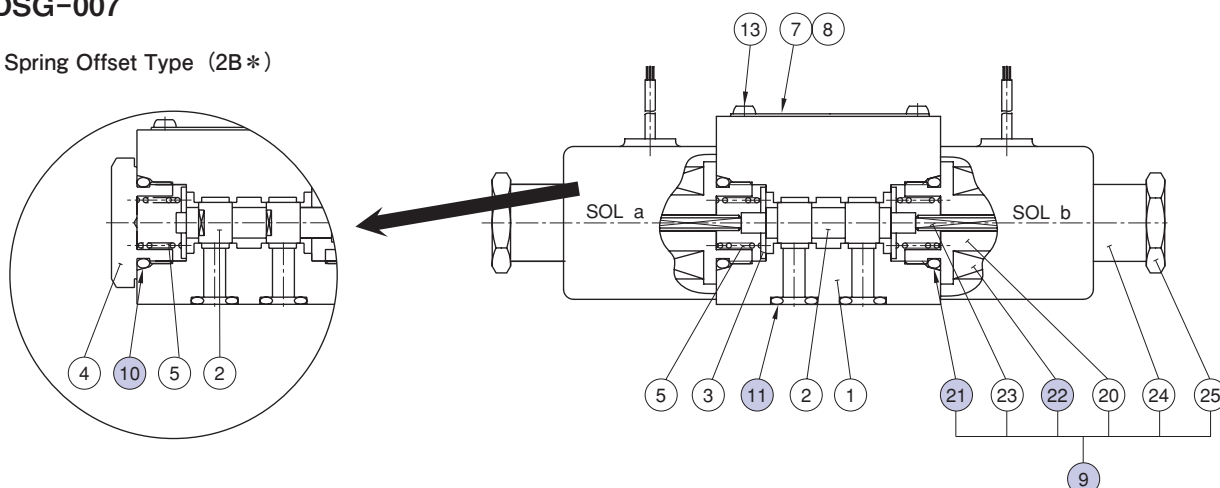


Sub-plate Model Numbers	D	Approx. Mass kg
DSGM-007X-10	1/8	0.8
DSGM-007Y-10	1/4	

List of Seals, Solenoid Ass'y

DSG-007

Spring Offset Type (2B*)



List of Seals

Item	Name of Parts	Part Numbers	Qty.		Remarks
			3C *	2B *	
10	O-Ring	OR NBR-90 P14-N	—	1	
11	O-Ring	OR NBR-90 P7-N	4	4	
21	O-Ring	OR NBR-90 P14-N	2	1	Included in Solenoid Ass'y ⑨

Solenoid Ass'y, Coil Ass'y No.

Valve Model Numbers	⑨Solenoid Ass'y No.	⑫Coil Ass'y No.	Remarks
DSG-007- * * *-A100	SA05-100-40	C-SA05-100-40	Flying Lead Wire Type
DSG-007- * * *-A200	SA05-200-40	C-SA05-200-40	
DSG-007- * * *-D12	SD05-12-40	C-SD05-12-40	
DSG-007- * * *-D24	SD05-24-40	C-SD05-24-40	
DSG-007- * * *-A100-N/N1	SA05-100-N-40	C-SA05-100-N-40	Plug-in Connector Type / Plug-in Connector with Indicator Light
DSG-007- * * *-A200-N/N1	SA05-200-N-40	C-SA05-200-N-40	
DSG-007- * * *-D 12-N/N1	SD05- 12-N-40	C-SD05- 12-N-40	
DSG-007- * * *-D 24-N/N1	SD05- 24-N-40	C-SD05- 24-N-40	

The World's Highest Level of High Pressure, High Flow and Low Pressure Drop

DSG-01 Series Solenoid Operated Directional Valves

These Solenoid Operated Directional Valves realized the world's highest level of high pressure, high flow and low pressure drop, the features of which can be materialized by employing a powerful wet type solenoid and the rational flow channel design including 5 chamber system.

High Pressure & High Flow Rate

In comparison to our existing lines, both the pressure and flow of these valves are much increased.

- Max. Operating Pressure: approx. 10 % increased [31.5→35 MPa]
- Max. T-Line Back Pressure: approx. 30 % increased [16→21 MPa]
- Max. Flow : approx. 60 % increased [63→100 L/min]

Low Pressure Drop

The pressure drop of these valves is reduced by 10 % from 1.0 to 0.9 MPa, in comparison to our existing lines*; the valves effectively reduce the energy consumption of the unit.

★At Flow Rate: 60 L/min, Spool Type: 3C2 (P→A)

Compact & Small Mass

Despite of high pressure, high flow and low pressure drop, these valve bodies are compact and lightweight with DC double solenoids; the overall length and mass are reduced from 210 to 205 mm and from 2.2 to 1.85 kg, respectively.

Shockless type available

In addition to the standard valves for high pressure and high flow, a shockless type capable of minimizing noise and vibration in piping during spool changeover is also available.

Stable Operation

Due to the powerful magnetic and spring force of the solenoids, these valves exhibit a high tolerance to contaminants and especially stable operation.

IP65-equivalent high dust- and water-proof

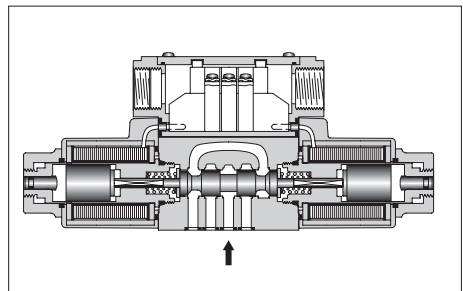
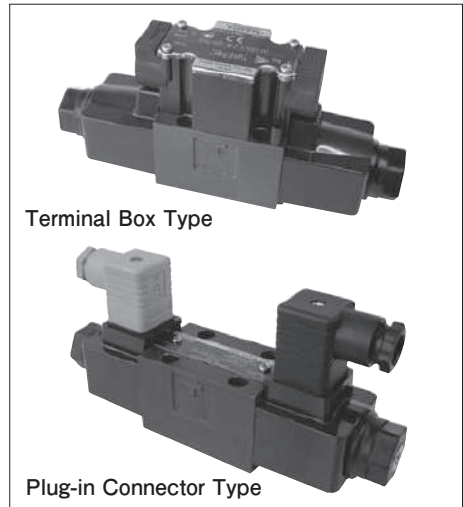
These valves demonstrate excellent dust- and water-proof characteristics, in compliance with I. E. C. Pub. 529, IP65 and JIS C 0920 IP65 (dust- and jet-proof type). The Deutsch Connector Type in compliance with IP67 is also available.

Usable in products of various standards

These standard valves are CE certified for installation in equipment overseas. UL/CSA certified products are also available. (UL/CSA certified products are special design products, so for details, please contact us.)

Various Type of Connection

In addition to the current Terminal Box Type and Plug-in Connector Type, according usage you can select M12-4 Pin Connector Type suitable for serial transfer, Center Plug-in Connector Type to contribute shortening the wiring man-hour, Deutsch Connector Type with good water-proof characteristics.



Specifications

Valve Type	Model Numbers	Max. Flow* ² L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min ⁻¹	Mass kg
Standard Type	DSG-01-3C *- *-70	100	35	21	300 (R Type Sol. Only) 120	1.85
	DSG-01-2D2 *- *-70					1.4
	DSG-01-2B *- *-70					1.4
Shockless Type	S-DSG-01-3C *- *-70	63	25	21	120	1.85
	S-DSG-01-2B2 *- *-70					1.4
Low Wattage (14W) Type ^{★1}	L-DSG-01-3C *- *-70	40	16	16	300 (R Type Sol. Only) 120	1.85
	L-DSG-01-2D2 *- *-70					1.85
	L-DSG-01-2N *- *-70					1.85
	L-DSG-01-2B *- *-70					1.4

★1. For details of Low Wattage (14W) Type, please contact us.

★2. The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.
The maximum flow differs according to the spool type and operating conditions. For details, please refer to the "List of Standard Models" on pages E-25 to E-27.

Sub-plates

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

● Sub-plates are available. Specify the sub-plate model number from the table above.

When sub-plates are not used, the mounting surface should have a good machined finish. (16/)

Solenoid Ratings

Valve Type	Electric Source	Coil Type★ ³	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
				Source Rating	Serviceable Range	Inrush★ ² (A)	Holding (A)	Power (W)
Standard Type	AC★ ¹	A 100	50	100	80 - 110	2.42	0.51	—
			60	100	90 - 120	2.14	0.37	
				110		2.35	0.44	
		A 120★ ⁴	50	120	96 - 132	2.02	0.42	
			60		108 - 144	1.78	0.31	
		A 200	50	200	160 - 220	1.21	0.25	
			60	200	180 - 240	1.07	0.19	
				220		1.18	0.22	
		A 240★ ⁴	50	240	192 - 264	1.01	0.21	
			60		216 - 288	0.89	0.15	
Shockless Type	DC (K Series)	D 12★ ⁴	—	12	10.8 - 13.2	—	2.45	29
		D 24★ ⁴		24	21.6 - 26.4		1.23	
		D 48		48	43.2 - 52.8		0.61	
	AC→ DC Rectified (R)	R 100	50/60	100	90 - 110	—	0.33	29
		R 200		200	180 - 220		0.16	

★1. AC solenoid is not available in shockless type.

R type models with built-in current rectifier is recommended for shockless operation with AC power.

★2. Inrush current in the above table show rms values at maximum stroke.

★3. There are more coil types other than the above. For details, please make inquiries.

★4. UL certified products are only available for the voltages above.

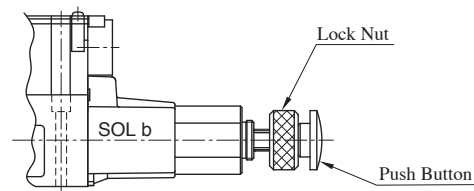
The coil type numbers in the shaded column are handled as optional extras.

In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Options

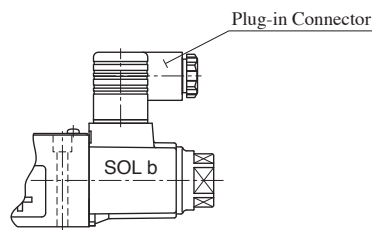
● Push Button with Lock Nut

Can be used for manual changeover of spool. The push button can be locked in the pressed condition.



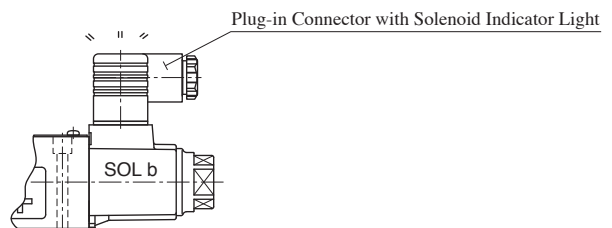
● Plug-in Connector Type

Electrical conduit connecting part is plug-in type, so can mount/dismount valves without disconnecting.



● Plug-in Connector with Solenoid Indicator Light

These are the indicator light incorporated plug-in connector type solenoids. Energisation or de-energisation of the solenoid can be easily identified with the incorporated indicator light.



Special connector type (M12-4 Pin Connector Type, Center Plug-in Connector Type, Center Plug-in M12-4 Connector Type, Deutsch Connector Type), refer to pages E-35 & E-36.

Model Number Designation

S-	DSG	-01	-2	B	2	A	-D24	-C	-N ^{★4}	-70	-L
Shockless Type	Series Number	Valve Size	Number of Valve Positions	Spool Spring Arrangement	Spool Type	Input Only Valves Using Neutral Position & Side Position	Coil Type	Manual Override	Electrical Conduit Connection	Design Number	Models with Reverse Mtg. of Solenoid
None: Standard Type	DSG: Solenoid Operated Directional Valve (Sub-plate Mounting Type)	01	3	C : Spring Centered	2 , 3 4 , 40 60 , 9 10, 11 12	—	AC : A100 A120 A200 A240	None: Manual Override Pin C : Push Button and Lock Nut (Option)	None: Terminal Box Type N : Plug-in Connector Type (Option) ★2 N1 : Plug-in Connector Type with Indicator Light (Option)	70	—
				D : No-Spring Detented	2	—	DC : D12 D24 D48				
2			B : Spring Offset	2 3 8	A : Using Neutral Position & SOL a Energised Position B : Using Neutral Position & SOL b Energised Position	R : (AC→DC) R100 R200	L : Input only for reverse mtg. of solenoid.				
3			C : Spring Centered	2 4	—	DC : D12 D24 D48	—				
2			B : Spring Offset	2	—	R : (AC→DC) R100 R200	L : Input only for reverse mtg. of solenoid.				
S : Shockless Type											

★1. In case of Valves Using Neutral Position and Side Position, please refer to page E-28 for details.

★2. “N1: Plug-in Connector Type with Indicator Light” is not available for R type (AC→DC).

★3. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix “F-” to the model number because the special seals (fluororubber) are required to be used.

★4. Special connector types, “ M12-4 Pin Connector Type ”, “ Center Plug-in Connector Type ”, “ Center Plug-in M12-4 Connector Type ”, “ Deutsch Connector Type ”, please refer to pages E-35 & E-36.

Attention

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

List of Standard Models

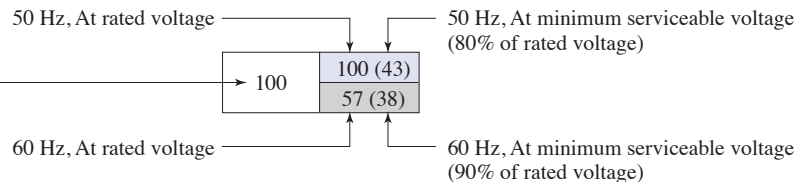
Models with AC Solenoids : DSG-01-* * *-A *

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min														
				P → A → B → T					P → A [Port "B" Blocked]					P → B [Port "A" Blocked]				
				Working Pressure MPa					Working Pressure MPa					Working Pressure MPa				
				10	16	25	31.5	35	10	16	25	31.5	35	10	16	25	31.5	35
Three Positions	Spring Centered	DSG-01-3C2		100	100	100	100	100	100 (43) 57 (38)	100 (41) 53 (31)	80 (21) 29 (17)	60 (17) 19 (10)	38 (15) 13 (9)	100 (43) 57 (38)	100 (41) 53 (31)	80 (21) 29 (17)	60 (17) 19 (10)	38 (15) 13 (9)
		DSG-01-3C3		100 (80) 90 (63)	100 (80) 90 (63)	100 (80) 90 (63)	100 (77) 90 (63)	100 (77) 90 (63)	70 (46) 45 (30)	70 (46) 45 (30)	70 (46) 45 (30)	70 (46) 45 (30)	70 (46) 45 (30)	70 (46) 45 (30)	70 (46) 45 (30)	70 (46) 45 (30)	70 (46) 45 (30)	70 (46) 45 (30)
		DSG-01-3C4		90	90	90	90 (22) 43 (14)	35 (18) 30 (11)	100 (38) 50 (31)	76 (28) 38 (20)	67 (15) 20 (10)	57 (10) 16 (7)	35 (7) 12 (5)	100 (38) 50 (31)	76 (28) 38 (20)	67 (15) 20 (10)	57 (10) 16 (7)	35 (7) 12 (5)
		DSG-01-3C40		85 80	85 80	85 80	80 (40) 63 (15)	80 (22) 25 (10)	85 (40) 70 (26)	85 (35) 50 (24)	85 (24) 32 (16)	60 (16) 22 (13)	55 (12) 18 (10)	85 (40) 70 (26)	85 (35) 50 (24)	85 (24) 32 (16)	60 (16) 22 (13)	55 (12) 18 (10)
		DSG-01-3C60★		43 (23) 40 (23)	43 (23) 40 (23)	42 (23) 38 (23)	42 (23) 36 (23)	42 (23) 35 (23)	54 (32) 48 (30)	54 (32) 47 (30)	52 (32) 47 (30)	52 (32) 47 (30)	52 (32) 47 (30)	54 (32) 48 (30)	54 (32) 47 (30)	52 (32) 47 (30)	52 (32) 47 (30)	52 (32) 47 (30)
		DSG-01-3C9		100	100	100	100	100	20	15	10	10	8	20	15	10	10	8
		DSG-01-3C10◆		100	100 100 (70)	100 (63) 80 (20)	100 (33) 70 (20)	100 (27) 40 (19)	100 (50) 100 (37)	100 (37) 55 (25)	100 (20) 29 (14)	78 (16) 20 (11)	62 (13) 15 (10)	100 (50) 100 (37)	100 (37) 55 (25)	100 (20) 29 (14)	78 (16) 20 (11)	62 (13) 15 (10)
		DSG-01-3C11◆		100	100	100	100	100	23	20	13	10	5	100 (65) 70 (50)	85 (52) 57 (40)	72 (45) 50 (25)	65 (34) 43 (19)	60 (27) 35 (18)
		DSG-01-3C12◆		100	100 100 (70)	100 (63) 80 (20)	100 (33) 70 (20)	100 (27) 40 (19)	100 (50) 100 (37)	100 (37) 55 (25)	100 (20) 29 (14)	78 (16) 20 (11)	62 (13) 15 (10)	100 (50) 100 (37)	100 (37) 55 (25)	100 (20) 29 (14)	78 (16) 20 (11)	62 (13) 15 (10)
Two Positions	No-Spring Detented	DSG-01-2D2		80	80	80	80	80	45	45	45 (21) 36 (18)	45 (16) 28 (13)	38 (13) 22 (12)	50	50 (45) 50 (45)	50 (42) 50 (42)	45 (40) 45 (40)	45 (40) 45 (40)
	Spring Offset	DSG-01-2B2		85	85	85	85	85	20	16	16	15	13	85 (63) 85 (30)	80 (50) 60 (33)	63 (40) 50 (28)	44 (32) 40 (28)	44 (32) 40 (28)
		DSG-01-2B3		70	70	70	70	70	50	50	50	50	50	80 (70) 70 (48)	80 (70) 70 (48)	80 (70) 70 (48)	80 (70) 70 (48)	80 (70) 70 (48)
		DSG-01-2B8		—	—	—	—	—	26	17	13	11	10	80 (50) 35 (20)	70 (40) 23 (15)	60 (20) 15 (8)	45 (10) 10 (5)	30 (10) 7 (5)

Notes: 1. The relation between the maximum flow in the table above and the frequency/voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of 50 Hz or 60 Hz and of any voltage variants within the serviceable voltage



2. For the maximum flow rate in P → T of the valves with a ★ mark, please see page E-27.

The valve models with a ◆ mark are handled as options. If you choose such valves, check the time of delivery beforehand.

List of Standard Models

● Models with DC or R Type Solenoids : DSG-01- * * *-D*/R*

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min														
				P → A → B → T					P → A [Port "B" Blocked]					P → B [Port "A" Blocked]				
				Working Pressure MPa					Working Pressure MPa					Working Pressure MPa				
				10	16	25	31.5	35	10	16	25	31.5	35	10	16	25	31.5	35
Three Positions	Spring Centered	DSG-01-3C2		100	100	100	100	100	100	45	28	25	22	100	45	28	25	22
		DSG-01-3C3		100	100	100	100	100	78	78	78	78	75	78	78	78	78	75
		DSG-01-3C4		90	90	90	50	38	100	58	38	31	29	100	58	38	31	29
		DSG-01-3C40		85	85	65	40	33	85	52	30	26	24	85	52	30	26	24
		DSG-01-3C60★		50	50	50	50	50	66	66	66	66	66	66	66	66	66	66
		DSG-01-3C9		100	100	100	100	100	20	15	10	10	8	20	15	10	10	8
		DSG-01-3C10◆		85	85	85	80	40	100	56	36	28	24	100	56	36	28	24
		DSG-01-3C11◆		100	100	100	100	100	23	20	13	10	5	100	60	40	36	32
		DSG-01-3C12◆		85	85	85	80	40	100	56	36	28	24	100	56	36	28	24
						35	23	20	74	43	28	20	19	74	43	28	20	19
Two Positions	No-Spring Detented	DSG-01-2D2		75	75	75	75	75	45	45	40	30	27	50	50	50	45	45
				70	70	70	70	70			30	25	22		45	42	40	40
	Spring Offset	DSG-01-2B2		80	80	80	80	80	20	16	16	15	13	46	31	24	22	22
		DSG-01-2B3		70	70	70	70	70	50	50	50	50	50	75	75	75	75	75
		DSG-01-2B8		—	—	—	—	—	26	17	13	11	10	53	35	23	19	17
														35	30	17	13	12

Notes: 1. The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage

→100

At rated voltage
[after temperature rise and saturated]

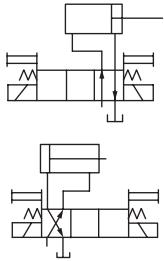
At minimum serviceable voltage
(90% of rated voltage)
[after temperature rise and saturated]

2. For the maximum flow rate in P → T of the valves with a ★ mark, please see page E-27.

The valve models with a ◆ mark are handled as Options. If you choose such valves, check the time of delivery beforehand.

Maximum Flow Rate in P → T Flow

In valve type 3C60, in case where the actuator is put on in between the cylinder ports A and B as illustrated below and where the actuator moves and suspended at its stroke end and where the valve is then shifted to the neutral position in the suspended state of the actuator, the maximum flow rates available are those as shown as the table below regardless of any voltage in the range of serviceable voltage.



Model Numbers	Graphic Symbol	Max. Flow L/min				
		10 MPa	16 MPa	25 MPa	31.5 MPa	35 MPa
DSG-01-3C60-A*/D*/R*		55	44	30	26	22

List of Standard Models (Shockless Type)

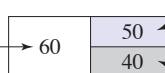
- Models with DC or R Type Solenoids : S-DSG-01-* *-D*/R*

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min								
				P → A → B → T P → B → A → T			P → A [Port "B" Blocked]			P → B [Port "A" Blocked]		
				Working Pressure MPa			Working Pressure MPa			Working Pressure MPa		
				10	16	25	10	16	25	10	16	25
Three Positions	Spring Centered	S-DSG-01-3C2		63	63	40	40	32	25	40	32	25
							32	20	16	32	20	16
		S-DSG-01-3C4		60	50	40	40	32	16	40	32	16
					40	20	32	16	12	32	16	12
Two Positions	Spring Offset	S-DSG-01-2B2		50	45	45	30	30	30	60	40	40
				45	40	40						

Notes: The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage



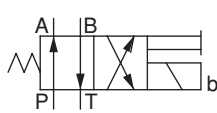
At rated voltage
[after temperature rise and saturated]

At minimum serviceable voltage
(90% of rated voltage)
[after temperature rise and saturated]

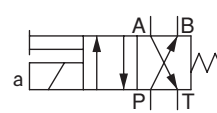
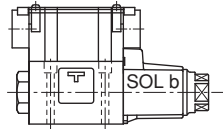
Reverse Mounting of Solenoid

In spring offset type, it is a standard configuration that the solenoid is mounted onto the valve in the SOL b position (side). However, in this particular spool-spring arrangement, the mounting of the solenoid onto the valve in the reverse position -SOL a side- is also available. The graphic symbol for this reverse mounting is as shown below.

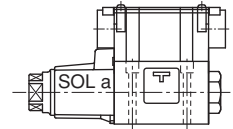
As for the valve type 2B*A and 2B*B, please refer to the explanation under the heading of "Valves Using Neutral Position and Side Position" given below.



Standard Mtg. of Solenoid



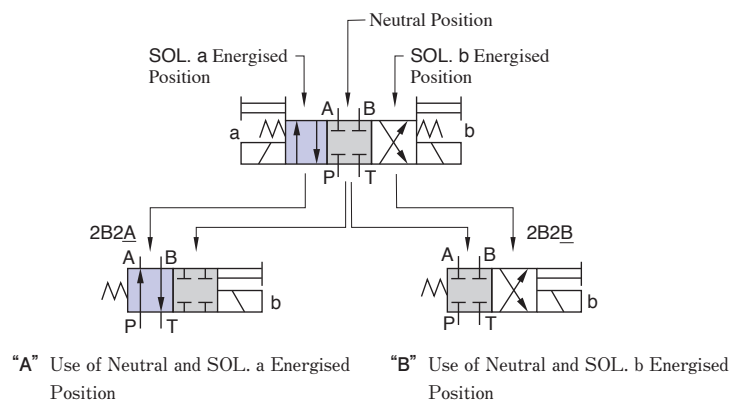
Reverse Mtg. of Solenoid



Valves Using Neutral Position and Side Position

Besides the use of the standard 2-position valves aforementioned in the "List of Standard Models", the 3-position valves also can be used as the 2-position valves using the two of their three positions. In this case, there are two kinds of the valve available. One is the valve using the neutral position and SOL a position (2B*A) and another is the valve using the neutral position and SOL b position (2B*B).

(Example) In case of Spool Type "2"



Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
DSG-01-2B * A		
DSG-01-2B2A		—

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
DSG-01-2B * B		
DSG-01-2B2B		—
DSG-01-2B3B		—
DSG-01-2B4B		
DSG-01-2B60B		—
DSG-01-2B10B		—

In the above table, the graphic symbols in mounting type highlighted with shade are optional extra, therefore, please confirm the time of delivery with us before ordering.

Typical Changeover Time (Example)

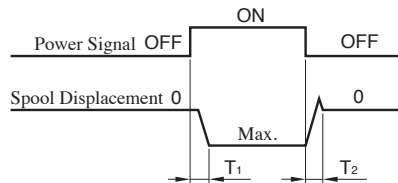
Changeover time varies according to oil viscosity, spool type and hydraulic circuit.

Standard Type (Without Shockless Function)

[Test Conditions]

Pressure : 16 MPa
Flow Rate : 31.5 L/min
Viscosity : 35 mm²/s
Voltage : 100 %V at rated voltage
(After coil temperature rise and saturated)

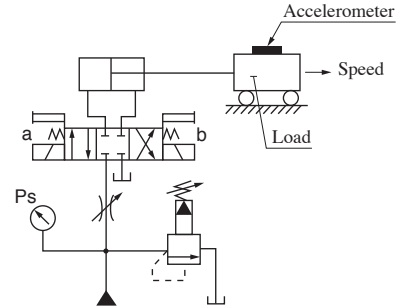
[Result of Measurement]



Type	Model Numbers	Time ms	
		T ₁	T ₂
Standard Type	DSG-01-3C2-A *	15	23
	DSG-01-3C2-D *	48	19
	DSG-01-3C2-R *	50	100

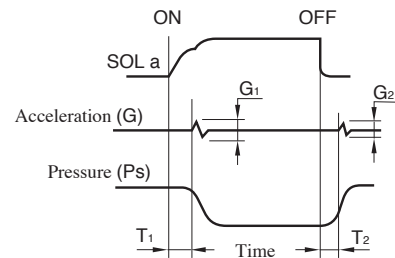
Shockless Type

[Test Circuit and Conditions]



Setting Pressure (Ps) : 7 MPa
Load (W) : 1000 kg
Cylinder Speed : 8 m/min
Viscosity : 35 mm²/s

[Result of Measurement]



Type	Model Nmbers	Time ms		Acceleration m/s ²	
		T ₁	T ₂	G ₁	G ₂
Shockless Type	S-DSG-01-3C2-D *	70	30	12	7
Reference: Standard Type	DSG-01-3C2-D *	35	25	18	15

Mounting Bolts

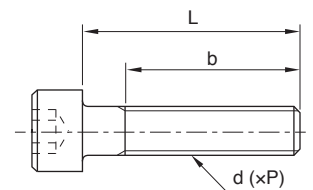
Mounting bolts are not available, please order separately.

Type/Dimension/Quantity

Item	Details
Type	Soc. Hd. Cap Screw (SCM)
Thread Size d	M5
Thread Pitch P mm	0.8
Bolt Length L mm	45
Thread Length (Reference) b mm	22
Quantity	4

Specifications/Machinery Characteristics

Item	Details
Material	Steel SCM
Screw Type	Meter Coarse Screw
Finishing	Black Oxide Film
Class of Strength	12.9
Standard	Based on JIS B 1176(2014)



★If order to us, please use the model numbers below.

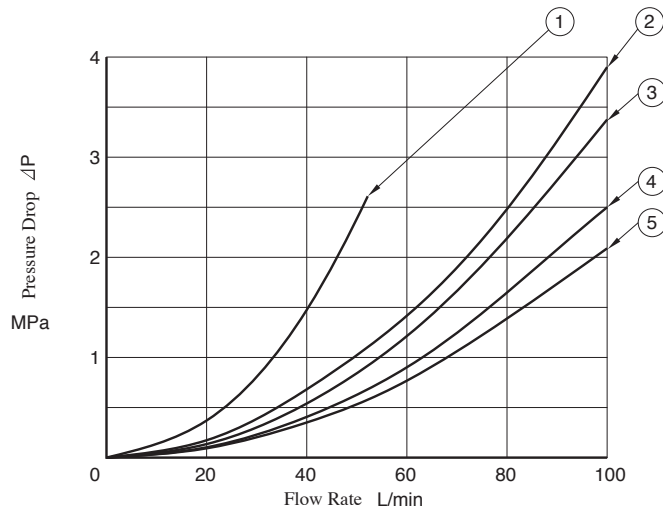
MBK-01-05- *

(* is the newest design number)

Pressure Drop

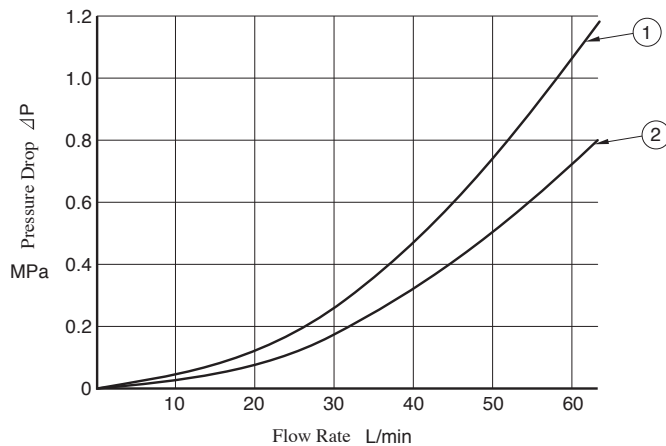
Pressure drop curves based on viscosity of 35 mm²/s and specific gravity of 0.850.

Standard Type



Model Numbers	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T
DSG-01-3C2	④	④	④	④	—
DSG-01-3C3	⑤	⑤	⑤	⑤	②
DSG-01-3C4	④	④	④	④	—
DSG-01-3C40	④	④	④	④	—
DSG-01-3C60	①	①	①	①	②
DSG-01-3C9	⑤	③	⑤	③	—
DSG-01-3C10	④	⑤	④	④	—
DSG-01-3C11	④	④	④	④	—
DSG-01-3C12	④	④	④	⑤	—
DSG-01-2D2	⑤	④	⑤	④	—
DSG-01-2B2	⑤	④	⑤	④	—
DSG-01-2B3	⑤	⑤	⑤	⑤	—
DSG-01-2B8	⑤	—	④	—	—

Shockless Type : S-DSG-01



Model Numbers	Pressure Drop Curve Number			
	P→A	B→T	P→B	A→T
S-DSG-01-3C2	①	①	①	①
S-DSG-01-3C4	①	②	①	②
S-DSG-01-2B2	①	①	①	①

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

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

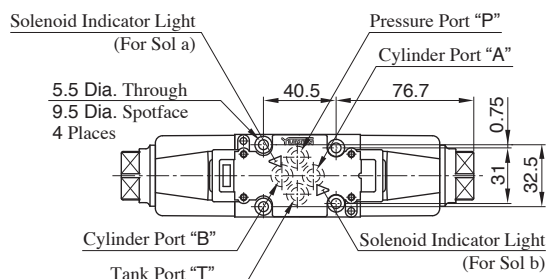
For any other specific gravity (G'), the pressure drop ($\Delta P'$) may be obtained from the formula below.
 $\Delta P' = \Delta P (G'/0.850)$

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

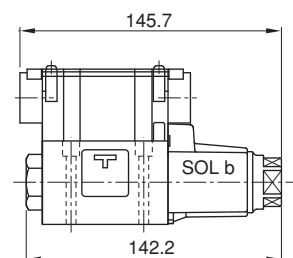
Terminal Box Type (Standard)

■ Models with AC Solenoids : **DSG-01-***-A***

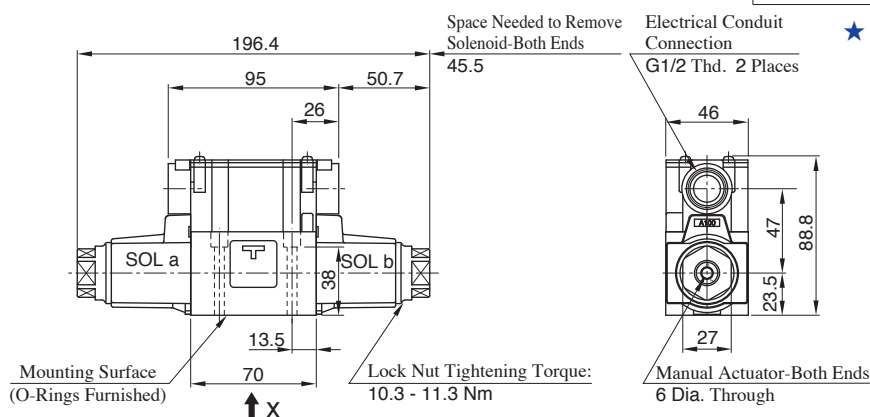
● Spring Centered & No-Spring Detented



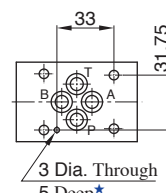
● Spring Offset



- For other dimensions, refer to the drawing left.
- Solenoid being mounted in the reverse position SOL a side is also available.



★ Locating pin can be fitted to this hole to conform with ISO standard. Valve with locating pin is also available, please consult Yuken for details.

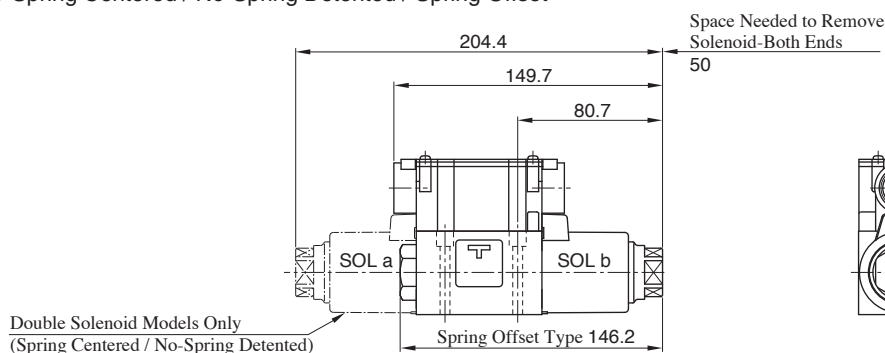


View Arrow X

■ Models with DC Solenoids : **(S-) DSG-01-***-D***

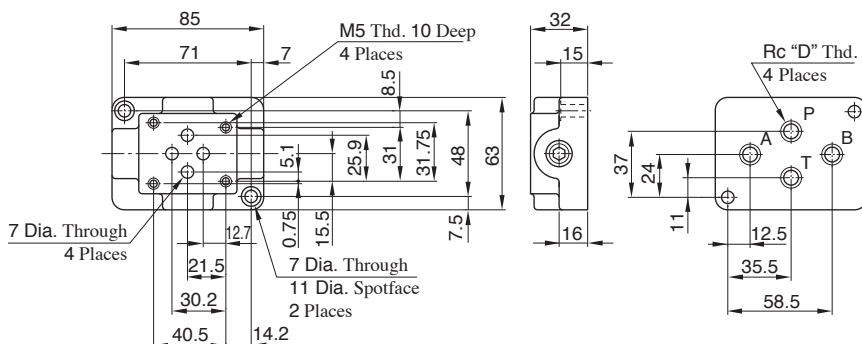
■ Models with R Type Solenoids : **(S-) DSG-01-***-R***

● Spring Centered / No-Spring Detented / Spring Offset



- For other dimensions, refer to models with AC solenoids drawing above.

■ Sub-plates : **DSGM-01, 01X, 01Y**

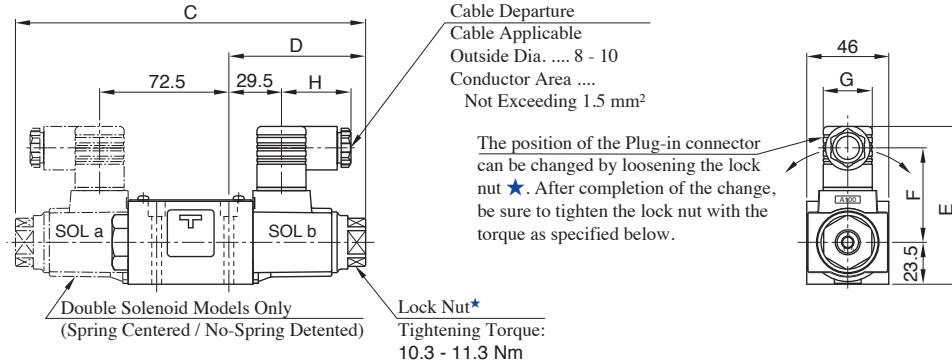


Sub-plate Model Numbers	D
DSGM-01-31	1/8
DSGM-01X-31	1/4
DSGM-01Y-31	3/8

Options

■ Plug-in Connector Type / Plug-in Connector with Indicator Light

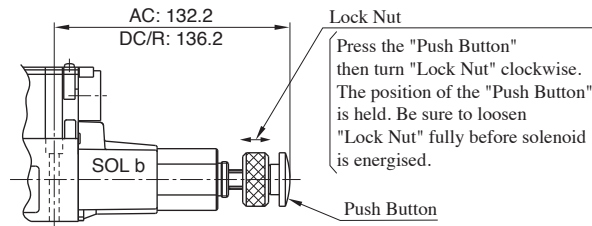
- Models with AC Solenoids : **DSG-01-***-A*-N/N1**
- Models with DC Solenoids : **(S-) DSG-01-***-D*-N/N1**
- Models with R Solenoids : **(S-) DSG-01-***-R*-N**



Model Numbers	C	D	E	F	G	H
DSG-01-***-A*-N*	196.4	76.7	88.5	53	27.5	39
(S-) DSG-01-***-D*-N*	204.4	80.7	99.5	64	27.5	39
(S-) DSG-01-***-R*-N	204.4	80.7	102.5	61.1	34	53

● For other dimensions, refer to "Terminal Box Type" (Page E-31).

■ Models with Push Button & Lock Nut (S-) DSG-01-***-*-C



■ Interchangeability in Installation Current and New Design

In order to achieve higher pressure, higher flow, lower pressure drop and more compact, DSG-01 valves has been upgraded from the 60 design series to the 70 design series.

The figures in the table below are the comparison between current and new design valves.

● Specifications

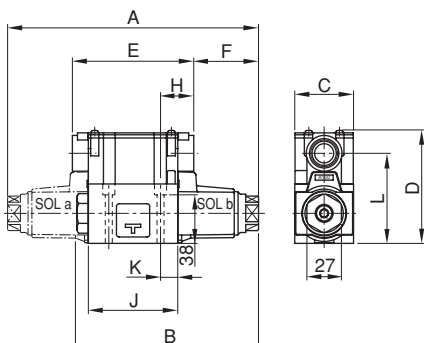
Design Number	Max. Flow L/min	Max. Operating Pressure MPa	Max. Tank-Line Back Pres. MPa	Max. Changeover Frequency min ⁻¹	Pressure Drop★ MPa	Mass kg	
						3C*/2D*	2B*
New Design : 70	100	35	21	300 (R Type sol. Only 120)	0.9	1.85	1.4
Current Design : 60	63	31.5	16		1.0	2.2	1.6

★Flow Rate: 60 L/min, Viscosity: 30 mm²/s, Spool type "2" (Closed center)

● The specifications of solenoid are not change between current and new designs.

● Interchangeability in Installation

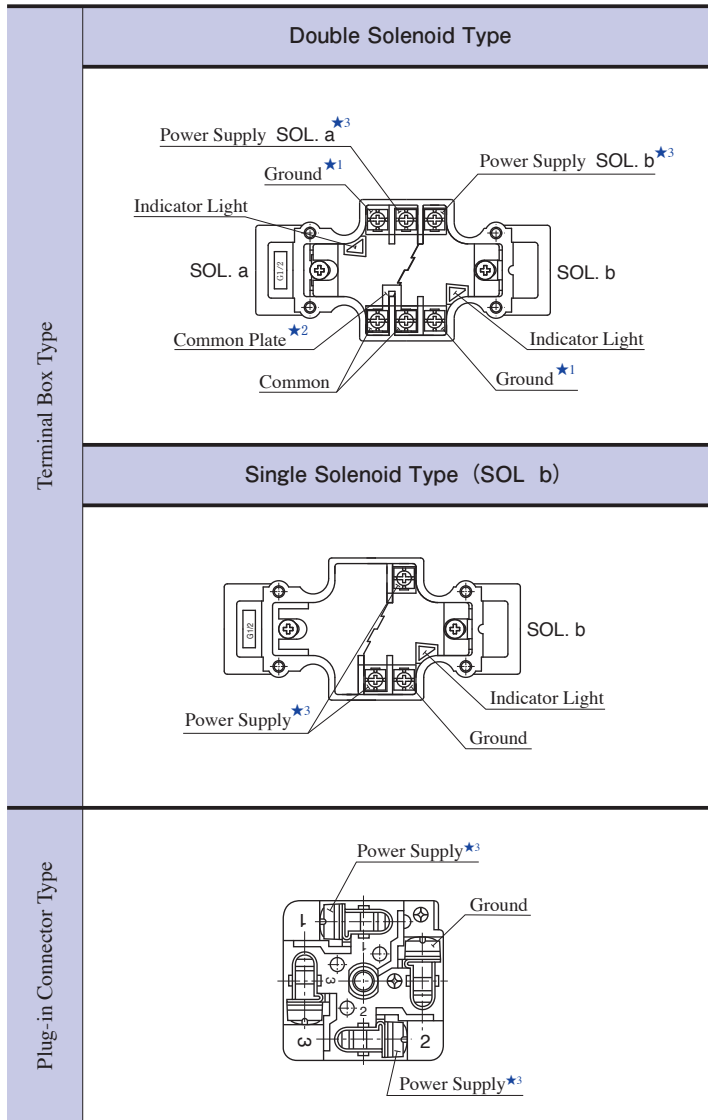
Interchangeability in installation is maintained though there are minor differences in demension as in the following table.



Solenoid Type	Design Number	A	B	C	D	E	F	H	J	K	L
AC	New Design : 70	196.4	142.2	46	88.8	95	50.7	26	70	13.5	70.5
	Current Design : 60	191.4	142.7	48	90.3	90	50.7	23.5	65	11	72
DC R	New Design : 70	204.4	146.2	46	88.8	95	54.7	26	70	13.5	70.5
	Current Design : 60	210	152	48	90.3	90	60	23.5	65	11	72

Electrical Conduit Connection

Details of Receptacle



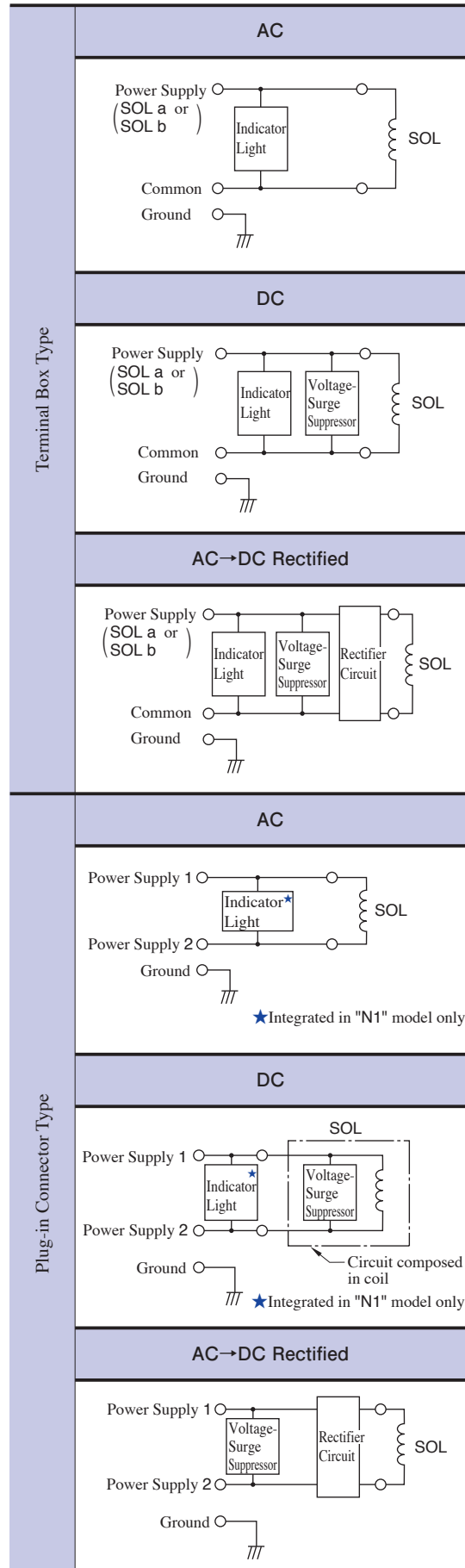
- ★1. There are two grounding terminals. You can use either one.
- ★2. If you do not need the common plate, remove it.
- ★3. With DC solenoids, polarity is no question.



DANGER

- Do not perform wiring while the power is on. Doing so may result in electric shock, burns or death.
- Make the wiring properly. Improper wiring will cause an irregular movement of the machine, resulting in a grave accident.

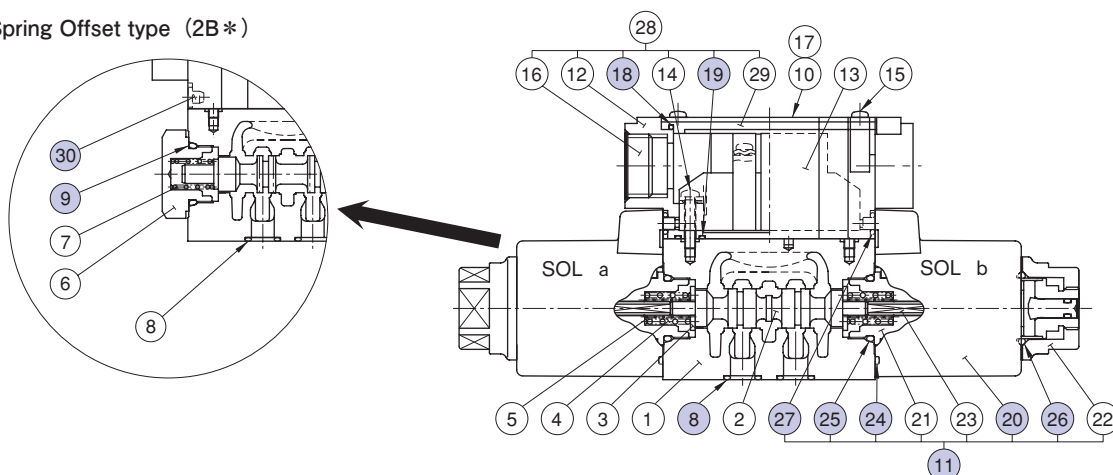
Electrical Circuit (Single Solenoid Type)



■ List of Seals and Solenoid Ass'y

(S-) DSG-01- * * *

Spring Offset type (2B*)



● List of Seals

Item	Name of Parts	Part Numbers	Qty.			Remarks
			3C *	2D *	2B *	
8	O-Ring	AS 568-012 (NBR-90)	4	4	4	
9	O-Ring	OR NBR-90 P18-N	—	—	1	
18	Packing	1790S-VK421290-8	1	1	1	
19	O-Ring	S6	2	2	2	
24	O-Ring	AS 568-026 (NBR-70-1)	2	2	1	Included in Solenoid Ass'y (Item ⑪)
25	O-Ring	OR NBR-90 P18-N	2	2	1	
26	O-Ring	OR NBR-70-1 P20-N	2	2	1	
27	O-Ring	OR NBR-70-1 P4-N	4	4	2	
30	Plug	1790S-VK418329-9	—	—	2	

■ Solenoid Ass'y, Coil Ass'y No.

Model Numbers	⑪ Solenoid Ass'y No.	⑳ Coil Ass'y No.	Remarks
DSG-01- * * *-A100	SA1-100-70	C-SA1-100-70	Terminal Box Type
DSG-01- * * *-A120	SA1-120-70	C-SA1-120-70	
DSG-01- * * *-A200	SA1-200-70	C-SA1-200-70	
DSG-01- * * *-A240	SA1-240-70	C-SA1-240-70	
DSG-01- * * *-D12	SD1-12-70	C-SD1-12-70	
DSG-01- * * *-D24	SD1-24-70	C-SD1-24-70	
DSG-01- * * *-D48	SD1-48-70	C-SD1-48-70	
DSG-01- * * *-R100	SR1-100-70	C-SR1-100-70	Plug-in Connector Type
DSG-01- * * *-R200	SR1-200-70	C-SR1-200-70	
DSG-01- * * *-A100-N/N1	SA1-100-N-70	C-SA1-100-N-70	
DSG-01- * * *-A120-N/N1	SA1-120-N-70	C-SA1-120-N-70	
DSG-01- * * *-A200-N/N1	SA1-200-N-70	C-SA1-200-N-70	
DSG-01- * * *-A240-N/N1	SA1-240-N-70	C-SA1-240-N-70	
DSG-01- * * *-D12-N/N1	SD1-12-N-70	C-SD1-12-N-70	
DSG-01- * * *-D24-N/N1	SD1-24-N-70	C-SD1-24-N-70	
DSG-01- * * *-D48-N/N1	SD1-48-N-70	C-SD1-48-N-70	
DSG-01- * * *-R100-N	SR1-100-N-70	C-SR1-100-N-70	
DSG-01- * * *-R200-N	SR1-200-N-70	C-SR1-200-N-70	

● As of solenoid Ass'y of shockless type and models with push button & lock nut, please order as below.

(Example)SD1-12-S-C-N-70

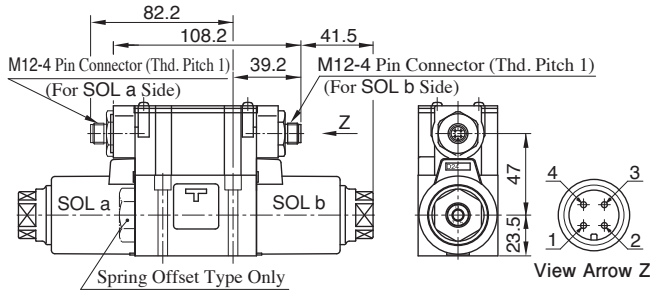
— **C** : Only for the models with push button & lock nut (option).

— **S** : Only for the models of shockless type.

Coil Ass'y numbers are same with those in above chart.

Special Electrical Conduit Connection

M12-4 Pin Connector Type



● For other dimensions, refer to page E-31 for Standard Terminal Box Type.

Pin No.

	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
Terminal	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused
Connector/Departure Direction	M1: SOL b Side M2: SOL a Side	M3: SOL b Side M4: SOL a Side	M1: SOL b Side M2: Plug Side	M3: SOL b Side M4: Plug Side	M1: Plug Side M2: SOL a Side	M3: Plug Side M4: SOL a Side

Model Numbers

DSG-01-2B2-D24-M1-70-L

— M12-4 Pin Connector Electrical Conduit Connection

M1 : Load Side Common Minus (PNP Type) Terminal Box SOL b Side Conduit Connection

M2 : Load Side Common Minus (PNP Type) Terminal Box SOL a Side Conduit Connection

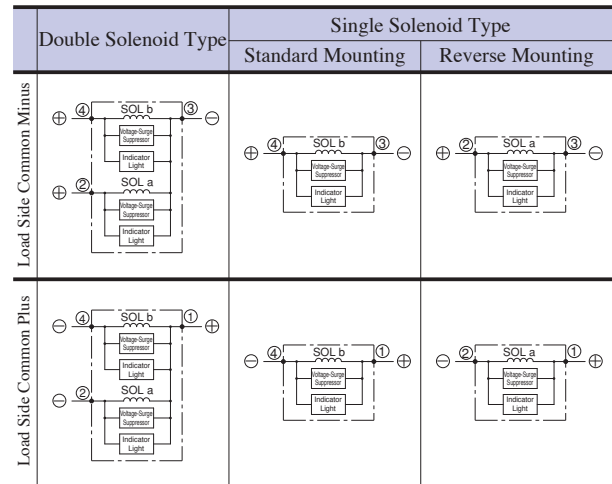
M3 : Load Side Common Plus (NPN Type) Terminal Box SOL b Side Conduit Connection

M4 : Load Side Common Plus Terminal Box SOL a Side Conduit Connection

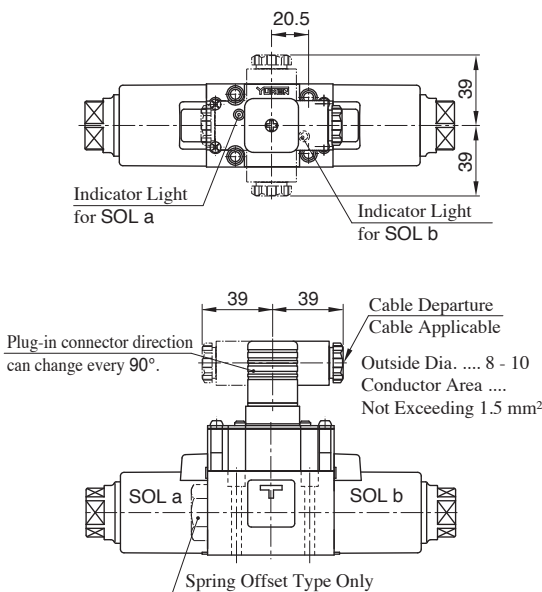
Coil numbers only for D12 and D24

● For other items, refer to page E-24 for Standard Model Number Designation.

Connection Circuit



Center Plug-in Connector Type



● For other dimensions, refer to page E-31 for Standard Terminal Box Type.

Model Numbers

DSG-01-2B2-D24-S-70-L

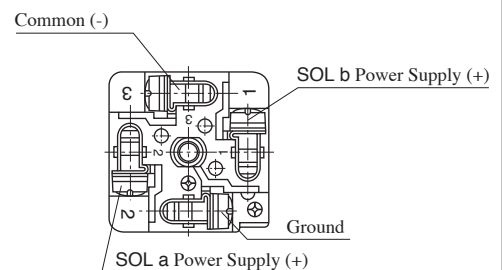
— Center Plug-in Connector

Electrical Conduit Connection Type

Coil Numbers Only for D12, D24, A100, A120, A200 & A240

● For other items, refer to page E-24 for Standard Model Number Designation.

Details of Receptacle



■ Center Plug-in Connector M12-4 Pin Connector Type

Model Numbers

DSG-01-2B2-D24-S1-70-L

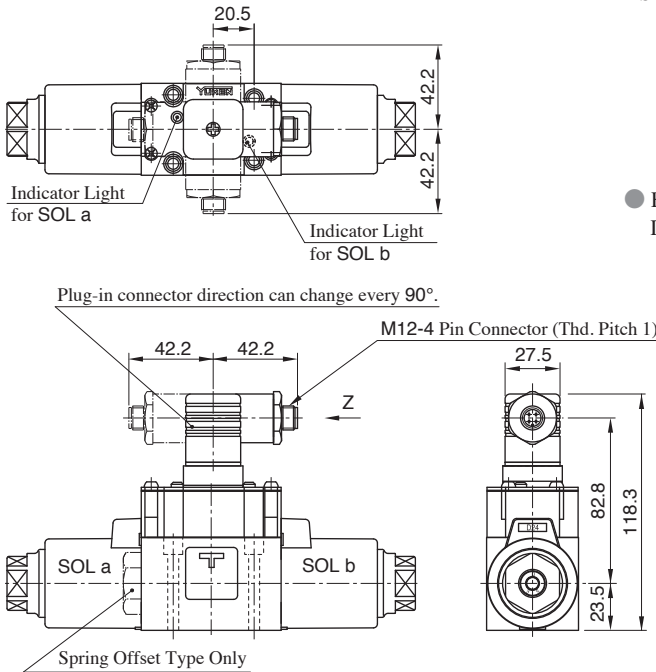
Center Plug-in M12 Connector 4 Pins Electrical Conduit Connection

S1 : Load Side Common Minus (PNP Type)

S2 : Load Side Common Plus (NPN Type)

Coil numbers only for D12 and D24

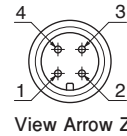
● For other items, refer to page E-24 for Standard Model Number Designation.



● For other dimensions, refer to page E-31 for Standard Terminal Box Type.

● Pin No.

	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
Terminal	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused



■ Connection Circuit

	Double Solenoid Type	Single Solenoid Type	
		Standard Mounting	Reverse Mounting
Load Side Common Minus			
Load Side Common Plus			

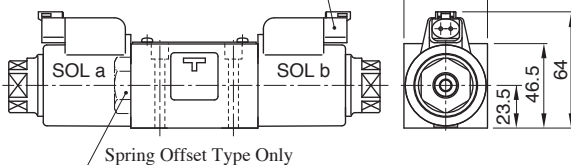
■ Deutsch Connector Type

Dust-proof / Water-proof property : IP67



Deutsch Connector
DEUTSCH Company Brand Equivalent Product

(Receptacle Body : DT04-2P-CE03)
Wedge : W2P
Pin Contact : 0460-202-16141



● For other dimensions, refer to page E-31 for Standard Terminal Box Type.

Model Numbers

DSG-01-2B2-D24-D-70-L

Deutsch Connector Electrical Conduit Connection

D : No Diode

D1 : Built-in Diode Type

Coil numbers only for D12 and D24

● For other items, refer to page E-24 for Standard Model Number Designation.

★ This valve needs another connector for electrical conduit connection.

The applicable connector as below.

Manufacturer : DEUTSCH Company

• Plug : DT06-2S-CE05

• Plug Wedge : W2S-P012

• Socket Contact : 0462-201-16141

DSG-03 Series Solenoid Operated Directional Valves

These are epoch-making solenoid operated valves of high pressure, high flow which have been developed incorporating a unique design concept into every part of the valve including the solenoid.

With wet type solenoids, these valves ensure the low noise and the long life, moreover, ensure no leakage of oil outside of the valves.

Wide Range of Models

Choose the optimum valve to meet your need from a large selection available. The DSG-03 series solenoid operated directional valves are classified into the two basic models.

- Standard type Usable at high pressure: 31.5 MPa and high flow: 120 L/min.
- Shockless type A noise at spool changeover and a vibration in piping can be reduced to a minimum.

Stable Operation

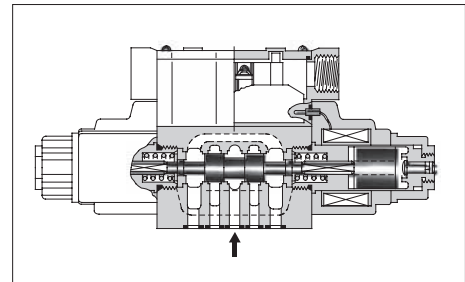
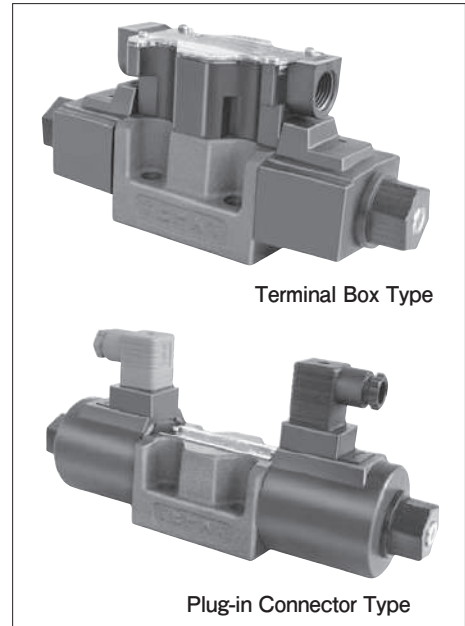
With a strong magnet and spring force, the valves are tough against contamination and thus ensure a stable operation.

Usable in products of various standards

These standard valves are CE certified for installation in equipment overseas. UL/CSA certified products are also available. (UL/CSA certified products are special design products, so for details, please contact us.)

Various Type of Connection

In addition to the current Terminal Box Type and Plug-in Connector Type, according usage you can select M12-4 Pin Connector Type suitable for serial transfer, Center Plug-in Connector Type to contribute shortening the wiring man-hour.



DSG-03 Series

Specifications

Valve Type	Model Numbers	Max. Flow*2 L/min	Max. Operating Pressure MPa	Max. T-Line Back Pres. MPa	Max. Changeover Frequency min ⁻¹	Approx. Mass kg	
						Type of Solenoid	
Standard Type	DSG-03-3C * - * -50	120	31.5 (Spool Type 60 Only) 25	16	240 (R Type Sol. Only) 120	AC	5
	DSG-03-2D2- * -50					DC,R,RQ	3.6
	DSG-03-2B * - * -50						3.6
Shockless Type	S-DSG-03-3C * - * -50	120	25	16	120	—	5
	S-DSG-03-2B2- * -50						3.6
Low Wattage (14W) *1	L-DSG-03-3C * - * -50	60	16	16	240 (R Type Sol. Only) 120	AC	4.8
	L-DSG-03-2D2- * -50					DC,R,RQ	3.6
	L-DSG-03-2B * - * -50						3.5

★1. For details of L-DSG-03, please contact us.

★2. The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.

The maximum flow differs according to the spool type and operating conditions. For details, please refer to the "List of Standard Models" on pages E-40 to E-42.

Sub-plates

Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
DSGM-03-40	3/8	3
DSGM-03X-40	1/2	
DSGM-03Y-40	3/4	4.7

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

Solenoid Ratings

Valve Type	Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
				Source Rating	Serviceable Range	Inrush* ² (A)	Holding (A)	Power (W)
Standard Type	AC ^{★1}	A 100	50	100	80 - 110	5.37	0.90	—
			60	100	90 - 120	4.57	0.63	
				110		5.03	0.77	
		A 120 ^{★3}	50	120	96 - 132	4.48	0.75	
			60		108 - 144	3.81	0.52	
		A 200	50	200	160 - 220	2.69	0.45	
			60	200	180 - 240	2.29	0.31	
				220		2.52	0.38	
		A 240 ^{★3}	50	240	192 - 264	2.24	0.37	
			60		216 - 288	1.91	0.26	
Shockless Type	DC (K Series)	D 12 ^{★3}	—	12	10.8 - 13.2	—	3.16	38
		D 24 ^{★3}		24	21.6 - 26.4		1.57	
		D 100		100	90 - 110		0.38	
	AC→DC Rectified	R 100	50/60	100	90 - 110	—	0.43	38
		R 200		200	180 - 220		0.21	
	AC→DC Rectified (Quick Return)	RQ100	50/60	100	90 - 110	—	0.43	38
							0.43	

★1. AC solenoid

AC solenoid (A*) is not available in shockless type. AC→DC rectified type solenoid (R*) or AC→DC rectified (quick return) type solenoid (RQ100) models are recommended for shockless operation with AC power.

★2. Inrush Current

Inrush current in the above table show rms values at maximum stroke.

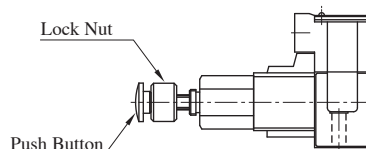
★3. UL certified products are only available for the voltages above.

The coil type numbers in the shaded column are handled as optional extras. In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Options

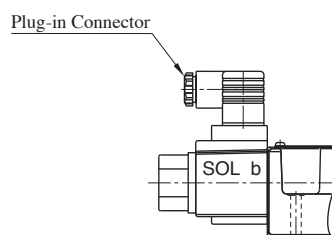
● Push Button with Lock Nut

Can be used for manual changeover of spool. The push button can be locked in the pressed condition.



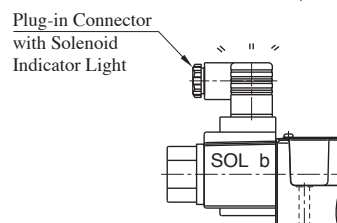
● Plug-in Connector Type

Electrical conduit connecting part is plug-in type, so can mount/dismount valves without disconnecting.



● Plug-in Connector with Solenoid Indicator Light

These are the indicator light incorporated plug-in connector type solenoids. Energisation or de-energisation of the solenoid can be easily identified with the incorporated indicator light.



● M8 Mounting Bolts

As the mounting bolts, M6 socket head cap screws are used for the standard valves, however, M8 socket head cap screws are also available for supply as optional extras. In case the M8 screws are required, suffix "02" to the design number of both valve and sub-plate model number like below.

(Example) Valve : DSG-03-3C2-A100-5002

Sub-plate : DSGM-03-4002

The valve is supplied with 4 pcs. hexagon socket head cap screws M8 × 38 L.

Special connector type (M12-4 Pin Connector Type, Center Plug-in Connector Type, Center Plug-in M12-4 Connector Type), refer to pages E-51 & E-52.

Model Number Designation

S-	DSG	-03	-2	B	2	A	-D24	-C	-N ^{★5}	-50	-L
Shockless Type	Series Number	Valve Size	Number of Valve Positions	Spool Spring Arrangement	Spool Type	Input Only Valves Using Neutral Position & Side Position.	Coil Type	Manual Override	Electrical Conduit Connection	Design Number	Models with Reverse Mtg. of Solenoid
None: Standard Type	DSG: Solenoid Operated Directional Valve (Sub-plate Mounting Type)	03	3	C : Spring Centered	2, 3 4, 40 5 , 60 9 , 10 11 , 12	—	AC : A100 A120 A200 A240	None: Manual Override Pin C : Push Button and Lock Nut (Option)	None: Terminal Box Type ★2 N : Plug-in Connector Type (Option) ★3 N1 : Plug-in Connector Type with Indicator Light (Option)	50	—
				D : No-Spring Detented	2	—	DC : D12 D24 D100				
			2	B : Spring Offset	2 3 8	A : ★1 Using Neutral Position & SOL a Energised Position B : ★1 Using Neutral Position & SOL b Energised Position	R : (AC→DC) R100 R200 RQ : (AC→DC) RQ100				
C : Spring Centered				2 4	—	DC : D12 D24 D48					
S : Shockless Type			2	B : Spring Offset	2	A : ★1 Using Neutral Position & SOL a Energised Position B : ★1 Using Neutral Position & SOL b Energised Position	R : (AC→DC) R100 R200 RQ : (AC→DC) RQ100				
				C : Spring Centered	2 4	—					

★1. In case of Valves Using Neutral Position and Side Position, please refer to page E-43 for details.

★2. “N: Plug-in Connector Type” is not available for RQ-type (AC→DC) solenoids (coil type: RQ100).

★3. “N1: Plug-in Connector Type with Indicator Light” is not available for R type (AC→DC) solenoids (coil type: R*) and RQ-type (AC→DC) solenoids (coil type: RQ100).

★4. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix “F-” to the model number because the special seals (fluororubber) are required to be used.

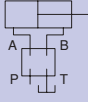
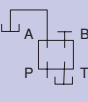
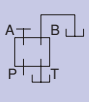
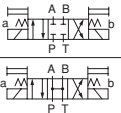
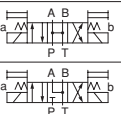
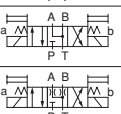
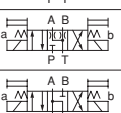
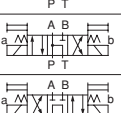
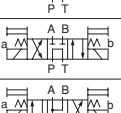
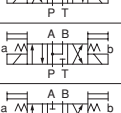
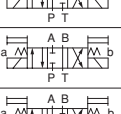
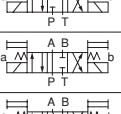
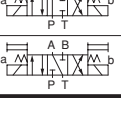
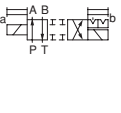
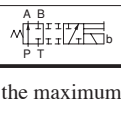
★5. Special connector types, “ M12-4 Pin Connector Type ”, “ Center Plug-in Connector Type ”, “ Center Plug-in M12-4 Connector Type ”, please refer to pages E-51 & E-52.

Attention

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

■ List of Standard Models

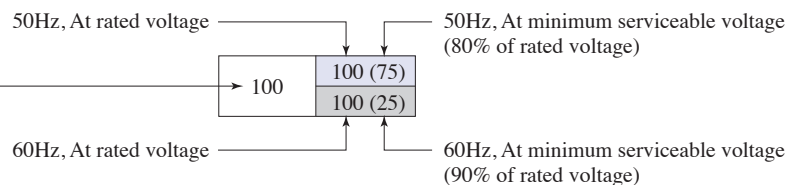
● Models with AC Solenoids : **DSG-03- * * * - A ***

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P → A → B → T P → B → A → T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
															
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				10	16	25	31.5	10	16	25	31.5	10	16	25	31.5
Three Positions	Spring Centered	DSG-03-3C2		100	100	100	100	100 (70) 90 (49)	100 (48) 53 (30)	96 (28) 34 (19)	65 (24) 26 (15)	100 (70) 90 (49)	100 (48) 53 (30)	96 (28) 34 (19)	65 (24) 26 (15)
		DSG-03-3C3		90	90	90	90	100 (81) 100 (81)	100 (81) 100 (81)	100 (81) 100 (81)	100 (81) 100 (81)	100 (81) 100 (81)	100 (81) 100 (81)	100 (81) 100 (81)	100 (81) 100 (81)
		DSG-03-3C4		80	80	80 (65) 75 (20)	80 (25) 30 (15)	100 (58) 90 (47)	100 (33) 50 (26)	76 (22) 28 (18)	46 (19) 22 (15)	100 (58) 90 (47)	100 (33) 50 (26)	76 (22) 28 (18)	46 (19) 22 (15)
		DSG-03-3C40		100	100	100	100 (75) 100 (25)	100 (62) 62 (40)	100 (39) 47 (26)	84 (21) 27 (16)	48 (18) 20 (12)	100 (62) 62 (40)	100 (39) 47 (26)	84 (21) 27 (16)	48 (18) 20 (12)
		DSG-03-3C5		30	30	30	30	26	21	18	16	30	28	28	28
		DSG-03-3C60		70	70	70	—	100	100	100	—	100	100	100	—
		DSG-03-3C9		100	100	100	100	60	60	60	60	60	60	60	60
		DSG-03-3C10		80	80	80 (30) 30 (25)	80 (20) 20 (15)	100 (55) 60 (38)	100 (36) 47 (24)	60 (21) 23 (14)	34 (16) 17 (11)	100 (55) 60 (38)	100 (36) 47 (24)	60 (21) 23 (14)	34 (16) 17 (11)
		DSG-03-3C11		100	100	100	100	100 (80) 80 (60)	100 (65) 70 (46)	85 (35) 51 (32)	62 (28) 45 (25)	100 (80) 80 (60)	100 (65) 70 (46)	85 (35) 51 (32)	62 (28) 45 (25)
		DSG-03-3C12		90	90	90 (30) 40 (20)	90 (20) 20 (15)	100 (55) 60 (38)	100 (36) 47 (24)	60 (21) 23 (14)	34 (16) 17 (11)	100 (55) 60 (38)	100 (36) 47 (24)	60 (21) 23 (14)	34 (16) 17 (11)
Two Positions	No-Spring Detented	DSG-03-2D2		100	100	100	100	40	40	30	28	60	60	40	35
	Spring Offset	DSG-03-2B2		100 100 (90)	100 100 (90)	100 100 (90)	100 100 (90)	34	24	20	19	100 (62) 80 (42)	100 (62) 73 (36)	100 (44) 63 (34)	94 (37) 51 (33)
		DSG-03-2B3		100 100 (75)	100 100 (75)	100 100 (75)	100 100 (75)	57	57	57	57	100 (79) 92 (55)	100 (72) 89 (46)	100 (64) 78 (28)	100 (59) 70 (27)
		DSG-03-2B8		—	—	—	—	26	19	18	16	100 (35) 45 (21)	87 (15) 34 (12)	61 (9) 15 (9)	49 (7) 11 (6)

Notes) 1. The relation between the maximum flow in the table above and the frequency/voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of 50 Hz or 60 Hz and of any voltage variants within the serviceable voltage.



2. For the maximum flow rate in P → T of the valves with a mark ★, please see page E-42.

The valve models with a ◆ mark are handled as options. If you choose such valves, check the time of delivery beforehand.

List of Standard Models

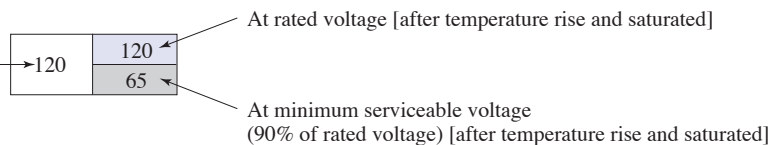
- Models with DC Solenoids : **DSG-03-***-D***
- Models with R Type Solenoids : **DSG-03-***-R***
- Models with RQ Type Solenoids : **DSG-03-***-RQ100**

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
				P → A → B → T				P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				10	16	25	31.5	10	16	25	31.5	10	16	25	31.5
Three Positions	Spring Centered	DSG-03-3C2		120	120	120	120	120	120	80	55	120	120	80	55
		DSG-03-3C3		120	120	120	120	120	120	120	120	120	120	120	120
		DSG-03-3C4		120	120	120	120	120	120	84	64	120	120	84	64
		DSG-03-3C40		120	120	120	120	120	120	65	53	120	120	65	53
		DSG-03-3C5		120	120	120	120	120	120	62	49	120	120	62	49
		DSG-03-3C60		50	50	50	50	35	24	21	20	45	45	45	45
		DSG-03-3C9		120	120	120	120	120	120	100	100	120	120	100	100
		DSG-03-3C10		120	120	120	65	120	112	60	51	120	112	60	51
		DSG-03-3C11		120	120	120	50	120	69	46	40	120	69	46	40
		DSG-03-3C12		120	120	120	65	120	80	65	52	120	80	65	52
Two Positions	No-Spring Detented	DSG-03-2D2		120	120	120	120	45	37	30	28	60	60	40	35
	Spring Offset	DSG-03-2B2		110	110	110	110	68	47	38	38	120	114	75	63
		DSG-03-2B3		100	100	100	100	77	77	77	77	120	83	58	48
		DSG-03-2B8		120	120	120	120	120	120	120	120	120	120	120	120
Two Positions	Spring Offset	DSG-03-2B2		120	120	120	120	77	77	77	77	120	120	120	120
		DSG-03-2B3		120	120	120	120	77	77	77	77	120	120	120	120
		DSG-03-2B8		—	—	—	—	53	33	24	23	120	120	62	47
		DSG-03-2B8		—	—	—	—	53	33	24	23	120	62	40	37

Notes) 1. The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage.

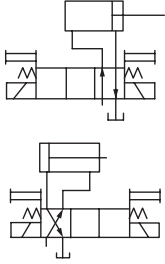


2. For the maximum flow rate in P → T of the valves with a ★ mark, please see page E-42.

The valve models with a ◆ mark are handled as options. If you choose such valves, check the time of delivery beforehand.

Maximum Flow Rate in P → T Flow

In valve type 3C3, 3C5, 3C60, in case where the actuator is put on between the cylinder ports A and B as illustrated below and where the actuator moves and suspended at its stroke end and where the valve is then shifted to the neutral position in the suspended state of the actuator, the maximum flow rates available are those as shown as the table below regardless of any voltage in the range of serviceable voltage.



Model Numbers	Graphic Symbols	Max. Flow L/min			
		10 MPa	16 MPa	25 MPa	31.5 MPa
DSG-03-3C3-A *		100	100	100	100
DSG-03-3C3-D */R */RQ100		120	120	120	120
DSG-03-3C5-A *		26	21	18	16
DSG-03-3C5-D */R */RQ100		35	24	21	20
DSG-03-3C60-A *		84	52	52	—
DSG-03-3C60-D */R */RQ100		68	65	61	—

List of Standard Models (Shockless Type)

- Models with DC Solenoids : **S-DSG-03-***-D***
- Models with R Type Solenoids : **S-DSG-03-***-R***
- Models with RQ Type Solenoids : **S-DSG-03-***-RQ100**

No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min											
								P → A [Port "B" Blocked]				P → B [Port "A" Blocked]			
				Working Pressure MPa				Working Pressure MPa				Working Pressure MPa			
				5	10	16	25	5	10	16	25	5	10	16	25
Three Positions	Spring Centered	S-DSG-03-3C2		120	120	120	120	120	120	75	50	120	120	75	50
									105	65	40		105	65	40
		S-DSG-03-3C4		120	120	85	65	120	120	75	40	120	120	75	40
						70	45		100	65	35		100	65	35
Two Positions	Spring Offset	S-DSG-03-2B2		120	100	75	40	39	39	39	39	120	120	105	60
														85	50

Note) 1. The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage.

→120	85
	70

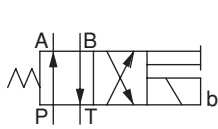
At rated voltage
[after temperature rise and saturated]

At minimum serviceable voltage
(90% of rated voltage)
[after temperature rise and saturated]

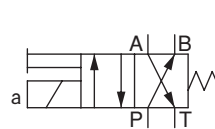
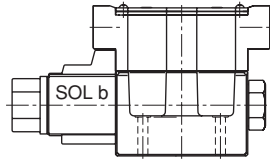
Reverse Mounting of Solenoid

In spring offset type, it is a standard configuration that the solenoid is mounted onto the valve in the SOL b position (side). However, in this particular spool-spring arrangement, the mounting of the solenoid onto the valve in the reverse position -SOL a side- is also available. The graphic symbol for this reverse mounting is as shown below.

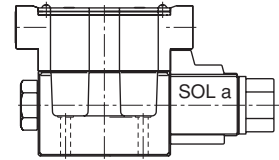
As for the valve type 2B*A and 2B*B, please refer to the explanation under the heading of "Valves Using Neutral Position and Side Position" given below.



Standard Mtg. of Solenoid



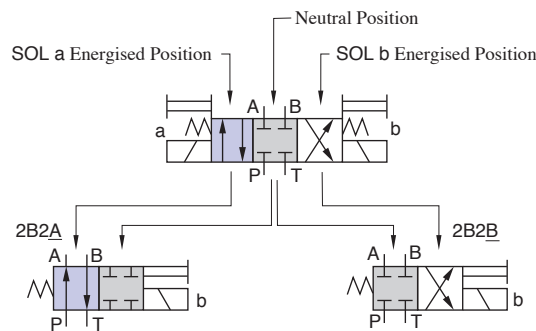
Reverse Mtg. of Solenoid



Valves Using Neutral Position and Side Position

Besides the use of the standard 2-position valves aforementioned in the "List of Standard Models", the 3-position valves also can be used as the 2-position valves using the two of their three positions. In this case, there are two kinds of the valve available. One is the valve using the neutral position and SOL a position (2B*A) and another is the valve using the neutral position and SOL b position (2B*B).

(Example) In case of Spool Type "2"



"A" Use of Neutral and SOL. a Energised Position

"B" Use of Neutral and SOL. b Energised Position

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
(S-) DSG-03-2B * Δ		
(S-) DSG-03-2B2A		—

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
* -DSG-03-2B * Δ		
(S-) DSG-03-2B2B		
DSG-03-2B3B		—
(S-) DSG-03-2B4B		—
DSG-03-2B60B		—
DSG-03-2B10B		—

In the above table, the graphic symbols in mounting type highlighted with shade are optional extra, therefore, please confirm the time of delivery with us before ordering.

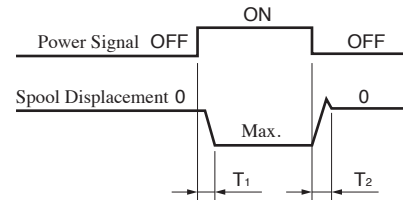
■ Typical Changeover Time (Example)

● Standard Type (Without Shockless Function)

[Test Conditions]

Pressure : 16 MPa
 Flow Rate : 70 L/min
 Viscosity : 30 mm²/s
 Voltage : 100 %V at rated voltage
 (After temperature rise and saturated)

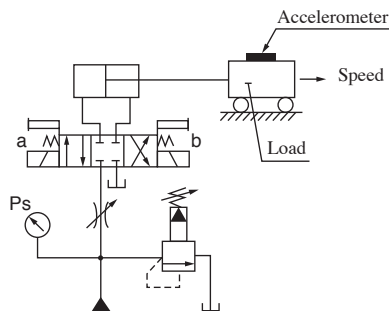
[Result of Measurement]



Type	Model Numbers	Time ms	
		T ₁	T ₂
Standard Type	DSG-03-3C2-A *	27	22
	DSG-03-3C2-D *	97	30
	DSG-03-3C2-R *	97	204
	DSG-03-3C2-RQ100	97	41

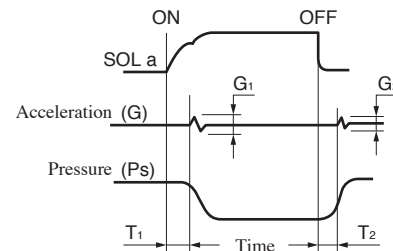
● Shockless Type

[Test Circuit and Conditions]



Setting Pressure (Ps) : 7 MPa
 Load (W) : 1000 kg
 Cylinder Speed : 8.8 m/min
 Viscosity : 30 mm²/s

[Result of Measurement]



Type	Model Numbers	Time ms		Acceleration m/s ²	
		T ₁	T ₂	G ₁	G ₂
Shockless Type	S-DSG-03-3C2-D *	110	120	6.4	6.4
	S-DSG-03-3C2-R *	110	220		
	S-DSG-03-3C2-RQ100	110	120		

■ Mounting Bolts

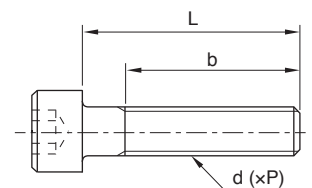
Mounting bolts are not available, please order separately.

Type/Dimension/Quantity

Item	Details
Type	Soc. Hd. Cap Screw (SCM)
Thread Size d	M6
Thread Pitch P	mm 1
Bolt Length L	mm 35
Thread Length (Reference) b	mm 24
Quantity	4

Specifications/Machinery Characteristics

Item	Details
Material	Steel SCM
Screw Type	Meter Coarse Screw
Finishing	Black Oxide Film
Class of Strength	12.9
Standard	Based on JIS B 1176 (2014)



★If order to us, please use the model numbers below.

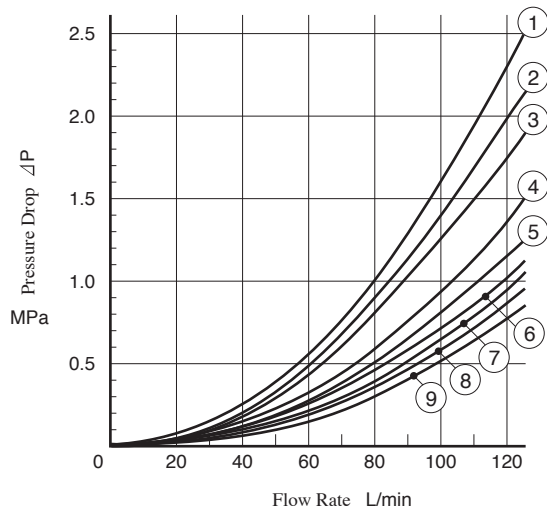
MBK-03-05- *

(* is the newest design number)

Pressure Drop

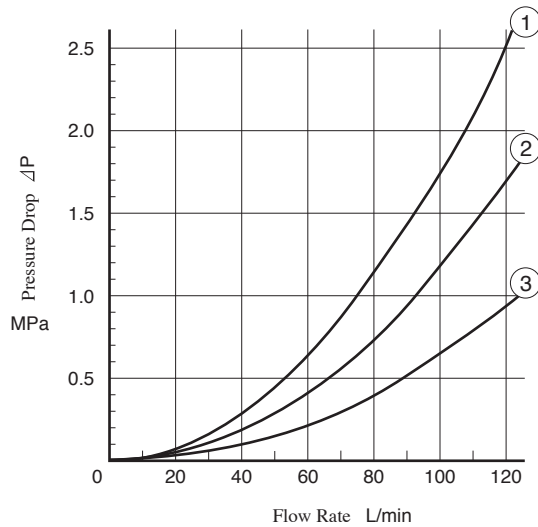
Pressure drop curves based on viscosity of 35 mm²/s and specific gravity of 0.850.

Standard Type : DSG-03



Model Numbers	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T
DSG-03-3C2	⑦	⑦	⑦	⑦	—
DSG-03-3C3	⑨	⑨	⑨	⑨	⑤
DSG-03-3C4	⑦	⑧	⑦	⑧	—
DSG-03-3C40	⑦	⑦	⑦	⑦	—
DSG-03-3C5	⑨	⑦	⑦	⑨	①
DSG-03-3C60	⑥	⑤	⑥	⑤	①
DSG-03-3C9	⑨	⑦	⑨	⑦	—
DSG-03-3C10	⑦	⑧	⑦	⑦	—
DSG-03-3C11	⑨	⑦	⑦	⑦	—
DSG-03-3C12	⑦	⑦	⑦	⑧	—
DSG-03-2D2	④	③	⑥	⑥	—
DSG-03-2B2	②	①	⑦	⑦	—
DSG-03-2B3	③	②	⑨	⑨	—
DSG-03-2B8	⑥	—	⑤	—	—

Shockless Type : S-DSG-03



Model Numbers	Pressure Drop Curve Number			
	P→A	B→T	P→B	A→T
S-DSG-03-3C2	②	②	②	②
S-DSG-03-3C4	②	②	③	③
S-DSG-03-2B2	①	②	②	②

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

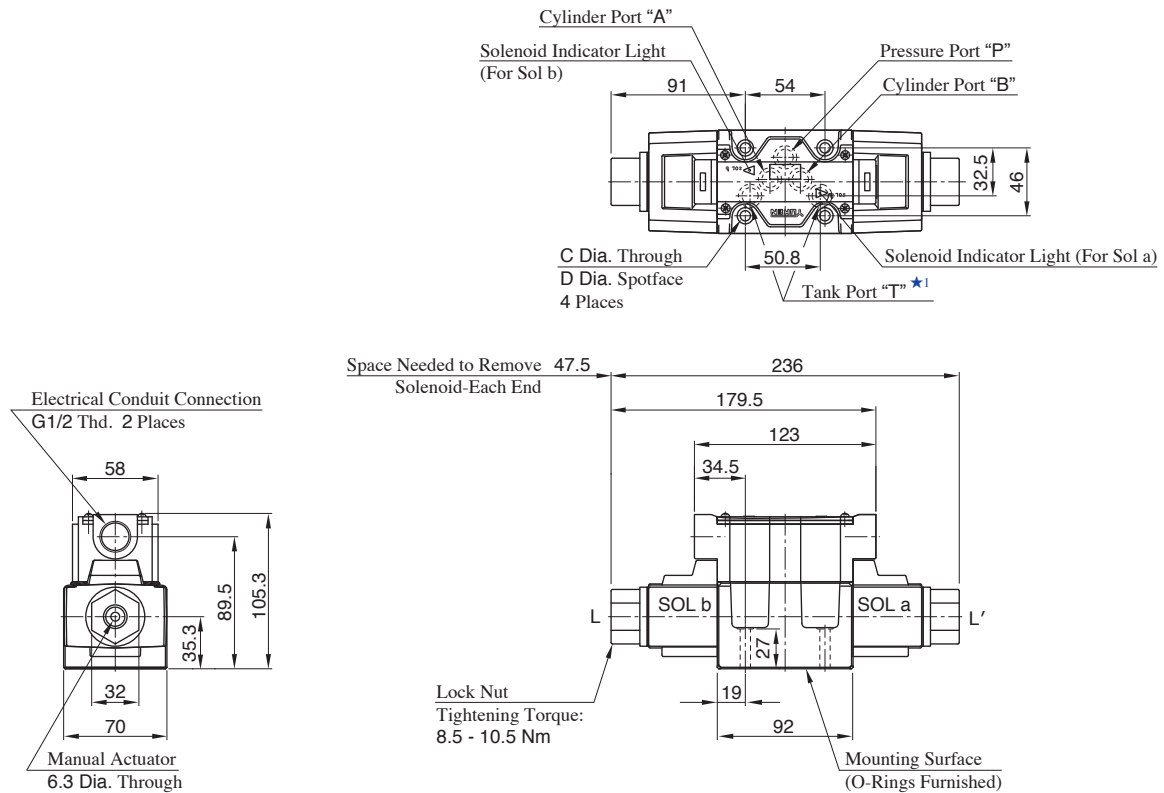
Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

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

Terminal Box Type (Standard)

■ Models with AC Solenoids : DSG-03- * * *-A *

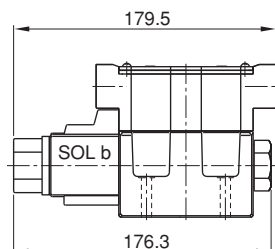
- Spring Centered
- No-Spring Detented



Model Numbers	C	D	Remarks
DSG-03- * * *-A *-50	7	11	Standard
DSG-03- * * *-A *-5002	8.8	14	Option

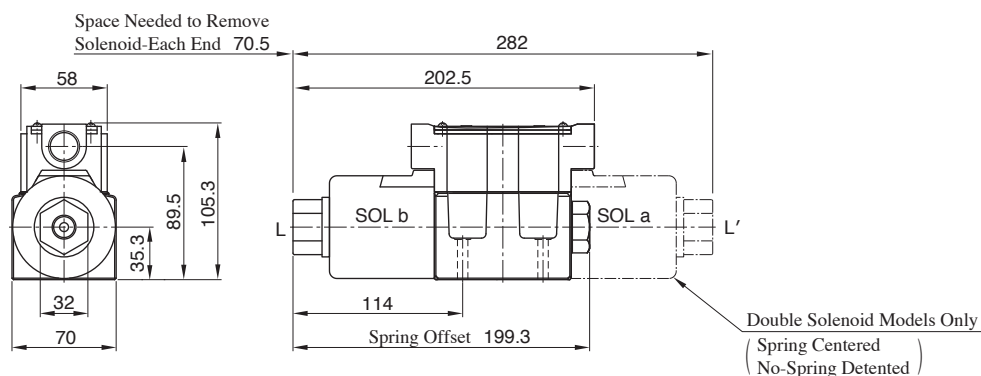
★1. Of the two of tank port "T", the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

● Spring Offset



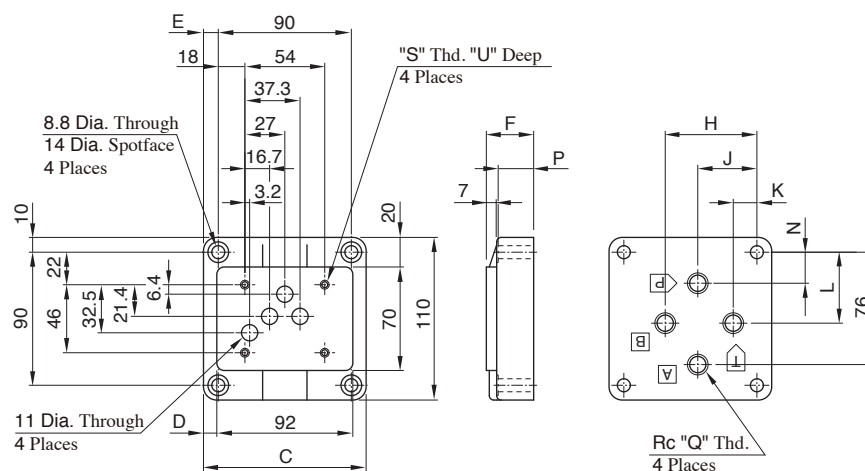
- For other dimensions, refer to the drawing above.
- Solenoid being mounted in the reverse position -SOL a side- is also available.

- Models with DC Solenoids : (S-) DSG-03-***-D*
- Models with R Type Solenoids : (S-) DSG-03-***-R*
- Models with RQ Type Solenoids : (S-) DSG-03-***-RQ100
- Spring Centered
- No-Spring Detented
- Spring Offset



● For other dimensions, refer to Models with AC solenoids (Page E-46).

Sub- plates : DSGM-03/03X/03Y



Sub-plate Model Numbers	C	D	E	F	H	J	K	L	N	P	Q
DSGM-03-40/4002	110	9	10	32	62	40	16	48	21	24	$\frac{3}{8}$
DSGM-03X-40/4002											$\frac{1}{2}$
DSGM-03Y-40/4002	120	14	15	50	80	45	10	47	16	42	$\frac{3}{4}$

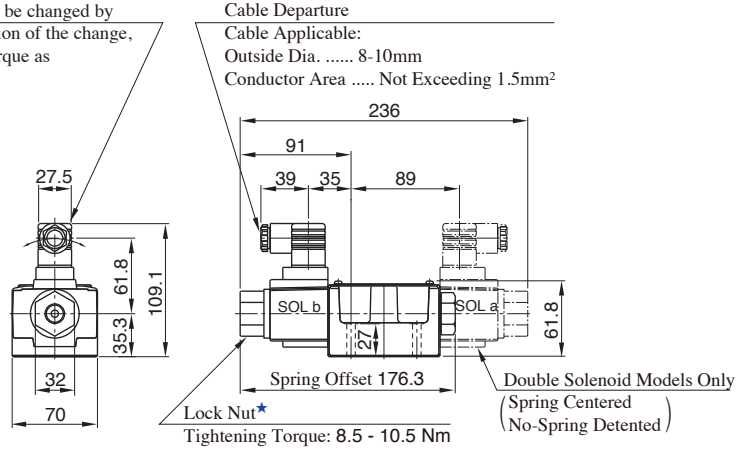
Sub-plate Model Numbers	S	U	Remarks
DSGM-03*-40	M6	13	Standard
DSGM-03*-4002	M8	14	Option

Options

■ Plug-in Connector Type/Plug-in Connector with Indicator Light

● Models with AC Solenoids : DSG-03- * * *-A *-N/N1

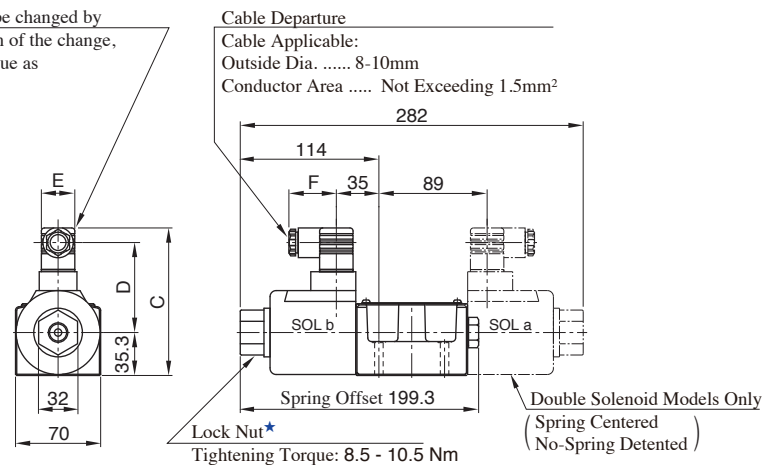
The position of the Plug-in connector can be changed by loosening the lock nut ★. After completion of the change, be sure to tighten the lock nut with the torque as specified below.



● Models with DC Solenoids : (S-) DSG-03- * * *-D *-N/N1

● Models with R Type Solenoids : (S-) DSG-03- * * *-R *-N

The position of the Plug-in connector can be changed by loosening the lock nut ★. After completion of the change, be sure to tighten the lock nut with the torque as specified below.



Model Numbers	C	D	E	F
DSG-03- * * *-D *-N/N1	121.1	73.8	27.5	39
DSG-03- * * *-R *-N	124.9	66.5	34	53

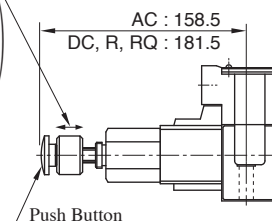
● For other dimensions, refer to "Terminal Box Type" (Page E-46 - E-47).

■ Models with Push Button & Lock Nut

(S-) DSG-03- * * *- *-C

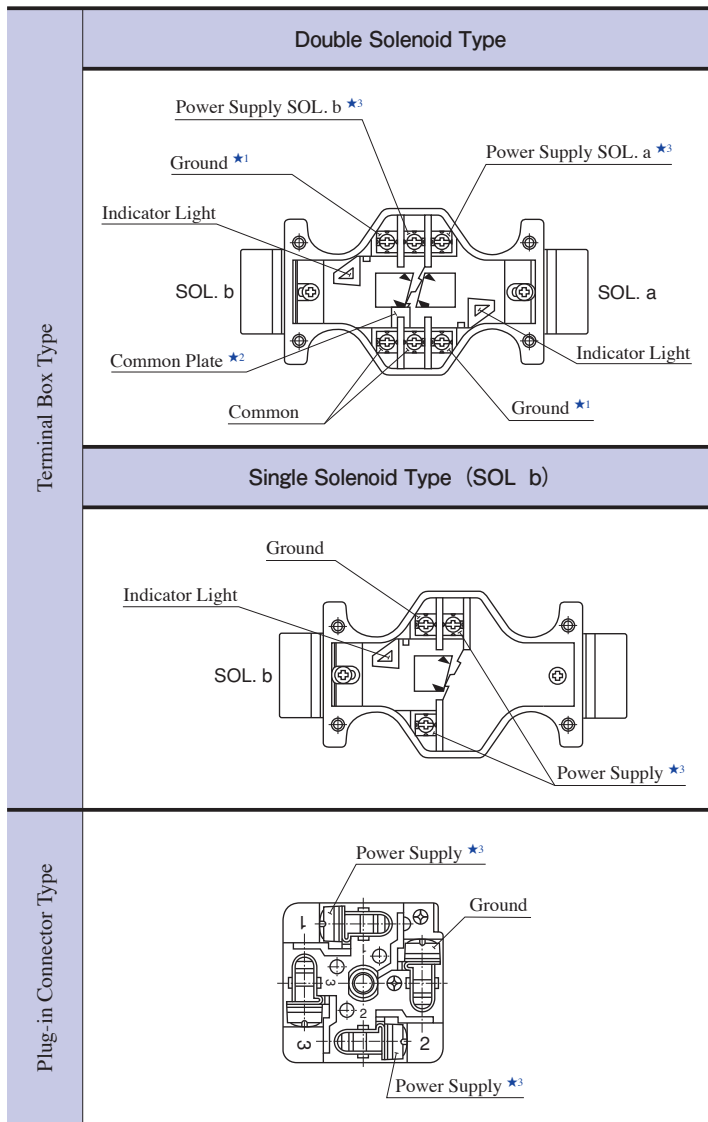
Lock Nut

Press the "Push Button" then turn "Lock Nut" clockwise. The position of the "Push Button" is held. Be sure to loosen "Lock Nut" fully before solenoid is energised.



Electrical Conduit Connection

Details of Receptacle

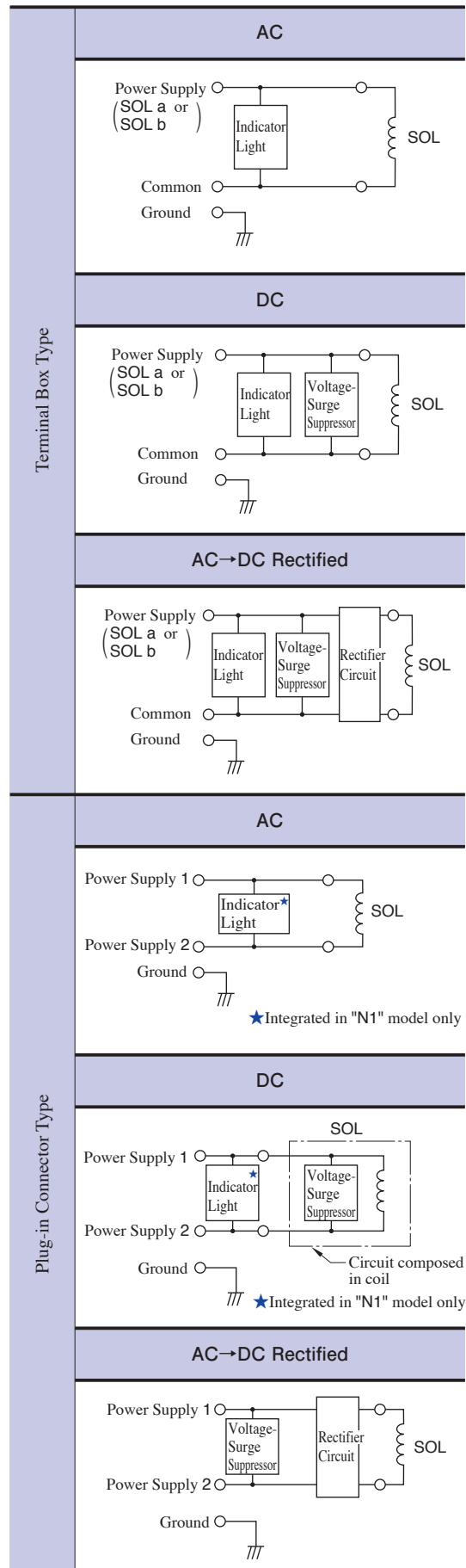


- ★1. There are two grounding terminals. You can use either one.
- ★2. If you do not need the common plate, remove it.
- ★3. With DC solenoids, polarity is no question.

DANGER

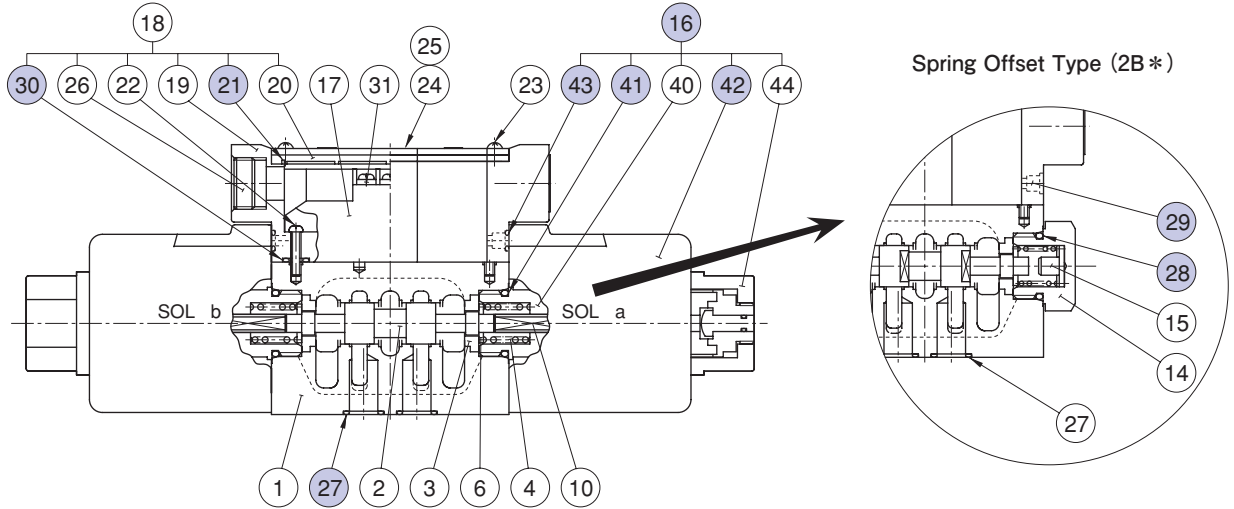
- Do not perform wiring while the power is on.
Doing so may result in electric shock, burns or death.
- Make the wiring properly. Improper wiring will cause an irregular movement of the machine, resulting in a grave accident.

Electrical Circuit (Single Solenoid Type)



■ List of Seals and Solenoid Ass'y

(S-) DSG-03- * * *



● List of Seals

Item	Name of Parts	Part Numbers	Qty.			Remarks
			3C *	2D *	2B *	
21	Gasket	1751S-VK418689-6	1	1	1	
27	O-Ring	AS 568-014 (NBR-90)	5	5	5	
28	O-Ring	OR NBR-90 P21-N	—	—	1	
29	Plug	1790S-VK418329-9	—	—	2	
30	O-Ring	S 6	2	2	2	
41	O-Ring	OR NBR-90 P21-N	2	2	1	Included in Solenoid Ass'y ⑯
43	O-Ring	OR NBR-70-1 P4-N	4	4	2	

■ List of Solenoid Ass'y and Coil Ass'y

Model Numbers	⑯ Solenoid Ass'y No.	④② Coil No.	Remarks
DSG-03- * * *-A100	SA3-100-51	C-SA3-100-51	Terminal Box Type
DSG-03- * * *-A120	SA3-120-51	C-SA3-120-51	
DSG-03- * * *-A200	SA3-200-51	C-SA3-200-51	
DSG-03- * * *-A240	SA3-240-51	C-SA3-240-51	
DSG-03- * * *-D12	SD3-12-51	C-SD3-12-51	
DSG-03- * * *-D24	SD3-24-51	C-SD3-24-51	
DSG-03- * * *-D48	SD3-48-51	C-SD3-48-51	
DSG-03- * * *-R100/RQ100	SR3-100-51	C-SR3-100-51	
DSG-03- * * *-R200	SR3-200-51	C-SR3-200-51	Plug-in Connector Type
DSG-03- * * *-A100-N/N1	SA3-100-N-51	C-SA3-100-N-51	
DSG-03- * * *-A120-N/N1	SA3-120-N-51	C-SA3-120-N-51	
DSG-03- * * *-A200-N/N1	SA3-200-N-51	C-SA3-200-N-51	
DSG-03- * * *-A240-N/N1	SA3-240-N-51	C-SA3-240-N-51	
DSG-03- * * *-D12-N/N1	SD3-12-N-51	C-SD3-12-N-51	
DSG-03- * * *-D24-N/N1	SD3-24-N-51	C-SD3-24-N-51	
DSG-03- * * *-D48-N/N1	SD3-48-N-51	C-SD3-48-N-51	
DSG-03- * * *-R100-N	SR3-100-N-51	C-SR3-100-N-51	
DSG-03- * * *-R200-N	SR3-200-N-51	C-SR3-200-N-51	

● As of solenoid Ass'y of shockless type and models with push button & lock nut, please order as below.

(Example) SD3-12-S-C-N-51

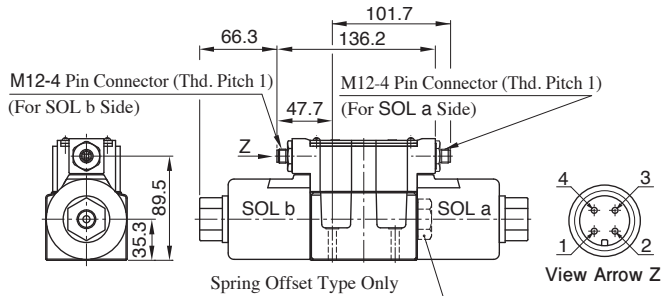
— C : Only for the models with push button & lock nut (option)

— S : Only for the models of shockless type

Coil Ass'y numbers are same with those in the above chart.

Special Electrical Conduit Connection

M12-4 Pin Connector Type

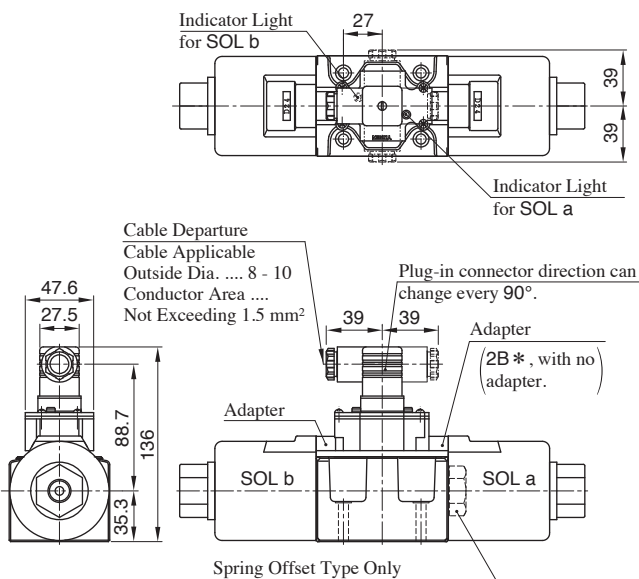


● For other dimensions, refer to page E-47 for Standard Terminal Box Type.

Pin No.

	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
Terminal	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused
Connector/Dependant Direction	M1: SOL b Side M2: SOL a Side	M3: SOL b Side M4: SOL a Side	M1: SOL b Side M2: Plug Side	M3: SOL b Side M4: Plug Side	M1: Plug Side M2: SOL a Side	M3: Plug Side M4: SOL a Side

Center Plug-in Connector Type



● For other dimensions, refer to page E-47 for Standard Terminal Box Type.

Model Numbers

DSG-03-2B2-D24-M1-50-L

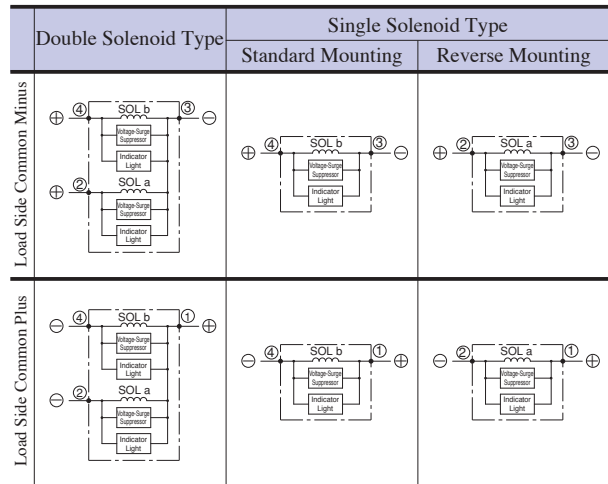
M12-4 Pin Connector Electrical Conduit Connection

- M1 : Load Side Common Minus (PNP Type) Terminal Box SOL b Side Conduit Connection
- M2 : Load Side Common Minus (PNP Type) Terminal Box SOL a Side Conduit Connection
- M3 : Load Side Common Plus (NPN Type) Terminal Box SOL b Side Conduit Connection
- M4 : Load Side Common Plus Terminal Box SOL a Side Conduit Connection

Coil numbers only for D12 and D24

● For other items, refer to page E-39 for Standard Model Number Designation.

Connection Circuit



Model Numbers

DSG-03-2B2-D24-S-50-L

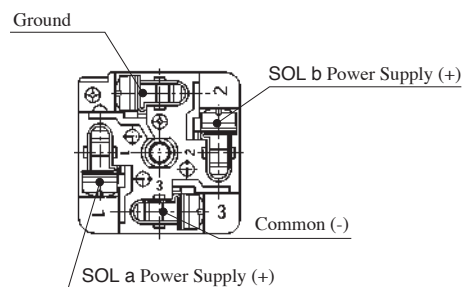
Center Plug-in Connector

Electrical Conduit Connection Type

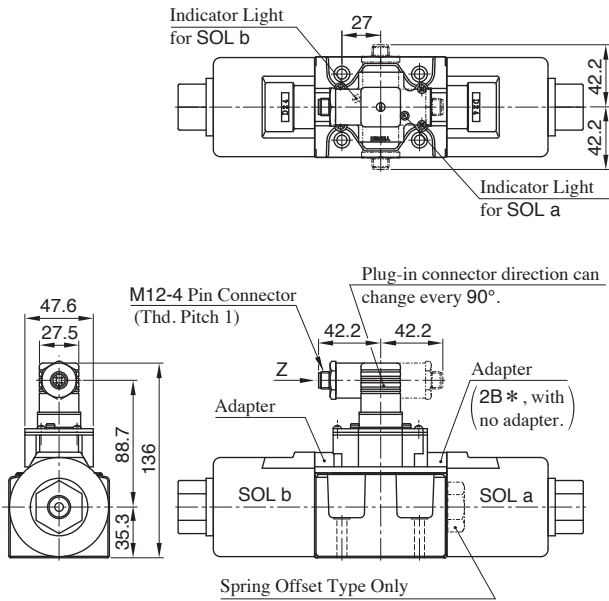
Coil Numbers Only for D12, D24, A100, A120, A200 & A240

● For other items, refer to page E-39 for Standard Model Number Designation.

Details of Receptacle



■ Center Plug-in Connector M12-4 Pin Connector Type



● For other dimensions, refer to page E-47 for Standard Terminal Box Type.

● Pin No.

Terminal	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused

Model Numbers

DSG-03-2B2-D24-S1-50-L

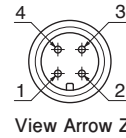
Center Plug-in M12 Connector 4 Pins Electrical Conduit Connection

S1 : Load Side Common Minus (PNP Type)

S2 : Load Side Common Plus (NPN Type)

Coil numbers only for D12 and D24

● For other items, refer to page E-39 for Standard Model Number Designation.



■ Connection Circuit

	Double Solenoid Type	Single Solenoid Type	
		Standard Mounting	Reverse Mounting
Load Side Common Minus			
Load Side Common Plus			

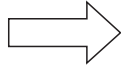
Low Wattage (5W) Type Solenoid Operated Directional Valves

Two types of Direct Acting Type Solenoid Operated Directional Valves, E-DSG-01/03, with suppressed consumption power 5W are launched in series.

● Enable Savings In Operating Cost

Because these valves only 5W of power which enables remarkable reduction of operating cost.

Standard DSG Series
DSG-01 : 29W
DSG-03 : 38W



Low Wattage Type E-DSG Series
E-DSG-01 : 5W
E-DSG-03 : 5W

● Enable Savings In Initial Cost

Since these valves operate on only 5W, they can be driven through the output circuit of a programmed or sequence controller. This feature simplifies the electric circuitry and enables savings in initial cost.

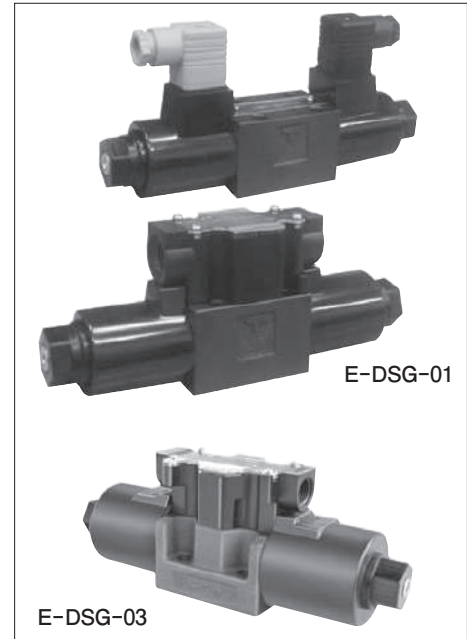
● Low Coil Surface Temperature

These low wattage valves minimize coil surface temperature.

● CE Certified Products Available

Because E-DSG-03 models are for the European equipment market, so CE certified products are also available.

(For more details, please contact us.)



E-DSG-01

E-DSG-03

Specifications

Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min ⁻¹	Mass kg
E-DSG-01-3C * -D * -70	45	16	16	240	2.0
E-DSG-01-2D2-D * -70					2.0
E-DSG-01-2B * -D * -70					1.5
E-DSG-03-3C * -D * -50	63	16	16	240	5
E-DSG-03-2D2-D * -50					5
E-DSG-03-2B2-D * -50					3.6

★ The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.
The maximum flow differs according to the spool type and operating conditions. For details, please refer to the "List of Standard Models" on page E-55.

Solenoid Ratings

Model Numbers	Electric Source	Coil Type	Voltage (V)		Current & Power at Rated Voltage	
			Source Rating	Serviceable Range	Inrush (A)	Power (W)
E-DSG-01	DC (K Series)	D 24	24	21.6 - 26.4	0.22	5
E-DSG-03		D 12	12	10.8 - 13.2	0.44	5
		D 24	24	21.6 - 26.4	0.22	

The coil type numbers in the shaded column are handled as optional extras. In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Sub-plates

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

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.(1/8")
- Sub-plates are same with those for DSG 01/03 series. For dimensions, refer to pages E-31 & E-47.

Mounting Bolts

Mounting bolts are not available, so please order separately. For details, please refer to pages E-29 & E-44.

Special Electrical Conduit Connection

"M12-4 Pin Connector Type", "Center Plug-in Connector Type"
"Center Plug-in M12-4 Pin Connector Type" are available, please refer to page E-61 for details.

Model Number Designation

E-DSG	-01	-2	B	2	A	-D24	-N	-70	-L
Series Number	Valve Size	Number of Valve Positions	Spool Spring Arrangement	Spool Type	Input Only Valves Using ^{★1} Neutral Position & Side Position	Coil Type	Electrical Conduit Connection	Design Number	Models with Reverse Mtg. of Solenoid
E-DSG : Low Wattage (5W) Solenoid Operated Directional Valve (Sub-plate Mounting Type)	01	3	C : Spring Centered	2, 3, 4 11, 40	—	D24	None: Terminal Box Type (Standard) N : Plug-in Connector Type	70	—
		2	D : No-Spring Detented	2	—				—
			B : Spring Offset	2, 3, 8	—				L : Input only for reverse mtg. of solenoid.
				2, 4 40	A : Using Neutral Position & SOL a Energised Position B : Using Neutral Position & SOL b Energised Position				
	03	3	C : Spring Centered	2, 4	—	D12 D24	N1 : Plug-in Connector Type with Indicator Light	50	—
		2	D : No-Spring Detented	2	—				—
			B : Spring Offset	2	B : Using Neutral Position & SOL b Energised Position				L : Input only for reverse mtg. of solenoid.

★1. In case of Valves Using Neutral Position and Side Position, please refer to page E-56 for details.

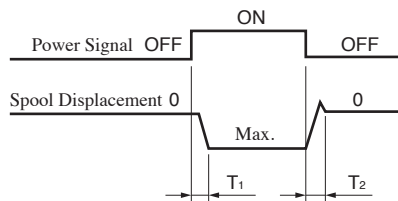
★2. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix “F-” to the model number because the special seals (fluororubber) are required to be used.

Attention

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

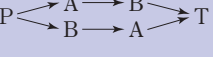
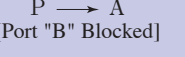
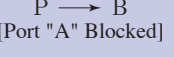
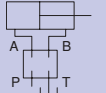
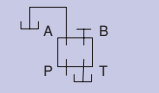
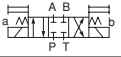
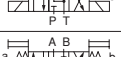
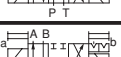
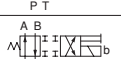
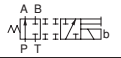
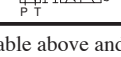
Typical Changeover Time (Example)

Changeover time varies according to oil viscosity, spool type and hydraulic circuit.



Valve Size	Model Numbers	Time ms		Test Conditions			
		T ₁	T ₂	Pressure MPa	Flow Rate L/min	Viscosity mm2/s	Voltage
01	E-DSG-01-3C2	125	37	16	30	30	100 %V at rated voltage (After temperature rise and saturated)
03	E-DSG-03-3C2	190	70	16	50	35	
	E-DSG-03-2B2	190	100		40		

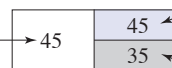
List of Standard Models

Valve Size	No. of Valve Positions	Spool-Spring Arrangement	Model Numbers	Graphic Symbols	Max. Flow L/min								
													
													
					Working Pressure MPa			Working Pressure MPa			Working Pressure MPa		
					3.5	7	16	3.5	7	16	3.5	7	16
01	Three Positions	Spring Centered	E-DSG-01-3C2		45	45	45	45	45	20	45	45	20
			E-DSG-01-3C3		45	45	45	45	45	45	45	45	45
			E-DSG-01-3C4		45	45	45	45	45	20	45	45	20
			E-DSG-01-3C40		45	45	45	45	45	20	45	45	20
			E-DSG-01-3C11		45	45	45	16	8	3	45	25	9
	Two Positions	No-Spring Detented	E-DSG-01-2D2		40	40	40	40	30	20	40	30	20
			E-DSG-01-2B2		45	45	45	30	10	9	45	20	12
		Spring Offset	E-DSG-01-2B3		45	45	45	35	35	25	45	45	45
			E-DSG-01-2B8		—	—	—	16	5	2	40	25	9
			03	Three Positions	Spring Centered	E-DSG-03-3C2		63	63	50	50	48	22
E-DSG-03-3C4		63				63	30	50	45	32	50	45	32
Two Positions	No-Spring Detented	E-DSG-03-2D2			63	63	50	34	34	25	34	34	25
		E-DSG-03-2B2			50	50	40	16	12	10	50	32	16
	Spring Offset												

Note) 1. The relation between the maximum flow in the table above and the voltage (within the serviceable voltage) is as shown below.

(Example)

The maximum flow rate is constant regardless of any voltage variants within the serviceable voltage



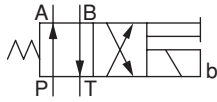
At rated voltage
[after temperature rise and saturated]

At minimum serviceable voltage
(90% of rated voltage)
[after temperature rise and saturated]

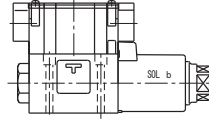
Reverse Mounting of Solenoid

In spring offset type, it is a standard configuration that the solenoid is mounted onto the valve in the SOL b position (side). However, in this particular spool-spring arrangement, the mounting of the solenoid onto the valve in the reverse position -SOL a side- is also available. The graphic symbol for this reverse mounting is as shown below.

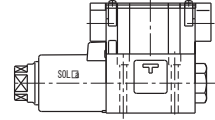
As for the valve type 2B*A and 2B*B, please refer to the explanation under the heading of "Valves Using Neutral Position and Side Position" given below.



Standard Mtg. of Solenoid



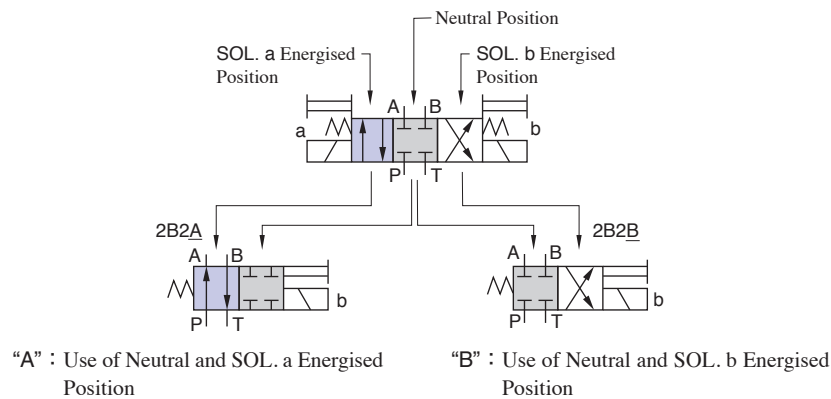
Reverse Mtg. of Solenoid



Valves Using Neutral Position and Side Position

Besides the use of the standard 2-position valves aforementioned in the "List of Standard Models", the 3-position valves also can be used as the 2-position valves using the two of their three positions. In this case, there are two kinds of the valve available. One is the valve using the neutral position and SOL a position (2B*A) and another is the valve using the neutral position and SOL b position (2B*B).

(Example) In case of Spool Type "2"



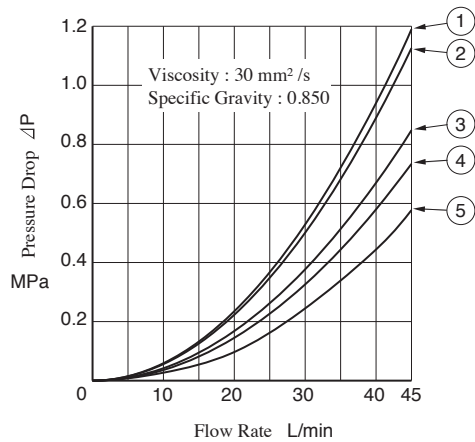
Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
E-DSG-01-2B * A		
E-DSG-01-2B2A		—

Model Numbers	Graphic Symbols	
	Standard Mtg. Type	Reverse Mtg. Type
E-DSG- ⁰¹ ₀₃ -2B * B		
E-DSG- ⁰¹ ₀₃ -2B2B		—
E-DSG- ⁰¹ ₀₃ -2B4B		

In the above table, the graphic symbols in mounting type highlighted with shade are optional extra, therefore, please confirm the time of delivery with us before ordering.

Pressure Drop

E-DSG-01



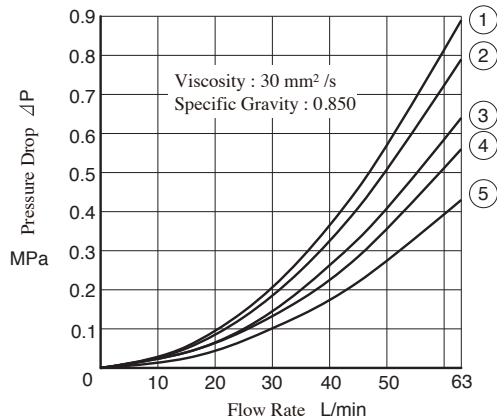
Model Numbers	Pressure Drop Curve Number			
	P→A	B→T	P→B	A→T
E-DSG-01-3C2	①	①	①	①
E-DSG-01-3C3	⑤	⑤	⑤	⑤
E-DSG-01-3C4	①	④	①	④
E-DSG-01-3C40	①	①	①	①
E-DSG-01-3C11	⑤	①	①	①
E-DSG-01-2D2	②	②	②	②
E-DSG-01-2B2	②	②	②	②
E-DSG-01-2B3	③	③	③	③
E-DSG-01-2B8	②	—	②	—

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

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

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

E-DSG-03



Model Numbers	Pressure Drop Curve Number			
	P→A	B→T	P→B	A→T
E-DSG-03-3C2	③	③	③	③
E-DSG-03-3C4	③	④	③	④
E-DSG-03-2D2	①	①	⑤	⑤
E-DSG-03-2B2	②	②	③	③

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

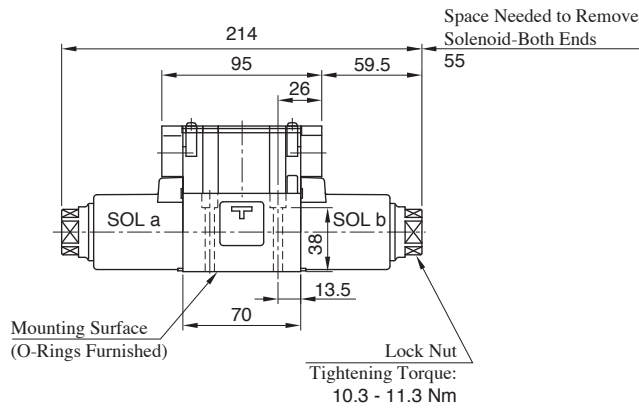
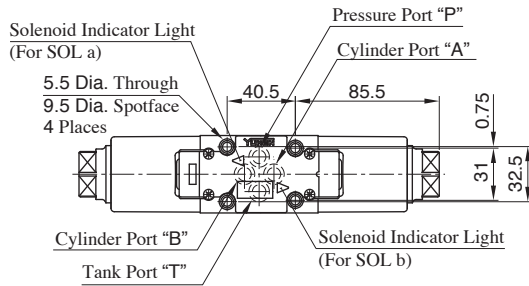
Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

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

Terminal Box Type (Standard)

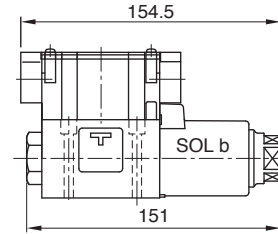
E-DSG-01-*-D24**

● Spring Centered & No-Spring Detented



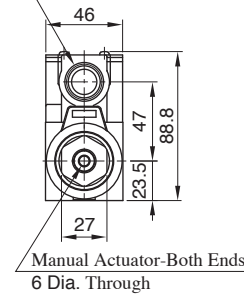
Note : Dimensions of valve mounting surface, refer to page E-31 for shared sub-plates dimensions.

● Spring Offset



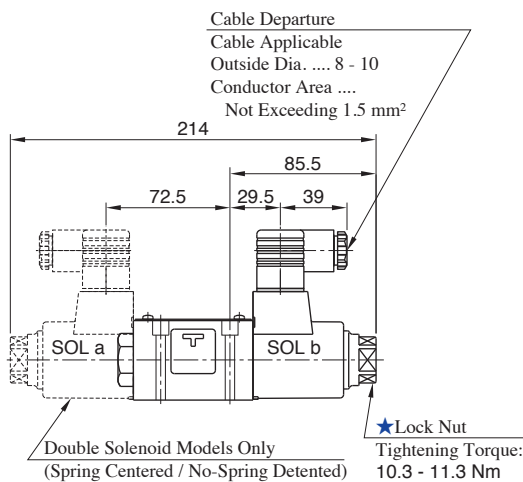
● For other dimensions, refer to the drawing left.
● Solenoid being mounted in the reverse position SOL a side is also available.

Electrical Conduit Connection
G1/2 Thd. 2 Places

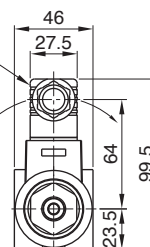


Options

Plug-in Connector Type / Plug-in Connector with Indicator Light : E-DSG-01-*-D24-N/N1**



The position of the Plug-in connector can be changed by loosening the lock nut ★. After completion of the change, be sure to tighten the lock nut with the torque as specified below.



● For other dimensions, refer to "Terminal Box Type" drawing above.

E-DSG-03-*-D***

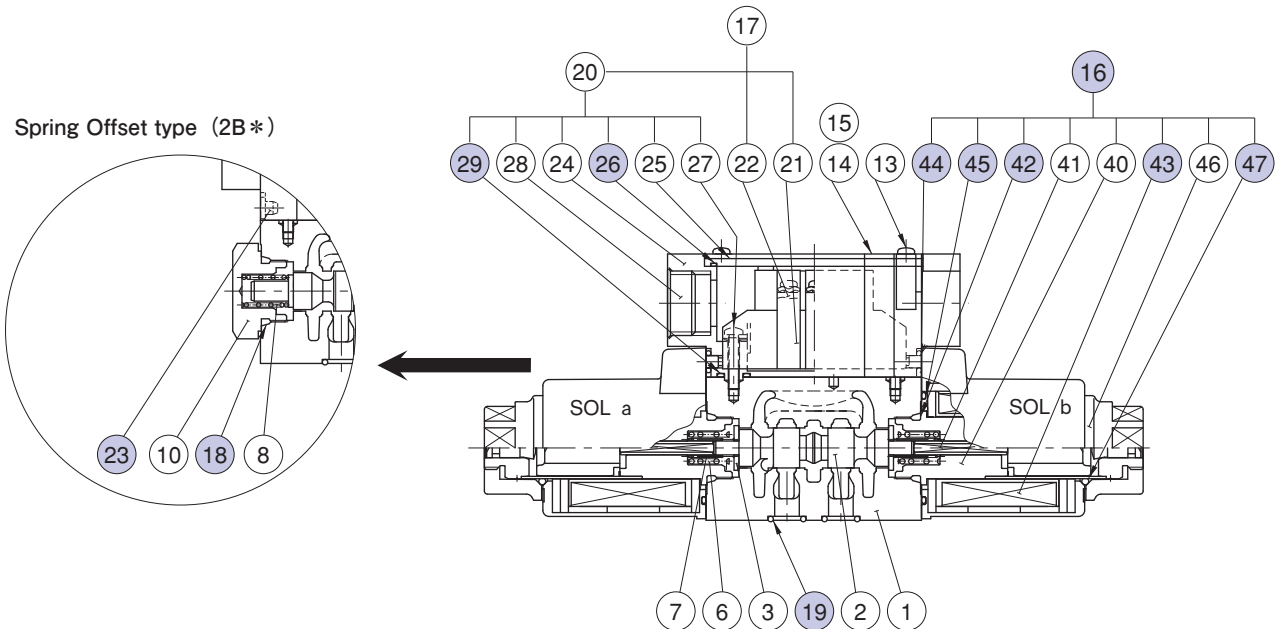
Outside dimensions are same with DSG-03 series solenoid operated directional valves, refer to pages E-47 & E-48.

Electrical Conduit Connection

As of details of receptacle and electrical circuit, please refer to page E-33 & E-49 for standard DSG-01 / DSG-03 series solenoid operated directional valves.

List of Seals and Solenoid Ass'y

E-DSG-01-***-D24



List of Seals

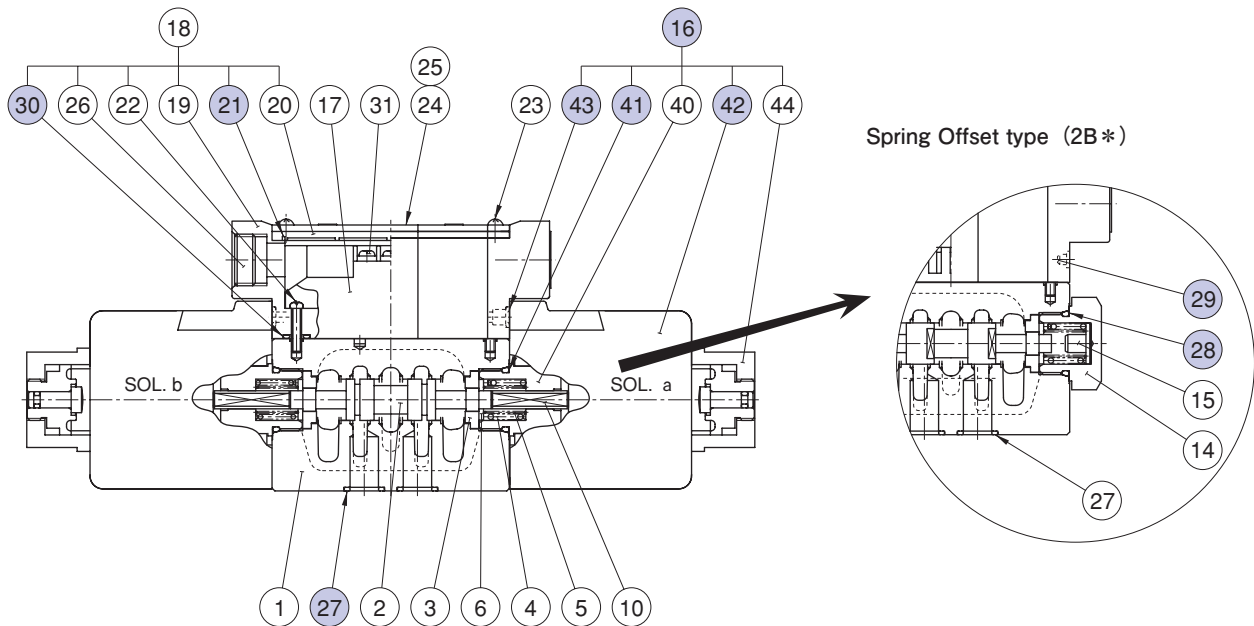
Item	Name of Parts	Part Numbers	Qty.			Remarks
			3C *	2D *	2B *	
18	O-Ring	OR NBR-90 P18-N	—	—	1	Included in Solenoid Ass'y (Item ⑯)
19	O-Ring	AS568-012 (NBR-90)	4	4	4	
23	Packing	1790S-VK418329-9	—	—	2	
26	Gasket	1790S-VK421290-8	1	1	1	
29	O-Ring	S 6	2	2	2	
42	O-Ring	OR NBR-90 P18-N	2	2	1	
44	O-Ring	OR NBR-70-1 P4-N	4	4	2	
45	O-Ring	AS568-026 (NBR-70-1)	2	2	1	
47	O-Ring	OR NBR-70-1 P20-N	2	2	1	

Solenoid Ass'y, Coil Ass'y No.

Model Numbers	⑯ Solenoid Ass'y No.	④③ Coil Ass'y No.	Remarks
E-DSG-01-***-D24	E-SD1H-24-70	C-E-SD1H-24-70	Terminal Box Type
E-DSG-01-***-D24-N/N1	E-SD1H-24-N-70	C-E-SD1H-24-N-70	Plug-in Connector Type / Plug-in Connector with Indicator Light

■ List of Seals and Solenoid Ass'y

E-DSG-03- * * * -D *



● List of Seals

Item	Name of Parts	Part Numbers	Qty.			Remarks
			3C *	2D *	2B *	
21	Gasket	1751S-VK418689-6	1	1	1	
27	O-Ring	AS 568-014 (NBR-90)	5	5	5	
28	O-Ring	OR NBR-90 P21-N	—	—	1	
29	Plug	1790S-VK418329-2	—	—	2	
30	O-Ring	S 6	2	2	2	
41	O-Ring	OR NBR-90 P21-N	2	2	1	Included in Solenoid Ass'y (Item ①⑥)
43	O-Ring	OR NBR-70-1 P4-N	4	4	2	

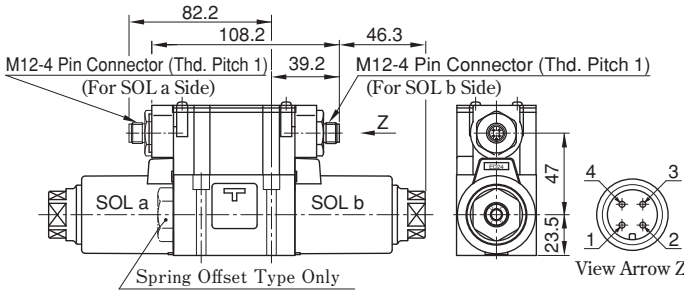
■ Solenoid Ass'y, Coil Ass'y No.

Model Numbers	①⑥ Solenoid Ass'y No.	④② Coil Ass'y No.	Remarks
E-DSG-03- * * * -D12	E-SD3-12-51	C-E-SD3-12-51	Terminal Box Type
E-DSG-03- * * * -D24	E-SD3-24-51	C-E-SD3-24-51	
E-DSG-03- * * * -D12-N/N1	E-SD3-12-N-51	C-E-SD3-12-N-51	Plug-in Connector Type / Plug-in Connector with Indicator Light
E-DSG-03- * * * -D24-N/N1	E-SD3-24-N-51	C-E-SD3-24-N-51	

Special Electrical Conduit Connection

- E-DSG-01-***-D*-M*
- M12-4 Pin Connector Type

Model Numbers
E-DSG-01-2B2-D24-M1-70-L



M12-4 Pin Connector Electrical Conduit Connection

- M1 : Load Side Common Minus (PNP Type) Terminal Box SOL b Side Conduit Connection
- M2 : Load Side Common Minus (PNP Type) Terminal Box SOL a Side Conduit Connection
- M3 : Load Side Common Plus (NPN Type) Terminal Box SOL b Side Conduit Connection
- M4 : Load Side Common Plus Terminal Box SOL a Side Conduit Connection

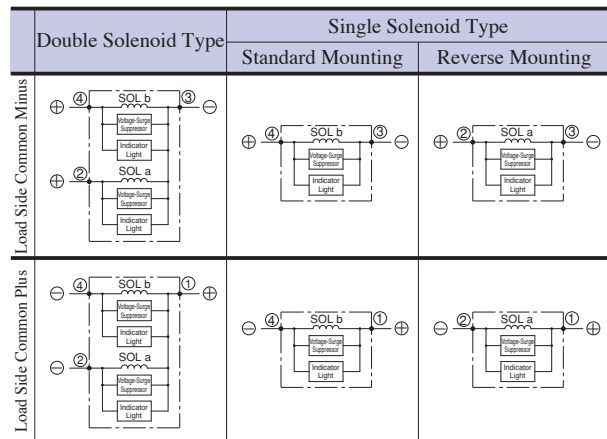
- For other dimensions, refer to page E-58 for Standard Terminal Box Type.

- Pin No.

	Double Solenoid Type		Single Solenoid Type (Standard Mounting)		Single Solenoid Type (Reverse Mounting)	
Terminal	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)	Common Minus PNP (Source)	Common Plus NPN (Sink)
①	Unused	Common(+)	Unused	Common(+)	Unused	Common(+)
②	SOL a	SOL a	Unused	Unused	SOL a	SOL a
③	Common(-)	Unused	Common(-)	Unused	Common(-)	Unused
④	SOL b	SOL b	SOL b	SOL b	Unused	Unused
Connector/Direction	M1: SOL b Side M2: SOL a Side	M3: SOL b Side M4: SOL a Side	M1: SOL b Side M2: Plug Side	M3: SOL b Side M4: Plug Side	M1: Plug Side M2: SOL a Side	M3: Plug Side M4: SOL a Side

- For other items, refer to page E-54 for Standard Model Number Designation.

Connection Circuit



- E-DSG-03-***-D*-M*/S/S*

- M12-4 Pin Connector Type / Center Plug-in Connector Type / Center Plug-in M12-4 Pin Connector Type

Outside dimensions are same with DSG-03 series solenoid operated directional valves, refer to page E-47, E-51 & E-52.

Interchangeability in Installation between Current and New Design

E-DSG-01 model products made change from 60 design to 70 design, enables hige flow and compact.

Specifications / Characteristics

- ①Max. Flow : 30 → 45 L/min
- ②Spool Type : Spool types are limited as below.
3C2, 3C3, 3C4, 3C40, 3C11, 2D2, 2B2, 2B3, 2B8
(If use neutral position and side position, please refer to page E-56.)

Standard Solenoid Type

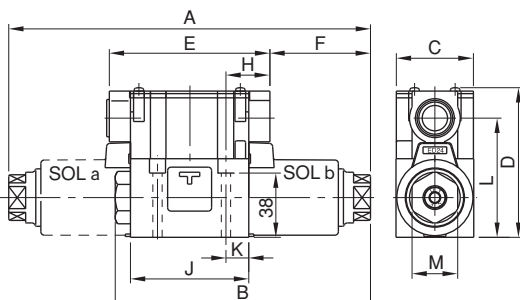
There are no changes in specifications, but coil type is limited only for D24.

Special Electrical Conduit Connection

Electrical conduit connection is limited only for M12 pin connector type.

Interchangeability in Mounting between Current and New Design

Position of electrical conduit connection port is changed a little, but has interchangeability in mounting.



Design Number	A	B	C	D	E	F	H	J	K	L	M
(New) 70 Design	214	151	46	88.8	95	59.5	26	70	13.5	70.5	27
(Current) 60 Design	216	155	48	90.3	90	63	23.5	65	11	72	22

Electronic Relay Incorporated Solenoid Operated Directional Valves

The valve is actuated by operating a built-in switch using a very small current signal (about 10 mA) when the solenoid is energised.

- A Direct drive by the programmable controller is now possible
As the valve can be actuated by a very small current signal (about 10 mA), a Direct Drive is possible on the output circuit of the programmable controller or sequence controller.
- Simple construction and stable operation
Since the valve is a direct type, the construction is quite simple. Also the solenoid is the well proven wet armature type, which can withstand contamination. Therefore a stable operation can be obtained.

Specifications and Characteristics of Standard Solenoid

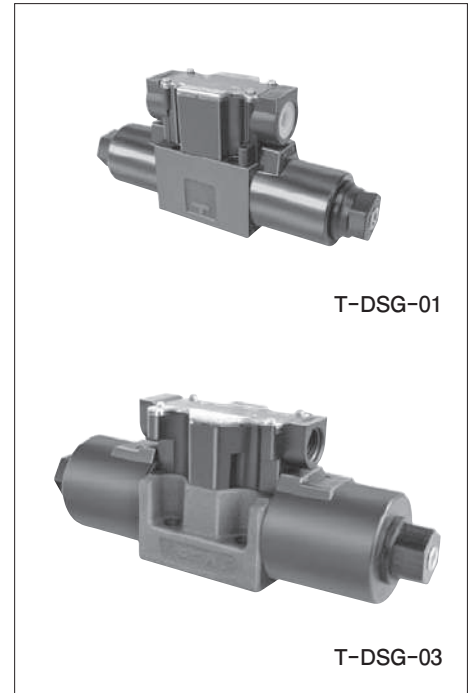
Standard solenoid specifications and pressure drop are same with DSG-01/03 series, please refer to relevant pages.

Dimensions

Dimensions are same with DSG-01/03 series, please refer to relevant pages.

Sub-plates and Mounting Bolts

Sub-plates use same models with DSG-01/03 series. Mounting bolts are same with DSG-01/03 series, please refer to relevant pages.



Specifications

Valve Type	Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min ⁻¹	Mass kg
Standard Type	T-DSG-01-3C * -D24 * -70	100	35	21	300	1.85
	T-DSG-01-2D2-D24 * -70					1.4
	T-DSG-01-2B * -D24 * -70					1.4
Shockless Type	T-S-DSG-01-3C * -D24 * -70	63	25	21	120	1.85
	T-S-DSG-01-2B2-D24 * -70					1.4
Standard Type	T-DSG-03-3C * -D24 * -50	120	31.5 (Spool Type 60 Only) 25	16	240	5
	T-DSG-03-2D2-D24 * -50					3.6
	T-DSG-03-2B * -D24 * -50					3.6
Shockless Type	T-S-DSG-03-3C * -D24 * -50	120	25	16	120	5
	T-S-DSG-03-2B2-D24 * -50					3.6

★ Maximum flow indicates a ceiling flow. As the ceiling flow depends on the type of spool and operating condition same as those for standard DSG-01/03, refer to the List of Standard Models for details.

Pages for List of DSG-01/03 Standard Models

Valve Size	Type : Model Numbers	Pages for List of Standard Models
01	Standard Type : DSG-01- * * * -D * -70	E-26
	Shockless Type : S-DSG-01- * * * -D * -70	E-27
03	Standard Type : DSG-03- * * * -D * -50	E-41
	Shockless Type : S-DSG-03- * * * -D * -50	E-42

Signal Power Voltage (External Signal Power Type)

Valve Size	Signal Power Voltage	Current on Signal Cable
01	20 - 65 V DC★ ¹	About 10 mA Constant★ ²
03		

★¹. If use at the range of 5 - 20 V DC, please contact us.

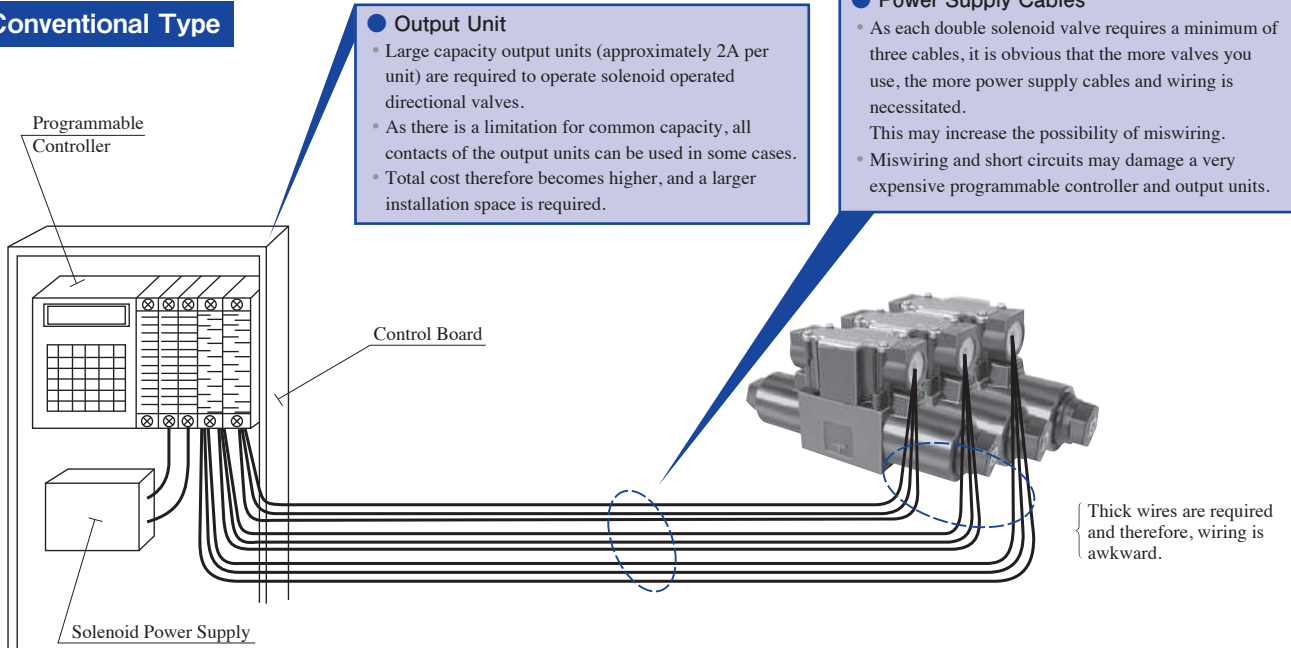
★². Current does not increase with voltage increase, so no need to district current by resistor etc.

Characteristics and Effect

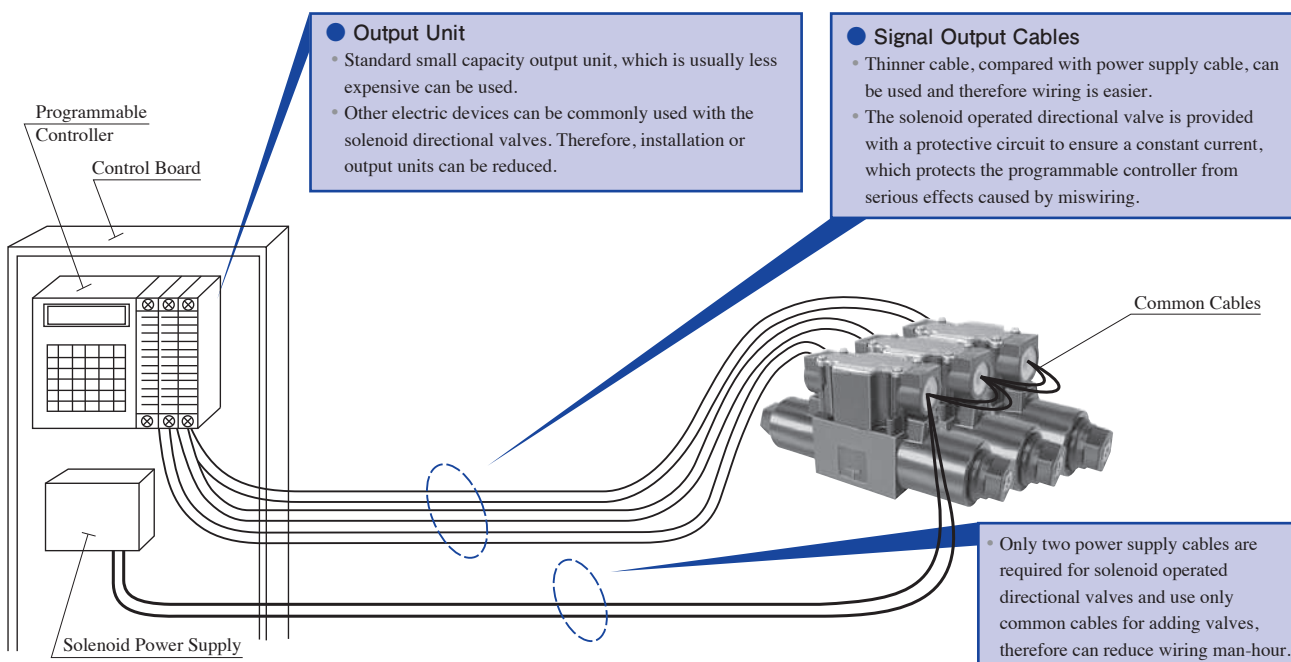
Characteristics	Merit	Effect (Example)
Changeover signal current is very small as one hundredth of the conventional type. Changeover Signal Current : 10 mA Constant (Voltage 20 - 65V DC)	- Enable to wiring by the cables thinner than conventional ones. - Can changeover directly from programmable controller ! - Programmable controller enable to be more compact and cut costs. - Enable to increase number of simultaneous changeover contacts. - Not influence on surge voltage in the sequence output unit.	- Cable occupied spaces reduce to one third. - No need to relay for changeover. 16 contacts output unit Conventional Type.....Max. 3 Contacts Electronic Relay Incorporated Type..... Max. 16 Contacts
Protect of Output Circuit	Not influence on the output side even if over current by defective solenoid changeover for some reason.	Only to replace solenoid operated valve in case of trouble.

Comparison of The Conventional Type and The Electronic Relay Incorporated Type

Conventional Type



Electronic Relay Incorporated Type



Model Number Designation

T-	S-	DSG	-01	-2	B	2	A	-D24	M	-70	-L				
Control Type	Type	Series Number	Valve Size	Number of Valve Positions	Spool-Spring Arrangement	Spool Type	Input Only Valves Using Neutral Position & Side Position	Coil Type	Supply Type of Signal Power	Design Number	Models with Reverse Mtg. of Solenoid				
T : Electronic Relay Incorporated Type	None: Standard Type	DSG : Solenoid Operated Directional Valve (Sub-plate Mounting Type)	01	3	C : Spring Centered	2 , 3 4 , 40 60 , 9 10 , 11 12	—	DC: D24	None: Internal Signal Power M : External Signal Power Sink Type MS : External Signal Power Source Type	70	—				
					2	D : No-Spring Detented	2		—		MS : External Signal Power Source Type	L : Input only for reverse mtg. of solenoid.			
						B : Spring Offset	2 3 8		A ^{★1} B ^{★1}						
	S: Shockless Type			DSG : Solenoid Operated Directional Valve (Sub-plate Mounting Type)	01	3	C : Spring Centered	2 4	—	DC: D24	None: Internal Signal Power M : External Signal Power Sink Type MS : External Signal Power Source Type	70	—		
							2	B : Spring Offset	2		—		MS : External Signal Power Source Type	L : Input only for reverse mtg. of solenoid.	
	None: Standard Type	None: Standard Type	DSG : Solenoid Operated Directional Valve (Sub-plate Mounting Type)	03	3	C : Spring Centered	2 , 3 4 , 40 5 , 60 9 , 10 11 , 12	—	DC: D24	None: Internal Signal Power M : External Signal Power Sink Type MS : External Signal Power Source Type	50	—			
						2	D : No-Spring Detented	2		—		MS : External Signal Power Source Type	L : Input only for reverse mtg. of solenoid.		
							B : Spring Offset	2 3 8		A ^{★1} B ^{★1}					
		S: Shockless Type			S: Shockless Type	DSG : Solenoid Operated Directional Valve (Sub-plate Mounting Type)	03	3	C : Spring Centered	2 4	—	DC: D24	None: Internal Signal Power M : External Signal Power	50	—
									2	B : Spring Offset	2		A ^{★1} B ^{★1}		M : External Signal Power

★1. In case of Valves Using Neutral Position and Side Position, please refer to pages E-28 & E-43 for details.

★2. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Attention

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

Details of Receptacle

Item	Internal Signal Power	External Signal Power	
		Sink Type	Source Type
Electrical Circuit	● The power of semiconductor switch operating signal is supplied from solenoid power source. ● When signal cable short circuit to the minus side of power source, approximate 10 mA current flow into signal cable. If solenoid power voltage increase, 10 mA current does not change.	● The power of semiconductor switch operating signal is supplied from the other power sources. ● Signal terminal and power terminal are insulated absolutely.	
Receptacle			

★ This drawing shows double solenoid type. Single solenoid type does not have terminal ④.

Terminal Number	Name of Terminals		
	Internal Signal Power	External Signal Power	
		Sink Type	Source Type
①	Power Terminal (24V DC ⊕ Terminal)	Power Terminal (24V DC ⊕ Terminal)	
②	Power Terminal (24V DC ⊖ Terminal)	Power Terminal (24V DC ⊖ Terminal)	
③	Short circuit to terminal ① by common plate. (Unused)	Signal Power Terminal (⊕ Terminal)	Signal Power Terminal (⊖ Terminal)
④	SOL a Signal Terminal (Single solenoid does not have this terminal.)		
⑤	SOL b Signal Terminal		
⑥	Ground Terminal (Connect to body of solenoid operated directional valve)		
⑦	Common Plates	—	

- Please wire correctly to the receptacle. Power terminals are fixed (+) and (-) sides. Please use smoothing power source for DC power supply.
- There is no time lag between signal output cables switch (ON/OFF) and solenoid switching (ON/OFF).
- Signal output cables do not need to use shield cables.
- This valves of external signal type, the signal terminal and power terminal are insulated. So that surge voltage which generated when solenoid off will not affect to control units connecting signal output cables. (Internal signal type generate surge voltage, so please install surge killer as required.)

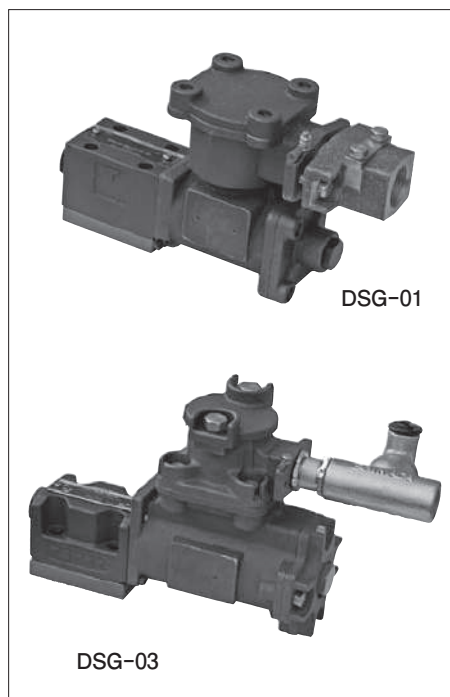
Explosion Proof (Flameproof) Type Solenoid Operated Directional Valves

“Even if explosive gas invasion from outside into vessel cause internal ignition or explosion, substantially isolate ignition source in vessel by special elaborating to vessel structure for avoiding any bad influence externally.” is the point of pressure & explosion proof construction.

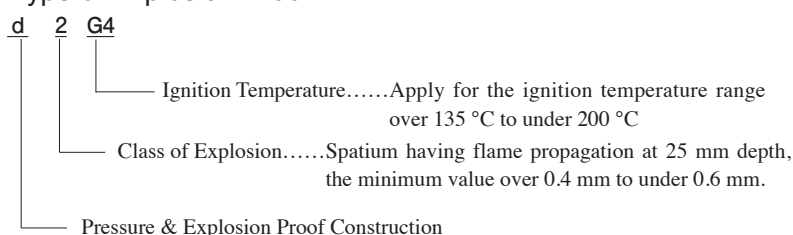
On this point of view, YUKEN's Explosion Proof Type Solenoid Operated Directional Valves involve solenoid and receptacle in the vessel with all closed pressure proof structure.

If explosion of explosive gas happened in vessel, the vessel could stand the pressure and there is no danger to ignite external explosive gas.

Usable at the danger zone 1 & 2.



Type of Explosion Proof



Technology Institution of Industrial Safety Certificate Number

Model Numbers	Certificate Number	
	Threaded Conduit Connection	Pressure Proof Packing Type
DSG-01	T67046	T67037
DSG-03	T67047	T67036

Specifications

Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min ⁻¹	Mass kg
DSG-01-3C *- * X *-70	100	35	14	300 : With DC Solenoid 120 : With R Solenoid	7.75
DSG-01-2D2- * X *-70					7.75
DSG-01-2B *- * X *-70					4.35
DSG-03-3C *- * X *-51	120	31.5 〔 Spool Type 60 Only 25 〕	16	240 : With DC Solenoid 120 : With R Solenoid	18.2
DSG-03-2D2- * X *-51					18.2
DSG-03-2B *- * X *-51					10.2

★ The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.
The maximum flow differs according to the spool type and operating conditions. For details, please contact us.

■ Interchangeability in Installation between Current and New Design

For further improvement of reliability, Explosion Proof Type Solenoid Operated Directional Valves have been upgraded as below.

DSG-01 : 50 Design → 70 Design

DSG-03 : 50 Design → 51 Design

● Cable Departure

As of threaded conduit connection type, add sealing fitting on the cable departure. With this arrangement, the certificate number also changed.

Model Numbers	Certificate Number		
	(Current)	(New)	
		Threaded Conduit Connection Type	Pressure Proof Packing Type
DSG-01	T32873	T67046	T67037
DSG-03	T43853	T67047	T67036

● Specifications / Characteristics

DSG-01 models improve high pressure and high flow.

Model Numbers	Max. Flow L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min ⁻¹	Mass kg	
					3C*/2D*	2B*
(New) 70 Design	100	35	14	300 : With DC Solenoid 120 : With R Solenoid	7.75	4.35
(Current) 50 Design	35	31.5 (3C60 : 25)		120	7.3	4.1

DSG-03 have no changes between current and new models.

● Interchangeability in Installation between Current and New Design

There are some changes in dimensions concerned sealing fitting, but there is interchangeability in installation between current and new design.

———— Please contact us for details about Explosion Proof (Flameproof) Type Solenoid Operated Directional Valves. ————

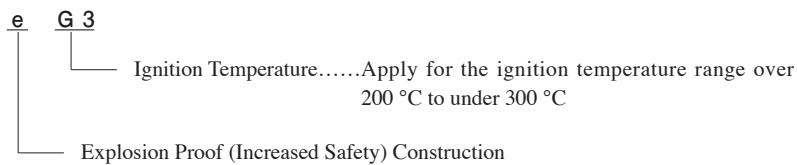
Explosion Proof (Increased Safety) Type Solenoid Operated Directional Valves

“As of electrical machinery which has no spark parts or hot section being ignition source, especially increase safety and avoid trouble - Increased Safety of Electrical Machinery with No Spark” is the point of explosion proof (increased safety) construction.

On this point of view, YUKEN's Explosion Proof (Increased Safety) Type Solenoid Operated Directional Valves increased safety about high temperature, isolation and locking mechanism.

But explosion proof in case of internal trouble is not guaranteed, so please decide propriety of use considering about surround conditions and maintenance management. Please use at the danger zone 2 in general, not recommend to use at zone 1.

Type of Explosion Proof



Technology Institution of Industrial Safety Certificate Number

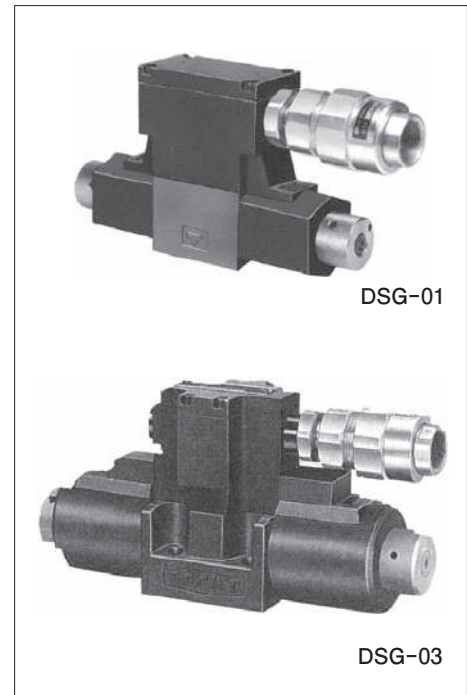
- DSG-01 With DC Solenoid : T48037
With AC Solenoid : T48038
(Rectifier Incorporated Type)
- DSG-03 With DC Solenoid : T47687
With AC Solenoid : T47688
(Rectifier Incorporated Type)

—— Please contact us for details about Explosion Proof (Increased Safety) Type Solenoid Operated Directional Valves. ——

Specifications

Model Numbers	Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Max. Changeover Frequency min ⁻¹	Mass kg
DSG-01-3C * - * Y * -51	63	31.5	16	240 : With DC Solenoid 120 : With R Solenoid	2.8
DSG-01-2D2- * Y * -51		Spool Type 60 Only			2.8
DSG-01-2B * - * Y * -51		25			2.2
DSG-03-3C * - * Y * -50	120	31.5	16	240 : With DC Solenoid 120 : With R Solenoid	5.8
DSG-03-2D2- * Y * -50		Spool Type 5 & 60 Only			5.8
DSG-03-2B * - * Y * -50		25			4.4

- ★ Maximum flow indicates a ceiling flow to keep valve operation (changeover) normal.
It depends on the type of spool and operating condition, please contact us for details.



Solenoid Controlled Pilot Operated Directional Valves

● High Pressure / High Flow

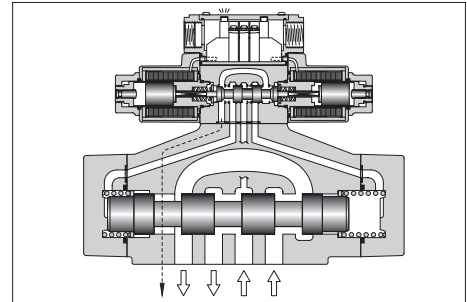
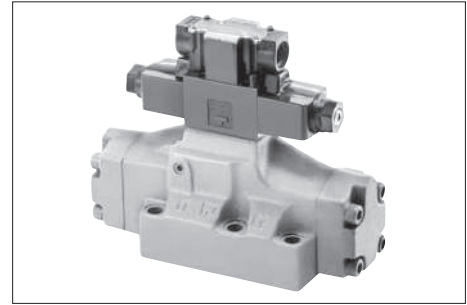
Size “04” valves can flow maximum 300 L/min, “06” valves can flow maximum 500 L/min and “10” valves can flow maximum 1100 L/min. High pressure along with high flow means compact system design.

● Lower Pressure Drop

System energy saving increased as pressure drop of each valve has been greatly reduced.

● Easy Exchange Between Pilot and Drain Connection Type

It is easy to exchange between pilot and drain connection type (internal ↔ external) by plug mounting on-off.



■ Specifications

Valve Type	Model Numbers	Max. Flow L/min	Max. Operating Pressure MPa	Max. Pilot Pressure MPa	Min.★ ² Required Pilot Pres. MPa	Max. T-Line Back Pressure MPa		Max. Changeover Frequency min ⁻¹			Mass kg			
						Ext. Drain	Int. Drain	AC	DC	R				
Standard Type	DSHG-01-3C * - * -14	40	21	21	1.0	16	16	120	120	120	4.0 (3.2)★ ⁴			
	DSHG-01-2B * - * -14										3.5 (2.7)★ ⁴			
	DSHG-03-3C * - * -14	160	25	25	0.7	16	16	120	120	120	6.9			
	DSHG-03-2N * - * -14										6.9			
	DSHG-03-2B * - * -14										6.4			
Shockless Type	(S-) DSHG-04-3C * - * -52	300	31.5	25	0.8	21	21	120	120	120	8.5			
	(S-) DSHG-04-2N * - * -52										8.5			
	(S-) DSHG-04-2B * - * -52										8.0			
	(S-) DSHG-06-3C * - * -53	500	31.5	25	0.8★ ³	21	21	120	120	120	12.4			
	(S-) DSHG-06-2N * - * -53										12.4			
	(S-) DSHG-06-2B * - * -53			21	1.0			110	110	110	11.9			
	(S-) DSHG-06-3H * - * -53										13.2			
	(S-) DSHG-10-3C * - * -43	1100	31.5	25	1.0★ ³	21	21	120	120	100	45.0			
	(S-) DSHG-10-2N * - * -43							100	100	100	45.0			
	(S-) DSHG-10-2B * - * -43			21							60	60	50	44.5
	(S-) DSHG-10-3H * - * -43													52.9

★1. Maximum flow indicates a ceiling flow, refer to the List of Standard Models on pages E-74 - E-78 for details.

★2. Pilot pressure of internal pilot drain models must always exceed tank line back pressure by a minimum required pilot pressure.

★3. Min. pilot pressure of with pilot piston is 1.8 MPa.

★4. Only the mass of internal pilot and internal drain type valve is the value in parentheses.

● Please contact us about High Flow Valves (Flange Connecting Type).

■ Solenoid Ratings

Refer to relevant solenoid ratings described on the page below.

Model Numbers	Pilot Valve Model Numbers	Solenoid Ratings described on the page below
DSHG-01	DSG-01- * - * - * -70	E-23
DSHG-03		
(S-) DSHG-04		
(S-) DSHG-06		
(S-) DSHG-10		

Model Number Designation

S-	DSHG	-06	-2	B	2	A	-C2	-E	T		
Type	Series Number	Valve Size	No. of Valve Positions	Spool-Spring Arrangement	Spool Type	Input Only Valves Using Neutral Position & Side Position	Models with Pilot Choke Valve	Pilot Connection	Drain Connection		
None: Standard Type	DSHG : Solenoid Controlled Pilot Operated Directional Valve, Sub-plate Mounting	01	3	C : Spring Centered	2 , 3 , 4 40 , 5 , 60 7 , 9 , 10 11 , 12	_____	_____				
			2	B : Spring Offset	2 , 3 , 4 40 , 7						
		03	3	C : Spring Centered	2 , 3 , 4 40 , 5 , 60 7 , 9 , 10 11 , 12	_____					
			2	N : No-Spring	2 3 4 40 7						
		04		3	C : Spring Centered	2 , 4 , 40 60 , 10 , 12 (3 , 5 , 6) ^{★1} (7 , 9 , 11)	_____			C1 : With C1 Choke	None: Internal Pilot
			2	N : No-Spring	2 , 4 , 40 (3 , 7) ^{★1}	A ^{★2}	C2 : With C2 Choke				
		06		3	C : Spring Centered	2 , 4 , 40 60 , 10 , 12 (3 , 5 , 6) ^{★1} (7 , 9 , 11)	_____			C1C2 : With C1 & C2 Choke	E : External Pilot
			H : Pressure Centered ^{★3}								
None: Standard Type		10	2	N : No-Spring	2 , 4 , 40 (3 , 7) ^{★1}	A ^{★2}					
				B : Spring Offset	2 , 4 , 40 (3 , 7) ^{★1}	A ^{★2} B ^{★2}					
S: Shockless Type											

Note: In spool type “3”, “5”, “6”, “60”, and “7”, the combination applicable between pilot system and drain system is as described in the table below.

Pilot Connection	Drain Connection	Care in Application
Internal Pilot	External Drain	Hold back pressure in the tank line so that the difference between pilot pressure and drain pressure is always more than minimum required pilot pressure.
	Internal Drain (T)	Combination is not applicable.
External Pilot (E)	External Drain	No restrictions in the combination on us
	Internal Drain (T)	

Attention

In the table above, the symbols and numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore please confirm the time of delivery with us before ordering.

	-R2	-A100	-C	-H	-N	-53	-L
	Spool Control Modification (Omit if not required)	Coil Type	Manual Override of Pilot Valve	Built-in Orifice for Pilot Line	Type of Electrical Conduit Connection	Design Number	Models with Reverse Mtg. of Solenoid
	_____	AC: A100 , A200 A120 , A240		_____		14	_____
		DC: D12 , D24 D48				14	_____
	R2 : With Stroke Adjustment, Both Ends RA : With Stroke Adjustment, Port "A" End RB : With Stroke Adjustment, Port "B" End	AC → DC : R100 , R200	None : Manual Override Pin		None: Terminal Box Type		L : Input only for reverse mtg. of solenoid.
			C : Push Button & Lock Nut		N : Plug-in Connector Type	52	_____
		AC: A100 , A200 A120 , A240			N1 : Plug-in*4 Connector with Indicator Light		L : Input only for reverse mtg. of solenoid.
	R2 : With Stroke Adjustment, Both Ends RA : With Stroke Adjustment, Port "A" End RB : With Stroke Adjustment, Port "B" End P2 : With Pilot Piston, Both Ends PA : With Pilot Piston, Port "A" End PB : With Pilot Piston, Port "B" End	DC: D12 , D24 D48		H : *5 Input only for spool-spring arrangement "H" and with built-in orifice.		53	_____
		AC → DC : R100 , R200				43	L : Input only for reverse mtg. of solenoid.

- ★1. Shockless type (S-DSHG) are not available for spool type marked ().
- ★2. As for the details of the valve using the neutral position and the side position, please refer to page E-79.
Furthermore, the spool types other than "2", "4", "40" (3, 7) are also available.
- ★3. In spool-spring arrangement "H" (Pressure centered models), the valves with stroke adjustment (R*) and pilot-piston (P*) are not available.
- ★4. N1 stands for Plug-in connector with solenoid indicator light. N1 is not available for R-type solenoids.
- ★5. In spool-spring arrangement "H" (pressure centered models), in case the pilot pressure is more than 10 MPa, please specify that the valve should have the built-in orifice to the pilot line.
- ★6. Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

CSA Approved Solenoid Valve

Available to supply DSHG-06 series valve approved by the CSA (Canadian Standards Association). Consult us for details.



Solenoid Controlled Pilot Operated Type

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg	Figure for the dimensions described on the page below	Remarks
DSHG-01	DSGM-01-31	1/8	0.8	E-31	Common to those for DSG-01 Solenoid Operated Directional Valves
	DSGM-01X-31	1/4			
	DSGM-01Y-31	3/8			
DSHG-03	DSGM-03-40	3/8	3	E-47	As for Internal Pilot - Internal Drain Type, common to those for DSG-03 Solenoid Operated Directional Valves
	DSGM-03X-40	1/2			
	DSGM-03Y-40	3/4	4.7		
	DHGM-03Y-10	3/4	4.7	E-84	For External Pilot Type or External Drain Type
(S-) DSHG-04	DHGM-04-20	1/2	4.4	E-85	_____
	DHGM-04X-20	3/4	4.1		
(S-) DSHG-06	DHGM-06-50	3/4	7.4	E-87	_____
	DHGM-06X-50	1			
(S-) DSHG-10	DHGM-10-40	1 1/4	21.5	E-87	_____
	DHGM-10X-40	1 1/2			

- Sub-plates are available. Specify the sub-plate model number from the table above.
 When sub-plates are not used, the mounting surface should have a good machined finish. ($\sqrt{16}$)

Accessories

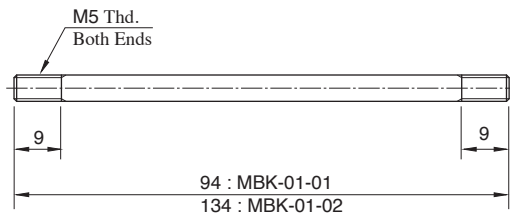
Mounting Bolt

Model Numbers	Mounting Bolt	Qty.	Tightening Torque Nm
DSHG-01	Bolt Kits : MBK-01-01-30 ^{★1} MBK-01-02-30 ^{★2}	1set	5 - 6
DSHG-03	Socket Head Cap Bolt : M6×35L	4	12 - 15
(S-) DSHG-04	Socket Head Cap Bolt : M6×45L	2	12 - 15
	Socket Head Cap Bolt : M10×50L	4	58 - 72
(S-) DSHG-06	Socket Head Cap Bolt : M12×60L	6	100 - 123
(S-) DSHG-10	Socket Head Cap Bolt : M20×75L	6	473 - 585

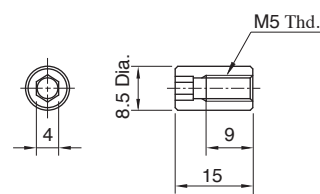
- ★1. For Internal Pilot-Internal Drain.
 ★2. For External Pilot-External Drain, External Pilot-Internal Drain and Internal Pilot-External Drain.

Bolt Kits Details

● Stud Bolt 4 Pcs.



● Nut 4 Pcs.

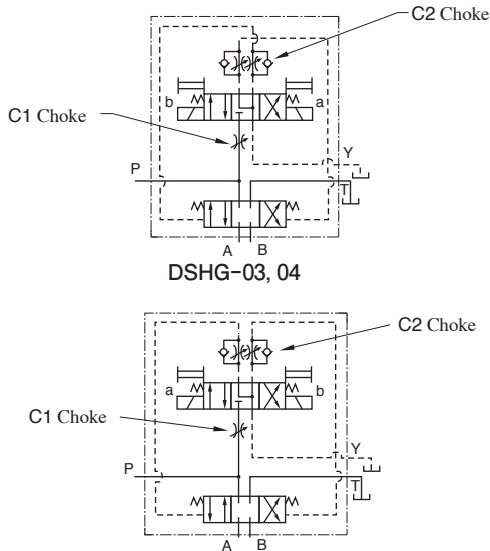


Options

Models with Pilot Choke Adjustment (C1, C2, C1C2)

When the adjustment screw is turned clockwise, changeover speed of the main spool becomes slow. In case of the spring centered valves in particular, making slow of the returning speed of the main spool to the neutral position is possible with a C2 choke valve. These choke valves can be used in combination with the valves of spring centered, no-spring, offset, pressure centered and the valves with stroke adjustment.

Graphic Symbols (Ex.: Spring Centered)
DSHG-01, 06, 10

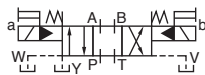


Models with Pilot Piston (P2, PA, PB)

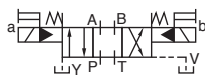
The valves with a pilot piston can be used when the high speed changeover of the main spool is required. However, in case of spring centered valves, there is no change in the returning speed of the main spool to the neutral position even with the pilot piston.

Graphic Symbols (Ex.: Spring Centered)

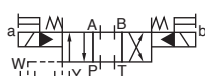
"P2" Models



"PA" Models



"PB" Models

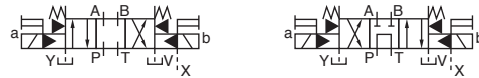


Pressure Centered Models (3H*)

The pressure centered type can be used when the returning of the main spool to the neutral position is required to be firmly.

Graphic Symbols (Ex.: External Pilot-External Drain)

(Only for 3H6, 3H60)

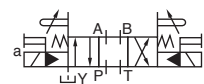


Models with Stroke Adjustment (R2, RA, RB)

When the adjustment screw is screwed in, the main spool stroke becomes short and flow rate reduces.

Graphic Symbols (Ex.: Spring Centered)

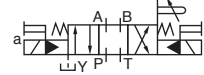
"R2" Models



"RA" Models



"RB" Models



Additional Mass of Options

Add the mass described below to the mass of standard models on page E-69, if options are required.

(kg)

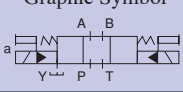
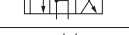
Model Numbers	Models with Pilot Choke Adj.		Models with Pilot Piston		Models with Stroke Adj.	
	C1, C2	C1C2	P2	PA PB	R2	RA RB
DSHG-03	0.65	1.3	—	—	0.6	0.3
(S-) DSHG-04	0.65	1.3	—	—	1.0	0.5
(S-) DSHG-06	0.65	1.3	1.0	0.5	1.2	0.6
(S-) DSHG-10	0.65	1.3	3.6	1.8	3.7	1.85

Options on Pilot Valve

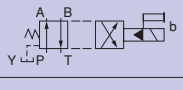
The same options to DSG-01 series valves are available. Please refer to page E-23 for the details.

■ List of Standard Models (DSHG-01)

● Three Positions

Spool Type	Spring Centered			
		Maximum Flow L/min		
		7 MPa	14 MPa	21 MPa
	Model Numbers			
“2” 	DSHG-01-3C2	40	40	40
“3” 	DSHG-01-3C3	40	40	40
“4” 	DSHG-01-3C4	40	40	40
“40” 	DSHG-01-3C40	40	40	40
“5” 	DSHG-01-3C5	40	40	40
“60” 	DSHG-01-3C60	40	40	40
“7” 	DSHG-01-3C7	40	40	40
“9” 	DSHG-01-3C9	40	40	40
“10” 	DSHG-01-3C10	40	40	40
“11” 	DSHG-01-3C11	40	40	40
“12” 	DSHG-01-3C12	40	40	40

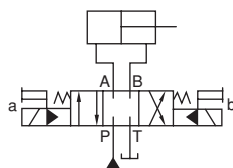
● Two Positions

Spool Type	Spring Offset			
		Maximum Flow L/min		
		7 MPa	14 MPa	21 MPa
	Model Numbers			
“2” 	DSHG-01-2B2	40	40	40
“3” 	DSHG-01-2B3	40	40	40
“4” 	DSHG-01-2B4	40	40	40
“40” 	DSHG-01-2B40	40	40	40
“7” 	DSHG-01-2B7	40	40	40

Notes) 1. Max. flow shows value at pilot pressure more than 1 MPa.

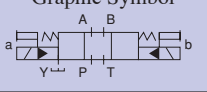
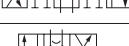
2. Max. flow in the table above represents the value in the flow condition of P → A → B → T (or P → B → A → T) as shown in the circuit diagram below.

In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.

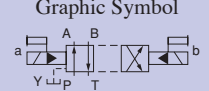
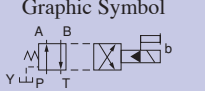


List of Standard Models (DSHG-03)

Three Positions

Spool Type		Spring Centered		
		Maximum Flow L/min		
		7 MPa	14 MPa	25 MPa
"2"		160	85	60
			160	95
"3"		160	160	160
"4"		160	85	60
			160	95
"40"		160	85	60
			160	95
"5"		160	85	60
			160	95
"60"		160	160	125
				160
"7"		160	85	60
			160	95
"9"		160	85	60
			160	95
"10"		160	85	60
			160	95
"11"		160	85	60
			160	95
"12"		160	85	60
			160	95

Two Positions

Spool Type	No-Spring				Spring Offset			
		Maximum Flow L/min				Maximum Flow L/min		
		7 MPa	14 MPa	25 MPa		7 MPa	14 MPa	25 MPa
	Model Numbers				Model Numbers			
“2” 	DSHG-03-2N2	160	160	85	DSHG-03-2B2	160	160	85
				160				160
“3” 	DSHG-03-2N3	160	160	85	DSHG-03-2B3	160	160	85
				160				160
“4” 	DSHG-03-2N4	160	160	85	DSHG-03-2B4	160	160	85
				160				160
“40” 	DSHG-03-2N40	160	160	85	DSHG-03-2B40	160	160	85
				160				160
“7” 	DSHG-03-2N7	160	160	85	DSHG-03-2B7	160	160	85
				160				160

Notes: 1. The relation between max. flow and pilot pressure in the table above is as shown below.

(Example)

Maximum flow rate is constant regardless of pilot pressure.
Pilot Pressure more than 0.7 MPa.

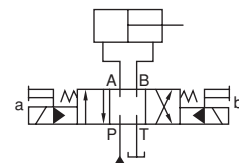
→160	85
	160

Pilot Pressure at 0.7 MPa

Pilot Pressure at 1 MPa

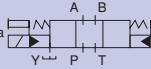
2. Max. flow in the table above represents the value in the flow condition of P → A → B → T (or P → B → A → T) as shown in the circuit diagram right.

In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.

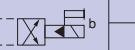
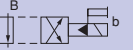


■ List of Standard Models (DSHG-04/S-DSHG-04)

● Three Positions

Spool Type	Spring Centered				
		Maximum Flow L/min			
		10 MPa	16 MPa	25 MPa	31.5 MPa
	Model Numbers				
“2” 	DSHG-04-3C2	300	300	200	145
	S-DSHG-04-3C2	300	250	120	110
“3” 	DSHG-04-3C3	300	300	300	300
“4” 	DSHG-04-3C4	300	300	250	165
	S-DSHG-04-3C4	300	300	140	110
“40” 	DSHG-04-3C40	300	300	200	145
	S-DSHG-04-3C40	300	250	120	110
“5” 	DSHG-04-3C5	255	250	245	235
“6” 	DSHG-04-3C6	300	260	245	235
“60” 	DSHG-04-3C60	300	300	300	300
	S-DSHG-04-3C60				
“7” 	DSHG-04-3C7	300	300	200	145
“9” 	DSHG-04-3C9	300	300	280	250
“10” 	DSHG-04-3C10	300	300	200	150
	S-DSHG-04-3C10	300	250	120	110
“11” 	DSHG-04-3C11	300	260	160	140
“12” 	DSHG-04-3C12	300	280	170	135
	S-DSHG-04-3C12	300	250	120	110

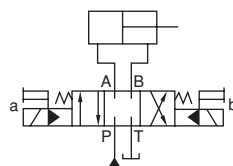
● Two Positions

Spool Type	No-Spring					Spring Offset				
	Graphic Symbol 	Maximum Flow L/min				Graphic Symbol 	Maximum Flow L/min			
		10 MPa	16 MPa	25 MPa	31.5 MPa		10 MPa	16 MPa	25 MPa	31.5 MPa
	Model Numbers					Model Numbers				
“2” 	(S-) DSHG-04-2N2	300	300	300	300	(S-) DSHG-04-2B2	300	300	300	300
“3” 	DSHG-04-2N3	300	300	300	300	DSHG-04-2B3	300	300	300	300
“4” 	(S-) DSHG-04-2N4	300	300	300	300	(S-) DSHG-04-2B4	300	300	300	300
“40” 	(S-) DSHG-04-2N40	300	300	300	300	(S-) DSHG-04-2B40	300	300	300	300
“7” 	DSHG-04-2N7	300	300	300	300	DSHG-04-2B7	300	300	300	300

Notes: 1. Max. flow described above shows value at pilot pressure more than 0.8 MPa.

2. Max. flow in the table above represents the value in the flow condition of $P \rightarrow A \rightarrow B \rightarrow T$ (or $P \rightarrow B \rightarrow A \rightarrow T$) as shown in the circuit diagram below.

In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.



List of Standard Models (DSHG-06/S-DSHG-06)

Three Positions

Spool Type	Spring Centered					Pressure Centered				
	Graphic Symbol	Maximum Flow L/min				Graphic Symbol	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2"	(S-) DSHG-06-3C2	500	500	410 500	310 410	(S-) DSHG-06-3H2	500	500	500	420 500
"3"	DSHG-06-3C3	500	500	460	370	DSHG-06-3H3	500	500	500	500
"4"	(S-) DSHG-06-3C4	500	500	410 500	310 500	(S-) DSHG-06-3H4	500	500	500	420 500
"40"	(S-) DSHG-06-3C40	500	500	410 500	310 500	(S-) DSHG-06-3H40	500	500	500	420 500
"5"	DSHG-06-3C5	500	500	425	350	DSHG-06-3H5	500	500	500	470 500
"6"	DSHG-06-3C6	475	390	300	230	DSHG-06-3H6	500	500	500	420 500
"60"	(S-) DSHG-06-3C60	475	420	340	280	(S-) DSHG-06-3H60	500	500	500	420 500
"7"	DSHG-06-3C7	500	500	450	360	DSHG-06-3H7	500	500	500	500
"9"	DSHG-06-3C9	500	500	450 500	360 500	DSHG-06-3H9	500	500	500	500
"10"	(S-) DSHG-06-3C10	500	500	410 500	310 500	(S-) DSHG-06-3H10	500	500	500	460 500
"11"	DSHG-06-3C11	500	500	410 500	310 500	DSHG-06-3H11	500	500	500	460 500
"12"	(S-) DSHG-06-3C12	500	500	410 500	310 500	(S-) DSHG-06-3H12	500	500	500	460 500

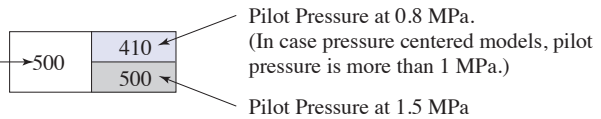
Two Positions

Spool Type	No-Spring					Spring Offset				
	Graphic Symbol	Maximum Flow L/min				Graphic Symbol	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2"	(S-) DSHG-06-2N2	500	500	500	500	(S-) DSHG-06-2B2	500	500	500	500
"3"	DSHG-06-2N3	500	500	500	500	DSHG-06-2B3	500	500	500	500
"4"	(S-) DSHG-06-2N4	500	500	500	500	(S-) DSHG-06-2B4	500	500	500	500
"40"	(S-) DSHG-06-2N40	500	500	500	500	(S-) DSHG-06-2B40	500	500	500	500
"7"	DSHG-06-2N7	500	500	500	500	DSHG-06-2B7	500	500	500	500

Notes: 1. The relation between max. flow and pilot pressure in the table above is as shown below.

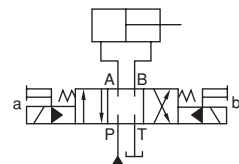
(Example)

Maximum flow rate is constant regardless of pilot pressure.
(Pilot Pressure more than 0.8 MPa. In case pressure centered models, pilot pressure is more than 1 MPa.)



2. Max. flow in the table above represents the value in the flow condition of P → A → B → T (or P → B → A → T) as shown in the circuit diagram right.

In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.



■ List of Standard Models (DSHG-10/S-DSHG-10)

● Three Positions

Spool Type	Spring Centered					Pressure Centered				
	Graphic Symbol	Maximum Flow L/min				Graphic Symbol	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2" 	(S-)DSHG-10-3C2	1100	1100	950 1100	750 1100	(S-)DSHG-10-3H2	1100	1100	1100	970 1100
"3" 	DSHG-10-3C3	1100	1100	1060	895	DSHG-10-3H3	1100	1100	1100	1050 1100
"4" 	(S-)DSHG-10-3C4	1100	1100	950 1100	750 1100	(S-)DSHG-10-3H4	1100	1100	1100	970 1100
"40" 	(S-)DSHG-10-3C40	1100	1100	950 1100	750 1100	(S-)DSHG-10-3H40	1100	1100	1100	970 1100
"5" 	DSHG-10-3C5	1100	1100	980	850	DSHG-10-3H5	1100	1100	1100	1000 1100
"6" 	DSHG-10-3C6	1050	880	700	570	DSHG-10-3H6	1100	1100	1100	970 1100
"60" 	(S-)DSHG-10-3C60	1050	940	785	680	(S-)DSHG-10-3H60	1100	1100	1100	970 1100
"7" 	DSHG-10-3C7	1100	1100	1040 1100	870 1100	DSHG-10-3H7	1100	1100	1100	1100
"9" 	DSHG-10-3C9	1100	1100	1040	870	DSHG-10-3H9	1100	1100	1100	1100
"10" 	(S-)DSHG-10-3C10	1100	1100	950 1100	750 1100	(S-)DSHG-10-3H10	1100	1100	1100	1060 1100
"11" 	DSHG-10-3C11	1100	1100	950 1100	750 1100	DSHG-10-3H11	1100	1100	1100	1060 1100
"12" 	(S-)DSHG-10-3C12	1100	1100	950 1100	750 1100	(S-)DSHG-10-3H12	1100	1100	1100	1060 1100

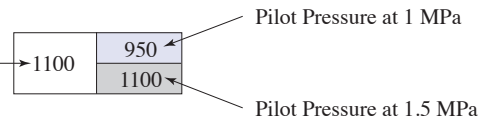
● Two Positions

Spool Type	No-Spring					Spring Offset				
	Graphic Symbol	Maximum Flow L/min				Graphic Symbol	Maximum Flow L/min			
	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa	Model Numbers	10 MPa	16 MPa	25 MPa	31.5 MPa
"2" 	(S-)DSHG-10-2N2	1100	1100	1100	1100	(S-)DSHG-10-2B2	1100	1100	1100	1100
"3" 	DSHG-10-2N3	1100	1100	1100	1100	DSHG-10-2B3	1100	1100	1100	1100
"4" 	(S-)DSHG-10-2N4	1100	1100	1100	1100	(S-)DSHG-10-2B4	1100	1100	1100	1100
"40" 	(S-)DSHG-10-2N40	1100	1100	1100	1100	(S-)DSHG-10-2B40	1100	1100	1100	1100
"7" 	DSHG-10-2N7	1100	1100	1100	1100	DSHG-10-2B7	1100	1100	1100	1100

Notes) 1. The relation between max. flow and pilot pressure in the table above is as shown below.

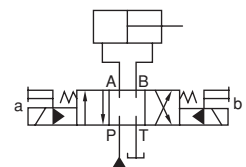
(Example)

Maximum flow rate is constant regardless of pilot pressure. Pilot Pressure more than 1 MPa.



2. Max. flow in the table above represents the value in the flow condition of P → A → B → T (or P → B → A → T) as shown in the circuit diagram right.

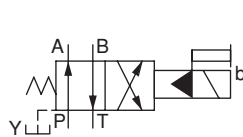
In case the valve is used in the condition that either A or B port is blocked, the maximum flow differs according to a hydraulic circuit, therefore, please consult us for details.



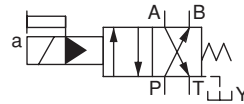
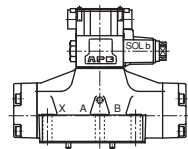
Reverse Mounting of Solenoid

In spring offset type, it is a standard configuration that the solenoid is mounted onto the valve in the SOL b position (side). However, in this particular spool-spring arrangement, the mounting of the solenoid onto the valve in the reverse position - SOL a side - is also available. The graphic symbol for this reverse mounting is as shown below.

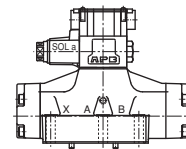
As for the valve type 2B * A and 2B * B, please refer to the explanation under the heading of "Valves Using Neutral Position and Side Position" given below.



Standard Mtg. of Solenoid



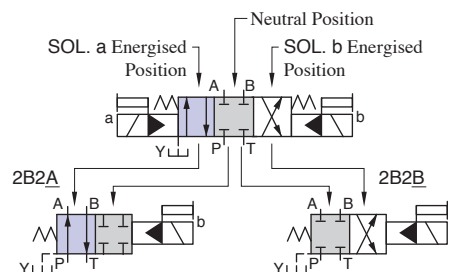
Reverse Mtg. of Solenoid



Valves Using Neutral Position and Side Position

Besides the use of the standard 2-position valves aforementioned in the "List of Standard Models", the 3-position valves also can be used as the 2-position valves using the two of their three positions. In this case, there are two kinds of the valve available. One is the valve using the neutral position and SOL a position (2B * A) and another is the valve using the neutral position and SOL b position (2B * B).

(Example) In case of Spool Type "2"



"A" : Use of Neutral and SOL. a Energised Position

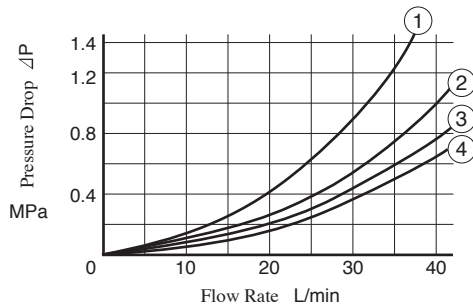
"B" : Use of Neutral and SOL. b Energised Position

Model Numbers	Graphic Symbols		Model Numbers	Graphic Symbols		Model Numbers	Graphic Symbols
	Standard Mtg. Type	Reverse Mtg. Type		Standard Mtg. Type	Reverse Mtg. Type		Standard Mtg. Type
04 DSHG-06-2B * A 10			04 DSHG-06-2B * B 10			04 DSHG-06-2N * A 10	
(S-) DSHG- * -2B2A			(S-) DSHG- * -2B2B			(S-) DSHG- * -2N2A	
DSHG- * -2B3A			DSHG- * -2B3B			DSHG- * -2N3A	
(S-) DSHG- * -2B4A			(S-) DSHG- * -2B4B			(S-) DSHG- * -2N4A	
(S-) DSHG- * -2B40A			(S-) DSHG- * -2B40B			(S-) DSHG- * -2N40A	
DSHG- * -2B5A			DSHG- * -2B5B			DSHG- * -2N5A	
DSHG- * -2B6A			DSHG- * -2B6B			DSHG- * -2N6A	
(S-) DSHG- * -2B60A			(S-) DSHG- * -2B60B			(S-) DSHG- * -2N60A	
DSHG- * -2B7A			DSHG- * -2B7B			DSHG- * -2N7A	
DSHG- * -2B9A			DSHG- * -2B9B			DSHG- * -2N9A	
(S-) DSHG- * -2B10A			(S-) DSHG- * -2B10B			(S-) DSHG- * -2N10A	
DSHG- * -2B11A			DSHG- * -2B11B			DSHG- * -2N11A	
(S-) DSHG- * -2B12A			(S-) DSHG- * -2B12B			(S-) DSHG- * -2N12A	

Pressure Drop

Pressure drop curves based on viscosity of 35 mm²/s and specific gravity of 0.850.

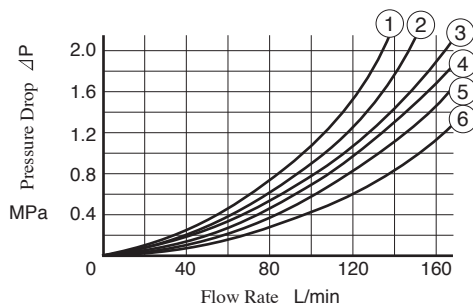
DSHG-01



DSHG-01

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	③	②	③	②	—	7	③	②	③	②	—
3	④	②	④	②	②	9	④	②	④	②	—
4	③	②	③	②	—	10	③	②	③	②	—
40	③	②	③	②	—	11	③	②	③	②	—
5	③	②	③	②	①	12	③	②	③	②	—
60	③	②	③	②	①						

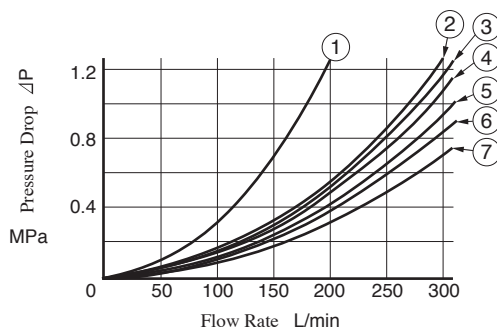
DSHG-03



DSHG-03

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	③	③	④	④	—	7	③	③	④	④	—
3	⑤	⑤	⑤	⑥	④	9	⑥	③	⑥	④	—
4	③	⑤	④	⑥	—	10	③	⑤	④	④	—
40	③	③	④	④	—	11	⑥	③	④	④	—
5	⑥	③	④	⑥	②	12	③	③	④	⑥	—
60	④	③	④	④	①						

DSHG-04、S-DSHG-04



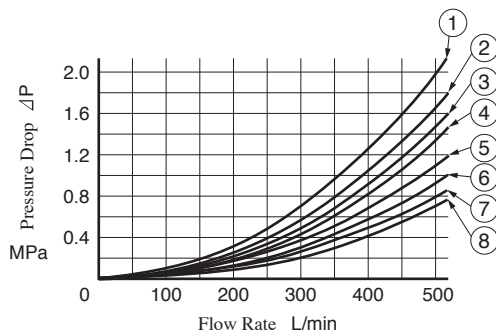
DSHG-04

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑤	④	⑤	⑥	—	60	⑦	⑤	⑦	⑦	②
3	⑤	③	⑤	⑤	⑦	7	⑤	④	⑤	⑥	—
4	⑤	③	⑤	⑤	—	9	⑤	④	⑤	⑥	—
40	⑤	④	⑤	⑥	—	10	⑤	②	⑤	⑥	—
5	⑦	④	⑤	⑤	⑤	11	⑥	④	⑤	⑥	—
6	⑤	③	⑤	⑥	①	12	⑤	④	⑤	⑤	—

S-DSHG-04

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	②	②	②	④	—	60	⑥	④	⑥	⑦	②
4	②	③	②	⑤	—	10	②	②	②	④	—
40	②	④	②	⑥	—	12	②	②	②	⑤	—

DSHG-06、S-DSHG-06



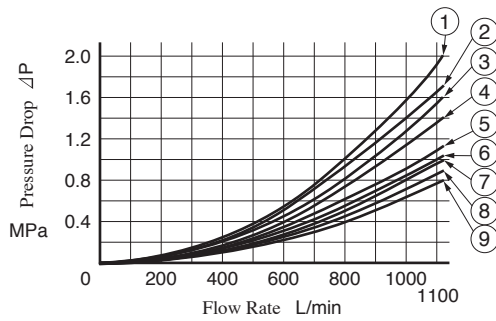
DSHG-06

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑧	⑤	⑧	⑦	—	60	⑥	⑤	⑥	⑦	①
3	⑥	④	⑥	⑦	④	7	⑥	④	⑥	⑦	—
4	⑧	⑤	⑧	⑦	—	9	⑥	⑤	⑥	⑦	—
40	⑧	⑤	⑧	⑦	—	10	⑧	⑤	⑧	⑦	—
5	⑧	④	⑤	⑦	①	11	⑧	④	⑤	⑦	—
6	⑤	③	⑤	④	①	12	⑧	⑤	⑧	⑦	—

S-DSHG-06

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑥	①	⑥	②	—	60	⑥	②	⑥	③	①
4	⑥	②	⑥	②	—	10	⑧	⑤	⑧	⑦	—
40	⑧	⑤	⑧	⑦	—	12	⑧	⑤	⑧	⑦	—

DSHG-10、S-DSHG-10



DSHG-10

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑨	⑥	⑨	⑧	—	60	⑧	⑤	⑧	⑤	③
3	⑦	⑥	⑦	⑦	⑤	7	⑦	⑥	⑦	⑦	—
4	⑨	⑥	⑨	⑥	—	9	⑦	⑥	⑦	⑧	—
40	⑨	⑥	⑨	⑧	—	10	⑨	⑤	⑨	⑧	—
5	⑨	⑥	⑧	⑥	①	11	⑨	⑥	⑧	⑦	—
6	⑤	③	⑤	④	②	12	⑨	⑦	⑨	⑥	—

S-DSHG-10

Spool Type	Pressure Drop Curve Number					Spool Type	Pressure Drop Curve Number				
	P→A	B→T	P→B	A→T	P→T		P→A	B→T	P→B	A→T	P→T
2	⑧	③	⑧	④	—	60	⑧	④	⑧	④	②
4	⑧	⑤	⑧	⑥	—	10	⑨	⑤	⑨	⑧	—
40	⑨	⑥	⑨	⑧	—	12	⑨	⑦	⑨	⑥	—

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

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

● For any other specific gravity (G'), the pressure drop ($\Delta P'$) may be obtained from the formula below.
 $\Delta P' = \Delta P(G'/0.850)$

Typical Changeover Time

Changeover time varies according to oil viscosity, spool type and hydraulic circuit.

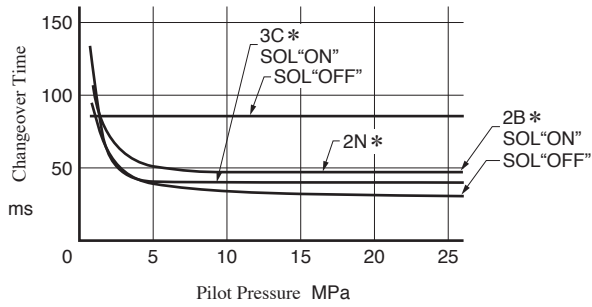
Test Conditions

Coil Type : D * (Models with DC solenoids)

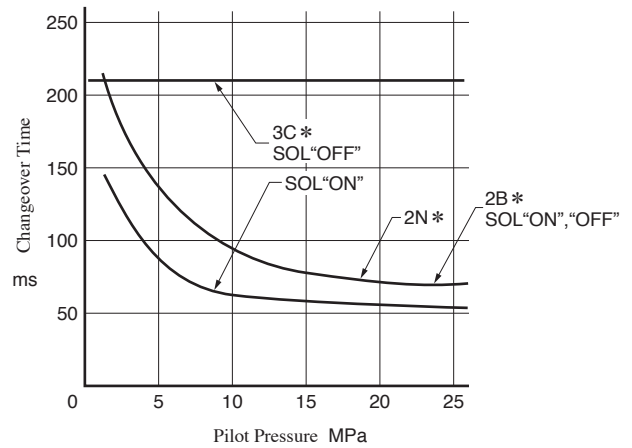
Voltage : Rated Voltage

Oil Viscosity : 35 mm²/s

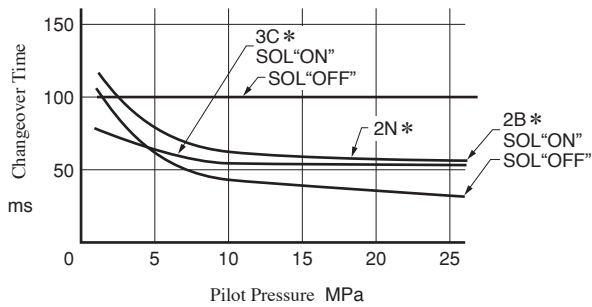
DSHG-04



DSHG-10



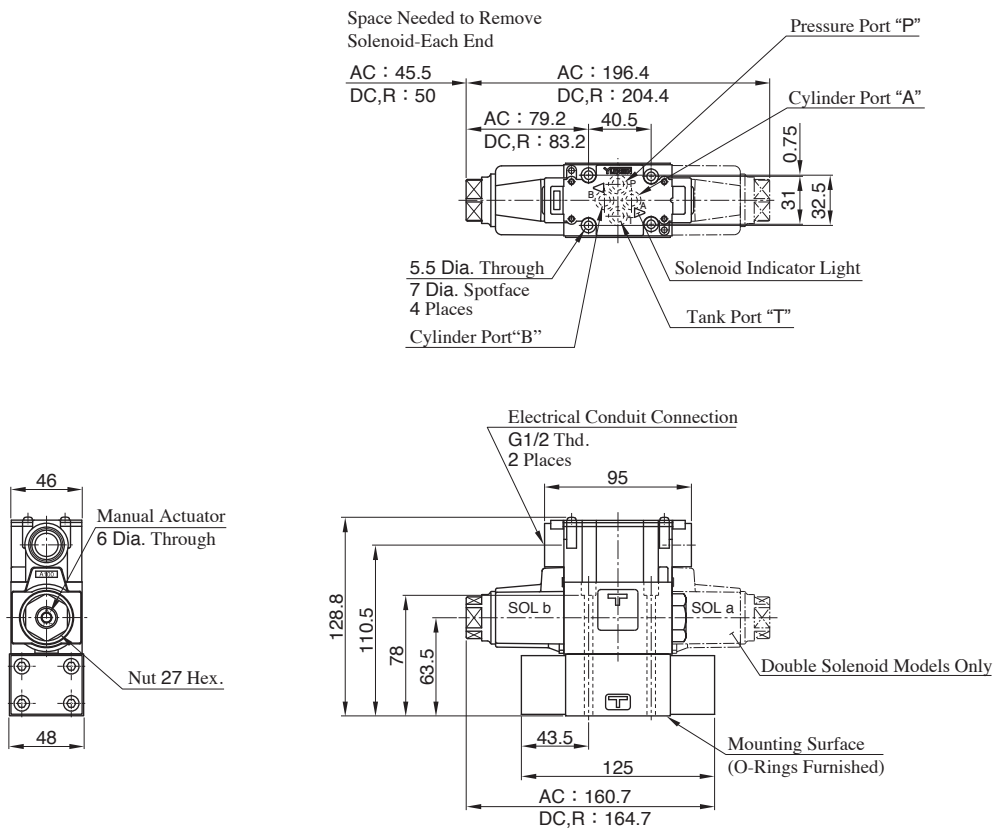
DSHG-06



DSHG-01

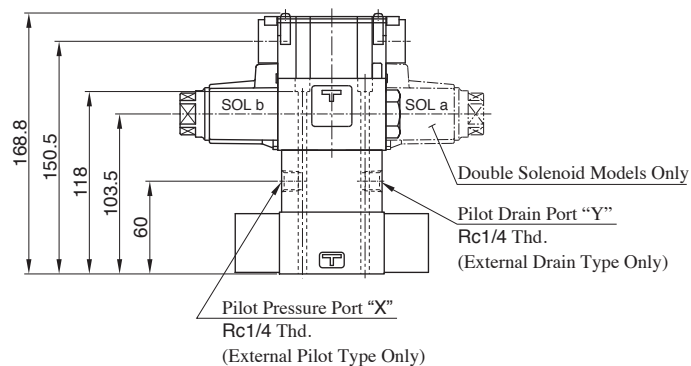
Mounting Surface: ISO 4401-03-02-0-05

● Internal Pilot - Internal Drain



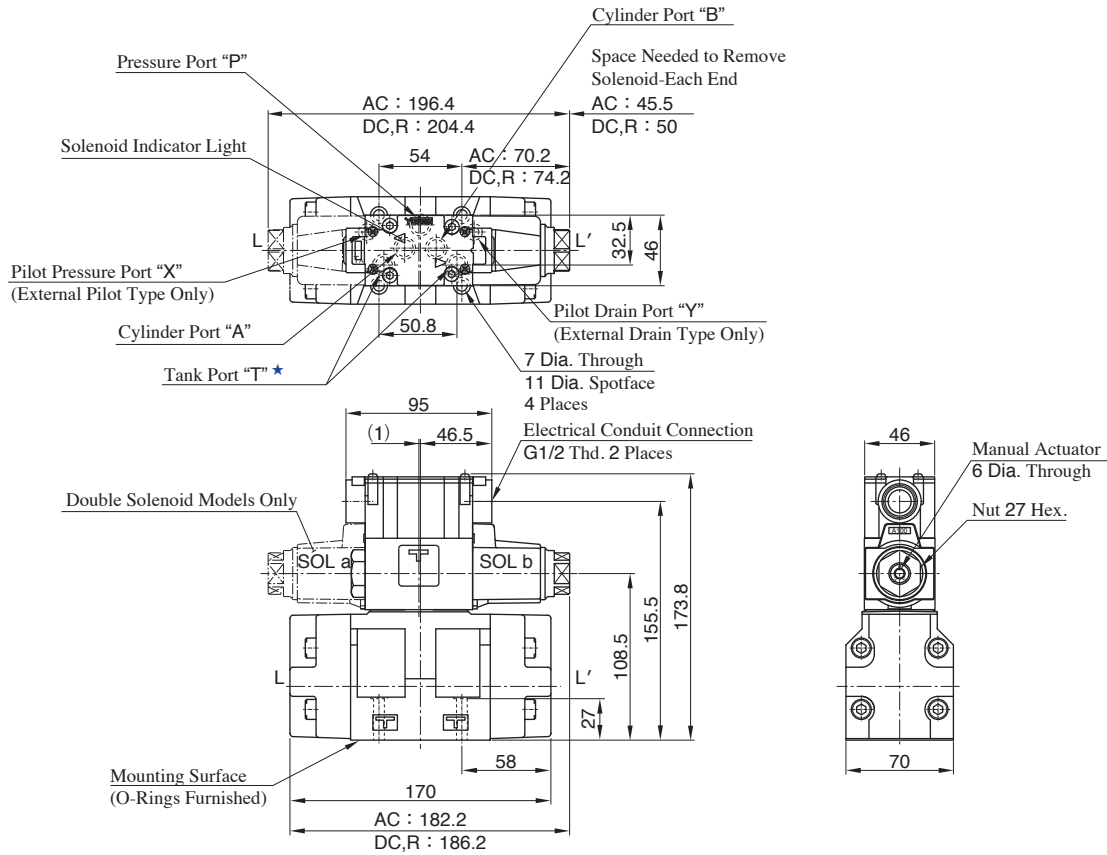
Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.

- External Pilot - External Drain
- External Pilot - Internal Drain
- Internal Pilot - External Drain



● For other dimensions, refer to "Internal Pilot / Internal Drain Type".

DSHG-03

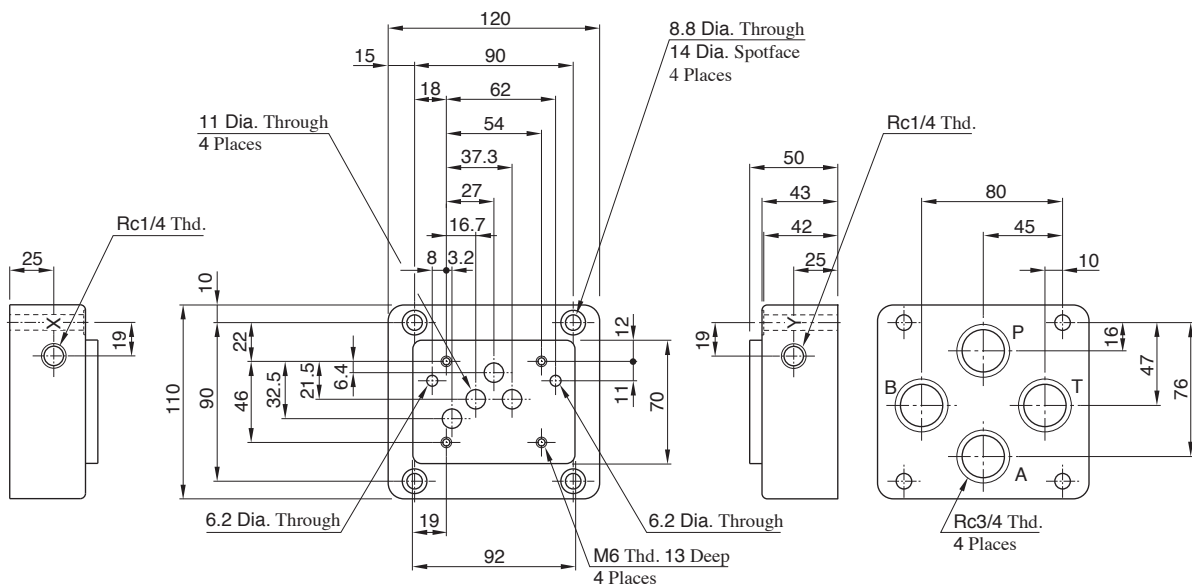


★Of the two of tank port "T", the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.

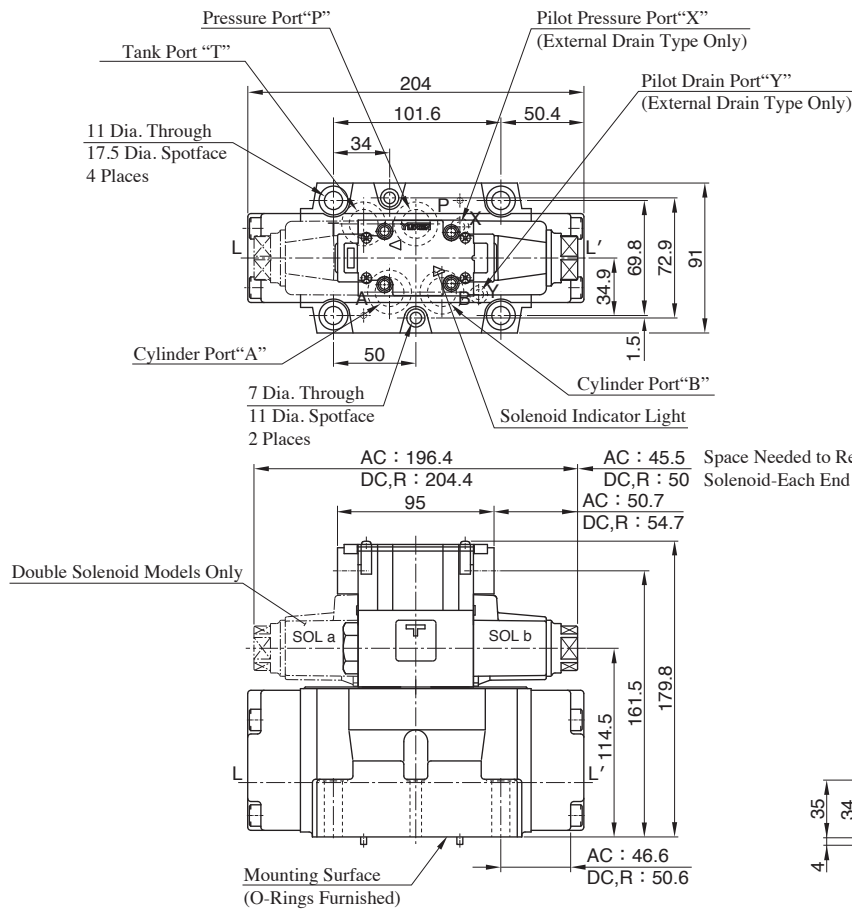
Sub-plate

DHGM-03Y

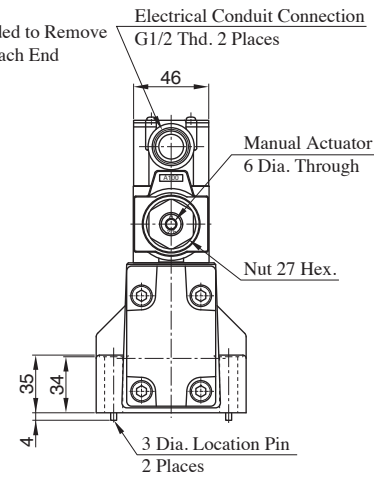


(S-) DSHG-04

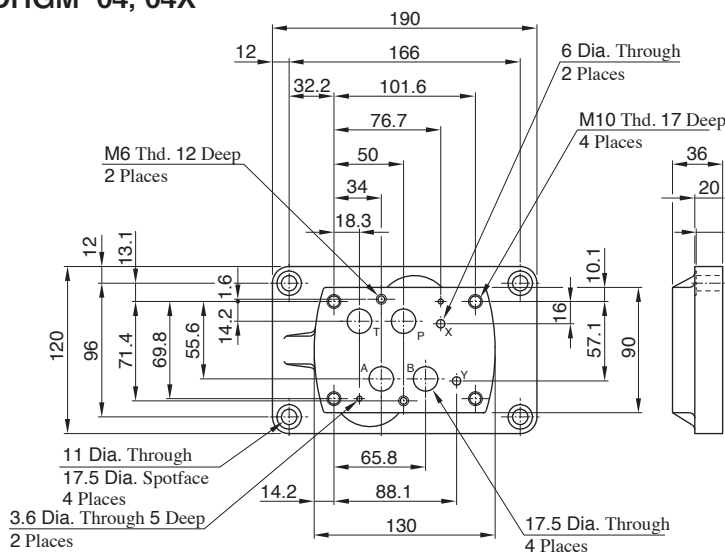
Mounting Surface: ISO 4401-07-07-0-05



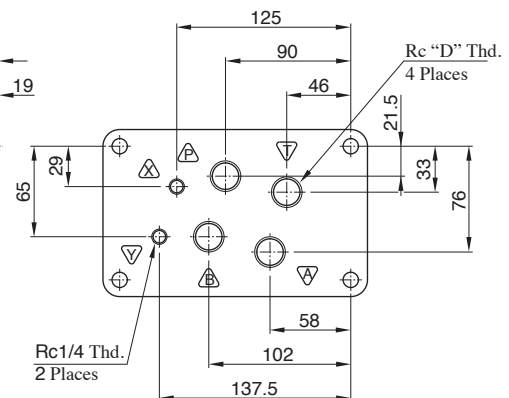
Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.



Sub-plate DHGM-04, 04X



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

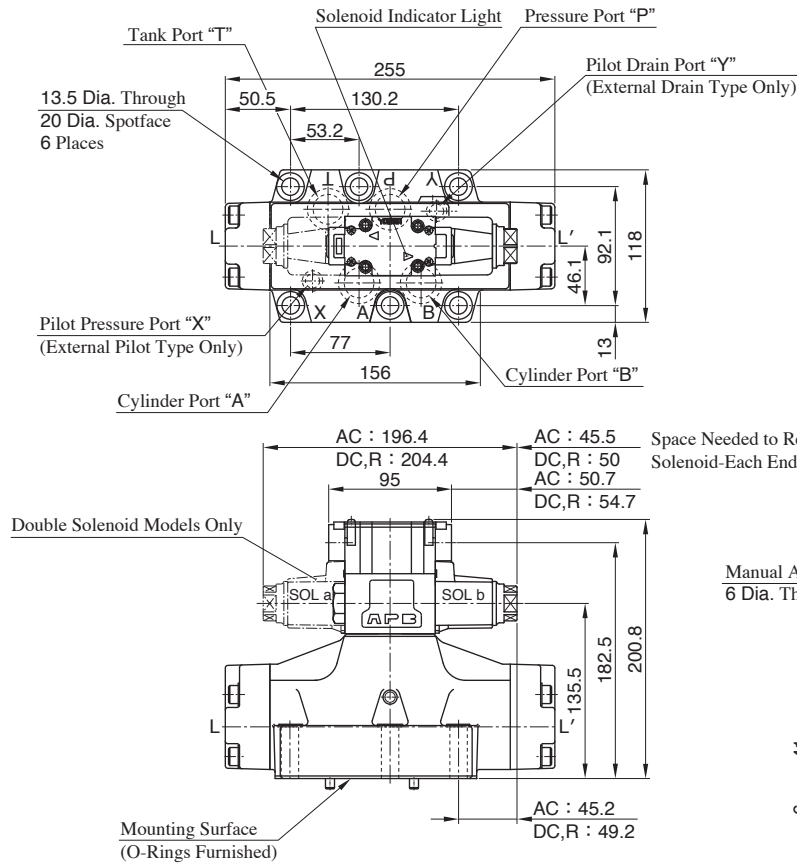


Note) Use Type of Port "X" and "Y"

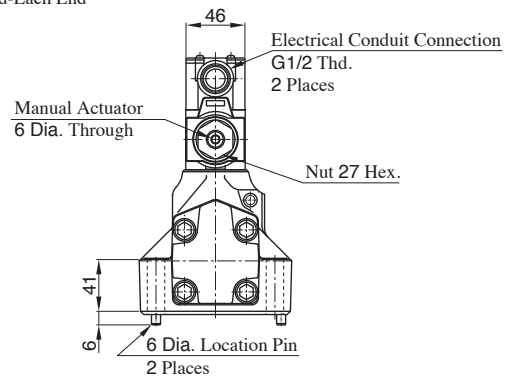
Pilot Pressure Port "X"	Drain Port "Y"
Used only on external pilot type valves. To be plugged on internal pilot type valves.	Used as drain port only on external drain type valves. To be plugged on internal drain type valves.

(S-) DSHG-06

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

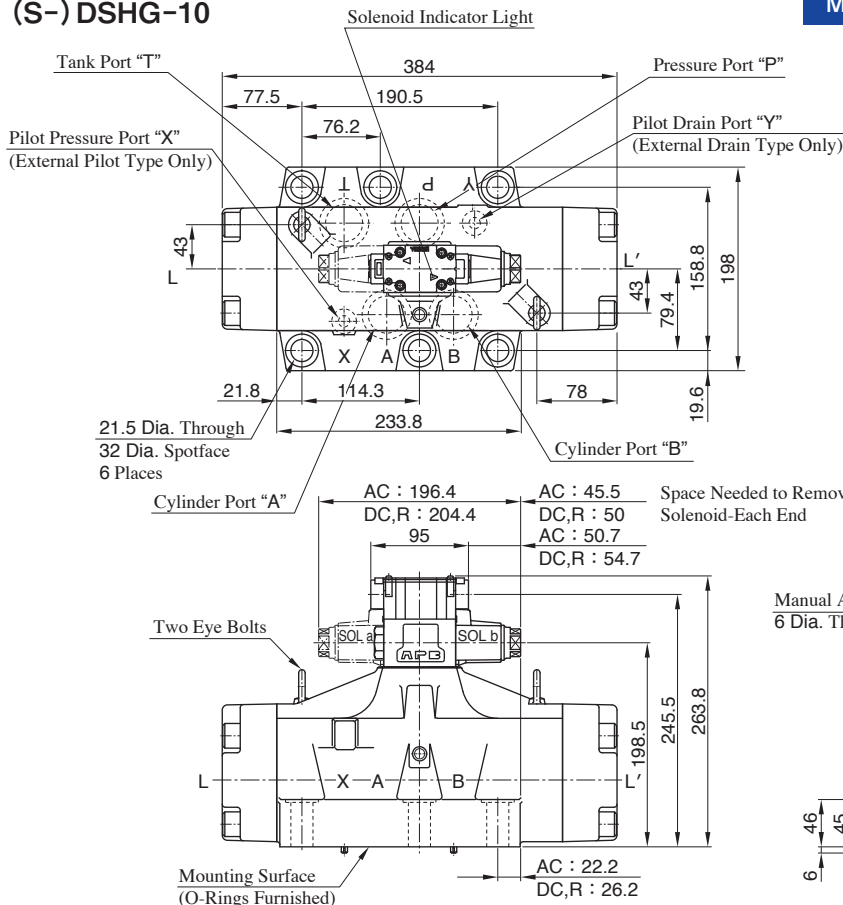


Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.

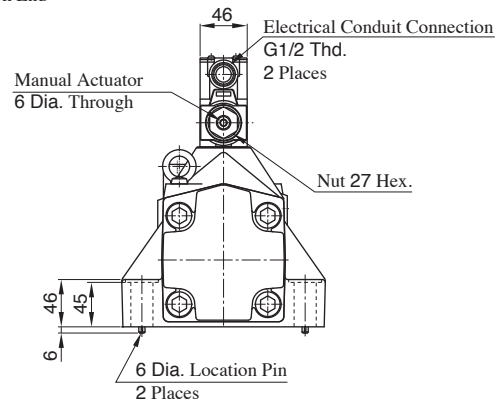


(S-) DSHG-10

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

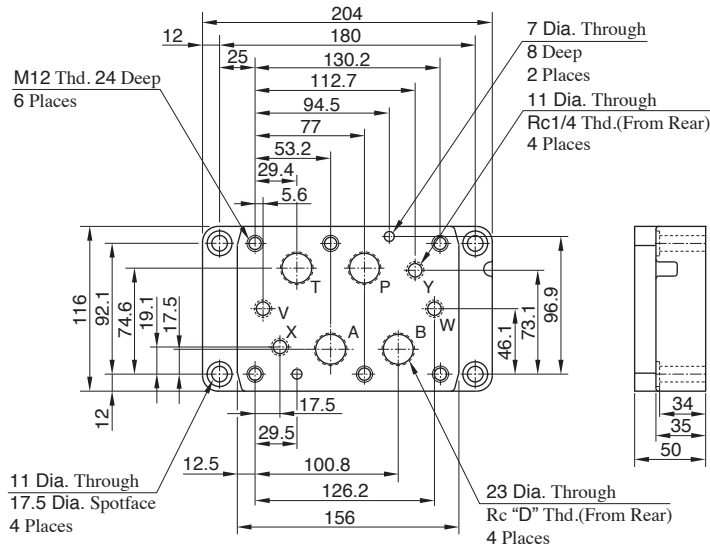


Note) Valves that position of cable departure can change plug-in connector type are also available.
For details, refer to DSG-01 valve on page E-32.



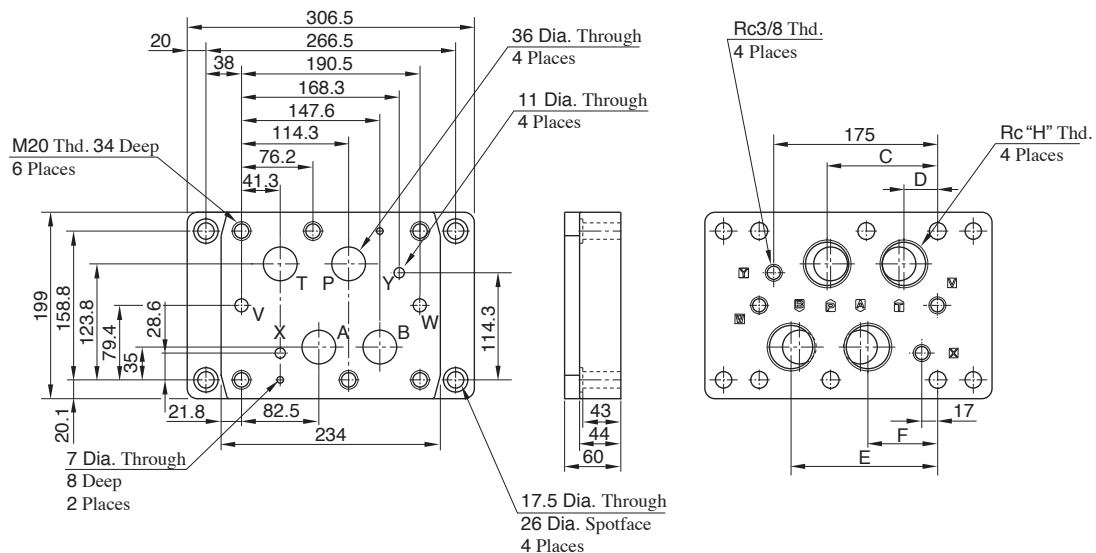
Sub-plate

DHGM-06, 06X



Sub-plate Model Numbers	"D"
DHGM-06	$\frac{3}{4}$
DHGM-06X	1

DHGM-10, 10X



Sub-plate Model Numbers	C	D	E	F	H
DHGM-10	114	41	147.5	82.5	$1\frac{1}{4}$
DHGM-10X	118	36	156.5	74.5	$1\frac{1}{2}$

Note) Use Type of Port "X", "Y", "V" and "W"

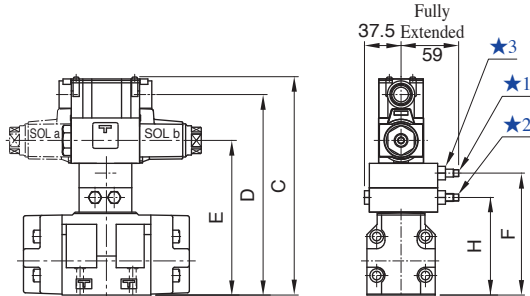
Valve Types	Pilot Pres. Port "X"	Pilot Drain Port "Y"	Drain Port "V"	Drain Port "W"
Spring Centered, No-Spring, Spring Offset	Used only on external pilot type valves.	Used as drain port only on external drain type valves.	Not used (plug is not required)	
Pressure Centered			Used	Not used (plug is not required)
With Pilot Piston, Both Ends	To be plugged on internal pilot type valves.	To be plugged on* internal drain type valves.	Used	Used
With Pilot Piston, Port "A" End			Used	Not used (plug is required)
With Pilot Piston, Port "B" End			Not used (plug is required)	Used

* As the thread is provided on the body, plug either port on the sub-plate or port on the body.

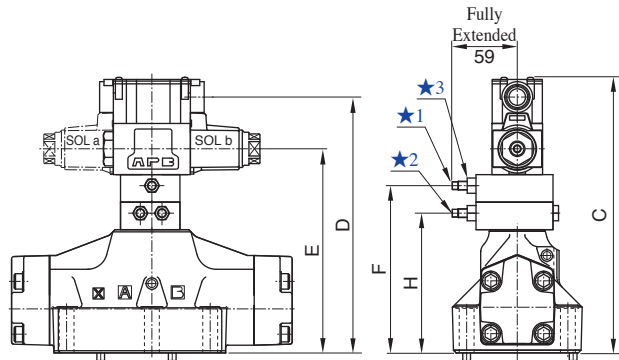
Options

Models with Pilot Choke Valve

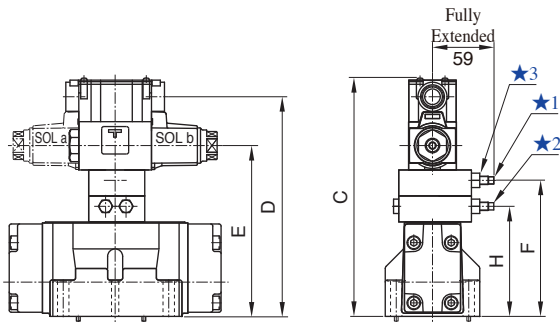
DSHG-03-***-C1, C2, C1C2



(S-) DSHG-06-10-***-C1, C2, C1C2



(S-) DSHG-04-***-C1, C2, C1C2



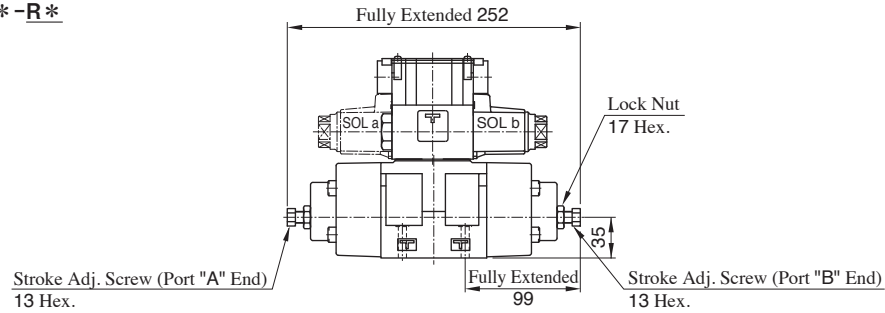
- ★ 1. "C1" Choke (Meter-in) Adj. Screw 6 Hex.
- ★ 2. "C2" Choke (Meter-out) Adj. Screw 6 Hex.
- ★ 3. Lock Nut 12 Hex.

Model Numbers	C	D	E	F	H
DSHG-03-***-C1	198.8	180.5	133.5	100	—
DSHG-03-***-C2				—	100
DSHG-03-***-C1C2	223.8	205.5	158.5	125	100
(S-) DSHG-04-***-C1	204.8	186.5	139.5	106	—
(S-) DSHG-04-***-C2				—	106
(S-) DSHG-04-***-C1C2	229.8	211.5	164.5	131	106
(S-) DSHG-06-***-C1	225.8	207.5	160.5	127	—
(S-) DSHG-06-***-C2				—	127
(S-) DSHG-06-***-C1C2	250.8	232.5	185.5	152	127
(S-) DSHG-10-***-C1	288.8	270.5	223.5	190	—
(S-) DSHG-10-***-C2				—	190
(S-) DSHG-10-***-C1C2	313.8	295.5	248.5	215	190

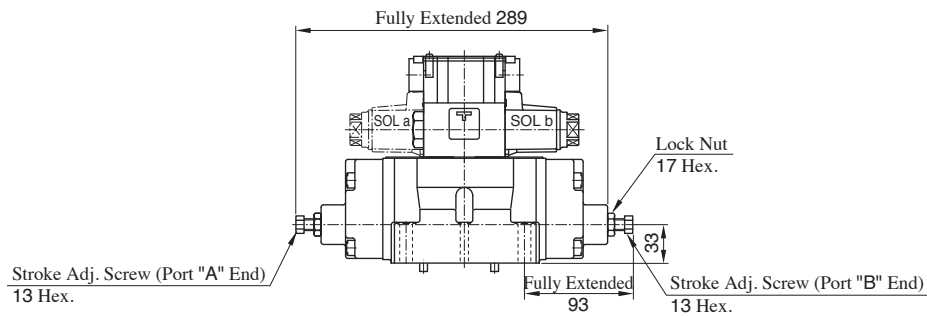
Options

Models with Stroke Adjustment

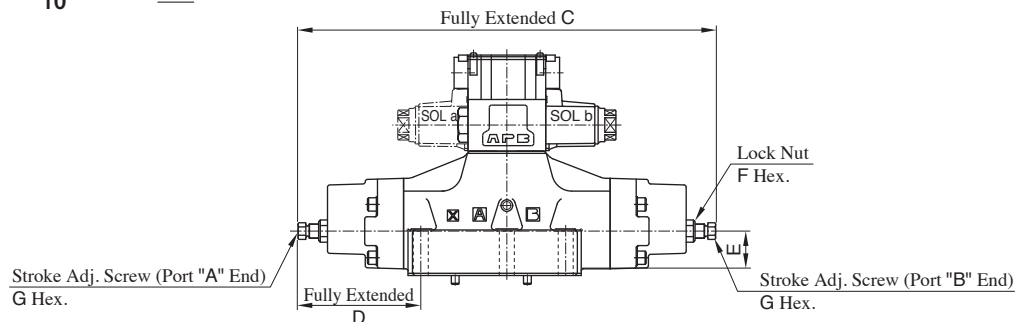
DSHG-03-***-R*



(S-) DSHG-04-***-R*



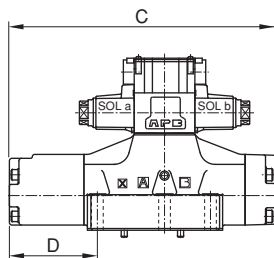
(S-) DSHG-06/10-***-R*



Model Numbers	C	D	E	F	G
(S-) DSHG-06-***-R2	376	111	40	19	13
(S-) DSHG-10-***-R2	558	164.5	65	24	17

Pressure Centered Models

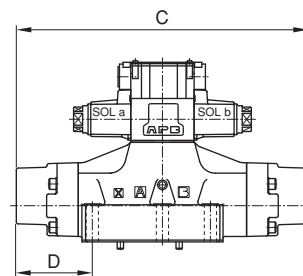
(S-) DSHG-06/10-3H*



Model Numbers	C	D
(S-) DSHG-06-3H*	306.5	102
(S-) DSHG-10-3H*	456	149.5

Models with Pilot Piston

(S-) DSHG-06/10-***-P*

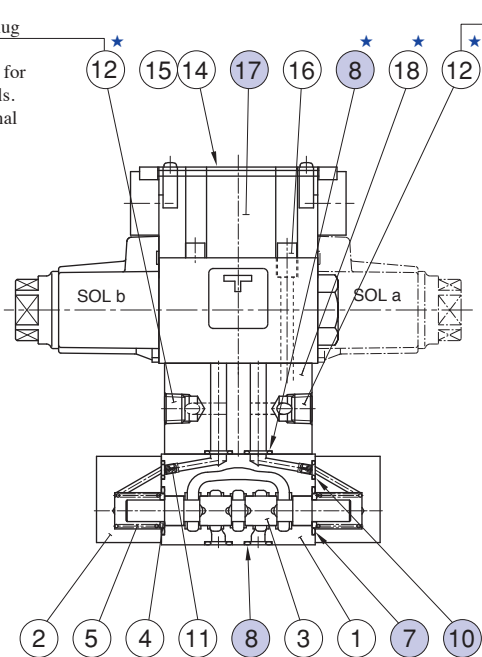


Model Numbers	C	D
(S-) DSHG-06-***-P2	323	84
(S-) DSHG-10-***-P2	479	125

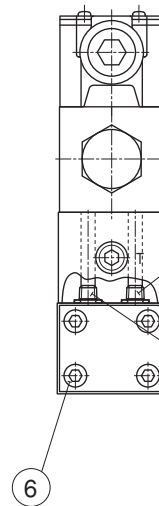
List of Seals and Pilot Valves

DSHG-01

Socket Head Cap Plug
R1/4 Thd.
This plug used only for
Internal Pilot Models.
Removed for External
Pilot Models



Socket Head Cap Plug
R1/4 Thd.
This plug used only for Internal Drain Models.
Removed for External Drain Models



Socket Head Cap Plug (NPT 1/16) Thd.
This plug used only for External Pilot Models.
Removed for Internal Pilot Models

Socket Head Cap Plug (NPT 1/16) Thd.
This plug used only for External Drain Models.
Removed for Internal Drain Models

Note: Piece parts marked ★ are not available for internal pilot-internal drain type.

● List of Seals

Item	Name	Part Numbers	Qty.
7	O-Ring	JASO 1018 1A	2
8		OR NBR-90 P9-N	8 (4) ★ ¹
10		OR NBR-90 P5-N	2

★1. Quantities in the () are applicable to internal pilot-internal drain.

● List of Item ⑰ Pilot Valves

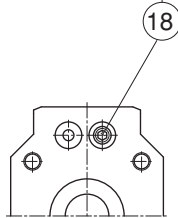
Solenoid Controlled Pilot Operated Directional Valve Model Numbers	⑰ Pilot Valve Model Numbers
DSHG-01-3C * -★-14	DSG-01-3C4-★-70
DSHG-01-2B * -★-14	DSG-01-2B2-★-70-L

Note) Fill coil type (a symbol representing current/voltage) in section marked ★.
For the details of the pilot valves, refer to page E-34 for DSG-01 series.

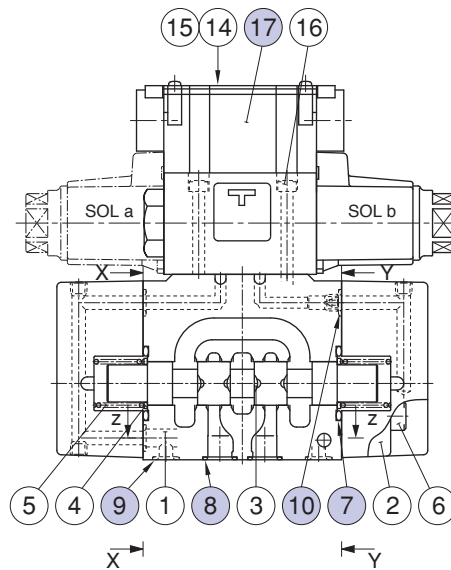
List of Seals and Pilot Valves

DSHG-03

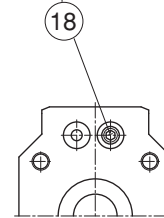
Throttle Taper Thread Plug
Used only for 2B * and 2N *
Removed for 3C *



Section X-X

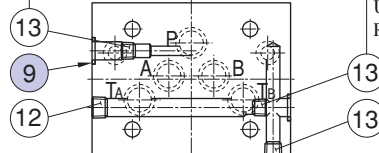


Throttle Taper Thread Plug
Used only for 2B * and 2N *
Removed for 3C *



Section Y-Y

Socket Head Cap Plug (NPT 1/16) Thd.
Used only for External Pilot Models
Removed for Internal Pilot Models



Section Z-Z

Socket Head Cap Plug (NPT 1/16) Thd.
Used only for External Drain Models
Removed for Internal Drain Models

List of Seals

Item	Name	Part Numbers	Qty.
7	O-Ring	OR NBR-90 P28-N	2
8		AS568-014 (NBR-90)	5
9		OR NBR-90 P9-N	2
10		OR NBR-90 P9-N	6

List of Item 17 Pilot Valves

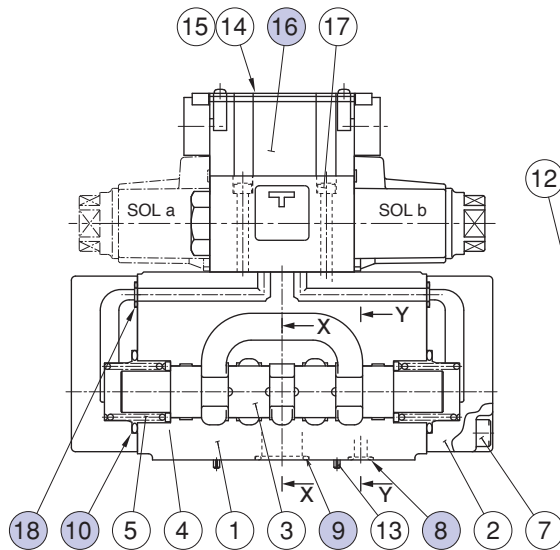
Solenoid Controlled Pilot Operated Directional Valve Model Numbers	17 Pilot Valve Model Numbers
DSHG-03-3C * -★-14	DSG-01-3C4-★-70
DSHG-03-2B * -★-14	DSG-01-2B2-★-70
DSHG-03-2N * -★-14	DSG-01-2D2-★-70

Note) Fill coil type (a symbol representing current/voltage) in section marked ★.

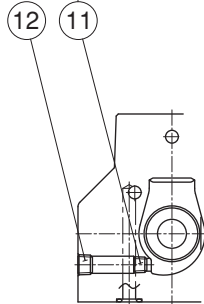
For the details of the pilot valves, refer to page E-34 for DSG-01 series.

List of Seals and Pilot Valves

(S-) DSHG-04

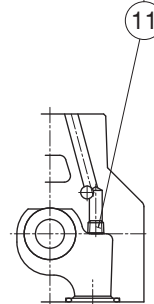


Socket Head Cap Plug
(NPT 1/16) Thd.
This plug used only for
External Drain Models.
Removed for Internal
Drain Models



Section Y-Y

Socket Head Cap Plug
(NPT 1/16) Thd.
This plug used only for
External Pilot Models.
Removed for Internal
Pilot Models



Section X-X

List of Seals

Item	Name	Part Numbers	Qty.
8	O-Ring	OR NBR-90 P9-N	2
9		OR NBR-90 P22-N	4
10		OR NBR-90 P34-N	2
18		OR NBR-90 P9-N	2

List of Item 16 Pilot Valves

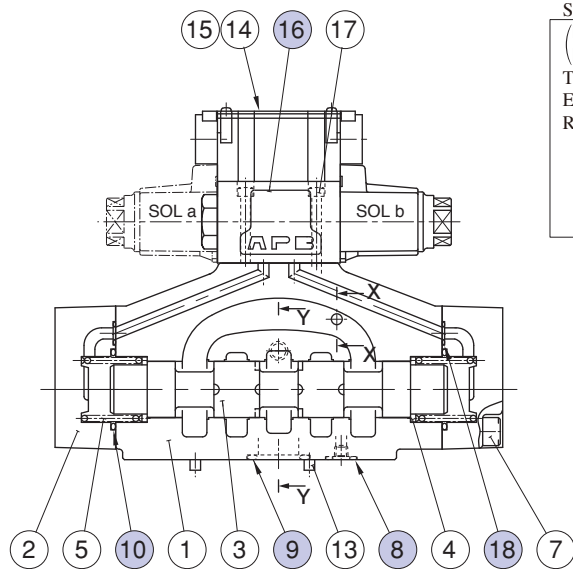
Solenoid Controlled Pilot Operated Directional Valve Model Numbers	16 Pilot Valve Model Numbers
(S-) DSHG-04-3C *-★-52	DSG-01-3C4-★-70
(S-) DSHG-04-2N *-★-52	DSG-01-2D2-★-70
(S-) DSHG-04-2B *-★-52	DSG-01-2B2-★-70

Note) Fill coil type (a symbol representing current/voltage) in
section marked ★.

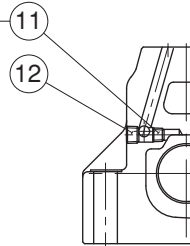
For the details of the pilot valves, refer to page E-34 for
DSG-01 series.

List of Seals and Pilot Valves

(S-) DSHG-06, 10

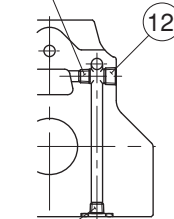


Socket Head Cap Plug
(DSHG-06(NPT 1/16) Thd.)
(DSHG-10(R 1/8) Thd.)
This plug used only for
External Pilot Models.
Removed for Internal Pilot Models



Section Y-Y

Socket Head Cap Plug
(DSHG-06(NPT 1/16) Thd.)
(DSHG-10(R 1/8) Thd.)
This plug used only for
External Drain Models.
Removed for Internal Drain Models



Section X-X

Socket Head Cap Plug
(DSHG-06(NPT 1/16) Thd.)
(DSHG-10(R 1/8) Thd.)
This plug used only for
Internal Drain Models.
Removed for External Drain Models

List of Seals

Item	Name	Part Numbers		Qty.
		(S-) DSHG-06	(S-) DSHG-10	
8	O-Ring	OR NBR-90 P14-N	OR NBR-90 P20-N	2
9		OR NBR-90 P30-N	OR NBR-90 P42-N	4
10		OR NBR-90 P40-N	OR NBR-90 G65-N	2
18		OR NBR-90 P10-N	OR NBR-90 P14-N	2

List of Item 16 Pilot Valves

Solenoid Controlled Pilot Operated Directional Valve Model Numbers	16 Pilot Valve Model Numbers
(S-) DSHG-06-3C * -★-53	DSG-01-3C4-★-70
(S-) DSHG-10-3C * -★-43	
(S-) DSHG-06-2N * -★-53	DSG-01-2D2-★-70
(S-) DSHG-10-2N * -★-43	
(S-) DSHG-06-2B * -★-53	DSG-01-2B2-★-70-L
(S-) DSHG-10-2B * -★-43	
(S-) DSHG-06-3H * -★-53	DSG-01-3C9-★-70
(S-) DSHG-10-3H * -★-43	

Note) Fill coil type (a symbol representing current/voltage) in
section marked ★.

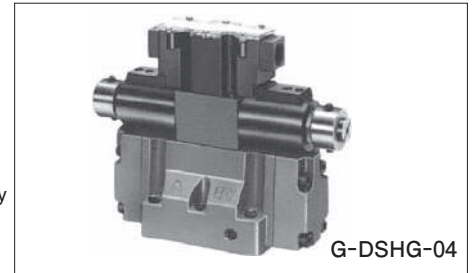
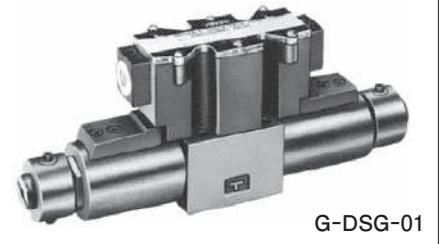
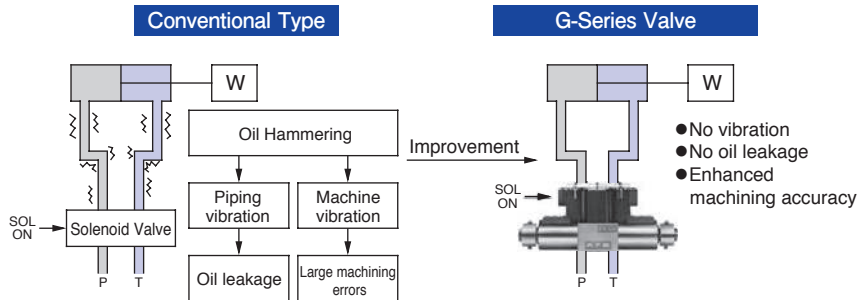
For the details of the pilot valves, refer to page E-34 for
DSG-01 series.

"G" Series Shockless Type Solenoid Operated / Solenoid Controlled Pilot Operated Directional Valves

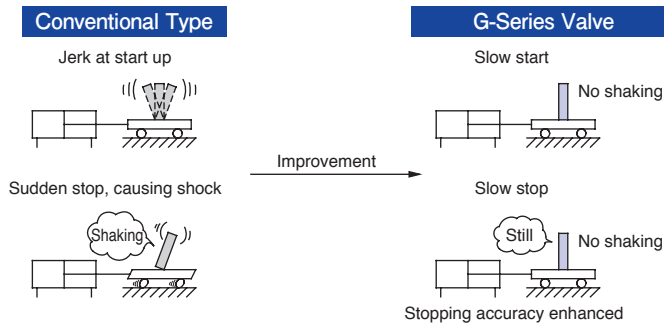
Patent Number
1775681

The shifting time of conventional Solenoid Operated, Shockless, and Directional Valves is constant and cannot be adjusted.
The G-Series Solenoid Operated Directional Valves incorporate electronic circuits enable adjustment of the spool shifting time, it can be set at an optimal level to minimise shocks to the machine.

1 Reduces oil hammering during spool changeover.



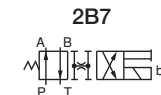
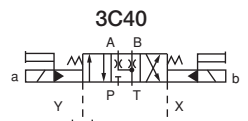
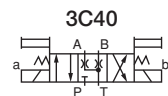
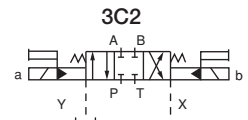
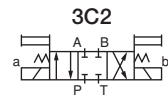
2 Reduces shock caused by acceleration and deceleration



Graphic Symbols

● G-DSG-01/03

● G-DSHG-04/06



Specifications

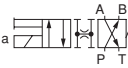
Model Numbers	Max. Flow L/min	Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Pilot Pressure MPa		Pilot Flow L/min		Shifting Time Range s		Mass kg	
				Max.	Min.	at Normal	at Transition	for ON	for OFF	3C *	2B7
G-DSG-01-***-51	10 20 30 40	25	16	—	—	—	—	0.1 - 1		3	2.1
G-DSG-03-***-51	40 60 80	25	16	—	—	—	—	0.3 - 1		7.5	5.3
G-DSHG-04-3C***-50	160	25	16	16	1.5	1	4	0.06 - 1.5	0.1 - 2	12	—
G-DSHG-06-3C***-50	250					1	6	0.1 - 1	0.2 - 2	15	—

Electrical Specifications

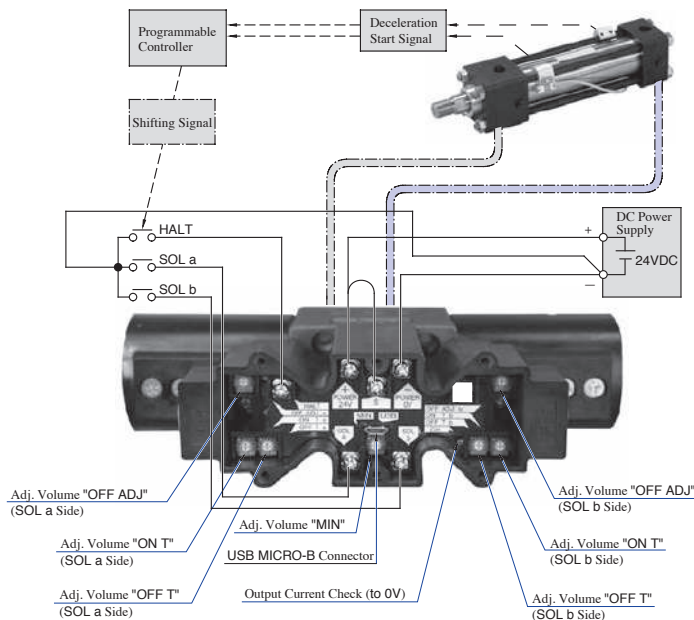
Model Numbers	Electric Power Supply		Shifting Signal, low speed operation halt signal (HALT)		
	Voltage	Input Power	Voltage	Current	Input Interface
G-DSG-01-***-51	24 V DC (21 - 28 V DC Included Ripple) Use a stable power supply	36 W	5 - 48 V DC (Can be used in common with electric power supply) Use a stable power supply	Constant at 10 mA (A constant current circuit is used)	Sink Type, Source Type
G-DSG-03-***-51					
G-DSHG-04-3C***-50					
G-DSHG-06-3C***-50					

— For details of "G" Series Shockless Type Solenoid Operated / Solenoid Controlled Pilot Operated Directional Valves, please contact us. —

Model Number Designation

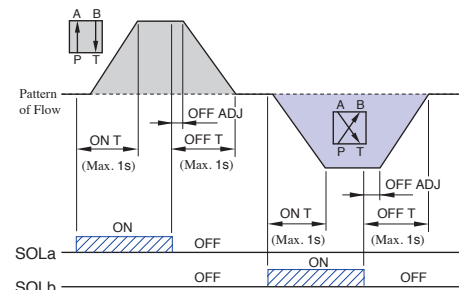
G-DSG	-01	-10	-2B7	—	—	-S	-51	-L
G-DSHG	-04	—	-3C2	-E	-R2	-S	-50	—
Series Number	Valve Size	Metered Flow Capacity	Spool Type (Refer to Graphic symbols)	Pilot Connection	Input only for options below	Input Interface	Design Number	Models with reverse mtg. of solenoid
G-DSG : “G ” Series Shockless Type Solenoid Operated Directional Valves (Sub-plate Mounting Type)	01	None : 40L/min 10 : 10L/min 20 : 20L/min	3C2 3C40	—	—	None : Sink Type (Standard) S : Source Type	51	L : Input only for reverse mtg. of solenoid. (Only for 2B7) 
		None : 30L/min 10 : 10L/min 20 : 20L/min	2B7				51	
	03	None : 80L/min 40 : 40L/min 60 : 60L/min	3C2 3C40				51	
		None : 60L/min 40 : 40L/min	2B7				51	
G-DSHG : “G ” Series Shockless Type Solenoid Controlled Pilot Operated Directional Valves (Sub-plate Mounting Type)	04	—	3C2 3C40	None : Internal Pilot	R2 : With Stroke Adjustment, Both Ends RA : With Stroke Adjustment, Port "A" End RB : With Stroke Adjustment, Port "B" End		50	—
	06			E : External Pilot			50	

System Diagram (Example of sink type wiring)

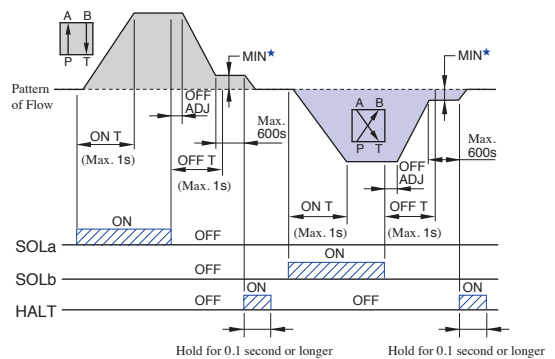


Relationships between SOL signals and flow patterns

Without HALT functions



With HALT functions



★ The minimum adjustment volume is common for SOL a and b, and it is not possible to set a different volume for each SOL a and b individually.
If the HALT functions are not used, set the minimum adjustment volume to zero.

Interchangeability between Current and New Product

“G ” Series Shockless Type Solenoid Operated Directional Valves have changed models from 50 design to 51 design by installation of new amplifier.

Current Model Numbers	New Model Numbers
G-DSG-01- * - * - * - * -50	G-DSG-01- * - * - * - * -51
G-DSG-03- * - * - * - * -50	G-DSG-03- * - * - * - * -51

Major Changes

Use newly developed Digital Control Amplifier.

Interchangeability

Adjusting trimmer is inherited from the current model. Same as on the current model, trimmer adjustment allows to modify the time of spool switching in accordance with the machine.

New Functions

USB MICRO-B connector has been added and adjustment on PC using specialized software made available.

Making minute adjustments and readjusting has become easier compared to current model. Copying of set adjustment value made available. There is a maintenance function that allows to check working conditions of the valve such as solenoid current value and operating time on PC.

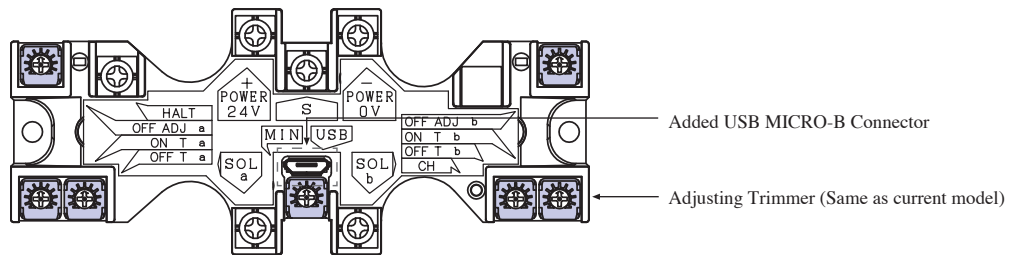
Interchangeability in Installation

Yes

Comparison between Current and New

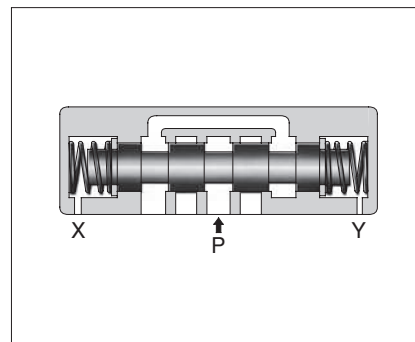
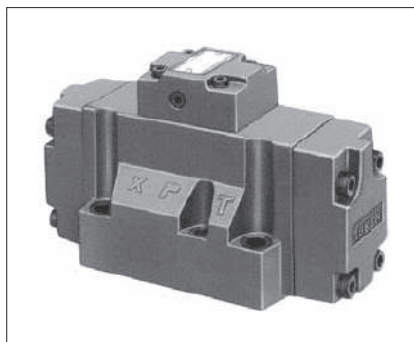
No changes in specifications, characteristics, dimensions, installations, connecting terminal and trimmer arrangement.

USB MICRO-B connector has been added to the on-board amplifier.



Pilot Operated Directional Valves

These valves perform a change over of spool by hydraulic pilot and shift the direction of oil flow.



Specifications

Model Numbers		Max. Flow★ L/min	Max. Operating Pressure MPa	Max. Pilot Pressure MPa	Min. Required Pilot Pressure MPa
Spring Centered	DHG-04-3C * -50	300	31.5	25	0.8
No-Spring	DHG-04-2N * -50	300			
Spring Offset	DHG-04-2B * -50	130			
Spring Centered	DHG-06-3C * -50	500	31.5	25	0.8
No-Spring	DHG-06-2N * -50	500			
Spring Offset	DHG-06-2B * -50	140			
Pressure Centered	DHG-06-3H * -50	500		21	1.0
Spring Centered	DHG-10-3C * -40	1100	31.5	25	1.0
No-Spring	DHG-10-2N * -40	1100			
Spring Offset	DHG-10-2B * -40	460			
Pressure Centered	DHG-10-3H * -40	1100		21	

★ Maximum flow indicates a ceiling flow to keep valve operation (changeover) normal.

It depends on the type of valve and circuit, please contact us for details.

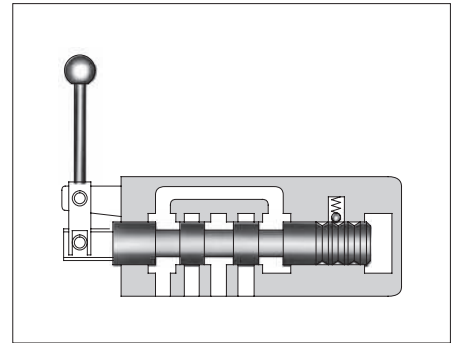
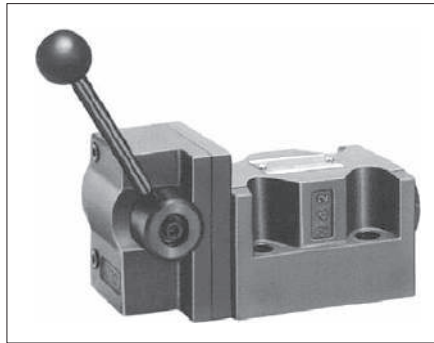
Note) Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

● About high flow valves (Flange Connection Type), please contact us for details.

———— For details of Pilot Operated Directional Valves, please contact us. ————

Manually Operated Directional Valves

These valves may be used to manually shift the spool position and change the direction of oil flow.



Specifications

Model Numbers		Maximum Flow ^{Note)1} L/min				Max. Operating Pressure MPa	Max. T-Line Back Pressure MPa	Approx. Mass kg
		7 MPa	14 MPa	21 MPa	31.5 MPa			
Threaded Connections	DMT-03-3C *-50	100★ ¹	100★ ¹	100★ ¹	—	25	16	5.0
	DMT-03-3D *-50	100	100	100	—			
	DMT-03-2D *-50	100	100	100	—			
	DMT-03-2B *-50	100★ ¹	100★ ¹	100★ ¹	—			
	DMT-06 *-3C *-30	300 (200)★ ²	300 (120)★ ²	300 (100)★ ²	—	21	At time spool shift is required: 7 At time spool shift is not required: 21	12.9
	DMT-06 *-3D *-30	300	300	300	—			
	DMT-06 *-2D *-30	300	300	300	—			
	DMT-06 *-2B *-30	200	120	100	—			
	DMT-10 *-3C *-30	500 (315)★ ²	500 (315)★ ²	500 (315)★ ²	—	21	At time spool shift is required: 7 At time spool shift is not required: 21	22
	DMT-10 *-3D *-30	500	500	500	—			
	DMT-10 *-2D *-30	500	500	500	—			
	DMT-10 *-2B *-30	315	315	315	—			
Sub-plate Mounting	DMG-01-3C *-10	35	35	35	—	25	14★ ⁶	1.8
	DMG-01-3D *-10							
	DMG-01-2D *-10							
	DMG-01-2B *-10							
	DMG-03-3C *-50	100★ ¹	100★ ¹	100★ ¹	—	25	16	4.0
	DMG-03-3D *-50	100	100	100	—			
	DMG-03-2D *-50	100	100	100	—			
	DMG-03-2B *-50	100★ ¹	100★ ¹	100★ ¹	—			
	DMG-04-3C *-21	200★ ³	200★ ³	105★ ³	—	21	21★ ⁷	7.4
	DMG-04-3D *-21	200	200	200	—			
	DMG-04-2D *-21	200	200	200	—			7.9
	DMG-04-2B *-21	90	60	50	—			
	DMG-06-3C *-50	500★ ⁴	500★ ⁴	500★ ⁴	500★ ⁴	31.5	21★ ⁷	11.5
	DMG-06-3D *-50	500	500	500	500			
	DMG-06-2D *-50	500	500	500	500			12
	DMG-06-2B *-50	420	300	250	200			
	DMG-10-3C *-40	1100★ ⁵	1100★ ⁵	1100★ ⁵	1100★ ⁵	31.5	21★ ⁷	48.2
	DMG-10-3D *-40	1100	1100	1100	1100			
	DMG-10-2D *-40	1100	1100	1100	1100			50
	DMG-10-2B *-40	670	350	260	200			

Note) 1. The maximum flow means the limited flow of the valve. In case of pressure or flow condition, the lever operating torque of over DMG-04 size models is possible over 40 Nm.

- ★1. Varies depending on the spool type. For details, see the "List of Standard Models" for DSG-03 Series Solenoid Operated Directional Valves (page E-40 at 50 Hz rated voltage).
- ★2. The figures in parentheses indicate max. flow for 3C3, 3C5, 3C6 and 3C60.
- ★3. Varies depending on the spool type. Please contact us for details.
- ★4. Varies depending on the spool type. Same as DSHG-06 (at pilot pressure of 0.8 MPa), see page E-77.
- ★5. Varies depending on the spool type. Same as DSHG-10 (at pilot pressure of 1.0 MPa), see page E-78.
- ★6. Lever operating torque varies depending on the T-line back pressure.
- ★7. If the T-Line back pressure exceeds 7 MPa, directly connect the drain port to the reservoir.
- About high flow valves (Flange Connection Type), please contact us for details.

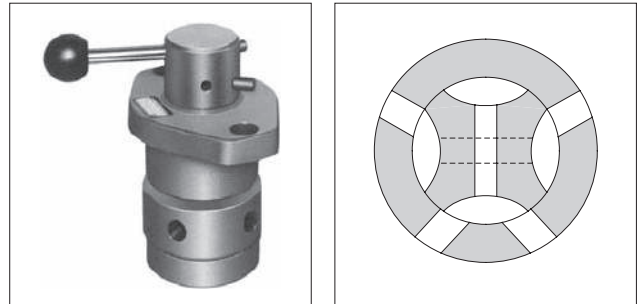
———— For details of Manually Operated Directional Valves, please contact us. ————

Mechanically Operated Directional Valves

These valves are chiefly used to shift the pilot circuit. Rotary Type Directional Valves and Cam Operated Type Directional Valves are available.

Rotary Type Directional Valves

These valves are used to rotate the spool either manually or by way of cam and shift the direction of oil flow. The detented mechanism incorporated in these valves prevents the valve from being changed over by itself due to vibrations or any other shocks.



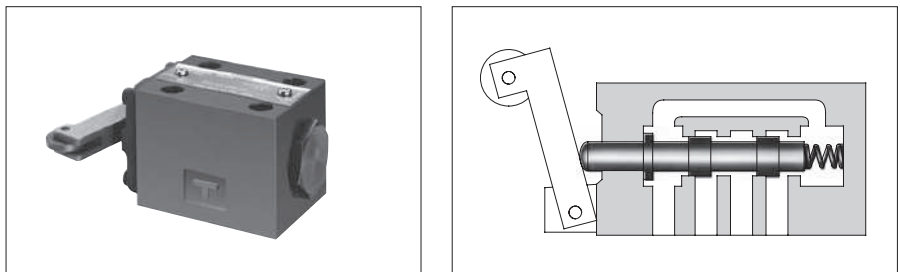
Specifications

Model Numbers		Rated Flow L/min	Max. Operating Pressure MPa	Max. T-Line Pressure MPa	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting				DRT Type	DRG Type
DRT-02-*D*-**-20	DRG-02-*D*-**-20	16	7	7★	4.7	3.4

★ When a back pressure of more than 3 MPa is generated in the tank port, be sure to use External Drain Type.

Cam Operated Directional Valves

These valves may be used to shift the direction of oil flow by depressing the spool by way of cam.



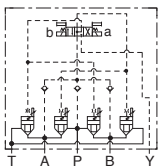
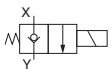
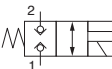
Specifications

Model Numbers		Max. Flow★ L/min	Max. Operating Pressure MPa	Max. T-Line Pressure MPa	Approx. Mass kg	
Threaded Connection	Sub-plate Mounting				DCT Type	DCG Type
DCT-01-2B*-**-40	DCG-01-2B*-**-40	30	21	7	1.1	1.1
DCT-03-2B*-**-50	DCG-03-2B*-**-50	100	25	10	4.5	2.9

★ Max. flow indicates the ceiling flow which does not affect the normal function (changeover) of valves.

———— For details of Mechanically Operated Directional Valves, please contact us. ————

Poppet Type Directional Valves

Valve Type	Graphic Symbols	Max. Operating Pressure MPa	Maximum Flow L/min										Page
			1	2	5	10	20	50	100	200	500	1000	
Multi Purpose Control Valves		25	DSLHG-04										E-102
			DSLHG-06										
			DSLHG-10										
Solenoid Operated Poppet Type Two-Way Valves		21	CDSC-01										E-122
		14	CDSC-03										
			CDST-03*										
			CDSG-03										
Shut-off Type Solenoid Operated Directional Valves		25	DSPC-01										E-128
			DSPG-01										
			DSPC-03										
			DSPG-03										

■ Mounting Surface

Mounting surface dimensions conform to ISO standard described in the below table.

Name	Model Numbers	ISO Code of Mounting Surface
Shut-off Type Solenoid Operated Directional Valves	DSPG-01	ISO 4401-03-02-0-05
	DSPG-03	ISO 4401-05-04-0-05
	DSPC-01	ISO 7789 20-01-0-07
	DSPC-03	ISO 7789 27-01-0-07
Multi Purpose Control Valves	DSLHG-04	ISO 4401-07-07-0-05
	DSLHG-06	ISO 4401-08-08-0-05
	DSLHG-10	ISO 4401-10-09-0-05

Interchangeability in Installation between Current and New Design

Model change has been made on the following products.

The difference between current and new design has been described on the paragraph of “Interchangeability in Installation between Current and New Design”. Refer to relevant pages on each series.

Name	Model Numbers		Mtg. Interchangeability	Page	Major Changes
	Current	New			
$\frac{1}{2}, \frac{3}{4}, 1\frac{1}{4}$ Multi Purpose Control Valves	DSLHG-04- *- *-12 DSLHG-06- *- *-12 DSLHG-10- *- *-12	DSLHG-04- *- *-13 DSLHG-06- *- *-13 DSLHG-10- *- *-13	Yes	—	• Pilot valve (DSG-01) changed 60→70 design.
Solenoid Operated Poppet Type Two-Way Valves	CDS *-03 *-C *-20	CDS *-03 *-C *-21	Yes	E-127	• The change of solenoid ratings.
Shut-off Type Solenoid Operated Directional Valves	DSP *-01-C *-20	DSP *-01-C *-30	Yes	E-135	• High pressure and the change of solenoid ratings.

Solenoid

■ Solenoid Connector (DIN Connector)

The solenoid connector is in accordance with the international standard ISO 4400 (Fluid power systems and components-Three-pin electrical plug connectors-Characteristics and requirements).

■ AC Solenoid

50-60 Hz common service solenoids do not require rewiring when the applied frequency is changed.

■ DC Solenoid

K-series DC Solenoid which has a reputation for excellent DC control is employed.

★Three Characteristics of K-series★

- Avoid malfunction of computers.
(The surge voltage is low, so these valves do not give bad influences like noise to electronic devices)
- The relays last for long time.
(The spark between the relay contacts has been eliminated and therefore drastically decrease damages of contacts)
- Time lag on de-energisation is reduced.

■ R Type Models with Current Rectifier and DC Solenoid

Specially designed DC solenoids and receptacle (or connector) containing AC-DC rectifier and transient peak suppressor are provided. Connection to be made to AC power source as with conventional AC solenoid.

Remarkably high reliability and long life and other advantages including quiet valve operation. No overheating of coil due to the spool sticking and protection against transient voltage peaks are assured.

■ Insulation Class of Solenoid

Model Numbers	Insulation Class
DSLHG-04/06/10	Class H
CDSC-01	
CDS *-03 * DSP *-01/03	

■ Multi Purpose Control Valves

The Yuken Multi-Purpose Control Valves Comply with The Needs of Reducing Cost and Size of Your Machine

YUKEN's Multi Purpose Control Valves are compound valves composed of the main valve having four poppets, 1/8 Solenoid Operated Directional Valves for pilot and Pilot Selector Valves. This valve is multifunctionalized by having individual poppet had functions such as directional control, flow control or pressure control according to the combination of the main valve and pilot selector valve.

■ Features

● Multi-purpose control valves

The valves combine three functions of directional control, flow control and of pilot operated check valve (or counterbalance valve). The valves contribute for reducing a number of valves in applications and space for installation and then eventually leads to reduction in size and cost of your machines.

● Quick response, High reliability

Changeover response time is very quick as the valves are poppet type, there is no over-lap.

No hydraulic lock occurs as there is no leakage of pressurised oil from the seat parts.

● Easy to reduce shock in your hydraulic system

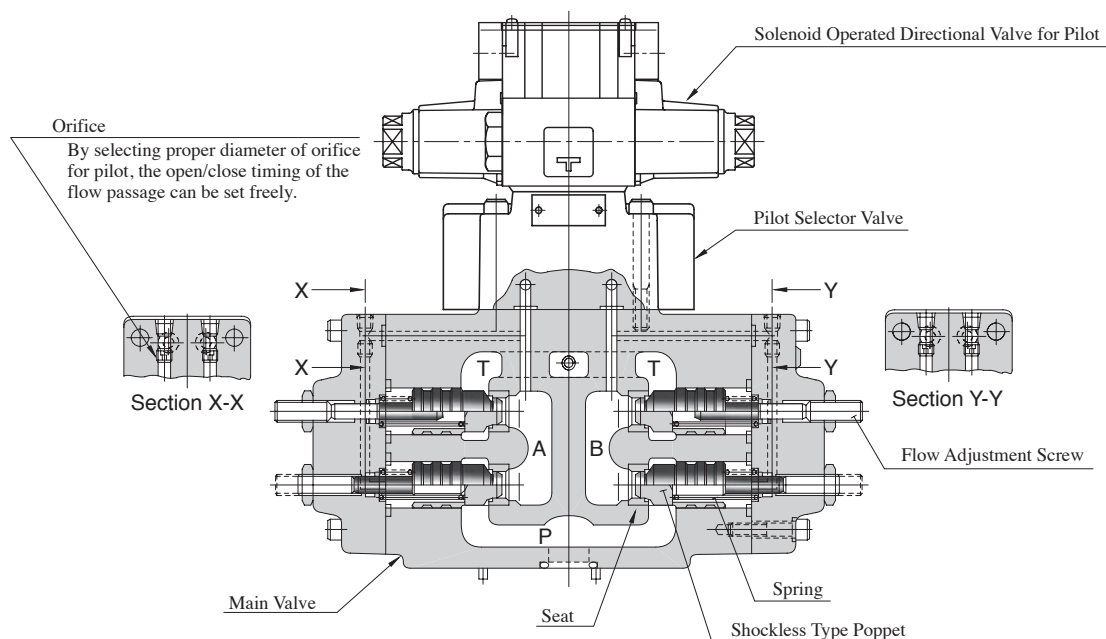
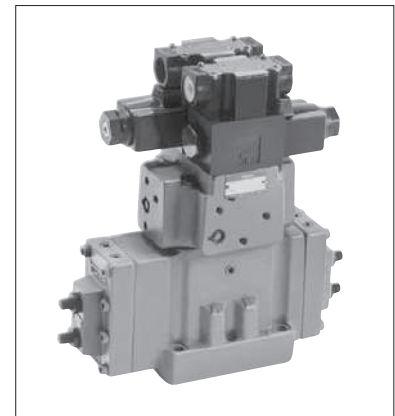
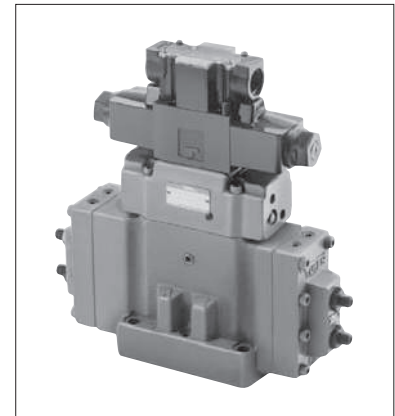
By selecting proper diameter of orifice for pilot, the open/close timing of the flow passage can be set freely. Therefore, smooth starting and stopping of actuator can be done combined with using shockless type poppet. Noise of ON/OFF and vibration of piping in hydraulic system can be also reduced.

● For regenerative circuit

4 position-4 way type, which is to compose regenerative circuit, is available. By adopting regenerative circuit, gaining fast feed speed by using smaller volume pump is possible. Therefore saving electric power of system is possible.

● The mounting dimensions are conformed with ISO standard

The valves are interchangeable with our conventional valves in mounting.



Specifications

Model Numbers	Max. Flow L/min	Max. Operating Pressure MPa	Max. Pilot Pressure MPa	Max. T-Line Back Pres. MPa	Pressure Adj. Range of Counterbalance MPa	Ratio of Poppet Area (Seat Area: Annular Area)		Approx. Mass kg
						Direction & Flow Control	Pressure Control	
DSLHG-04-1*-13*	150 (39.6)	25	25	16	—	1:1	—	15
DSLHG-04-2*-13*								15
DSLHG-04-3*-13*								19
DSLHG-04-4*-13*	150 {100}*	25	25	16	Refer to Model No. Designation	1:1	24:1	20
DSLHG-04-5*-13*								22.5
DSLHG-06-1*-13*	300 (79.3)	25	25	16	—	1:1	—	26.5
DSLHG-06-2*-13*								26.5
DSLHG-06-3*-13*								28
DSLHG-06-4*-13*	300 {200}*	25	25	16	Refer to Model No. Designation	1:1	24:1	31
DSLHG-06-5*-13*								34.5
DSLHG-10-1*-13*	500 (132)	25	25	16	—	1:1	—	59
DSLHG-10-2*-13*								59
DSLHG-10-3*-13*								62
DSLHG-10-4*-13*	500 {300}*	25	25	16	Refer to Model No. Designation	1:1	24:1	63.5
DSLHG-10-5*-13*								67

★ In case of counterbalance function line, maximum flow is limited to the values in brackets.

Solenoid Ratings

Refer to Pilot Valve (DSG-01 Series Solenoid Operated Directional Valve) Solenoid Ratings on page E-23.

Sub-plate

Valve Model Numbers	Japanese Standard "JIS"		
	Sub-plate Model Numbers	Thread Size	Approx. Mass kg
DSLHG-04	DHGM-04-20	Rc 1/2	4.4
	DHGM-04X-20	Rc 3/4	4.1
DSLHG-06	DHGM-06-50	Rc 3/4	7.4
	DHGM-06X-50	Rc 1	7.4
DSLHG-10	DHGM-10-40	Rc 1-1/4	21.5
	DHGM-10X-40	Rc 1-1/2	21.5

- Sub-plates are available. Specify the sub-plate model number from the table above.
When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1}{16}$)
- These sub-plates are sharable with those for DSHG Series Solenoid Controlled Pilot Operated Directional Valve. For dimensions, see pages E-85 and E-87.

Mounting Bolts

Socket head cap screws in the table below are included.

Model Numbers	Socket Head Cap Screw
DSLHG-04	M6 × 40
	M10 × 45
DSLHG-06	M12 × 60
DSLHG-10	M20 × 75

Model Number Designation

DSLH	G	-04	-4	A	-B	-E	T	-A100	-C	-N	-13
Series Number	Type of Mounting	Valve Size	Type of Pilot Control	Counterbalance Function	Pressure Adj. Range of Counterbalance MPa	Pilot Connection	Drain ^{★2} Connection	Coil Type	Manual Override	Electrical Conduit Connection	Design Number
DSLH: Multi-Purpose Control Valve	G: Sub-plate Mounting	04	1 2 3	—	—	None: Internal Pilot	None: External Drain	AC: A100 A120 A200 A240	None: Manual Override Pin	None: Terminal Box Type	13
			4 5	A : AT Line W : AT & BT Lines	B : * ^{★1} - 7 H : 6 - 25			DC: D12 D24 D48			
		06	1 2 3	—	—	E: External Pilot	T: Internal Drain	R: (AC→DC) R100 R200	C: Push Button & Lock Nut (Options)	N: Plug-in Connector Type	13
			4 5	A : AT Line W : AT & BT Lines	None: * ^{★1} - 25						
		10	1 2 3	—	—						13
			4 5	A : AT Line W : AT & BT Lines	None: * ^{★1} - 25						
				See page E-105 for functions and purpose of use.							

★1. See "Min. Adjustment Pressure", page E-107, for information on minimum adjustment pressure.

★2. In case of lines with counterbalance function ($-4 \frac{A}{W}$, $-5 \frac{A}{W}$), External Drain must be selected for Drain Connection.

The coil type numbers in the shaded column are handled as optional extras.
In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.

Function and Purpose of Use

Type of Pilot Control	Model No.	Graphic Symbols	Function			Purpose of Use															
			Directional Control	Flow Control	Pilot Operated Check Valve / Pressure Control																
Type "1"	DSLHG-*1		<table><tr><th>Position</th><th>#1</th><th>#2</th><th>#3</th></tr><tr><td>SOL a</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>SOL b</td><td>OFF</td><td>OFF</td><td>ON</td></tr></table>	Position	#1	#2	#3	SOL a	ON	OFF	OFF	SOL b	OFF	OFF	ON			● Functions as Three Position Four-Way Valve (Spring Centered Model).			
Position	#1	#2	#3																		
SOL a	ON	OFF	OFF																		
SOL b	OFF	OFF	ON																		
Type "2"	DSLHG-*2		<table><tr><th>Position</th><th>#1</th><th>#2</th><th>#3</th></tr><tr><td>SOL a</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>SOL b</td><td>OFF</td><td>OFF</td><td>ON</td></tr></table>	Position	#1	#2	#3	SOL a	ON	OFF	OFF	SOL b	OFF	OFF	ON	Both Meter-in and Meter-out are possible	To get a function of pilot operated check valve, the following conditions should be fulfilled. ● Internal pilot type ("P" port pressure) $\geq$ ("A" "B" ports pressure) ● External pilot type (Pilot pressure) $\geq$ ("A" "B" ports pressure)	● Functions as Three Position Four-Way Valve (Spring Centered Model) as well as Two Position Valve which uses positions #1 and #3. ● Effective especially when the actuator has inertia force.			
Position	#1	#2	#3																		
SOL a	ON	OFF	OFF																		
SOL b	OFF	OFF	ON																		
Type "3"	DSLHG-*3		<table><tr><th>Position</th><th>#1</th><th>#2</th><th>#3</th><th>#4</th></tr><tr><td>SOL a</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td></tr><tr><td>SOL b</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr></table>	Position	#1	#2	#3	#4	SOL a	ON	OFF	ON	OFF	SOL b	OFF	OFF	ON	ON			● Functions as Four Position Four-Way Valve. ● Regenerative circuit can be constructed at the Position #3.
Position	#1	#2	#3	#4																	
SOL a	ON	OFF	ON	OFF																	
SOL b	OFF	OFF	ON	ON																	
Type "4"	DSLHG-*4A					● Pressure control function (counterbalance valve) has been added to Type "2" to make this type.															
	DSLHG-*4W		<table><tr><th>Position</th><th>#1</th><th>#2</th><th>#3</th></tr><tr><td>SOL a</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>SOL b</td><td>OFF</td><td>OFF</td><td>ON</td></tr></table>	Position	#1	#2	#3	SOL a	ON	OFF	OFF	SOL b	OFF	OFF	ON			● Used to control the back pressure of the actuator.			
Position	#1	#2	#3																		
SOL a	ON	OFF	OFF																		
SOL b	OFF	OFF	ON																		
Type "5"	DSLHG-*5A					● Pressure control function (counterbalance valve) has been added to Type "3" to make this type.															
	DSLHG-*5W		<table><tr><th>Position</th><th>#1</th><th>#2</th><th>#3</th><th>#4</th></tr><tr><td>SOL a</td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td></tr><tr><td>SOL b</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr></table>	Position	#1	#2	#3	#4	SOL a	ON	OFF	ON	OFF	SOL b	OFF	OFF	ON	ON			● Used to control the back pressure of the actuator.
Position	#1	#2	#3	#4																	
SOL a	ON	OFF	ON	OFF																	
SOL b	OFF	OFF	ON	ON																	

■ Instructions

● Pilot Pressure

Pilot pressure of external pilot drain models must always exceed the pressure of the main pressure port "P".

● Pilot Drain Port

Avoid connecting the pilot drain port to a line with possible surge pressure.

● Drain Connection when with Counterbalance Function

When a valve having counterbalance function is used with internal drain type, the counterbalance pilot valve is subjected to pressure fluctuation and the pressure setting becomes unstable. For this reason, be sure to use external drain type valve.

● Flow Adjustment

To perform the flow adjustment, loosen the lock nut, then turn the flow adjustment screw clockwise to decrease the flow. Be sure to re-tighten the lock nut after the adjustment.

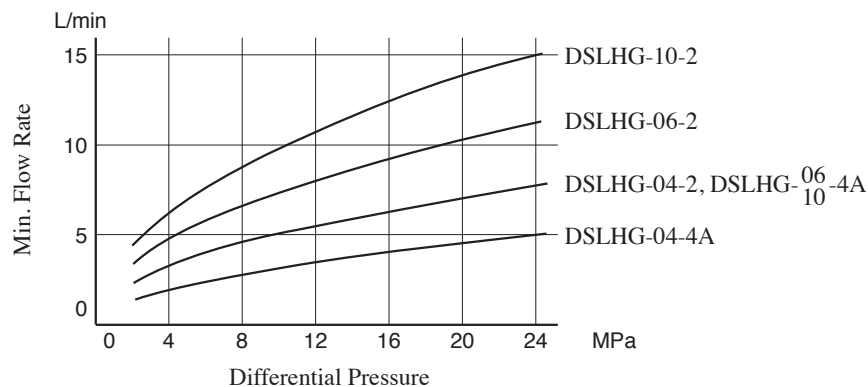
● Pressure Adjustment

To perform the pressure adjustment, loosen the lock nut, then turn the pressure adjustment screw clockwise to increase the pressure. Be sure to re-tighten the lock nut after the adjustment.

● Min. Controlled Flow for Types "2" and "4A" at The Time of Meter-out Control

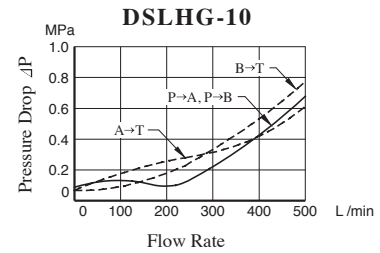
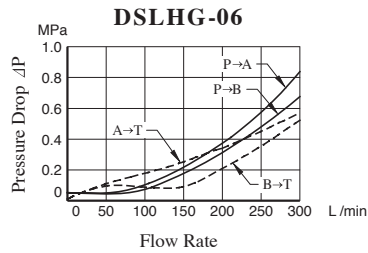
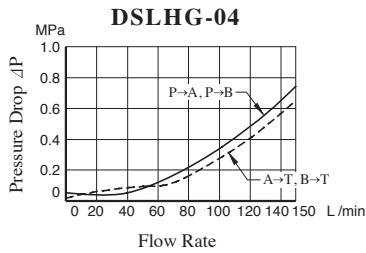
Minimum controlled flow at the time of meter-out control is limited (this does not happen during meter-in control) as shown in the figure below only in the case of pilot control types "2" (DSLHG- *-2) and "4A" (DSLHG- *-4A).

Min. Controlled Flow for Types "2" and "4A" at The Time of Meter-out Control



Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop



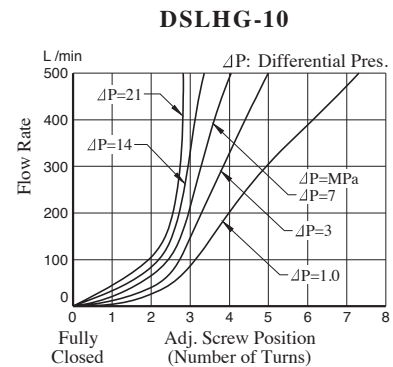
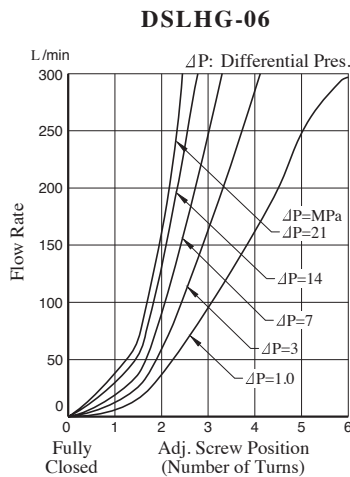
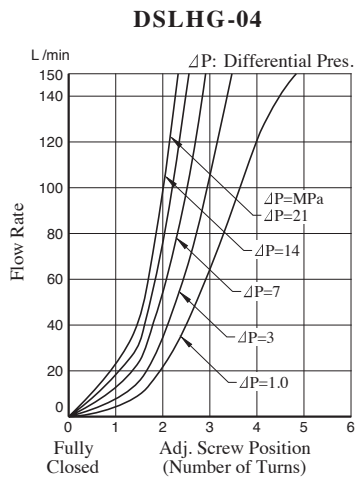
- For any other viscosity, multiply the factors in the table below.

Viscosity	mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

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

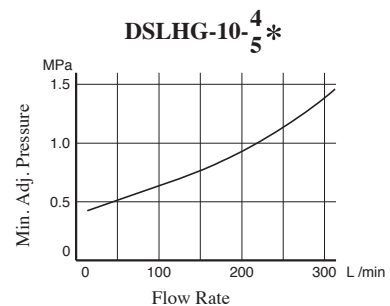
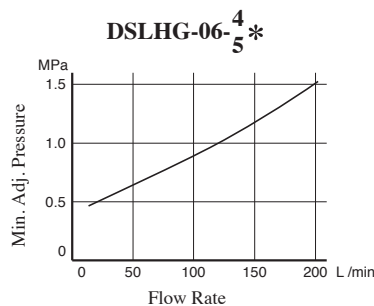
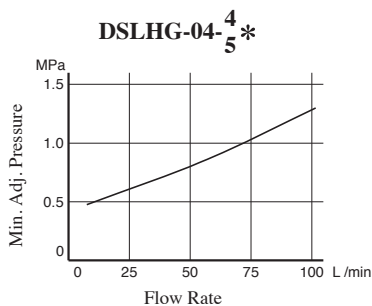
$$\Delta P' = \Delta P (G'/0.850)$$

Flow vs. Adjustment Revolutions



Minimum Adjustment Pressure

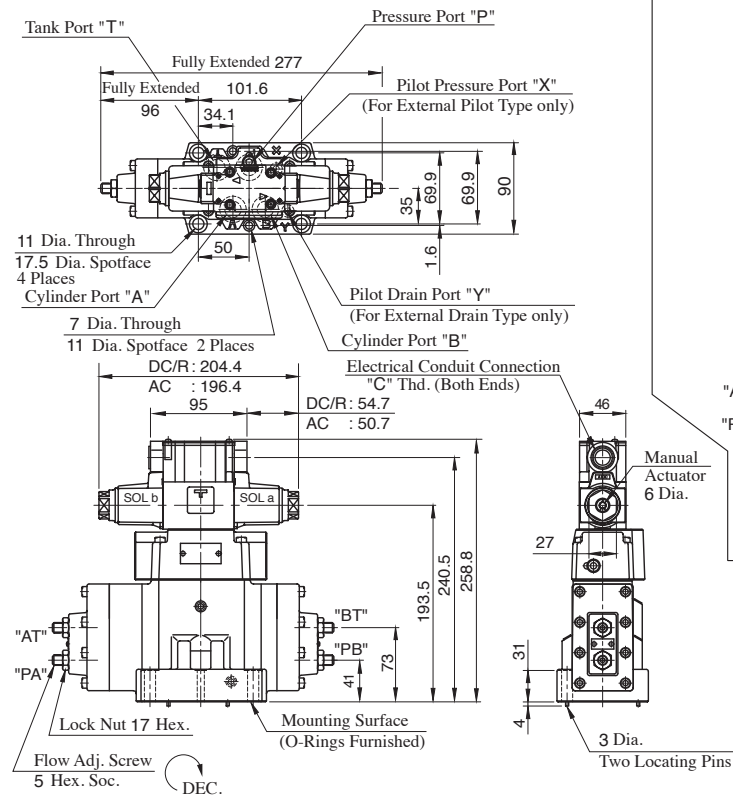
Because the minimum adjustment pressure varies with the tank line back pressure, add the tank line back pressure to the value on the following lines.



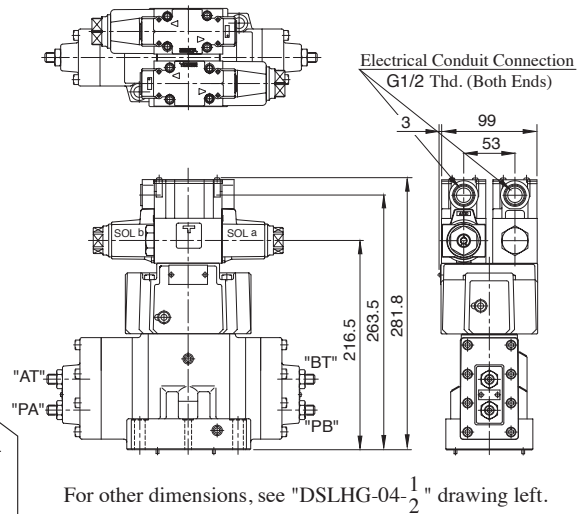
DSLHG-04- $\frac{1}{2}$ -*-13

Terminal Box Type

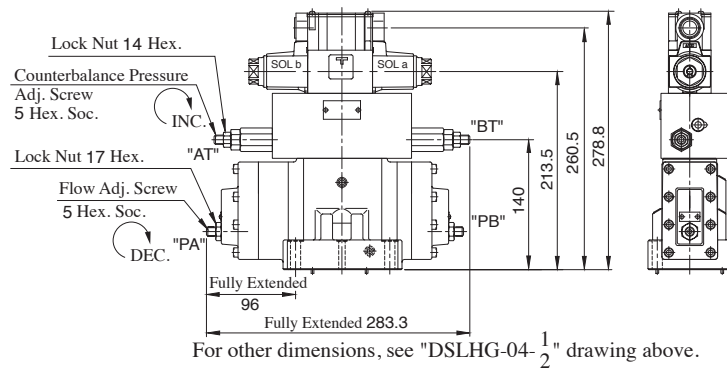
Mounting Surface:
ISO 4401-07-07-0-05



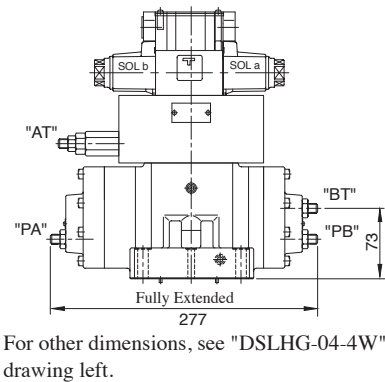
DSLHG-04-3-*-13



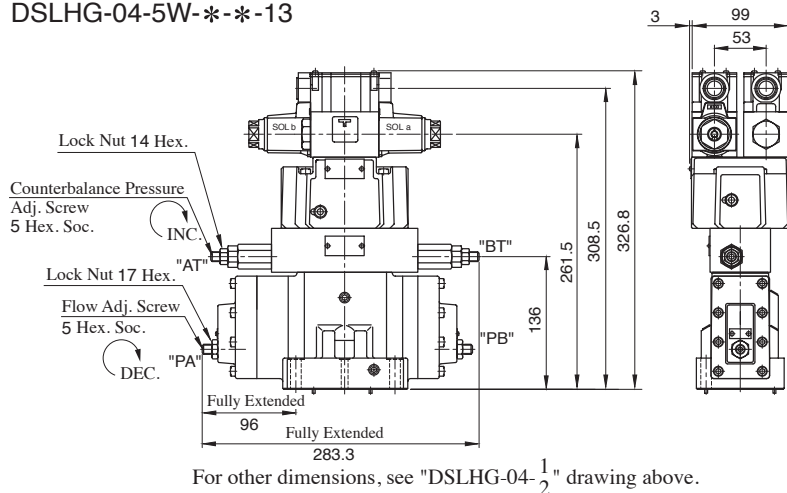
DSLHG-04-4W-*-*-13



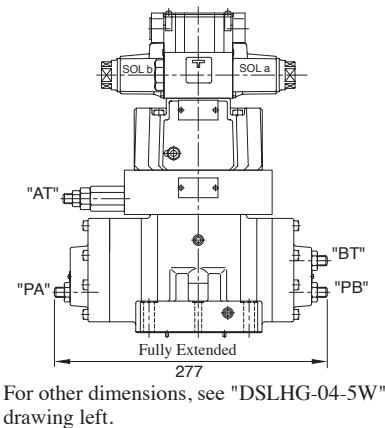
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DSLHG-04-5W-*-*-13



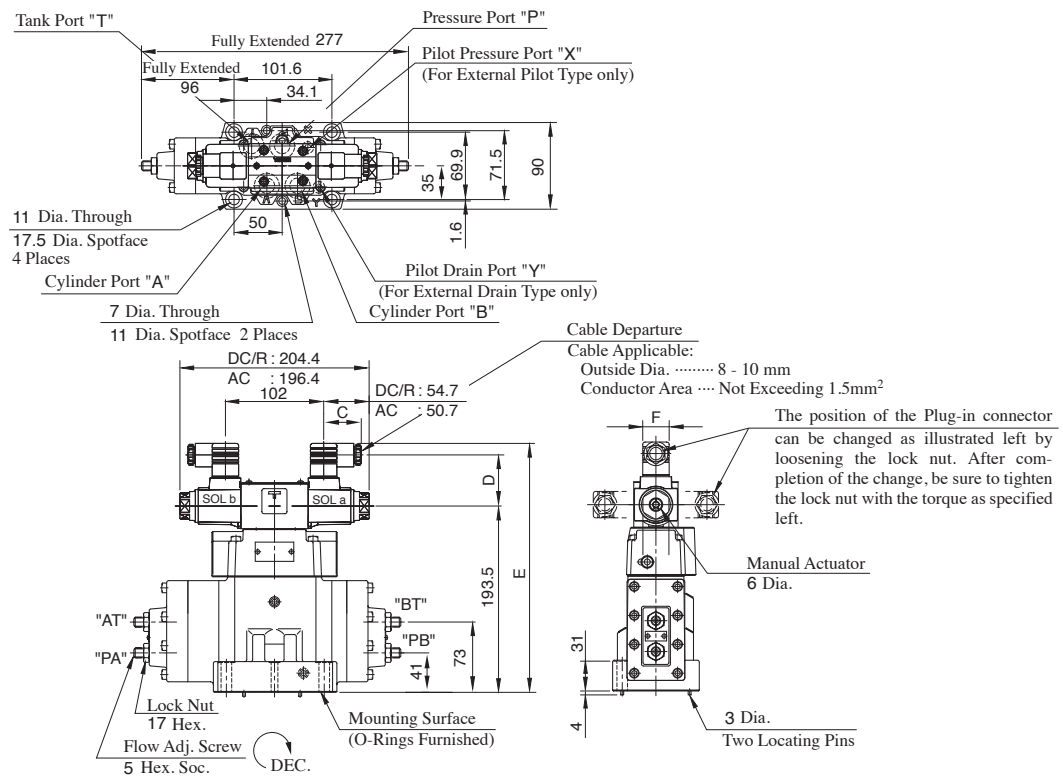
DSLHG-04-5A-*-*-13



DSLHG-04- $\frac{1}{2}$ -*-N-13

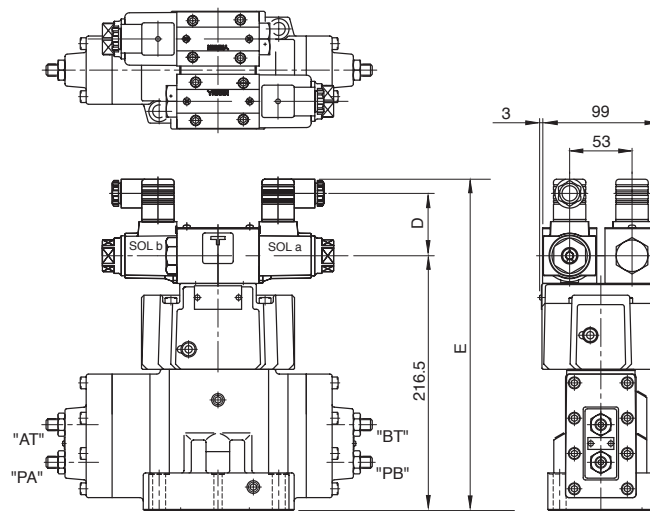
Plug-in Connector Type

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



Model Numbers	C	D	E	F
DSLHG-04-*-A*-N	39	53	258.5	27.5
DSLHG-04-*-D*-N	39	64	269.5	27.5
DSLHG-04-*-R*-N	53	57.2	272.5	34

DSLHG-04-3-*-N-13



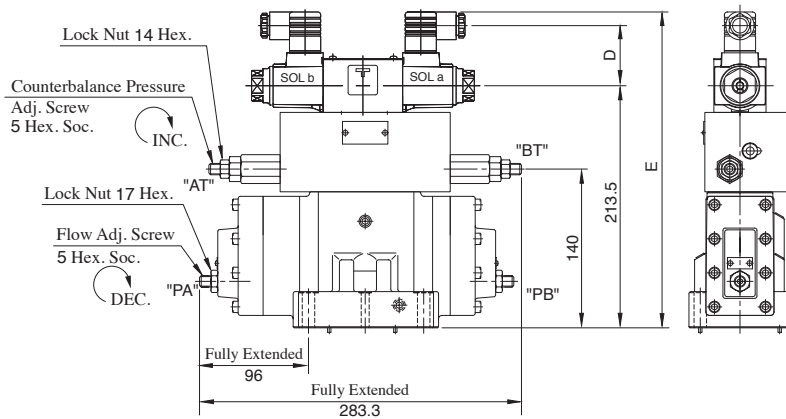
Model Numbers	D	E
DSLHG-04-3-A*-N	53	281.5
DSLHG-04-3-D*-N	64	292.5
DSLHG-04-3-R*-N	57.2	299.5

For other dimensions, see "DSLHG-04- $\frac{1}{2}$ -*-N" drawing above.

Plug-in Connector Type

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

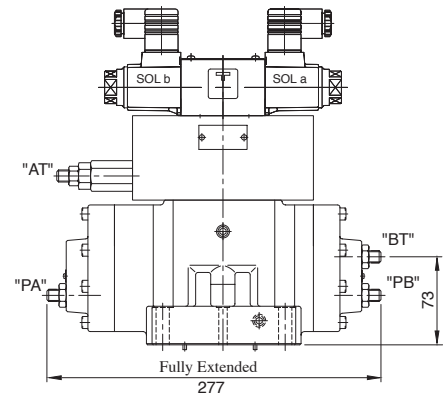
DSLHG-04-4W-*-N-13



Model Numbers	D	E
DSLHG-04-4W-*-A*-N	53	278.5
DSLHG-04-4W-*-D*-N	64	289.5
DSLHG-04-4W-*-R*-N	57.2	292.5

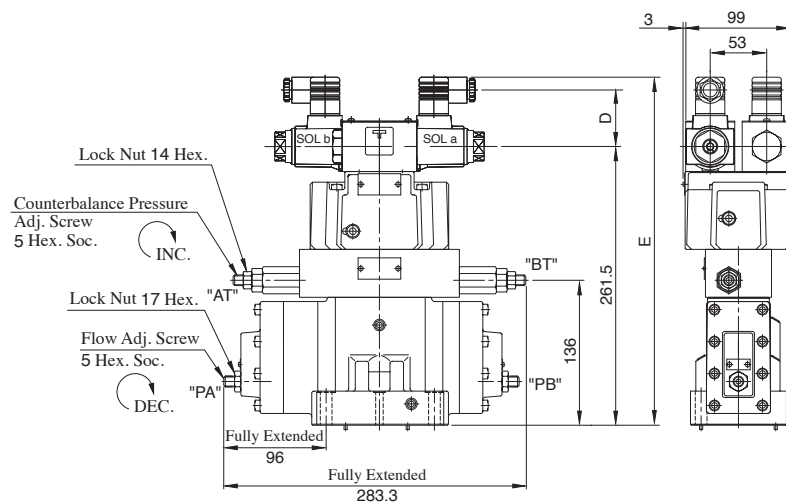
For other dimensions, see DSLHG-04- $\frac{1}{2}$ -*-N on the previous page.

DSLHG-04-4A-*-N-13



For other dimensions, see
"DSLHG-04-4W-*-N-13" drawing left.

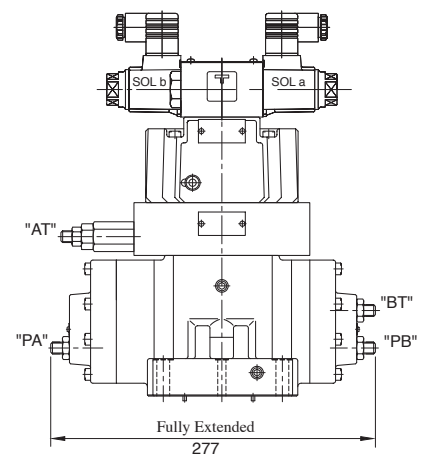
DSLHG-04-5W-*-N-13



Model Numbers	D	E
DSLHG-04-5W-*-A*-N	53	326.5
DSLHG-04-5W-*-D*-N	64	337.5
DSLHG-04-5W-*-R*-N	57.2	340.5

For other dimensions, see DSLHG-04- $\frac{1}{2}$ -*-N on the previous page.

DSLHG-04-5A-*-N-13

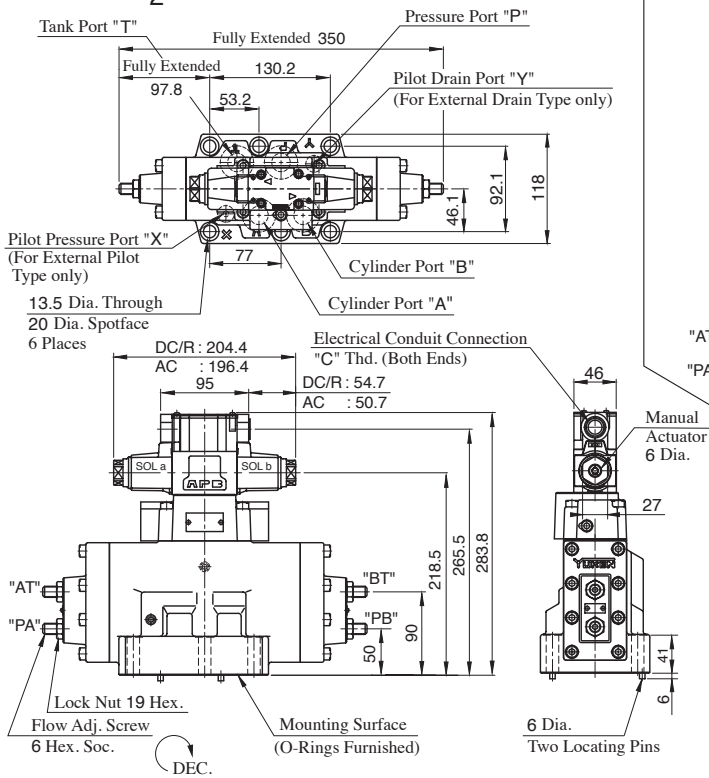


For other dimensions, see
"DSLHG-04-5W-*-N-13" drawing left.

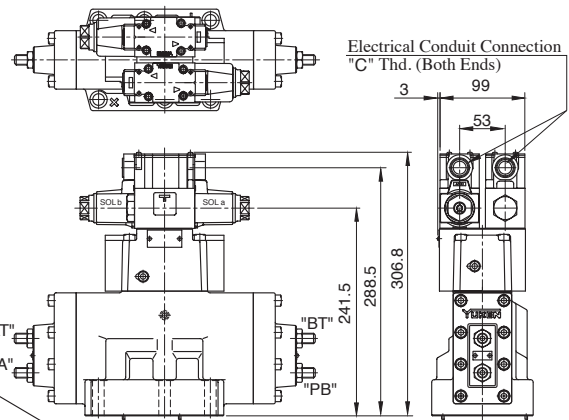
Terminal Box Type

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

DSLHG-06- $\frac{1}{2}$ -*-13

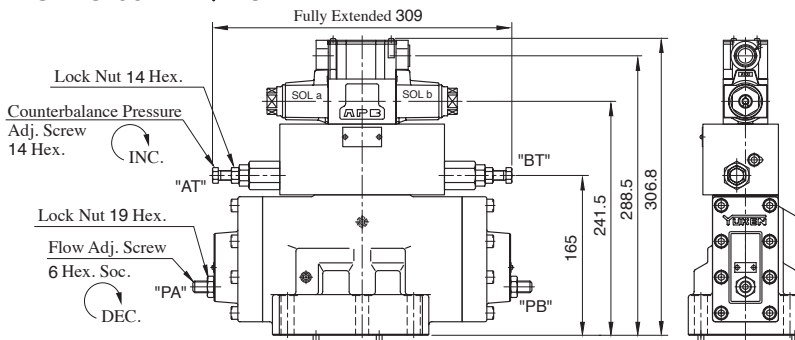


DSLHG-06-3-*-13



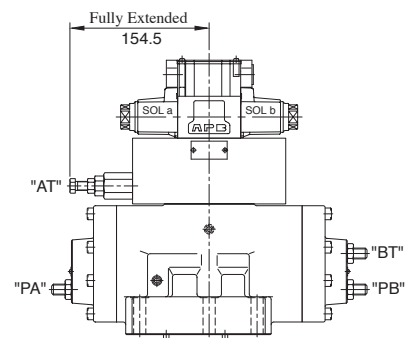
For other dimensions, see "DSLHG-06- $\frac{1}{2}$ " drawing left.

DSLHG-06-4W-*-13



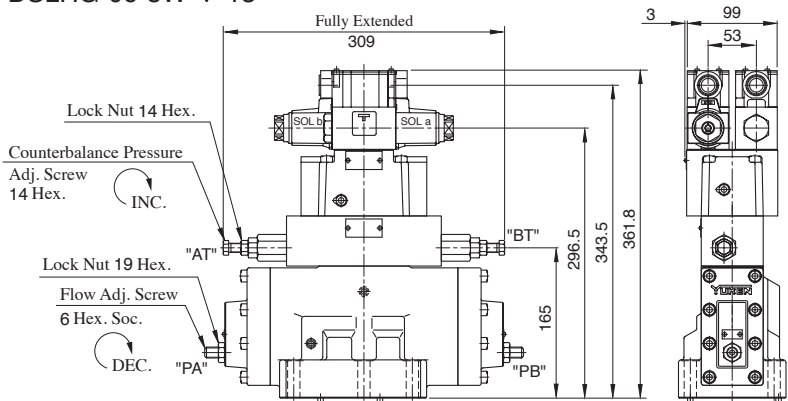
For other dimensions, see "DSLHG-06- $\frac{1}{2}$ " drawing above.

DSLHG-06-4A-*-13



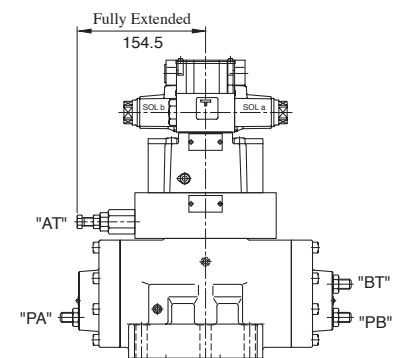
For other dimensions, see "DSLHG-06-4W" drawing left.

DSLHG-06-5W-*-13



For other dimensions, see "DSLHG-06- $\frac{1}{2}$ " drawing above.

DSLHG-06-5A-*-13

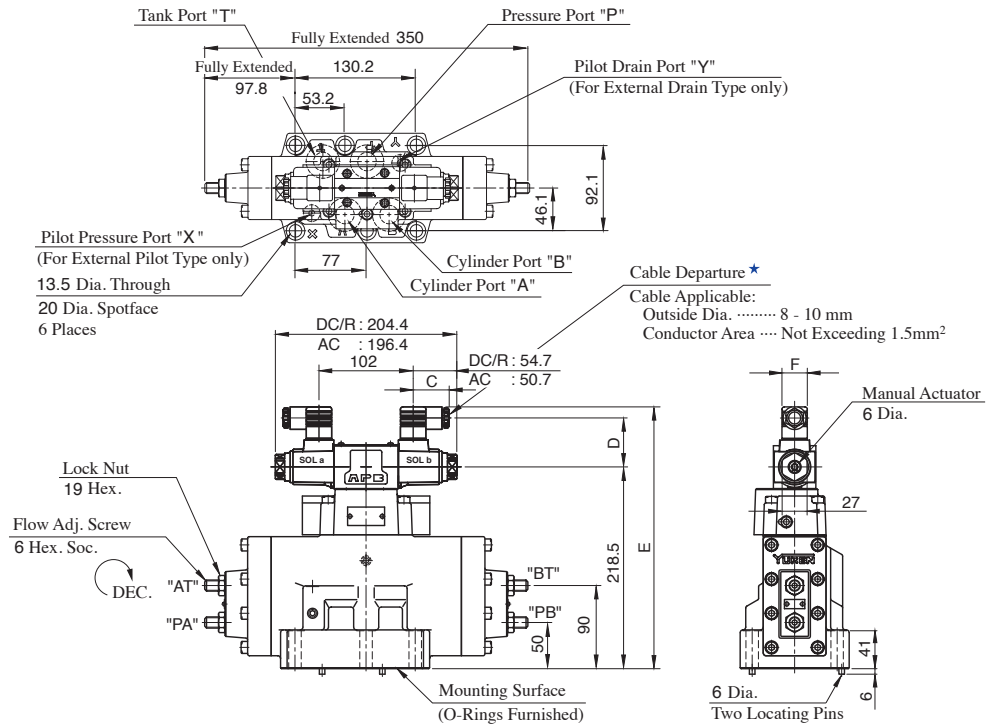


For other dimensions, see "DSLHG-06-5W" drawing left.

DSLHG-06- $\frac{1}{2}$ -*-N-13

Plug-in Connector Type

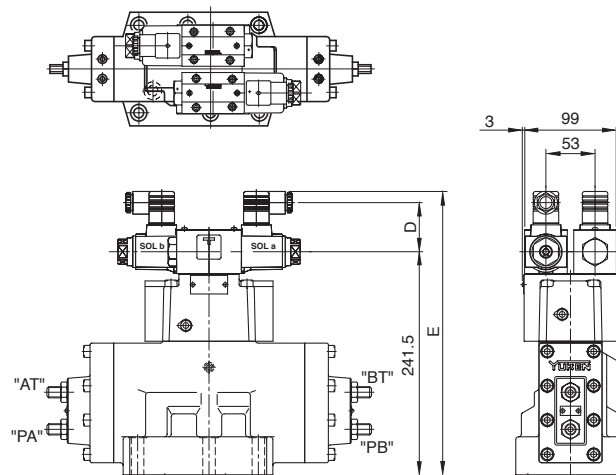
Mounting Surface:
ISO 4401-08-08-0-05



Model Numbers	C	D	E	F
DSLHG-06-*-A*-N	39	53	283.5	27.5
DSLHG-06-*-D*-N	39	64	294.5	27.5
DSLHG-06-*-R*-N	53	57.2	297.5	34

★ Position of cable departure can be changed. For the details, refer to DSLHG-04 valve on page E-109.

DSLHG-06-3-*-N-13



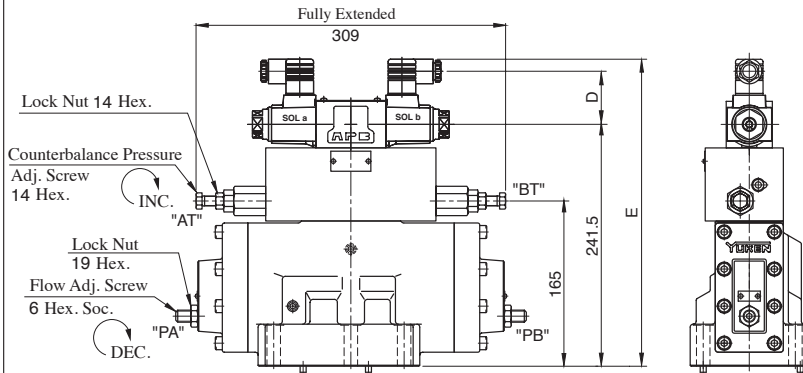
Model Numbers	D	E
DSLHG-06-3-A*-N	53	306.5
DSLHG-06-3-D*-N	64	317.5
DSLHG-06-3-R*-N	57.2	320.5

For other dimensions, see "DSLHG-06- $\frac{1}{2}$ -*-N" drawing above.

Plug-in Connector Type

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

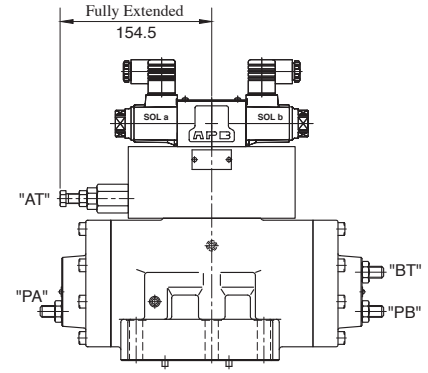
DSLHG-06-4W-*-N-13



Model Numbers	D	E
DSLHG-06-4W-A*-N	53	306.5
DSLHG-06-4W-D*-N	64	317.5
DSLHG-06-4W-R*-N	57.2	320.5

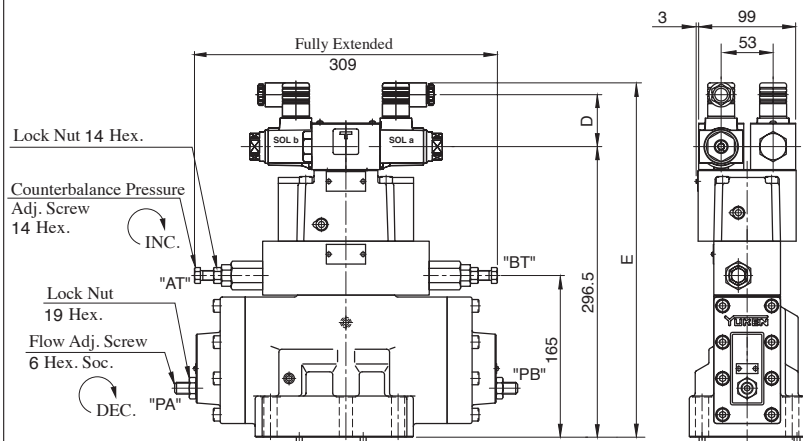
For other dimensions, see DSLHG-06- $\frac{1}{2}$ -*-N on the previous page.

DSLHG-06-4A-*-N-13



For other dimensions, see "DSLHG-06-4W-*-N" drawing left.

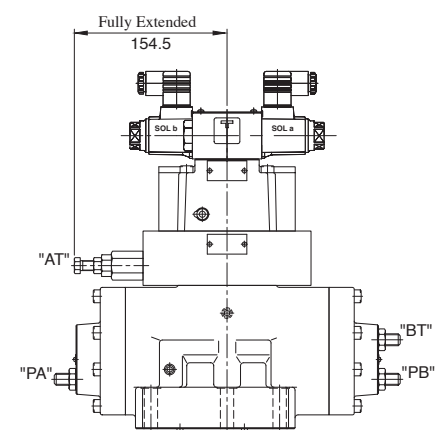
DSLHG-06-5W-*-N-13



Model Numbers	D	E
DSLHG-06-5W-A*-N	53	361.5
DSLHG-06-5W-D*-N	64	372.5
DSLHG-06-5W-R*-N	57.2	375.5

For other dimensions, see DSLHG-06- $\frac{1}{2}$ -*-N on the previous page.

DSLHG-06-5A-*-N-13

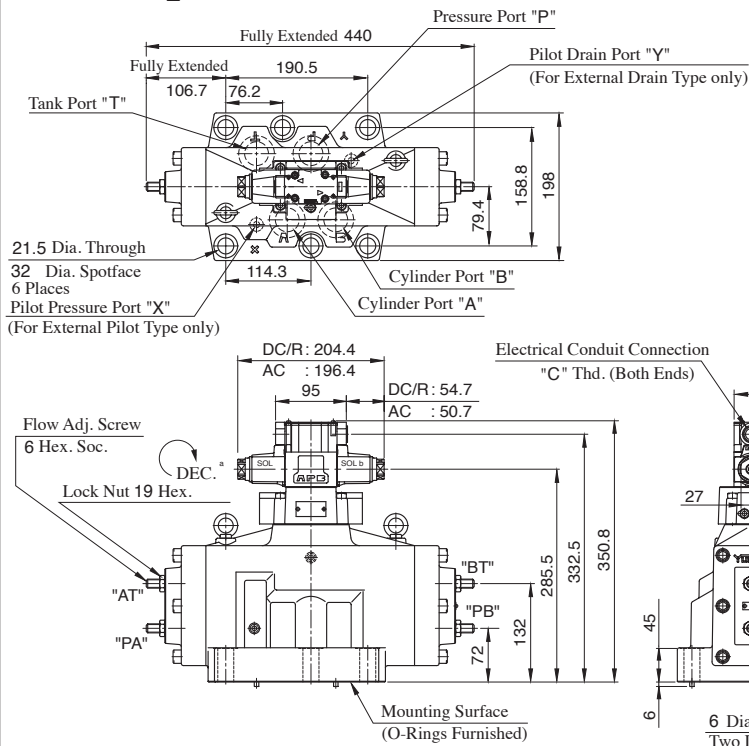


For other dimensions, see "DSLHG-06-5W-*-N" drawing left.

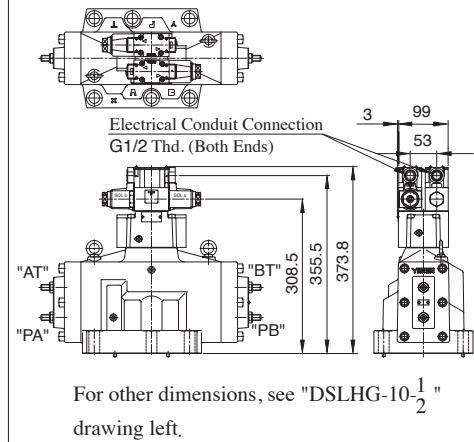
Terminal Box Type

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

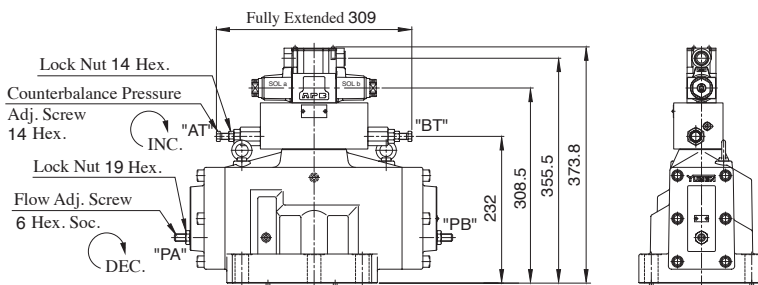
DSLHG-10- $\frac{1}{2}$ -*-13



DSLHG-10-3-*-13

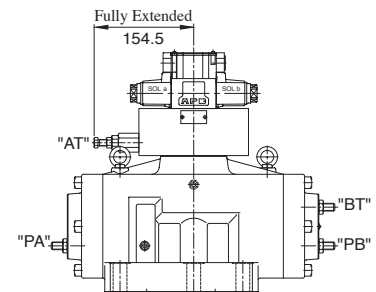


DSLHG-10-4W-*-13



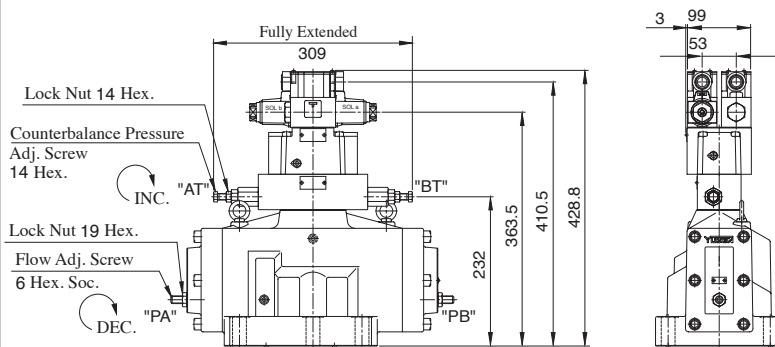
For other dimensions, see "DSLHG-10- $\frac{1}{2}$ " drawing above.

DSLHG-10-4A-*-13



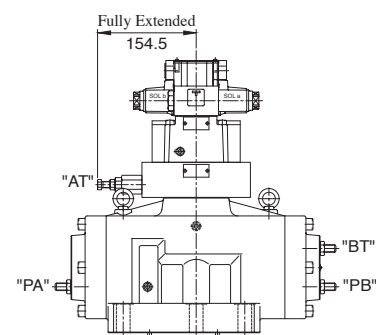
For other dimensions, see "DSLHG-10-4W" drawing left.

DSLHG-10-5W-*-13



For other dimensions, see "DSLHG-10- $\frac{1}{2}$ " drawing above.

DSLHG-10-5A-*-13

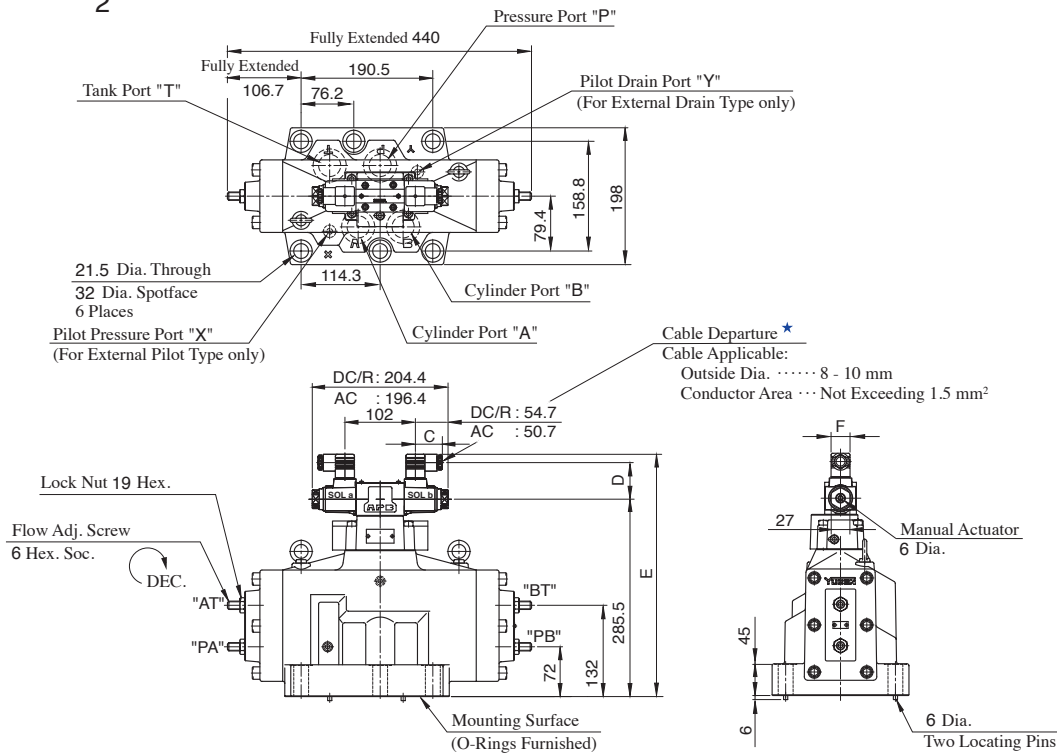


For other dimensions, see "DSLHG-10-5W" drawing left.

Plug-in Connector Type

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

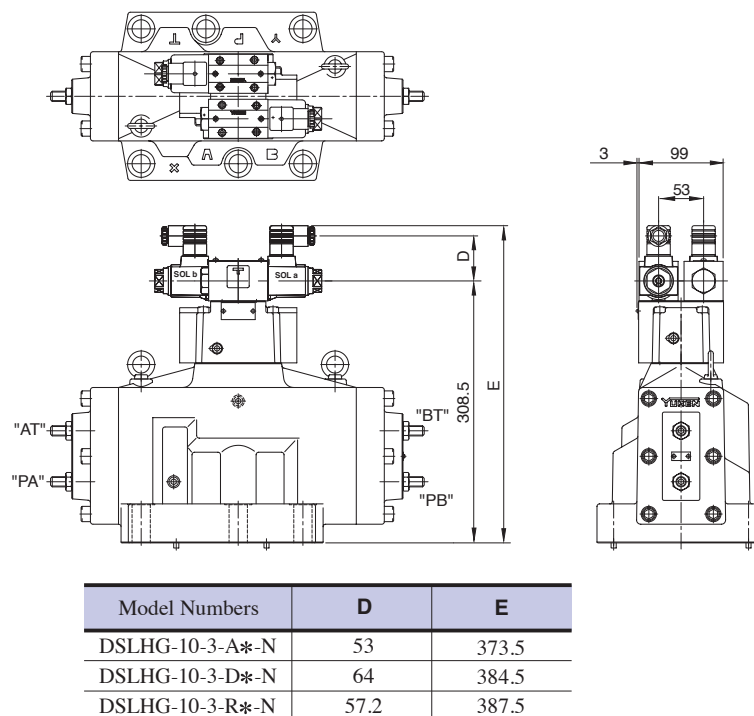
DSLHG-10- $\frac{1}{2}$ -*-N-13



Model Numbers	C	D	E	F
DSLHG-10-*-A*-N	39	53	350.5	27.5
DSLHG-10-*-D*-N	39	64	361.5	27.5
DSLHG-10-*-R*-N	53	57.2	364.5	34

★ Position of cable departure can be changed. For the details, refer to DSLHG-04 valve on page E-109.

DSLHG-10-3*-N-13



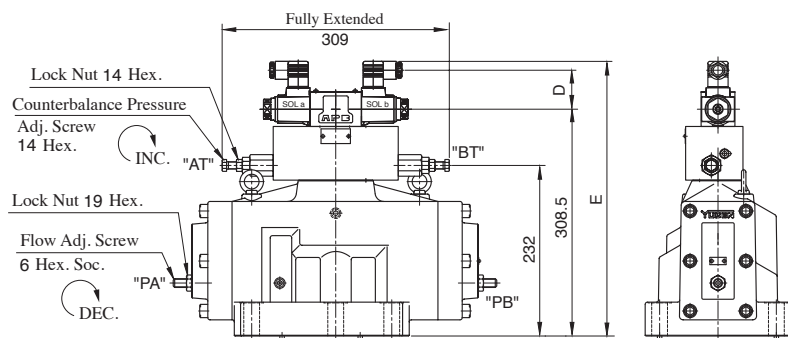
Model Numbers	D	E
DSLHG-10-3-A*-N	53	373.5
DSLHG-10-3-D*-N	64	384.5
DSLHG-10-3-R*-N	57.2	387.5

For other dimensions, see "DSLHG-10- $\frac{1}{2}$ -*-N" drawing above.

Plug-in Connector Type

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

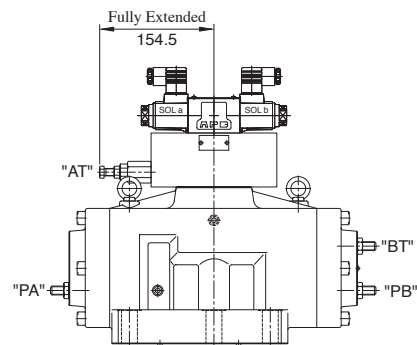
DSLHG-10-4W-*N-13



Model Numbers	D	E
DSLHG-10-4W-A*-N	53	373.5
DSLHG-10-4W-D*-N	64	384.5
DSLHG-10-4W-R*-N	57.2	387.5

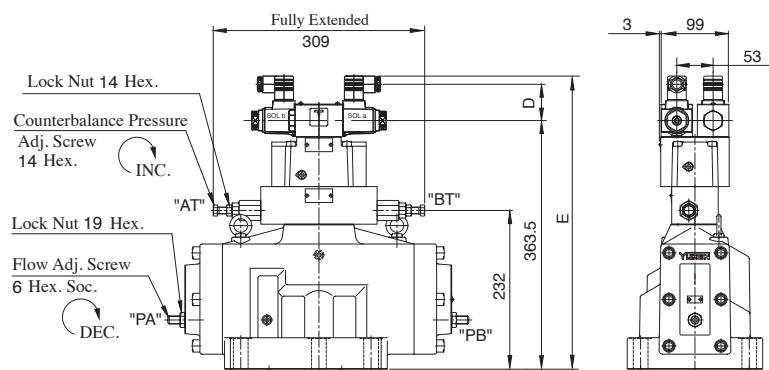
For other dimensions, see DSLHG-10- $\frac{1}{2}$ -*-N on the previous page.

DSLHG-10-4A-*N-13



For other dimensions, see
"DSLHG-10-4W-*N" drawing left.

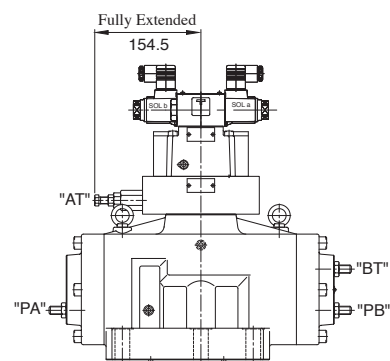
DSLHG-10-5W-*N-13



Model Numbers	D	E
DSLHG-10-5W-A*-N	53	428.5
DSLHG-10-5W-D*-N	64	439.5
DSLHG-10-5W-R*-N	57.2	442.5

For other dimensions, see DSLHG-10- $\frac{1}{2}$ -*-N on the previous page.

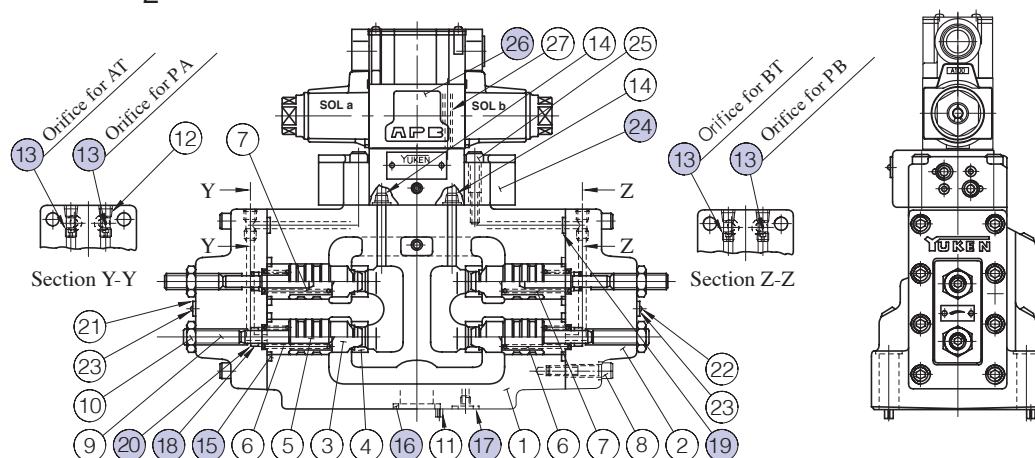
DSLHG-10-5A-*N-13



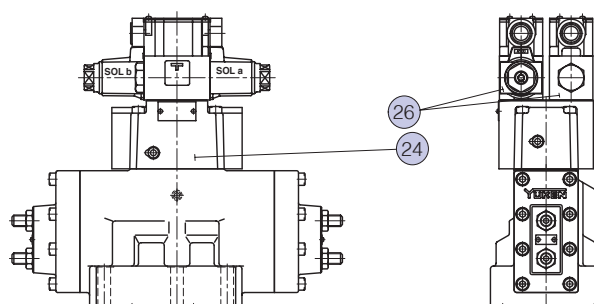
For other dimensions, see
"DSLHG-10-5W-*N" drawing left.

List of Seals for Main Valve, Pilot Selector Valve and Orifice

DSLHG-04/06/10- $\frac{1}{2}$ -*-13



DSLHG-04/06/10-3-*-13



Note) Main valve is same as above drawings.

List of Seals for Main Valves

Item	Name of Parts	Part Numbers			Qty.
		DSLHG-04	DSLHG-06	DSLHG-10	
15	O-Ring	OR NBR-90 P22-N	OR NBR-90 G30-N	OR NBR-90 G40-N	4
16	O-Ring	OR NBR-90 P22-N	OR NBR-90 P30-N	OR NBR-90 P42-N	4
17	O-Ring	OR NBR-90 P9-N	OR NBR-90 P14-N	OR NBR-90 P14-N	2
18	O-Ring	OR NBR-70 P8-N	OR NBR-70 P10-N	OR NBR-70 P16-N	4
19	O-Ring	OR NBR-90 P8-N	OR NBR-90 P9-N	OR NBR-90 P11-N	4
20	Back Up Ring	BR JIS B 2401-4-T2-P8	BR JIS B 2401-4-T2-P10	BR JIS B 2401-4-T2-P16	4

Item 13 Orifice

The timing of flow path opening/closing can be adjusted as required by selecting the appropriate pilot orifice diameter. When the diameter of the orifice is to be changed, another orifice should be ordered. Standard built-in orifice diameters and selectable orifice diameters are listed in the table below.

Orifice Type	TP-OPT-1/16 x d		
	Orifice Diameter "d" mm		
Model Numbers	Standard Built-in	Selectable	Max. Dia. at Pressure over 20 MPa
DSLHG-04	1.0	0.5, 0.6, 0.8, 1.0	1.2
DSLHG-06	1.2	1.2, 1.4, 1.6, 1.8	
DSLHG-10	1.4	2.0, 2.5	1.4

Item 24 Pilot Selector Valve List

Multi-Purpose Control Valve Model Numbers	24 Pilot Selector Valve Model Numbers
DSLHG-04-1	CG-04-1-10
DSLHG-04-2	CG-04-2-10
DSLHG-04-3	CG-04-3-10
DSLHG-06-1	CG-06-1-10
DSLHG-06-2	CG-06-2-10
DSLHG-06-3	CG-06-3-10
DSLHG-10-1	CG-06-1-10
DSLHG-10-2	CG-06-2-10
DSLHG-10-3	CG-06-3-10

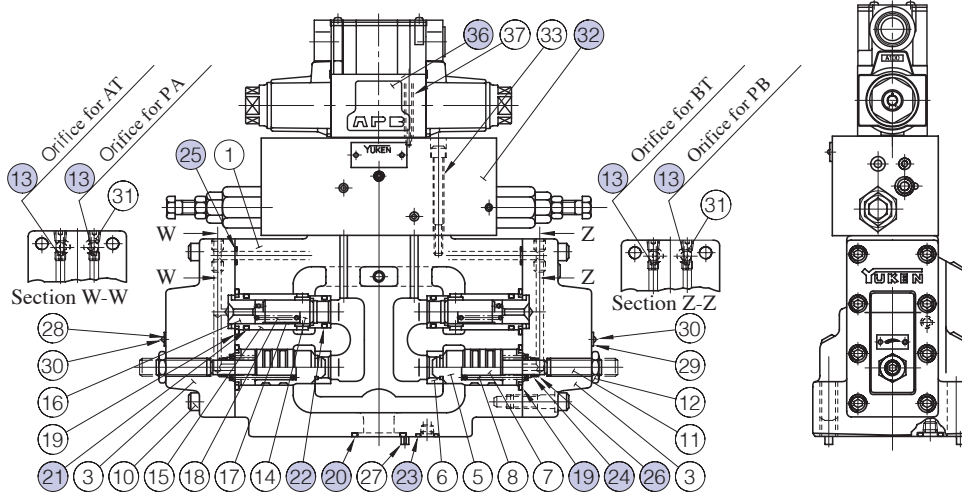
Note For details of Pilot Selector Valve, see page E-119.

Pilot Valve

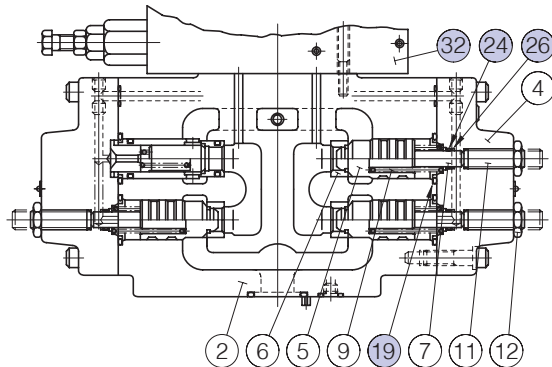
Refer to page E-121 for Pilot Valve Model Numbers.

■ List of Seals for Main Valves and Pilot Selector Valve

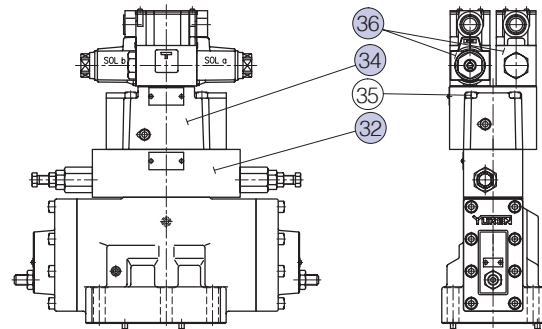
DSLHG-04/06/10-4W-*-12



DSLHG-04/06/10-^{4A}_{5A}-*-12



DSLHG-04/06/10-5W-*-12



Note) Main valve is the same as above drawings.

● List of Seals for Main Valves

Item	Name of Parts	Part Numbers			Qty.
		DSLHG-04	DSLHG-06	DSLHG-10	
19	O-Ring	OR NBR-90 P22-N	OR NBR-90 G30-N	OR NBR-90 G40-N	4
20	O-Ring	OR NBR-90 P22-N	OR NBR-90 P30-N	OR NBR-90 P42-N	4
21	O-Ring	OR NBR-90 P16-N	OR NBR-90 P22-N	OR NBR-90 P30-N	2(1)
22	O-Ring	OR NBR-90 P14-N	OR NBR-90 P20-N	AS568-A122(NBR-90)	2(1)
23	O-Ring	OR NBR-90 P9-N	OR NBR-90 P14-N	OR NBR-90 P14-N	2
24	O-Ring	OR NBR-70 P8-N	OR NBR-70 P10-N	OR NBR-70 P16-N	2(3)
25	O-Ring	OR NBR-90 P8-N	OR NBR-90 P9-N	OR NBR-90 P11-N	4
26	Back Up Ring	BR JIS B 2401-4-T2-P8	BR JIS B 2401-4-T2-P10	BR JIS B 2401-4-T2-P16	2(3)

Note 1: The figures in () indicate the quantity of seals used for 4A and 5A.

● Pilot Valve

Refer to page E-121 for Pilot Valve Model Numbers.

● Pilot Selector Valve List

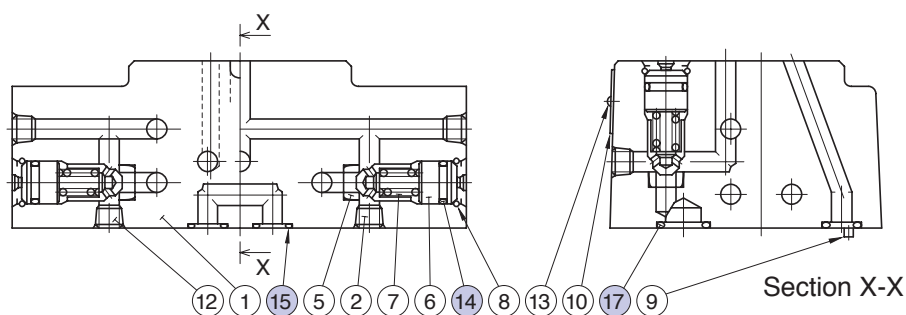
Multi-Purpose Control Valve Model Numbers	Pilot Selector Valve Model Numbers	
	Item (32)	Item (34)
DSLHG-04-4A-■	CG-04-4A-■-10	—
DSLHG-04-4W-■	CG-04-4W-■-10	—
DSLHG-04-5A-■	CG-04-5A-■-10	CG-04-3-10
DSLHG-04-5W-■	CG-04-5W-■-10	
DSLHG-06-4A	CG-06-4A-10	—
DSLHG-06-4W	CG-06-4W-10	—
DSLHG-06-5A	CG-06-5A-10	CG-06-3-10
DSLHG-06-5W	CG-06-5W-10	
DSLHG-10-4A	CG-06-4A-10	—
DSLHG-10-4W	CG-06-4W-10	—
DSLHG-10-5A	CG-06-5A-10	CG-06-3-10
DSLHG-10-5W	CG-06-5W-10	

Note: Fill "B" or "H" representing the pressure adjustment range in section marked with ■.
See page E-120 for the details of the pilot selector valves.

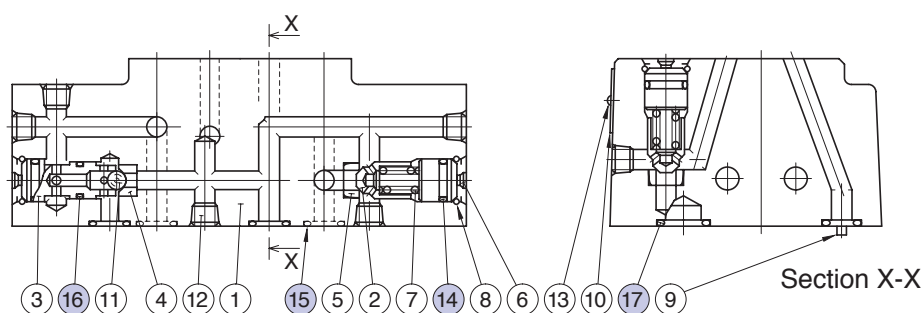
● See the previous page for Item (13) Orifice.

List of Seals (Pilot Selector Valves)

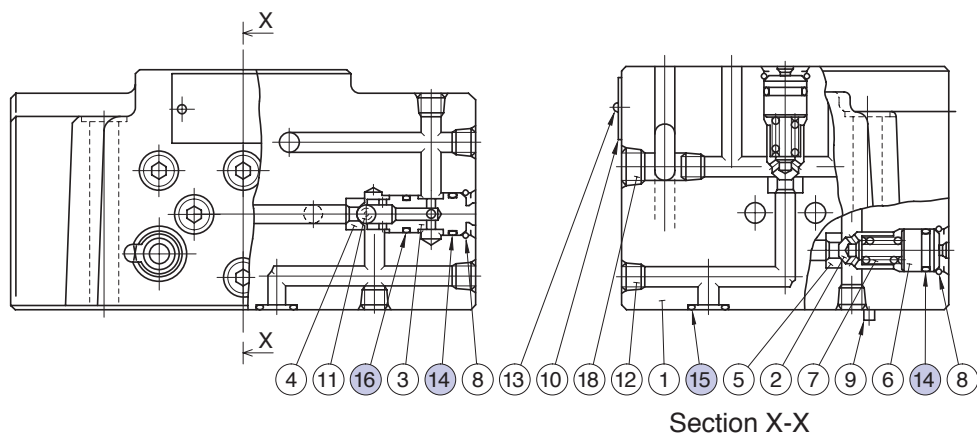
CG-04/06-1-10



CG-04/06-2-10



CG-04/06-3-10

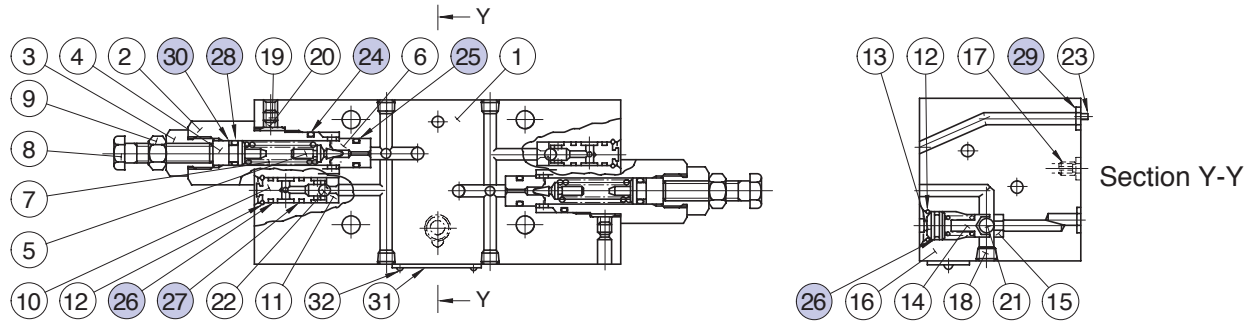


List of Seals

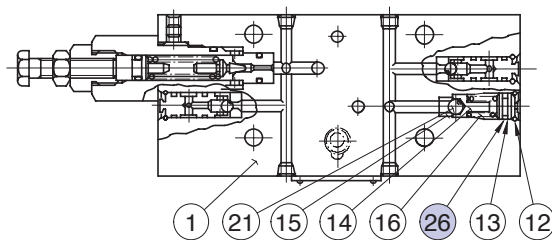
Item	Name of Parts	CG-04				CG-06			
		Part Numbers	Quantity			Part Nmbers	Quantity		
			CG-04-1	CG-04-2	CG-04-3		CG-06-1	CG-06-2	CG-06-3
14	O-Ring	OR NBR-90 P10-N	3	5	5	OR NBR-90 P10-N	3	5	5
15	O-Ring	OR NBR-90 P8-N	7	7	8	OR NBR-90 P9-N	7	7	8
16	O-Ring	OR NBR-90 P8-N	—	2	2	OR NBR-90 P8-N	—	2	2
17	O-Ring	OR NBR-90 P8-N	1	1	—	AS568-A014(NBR-90)	1	1	—

■ List of Seals (Pilot Selector Valves)

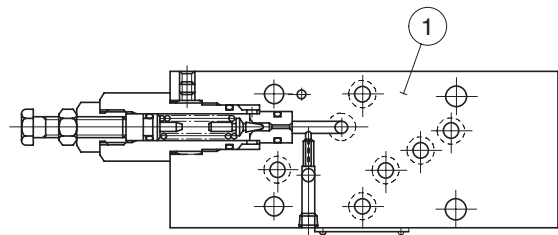
CG-04/06-4W-10



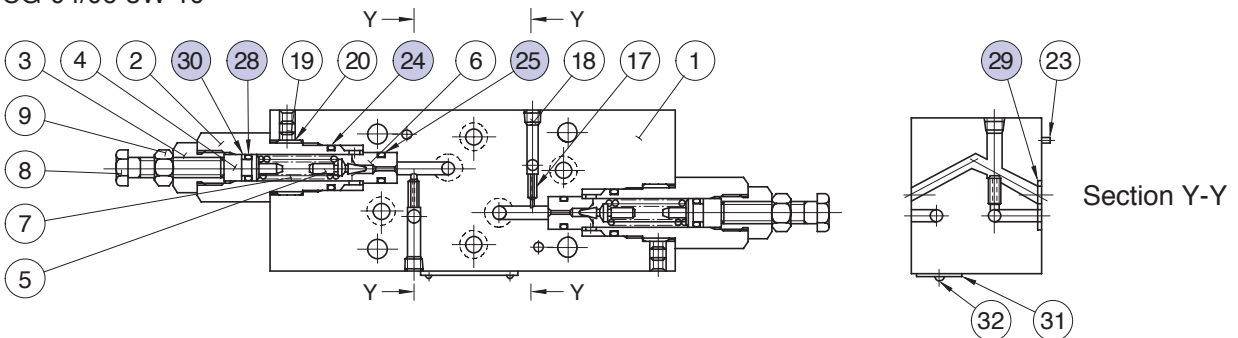
CG-04/06-4A-10



CG-04/06-5A-10



CG-04/06-5W-10



● List of Seals

Item	Name of Parts	CG-04						CG-06					
		Part Numbers	Quantity				Part Numbers	Quantity				Part Numbers	Quantity
			-4W-	-4A-	-5W-	-5A-		-4W-	-4A-	-5W-	-5A-		
24	O-Ring	OR NBR-90 P12-N	2	1	2	1	OR NBR-90 P16-N	2	1	2	1		
25	O-Ring	OR NBR-90 P9-N	2	1	2	1	OR NBR-90 P11-N	2	1	2	1		
26	O-Ring	OR NBR-90 P10-N	3	4	—	—	OR NBR-90 P10-N	3	4	—	—		
27	O-Ring	OR NBR-90 P8-N	2	2	—	—	OR NBR-90 P8-N	2	2	—	—		
28	O-Ring	OR NBR-70 P6-N	2	1	2	1	OR NBR-70 P9-N	2	1	2	1		
29	O-Ring	OR NBR-90 P8-N	8	8	8	8	OR NBR-90 P9-N	8	8	8	8		
30	Back Up Ring	BR JIS B 2401-4-T2-P6	2	1	2	1	BR JIS B 2401-4-T2-P9	2	1	2	1		

List of Pilot Valves

Model Numbers	Pilot Valve Model Numbers
DSLHG-04-1-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-04-2-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-04-3-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-04-4A-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-04-4W-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-04-5A-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-04-5W-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-06-1-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-06-2-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-06-3-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-06-4A-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-06-4W-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-06-5A-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-06-5W-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-10-1-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-10-2-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-10-3-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-10-4A-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-10-4W-★-▲-13	DSG-01-3C9-★-▲-70
DSLHG-10-5A-★-▲-13	DSG-01-2B2-★-▲-70
DSLHG-10-5W-★-▲-13	DSG-01-2B2-★-▲-70

Note 1: Fill coil type (a symbol representing current/voltage) in section marked ★. Likewise, in section marked ▲, fill a symbol representing the type of electrical conduit connection (None: Terminal Box Type, N: Plug-in Connector Type).

2: See page E-22 for the detailed information on the pilot valves.

Solenoid Operated Poppet Type Two-Way Valves

These valves are used for opening/closing the oil path by having the poppet valve operated with an electric signal via solenoid. Because these are poppet type valves, the internal leakage is quite small and there is no worry about hydraulic lock.

Specifications

Model Numbers	Max. Flow* ¹ L/min	Max. Operating Pressure MPa	Internal leakage cm ³ /min	Max. Changeover Frequency min ⁻¹	Approx. Mass kg
CDSC-01-C-D24-10	15	21* ²	0.25 or less	240	0.35
CDSC-03-C-* -21	50	14	0.25 or less	AC : 300 DC : 240 R : 120	0.5
CDST- ^{03W} ₀₃ -C-* -21					0.85
CDSG-03-C-* -21					0.85

- ★1. The maximum flow means the limited flow without inducing any abnormality to the operation (changeover) of the valve.
- ★2. When the valve is operated at 18.5 MPa or higher pressure, continuous energies time is restricted with max. 30 min., and also the energies ratio less than 90 %.

Solenoid Ratings

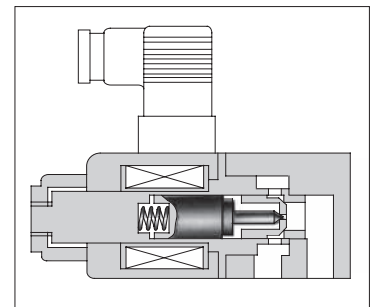
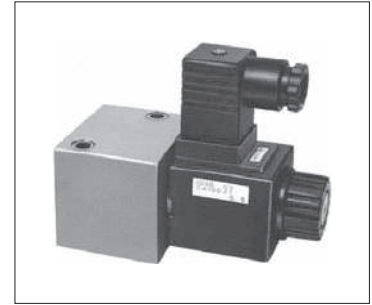
Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
			Source Rating	Serviceable Range	Inrush (A)	Holding (A)	Power (W)
AC	A 100	50	100	80 - 100	1.12	0.55	—
		60	100 110	90 - 120	0.95 0.86	0.40 0.36	
	A 120	50	120	96 - 132	0.93	0.46	
		60		108 - 144	0.79	0.33	
	A 200	50	200	160 - 220	0.56	0.28	
		60	200 220	180 - 240	0.48 0.43	0.20 0.18	
	A 240	50	240	192 - 264	0.47	0.23	
		60		216 - 288	0.40	0.17	
DC (K Series)	D 12	—	12	10.8 - 13.2	—	2.20	26
	D 24*		24	21.6 - 26.4		1.10	
	D 100		100	90 - 110		0.27	
AC → DC Rectified	R 100	50/60	100	90 - 110	—	0.30	26
	R 200		200	180 - 220		0.15	

- ★CDSC-01 is available with coil type "D24" only.
- Because both AC and DC solenoids employ the plug-in type electrical wiring, the valve can be removed without removing the wiring. (Coil type of CDSC-01 is flying lead wire only.)
- Being 50-60 Hz common service AC solenoids, do not require rewiring when the applied frequency is changed.
- K-Series DC Solenoid which has a reputation for excellent DC control is employed. (Coil type of CDSC-01 is with Surge Suppressor.)

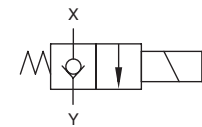
Model Number Designation

CDS	T	-03	-C	-D12	-21
Series Number	Type of Connection	Valve Size	Valve Type	Coil Type	Design Number
CDS : Solenoid Operated Poppet Type Two- Way Valves	C : Cartridge Type	01	C : Normally Closed	DC D24	10
		03		AC A100 A120 A200 A240	21
	T : Threaded Connection	03W (Rc 1/4) 03 (Rc 3/8)		DC D12 D24 D100	21
		03		AC DC Rectified R100 R200	21
	G : Gasket Mounting	03			

- ★ Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.



Graphic Symbol



Instructions

- Direction of flow when the solenoid is energised
These valves do not allow flow from Y to X when the solenoid is energised.
- Mounting
There are no mounting restrictions for any models.
- At the time of test run
At the time of test run, there is a possibility that the oil may not flow even after the solenoid is energised because of the residual air in the valve, so please release the air by few times solenoid energising at on-load condition.

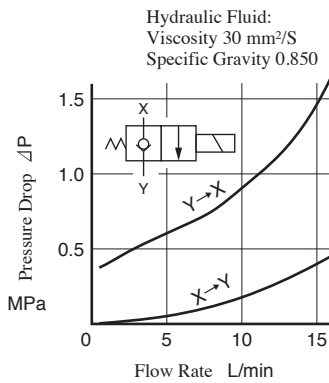
Accessories

Mounting bolt below is attached only for Gasket mounting type valve (CDSG-03).

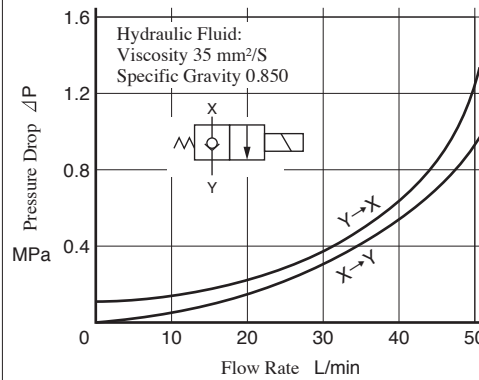
Socket Head Cap Screws :
M6×60L ...2pcs.

Pressure Drop

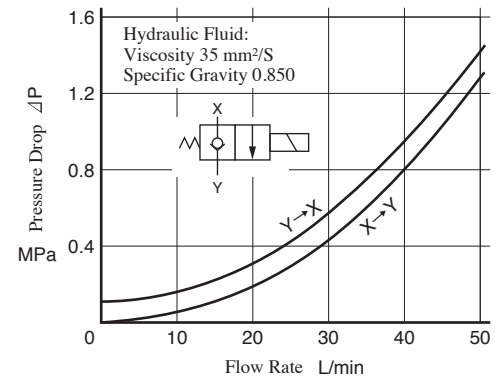
CDSC-01



CDSC-03 CDST-03 CDSG-03



CDST-03W



Note: Measuring has been made for the CDSC-03 (Cartridge type) when it is equipped with the same body as the threaded connections and the gasket mounting type.

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

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.84	0.91	1.00	1.07	1.14	1.19	1.24	1.28	1.32	1.35

For any other specific gravity (G'), the pressure drop ($\Delta P'$) may be obtained from the formula below.
 $\Delta P' = \Delta P(G'/0.850)$

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

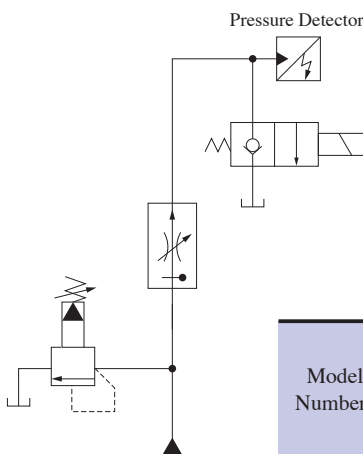
Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

For any other specific gravity (G'), the pressure drop ($\Delta P'$) may be obtained from the formula below.
 $\Delta P' = \Delta P(G'/0.850)$

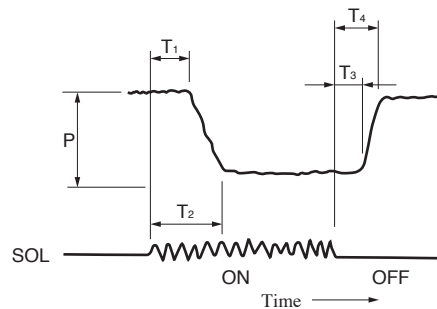
Changeover Time

Changeover time, T₂ and T₄, in particular, varies according to the hydraulic circuit and operating conditions. As an example, the following figures show how the measurement is made.

Test Circuit



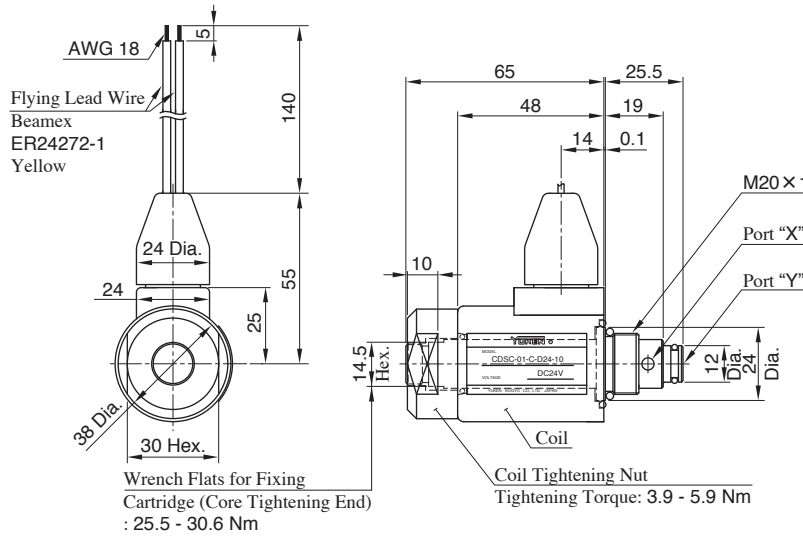
Result of measurement



Model Numbers	Solenoid Types	Condition		Time ms			
		Pressure "P" MPa	Flow Rate L/min	SOL "ON" (Open → Close)		SOL "OFF" (Open → Close)	
				T ₁	T ₂ (ex.)	T ₃	T ₄ (ex.)
CDSC-01	DC	10	15	21.4	44.0	29.0	38.4
		21	15	30.6	47.0	27.0	44.0
CDS*-03	AC	7	50	10.0	86.0	20.0	44.0
		14	50	11.0	43.0	12.0	54.0
	DC	7	50	22.0	104.0	44.0	66.0
		14	50	24.0	60.0	41.0	73.0
	AC → DC Rectified	7	50	27.0	100.0	114.0	146.0
		14	50	32.0	66.0	108.0	142.0

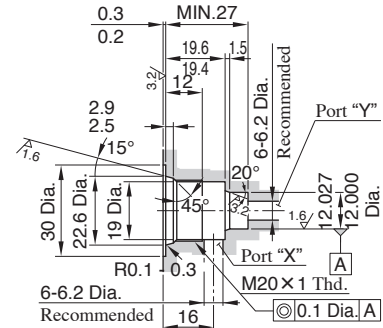
Note: Shifting time above is the value at rated voltage.

CDSC-01



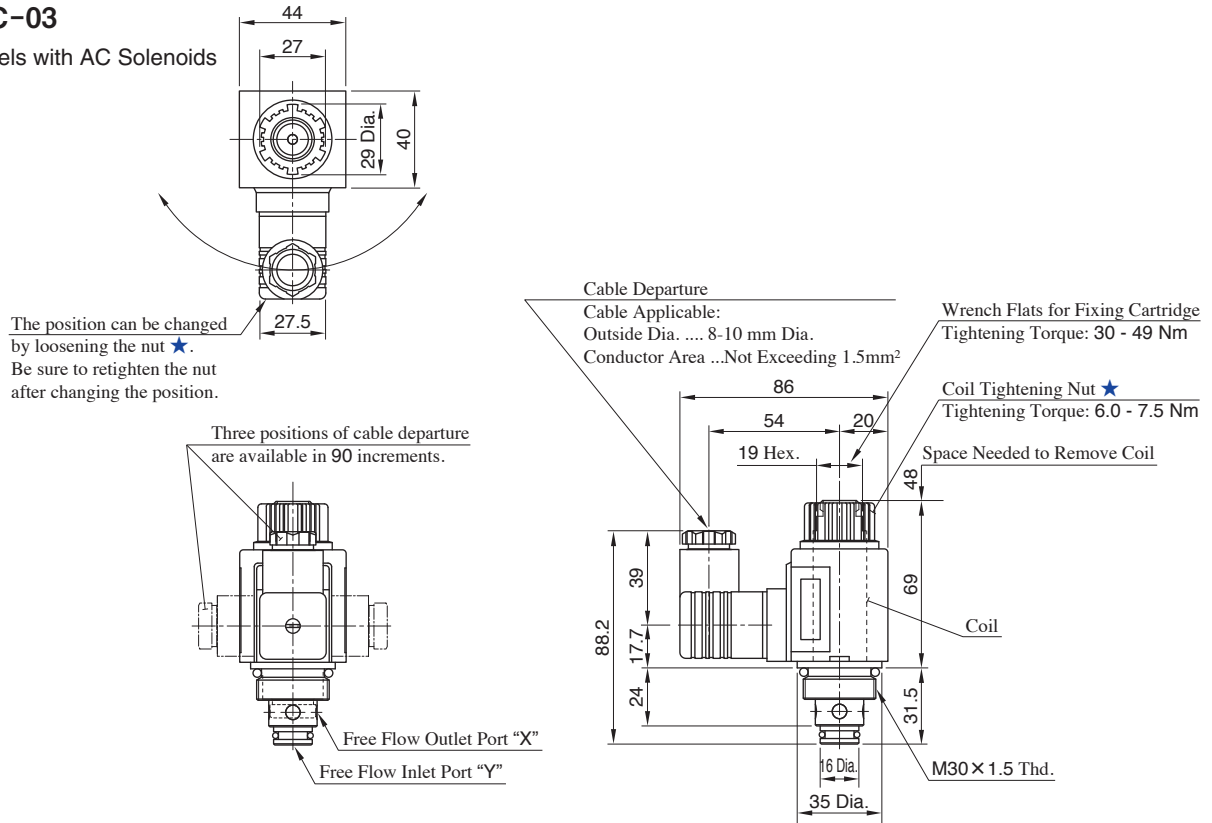
Details of Mounting Holes

How to mount, see CDSC-03 below.

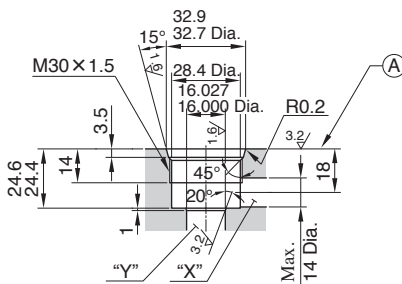


CDSC-03

Models with AC Solenoids



Details of Mounting Holes



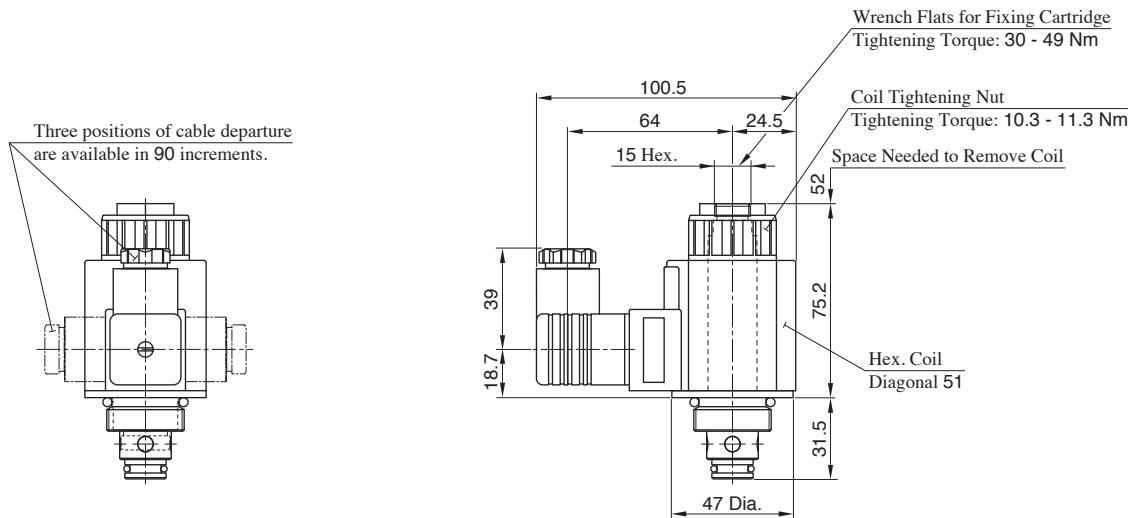
How to Mount

When mounting, the following steps must be followed:

1. Loosen the nut ★, then remove the coil.
2. Thread the cartridge, making sure that the collar (AC:35 Dia.,DC/R:47 Dia.) of the cartridge is well fitted to the component surface (A) surface in the left drawing.
3. Attach the coil and secure it with a nut.

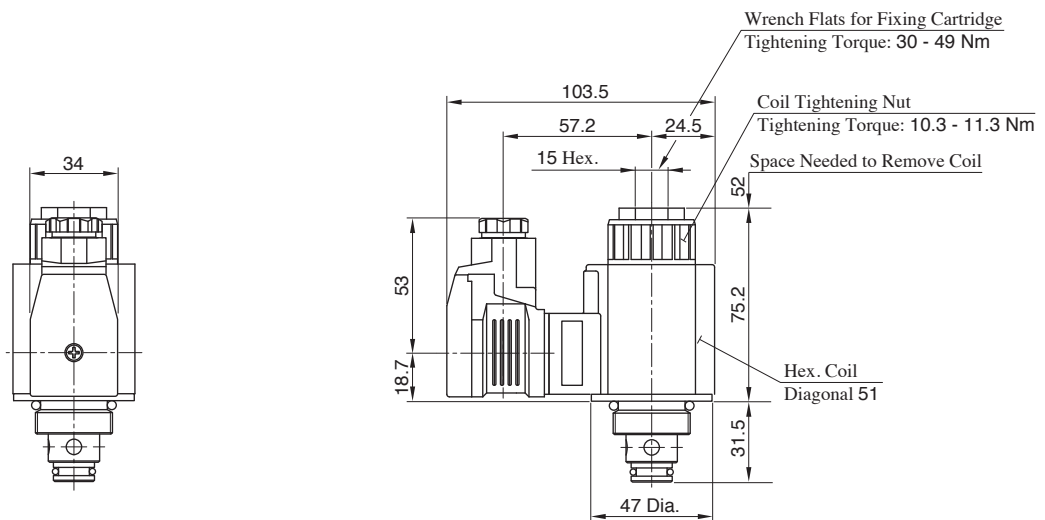
CDSC-03

● Models with DC Solenoids



- For other dimensions, refer to the "Models with AC Solenoids".
- How to mount, refer to the previous page.

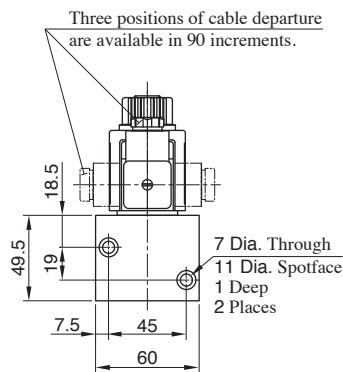
● Models with R Type Solenoids



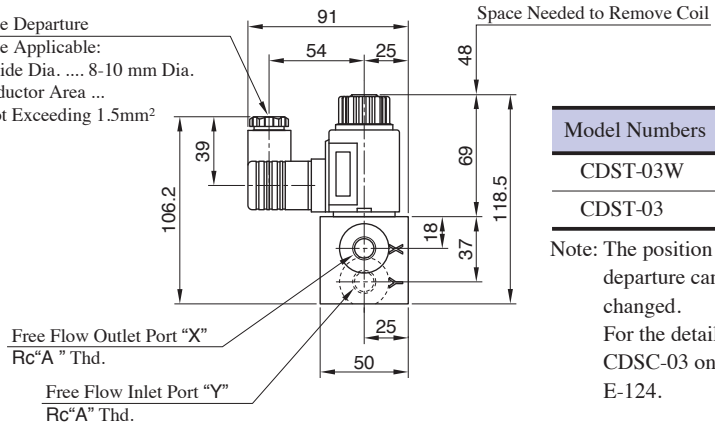
- For other dimensions, refer to the "Models with AC Solenoids".
- How to mount, refer to the previous page.

CDST-03, 03W

● Models with AC Solenoids



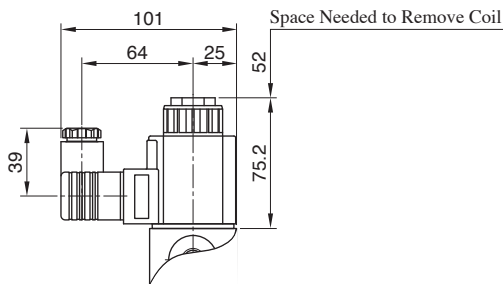
Cable Departure
Cable Applicable:
Outside Dia. 8-10 mm Dia.
Conductor Area ...
Not Exceeding 1.5mm²



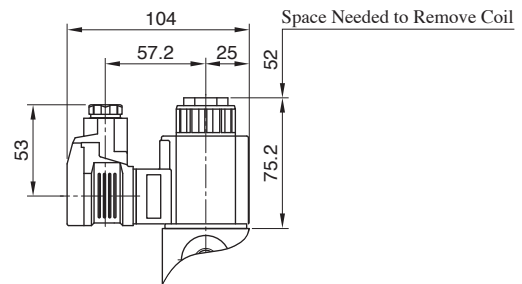
Model Numbers	A
CDST-03W	$\frac{1}{4}$
CDST-03	$\frac{3}{8}$

Note: The position of cable departure can be changed.
For the detail, refer to CDSC-03 on page E-124.

● Models with DC Solenoids



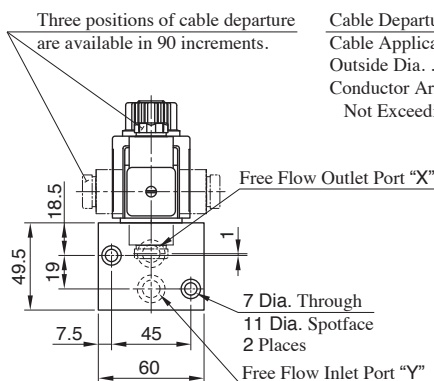
● Models with R Type Solenoids



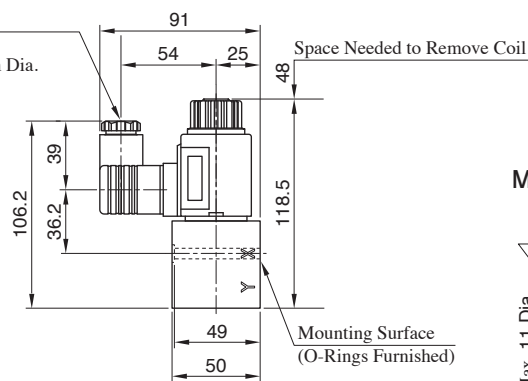
● For other dimensions, refer to the "Models with AC Solenoids".

CDSG-03

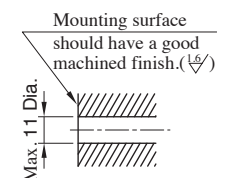
● Models with AC Solenoids



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



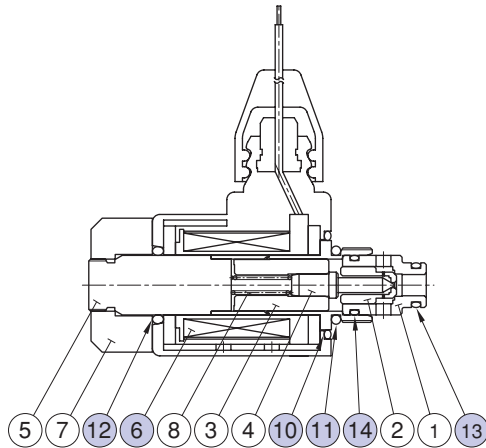
Mounting Surface



Note) 1. For models with DC solenoids and models with R type solenoids, refer to CDST-03, 03W.
2. The position of cable departure can be changed. For the detail, refer to CDSC-03 on page E-124.

List of Seals, Solenoid Ass'y, Coil Ass'y

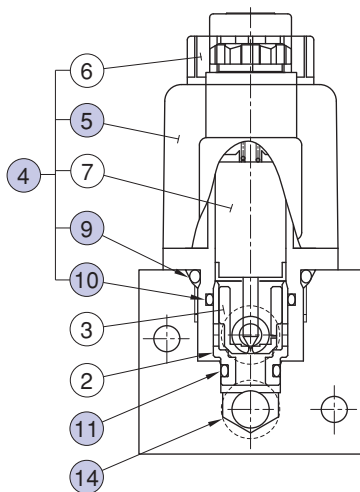
CDSC-01



List of Seals and Coil Ass'y

Item	Name of Parts	Part Numbers	Qty.
6	Coil Ass'y	2697-VK317470-3	1
10	O-Ring	JASO 2025 4 D	1
11	O-Ring	OR NBR-90 P18-N	1
12	O-Ring	OR NBR-90 P16-N	1
13	O-Ring	OR NBR-90 P9-N	1
14	O-Ring	AS 568-014 (NBR-90)	1

CDSC/CDST/CDSG-03 *



List of Seals

Item	Name of Parts	Part Numbers	Qty.	Remarks
9	O-Ring	OR NBR-90 P26-N	1	Included in Solenoid Ass'y
10	O-Ring	OR NBR-90 P20-N	1	
11	O-Ring	OR NBR-90 P12-N	1	
14	O-Ring	AS 568-014 (NBR-90)	2	only for CDSG

Solenoid Ass'y, Coil Ass'y

Valve Model No.	④ Solenoid Ass'y No.	⑤ Coil Ass'y No.
CDS *-03 *-C-A100	CSA1-100-20	C-CSA1-100-20
CDS *-03 *-C-A120	CSA1-120-20	C-CSA1-120-20
CDS *-03 *-C-A200	CSA1-200-20	C-CSA1-200-20
CDS *-03 *-C-A240	CSA1-240-20	C-CSA1-240-20
CDS *-03 *-C-D 12	CSD1-12-20	C-SD1-12-N-50
CDS *-03 *-C-D 24	CSD1-24-20	C-SD1-24-N-50
CDS *-03 *-C-D100	CSD1-100-20	C-SD1-100-N-50
CDS *-03 *-C-R100	CSR1-100-20	C-SR1-100-N-50
CDS *-03 *-C-R200	CSR1-200-20	C-SR1-200-N-50

Interchangeability between Current and New Design

Because of solenoid assembly improvements, CDS -03 has been model-changed (design 20 to design 21).

Specifications and Characteristics

There are no changes in the specifications and characteristics of the valves themselves.

Solenoid Ratings

There are changes in the inrush current, holding current and power, but there are no technical problem.

Interchangeability in Installation

There are some changes in dimensions about solenoids, but interchangeability in installation is no problem.

Shut-off Type Solenoid Operated Directional Valves

The shut-off type solenoid operated directional valves are poppet type solenoid operated two-way directional valves developed to meet the needs of this age such as energy and resources saving.

- **High-response**

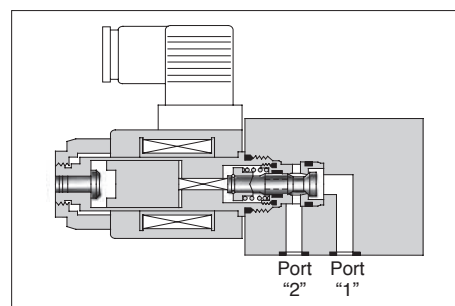
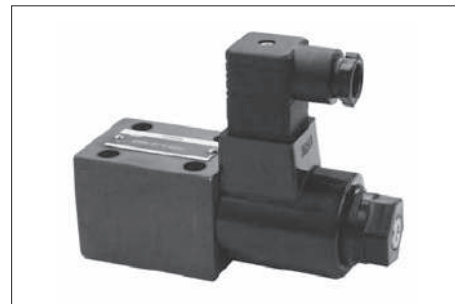
High response is provided by the poppet design.

- **Smallest internal leakage**

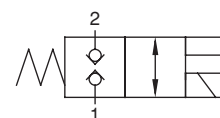
Internal leakage are very small, less than 5 drips per min., which is achieved by the poppet design.

- **Two mounting types: cartridge and sub-plate**

Mounting dimensions for both types conform to ISO standard.



Graphic Symbol



Specifications

Model Numbers	Max. Flow★ ¹ L/min	Max. Operating Pressure MPa			Max. Changeover Frequency min ⁻¹	Internal leakage cm³/min	Approx. Mass kg
		Port“1”		Port “2”			
		“1”→“2”Flow	“2”→“1”Flow				
DSPC-01-C-D24-30★ ²	40	10	21	25	300	0.25 or Less	0.6
DSPG-01-C-D24-30★ ²							1.6
DSPC-03-C-D24-10★ ²	80	10	16	25	240	0.25 or Less	1.0
DSPG-03-C-D24-10★ ²							3.9

★1. Maximum flow rates depend on operating conditions. For details, see page E-130.

★2. Protections against dust and water conform to the international electric standard below.

DSPC-01, DSPG-01 : (I.E.C) PUBL.529 IP65

DSPC-03, DSPG-03 : (I.E.C) PUBL.529 IP64

Instructions

- Do not connect port "1" to a line subjected to surge pressures. In addition, if you use port "1" for tank line, be sure to keep the end of the line in the oil.
- In the case of "DSPC", use iron material for installation body.

Model Number Designation

DSP	G	-01	-C	-D24	-30
Series Number	Type of Connection	Valve Size	Valve Type	Coil Type	Design Number
DSP : Shut-off Type Solenoid Operated Directional Valves	C : Cartridge Type G : Sub-plate Mounting	01	C : Normally Closed	DC D24	30
		03		DC D12 D24	10

★ Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Solenoid Ratings

Electric Source	Coil Type	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage					
			Source Rating	Serviceable Range	Inrush★ ¹ (A)		Holding (A)		Power (W)	
					01	03	01	03	01	03
DC★ ²	D12	—	12	10.8 - 13.2	—	—	—	3.16	—	38
	D24		24	21.6 - 26.4			1.22	1.57	29	

★ 1. Inrush current in the above table shows rms values at maximum stroke.

★ 2. K-Series DC Solenoid which has a reputation for excellent DC control is employed.

Sub-plates

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

● 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)

● These sub-plates are sharable with those for DSG-01/03 Series Solenoid Operated Directional Valve. For dimensions, see pages E-31 and E-47.

Accessories

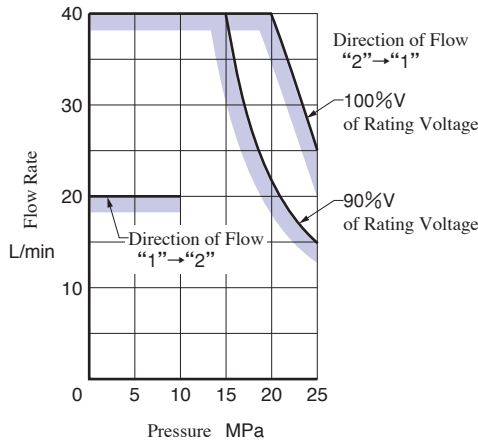
Valve Model Numbers	Mounting Bolts (Soc. Hd. Cap Screw)	
	Size	Tightening Torque
DSPG-01	M5×50L 4 pcs.	5 - 7 Nm
DSPG-03	M6×80L 4 pcs.	12 - 15 Nm

Characteristics Typical Performance Characteristics at Viscosity 30 mm²/s (ISO VG 46 oils, 50°C)

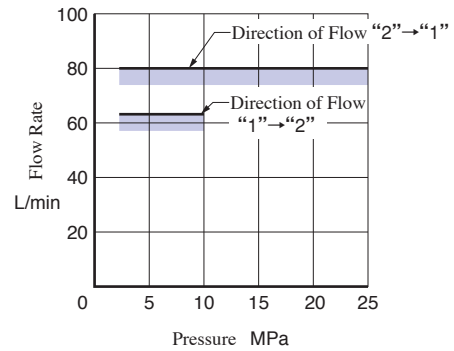
Maximum Flow Rate

The zone under each shaded line denotes the flow rate ranges being free of trouble in changeover.

● DSPC/DSPG-01



● DSPC/DSPG-03

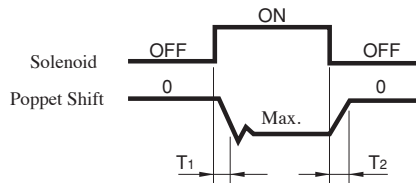


Typical Changeover Time

[Test Conditions]

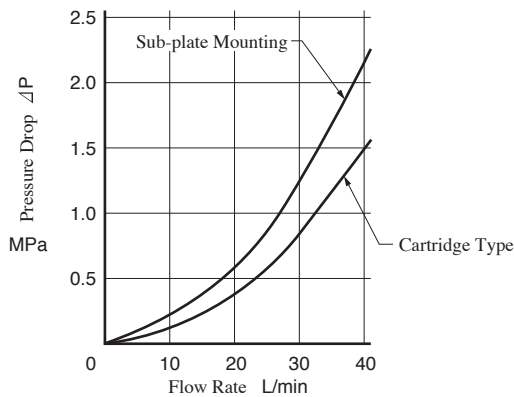
- Pressure : 15 MPa
- Flow Rate : (01) 30 L/min
(03) 63 L/min
- Voltage : 100% V of Rating Voltage
- Direction of Flow : "2" → "1"

Model Numbers	Time ms	
	T ₁	T ₂
DSP*-01-C-D*	69	14
DSP*-03-C-D*	60	80

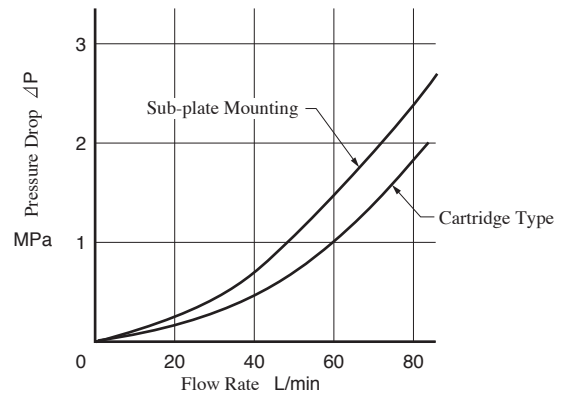


Pressure Drop

● DSPC/DSPG-01



● DSPC/DSPG-03



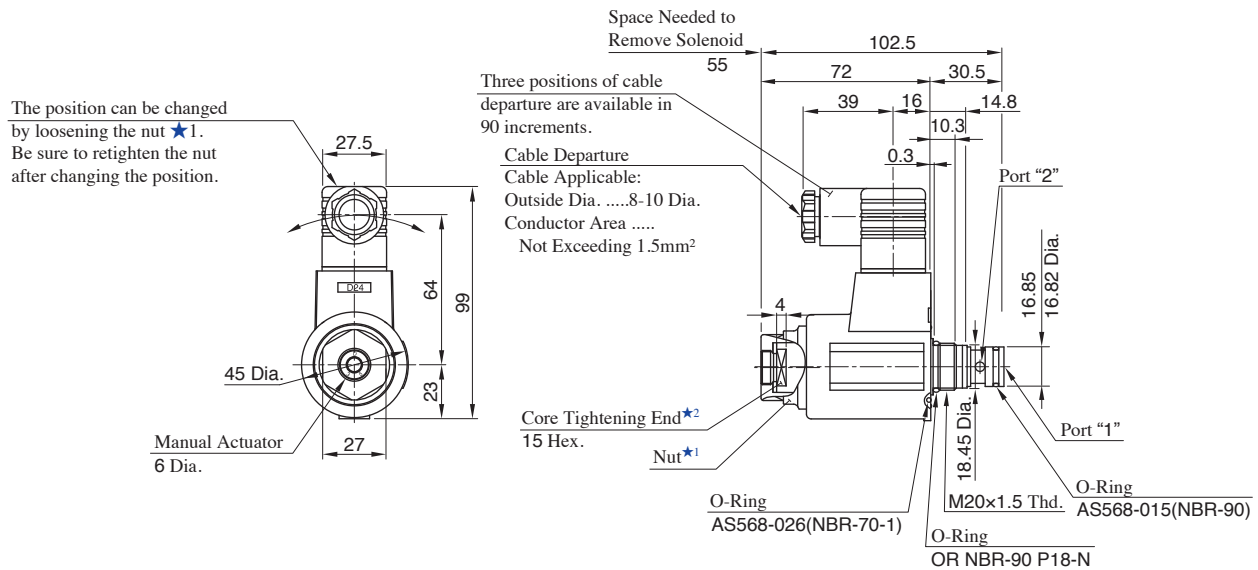
- For any other viscosity, multiply the factors in the table right.
- For any other specific gravity (G'), the pressure drop (ΔP') may be obtained from the formula below.

$$\Delta P' = \Delta P (G'/0.850)$$

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.84	0.91	1.00	1.07	1.14	1.19	1.24	1.28	1.32	1.35

DSPC-01

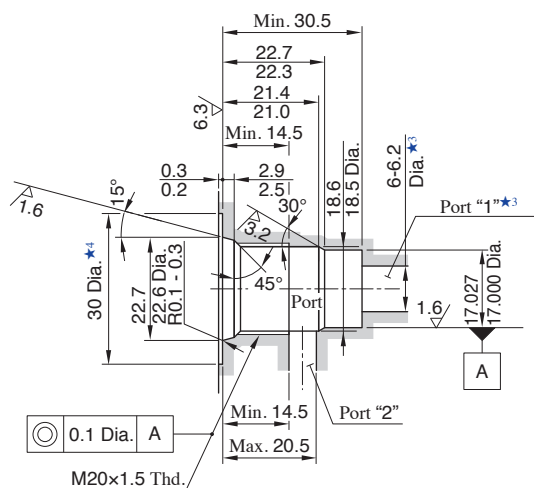
Mounting Surface: ISO 7789 20-01-0-07



- ★1. Tightening Torque for Nuts : 10.3 - 11.3 Nm
- ★2. Tightening Torque for Iron Core Assembly : 20.5 - 25.5 Nm

Shut-off Type

Details of Mounting Holes



How to Mount

When mounting, the following steps must be followed.

1. Loosen the coil fastening the nut ★2 and remove the coil.
2. Making use of the core tightening end ★1, screw the cartridge in.
3. Attach the coil and fix it with the nut.

Note 1) ★3 Port diameter of 6.2 Dia. recommended.

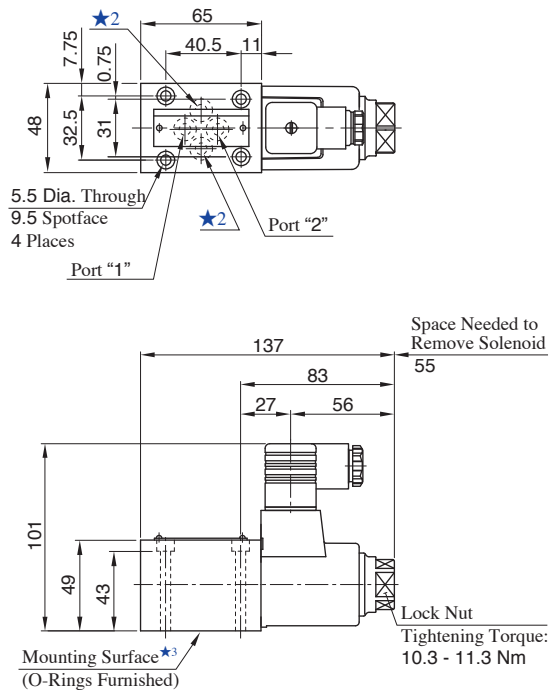
Note 2) Mounting hole dimensions conform to ISO 7789 20-01-0-07, only ★4 dimension is different.

So in case that 30 design products mount on 33 Dia. hole of current design (10,20 design), those of water-proof function decrease to about IP 64 level.

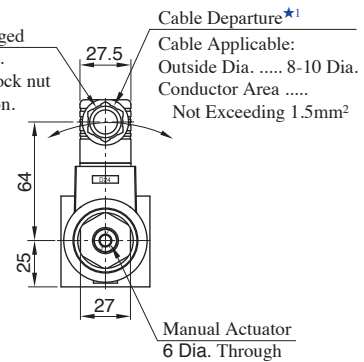
Note 3) Use iron materials for the mounting section.

DSPG-01

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



The position can be changed by loosening the lock nut. Be sure to retighten the lock nut after changing the position.

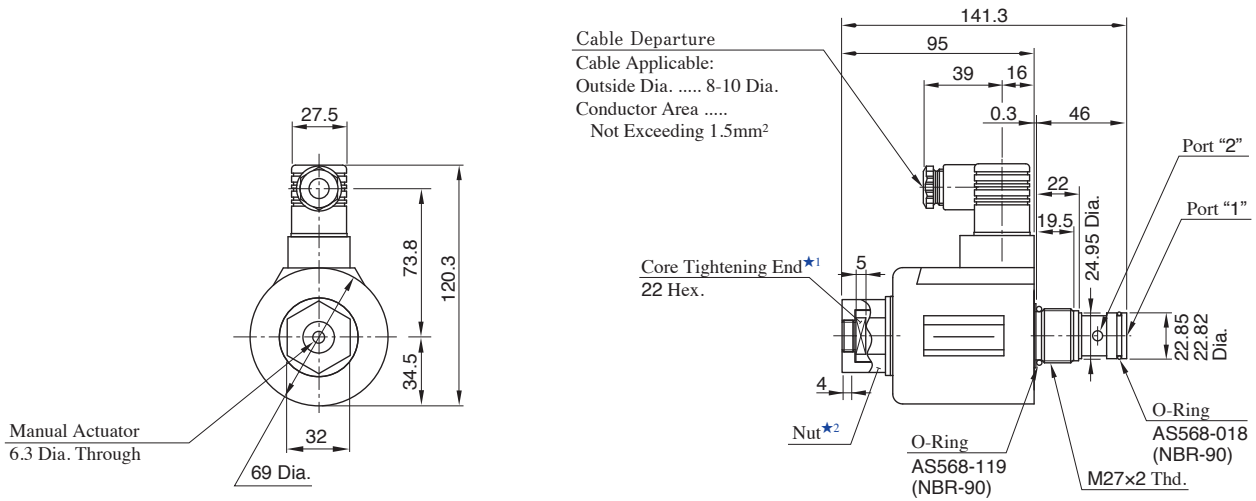


- ★1. The location and the position of the cable departure can be changed. For details, see the cartridge type.
- ★2. These ports (2 places) are not used. In addition, the body has the O-ring grooves and O-rings are included in the body.
- ★3. Ports A and B are used as ports "2" and "1" respectively.
- ★4. O-rings for Ports: OR NBR-90 P9-N

Note) Dimensions of valve mounting surface are shared with those of sub-plates, refer to page E-31.

DSPC-03

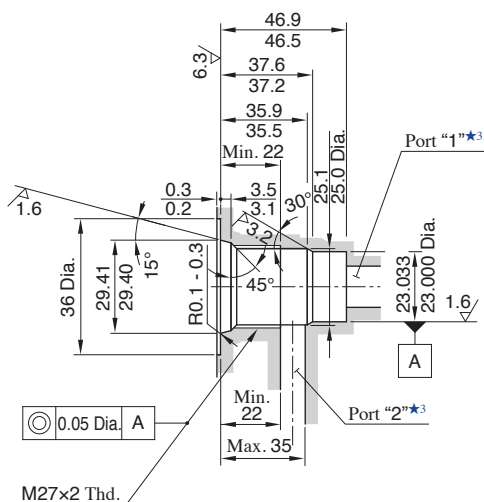
Mounting Surface: ISO 7789 27-01-0-07



- ★¹. Tightening Torque for Iron Core Assembly : 110 - 140 Nm
- ★². Tightening Torque for Nuts : 8.5 - 10.5 Nm

Shut-off Type

Details of Mounting Holes



How to Mount

When mounting, the following steps must be followed.

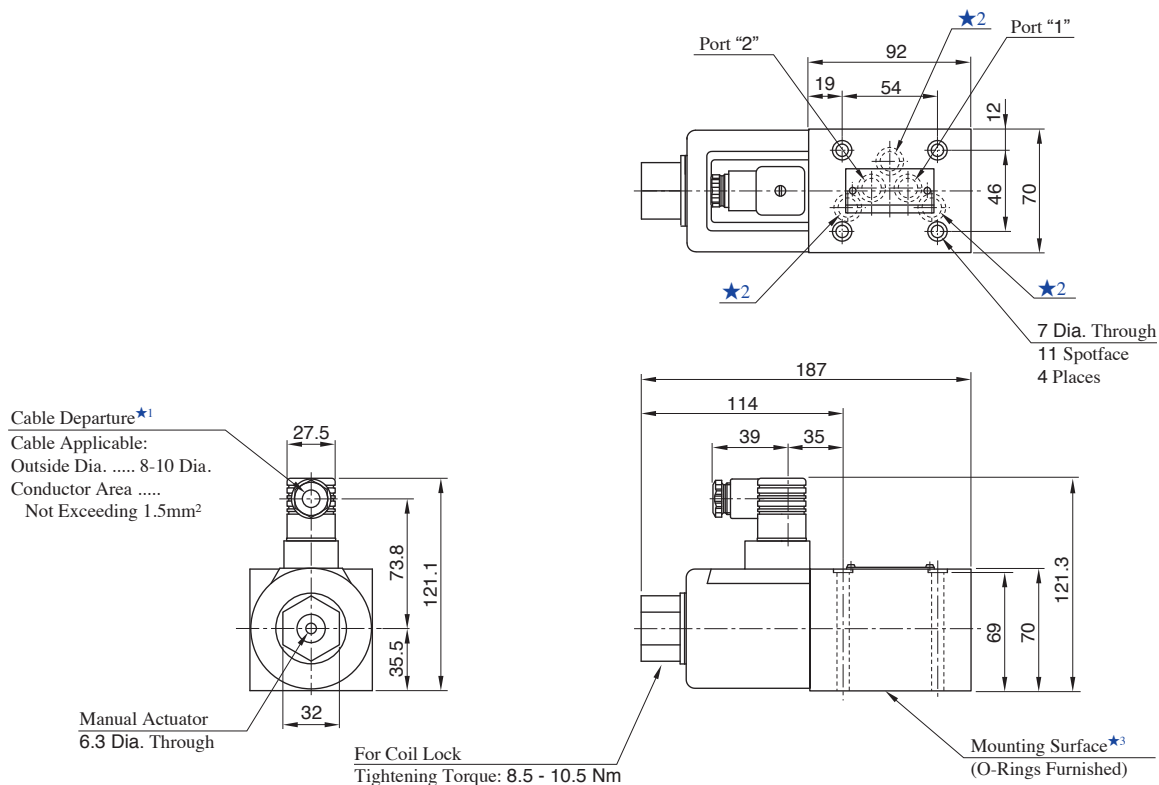
1. Loosen the coil fastening the nut ★² and remove the coil.
2. Making use of the core tightening end ★¹, screw the cartridge in.
3. Attach the coil and fix it with the nut.

Note 1) ★³ Port diameter of 11 Dia. recommended.

Note 2) Use iron materials for the mounting section.

DSPG-03

Mounting Surface: ISO 4401-05-04-0-05

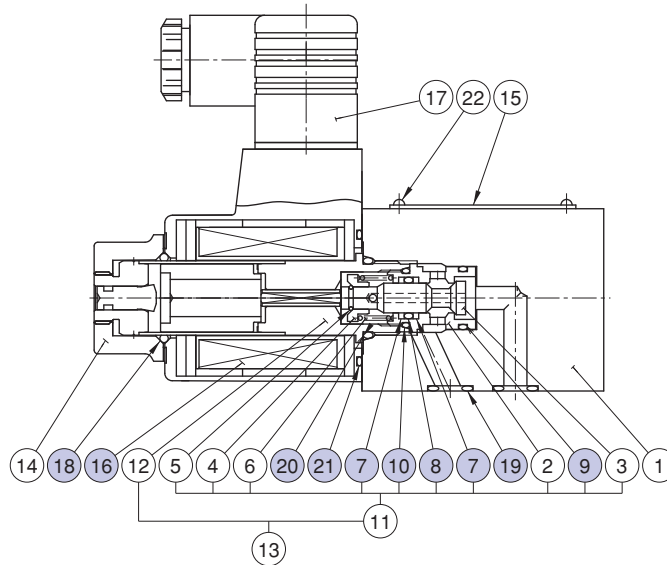


- ★1. The location and the position of the cable departure can be changed. For details, see the DSG-03 Series Solenoid Operated Valves on page E-48.
- ★2. These ports (3 places) are not used. In addition, the body has the O-ring grooves and O-rings are included in the body.
- ★3. Ports A and B are used as ports "2" and "1" respectively.
- ★4. O-rings for ports: AS 568-014 (NBR-90)

Note) Dimensions of valve mounting surface are shared with those of sub-plates, refer to page E-47.

List of Seals, Solenoid Ass'y, Coil Ass'y

DSPC/DSPG-01 DSPC/DSPG-03



List of Seals

Item	Name of Parts	DSP*-01		DSP*-03	
		Part Numbers	Qty.	Part Numbers	Qty.
7	Back Up Ring	SD 1286-VK420107-5	2	2691-VK418550-0	2
8	O-Ring	OR NBR-70-1 P8-N	1	OR NBR-70-1 P12-N	1
9	O-Ring	AS 568-015 (NBR-90)	1	AS 568-018 (NBR-90)	1
10	O-Ring	AS 568-014 (NBR-90)	1	AS 568-017 (NBR-90)	1
18	O-Ring	OR NBR-70-1 P20-N	1	—	—
19★	O-Ring	OR NBR-90 P9-N	4	AS 568-014 (NBR-90)	5
20	O-Ring	OR NBR-90 P18-N	1	AS 568-119 (NBR-90)	1
21	O-Ring	AS 568-026 (NBR-70-1)	1	—	—

★ O-ring item ⑱, use only for sub-plates mounting type (DSPG-01/03).

List of Solenoid Ass'y, Coil Ass'y

Valve Model No.	Solenoid Ass'y No.	⑱Coil Ass'y No.
DSPC/DSPG-01-C-D24	—★	C-SD1H-24-N-70
DSPC/DSPG-03-C-D12	SD3-12-N-5130	C-SD3-12-N-51
DSPC/DSPG-03-C-D24	SD3-24-N-5130	C-SD3-24-N-51

★About replacement of DSPC/DSPG-01 solenoid ass'y, please contact us.

Interchangeability between Current and New Design

Because of solenoid assembly improvements, DSP*-03 has been model-changed (design 20 to design 30).

Specifications and Characteristics

Max. operating pressure at port “1” flow “2”→“1”, pressure changed 16MPa → 21 MPa.

Solenoid Ratings

There are changes in the holding current, but there are no technical problem.

But the coil type is limited only for D24, about replacement of solenoid ass'y, please contact us.

Dust and Water Proof Specifications

Water-proof protection level is upgraded. (IEC) PUBL.529 IP64 → (IEC) PUBL.529 IP65

In case that DSPC-01 mount on 33 Dia. hole of current design, those of water-proof function decrease to IP 64 level.

Interchangeability in Installation

There are some changes in dimensions about solenoids, but interchangeability in installation is no problem.

Models with AC Solenoids

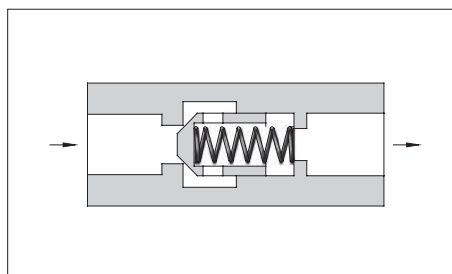
Because of the component parts stock shortage, stop selling.

Check/Pilot Controlled Check Valves

Valve Type	Graphic Symbols	Max. Operating Pressure MPa	Maximum Flow L/min												Page
			1	2	5	10	20	50	100	200	500	1000	2000	5000	
Check Valves		25	In-Line (CIT)												E-137
			Right Angle (CRT/CRG)												
			Right Angle, Flanged Connection (CRF)												
Pilot Operated Check Valves		25	Threaded Connection (CP*T) Sub-plate Mounting (CP*G)												E-143
			Flanged Connection (CP*F)												
In-Line Prefill Valves		25	PI * F-40												E-148

In-Line Check Valves

These valves allow free flow in one direction and prevent flow in the reverse direction. Cracking pressure specified is the pressure required to open the valve and allow free flow.



Graphic Symbol



Specifications

Model Numbers	Rated Flow★ L/min	Max. Operating Pres. MPa	Cracking Pres. MPa	Approx. Mass kg
CIT-02- *-50	16	25	0.04 0.35 0.5	0.1
CIT-03- *-50	30			0.3
CIT-06- *-50	85			0.8
CIT-10- *-50	230			2.3

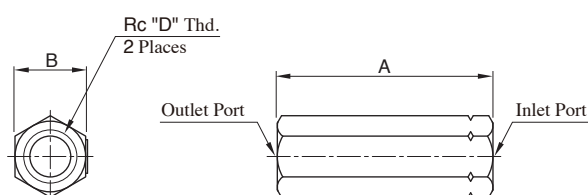
★Rated flow is the approximate flow rate, when there is a free flow pressure drop of maximum 0.3 MPa, the fluid has a specific gravity of 0.85 and a kinematic viscosity of 20 mm²/s, and the cracking pressure is 0.04 MPa.

Model Number Designation

CI	T	-03	-04	-50
Series Number	Type of Connection	Valve Size	Cracking Pressure MPa	Design Number
C I : In-Line Check Valve	T : Threaded Connection	02	04 : 0.04 35 : 0.35 50 : 0.5	50
		03		50
		06		50
		10		50

● For In-Line Check Valves, standard type (for petroleum base oils) can be used phosphate ester type fluid.

CIT-02, 03, 06, 10

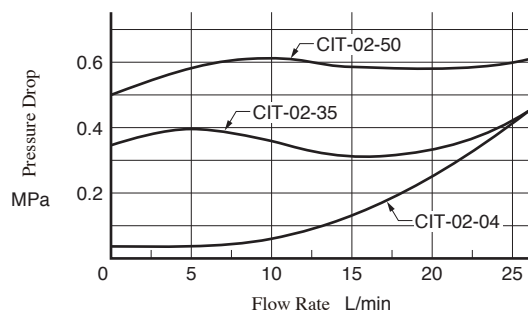


Model Numbers	A	B	D
CIT-02- *-50	58	19	1/4
CIT-03- *-50	76	27	3/8
CIT-06- *-50	95	41	3/4
CIT-10- *-50	133	60	1 1/4

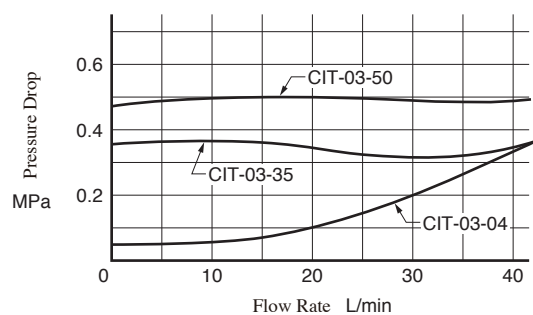
Pressure Drop

Hydraulic Fluid: Viscosity 30 mm²/s

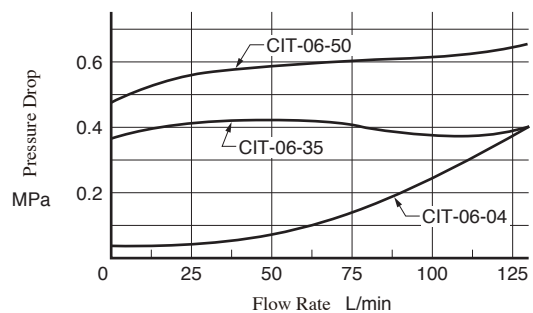
CIT-02



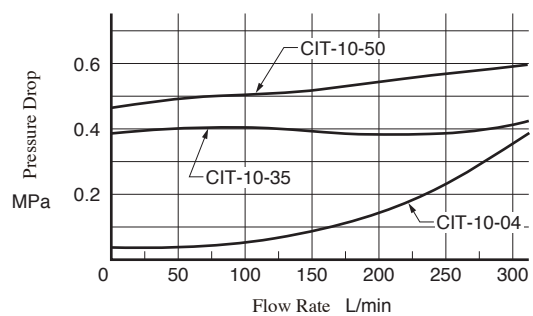
CIT-03



CIT-06

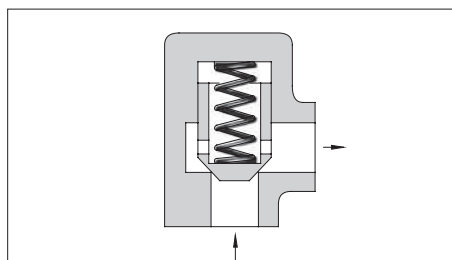


CIT-10



Right Angle Check Valves

These valves allow free flow in one direction and prevent flow in the reverse direction. Cracking pressure specified is the pressure required to open the valve and allow free flow.



Graphic Symbol



Specifications

Model Numbers		Rated Flow* L/min	Max. Operating Pres. MPa	Cracking Pres. MPa	Approx. Mass kg
Threaded Connection	CRT-03- *-50	40	25	0.04	0.9
	CRT-06- *-50	125		0.35	1.7
	CRT-10- *-50	250		0.5	5.6
Sub-plate Mounting	CRG-03- *-50	40	25	0.04	1.7
	CRG-06- *-50	125		0.35	2.9
	CRG-10- *-50	250		0.5	5.5

* Rated flow is the approximate flow rate, when there is a free flow pressure drop of maximum 0.3 MPa, the fluid has a specific gravity of 0.85 and a kinematic viscosity of 20 mm²/s, and the cracking pressure is 0.04 MPa.

Model Number Designation

CR	T	-03	-04	-50
Series Number	Type of Connection	Valve Size	Cracking Pressure MPa	Design Number
CR : Right Angle Check Valve	T : Threaded Connection	03	04 : 0.04 35 : 0.35	50
		06		50
		10		50
	G : Sub-plate Mounting	03	50 : 0.5	50
		06		50
		10		50

Note) Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
CRG-03	CRGM-03-50	3/8	1.6
	CRGM-03X-50	1/2	1.6
CRG-06	CRGM-06-50	3/4	2.4
	CRGM-06X-50	1	3.0
CRG-10	CRGM-10-50	1 1/4	4.8
	CRGM-10X-50	1 1/2	5.7

● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. (1/6)

Yuken can offer flanged connection valves described below.
For details, contact us.

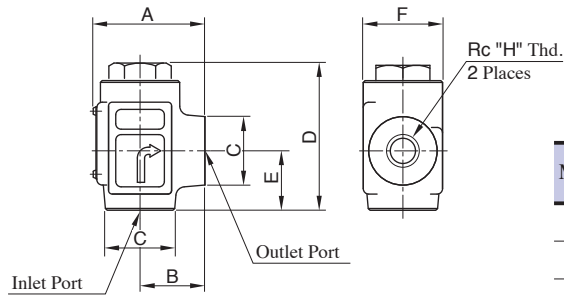
Model No.	Rated Flow L/min	Max. Operating Pres. MPa
CRF-10- *-50	300	25
CRF-16- *-50	600	
CRF-24- *-50	1300	

Accessories

● Mounting Bolts

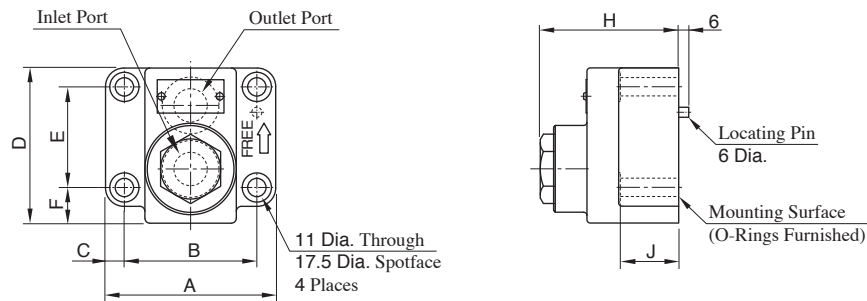
Valve Model Numbers	Socket Head Cap Screw	Qty.
CRG-03	M10 × 45L	4
CRG-06	M10 × 50L	4
CRG-10	M10 × 55L	6

CRT-03, 06, 10



Model Numbers	A	B	C	D	E	F	H
CRT-03	62	36	38 Dia.	80.5	33	44	$\frac{3}{8}$
CRT-06	74	45	54 Dia.	104.5	49	54	$\frac{3}{4}$
CRT-10	107	65	80 SQ.	130	65	80	$1\frac{1}{4}$

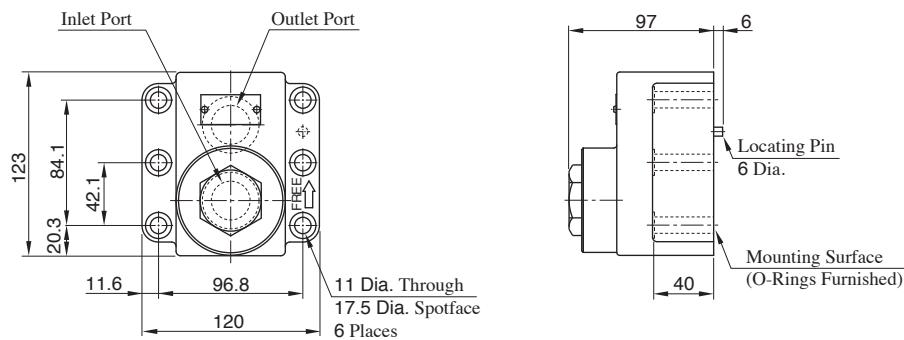
CRG-03, 06



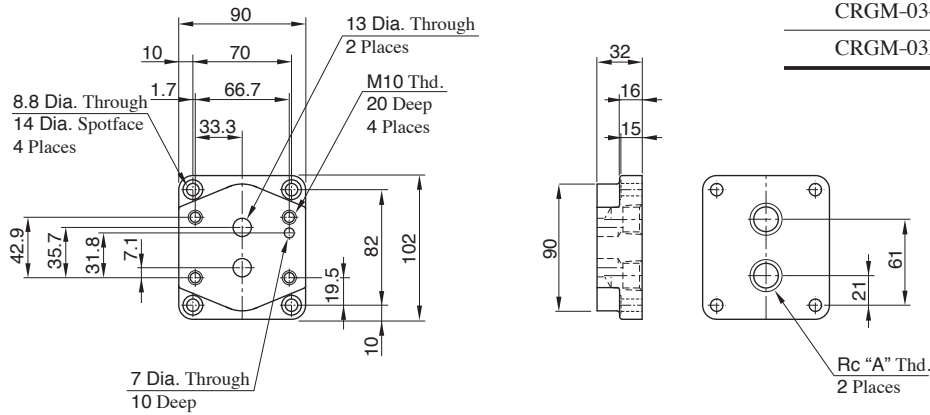
Model Numbers	A	B	C	D	E	F	H	J	Mounting surface conform to ISO standard below
CRG-03	90	66.7	11.7	72	42.9	17.5	72.5	30	ISO 5781-06-07-0-00
CRG-06	102	79.4	11.3	93	60.3	21.4	84.5	35	ISO 5781-08-10-0-00

CRG-10

Mounting Surface: ISO 5781-10-13-0-00

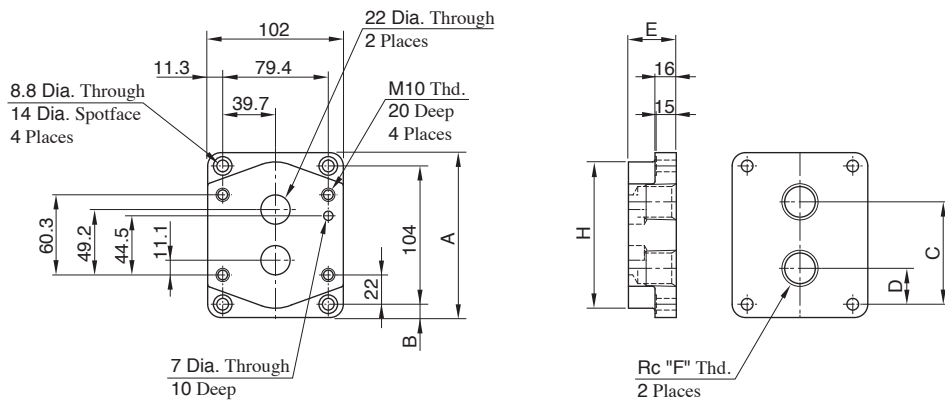


● Sub-plate CRGM-03, 03X



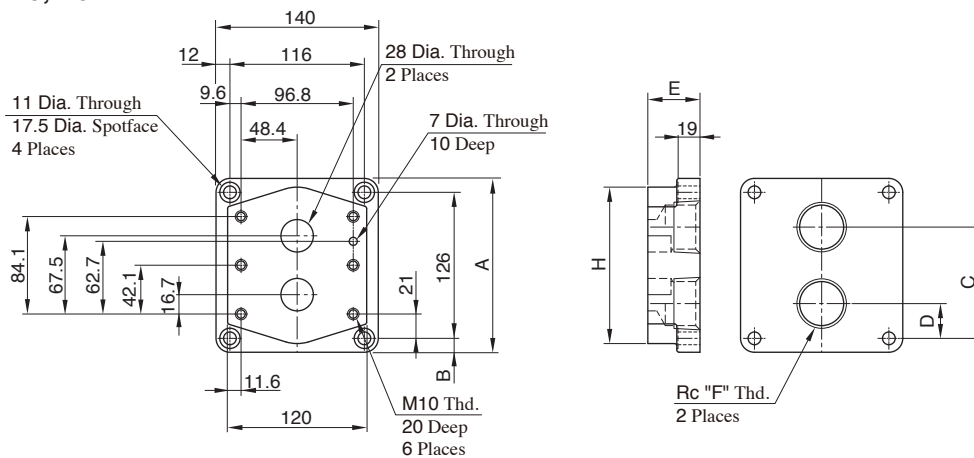
Sub-plate Model Numbers	A
CRGM-03-50	$\frac{3}{8}$
CRGM-03X-50	$\frac{1}{2}$

CRGM-06, 06X



Sub-plate Model Numbers	A	B	C	D	E	F	H
CRGM-06-50	124	10	77	27	36	$\frac{3}{4}$	110
CRGM-06X-50	136	16	82.3	22	45	1	130

CRGM-10, 10X

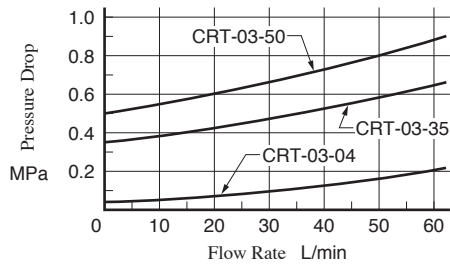


Sub-plate Model Numbers	A	B	C	D	E	F	H
CRGM-10-50	150	12	96	30	45	$1\frac{1}{4}$	135
CRGM-10X-50	177	25.5	104	22	50	$1\frac{1}{2}$	167

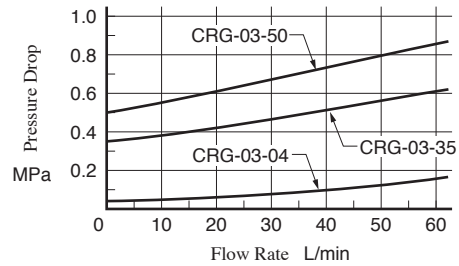
Pressure Drop

Hydraulic Fluid: Viscosity 30mm²/s

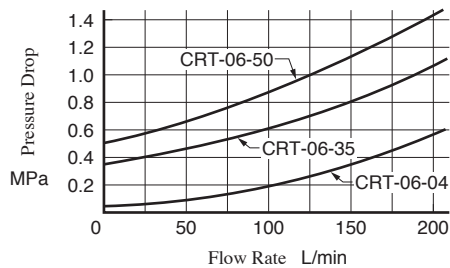
CRT-03



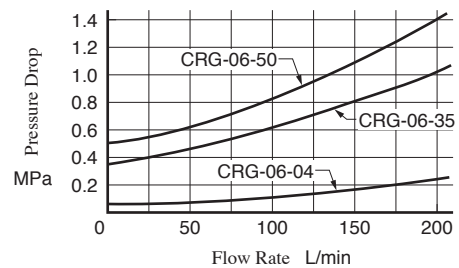
CRG-03



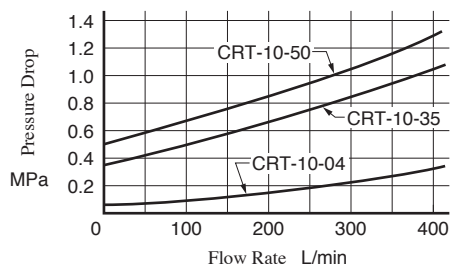
CRT-06



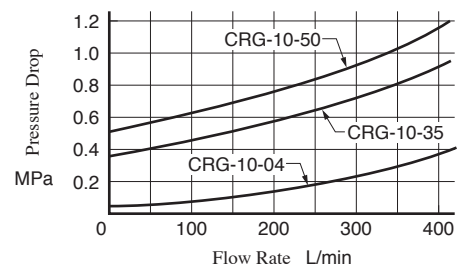
CRG-06



CRT-10

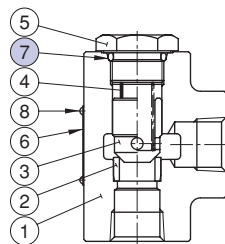


CRG-10



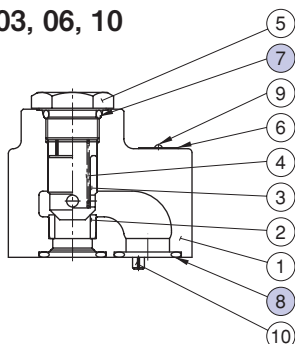
List of Seals

CRT-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.
		CRT-03	CRT-06	CRT-10	
7	O-Ring	OR NBR-90 P21-N	OR NBR-90 P24-N	OR NBR-90 P32-N	1

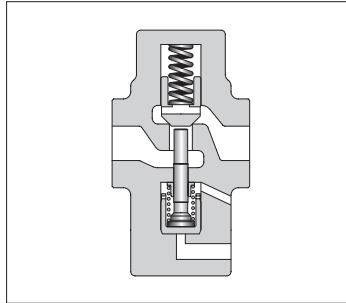
CRG-03, 06, 10



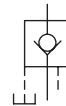
Item	Name of Parts	Part Numbers			Qty.
		CRG-03	CRG-06	CRG-10	
7	O-Ring	OR NBR-90 P21-N	OR NBR-90 P24-N	OR NBR-90 P32-N	1
8	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2

Pilot Controlled Check Valves

These check valves allow flow in one direction and prevent flow in the reverse direction, until operated by pilot pressure to allow free reverse flow.



Graphic Symbols



External Drain Type



Internal Drain Type

Specifications

Model Numbers		Rated Flow★ L/min	Max. Operating Pres. MPa	Cracking Pres. MPa	Approx. Mass kg
Threaded Connection	CP*T-03-*-*-50	40	25	0.04	3.0
	CP*T-06-*-*-50	125		0.2	5.5
	CP*T-10-*-*-50	250		0.35	9.6
Sub-plate Mounting	CP*G-03-*-*-50	40	25	0.04	3.3
	CP*G-06-*-*-50	125		0.2	5.4
	CP*G-10-*-*-50	250		0.35	8.5

★ Rated flow is the approximate flow rate, when there is a free flow pressure drop of maximum 0.3 MPa, the fluid has a specific gravity of 0.85 and a kinematic viscosity of 20 mm²/s, and the cracking pressure is 0.04 MPa.

Model Number Designation

CP	T	−03	−E	−04	−50
Series Number	Type of Connection	Valve Size	Drain Connection	Cracking Pres. MPa	Design Number
CP : Pilot Operated Check Valve CPD : Decompression Type Pilot Operated Check Valve	T : Threaded Connection	03	None : Internal Drain	04 : 0.04 20 : 0.2 35 : 0.35 50 : 0.5	50
		06			50
		10			50
	G : Sub-plate Mounting	03	E : External Drain		50
		06			50
		10			50

Note) Models for phosphate ester fluid are available. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
CP*G-03	M10 × 45L	4
CP*G-06	M10 × 50L	4
CP*G-10	M10 × 55L	6

Yuken can offer flanged connection valves described below.

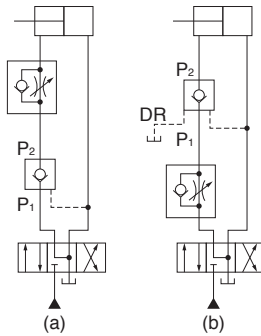
For details, contact us

Model Numbers	Rated Flow L/min	Max. Operating Pres. MPa
CP*F-10-*-*-50	250	25
CP*F-16-*-*-50	600	25

■ Instructions

● Operation of internal and external drain types

When the outlet side P₁ is directly connected to the tank in reversed free flow (Fig. a), the internal drain type is normally used. When the back pressure is applied to the outlet side P₁ (Fig. b), be sure to use the external drain type.



● Minimum pilot pressure characteristics

That depends on the pressure of the inlet side P₂ in the reversed free flow.
This value can be determined from the characteristics chart on page E-146.

■ Sub-plates

Valve Model Numbers	Sub-plate Model Numbers	Thread Size Rc	Approx. Mass kg
CP*G-03	HGM-03-20	$\frac{3}{8}$	1.6
	HGM-03X-20	$\frac{1}{2}$	
CP*G-06	HGM-06-20	$\frac{3}{4}$	2.4
	HGM-06X-20	1	
CP*G-10	HGM-10-20	$1\frac{1}{4}$	4.8
	HGM-10X-20	$1\frac{1}{2}$	

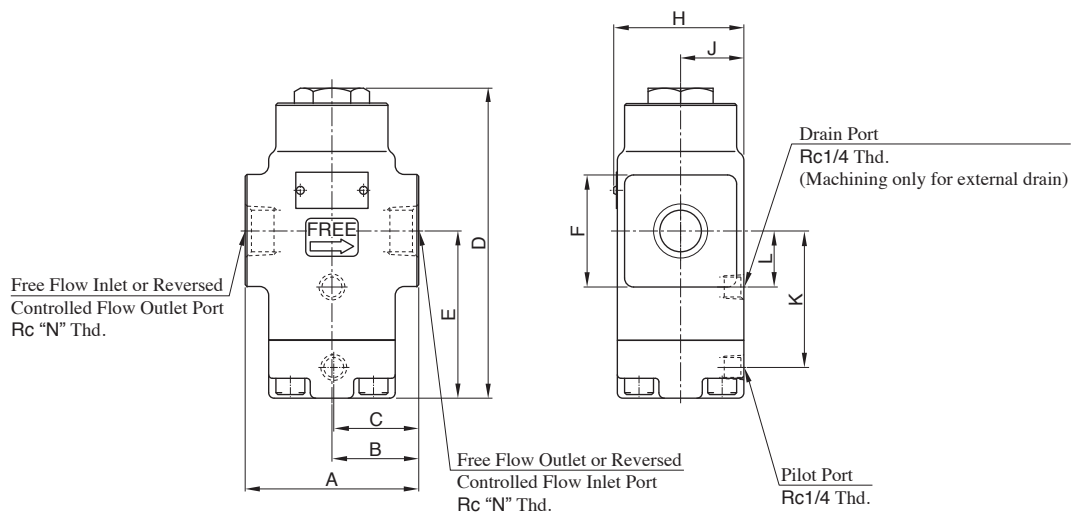
- Sub-plates are available, specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1}{16}$)
- Sub-plates are shared with those for H Type Pressure Control Valves. Refer to pages E-149 for dimensions.

● Cautions on replacement of 20 design low cracking pressure type valves with 50 design valves.

In 20 design valve with cracking pressure of 0.035 MPa (Code "5"), for closing the valve completely and certainly, it was necessary to introduce the pressurized oil into the drain port to push down the piston compulsory.

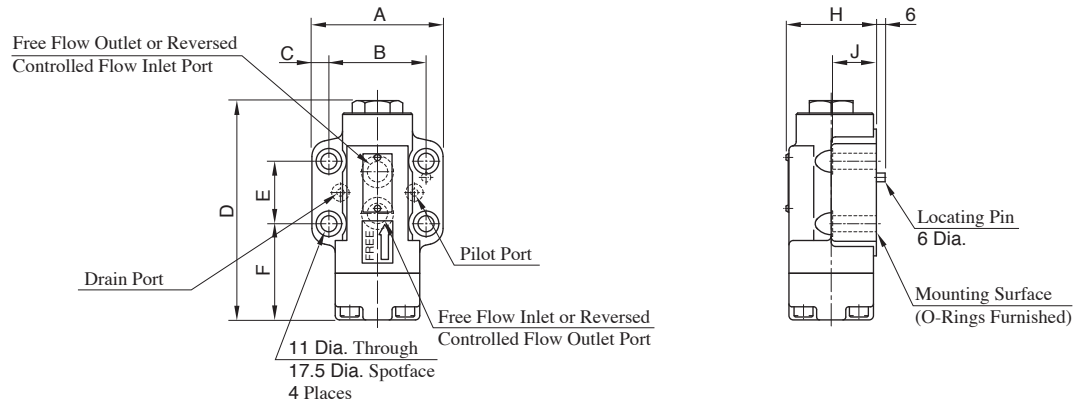
While in 50 design valve with cracking pressure of 0.04 MPa (Code "6"), it has such structure that the valve can be closed completely and certainly without introducing the pressurized oil into the drain port. On the contrary, what is worse is that if the pressurized oil is introduced into the drain port, the oil acts towards the direction of opening the valve, which is very dangerous and has to be absolutely avoided. Therefore, please do not supply any pressurized oil into the drain port in case of using 50 design valve.

CPT CPDT -03, 06, 10



Model Numbers	A	B	C	D	E	F	H	J	K	L	N
CP*T-03	80	40	39	150.5	84.5	38 Dia.	60	29	67.5	26.5	$\frac{3}{8}$
CP*T-06	96	48	47	171.5	92.5	62 SQ.	72	35	75.5	31	$\frac{3}{4}$
CP*T-10	140	70	64	203.5	113	80 SQ.	82	40	96	43	$1\frac{1}{4}$

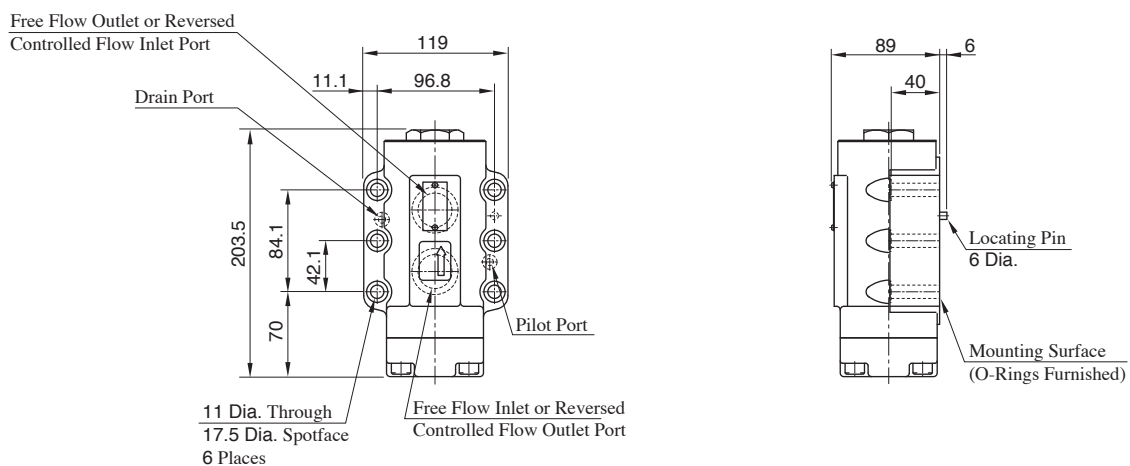
CPG CPDG -03, 06



Model Numbers	A	B	C	D	E	F	H	J	Mounting Surface
CP*G-03	90	66.7	11.7	150.5	42.9	66	62	30	ISO 5781-06-07-0-00
CP*G-06	102	79.4	11.3	171.5	60.3	67.5	74	35	ISO 5781-08-10-0-00

CPG CPDG -10

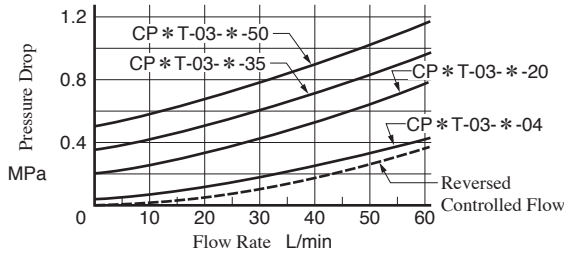
Mounting Surface: ISO 5781-10-13-0-00



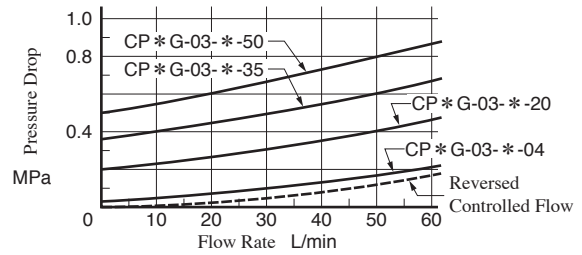
Pressure Drop

Hydraulic Fluid: Viscosity 30 mm²/s

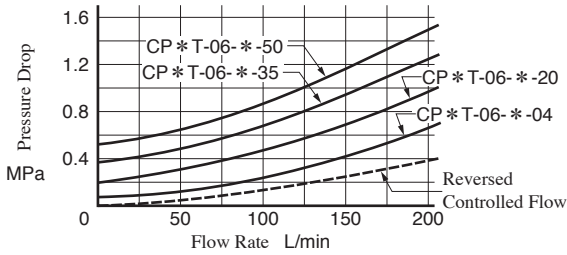
● CPT-03, CPDT-03



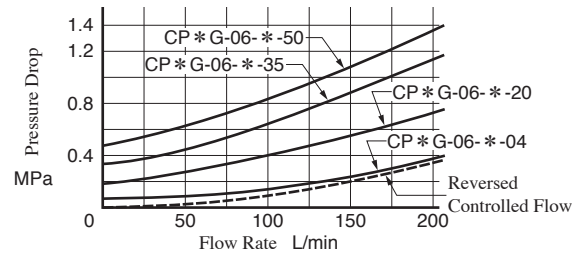
● CPG-03, CPDG-03



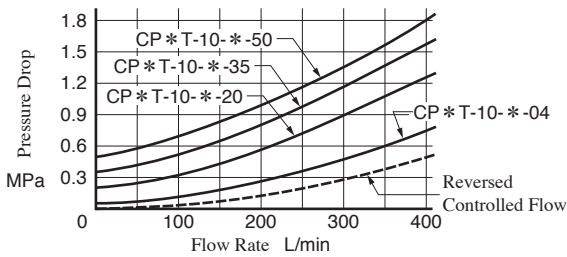
● CPT-06, CPDT-06



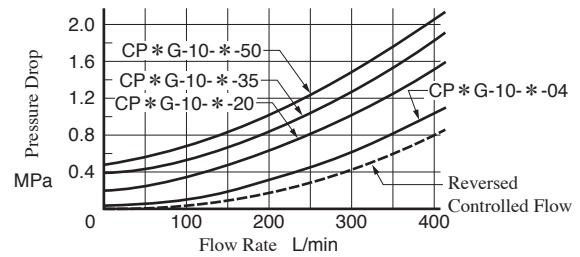
● CPG-06, CPDG-06



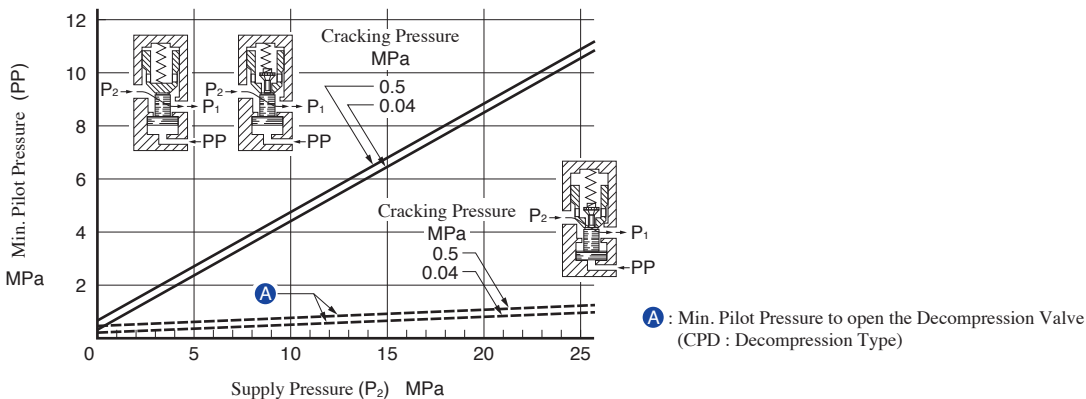
● CPT-10, CPDT-10



● CPG-10, CPDG-10



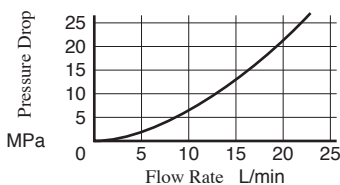
Min. Pilot Pressure Chart



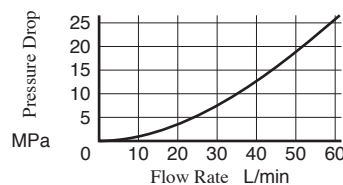
Pressure Drop for Reversed Controlled Flow Only when Decompression Valve is Opened

Hydraulic Fluid: Viscosity 30 mm²/s

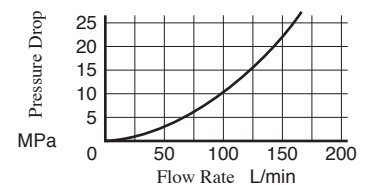
● CPDT-03, CPDG-03



● CPDT-06, CPDG-06

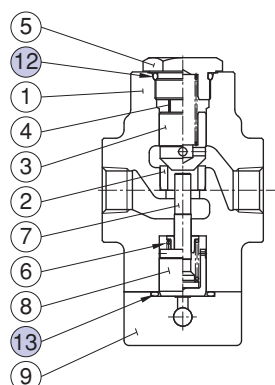


● CPDT-10, CPDG-10

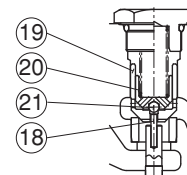
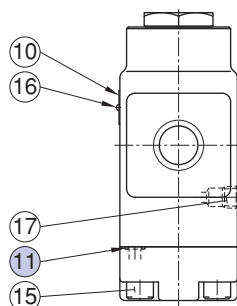


List of Seals

CPT-03, 06, 10

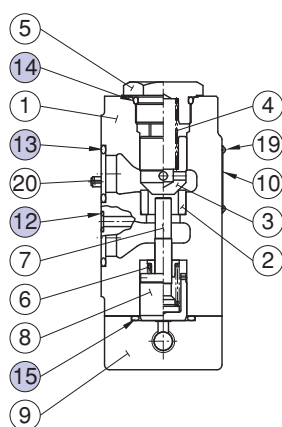


CPDT-03, 06, 10

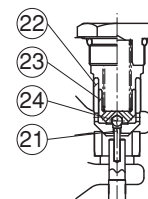
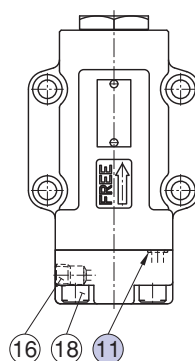


Item	Name of Parts	Part Numbers			Qty.
		CP * T-03	CP * T-06	CP * T-10	
11	O-Ring	OR NBR-90 P7-N	OR NBR-90 P9-N	OR NBR-90 P9-N	1
12	O-Ring	OR NBR-90 P21-N	OR NBR-90 P29-N	OR NBR-90 P36-N	1
13	O-Ring	OR NBR-90 G25-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1

CPG-03, 06, 10



CPDG-03, 06, 10



Item	Name of Parts	Part Numbers			Qty.
		CP * G-03	CP * G-06	CP * G-10	
11	O-Ring	OR NBR-90 P7-N	OR NBR-90 P9-N	OR NBR-90 P9-N	1
12	O-Ring	OR NBR-90 P9-N	OR NBR-90 P9-N	OR NBR-90 P9-N	2
13	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2
14	O-Ring	OR NBR-90 P21-N	OR NBR-90 P29-N	OR NBR-90 P36-N	1
15	O-Ring	OR NBR-90 G25-N	OR NBR-90 P32-N	OR NBR-90 P42-N	1

In-Line Prefill Valves

Prefill valves can be used by putting them between cylinder and reservoir in such a hydraulic system for large presses and injection molding machines where a high-speed operation is required with a small capacity pump.

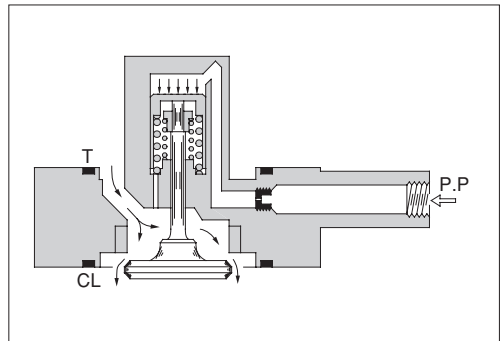
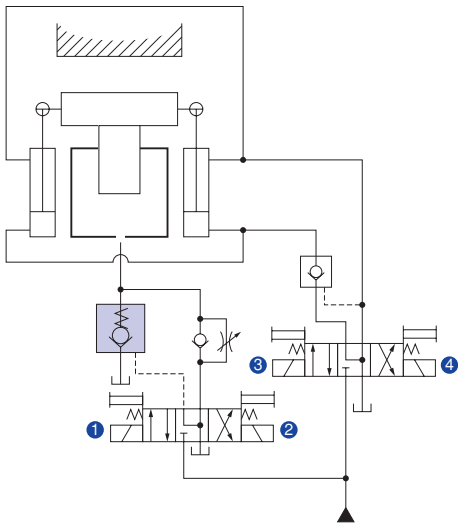
In a high-speed forward stroke of the cylinder, the prefill valve sucks large amount of oil from the reservoir and feeds it into the cylinder.

In pressurizing process, the valves prevent a reserve flow from the reservoir to the cylinder, and in return stroke of the cylinder, the valve has a function of discharging the oil into the reservoir by opening the valve with a pilot pressure.

- Simple structure and high durability
- Low pressure drop and large flow
- Direct and decompression types are available for all sizes.
- Slow return valves are optionally available for pilot ports.

(Example Diagram)

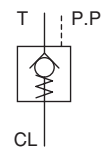
- Ram Cylinder System (with auxiliary cylinder)



[Solenoid Shifting and Operation]

Solenoid	Rapid Increase	Pressure	Rapid Decrease
①	ON	OFF	ON
②	OFF	ON	OFF
③	ON	ON	OFF
④	OFF	OFF	ON

Graphic Symbol



Specifications

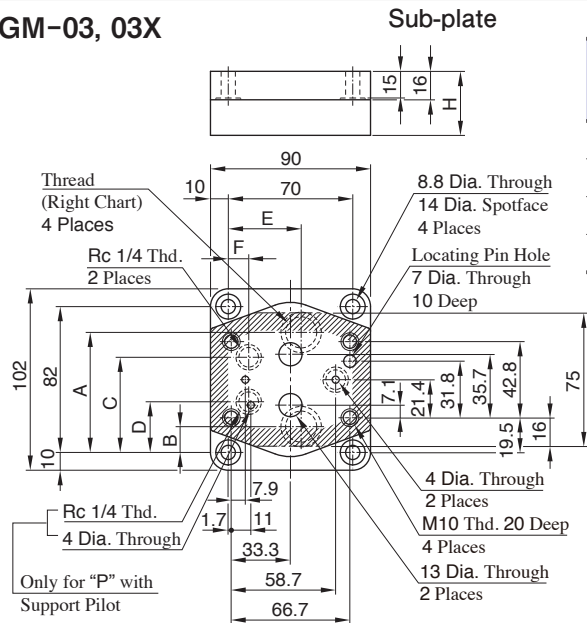
Model Numbers	Piping Size	Max. Flow L/min ^{★1}	Max. Operating Pressure MPa	Cracking Pressure MPa	Min. Pilot Pressure Ratio ^{★2} (Direct Type)		Pilot Volume cm ³
					P-Line Pressure	C-Line Pressure	
PI * F- 40-10	65A	200	25	0.011	3.4 : 1		2.5
PI * F- 50-10	80A	400		0.012	4.0 : 1		4.9
PI * F- 63-10	90A	630			4.0 : 1		8.5
PI * F- 80-10	100A	1000			4.3 : 1		16.3
PI * F-100-10	125A	1600			4.3 : 1		31.8

★1. Each maximum flow rate is an approximate value when the pressure drop at free flow is $\Delta P \approx 0.03$ MPa.

★2. The minimum pilot pressure ratio is determined by the area ratio between the seat and pressured part of the pilot. The decompression type is also available.

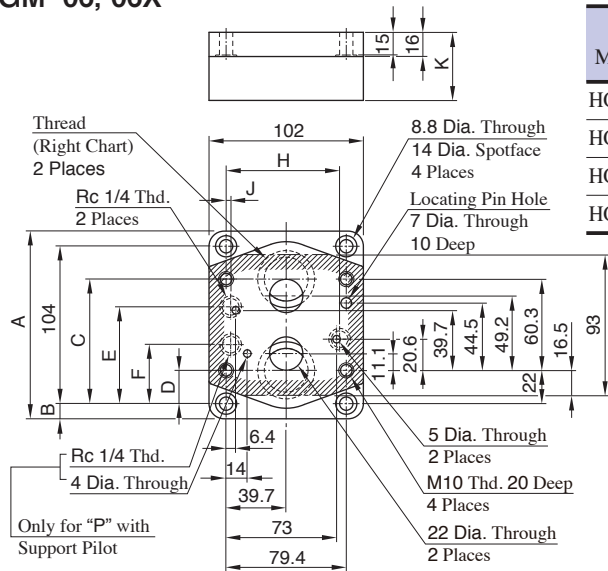
———— For details about In-Line Prefill Valves, refer to the model catalogues. ————

HGM-03, 03X



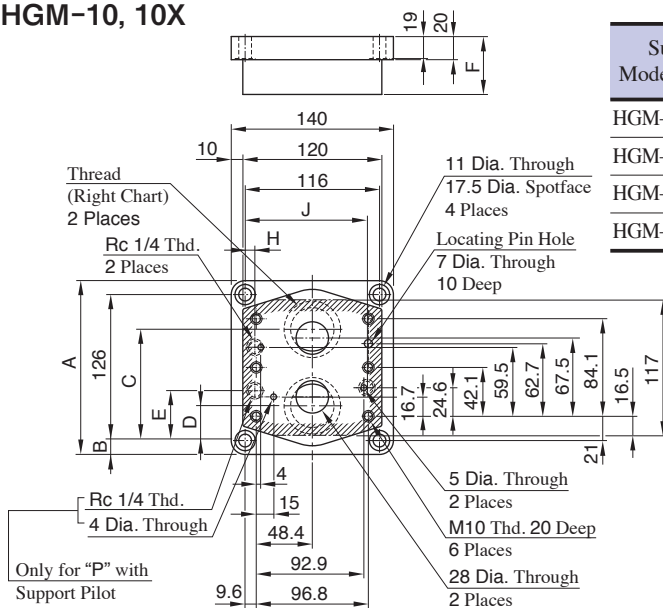
Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H
HGM-03-20	$\frac{3}{8}$	61	21	40.9	—	35	9.6	32
HGM-03X-20	$\frac{1}{2}$	61	21	40.9	—	35	9.6	32
HGM-03-P-20	$\frac{3}{8}$	69.5	12.5	53.5	28.5	35	11.5	36
HGM-03X-P-20	$\frac{1}{2}$	67.5	14.5	53.5	28.5	41	11.5	36

HGM-06, 06X



Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H	J	K
HGM-06-20	$\frac{3}{4}$	124	10	77	27	61.7	—	73	6.4	36
HGM-06X-20	1	136	16	82.3	22	61.7	—	75	6.4	45
HGM-06-P-20	$\frac{3}{4}$	124	10	77	27	64	39	73	3	36
HGM-06X-P-20	1	136	16	82.3	22	64	39	75	3	45

HGM-10, 10X



Sub-plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H	J
HGM-10-20	$1\frac{1}{4}$	150	12	96	30	—	45	13.6	102.5
HGM-10X-20	$1\frac{1}{2}$	177	25.5	104	22	—	50	13.6	102.5
HGM-10-P-20	$1\frac{1}{4}$	150	12	96	30	43	45	9.6	102.5
HGM-10X-P-20	$1\frac{1}{2}$	177	25.5	104	22	43	50	9.6	106

F

MODULES

YUKEN's Modular Valves are stack type valves, and require no piping. They not only rationalise system build, but they also meet the technical requirements for a variety of hydraulic systems. Stacking systems is a new era in hydraulics.

The valves have standardized mounting surface conforming to ISO 4401 and optimum thickness for each size. Any hydraulic circuits can be easily composed by stacking the valves with mounting bolts. The valves can be used widely for hydraulic systems for various industries such as machine tools, special purpose machines, ships and steel mill equipment.

Valve Type	Max. Operating Pressure MPa	Maximum Flow L/min																Page
		1	2	3	5	7	10	20	30	50	70	100	200	300	500	700	1000	
005 Series Modular Valves	25	005																F-7
007 Series Modular Valves	25	007																F-9
01 Series Modular Valves	35	01																F-11
03 Series Modular Valves	35	03																F-47
04 Series Modular Valves	35	04																F-78
06 Series Modular Valves	35	06																F-88
10 Series Modular Valves	25	10																F-98

★1. Maximum Flow for Throttle and Check Modular Valves. (MSA/MSB/MSW)

★2. Maximum Flow for Reducing Modular Valves with Pressure Adjustment Range "A" is limited to 80 L/min.

Hydraulic Fluids

Fluid Types

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

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

Note: For use with hydraulic fluids other than those listed above(ex. W/O type Emulsion), please consult your Yuken representative in advance.

Recommended Fluid Viscosity and Temperature

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

Name	Viscosity	Temperature
005 Series Modular Valves 007 Series Modular Valves	15 – 200 mm ² /s	–15 – +60°C
01 Series Modular Valves 03 Series Modular Valves 04 Series Modular Valves 06 Series Modular Valves 10 Series Modular Valves	15 – 400 mm ² /s	–15 – +70°C

Control of Contamination

Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valve.

Name	Contamination	Nominal Filtration
005 Series Modular Valves 007 Series Modular Valves	Within NAS1638 – Grade 11	20μm or less
01 Series Modular Valves 03 Series Modular Valves 04 Series Modular Valves 06 Series Modular Valves 10 Series Modular Valves	Within NAS1638 – Grade 12	20μm or less

High Pressure, High Flow Rate Modular Valves

Features

1. Installation and mounting space can be minimized.
2. No special skill is required for assembly and any addition or alteration of the hydraulic circuit can be made quickly and easily.
3. Problems such as oil-leaks, vibration and noise which may be caused by piping are minimized, increasing the reliability of the hydraulic system.
4. Maintenance and system check-ups can be easily carried out as they are normally installed in stackable units.

Specifications

Name	Valve Size	Max. Operating Pressure MPa	Max. Flow L/min	Number of Stack ^{★3}
005 Series Modular Valves	—	25	15	1 to 4 stacks
007 Series Modular Valves				
01 Series Modular Valves	1/8	35	60 (80) ^{★1}	1 to 5 stacks ^{★4}
03 Series Modular Valves	3/8	35	120 (160) ^{★1,2}	1 to 5 stacks ^{★4}
04 Series Modular Valves	1/2	35	300	1 to 5 stacks
06 Series Modular Valves	3/4	35	500	
10 Series Modular Valves	1 1/4	25	800	

- ★1. The values in parentheses represent the max. flow rates for throttle modular valves (MSP) and throttle check modular valves (MSA/MSB/MSW).
 ★2. Maximum flow for reducing modular valves with pressure adjustment range “A” is limited to 80 L/min.
 ★3. Solenoid operated directional valve is included in the number of stack.
 ★4. If the working pressure is above 25 MPa, the maximum number of layers in a stack is 4 including the solenoid operated directional valve.

Mounting Surface

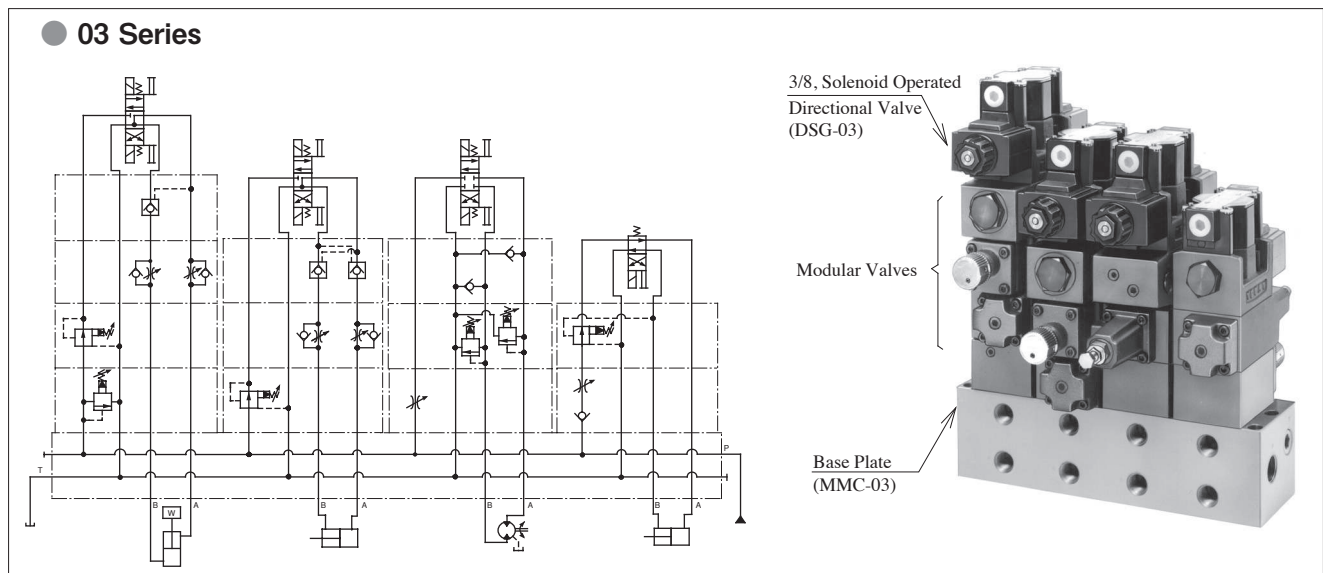
007 – 10 Series

Mounting surface dimensions conform to ISO 4401 (Hydraulic fluid power four port directional control valves mounting surface) as listed in the table below.

Name	ISO Mtg. Surface Code No.
007 Series Modular Valves	ISO 4401-02-01-0-05
01 Series Modular Valves	ISO 4401-03-02-0-05
03 Series Modular Valves	ISO 4401-05-04-0-05
04 Series Modular Valves	ISO 4401-07-07-0-05
06 Series Modular Valves	ISO 4401-08-08-0-05
10 Series Modular Valves	ISO 4401-10-09-0-05

- ★ Only 005 Series are YUKEN original specification

Stacking Example



Instructions

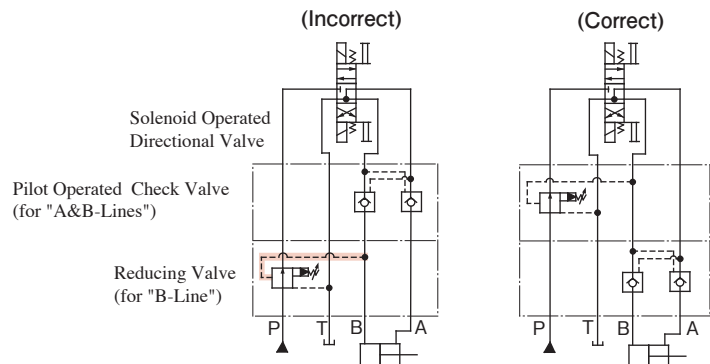
Caution in the selection of valves and circuit designing

The selection of modular valves, to suit a particular function or hydraulic circuit, are made in exactly the same way as conventional valves, taking into account of the flow and pressure of each valve to be used. In some cases, the stacking system may be restricted, so please refer to the following instructions for stacking sequence. Please note, that when designing a system using modular stacking valves, due consideration should be given to working space for future maintenance.

Stacking sequence when using reducing valves (for "A" or "B" line) and pilot operated check valves.

Because reducing valves are spool type, there is an internal leakage. In the stacking sequence shown in the drawing left (incorrect), the cylinder moves due to leakage through the pilot pressure line.

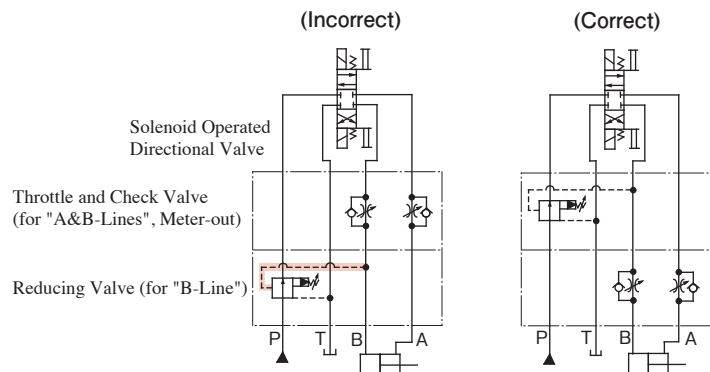
Consequently, retaining the position of the cylinder using a pilot operated check valve becomes impossible. The stacking sequence shown in the drawing right (correct) is required in order to retain the cylinder position.



Stacking sequence when using reducing valves (for "A" or "B" line) and throttle and check valves (for meter-out).

In B to T flow in the drawing left (incorrect), pressure is generated at the throttle and check valve. Depending upon the pressure so generated, the reducing valve may perform a pressure reducing function which causes a shortage of output power of the cylinder and spoils the smooth operation of the cylinder.

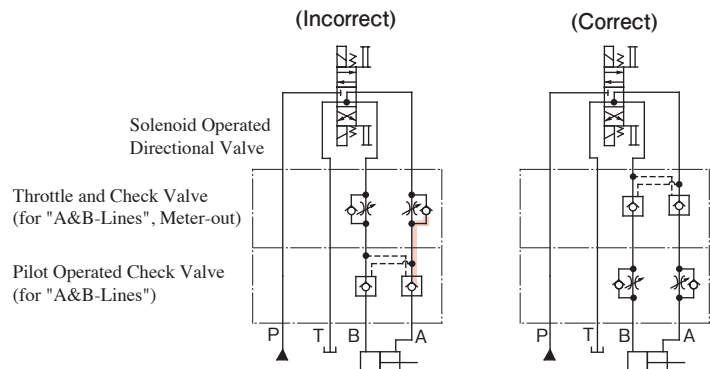
Therefore, stacking sequence in the drawing right (correct) is required in this combination.



Stacking sequence when using pilot operated check valves and throttle and check valves (for meter-out).

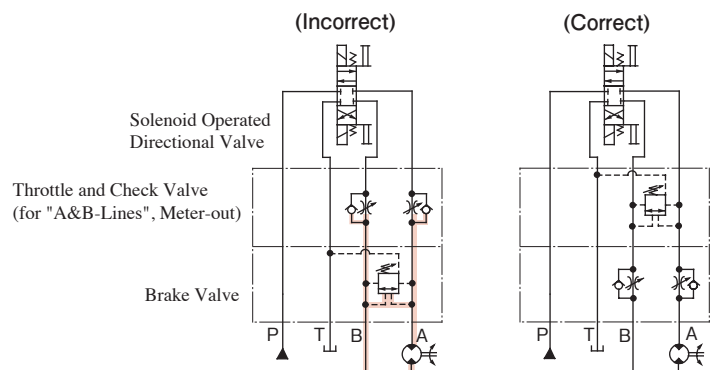
In A to T flow in the drawing left (incorrect), pressure is generated at the throttle and check valve.

The pressure so generated acts to shut the pilot operated check valve and eventually creates an open and shut operation of the valve repeatedly which may cause the cylinder to have a knocking effect (the same effect will occur in the case of B to T flow). Therefore, the stacking sequence in the drawing right (correct) is required in this combination.



Stacking sequence when using brake valves and throttle and check valves

In the drawing left (incorrect), pressure is generated at the throttle and check valve (a load pressure and a back pressure from throttle effect). For structural reasons of the brake valve, the load pressure and back pressure act to open the valve, therefore, the setting pressure should be more than the pressure equal to the load pressure plus back pressure ($P_a + P_b$). If the setting pressure is less than $P_a + P_b$, the brake valve acts and brakes the movement of the actuator in operation, this eventually reduces the speed of the actuator. On the contrary, if the setting pressure is more than $P_a + P_b$, shock may occur when braking the actuator since the setting pressure is too high against the load pressure. Therefore, the stacking sequence in the drawing right (correct) is required in this combination.



Base Plates and Sub-Plates

When mounting the modular valves, use base plates and sub-plates specified below. If these base plates and the sub-plates are not used, ensure that the mounting surface has a good machined finish. ($\sqrt{6}$)

Series	Base Plates		Sub-Plates	
	Model Numbers	Page	Model Numbers	Page
005 Series	Consult your Yuken representative in advance.	—	Consult your Yuken representative in advance.	—
007 Series		—		—
01 Series	MMC-01- * -40	F-39	DSGM-01 * -31	F-108
03 Series	MMC-03-T- * -21	F-71	DSGM-03 * -40	F-108
04 Series	Consult your Yuken representative in advance.	—	DHGM-04 * -20	F-108
06 Series		—	DHGM-06 * -50	F-109
10 Series		—	DHGM-10 * -40	F-109

Assembly

Assembly should be carried out in clean conditions and in accordance with the following procedure. Cautious attention should be paid to ensure that the interface of the valves are clean and free from dirt or other foreign materials.

Assembly Procedure:

005/007 Series

- 1) To stack modular valves and solenoid operated directional valves according to circuit requirements, match the O-ring surfaces to the mounting surface and check the alignment of the locating pins. (007 Series check the port arrangement)
- 2) Align the right and left sides of the stacked valves.
- 3) Tighten the four mounting bolts to the specified tightening torque. After the test run, be sure to tighten again firmly within the specified torque.

01-10 Series

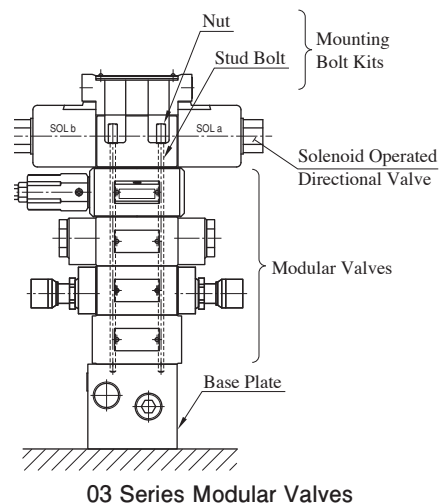
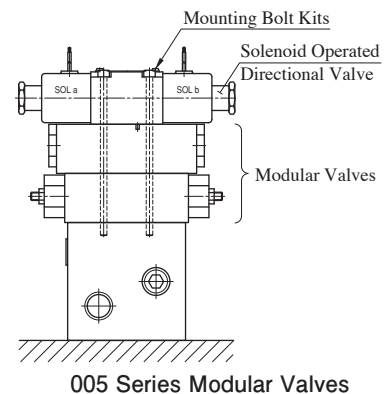
- 1) Screw-in the four stud bolts(04, 06 and 10 series: six stud bolts), fully into the tapped holes on the mounting surface of the specified base plate, sub-plate or manifold. 01,04 and 06 series stud bolts, screw short-side into the mounting surface of the specified base plate, sub-plate or manifold.
- 2) Stack the modular valves and solenoid operated directional valves in accordance with the hydraulic circuit, place the O-ring inserted surface face onto the base plate and make sure that the port arrangement of the modular valves are in the correct position before stacking the valves onto the stud bolts.
- 3) Align both the end of the valves stacked.
- 4) Screw-in the four nuts(04, 06 and 10 series: six nuts) onto the stud bolts and tighten with the specified torque. After the test run, be sure to retighten the nuts firmly within the specified torque.

Mounting Bolts

Modular valves are mounted using stud bolts which are supplied in a kit form. When mounting, see the following table for tightening torque. After the test run, be sure to tighten again firmly within the specified torque.

Series	Bolt Kit Model Numbers	Tightening Torque Nm
005 Series	MBK-005- * -20	2.5-3.5
007 Series	MBK-007- * -10	
01 Series	MBK-01- * -70	5-7(6-7)*
03 Series	MBK-03- * -10	12-15
04 Series	MBK-04- * -10	12-15(M6) 45-55(M10)
06 Series	MBK-06- * -70	70-100(90-100)*
10 Series	MBK-10- * -10	150-170

★ The value range in parentheses represents the tightening torque requirements if the operating pressure is above 25 MPa.



Pressure Drop

Pressure Drop

Pressure drop curves of the modular valves are those based on viscosity of 35 mm²/s and specific gravity of 0.850. When using the modular valves in conditions other than the above mentioned, find the appropriate values referring to the following table and formula.

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

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

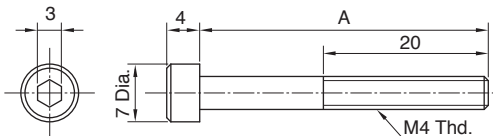
- For any other specific gravity (G'), the pressure drop ($\Delta P'$) may be obtained from the following formula. $\Delta P' = \Delta P (G'/0.850)$

■ Interchangeability in Installation between Current and New Design

The model changed for the following models have been made.

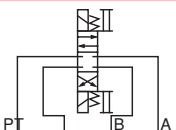
Name		Model Numbers		Mtg. Interchangeability	Page	Major changes
		Current	New			
01 Series	Relief Modular Valves	MB *-01- *-30	MB *-01- *- *-70	Yes	F-42-F-46	Higher Operating Pressure. Modification for large flow use.
	Reducing Modular Valves	MR *-01- *-30	MR *-01- *- *-70	Yes		
	Sequence Modular Valves	MHP-01- *-30	MHP-01- *- *-70	Yes		
	Counterbalance Modular Valves	MHA-01- *-30	MHA/MHB-01- *-70	Yes		
	Throttle and Check Modular Valves	MS *-01- *- *-50	MS *-01- *- *-70	Yes		
	Check Modular Valves	MC *-01- *-30	MC *-01- *-70	Yes		
	Pilot Operated Check Modular Valves	MP *-01- *-40	MP *-01- *-70	Yes		
		MP *-01- *-4001	MP *-01- *-L-70			
	Bolt Kits	MBK-01- *-30	MBK-01- *-70	Yes		
03 Series	Relief Modular Valves	MB *-03- *-30	MB *-03- *-70	Yes	F-74-F-77	Higher Operating Pressure. Modification for large flow use.
	Reducing Modular Valves	MR *-03- *-30	MR *-03- *-70	Yes		
	Throttle and Check Modular Valves	MS *-03- *-40	MS *-03- *-70	Yes		
	Check Modular Valves	MCP/MCT-03- *-10 MCA/B/W-03- *-20	MC *-03- *-70	Yes		
	Pilot Operated Check Modular Valves	MP *-03- *-20	MP *-03- *-70	Yes		
		MP *-03- *-2001	MP *-03- *-L-70			

■ Comparison of MBK-005 bolt kit model numbers

	Bolt Kit Model Numbers		Dimensions A mm	The number of the laminating steps quantity of valves to be stacked including solenoid operated directional valve
	(New) 20 Design	(Current) 10 Design		
	MBK-005-01-20	MBK-005-02-10	65	2
	MBK-005-02-20	MBK-005-03-10	95	3
	MBK-005-03-20	—	125	4
	MBK-005-05-20	MBK-005-01-10	35	1

005 Series Modular Valves

■ Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page
	Solenoid Operated Directional Valve DSG-005- * - * - * -40		★
Pressure Control Valves	Relief Valves (for "P-Line") MBP-005- * -20		F-8
	Reducing Valves (for "P-Line") MRP-005- * -20		F-8
Flow Control Valves	Throttle and Check Valves (for "A-Line", Meter-out) MSA-005-X-20		F-8
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-005-Y-20		
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-005-X-20		
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-005-Y-20		
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-005-X-20		
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-005-Y-20		
Directional Control Valves	Check Valves (for "P-Line") MCP-005-0-20		F-8
	Pilot Operated Check Valves (for "A-Line") MPA-005-2-20		F-8
	Pilot Operated Check Valves (for "B-Line") MPB-005-2-20		
	Pilot Operated Check Valves (for "A&B-Lines") MPW-005-2-20		
Modular Plates and Mounting Bolts	End Plates (Blocking Plates) MDC-005-A-20		F-8
	Base Plates MMC-005- * -20		F-8
	Bolts Kits MBK-005- * -20		F-8

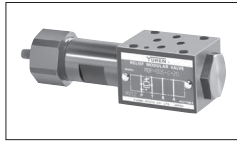
★Please refer to the catalog page of "E: Directional Control Valves".

●Further information about 005 series modular valves, please consult your Yuken representative.

Relief Modular Valves

Specifications

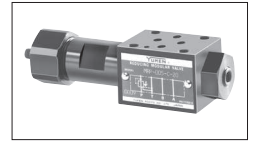
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MBP-005-* -20	25	15



Reducing Modular Valves

Specifications

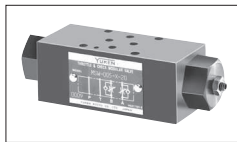
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MRP-005-* -20	25	15



Throttle and Check Modular Valves

Specifications

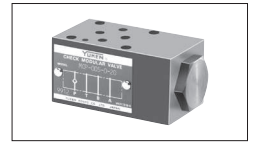
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS *-005-* -20	25	15



Check Modular Valves

Specifications

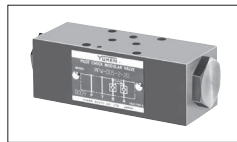
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MCP-005-0-20	25	15



Pilot Operated Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP *-005-2-20	25	15



End Plates

Blocking plates are used for auxiliary mounting surface or for closing unnecessary circuits.

Specifications

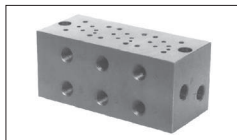
Model Numbers	Max. Operating Pressure MPa
MDC-005-A-20	25



Base Plates For Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa
MMC-005-* -20	25



Mounting Bolt Kits For Modular Valves

To mount the valves, four M4 bolts are used. The combination of valves varies with circuits. So, we have several mounting bolt kits suitable for different valve combinations.

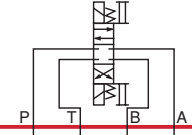
Model Numbers

MBK-005-* -10



007 Series Modular Valves

■ Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page
	Solenoid Operated Directional Valve DSG-007- * * * - * -10		★
Pressure Control Valves	Reducing Valves (for "P-Line") MRP-007- * -10		F-10
Flow Control Valves	Throttle and Check Valves (for "A-Line", Meter-out) MSA-007-X-10		F-10
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-007-Y-10		
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-007-X-10		
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-007-Y-10		
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-007-X-10		
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-007-Y-10		
Directional Control Valves	Pilot Operated Check Valves (for "A-Line") MPA-007-2-10		F-10
	Pilot Operated Check Valves (for "B-Line") MPB-007-2-10		
	Pilot Operated Check Valves (for "A&B-Lines") MPW-007-2-10		
Modular Plates and Mounting Bolts	End Plates (Blocking Plates) MDC-007-A-10		F-10
	Base Plates MMC-007- * -10		F-10
	Bolts Kits MBK-007- * -10		F-10

★ Please refer to the catalog page of "E: Directional Control Valves".

● Further information about 007 series modular valves, please consult your Yuken representative.

Reducing Modular Valves

Specifications

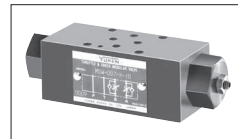
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MRP-007- *-10	25	15



Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS *-007- *-10	25	15



Pilot Operated Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP *-007-2-10	25	15



End Plates

Blocking plates are used for auxiliary mounting surface or for closing unnecessary circuits.

Specifications

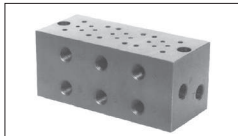
Model Numbers	Max. Operating Pressure MPa
MDC-007-A-10	25



Base Plates For Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa
MMC-007- *-10	25



Mounting Bolt Kits For Modular Valves

To mount the valves, four M4 bolts are used. The combination of valves varies with circuits. So, we have several mounting bolt kits suitable for different valve combinations.

Model Numbers

MBK-007- *-10



01 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page	Class	Name and Model Numbers	Graphic Symbols	Page
Pressure Control Valves	Solenoid Operated Directional Valve (S-) DSG-01-**-70 E-DSG-01-**-D**-70 T-DSG-01-**-D24**-70 G-DSG-01-**-51		★	Flow Control Valves	Throttle Valves (for "P-Line") MSP-01-50		F-29
	Relief Valves (for "P-Line") MBP-01-**-70		F-12		Throttle Valves (for "T-Line") MST-01-50		F-29
	Relief Valves (for "A-Line") MBA-01-**-70		F-12		Check and Throttle Valves (for "P-Line") MSCP-01-30		F-30
	Relief Valves (for "B-Line") MBB-01-**-70		F-12		Throttle and Check Valves (for "A-Line", Meter-out) MSA-01-X-70		F-31
	Reducing Valves (for "P-Line") MRP-01-**-70		F-14		Throttle and Check Valves (for "A-Line", Meter-in) MSA-01-Y-70		F-31
	Reducing Valves (for "A-Line") MRA-01-**-70		F-14		Throttle and Check Valves (for "B-Line", Meter-out) MSB-01-X-70		F-31
	Reducing Valves (for "B-Line") MRB-01-**-70		F-14		Throttle and Check Valves (for "B-Line", Meter-in) MSB-01-Y-70		F-31
	Two Pressure Reducing Valves (for "P-Line") MRDP-01-**-10		F-16		Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-01-X-70		F-31
	Brake Valves MBR-01-**-30		F-18		Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-01-Y-70		F-31
	Sequence Valves (for "P-Line") MHP-01-**-70		F-19	Directional Control Valves	Throttle and Check Valves (for "A&B-Lines", Meter-out, Meter-in) MSW-01-XY-70		F-31
	Counterbalance Valves (for "A-Line") MHA-01-**-70		F-19		Check Valves (for "P-Line") MCP-01-**-70		F-33
	Counterbalance Valves (for "B-Line") MHB-01-**-70		F-19		Check Valves (for "A-Line") MCA-01-**-70		F-33
	Pressure Switch Valves (for "P-Line") MJP-01-**-10		F-22		Check Valves (for "B-Line") MCB-01-**-70		F-33
	Pressure Switch Valves (for "A-Line") MJA-01-**-10		F-22		Check Valves (for "T-Line") MCT-01-**-70		F-33
	Pressure Switch Valves (for "B-Line") MJB-01-**-10		F-22		Check Valves (for "A&B-Line") MCW-01-**-70		F-33
	Pressure Switch Valves (for "A&B-Line") MJW-01-J-**-10		F-22		Anti-Cavitation Valves MAC-01-30		F-35
	Flow Control Valves (for "P-Line") MFP-01-10		F-25		Pilot Operated Check Valves (for "A-Line") MPA-01-**-70		F-36
	Flow Control and Check Valves (for "A-Line", Meter-out) MFA-01-X-10		F-25		Pilot Operated Check Valves (for "B-Line") MPB-01-**-70		F-36
	Flow Control and Check Valves (for "A-Line", Meter-in) MFA-01-Y-10		F-25		Pilot Operated Check Valves (for "A&B-Lines") MPW-01-**-70		F-36
Flow Control Valves	Flow Control and Check Valves (for "B-Line", Meter-out) MFB-01-X-10		F-25	Modular Plates and Mounting Bolts	End Plates (Blocking Plates) MDC-01-A-30		F-38
	Flow Control and Check Valves (for "B-Line", Meter-in) MFB-01-Y-10		F-25		End Plates (Bypass plates) MDC-01-B-30		F-38
	Flow Control and Check Valves (for "A&B-Lines", Meter-out) MFW-01-X-10		F-25		Connecting Plates (for "P&A-Lines") MDS-01-PA-30		F-38
	Flow Control and Check Valves (for "A&B-Lines", Meter-in) MFW-01-Y-10		F-25		Connecting Plates (for "P&B-Lines") MDS-01-PB-30		F-38
	Temperature Compensated Throttle and Check Valves (for "A-Line", Meter-out) MSTA-01-X-10		F-27		Connecting Plates (for "A&T-Lines") MDS-01-AT-30		F-38
	Temperature Compensated Throttle and Check Valves (for "B-Line", Meter-out) MSTB-01-X-10		F-27		Base Plates MMC-01-**-40		F-39
	Temperature Compensated Throttle and Check Valves (for "A&B-Lines", Meter-out) MSTW-01-X-10		F-27		Bolt Kits MBK-01-**-70		F-41

★ Please refer to the catalog page of "E: Directional Control Valves".

Relief Modular Valves

Specifications

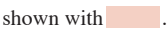
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MB *-01- *- *-70	35	60

Model Number Designation

MBP	-01	-B	-B	-70
Series Number	Valve Size	Pres. Adj. Range MPa	Pres. Adj. Screw Position	Design Number
MBP: Relief Valve for P-Line	01	B: ★-7 C: 3.5-14 H: 7-21 K: 14-35	None: A Port Side B: B Port Side	70
MBA: Relief Valve for A-Line			—	
MBB: Relief Valve for B-Line				

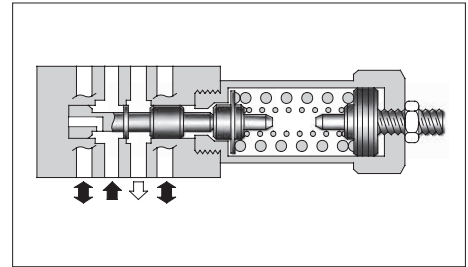
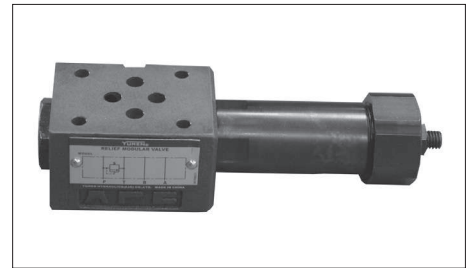
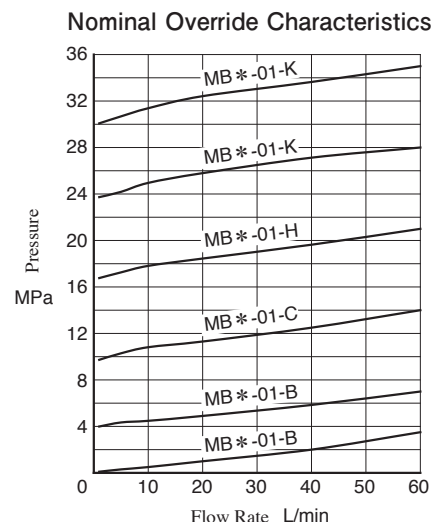
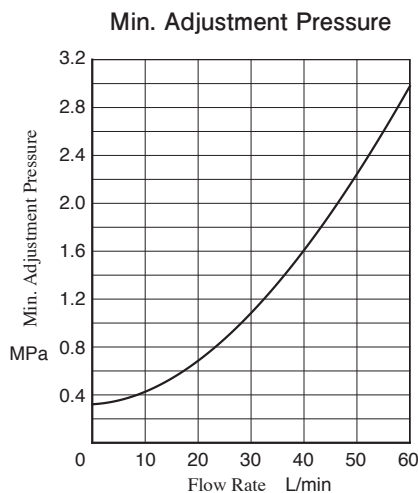
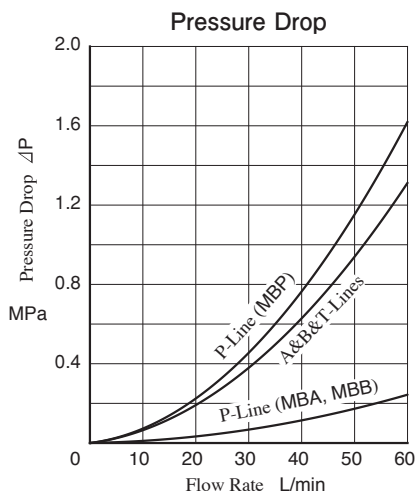
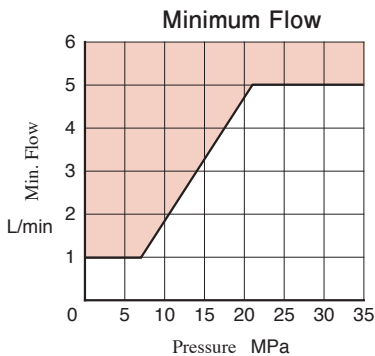
★See the "Min. Adjustment Pressure" of this page.

Instructions

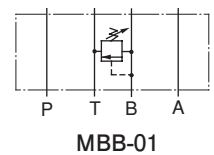
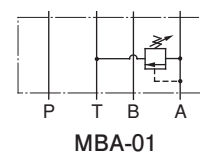
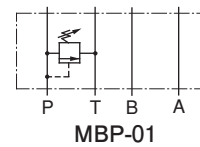
- The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of this page. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.
- In case of a small flow, the setting pressure may become unstable. To avoid this, refer to the minimum flow characteristic curve of the next page and use the valve within a range as shown with .

Typical Performance Characteristics

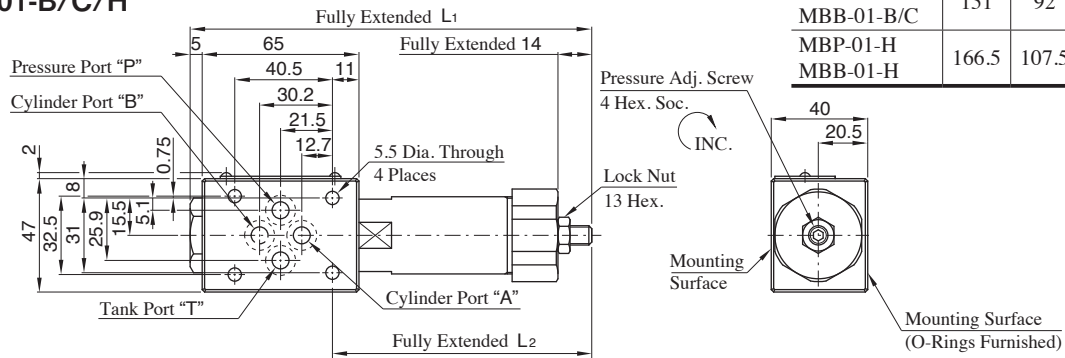
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Graphic Symbols

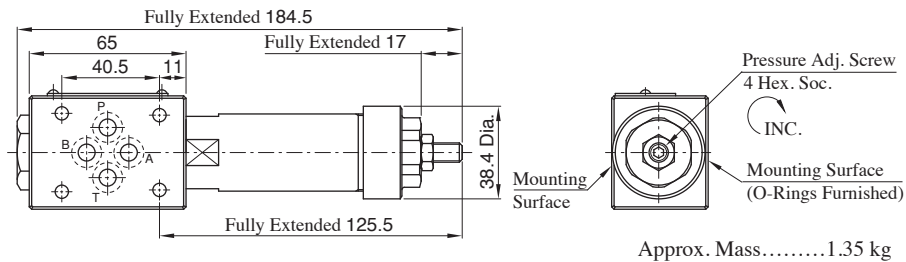


MBP-01-B/C/H MBB-01-B/C/H



Model Numbers	L1	L2	Mass kg
MBP-01-B/C MBB-01-B/C	151	92	1.15
MBP-01-H MBB-01-H	166.5	107.5	1.25

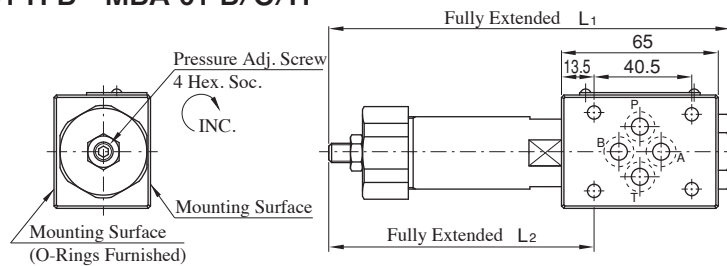
MBP-01-K MBB-01-K



Approx. Mass.....1.35 kg

● For other dimensions, refer to the drawing above (MBP-01-B/C/H).

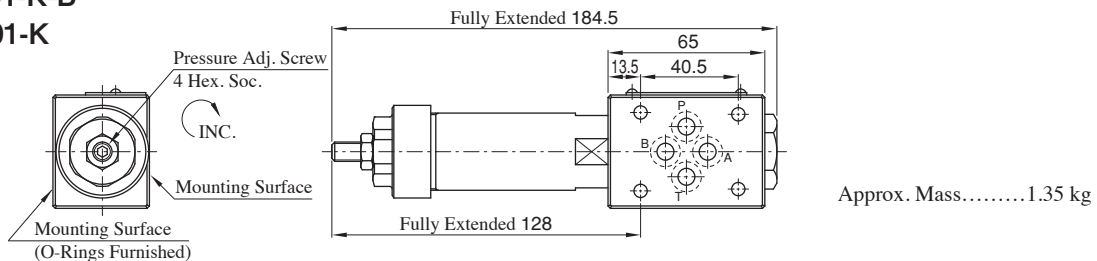
MBP-01-B-B • MBP-01-C-B MBP-01-H-B • MBA-01-B/C/H



Model Numbers	L1	L2	Mass kg
MBP-01-B-B MBP-01-C-B MBA-01-B/C	151	94.5	1.15
MBP-01-H-B MBA-01-H	166.5	110	1.25

● For other dimensions, refer to the drawing above (MBP-01-B/C/H).

MBP-01-K-B MBA-01-K

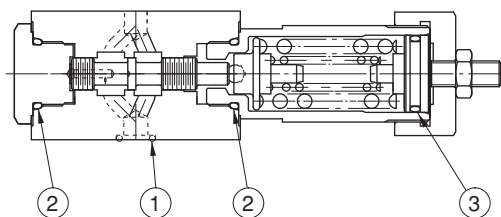


Approx. Mass.....1.35 kg

● For other dimensions, refer to the drawing above (MBP-01-B/C/H).

List of Seals

MBP-01 MBA-01 MBB-01



● MBP/MBB-01- * -B, MBA-01
The pressure adjustment part is assembled on the left side.

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2
3	O-Ring	OR NBR-70-1 P20-N (MB * -01-B/C/H(-B)) OR NBR-70-1 P22-N (MB * -01-K(-B))	1

Reducing Modular Valves

Specifications

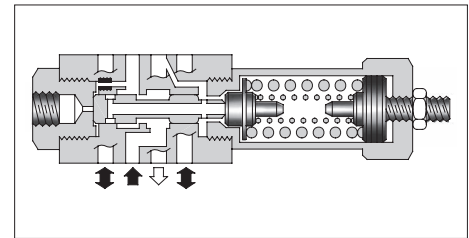
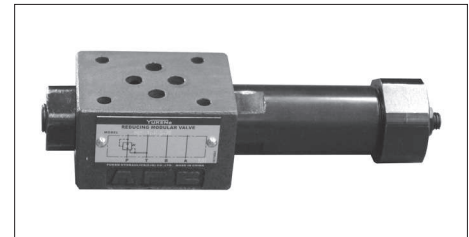
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MR*-01-**-70	35	60 ★

★ If the pressure is set below 0.5 MPa, the maximum flow is limited.
See the "Min. Adjustment Pressure vs. Max. Flow" of this page and during use, stay within the shaded zone on the graph.

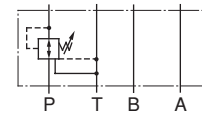
Model Number Designation

MRP	-01	-A	-B	-70
Series Number	Valve Size	Pres.Adj. Range MPa	Pres.Adj. Screw Position	Design Number
MRP: Reducing Valve for P-Line	01	A: ★-3.5	None: A Port Side B: B Port Side	70
MRA: Reducing Valve for A-Line		B: 0.8-7		
MRB: Reducing Valve for B-Line		C: 3.5-14 H: 7-21		

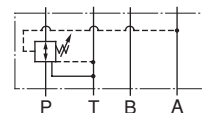
★ See the "Min. Adjustment Pressure vs. Max. Flow" of this page.



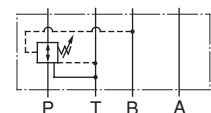
Graphic Symbols



MRP-01



MRA-01

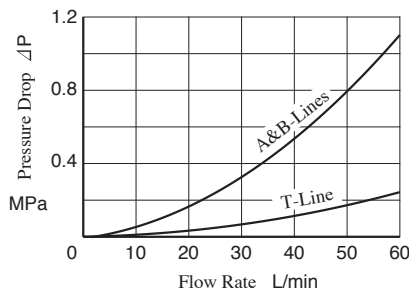


MRB-01

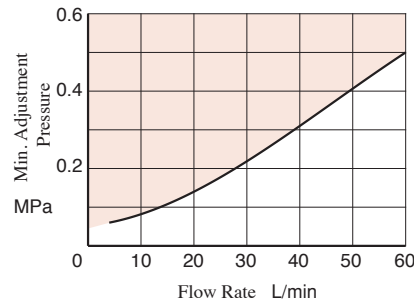
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

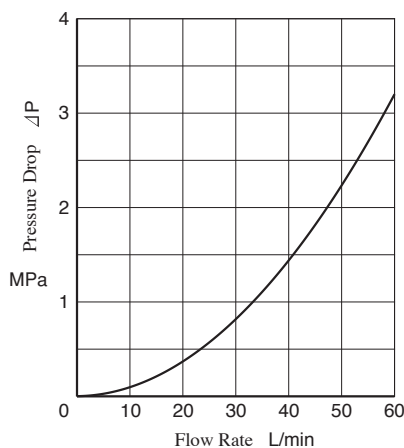
Pressure Drop



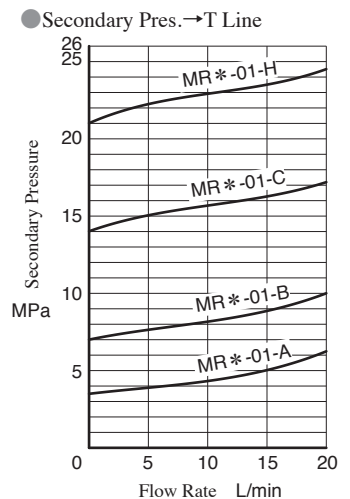
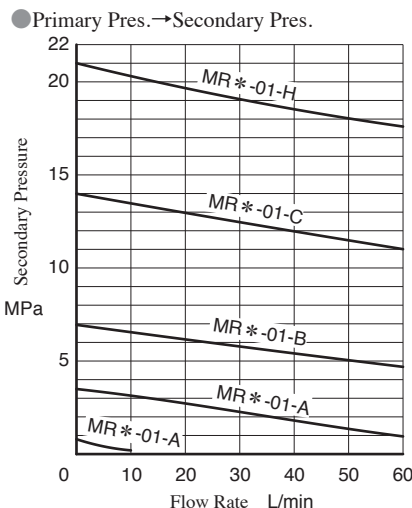
Min. Adjustment Pressure vs. Max. Flow



Pres. Drop at Spool Fully Open (P-Line)



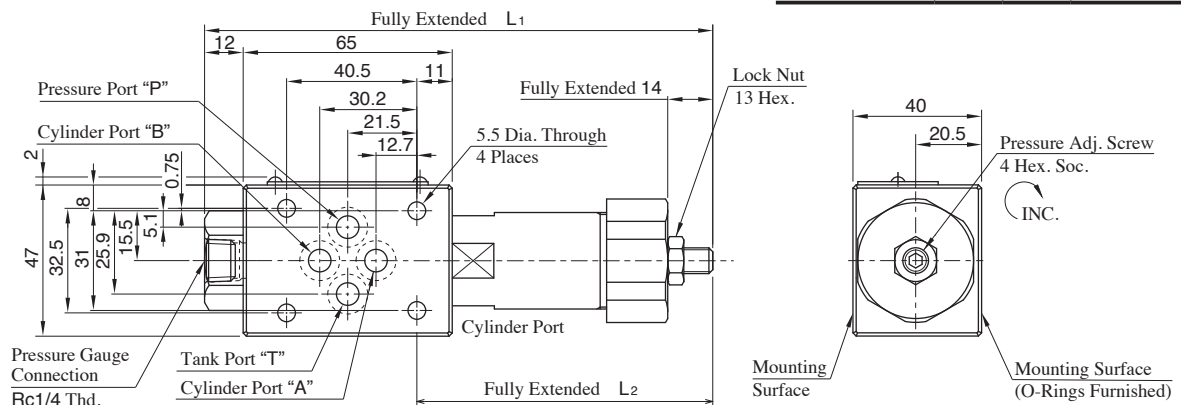
Nominal Override Characteristics Primary Pressure 35 MPa



Instructions

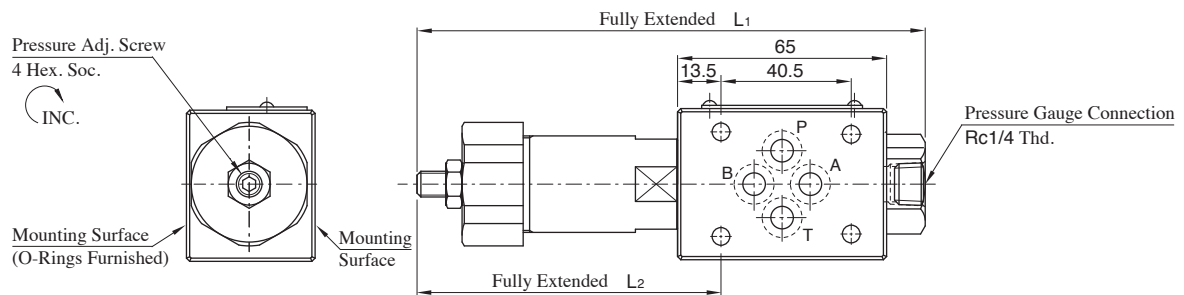
- The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise.
For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

MRP-01 MRA-01 MRB-01



Model Numbers	L1	L2	Mass kg
MR *-01-A	162.5	96.5	1.10
MR *-01-B/C	158	92	1.15
MR *-01-H	173.5	107.5	1.25

MRP-01-* -B MRA-01-* -B MRB-01-* -B

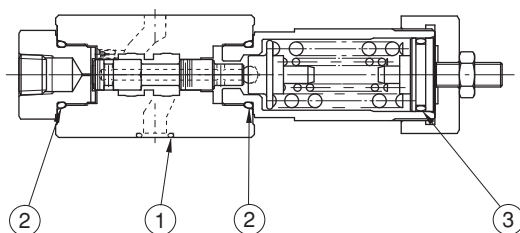


Model Numbers	L1	L2	Mass kg
MR *-01-A-B	162.5	99	1.10
MR *-01-B-B	158	94.5	1.15
MR *-01-C-B	158	94.5	1.15
MR *-01-H-B	173.5	110	1.25

● For other dimensions, please refer to "MRP/MRA/MRB-01" in the above figure.

List of Seals

MRP-01 MRA-01 MRB-01



Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2
3	O-Ring	OR NBR-70-1 P20-N	1

● MR *-01-* -B

The pressure adjustment part is assembled on the left side.

Two Pressure Reducing Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MRDP-01-B- *- *-10	14	20 ★
MRDP-01-C- *- *-10		40 ★

★ Max. Flow is limited when set pressure is low pressure.
See the "Min. Adjustment Pressure vs. Max. Flow" of this page and operate in the range above the graph curve.

Model Number Designation

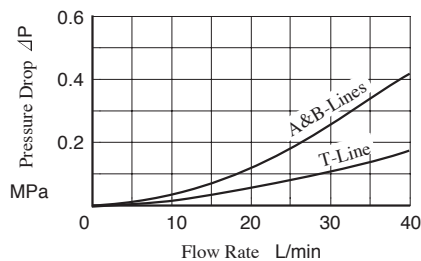
MRDP	-01	-B	-A100	-N	-10
Series Number	Valve Size	Pres. Adj. Range MPa	Coil Type	Electrical Conduit Connection	Design Number
MRDP: Two Pressure Reducing Valve for P-Line	01	Low Press. / High Press. B: 0.2-3.5 / 0.5-7 C: 0.5-7 / 0.5-14	AC A100, A200 DC D24 AC (Rectified) R100, R200 ★	N: Plug-in Connector Type N1: Plug-in Connector Type with Indicator Light (Option)	10

★ Coil Type "R200" is treated as an option.

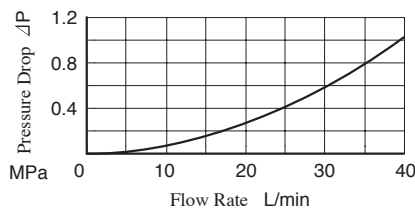
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

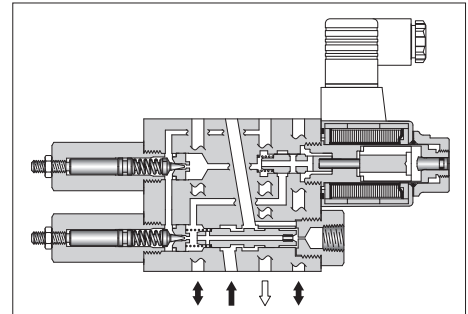
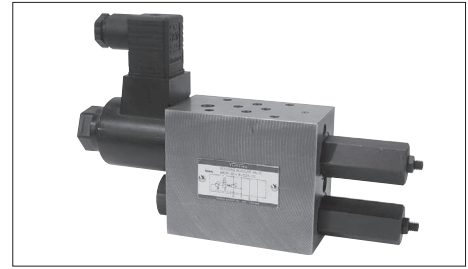
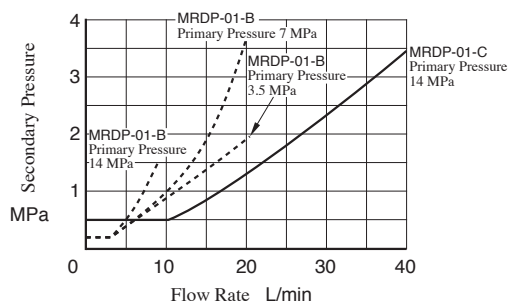
Pressure Drop



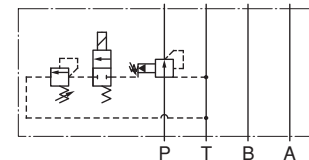
Pressure Drop at Spool Fully Open (P-Line)



Min. Adjustment Pressure vs. Max. Flow

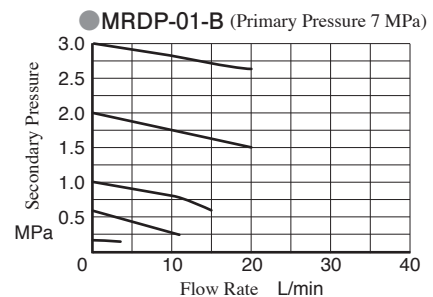
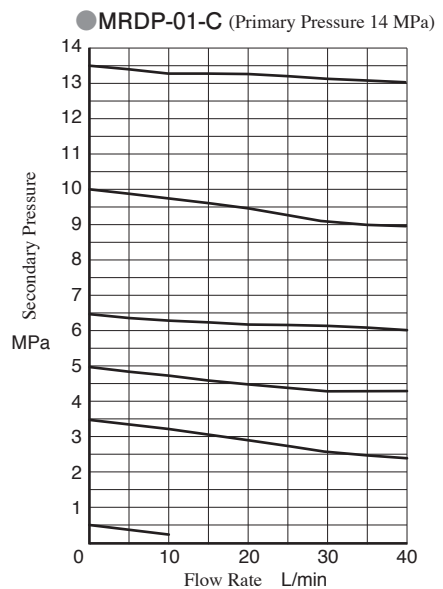


Graphic Symbol



MRDP-01

Nominal Override Characteristics



Standard Solenoid Ratings

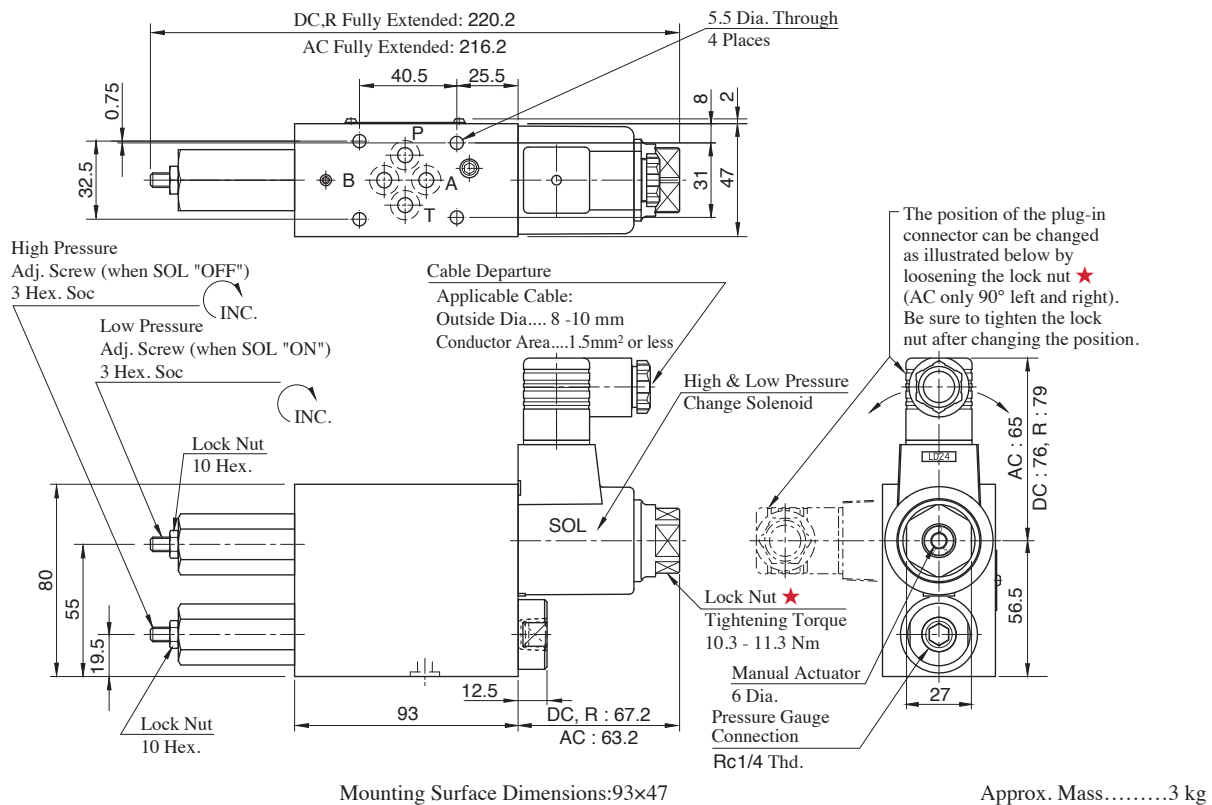
Electric Source	Coil Type	Frequency Hz	Voltage (V)		Current & Power at Rated Voltage		
			Source Rating	Serviceable Range	Inrush (A)	Holding (A)	Power (W)
AC	A100	50	100	80-110	1.65	0.30	—
		60	100	90-120	1.45	0.24	
			110		1.60	0.27	
	A200	50	200	160-220	0.83	0.15	
		60	200	180-240	0.73	0.12	
			220		0.80	0.14	
DC	D24	—	24	21.6-26.4	—	0.60	14
AC→DC (Rectified)	R100	50/60	100	90-110	—	0.168	14
	R200		200	180-220	—	0.084	

Instructions

- The minimum adjustment pressure equals the value of the minimum adjustment pressure on the previous page plus the tank line back pressure. This back pressure should include the value of the T-Line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
- To adjust the pressure, loosen the lock nut and turn the pressure adjustment screw slowly clockwise to increase pressure and anti-clockwise to decrease pressure. After adjustments do not forget to tighten the lock nut. Refer to the table below for the relationship between energized state of the high & low pres. change solenoid and set pressure.

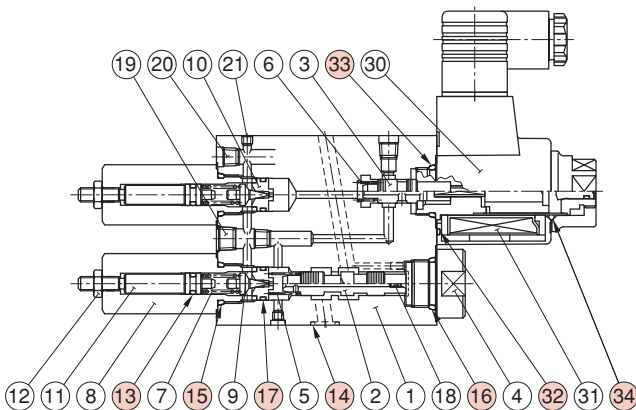
High & Low Pres. Change Solenoid	Set Pres.
OFF	High
ON	Low

MRDP-01



List of Seals, Solenoid Ass'y, Coil Ass'y No.

MRDP-01



List of Seals

Item	Name of Parts	Part Numbers	Qty.	Notes
13	O-Ring	OR NBR-70-1 P6-N	2	
14	O-Ring	OR NBR-90 P9-N	4	
15	O-Ring	OR NBR-90 P14-N	2	
16	O-Ring	OR NBR-90 P18-N	1	
17	O-Ring	AS568-013(NBR-90)	2	
32	O-Ring	AS568-026(NBR-70-1)	1	Included in solenoid ass'y (item ③①).
33	O-Ring	OR NBR-90 P18-N	1	
34	O-Ring	OR NBR-70-1 P20-N	1	

Solenoid Ass'y, Coil Ass'y No.

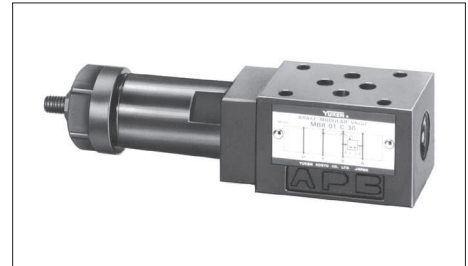
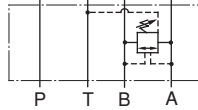
Model Numbers	③①Solenoid Ass'y No.	③①Coil Ass'y No.
MRDP-01- * -A100	L-SA1-100-N-7003	C-L-SA1-100-N-70
MRDP-01- * -A200	L-SA1-200-N-7003	C-L-SA1-200-N-70
MRDP-01- * -D24	L-SD1-24-N-7003	C-L-SD1-24-N-70
MRDP-01- * -R100	L-SR1-100-N-7003	C-L-SR1-100-N-70
MRDP-01- * -R200	L-SR1-200-N-7003	C-L-SR1-200-N-70

Brake Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MBR-01-* -30	25	35

Graphic Symbol



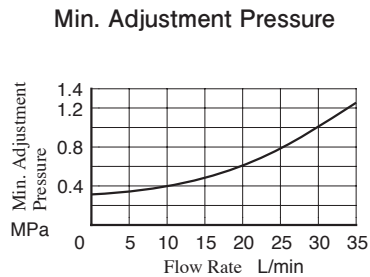
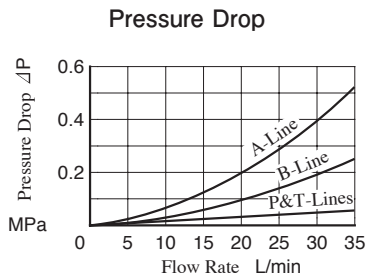
Model Number Designation

MBR	-01	-C	-30
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MBR: Brake Valve	01	C: ★-14 H: 7-21	30

★See the "Min. Adjustment Pressure" of this page.

Typical Performance Characteristics

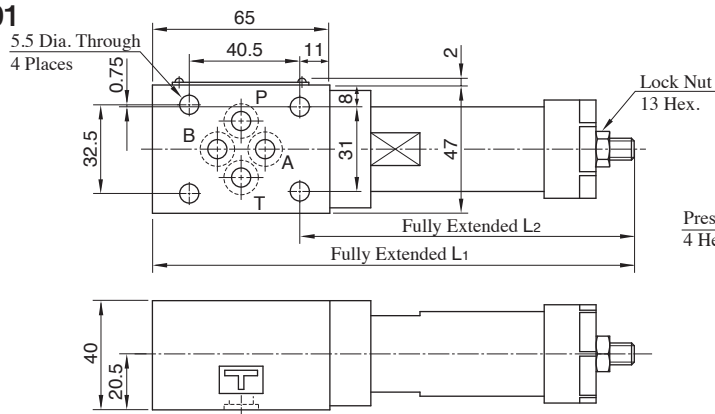
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Instructions

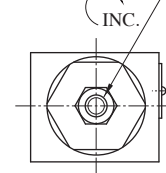
- The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of the left. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

MBR-01



Model Numbers	L1	L2
MBR-01-C	161	107
MBR-01-H	176.5	122.5

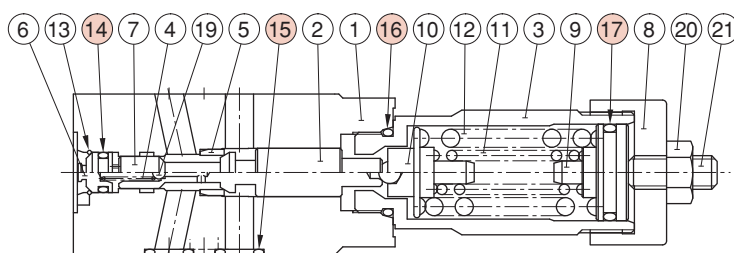
Pressure Adj. Screw
4 Hex. Soc.



Approx. Mass.....1.3 kg

List of Seals

MBR-01



Item	Name of Parts	Part Numbers	Qty.
14	O-Ring	OR NBR-90 P7-N	1
15	O-Ring	OR NBR-90 P9-N	4
16	O-Ring	OR NBR-90 P18-N	1
17	O-Ring	OR NBR-70-1 P20-N	1

Sequence Modular Valves/Counterbalance Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MHP-01- *- *-70	35	60
MHA/MHB-01- *-70		

Model Number Designation

MHP	-01	-B	-B	-70
Series Number	Valve Size	Pres. Adj. Range MPa	Pres. Adj. Screw Position	Design Number
MHP: Sequence Valve for P-Line	01	B: ★-7 C: 3.5-14 H: 7-21 K: 14-35	None: A Port Side B: B Port Side	70
MHA: Counterbalance Valve for A-Line			—	
MHB: Counterbalance Valve for B-Line			—	

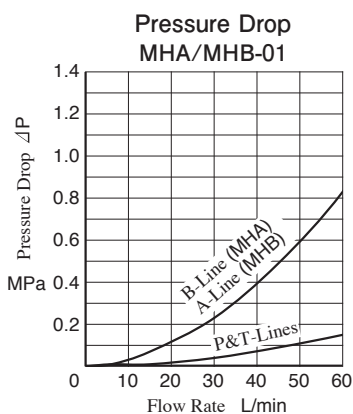
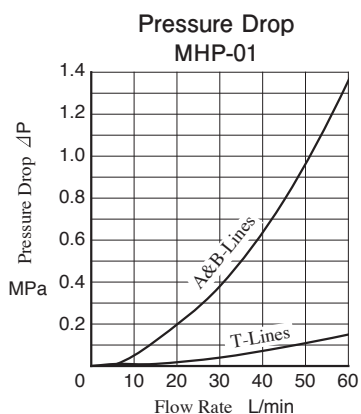
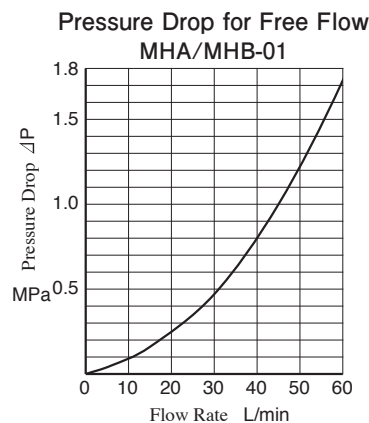
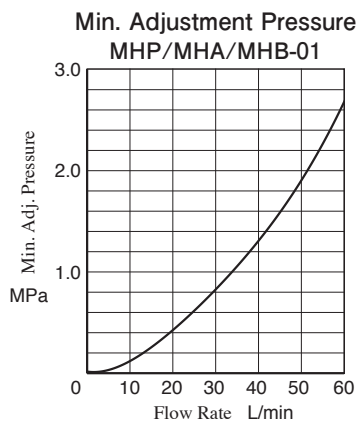
★See the "Min. Adjustment Pressure" on this page.

Instructions

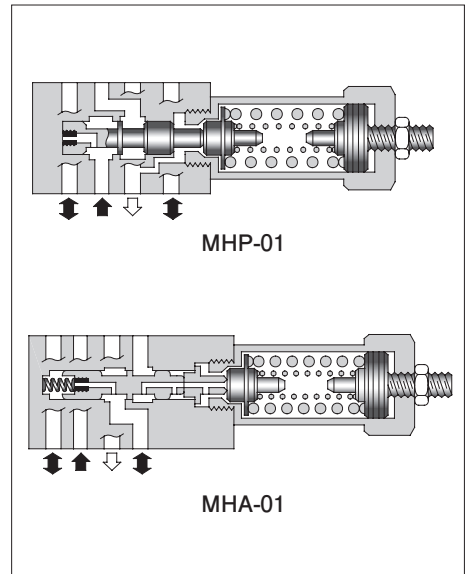
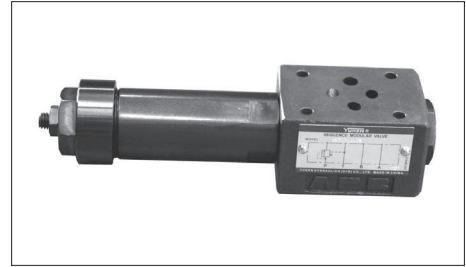
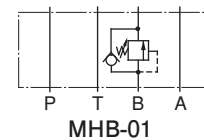
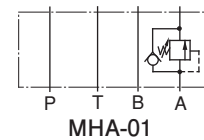
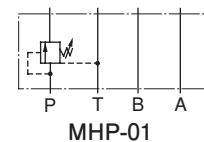
- The minimum adjustment pressure for MHP-01 equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure. This back pressure should include the value of the T-Line pressure drop characteristics of the valves stacked.
- The minimum adjustment pressure for MHA-01 and MHP-01 equals the value obtained from the minimum adjustment pressure characteristics plus the outlet-side back pressure of the valve.
The outlet-side back pressure should include the values of the A(B)-Line pressure drop.
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For increasing pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

Typical Performance Characteristics

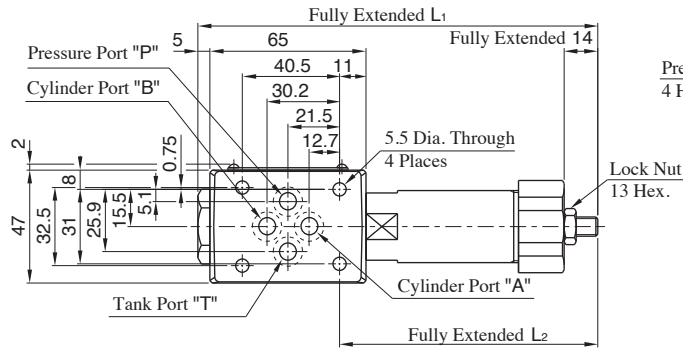
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity: 0.850



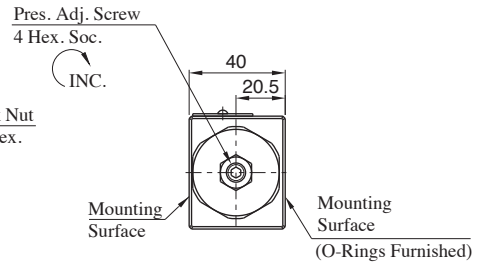
Graphic Symbols



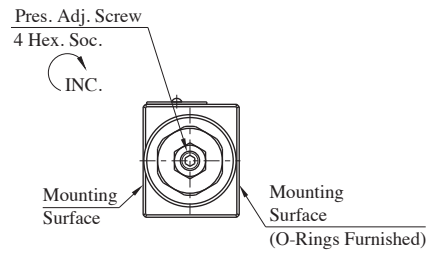
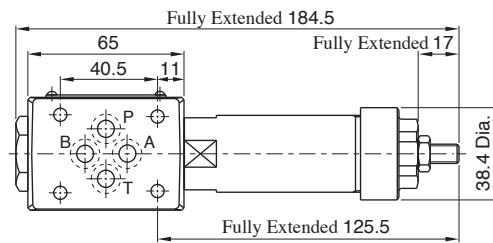
MHP-01-B/C/H



Model Numbers	L ₁	L ₂	Mass kg
MHP-01-B/C	151	92	1.45
MHP-01-H	166.5	107.5	1.55



MHP-01-K

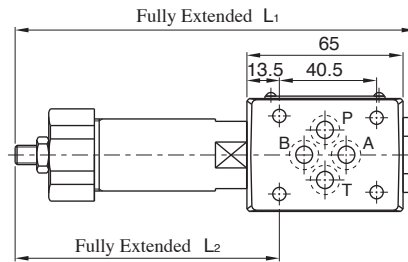
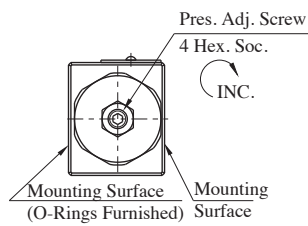


● For other dimensions, refer to "MHP-01-B/C/H" in the above figure.

Approx. Mass.....1.65 kg

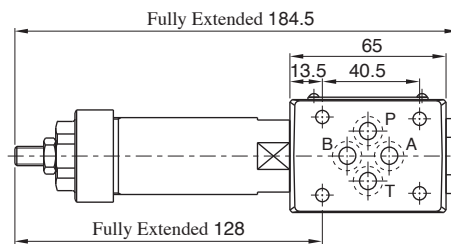
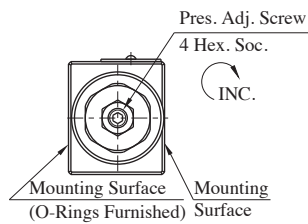
MHP-01-B-B MHP-01-C-B MHP-01-H-B

Model Numbers	L ₁	L ₂	Mass kg
MHP-01-B-B MHP-01-C-B	151	94.5	1.45
MHP-01-H-B	166.5	110	1.55



● For other dimensions, refer to "MHP-01-B/C/H" drawing above.

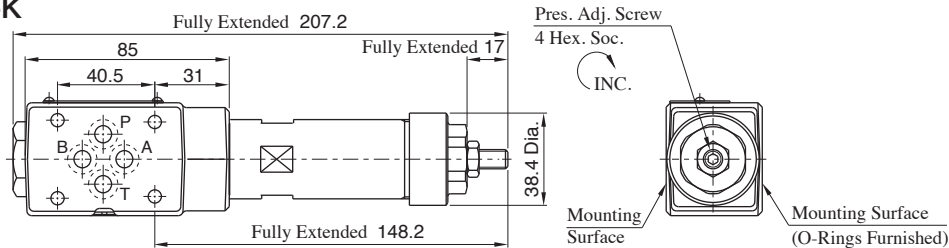
MHP-01-K-B



● For other dimensions, refer to "MHP-01-K" in the above figure.

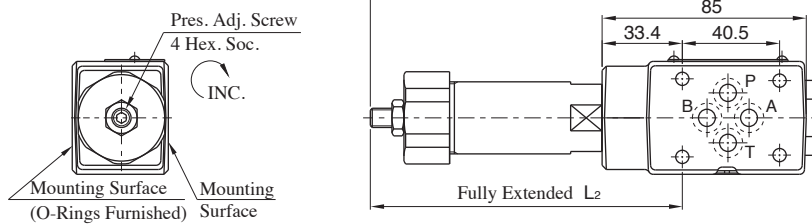
Approx. Mass.....1.65 kg

Model Numbers	L ₁	L ₂	Mass kg
MHA-01-B/C	171	112	1.65
MHA-01-H	186.5	127.5	1.75



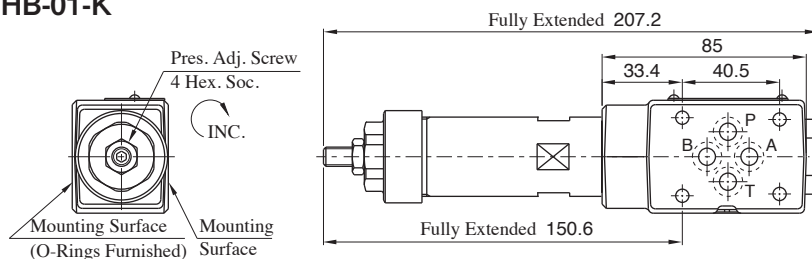
● For other dimensions, refer to "MHA-01-B/C/H" in the above figure.

Approx. Mass.....1.85 kg



● For other dimensions, refer to "MHA-01-B/C/H" in the above figure.

Model Numbers	L ₁	L ₂	Mass kg
MHB-01-B/C	171	114.4	1.65
MHB-01-H	186.5	129.9	1.75

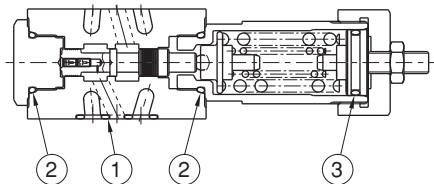


●For other dimensions, refer to "MHA-01-K" in the above figure.

Approx. Mass.....1.85 kg

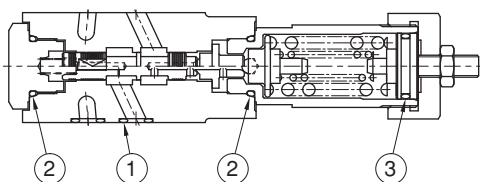
■ List of Seals

MHP-01



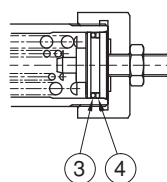
●MHP-01- *-B has the pressure adjustment part on the left side.

MHA-01



●MHB-01 has the pressure adjustment part on the left side.

MHA-01-K



Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2
3	O-Ring	OR NBR-70-1 P20-N [MHP-01-B/C/H] OR NBR-70-1 P22-N [MHP-01-K]	1

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2
3	O-Ring	OR NBR-90 P20-N [MHA-01-B/C/H] [MHB-01-B/C/H] OR NBR-90 P22-N [MHA-01-K] [MHB-01-K]	1
4	Back-up Ring	BR JIS B 2401-4-T2-P22 [MHA-01-K] [MHB-01-K]	1

Pressure Switch Modular Valves

Specifications

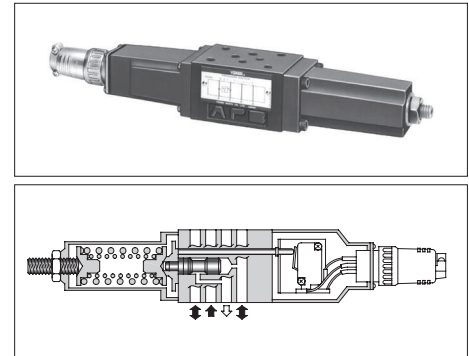
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MJ*-01-M-*-10	31.5	35
MJ*-01-J-35-10	10	
MJ*-01-J-100-10	10	
MJ*-01-J-200-10	20	
MJ*-01-J-350-10	35	

Sensitive Switch Ratings

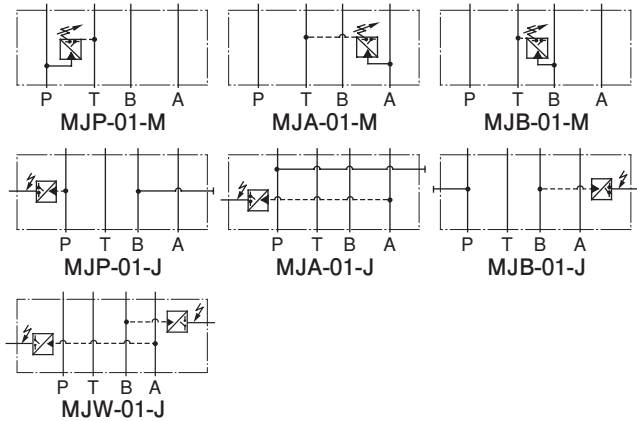
Electric Source	AC	DC	
Voltage (V)	125 · 250	125	250
Current (A)	11A-1/3 HP	0.5	0.25

Specifications of semiconductor type pressure switch

JT-02 series is installed for semiconductor type pressure switch, refer to "C Pressure Control Valves" catalog page for details.



Graphic Symbols



Model Number Designation

MJP	-01	-M	-B	-N	-10
Series Number	Valve Size	Type of Switch	Pres. Adj. Range MPa	Type of Electrical Connection	Design Number
MJP: for P-Line MJA: for A-Line MJB: for B-Line	01	M: Sensitive Switch	B: 1-7 C: 3.5-14 H: 7-21	None: Cable Connector Type N: With Plug-in Connector (DIN)	10
MJP: for P-Line MJA: for A-Line MJB: for B-Line MJW: for A&B-Line		J: Semiconductor Type Pressure Switch	35: 0.1-3.5 100: 1-10 200: 2-20 350: 3.5-35	None: Lead Wire Type	

Instructions

- Wiring of a sensitive switch should be made correctly referring to the table right. Numbers in the switch status column indicate wiring numbers in receptacles or contact numbers of connectors.

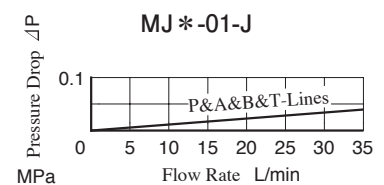
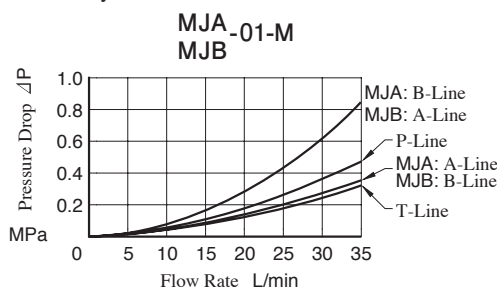
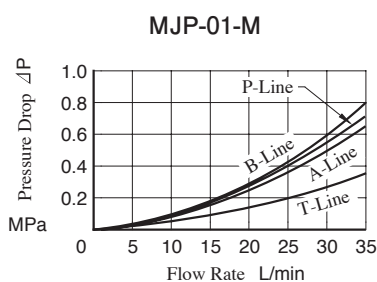
(Pressure with Sensitive Switch and The Switch Status)

Operating Pressure	Switch Status
Less than Pressure setting	1 ○ 2 ○ 3
More than Pressure setting	1 ○ 2 ○ 3

- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

Pressure Drop

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



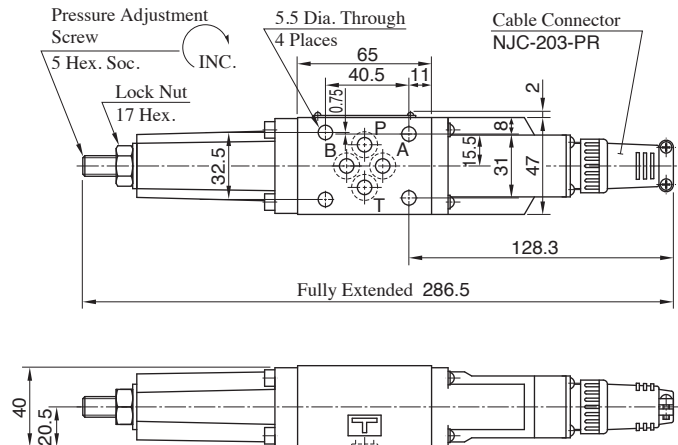
Accessories

Valve Model Numbers	Accessories
MJ *-01-M- *-10	Cable connector : NJC-203-PR.....1 Pc.
MJ *-01-M- *-N-10	DIN connector : GDM311-B-11.....1 Pc.

Cable Connector Type

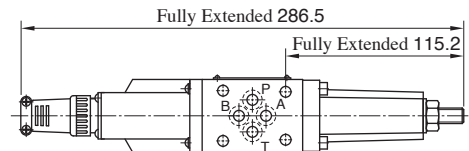
MJP-01-M- *-10

MJA-01-M- *-10



Approx. Mass.....1.3 kg

MJB-01-M- *-10



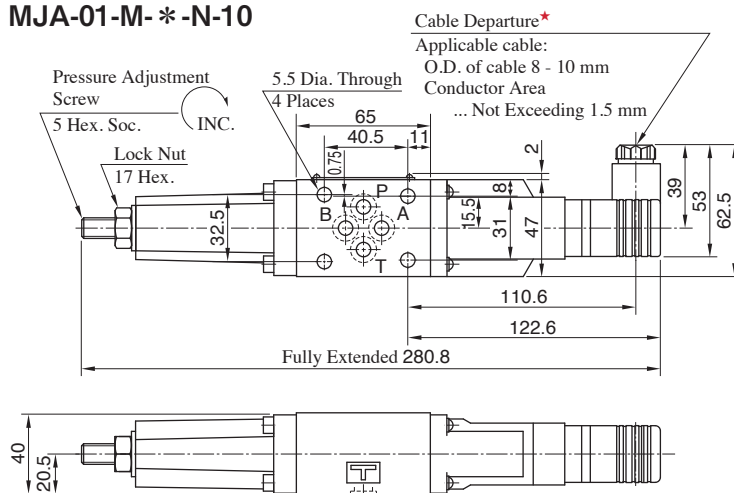
Approx. Mass.....1.3 kg

For other dimensions, refer to "MJP-01" in the drawing left.

Plug-in Connector Type

MJP-01-M- *-N-10

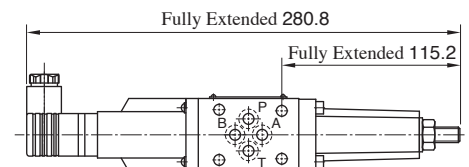
MJA-01-M- *-N-10



Approx. Mass.....1.3 kg

★As shown by the dot-and-dash line, the cable departure can also be faced opposite.

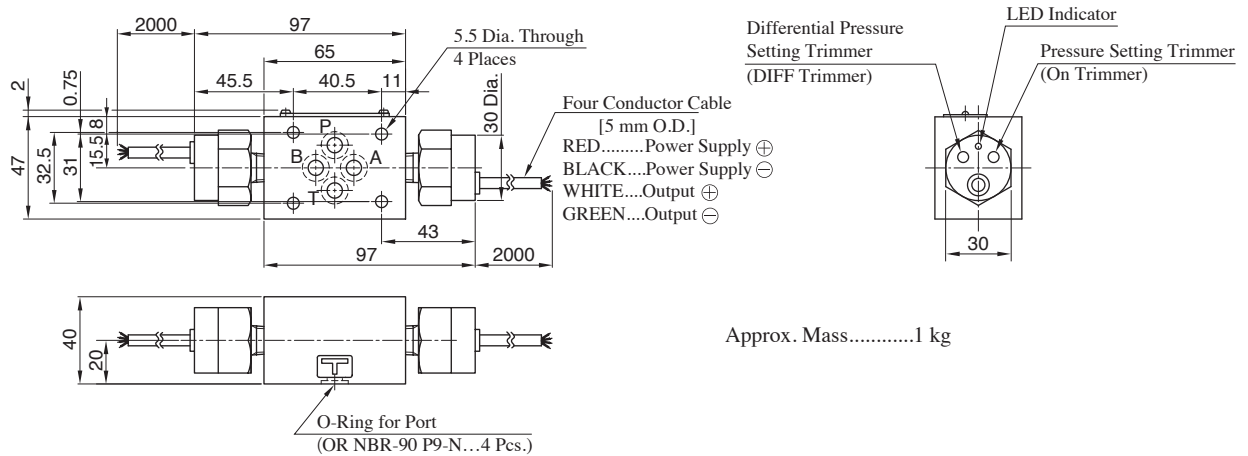
MJB-01-M- *-N-10



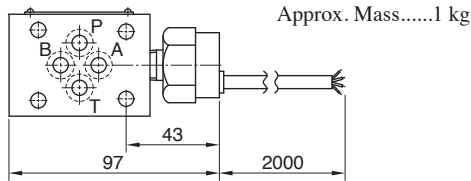
Approx. Mass.....1.3 kg

For other dimensions, refer to "MJP-01" in the drawing left.

● **Semiconductor Type Pressure Switch**
MJW-01-J- *-10

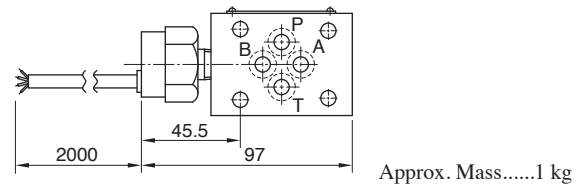


MJP-01-J- *-10
MJA-01-J- *-10



For other dimensions, refer to "MJW-01" in the drawing above.

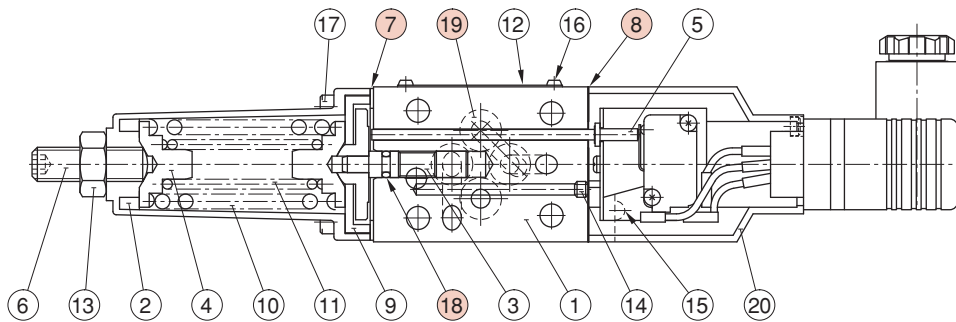
MJB-01-J- *-10



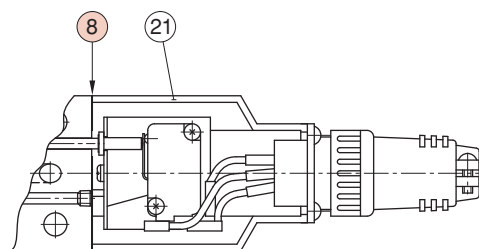
For other dimensions, refer to "MJW-01" in the drawing above.

■ **List of Seals**

MJP-01-M- *-N-10
Plug-in Connector Type



MJ *-01-M- *-10
Cable Connector Type



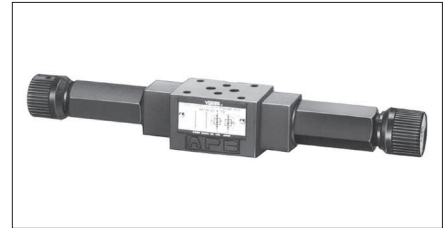
Item	Name of Parts	Part Numbers	Qty.
7	Packing	3116-VK414239-4	1
8	Packing	3116-VK414240-2	1
18	O-Ring	OR NBR-70-1 P5-N	1
19	O-Ring	OR NBR-90 P9-N	4

● Since MJ *-01-J- *-10 (Semiconductor type pressure switch) does not have any seals inside, only four(4) O-rings for the ports are required. Please refer to the drawing above.

Pressure and Temperature Compensated Flow Control (and Check) Modular Valves

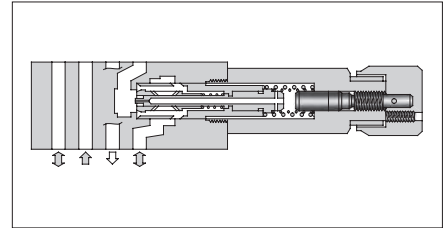
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Metered Flow L/min	Max. Free Flow L/min
MFP-01-10	16	35	—
MF * -01- *-10			35

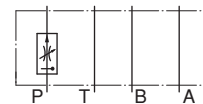


Model Number Designation

MFA	-01	-X	-10
Series Number	Valve Size	Direction of Flow	Design Number
MFP: Flow Control Valve for P-Line	01	—	10
MFA: Flow Control and Check Valve for A-Line		X: Meter-out Y: Meter-in	10
MFB: Flow Control and Check Valve for B-Line MFW: Flow Control and Check Valve for A&B-Lines			



Graphic Symbols

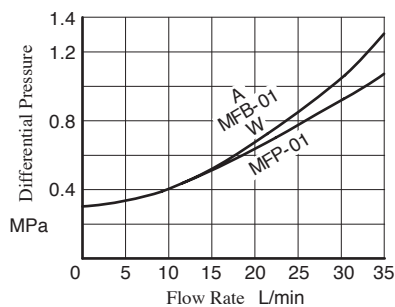


MFP-01

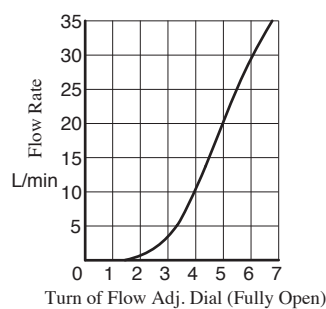
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

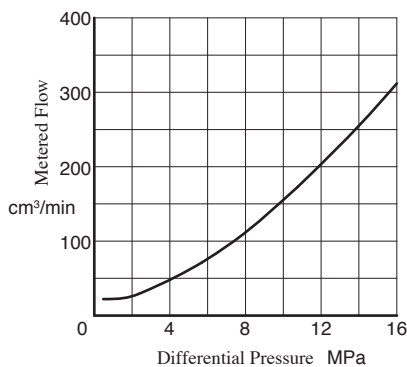
Min. Required Pressure Difference



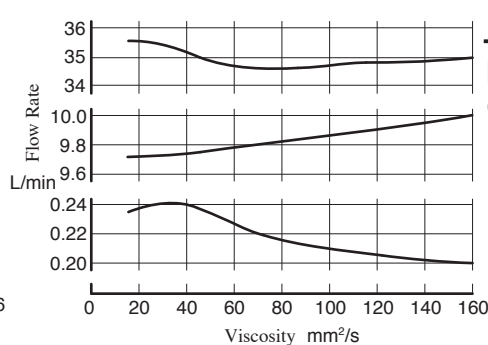
Metered Flow vs. Dial Position



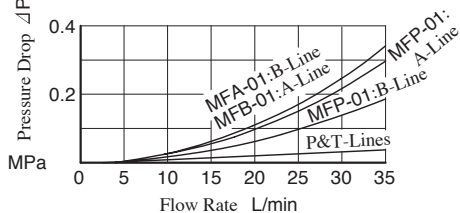
Min. Metered Flow



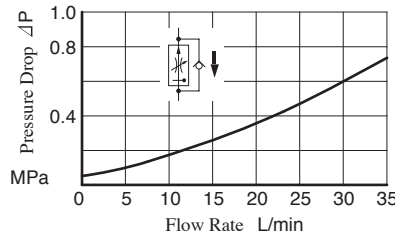
Metered Flow vs. Viscosity



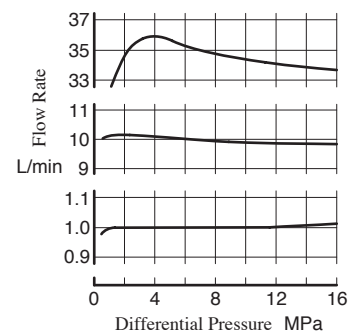
Pressure Drop



Pressure Drop for Free Flow



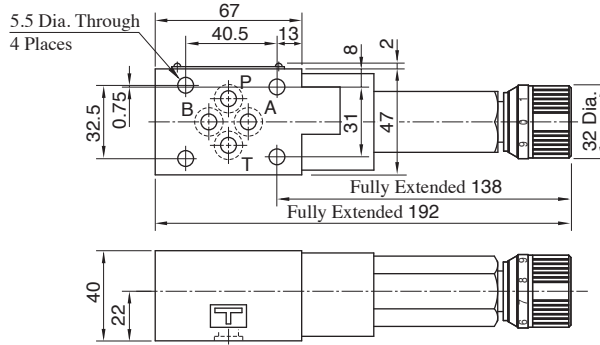
Metered Flow vs. Differential Pres.



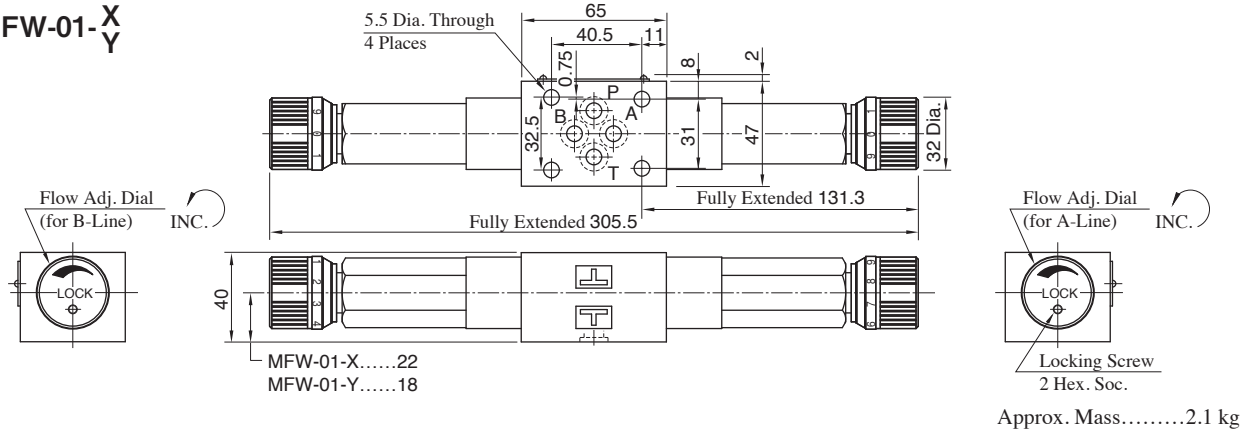
Instructions

- To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

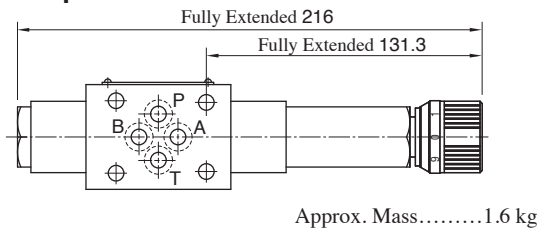
MFP-01



**MFW-01-X
Y**

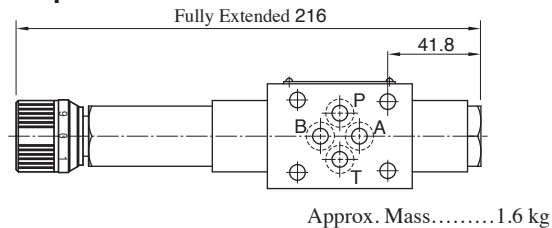


**MFA-01-X
Y**



For other dimensions, refer to "MFW-01" in the drawing above.

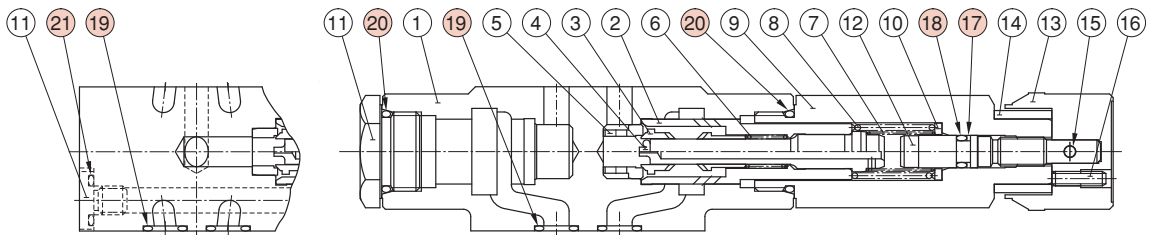
**MFB-01-X
Y**



For other dimensions, refer to "MFW-01" in the drawing above.

List of Seals

**MFP-01
MFA-01
MFB-01
MFW-01**



MFP-01

MFA-01

● MFB-01: Flow control part is built in the left side.

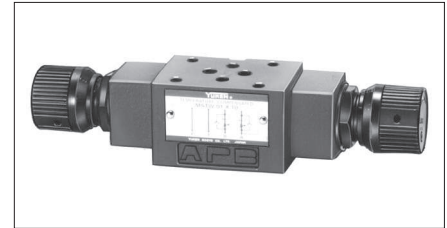
● MFW-01: Flow control part is built in the both sides.

Item	Name of Parts	Part Numbers	Qty.			
			MFP-01	MFA-01	MFB-01	MFW-01
17	Back-up Ring	BR JIS B 2401-4-T2-P6	1	1	1	2
18	O-Ring	OR NBR-70-1 P6-N	1	1	1	2
19	O-Ring	OR NBR-90 P9-N	4	4	4	4
20	O-Ring	OR NBR-90 P18-N	1	2	2	2
21	O-Ring	OR NBR-90 P10-N	1	—	—	—

Temperature Compensated Throttle and Check Modular Valves

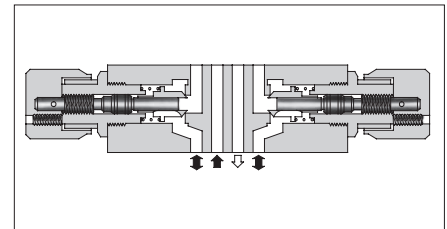
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Differential Pressure MPa	Max. Metered Flow L/min	Min. Metered Flow L/min	Max. Free Flow L/min
MST*-01-X-10	31.5	14	35	0.5	35

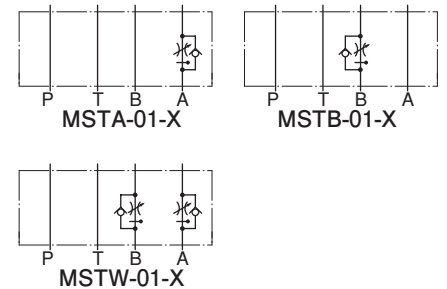


Model Number Designation

MSTA	-01	-X	-10
Series Number	Valve Size	Direction of Flow	Design Number
MSTA: for A-Line MSTB: for B-Line MSTW: for A&B-Lines	01	X: Meter-out	10

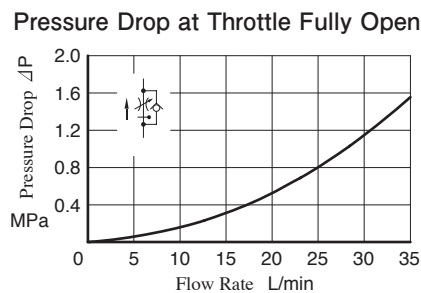
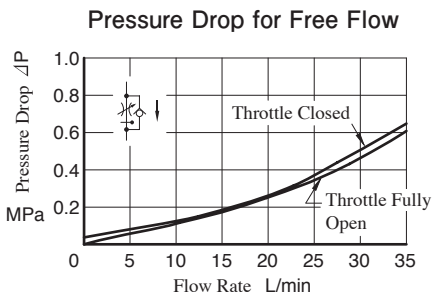
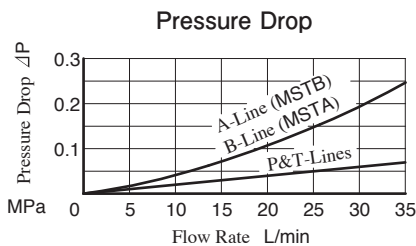


Graphic Symbols



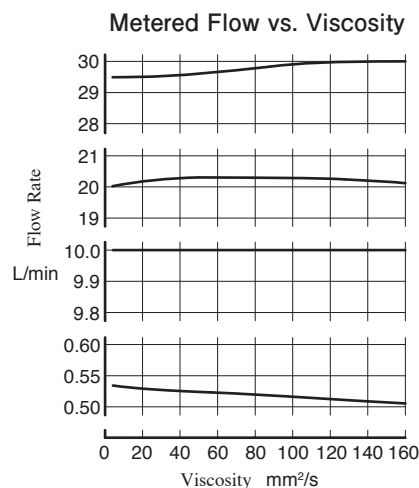
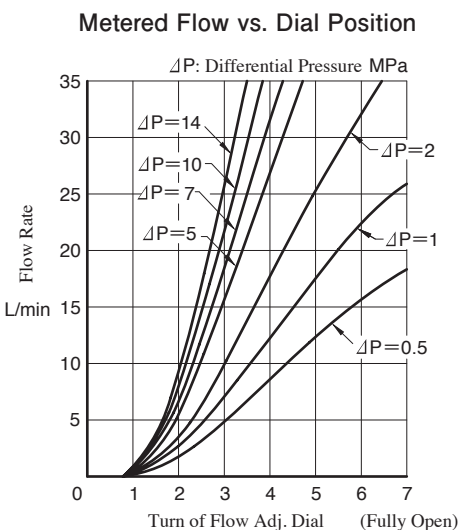
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

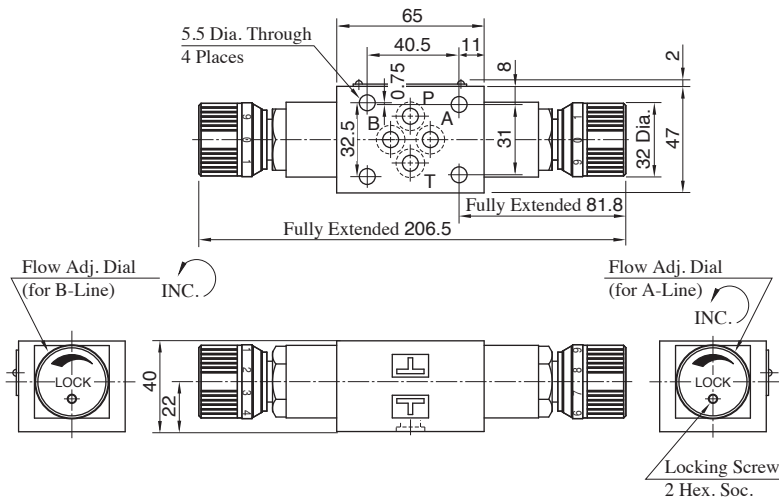


Instructions

- To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

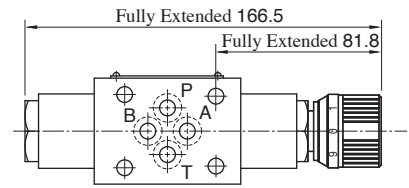


MSTW-01-X



Approx. Mass.....1.5 kg

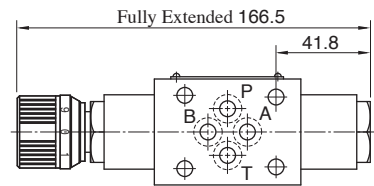
MSTA-01-X



Approx. Mass.....1.3 kg

For other dimensions, refer to "MSTW-01" in the drawing left.

MSTB-01-X

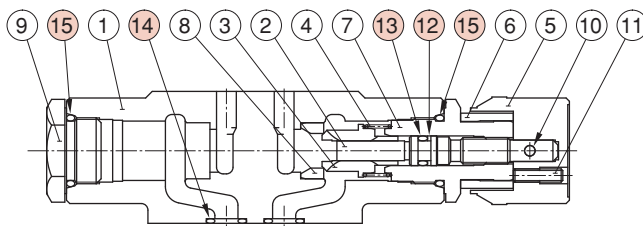


Approx. Mass.....1.3 kg

For other dimensions, refer to "MSTW-01" in the drawing left.

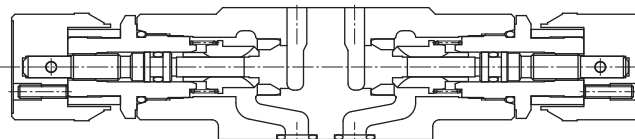
List of Seals

MSTA-01 MSTB-01 MSTW-01



MSTA-01-X

● MSTB-01-X: Flow control part is built in the left side.



MSTW-01-X

Item	Name of Parts	Part Numbers	Qty.		
			MSTA	MSTB	MSTW
12	Back-up Ring	BR JIS B 2401 -4 T2-P6	1	1	2
13	O-Ring	OR NBR-70-1 P6-N	1	1	2
14	O-Ring	OR NBR-90 P9-N	4	4	4
15	O-Ring	OR NBR-90 P18-N	2	2	2

Throttle Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS *-01-50	31.5	60 ★

★ At the low differential pressure, maximum flow is limited. See "Pressure Drop at Throttle Fully Open".

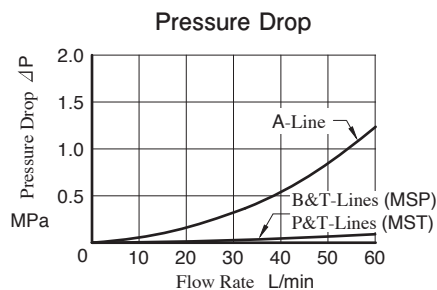
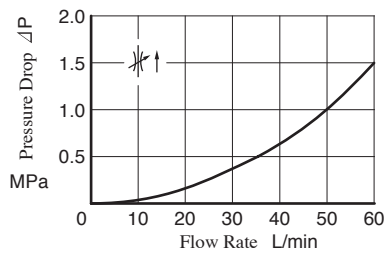
Model Number Designation

MSP	-01	-50
Series Number	Valve Size	Design Number
MSP: for P-Line } Throttle Valve MST: for T-Line }	01	50

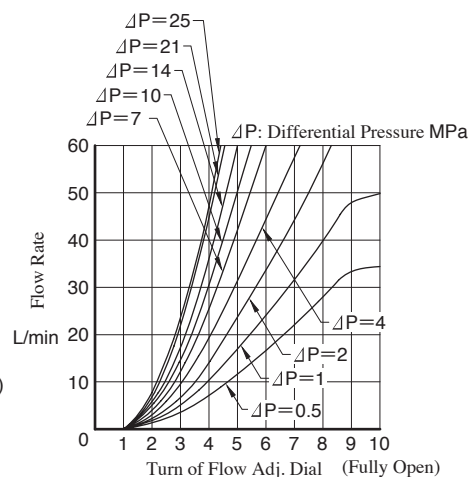
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

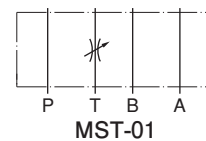
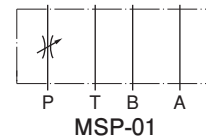
Pressure Drop at Throttle Fully Open



Metered Flow vs. Dial Position



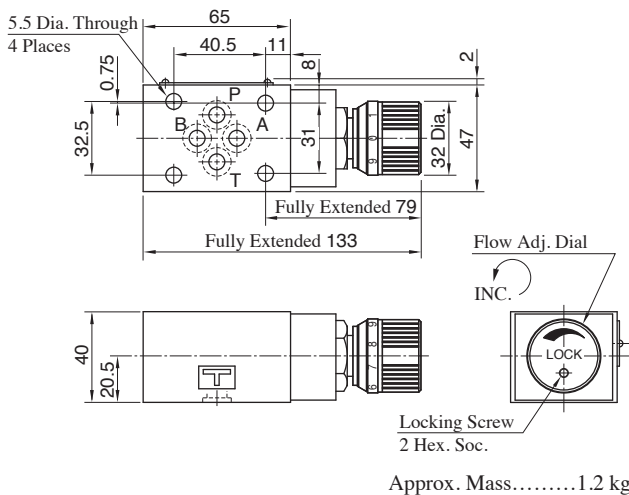
Graphic Symbols



Instructions

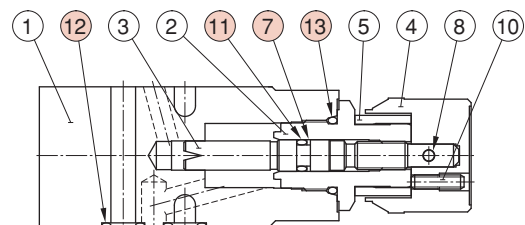
- To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

MSP-01 MST-01



List of Seals

MSP-01 MST-01



Item	Name of Parts	Part Numbers	Qty.
7	Back-up Ring	BR JIS B 2401-4 T2-P6	1
11	O-Ring	OR NBR-70-1 P6-N	1
12	O-Ring	OR NBR-90 P9-N	4
13	O-Ring	OR NBR-90 P18-N	1

Check and Throttle Modular Valves

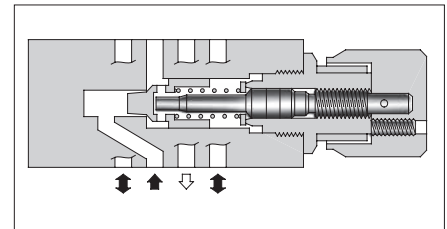
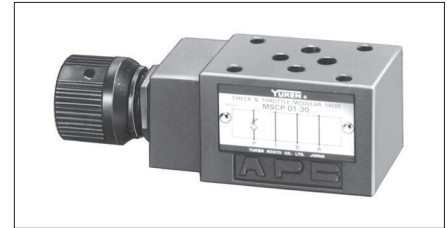
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MSCP-01-30	31.5	35 ★

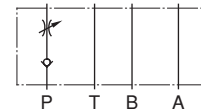
★At the low differential pressure, maximum flow is limited. See "Pressure Drop at Throttle Fully Open".

Model Number Designation

MSCP	-01	-30
Series Number	Valve Size	Design Number
MSCP: Check and Throttle MSCP: Valve for P-Line	01	30



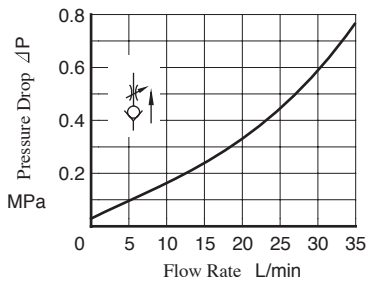
Graphic Symbol



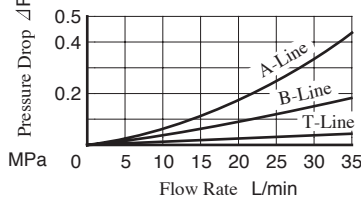
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

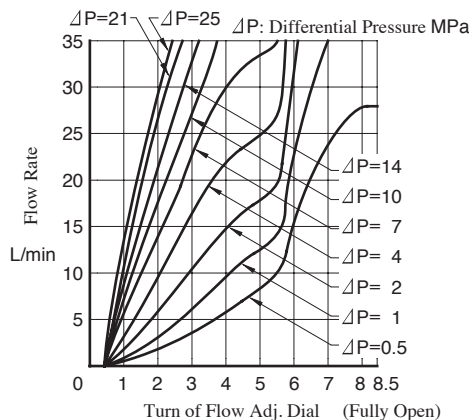
Pressure Drop at Throttle Fully Open



Pressure Drop



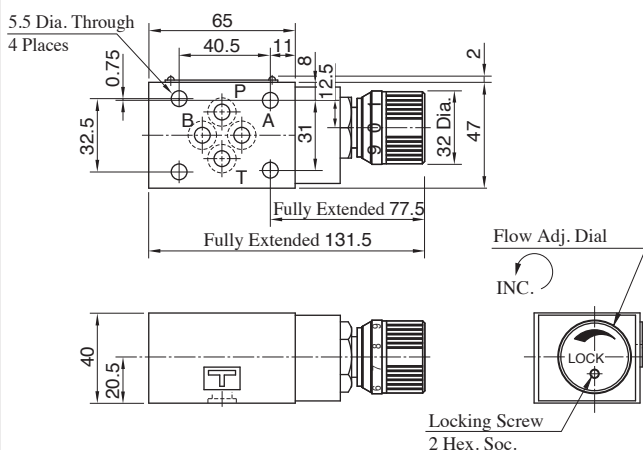
Metered Flow vs. Dial Position



Instructions

- To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

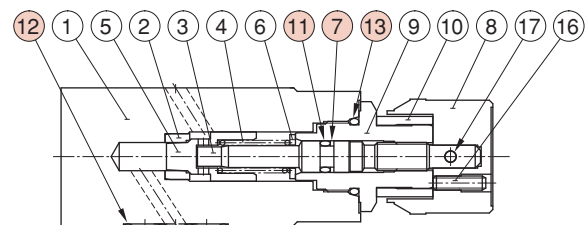
MSCP-01



Approx. Mass.....1.2 kg

List of Seals

MSCP-01



Item	Name of Parts	Part Numbers	Qty.
7	Back-up Ring	BR JIS B 2401-4-T2-P6	1
11	O-Ring	OR NBR-70-1 P6-N	1
12	O-Ring	OR NBR-90 P9-N	4
13	O-Ring	OR NBR-90 P18-N	1

Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS *-01- *-70	35	80

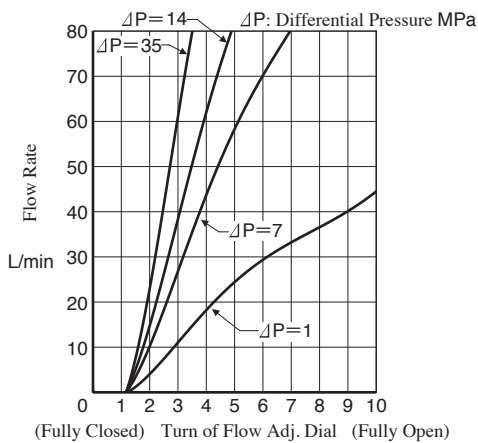
Model Number Designation

MSW	-01	-X	Y	-70
Series Number	Valve Size	Direction of Flow ("A" Line)	Direction of Flow ("B" Line)	Design Number
MSA: Throttle and Check Valve for A-Line	01	X: Meter-out Y: Meter-in	—	70
MSB: Throttle and Check Valve for B-Line		—	X: Meter-out Y: Meter-in	
MSW: Throttle and Check Valve for A&B-Lines		X: Meter-out Y: Meter-in		
		X: Meter-out Y: Meter-in	Y: Meter-in X: Meter-out	

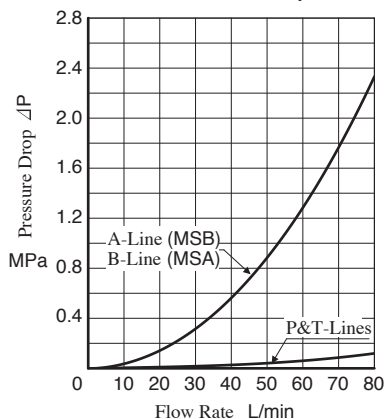
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

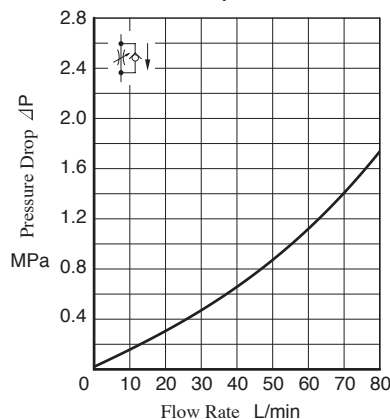
Metered Flow vs. Dial Position



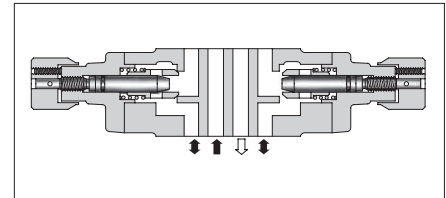
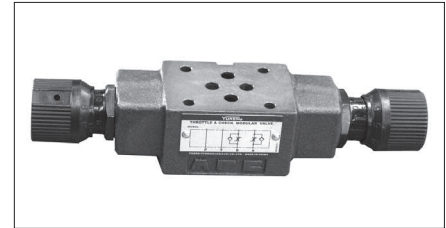
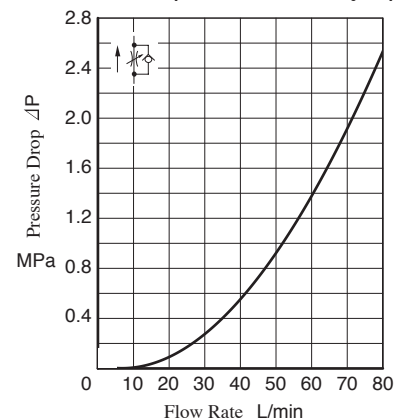
Pressure Drop



Pressure Drop for Free Flow



Pressure Drop at Throttle Fully Open



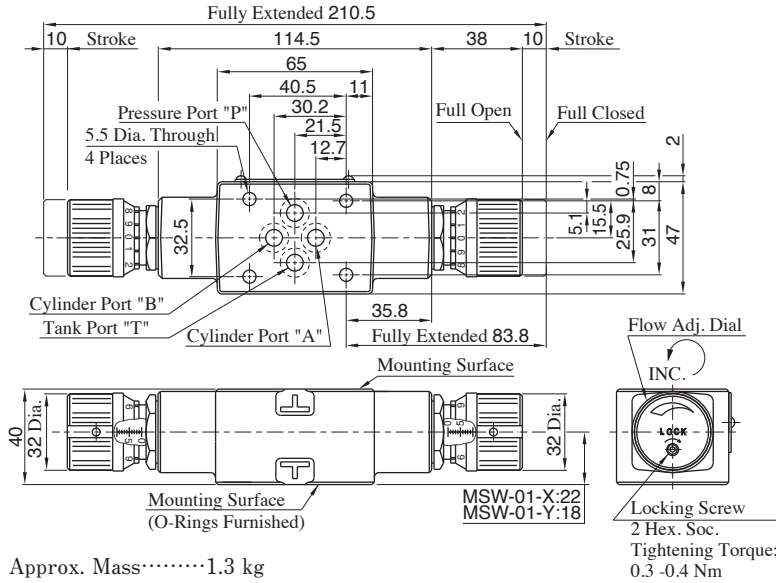
Graphic Symbols

Meter-out	Meter-in
MSA-01-X	MSA-01-Y
MSB-01-X	MSB-01-Y
MSW-01-X	MSW-01-Y
Meter-out • Meter-in	Meter-in • Meter-out
MSW-01-XY	MSW-01-YX

Instructions

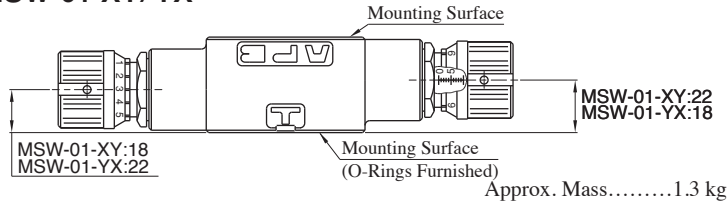
- To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise. For a decrease of flow turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

MSW-01-X/Y



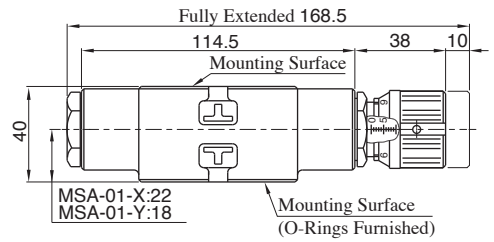
Approx. Mass.....1.3 kg

MSW-01-XY/YX



For other dimensions, refer to "MSW-01-X/Y" in the drawing above.

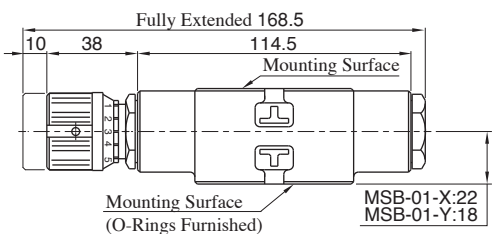
MSA-01-X/Y



Approx. Mass.....1.15 kg

For other dimensions, refer to "MSW-01" in the drawing left.

MSB-01-X/Y

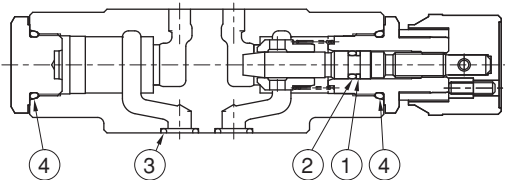


Approx. Mass.....1.15 kg

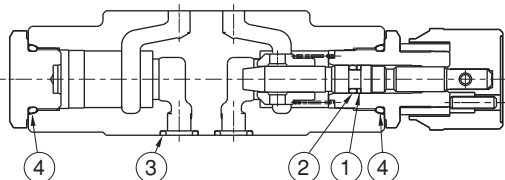
For other dimensions, refer to "MSW-01" in the drawing left.

List of Seals

MSA-01, MSB-01, MSW-01



MSA-01-X



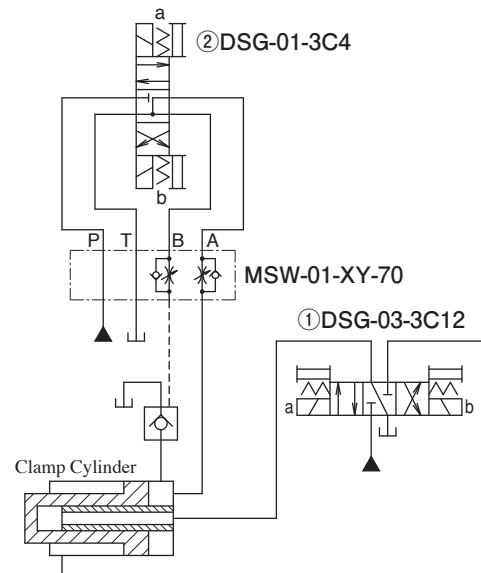
MSA-01-Y

- MSB-01: Flow control part is built in the left side.
- MSW-01: Flow control part is built in the both left and right sides.

Item	Name of Parts	Part Numbers	Qty.	
			MSA,MSB	MSW
1	Back-up Ring	BR JIS B 2401-4-T2-P6	1	2
2	O-Ring	OR NBR-70-1 P6-N	1	2
3	O-Ring	OR NBR-90 P9-N	4	4
4	O-Ring	OR NBR-90 P18-N	2	2

Application

- Circuit of Clamp Cylinder for Injection Molding Machine



Operation Sequence

Clamp Cylinder	Advance	End Point Pressurization	Decompression	Retreat
Solenoid Operated Directional Valve ①	Sol.a ON	→	Center Position	Sol.b ON
Solenoid Operated Directional Valve ②	Sol.b ON	Sol.a ON	Sol.b ON	→

Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MC *-01- *-70	35	60

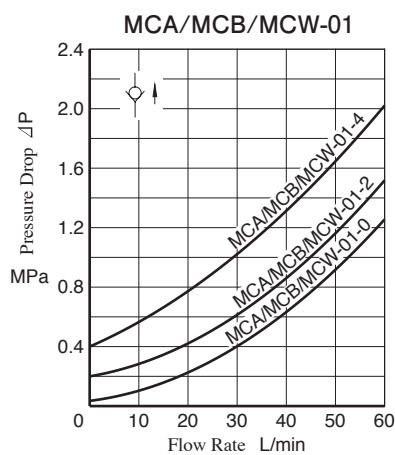
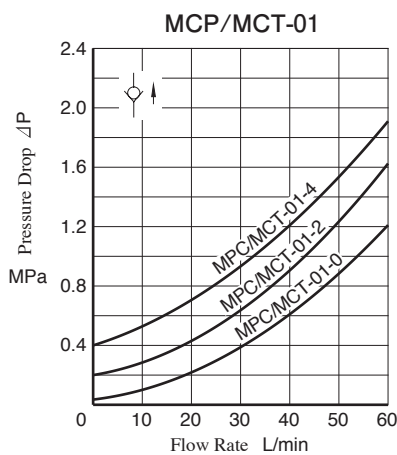
Model Number Designation

MCP	-01	-0	-70
Series Number	Valve Size	Cracking Pressure MPa	Design Number
MCP: Check Valve for P-Line MCA: Check Valve for A-Line MCB: Check Valve for B-Line MCT: Check Valve for T-Line MCW: Check Valve for A-Line & B-Line	01	0: 0.035 2: 0.2 4: 0.4	70

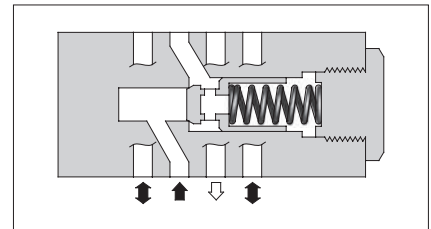
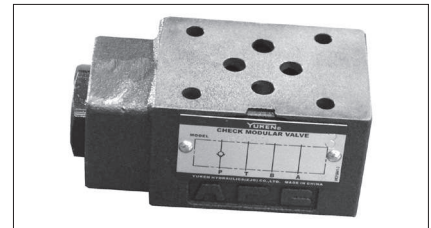
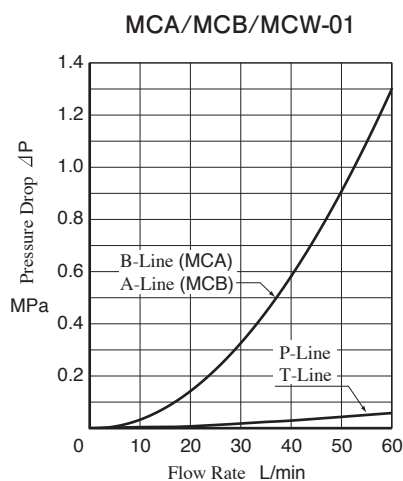
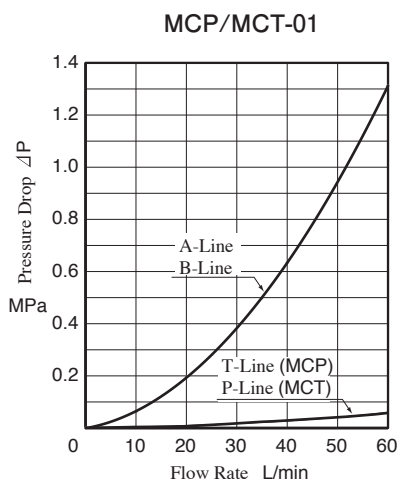
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

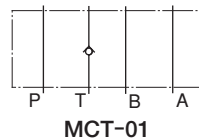
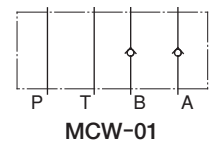
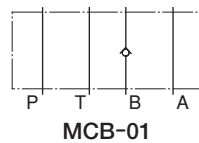
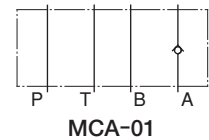
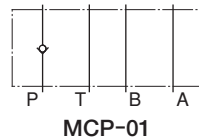
Pressure Drop for Free Flow



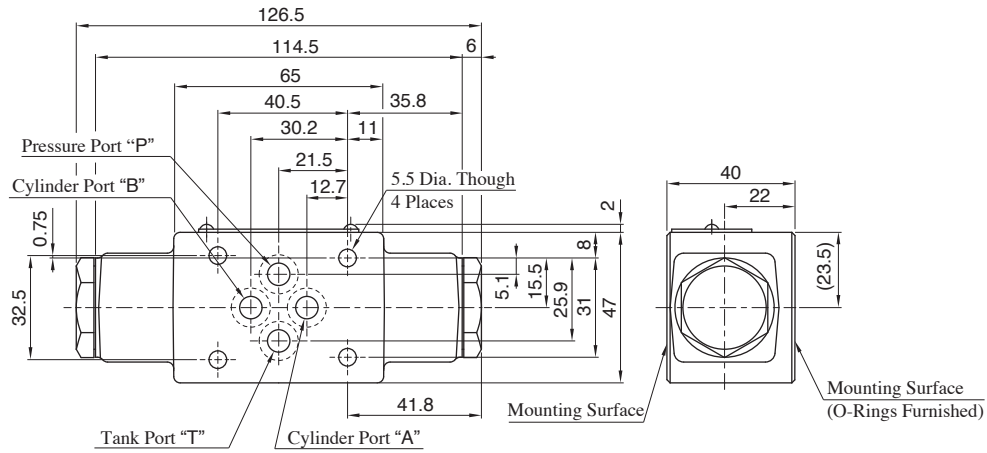
Pressure Drop of each line



Graphic Symbols



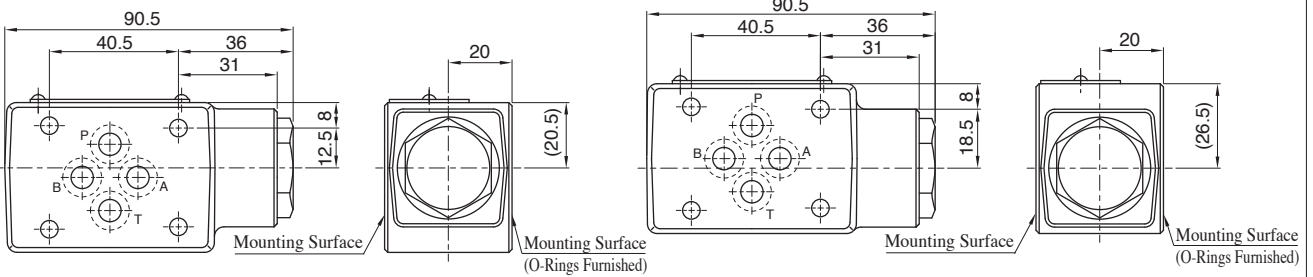
**MCA-01
MCB-01
MCW-01**



Approx. Mass.....1.2 kg

MCP-01

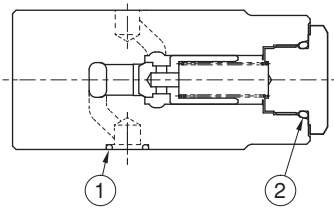
MCT-01



● Please refer to the drawing above (MCA-01/MCB-01/MCW-01) for other dimensions. Approx. Mass.....1.0 kg

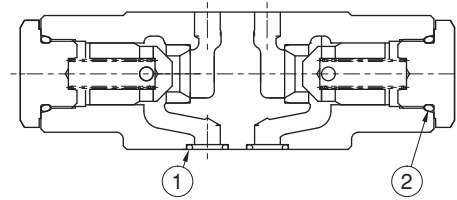
List of Seals

**MCP-01
MCT-01**



Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	1

**MCA-01
MCB-01
MCW-01**



Please refer to the drawing above for MCW-01.

- MCA-01 does not have poppet, spring or seat built in the left side.
- MCB-01 does not have poppet, spring or seat built in the right side.

Item	Name of Parts	Model of Parts	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2

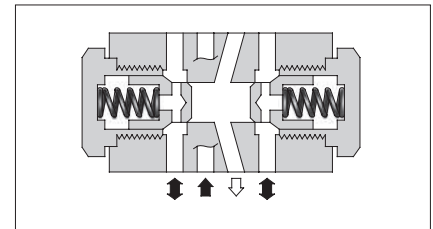
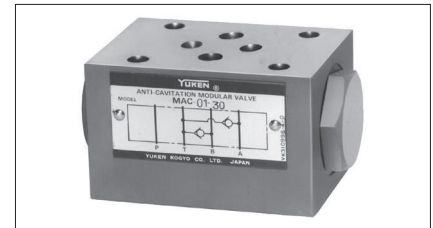
Anti-Cavitation Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MAC-01-30	31.5	35

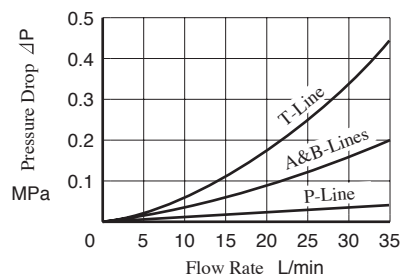
Model Number Designation

MAC	-01	-30
Series Number	Valve Size	Design Number
MAC: Anti-Cavitation Valve	01	30

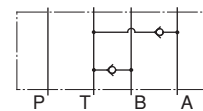


Pressure Drop

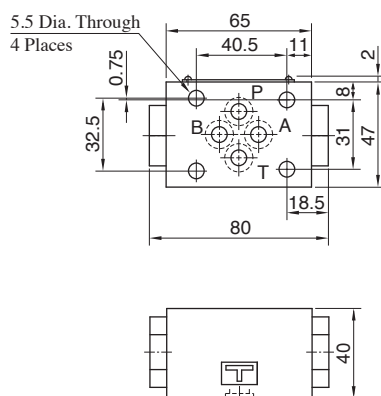
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Graphic Symbol

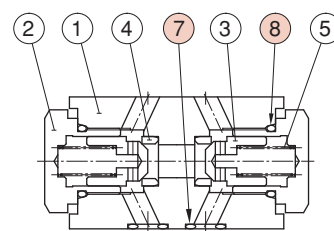


MAC-01



Approx. Mass.....0.8 kg

List of Seals MAC-01



Item	Name of Parts	Part Numbers	Qty.
7	O-Ring	OR NBR-90 P9-N	4
8	O-Ring	OR NBR-90 P18-N	2

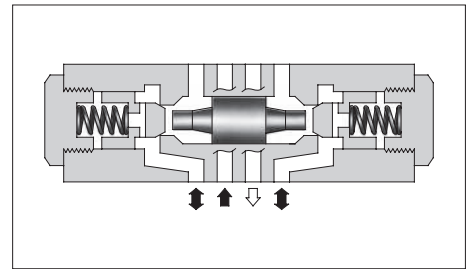
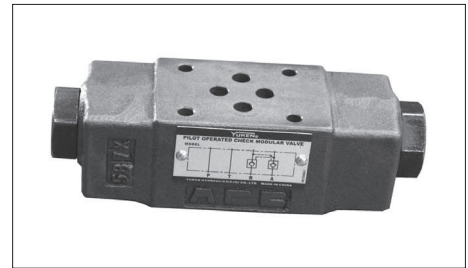
Pilot Operated Check Modular Valves

Specifications

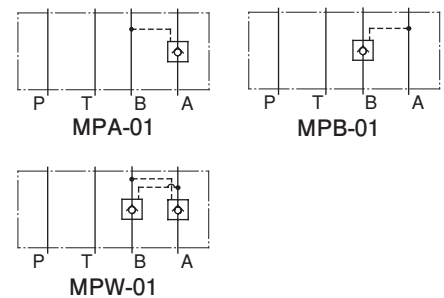
Model Numbers		Max. Operating Pressure MPa	Max. Flow L/min
Standard	MP *-01-* -70	35	60
Low Pilot Pressure Control Type	MP *-01-* -L-70		

Model Number Designation

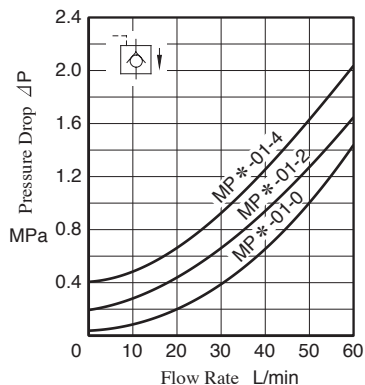
MPA	-01	-2	-L	-70
Series Number	Valve Size	Cracking Pressure MPa	Pilot Operation Format	Design Number
MPA: Pilot Operated Check Valve for A-Line MPB: Pilot Operated Check Valve for B-Line MPW: Pilot Operated Check Valve for A&B-Line	01	0: 0.035 2: 0.2 4: 0.4	None: Standard L: Low Pilot Pressure Type	70



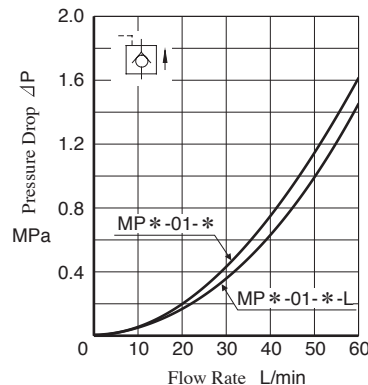
Graphic Symbols



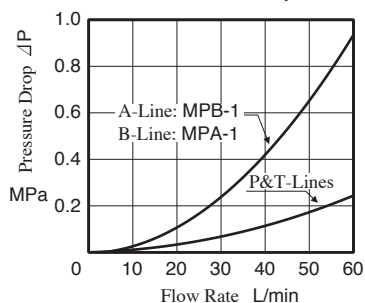
Pressure Drop for Free Flow



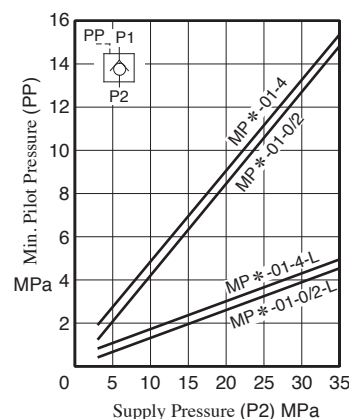
Pressure Drop for Reversed Controlled Flow



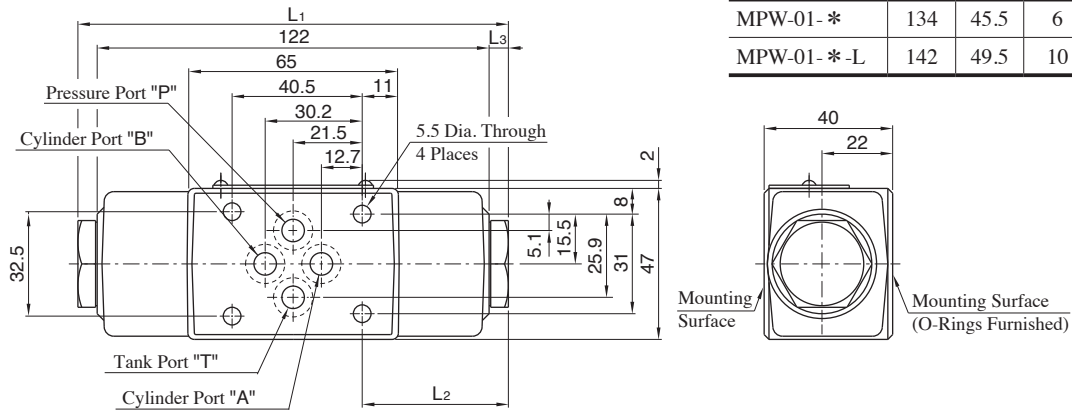
Pressure Drop



Min. Pilot Pressure

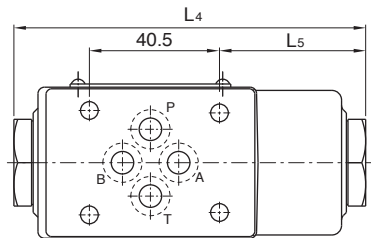


MPW-01



Model Numbers	L1	L2	L3	Approx. Mass kg
MPW-01- *	134	45.5	6	1.4
MPW-01- *-L	142	49.5	10	1.45

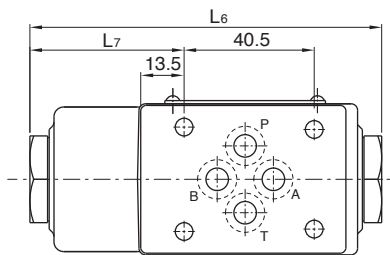
MPA-01



Model Numbers	L4	L5	Approx. Mass kg
MPA-01- *	109.5	45.5	1.15
MPA-01- *-L	113.5	49.5	1.2

● Please refer to the drawing above (MPW-01) for other dimensions.

MPB-01

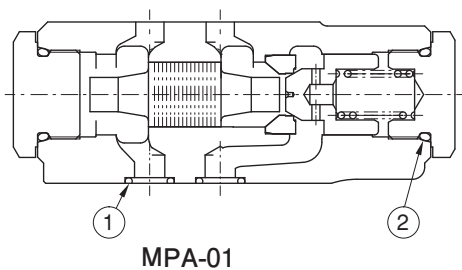


Model Numbers	L6	L7	Approx. Mass kg
MPB-01- *	109.5	48	1.15
MPB-01- *-L	113.5	52	1.2

● Please refer to the drawing above (MPW-01) for other dimensions.

List of Seals

MPA-01 MPB-01 MPW-01



Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	OR NBR-90 P9-N	4
2	O-Ring	OR NBR-90 P18-N	2

- MPW-01 has a check valve built in the left side.
- MPW-01 has check valves built in the both left and right sides.

End Plates

Blocking plates are used for auxiliary mounting surface or for closing unnecessary circuits.

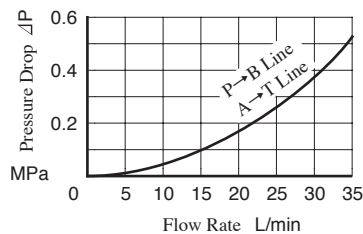
Bypass plates are used for unidirectional circuits that require no solenoid operated directional valves.

■ Model Number Designation

MDC	–01	–A	–30
Series Number	Plate Size	Type of Plate	Design Number
MDC: End Plate	01	A: Blocking Plate B: Bypass Plate	30

■ Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35
mm²/s, Specific Gravity 0.850



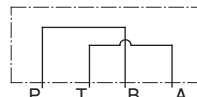
■ Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MDC-01-* :30	31.5	35

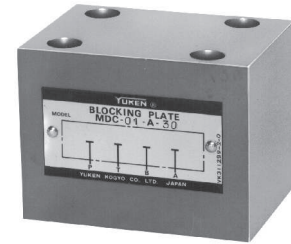
Graphic Symbols



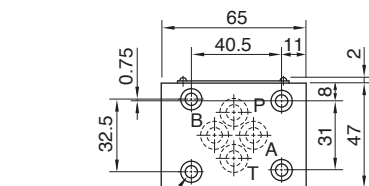
MDC-01-A



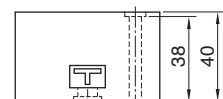
MDC-01-B



MDC-01



5.5 Dia. Through
9.5 Spotface 4 Places



O-Ring for Port
(OR NBR-90 P9-N...4 Pcs.)

Approx. Mass.....1 kg

Connecting Plates

These plates are used for detecting pressure of each line.

■ Model Number Designation

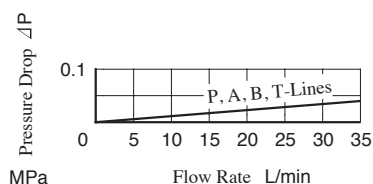
MDS	–01	–PA	–30
Series Number	Plate Size	Type of Detecting Line	Design Number
MDS: Connecting Plate	01	PA: P&A-Lines PB: P&B-Lines AT: A&T-Lines	30

■ Specifications

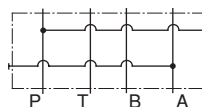
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MDS-01- *-30	31.5	35

■ Pressure Drop

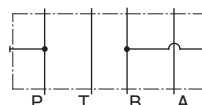
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



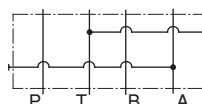
Graphic Symbols



MDS-01-PA



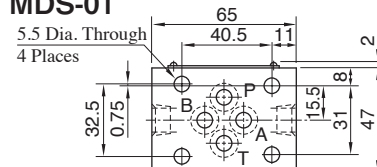
MDS-01-PB



MDS-01-AT



MDS-01



O-Ring for Port
(OR NBR-90 P9-N: 4 Pcs.)

Approx. Mass.....0.8 kg

Model Numbers	Pressure Detecting Line	
	Port “X”	Port “Y”
MDS-01-PA	P-Line	A-Line
MDS-01-PB	B-Line	P-Line
MDS-01-AT	T-Line	A-Line

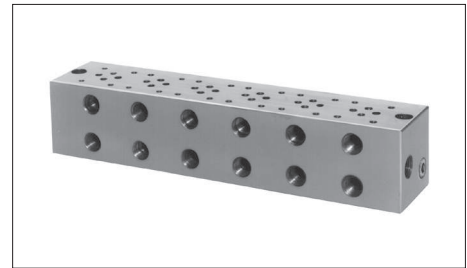
Base Plates For Modular Valves

Specifications

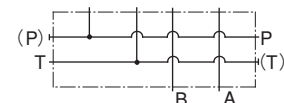
Max. Operating Pressure.....25 MPa

Model Number Designation

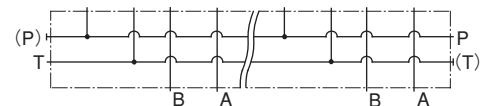
MMC	-01	-6	-40
Series Number	Plate Size	Number of Stations	Design Number
MMC: Base Plate	01	1: 1 Station	40
		2: 2 Stations	
		3: 3 Stations	
		4: 4 Stations	
		5: 5 Stations	
		6: 6 Stations	
		7: 7 Stations	
		8: 8 Stations	
		9: 9 Stations	
		10: 10 Stations	



Graphic Symbols



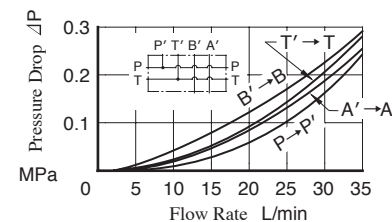
MMC-01-1



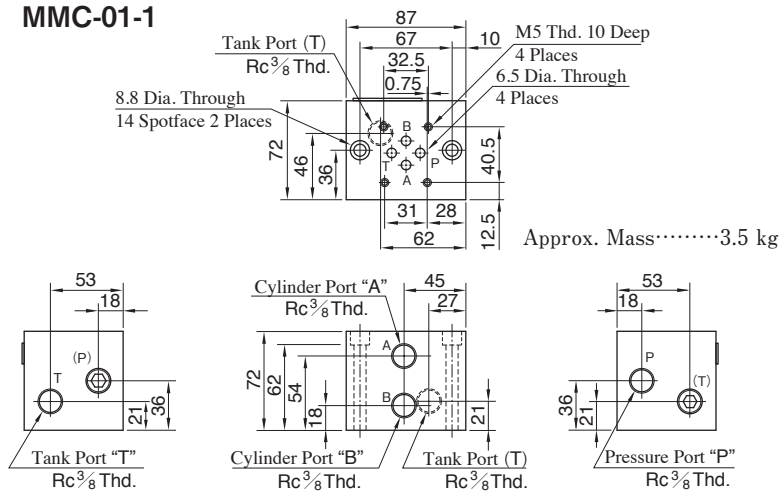
MMC-01-2~10

Pressure Drop

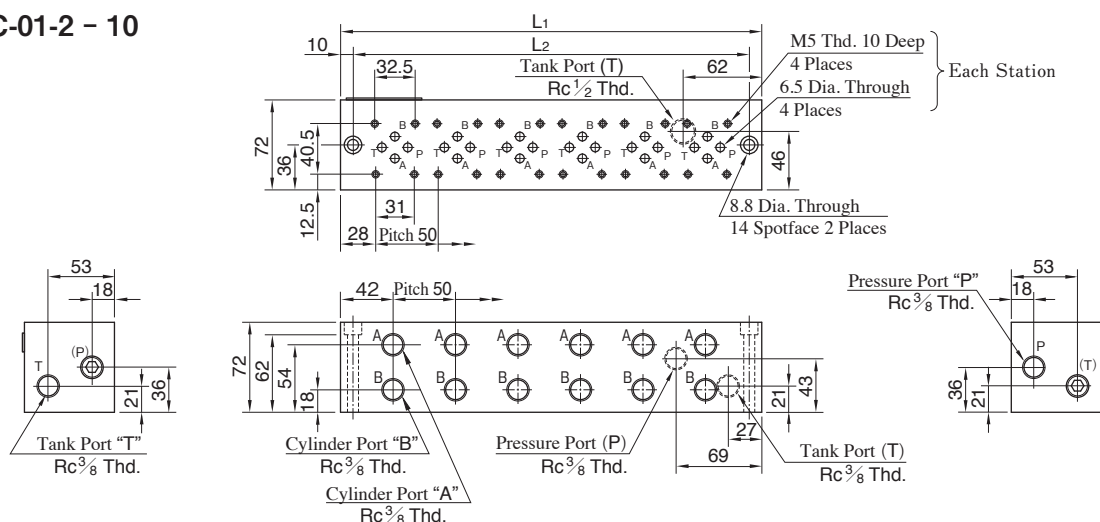
Hydraulic Fluid: Viscosity 35 mm²/s,
Specific Gravity 0.850



MMC-01-1



MMC-01-2 - 10



Model Numbers	L1	L2	Mass kg
MMC-01-2	137	117	5.5
MMC-01-3	187	167	7.0
MMC-01-4	237	217	8.5
MMC-01-5	287	267	10.0
MMC-01-6	337	317	11.5

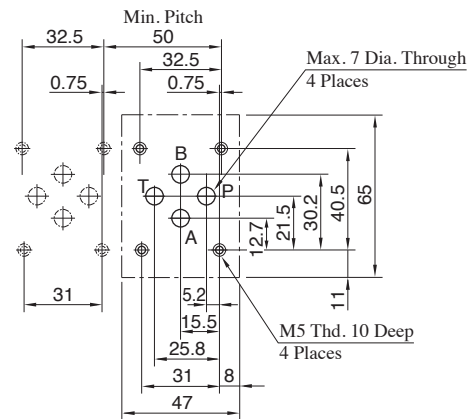
Model Numbers	L1	L2	Mass kg
MMC-01- 7	387	367	13.0
MMC-01- 8	437	417	14.5
MMC-01- 9	487	467	16.0
MMC-01-10	537	517	17.5

■ Instructions

- Port Used: Base plate has three (two, in case of 1 station type) pressure port "P"s and four tank port "T"s. Any one of these ports or two or more ports may be used. However, please note that the ports marked with (P) or (T) in the drawing are normally plugged. Remove the plugs when using such ports. Make sure that ports that are not currently used are properly plugged.

■ Interface Mounting Surface Dimensions for 01 Series Modular Valve

When standard base plates (MMC-01) are not used, the mounting surface described below must be prepared. The mounting surface should have a good machined finish. ($\sqrt{16}$)



Mounting Bolt Kits For Modular Valves

Valves are mounted with four stud bolts. Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis.

When ordering the bolt kit, be sure to give the bolt kit model number from the table below.

Model Number Designation

MBK	-01	-02	-70
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK : Bolt Kits for Modular Valves	01	01, 02, 03, 04, 05 (Refer to the following chart)	70

Bolt Kits Selection Chart

Model Numbers	Quantity of valves to be stacked			Approx. Mass g	Max. Operating Pressure MPa
	Solenoid Operated Directional Valve (*-DSG-01)	End Plate (MDC-01)	Modular Valve & Connecting Plate (M*-01) ★2		
MBK-01-01-70	1	0	1	85	35
	0	1			
MBK-01-02-70	1	0	2	110	35
	0	1			
MBK-01-03-70	1	0	3	135	35
	0	1			
MBK-01-04-70★1	1	0	4	160	25
	0	1			
MBK-01-05-70	1	0	0	32	35
	0	1			

★1. In case of MBK-01-04-70, operating pressure is restricted at 25 MPa or less.

★2. Two Pressure Reducing Valve(MRDP-01), that height of tightening position is equal to 2 pieces of other modular valves, so that if use Two Pressure Reducing Valves, add 1 piece to the actual using quantity.



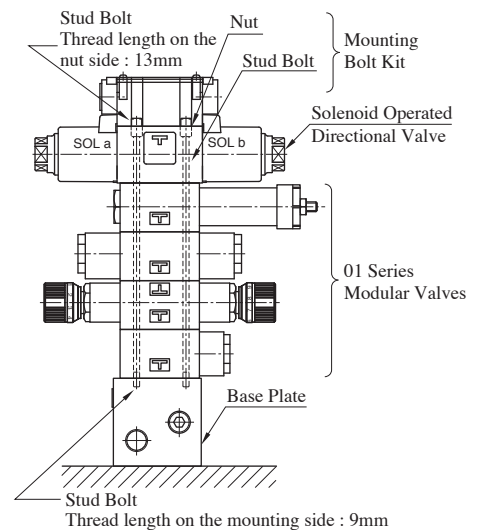
Bolt Kit Composition

Stud Bolt..... 4 Pcs. } 1 Set
Nut 4 Pcs. }

Note: In case of bolt kit model number having "05", four hexagon socket head cap screws only.

Tightening Torque:

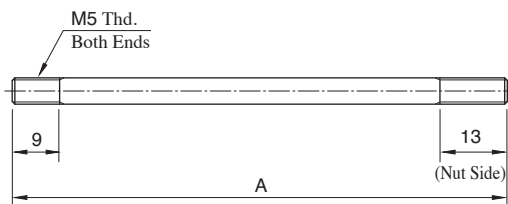
Operating Pressure MPa	Tightening Torque Nm
25 or less	5-7
More than 25	6-7



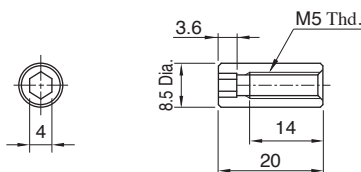
Stacking Example

MBK-01

Stud Bolt



Nut



Bolt Numbers	A mm
01	98
02	138
03	178
04	218
05	Socket Head Cap Screw M5x45 L

■ Interchangeability in Installation between Current and New Design

The following models of 01 Series Modular Valves have changed to 70 design numbers model to operate higher pressure and modification for large flow use.

Name	Model Numbers
Relief Modular Valves	MB * -01- * - * -70
Reducing Modular Valves	MR * -01- * - * -70
Sequence Modular Valves	MHP-01- * - * -70
Counterbalance Modular Valves	MHA/MHB-01- * -70
Throttle and Check Modular Valves	MS * -01- * * -70
Check Modular Valves	MC * -01- * -70
Pilot Operated Check Modular Valves	MP * -01- * - * -70
Bolt Kits	MBK-01- * -70

● Major Changes

- (1) Max. Operating Pressure (35MPa) & Max. Flow have substantially increased respectively.
- (2) Possible to select “B” port side of the pressure adjustment screw direction about 3 models below.
 - ① Relief Modular Valves (only for P-Line)
 - ② Reducing Modular Valves (for all P&A&B-Line)
 - ③ Sequence Modular Valves
- (3) Add B-Line for Counterbalance Modular Valves.
- (4) Selectable low pilot operation type as standard model for Pilot Operated Check Modular Valves.

● Mounting Interchangeability

Interchangeability	Details
Yes	• Mounting surface is not changed from current models. • If use the adjustment pressure as more than 25 MPa, have to select 70 design bolt kits (MBK-01). Mounting bolt kits of 70 design, the length of both sides screw is different, so refer to the assembly example about 01 series modular valves on page F-41.

● Specifications

Max. Operating Pressure

Name	Current		New	
	Model Numbers	Max. Operating Pressure MPa	Model Numbers	Max. Operating Pressure MPa
Relief Modular Valves	MB * -01- * -30	21	MB * -01- * - * -70	35
Reducing Modular Valves	MR * -01- * -30	31.5	MR * -01- * - * -70	
Sequence Modular Valves	MHP-01- * -30	25	MHP-01- * - * -70	
Counterbalance Modular Valves	MHA-01- * -30	25	MHA/MHB-01- * -70	
Throttle and Check Modular Valves	MS * -01- * * -50	31.5	MS * -01- * * -70	
Check Modular Valves	MC * -01- * -30	31.5	MC * -01- * -70	
Pilot Operated Check Modular Valves	MP * -01- * -40	31.5	MP * -01- * -70	
	MP * -01- * -4001	31.5	MP * -01- * -L-70	

Max. Flow

Name	Current		New	
	Model Numbers	Max. Flow L/min	Model Numbers	Max. Flow L/min
Relief Modular Valves	MB * -01- * -30	35	MB * -01- * - * -70	60
Reducing Modular Valves	MR * -01- * -30	35	MR * -01- * - * -70	60
Sequence Modular Valves	MHP-01- * -30	35	MHP-01- * - * -70	60
Counterbalance Modular Valves	MHA-01- * -30	35	MHA/MHB-01- * -70	60
Throttle and Check Modular Valves	MS * -01- * * -50	60	MS * -01- * * -70	80
Check Modular Valves	MC * -01- * -30	35	MC * -01- * -70	60
Pilot Operated Check Modular Valves	MP * -01- * -40	35	MP * -01- * -70	60
	MP * -01- * -4001	35	MP * -01- * -L-70	60

Model Number Designation

Function Addition

Name	Model Numbers	Additional Functions
Relief Modular Valves	MBP-01- * -B-70	Direction of the pressure adjustment screw, selectable B port side
Reducing Modular Valves	MR * -01- * -B-70	Direction of the pressure adjustment screw, selectable B port side
Sequence Modular Valves	MHP-01- * -B-70	Direction of the pressure adjustment screw, selectable B port side
Counterbalance Modular Valves	MHB-01- * -70	Add the Counterbalance Modular Valves for B-Line
Pilot Operated Check Modular Valves	MP * -01- * -L-70	Low pilot operation type, selectable as standard product

Pressure Adjustment Range

Name	Current		New	
	Model Numbers	Pres. Adj. Range MPa	Model Numbers	Pres. Adj. Range MPa
Relief Modular Valves	MB * -01- * -30	C: ★-14 H: 7-21	MB * -01- * - * -70	B: ★-7 C: 3.5-14 H: 7-21 K: 14-35
Reducing Modular Valves	MR * -01- * -30	B: ★-7 C: 3.5-14 H: 7-21	MR * -01- * - * -70	A: ★-3.5 B: 0.8-7 C: 3.5-14 H: 7-21
Sequence Modular Valves	MHP-01- * -30	C: ★-14 H: 7-21	MHP-01- * - * -70	B: ★-7 C: 3.5-14 H: 7-21 K: 14-35
Counterbalance Modular Valves	MHA-01- * -30		MHA/MHB-01- * -70	

Cracking Pressure

Name	Current		New	
	Model Numbers	Cracking Pressure MPa	Model Numbers	Cracking Pressure MPa
Pilot Operated Check Modular Valves	MP * -01- * -40	2: 0.2 4: 0.4	MP * -01- * -70	0: 0.035 2: 0.2 4: 0.4
	MP * -01- * -4001		MP * -01- * -L-70	

Typical Performance Characteristics

Characteristics of all models have been changed.

● Approx. Mass

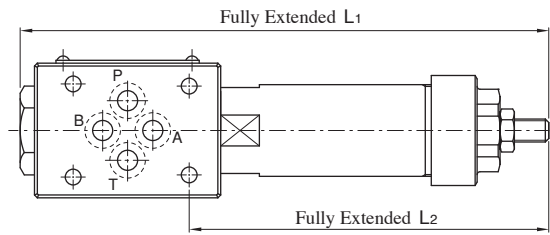
Name	Current		New	
	Model Numbers	Approx. Mass kg	Model Numbers	Approx. Mass kg
Relief Modular Valves	MB * -01- * -30	1.1	MBP-01-B/C-70 MBP-01-B/C-B-70 MBA-01-B/C-70 MBB-01-B/C-70	1.15
			MBP-01-H-70 MBP-01-H-B-70 MBA-01-H-70 MBB-01-H-70	1.25
Reducing Modular Valves	MR * -01-B/C-30	1.1	MR * -01-B/C-70	1.15
	MR * -01-H-30		MR * -01-H-70	1.25
Sequence Modular Valves	MHP-01- * -30	1.1	MHP-01-B/C- * -70	1.45
			MHP-01-H- * -70	1.55
Counterbalance Modular Valves	MHA-01- * -30	1.3	MHA-01-B/C- * -70	1.65
			MHB-01-B/C- * -70	1.65
			MHA/MHB-01-H- * -70	1.75
Throttle and Check Modular Valves	MSA/MSB-01- * * -50	1.3	MSA/MSB-01- * * -70	1.15
	MSW-01- * * -50	1.5	MSW-01- * * -70	1.3
Check Modular Valves	MCP/MCT-01- * -30	1.1	MCP/MCT-01- * -70	1.0
	MCA/MCB/MCW-01- * -30	1.3	MCA/MCB/MCW-01- * -70	1.2
Pilot Operated Check Modular Valves	MP * -01- * -40/4001	1.2	MPA/MPB-01- * -70	1.15
			MPW-01- * -70	1.4
			MPA/MPB-01- * -L-70	1.2
			MPW-01- * -L-70	1.45
Mounting Bolt Kits	MBK-01-01-30	0.060	MBK-01-01-70	0.085
	MBK-01-02-30	0.100	MBK-01-02-70	0.110
	MBK-01-03-30	0.130	MBK-01-03-70	0.135
	MBK-01-05-30	0.040	MBK-01-05-70	0.032

● Dimensions

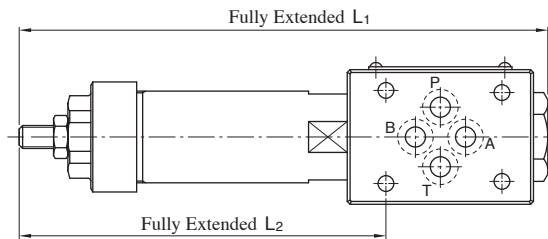
As of fully extended dimensions, height (40mm) and depth (47mm) are same between current and new models. Width is same except for the models below.

(1) Relief Modular Valves

MBP-01
MBB-01



MBP-01- *-B
MBA-01



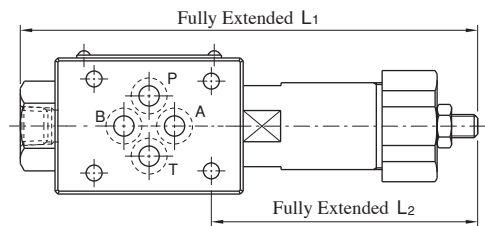
Model Numbers	L1	L2
MBP-01-B-70	151	92
MBB-01-B-70		
MBP-01-K-70	184.5	125.5
MBB-01-K-70		
MBP-01-B-B-70	151	94.5
MBP-01-C-B-70		
MBP-01-H-B-70	166.5	110
MBA-01-B-70	151	94.5
MBP-01-K-B-70	184.5	128
MBA-01-K-B-70		

★1. Pressure adjustment range "B", "K" newly added.

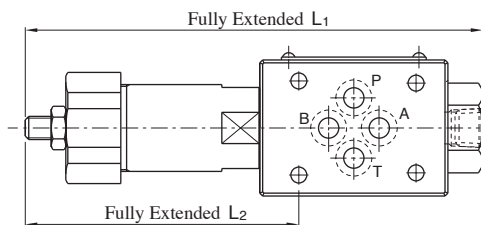
★2. Pressure adjustment screw direction B port side, newly added for P-Line.

(2) Reducing Modular Valves

MR *-01



MR *-01- *-B



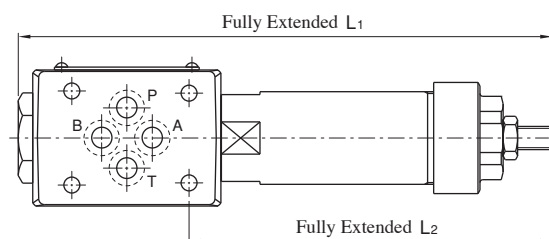
Model Numbers	L1	L2
MRA-01-A-70	162.5	96.5
MR *-01-A-B-70	162.5	99
MR *-01-B-B-70	158	94.5
MR *-01-C-B-70		
MR *-01-H-B-70	173.5	110

★1. Pressure adjustment range "A" newly added.

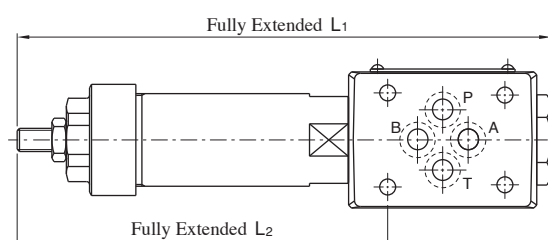
★2. Pressure adjustment screw direction B port side, newly added.

(3) Sequence Modular Valves

MHP-01



MHP-01- *-B



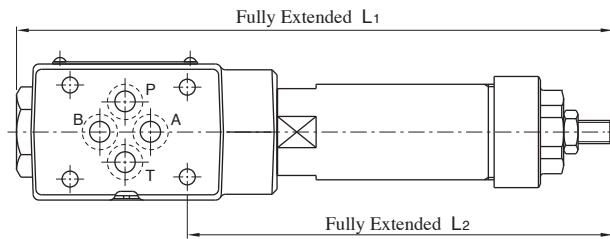
Model Numbers	L1	L2
MHP-01-B-70	151	92
MHP-01-K-70	184.5	125.5
MHP-01-B-B-70	151	94.5
MHP-01-C-B-70		
MHP-01-H-B-70	166.5	110
MBP-01-K-B-70	184.5	128

★1. Pressure adjustment range "B", "K" newly added.

★2. Pressure adjustment screw direction B port side, newly added.

(4) Counterbalance Modular Valves

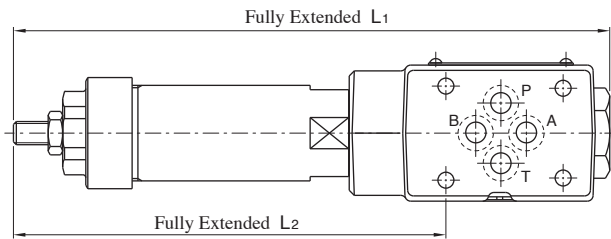
MHA-01



Model Numbers		L ₁	L ₂
New	MHA-01-B-70	171	112
	MHA-01-K-70	207.2	148.2

★Pressure adjustment range “B”, “K” newly added.

MHB-01

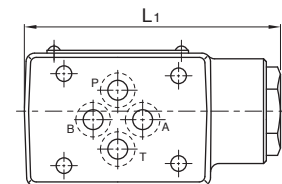


Model Numbers		L ₁	L ₂
New	MHB-01-B-70	171	114.4
	MHB-01-C-70		
	MHB-01-H-70	186.5	129.9
	MHB-01-K-70	207.2	150.6

★Newly added for B-Line.

(5) Check Modular Valves

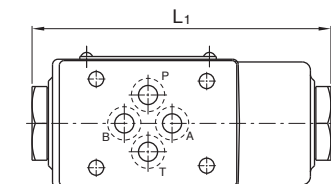
MCP/MCT-01



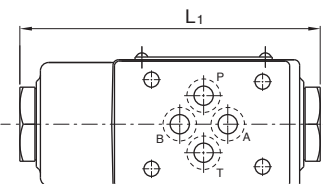
Model Numbers		L ₁
Current	MCP/MCT-01- *-30	90
New	MCP/MCT-01- *-70	90.5

(6) Pilot Operated Check Modular Valves

MPA-01



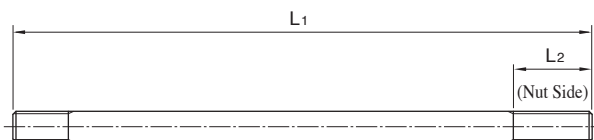
MPB-01



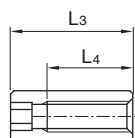
Model Numbers		L ₁
Current	MPA/MPB-01- *-40	134
	MPA/MPB-01- *-4001	138
New	MPA/MPB-01- *-70	109.5
	MPA/MPB-01- *-L-70	113.5

(7) Mounting Bolt Kits

● Stud Bolt



● Nut



Model Numbers		L ₁	L ₂	L ₃	L ₄
Current	MBK-01-01-30	94	9	15	9
	MBK-01-02-30	134			
	MBK-01-03-30	174			
	MBK-01-04-30	214			
New	MBK-01-01-70	98	13	20	14
	MBK-01-02-70	138			
	MBK-01-03-70	178			
	MBK-01-04-70	218			

03 Series Modular Valves

■ Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page	Class	Name and Model Numbers	Graphic Symbols	Page
Solenoid Operated Directional Valves (S-) DSG-03-***-50 E-DSG-03-***-D-50 T-DSG-03-***-D24-50 G-DSG-03-***-51							
Pressure Control Valves	Relief Valves (for "P-Line") MBP-03-**-70		F-48	Flow Control Valves	Temperature Compensated Throttle and Check Valves (for "A&B-Lines", Meter-out) MSTW-03-X-20		F-58
	Relief Valves (for "A-Line") MBA-03-**-70		F-48		Throttle Valves (for "P-Line") MSP-03-30		F-60
	Relief Valves (for "B-Line") MBB-03-**-70		F-48		Check and Throttle Valves (for "P-Line") MSCP-03-20		F-61
	Relief Valves (for "A&B-Lines") MBW-03-**-70		F-48		Throttle and Check Valves (for "A-Line", Meter-out) MSA-03-X-70		F-62
	Reducing Valves (for "P-Line") MRP-03-**-70		F-50		Throttle and Check Valves (for "A-Line", Meter-in) MSA-03-Y-70		F-62
	Reducing Valves (for "A-Line") MRA-03-**-70		F-50		Throttle and Check Valves (for "B-Line", Meter-out) MSB-03-X-70		F-62
	Reducing Valves (for "B-Line") MRB-03-**-70		F-50		Throttle and Check Valves (for "B-Line", Meter-in) MSB-03-Y-70		F-62
	Reducing Valves for Low Pressure Setting (for "P-Line") MRLP-03-10		F-52		Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-03-X-70		F-62
	Reducing Valves for Low Pressure Setting (for "A-Line") MRLA-03-10		F-52	Directional Control Valves	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-03-Y-70		F-62
	Reducing Valves for Low Pressure Setting (for "B-Line") MRLB-03-10		F-52		Check Valves (for "P-Line") MCP-03-**-70		F-64
	Sequence Valves (for "P-Line") MHP-03-**-20		F-54		Check Valves (for "A-Line") MCA-03-**-70		F-64
	Counterbalance Valves (for "A-Line") MHA-03-**-20		F-54		Check Valves (for "B-Line") MCB-03-**-70		F-64
	Counterbalance Valves (for "B-Line") MHB-03-**-20		F-54		Check Valves (for "T-Line") MCT-03-**-70		F-64
Flow Control Valves	Flow Control Valves (for "P-Line") MFP-03-11		F-56		Check Valves (for "A&B-Lines") MCW-03-**-70		F-64
	Flow Control and Check Valves (for "A-Line", Meter-in) MFA-03-X-11		F-56		Check Valves (for "P&T-Lines") MCPT-03-P-**-T-10		F-66
	Flow Control and Check Valves (for "A-Line", Meter-in) MFA-03-Y-11		F-56		Anti-Cavitation Valves MAC-03-10		F-67
	Flow Control and Check Valves (for "B-Line", Meter-out) MFB-03-X-11		F-56		Pilot Operated Check Valves (for "A-Line") MPA-03-**-70		F-68
	Flow Control and Check Valves (for "B-Line", Meter-in) MFB-03-Y-11		F-56		Pilot Operated Check Valves (for "B-Line") MPB-03-**-70		F-68
	Flow Control and Check Valves (for "A&B-Lines", Meter-out) MFW-03-X-11		F-56		Pilot Operated Check Valves (for "A&B-Lines") MPW-03-**-70		F-68
	Flow Control and Check Valves (for "A&B-Lines", Meter-in) MFW-03-Y-11		F-56	Modular Plates and Mounting Bolts	End Plates (Blocking Plates) MDC-03-A-10		F-70
	Temperature Compensated Throttle and Check Valves (for "A-Line", Meter-out) MSTA-03-X-20		F-58		End Plates (Bypass Plates) MDC-03-B-10		F-70
	Temperature Compensated Throttle and Check Valves (for "B-Line", Meter-out) MSTB-03-X-20		F-58		Connecting Plates MDS-03-10		F-70
					Base Plates MMC-03-T-**-21		F-71
					Bolt Kits MBK-03-**-10		F-73

★ Refer to the relevant pages of catalog "E: DIRECTIONAL CONTROLS"

Relief Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MB *-03- *-70	35	120

Model Number Designation

MBA	-03	-B	-70
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MBP: Relief Valve for P-Line MBA: Relief Valve for A-Line MBB: Relief Valve for B-Line MBW: Relief Valve for A&B-Lines	03	B: ★-7 C: 3.5-14 K: 7-35	70

★ See the "Min. Adjustment Pressure" of this page.

Instructions

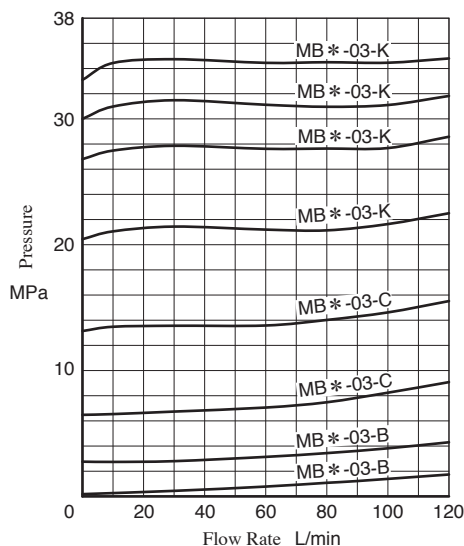
The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of this page. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve. To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

In case of a small flow, the setting pressure may become unstable. To avoid this, refer to the minimum flow characteristic curve of the this page and use the valve within a range as shown with .

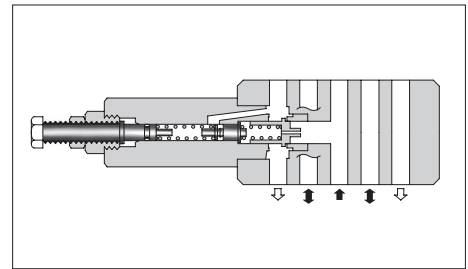
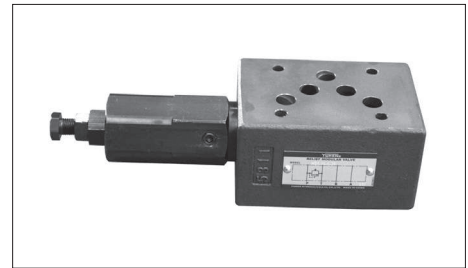
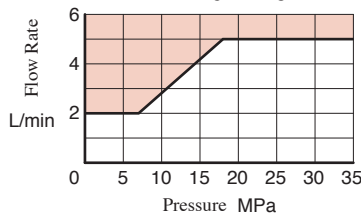
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Nominal Override Characteristics

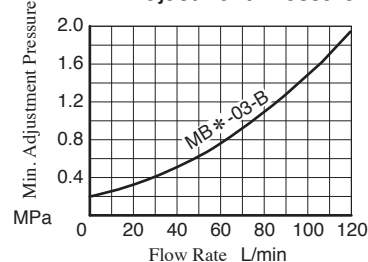


Minimum Flow

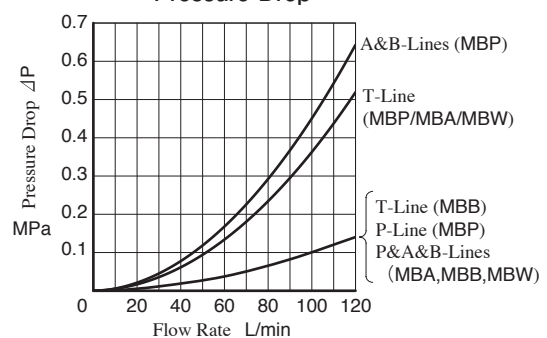


Model Numbers	Graphic Symbols	Graphic Symbols
MBP-03		
MBA-03		
MBB-03		
MBW-03		

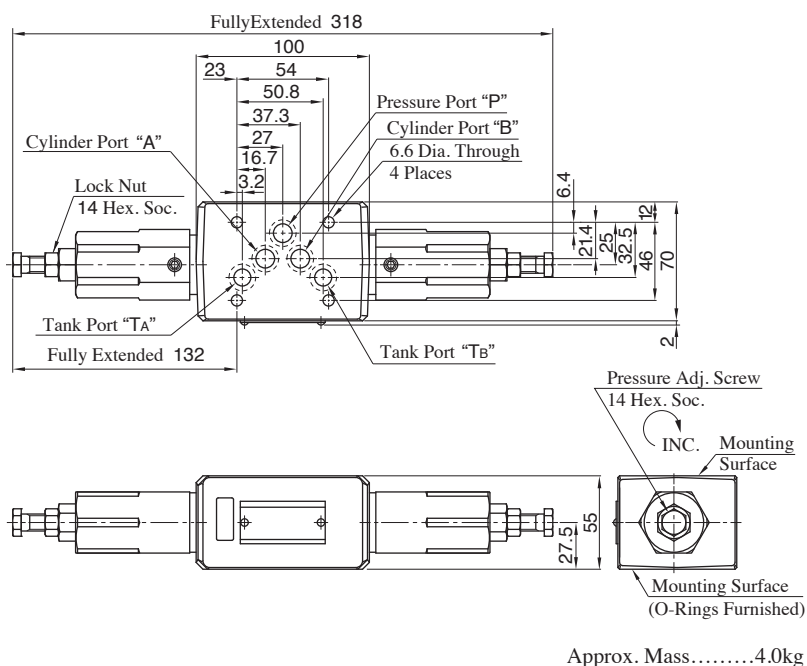
Min. Adjustment Pressure



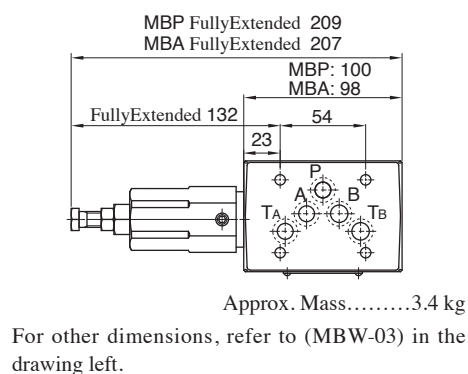
Pressure Drop



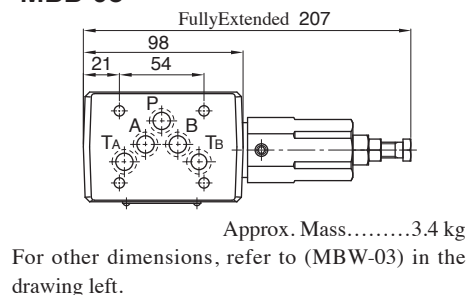
MBW-03



MBP-03, MBA-03

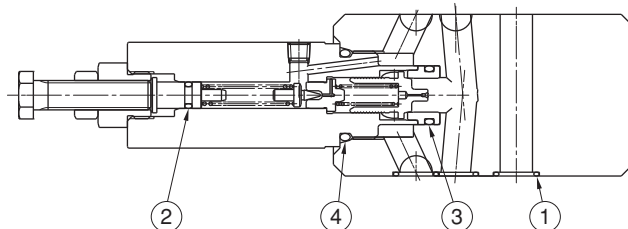


MBB-03



List of Seals

MBP-03
MBA-03
MBB-03
MBW-03



MBP-03
MBA-03

- MBB-03:The pressure adjustment part is assembled on the right side.
- MBW-03:The pressure adjustment part is assembled on the both sides.

Item	Name of Parts	Part Numbers	Qty.			
			MBP-03	MBA-03	MBB-03	MBW-03
1	O-Ring	AS568-014 (NBR-90)	5	5	5	5
2	O-Ring	OR NBR-70-1 P6-N	1	1	1	2
3	O-Ring	OR NBR-90 P16-N	1	1	1	2
4	O-Ring	OR NBR-90 P26-N	1	1	1	2

Reducing Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MR *-03-A-70★	35	80
MR *-03-B/C/H-70		120

★If the pressure is set below 1.2 MPa, the maximum flow is limited.
See the "Min. Adjustment Pressure vs. Max. Flow" of this page.

Model Number Designation

MRP	-03	-B	-70
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MRP: Reducing Valve for P-Line MRA: Reducing Valve for A-Line MRB: Reducing Valve for B-Line	03	A: ★-3.5 B: 1-7 C: 3.5-14 H: 7-31.5	70

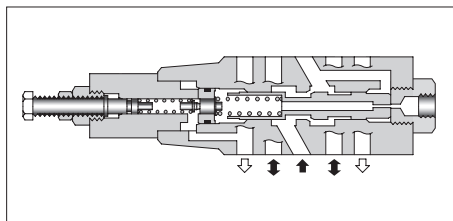
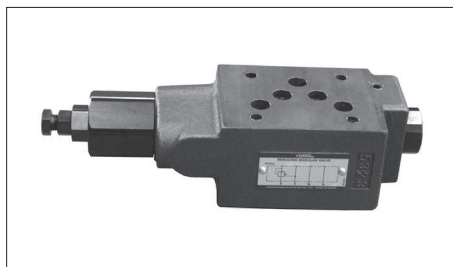
★See the "Min. Adjustment Pressure vs. Max. Flow" of this page.

Instructions

The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of this page. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve. To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anticlockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

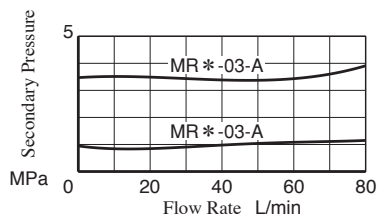
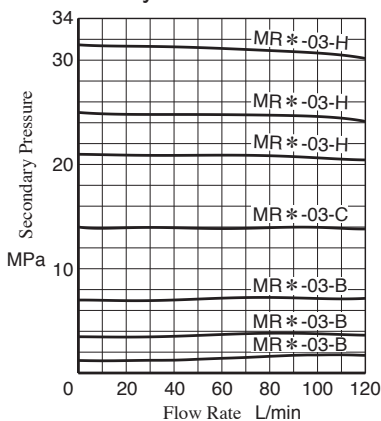
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

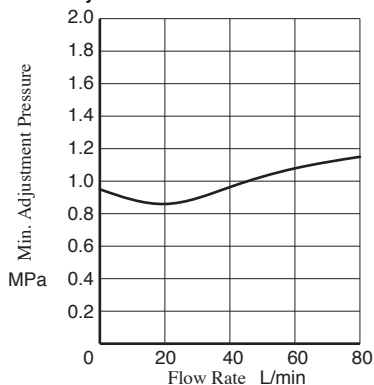


Model Numbers	Graphic Symbols	Graphic Symbols
MRP-03		
MRA-03		
MRB-03		

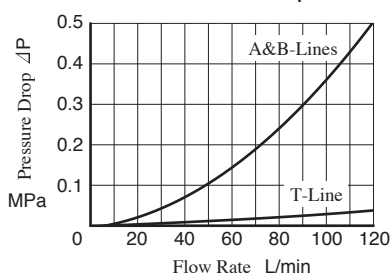
Nominal Override Characteristics
Primary Pressure 35 MPa



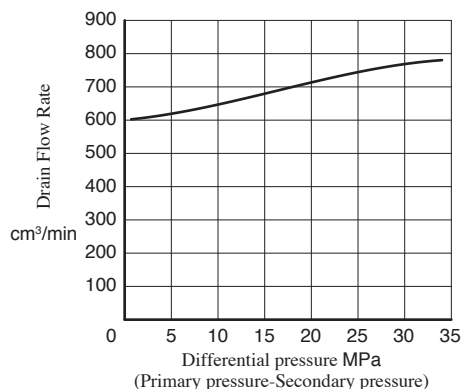
Min. Adjustment Pressure vs. Max. Flow



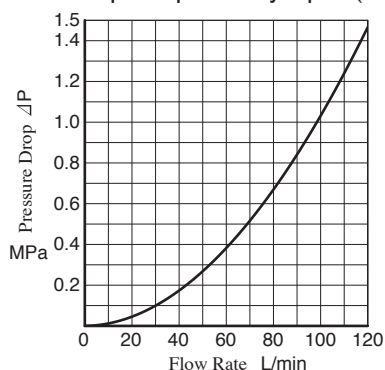
Pressure Drop



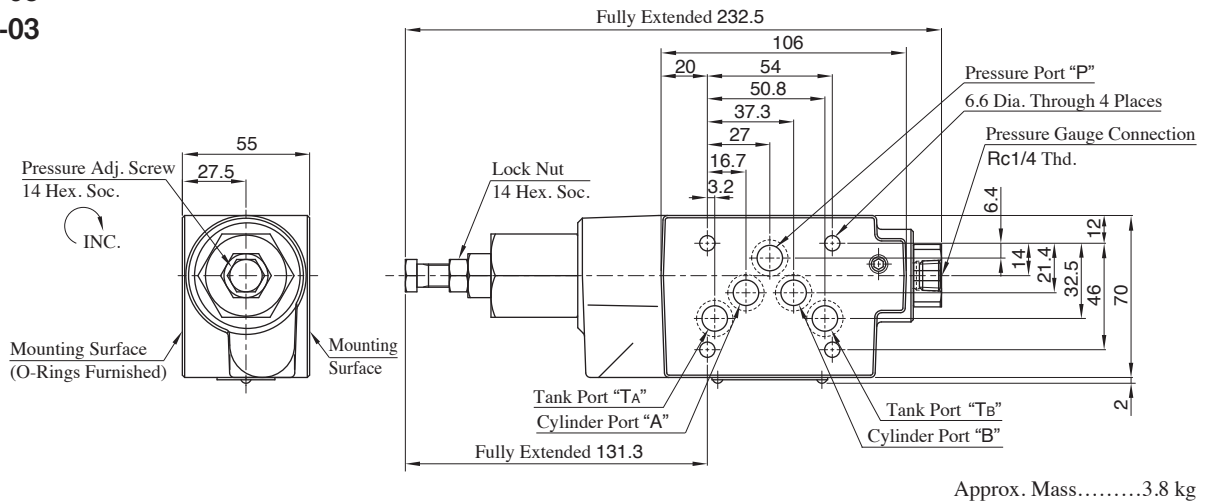
Drain Flow Rate



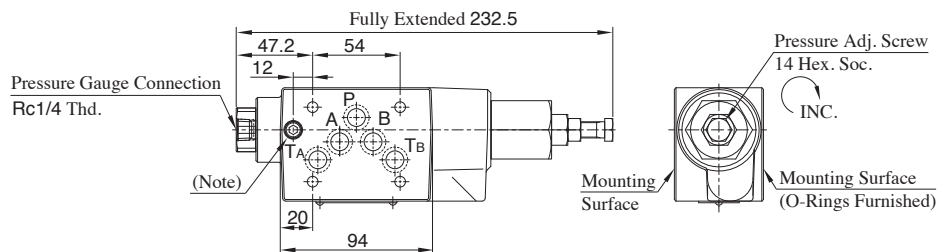
Pres. Drop at Spool Fully Open (P-Line)



MRP-03 MRB-03



MRA-03



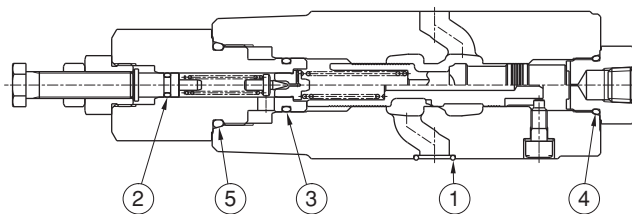
For other dimensions, refer to "MRP-03" in the drawing above.

Approx. Mass.....3.8 kg

Note: If mounting surface dimension equipped with the valves based on ISO 4401-05-05-0-05, pilot port of stacking valves will interfere with bolt hole of MRA-03, so check gasket surface of the stacking valves.

List of Seals

MRP-03 MRA-03 MRB-03



MRP-03

- MRA-03:The pressure adjustment part is assembled on the right side.
- MRB-03:The pressure adjustment part is assembled on the left side.

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-70-1 P6-N	1
3	O-Ring	OR NBR-90 P16-N	1
4	O-Ring	OR NBR-90 P18-N	1
5	O-Ring	OR NBR-90 P26-N	1

Reducing Modular Valves for Low Pressure Setting

Specifications

Model Numbers	Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max.Flow L/min
MRL *-03-10	7	0.2-6.5	50 ★

★ If the pressure is set below 0.8 MPa, the maximum flow is limited.
See the "Min. Adjustment Pressure vs. Max. Flow" of this page and during use, stay within the shaded zone on the graph.

Model Number Designation

MRLP	-03	-10
Series Number	Valve Size	Design Number
MRLP:Low Pressure Setting Type Reducing Valve for P-Line	03	10
MRLA:Low Pressure Setting Type Reducing Valve for A-Line		
MRLB:Low Pressure Setting Type Reducing Valve for B-Line		

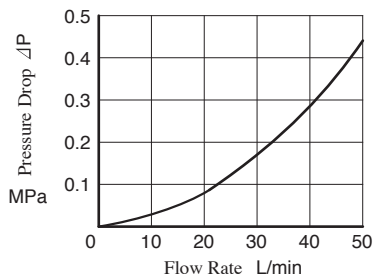
Instructions

If there is a pressure in drain line, it is added to the secondary setting pressure. Hence, drain line must be connected to tank directly with a low back pressure close to atmospheric pressure.

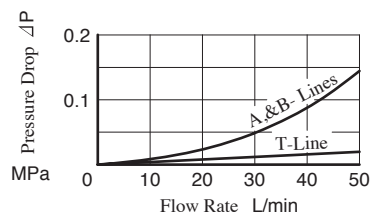
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

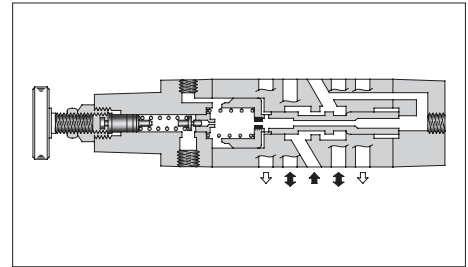
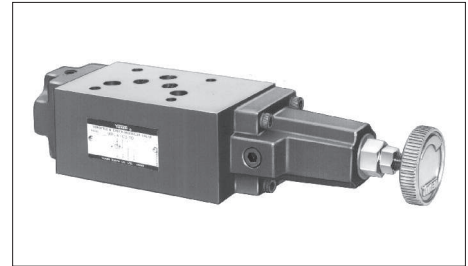
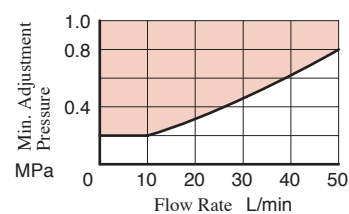
Pres. Drop at Spool Fully Open (P-Line)



Pressure Drop

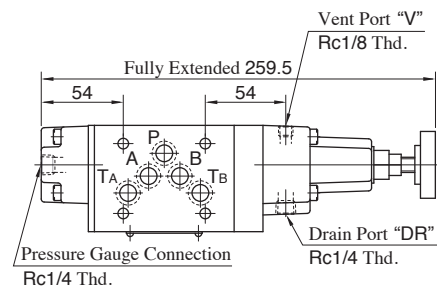
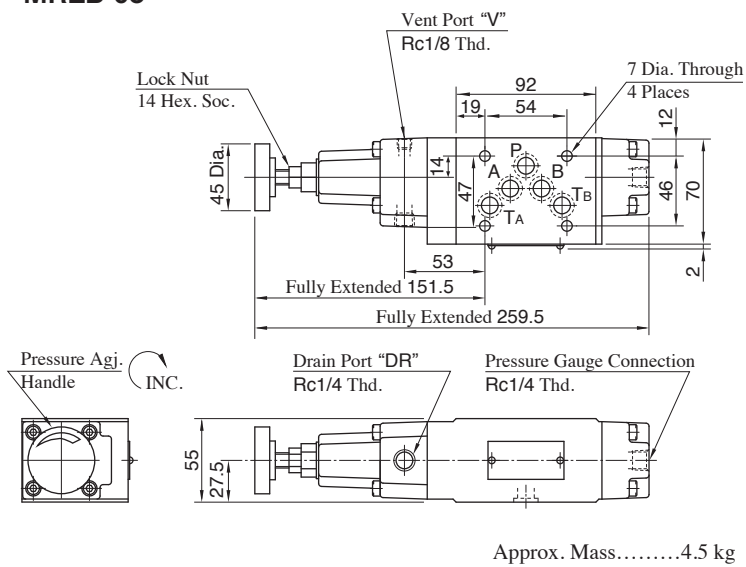


Min. Adjustment Pressure vs. Max. Flow



Model Numbers	Graphic Symbols	Graphic Symbols
MRLP-03		
MRLA-03		
MRLB-03		

MRLA-03

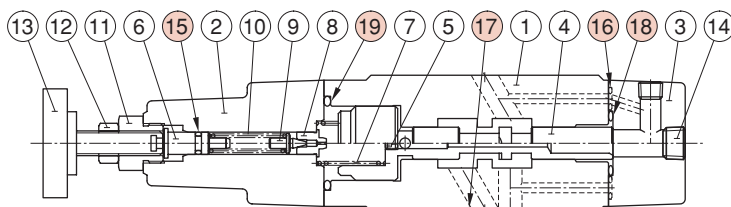


Approx. Mass.....4.5 kg

For other dimensions, refer to “MRLP-03/MRLB-03” in the drawing left.

■ List of Seals

MRLP-03
MRLA-03
MRLB-03



MRLP-03

Item	Name of Parts	Part Numbers	Qty.
15	O-Ring	OR NBR-70-1 P6-N	1
16	O-Ring	OR NBR-90 P6-N	2
17	O-Ring	AS568-014 (NBR-90)	5
18	O-Ring	OR NBR-90 P22-N	1
19	O-Ring	OR NBR-90 P32-N	1

- MRLA-03: The pressure adjustment part is assembled on the right side.
- MRLB-03: The cover will be rotated 180 degrees with respect to MRLP.

Sequence Modular Valves / Counterbalance Modular

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min	Free Flow L/min
MHP-03- *-20	25	50	—
MH *-03- *-20			70

Model Number Designation

MHP	-03	-C	-20
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MHP: Sequence Valve for P-Line	03	N: ★-1.8 A: 1.8-3.5 B: 3.5-7 C: 7-14	20
MHA: Counterbalance Valve for A-Line			20
MHB: Counterbalance Valve for B-Line			

★ See the "Min. Adjustment Pressure vs. Max. Flow" of this page.

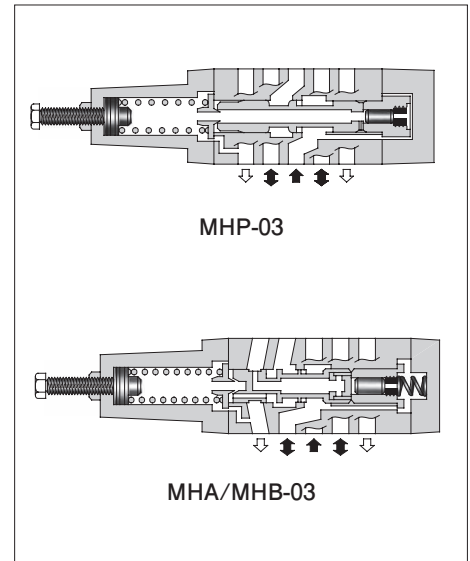
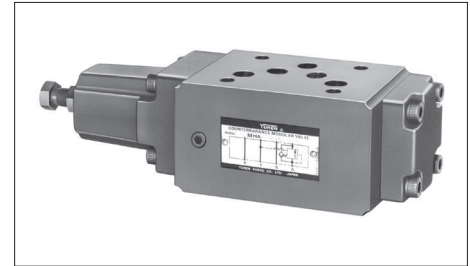
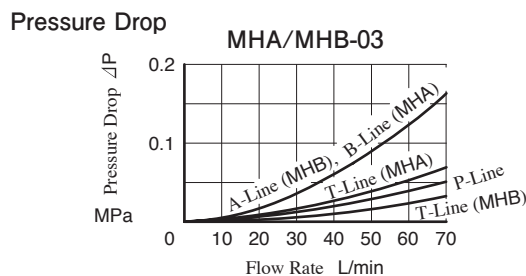
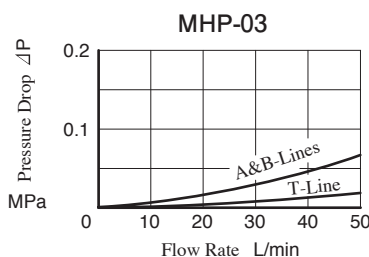
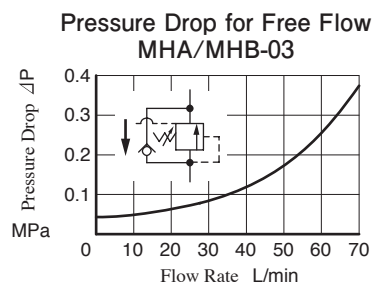
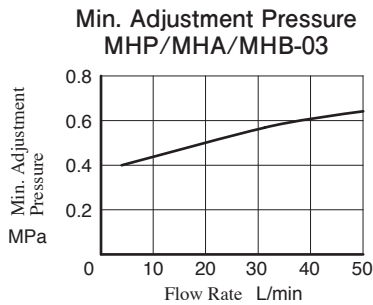
Instructions

The minimum adjustment pressure equals the value obtained from the minimum adjustment pressure characteristics plus the tank line back pressure of this page. This back pressure should include the value of the T-line pressure drop characteristics of the valves stacked to the base plate side of the modular valve.

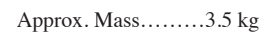
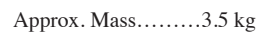
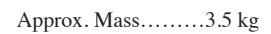
To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



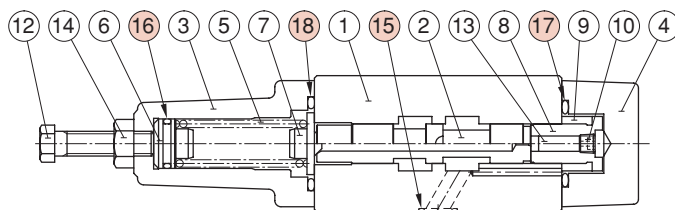
Model Numbers	Graphic Symbols	Graphic Symbols
MHP-03		
MHA-03		
MHB-03		



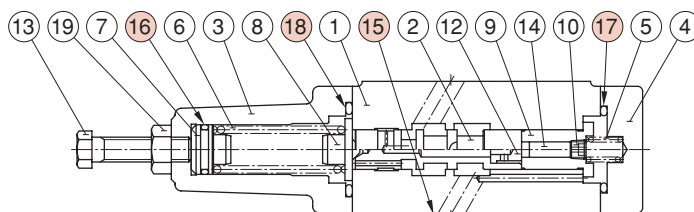
For other dimensions, refer to “MHA-03” in the drawing left..

■ List of Seals

MHP-03, MHA-03, MHB-03



MHP-03



MHA-03

●MHB-03: The pressure adjustment part is assembled on the right side.

Item	Name of Parts	Part Numbers	Qty.
15	O-Ring	AS568-014 (NBR-90)	5
16	O-Ring	OR NBR-90 P16-N (OR NBR-70-1 P16-N) [*]	1
17	O-Ring	OR NBR-90 P29-N	1
18	O-Ring	OR NBR-90 P32-N	1

★ If use MHP-03, the O-Ring of item 16 use the one within brackets.

Pressure and Temperature Compensated Flow Control (and Check) Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min	Free Flow L/min
MFP-03-11	16	50	—
MF*-03-*-11			70

Model Number Designation

MFA	-03	-X	-11
Series Number	Valve Size	Direction of Flow	Design Number
MFP: Pressure & Temperature Compensated Flow Control Valve for P-Line	03	—	11
MFA: Pressure & Temperature Compensated Flow Control & Check Valve for A-Line		X: Meter-out Y: Meter-in	11
MFB: Pressure & Temperature Compensated Flow Control & Check Valve for B-Line			
MFW: Pressure & Temperature Compensated Flow Control & Check Valve for A&B-Lines			

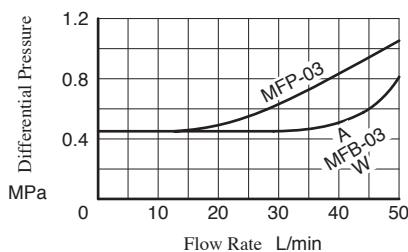
Instructions

- To make flow adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

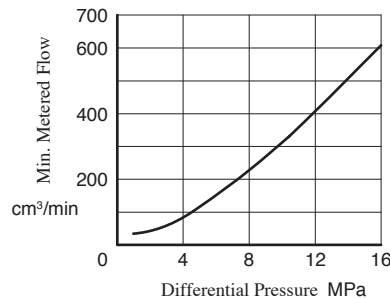
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

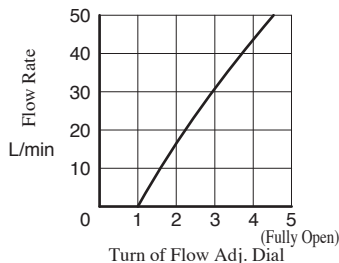
Min. Required Pressure Difference



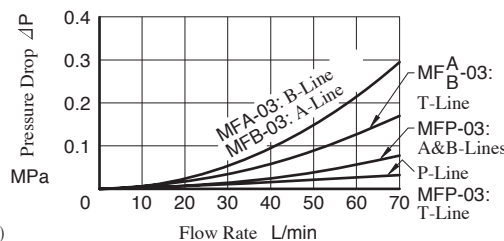
Min. Metered Flow



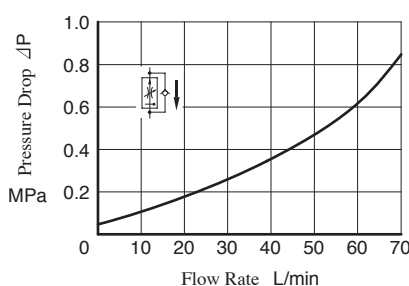
Metered Flow vs. Dial Position



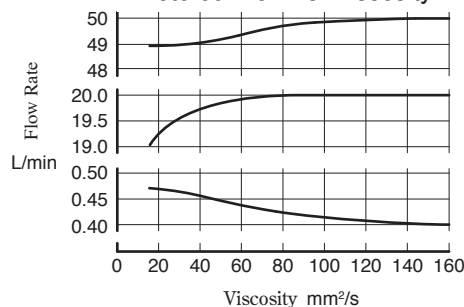
Pressure Drop



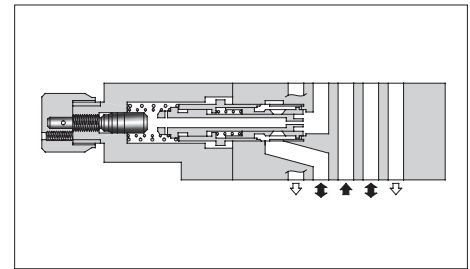
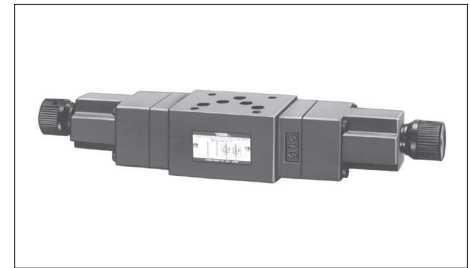
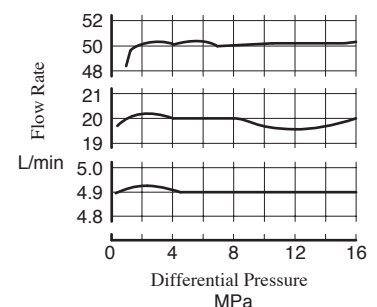
Pressure Drop for Free Flow



Metered Flow vs. Viscosity



Metered Flow vs. Differential Pressure



Model Numbers	Graphic Symbols
MFP-03	

Model Numbers	Graphic Symbols
MFA-03 -X	

Model Numbers	Graphic Symbols
MFB-03 -X	

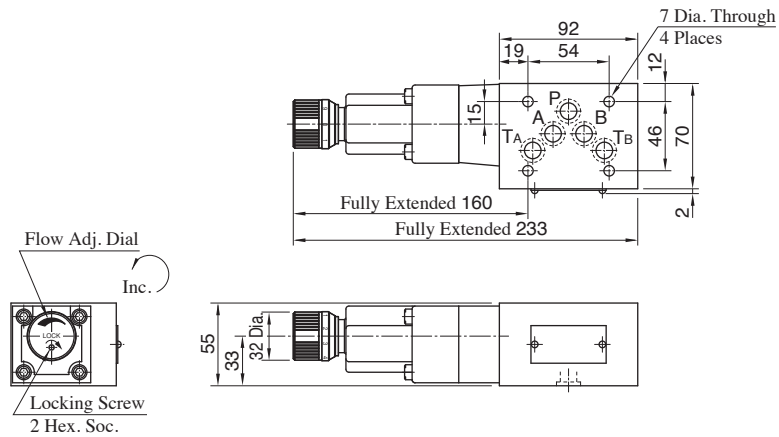
Model Numbers	Graphic Symbols
MFW-03 -X	

Model Numbers	Graphic Symbols
MFA-03 -Y	

Model Numbers	Graphic Symbols
MFB-03 -Y	

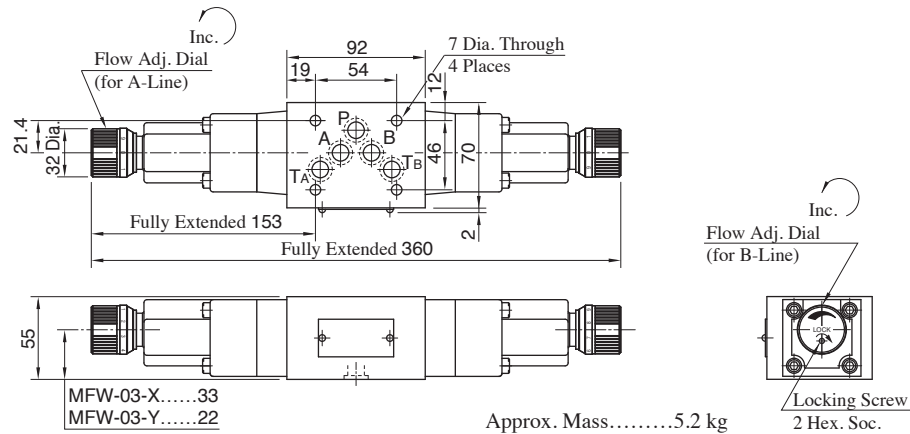
Model Numbers	Graphic Symbols
MFW-03 -Y	

MFP-03



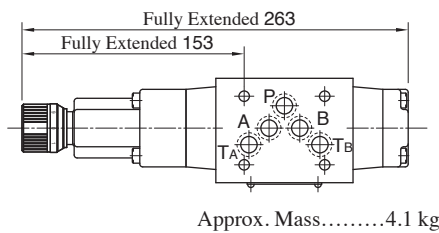
Approx. Mass.....4.2 kg

MFW-03-X_Y



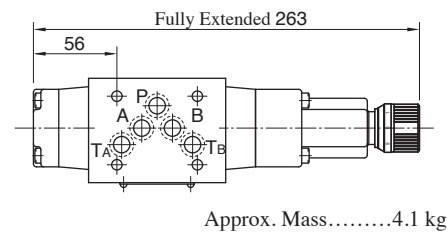
Approx. Mass.....5.2 kg

MFA-03-X_Y



Approx. Mass.....4.1 kg

MFB-03-X_Y

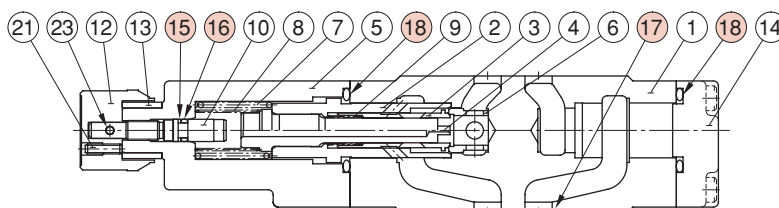


Approx. Mass.....4.1 kg

For other dimensions, refer to “MFW-03” in the drawing above.

List of Seals

MFP-03 MFA-03 MFB-03 MFW-03



MFA-03

- MFP-03: The body ① is different.
- MFB-03: The flow adjustment part is built in the right side.
- MFW-03: The flow adjustment part is built in the both left and right sides.

Item	Name of Parts	Part Numbers	Qty.			
			MFP-03	MFA-03	MFB-03	MFW-03
15	Back-up Ring	BR JIS B 2401-4-T2-P6	1	1	1	2
16	O-Ring	OR NBR-70-1 P6-N	1	1	1	2
17	O-Ring	AS568-014 (NBR-90)	5	5	5	5
18	O-Ring	OR NBR-90 P28-N	1	2	2	2

Temperature Compensated Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Differential Pressure MPa	Max. Metered Flow L/min	Min. Metered Flow L/min	Max. Free Flow L/min
MST*-03-X-20	25	25	70	2 (1)*	70

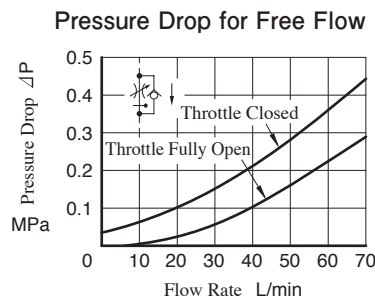
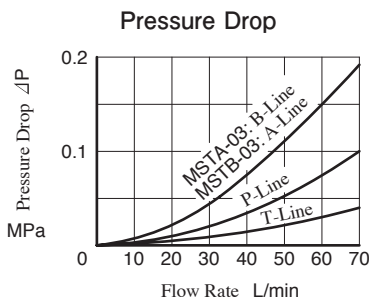
★The figures in parentheses are the values when the differential pressure is less than 3.5 MPa.

Model Number Designation

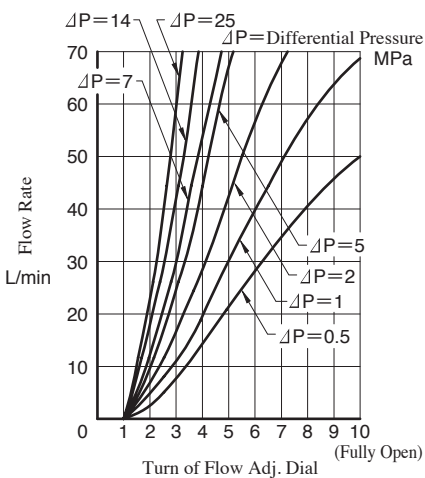
MSTA	-03	-X	-20
Series Number	Valve Size	Direction of Flow	Design Number
MSTA: for A-Line MSTB: for B-Line MSTW: for A&B-Lines	03	X: Meter-out	20

Typical Performance Characteristics

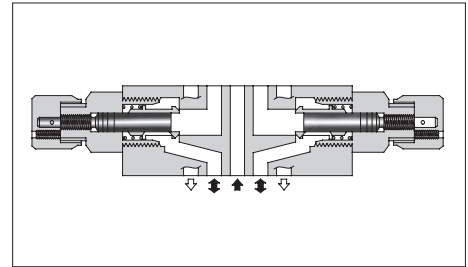
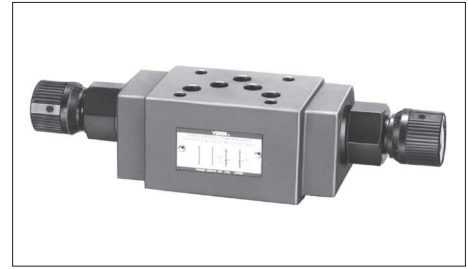
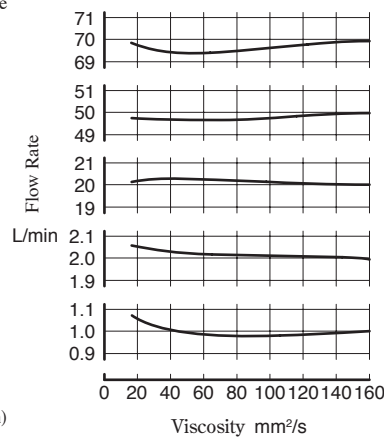
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Metered Flow vs. Dial Position



Metered Flow vs. Viscosity

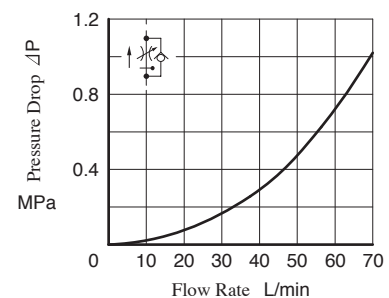


Model Numbers	Graphic Symbols	Detailed Graphic Symbols
Meter-out		
MSTA-03-X		
MSTB-03-X		
MSTW-03-X		

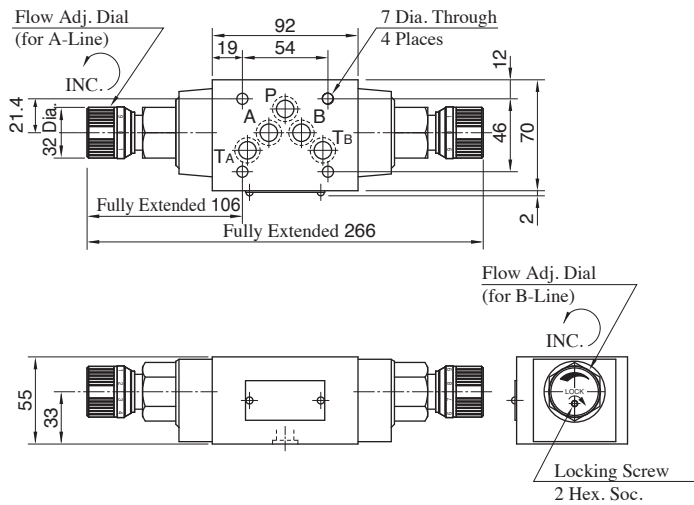
Instructions

- To make flow rate adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. For a decrease of flow, turn the dial clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

Pressure Drop at Throttle Fully Open

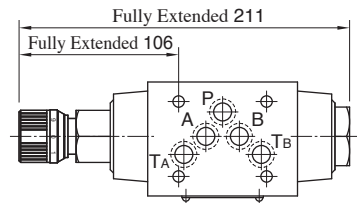


MSTW-03-X



Approx. Mass.....3.7 kg

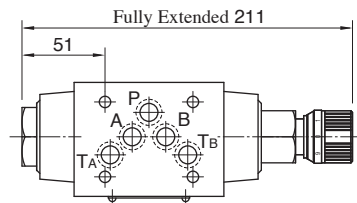
MSTA-03-X



Approx. Mass.....3.5 kg

For other dimensions, refer to "MSTW-03" in the drawing left.

MSTB-03-X



Approx. Mass.....3.5 kg

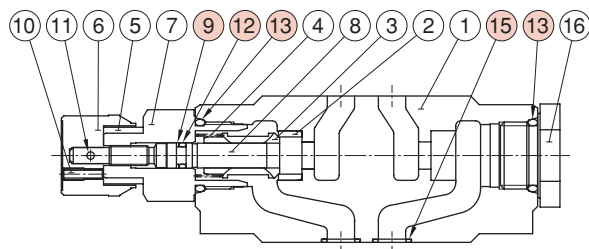
For other dimensions, refer to "MSTW-03" in the drawing left.

List of Seals

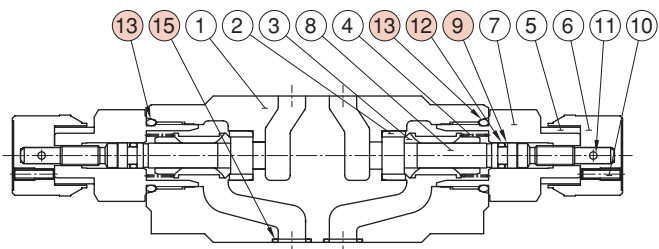
MSTA-03-X

MSTB-03-X

MSTW-03-X



MSTA-03-X



MSTW-03-X

●MSTB-03-X : The pressure adjustment part is built in the right side.

Item	Name of Parts	Part Numbers	Qty.		
			MSTA-03	MSTB-03	MSTW-03
9	Back-up Ring	900-VK411915-2	1	1	2
12	O-Ring	OR NBR-70-1 P7-N	1	1	2
13	O-Ring	OR NBR-90 P24-N	2	2	2
15	O-Ring	AS568-014 (NBR-90)	5	5	5

Throttle Modular Valves

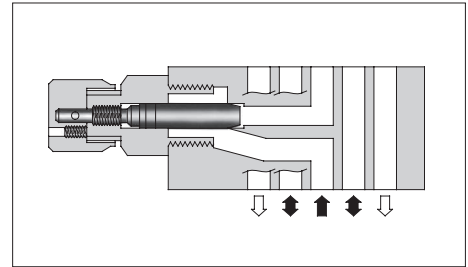
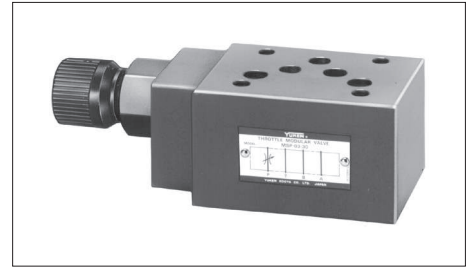
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MSP-03-30	25	70 *

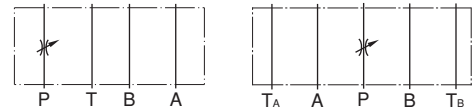
★ Maximum flow decreases when the differential pressure is less than 1 MPa. See the "Pressure Drop at Throttle Fully Open" of this page.

Model Number Designation

MSP	-03	-30
Series Number	Valve Size	Design Number
MSP: Throttle Valve for P-Line	03	30



Graphic Symbols

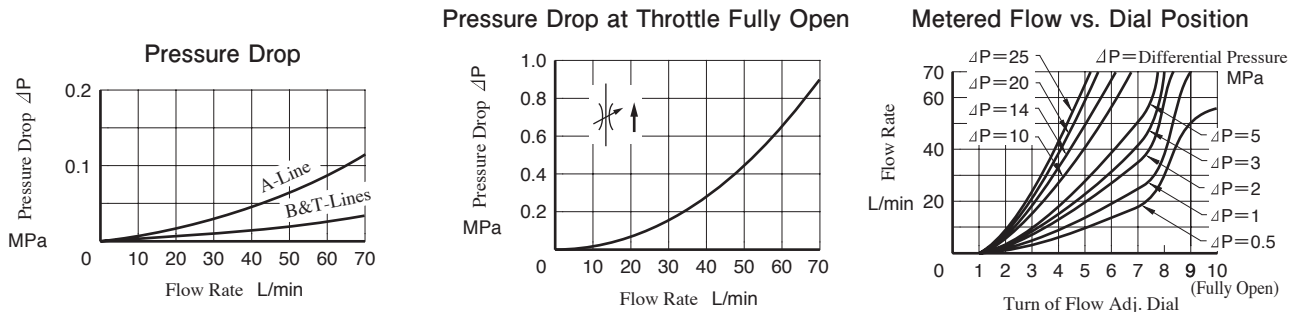


Instructions

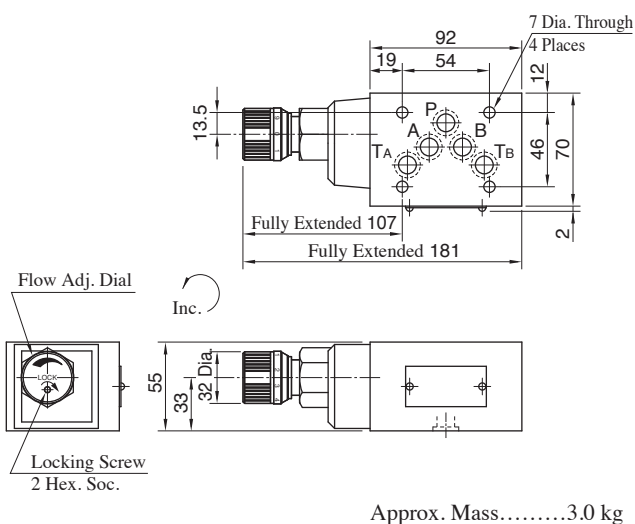
- To make flow adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

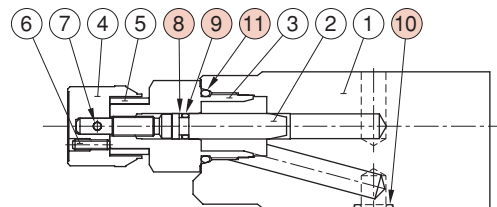


MSP-03



List of Seals

MSP-03



Item	Name of Parts	Part Numbers	Qty.
8	Back-up Ring	900-VK411915-2	1
9	O-Ring	OR NBR-70-1 P7-N	1
10	O-Ring	AS568-014 (NBR-90)	5
11	O-Ring	OR NBR-90 P24-N	1

Check and Throttle Modular Valves

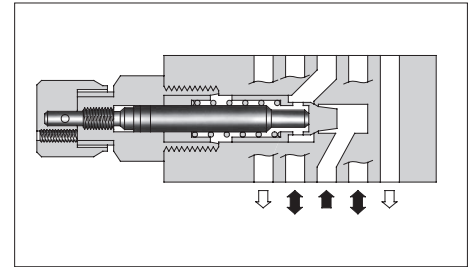
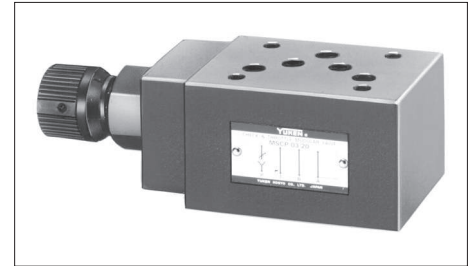
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MSCP-03-20	25	70 *

★ Maximum flow decreases when the differential pressure is less than 0.8 MPa. See the "Pressure Drop at Throttle Fully Open" of this page.

Model Number Designation

MSCP	-03	-20
Series Number	Valve Size	Design Number
MSCP: Check & Throttle Valve for P-Line	03	20

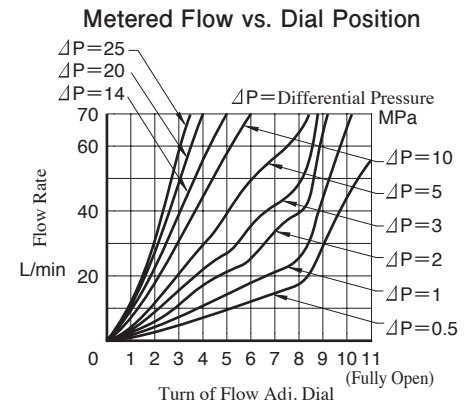
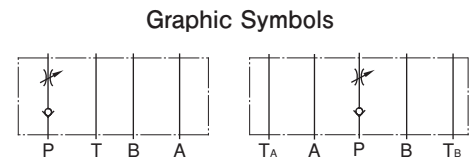
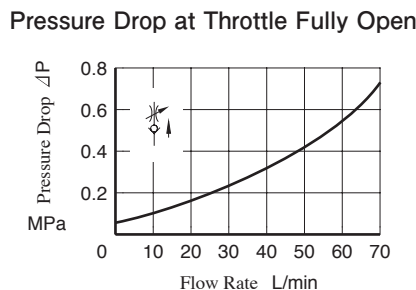
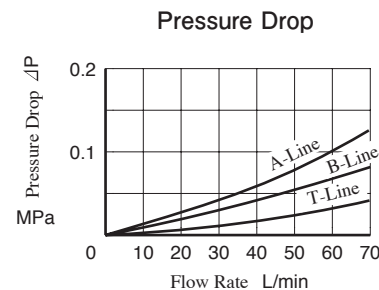


Instructions

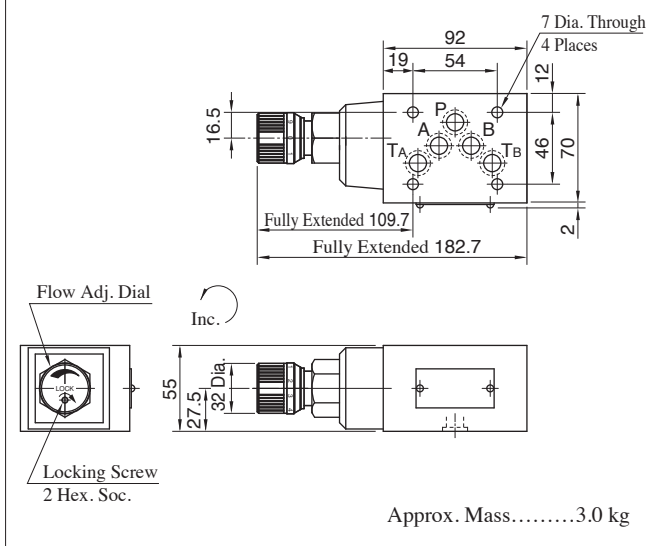
- To make flow adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

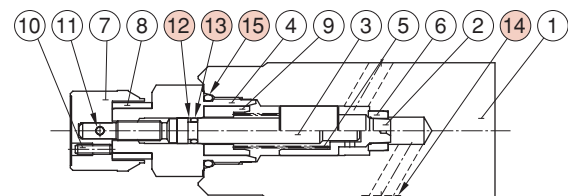


MSCP-03



List of Seals

MSCP-03



Item	Name of Parts	Part Numbers	Qty.
12	Back-up Ring	900-VK411915-2	1
13	O-Ring	OR NBR-70-1 P7-N	1
14	O-Ring	AS568-014 (NBR-90)	5
15	O-Ring	OR NBR-90 P24-N	1

Throttle and Check Modular Valves

Specifications

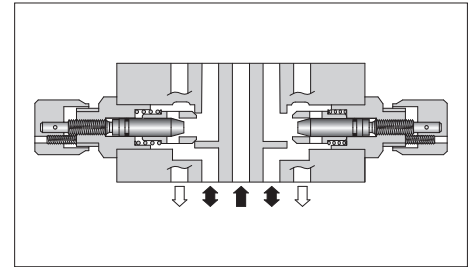
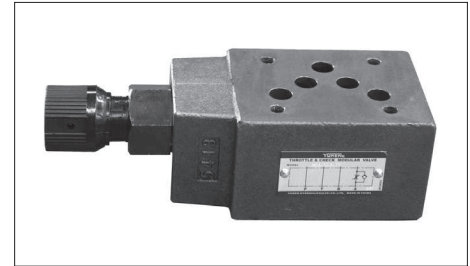
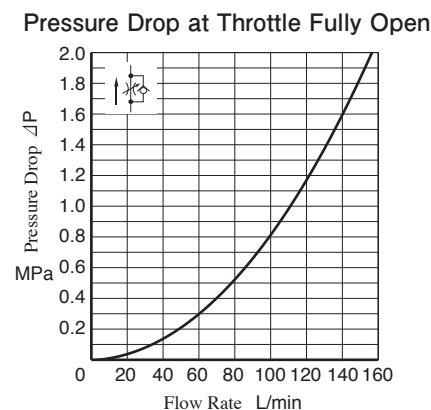
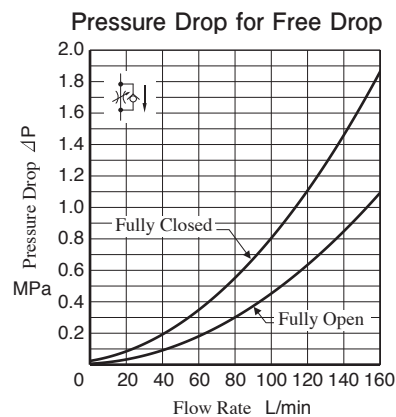
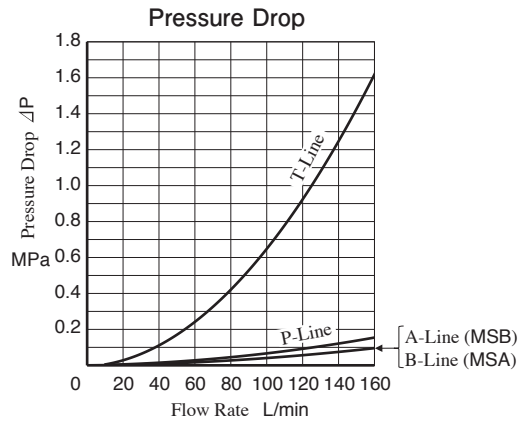
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS*-03*-70	35	160

Model Number Designation

MSA	-03	-X	-70
Series Number	Valve Size	Direction of Flow	Design Number
MSA: Throttle & Check Valve for A-Line MSB: Throttle & Check Valve for B-Line MSW: Throttle & Check Valve for A&B-Lines	03	X: Meter-out Y: Meter-in	70

Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



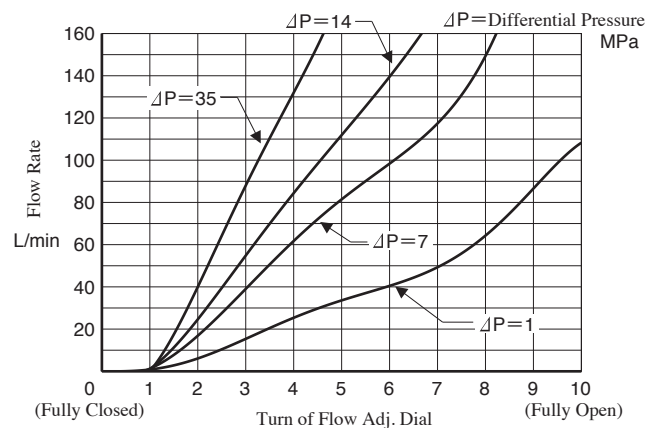
Model Numbers	Graphic Symbols

MSA-03 -X	
MSB-03 -X	
MSW-03 -X	

Model Numbers	Graphic Symbols

MSA-03 -Y	
MSB-03 -Y	
MSW-03 -Y	

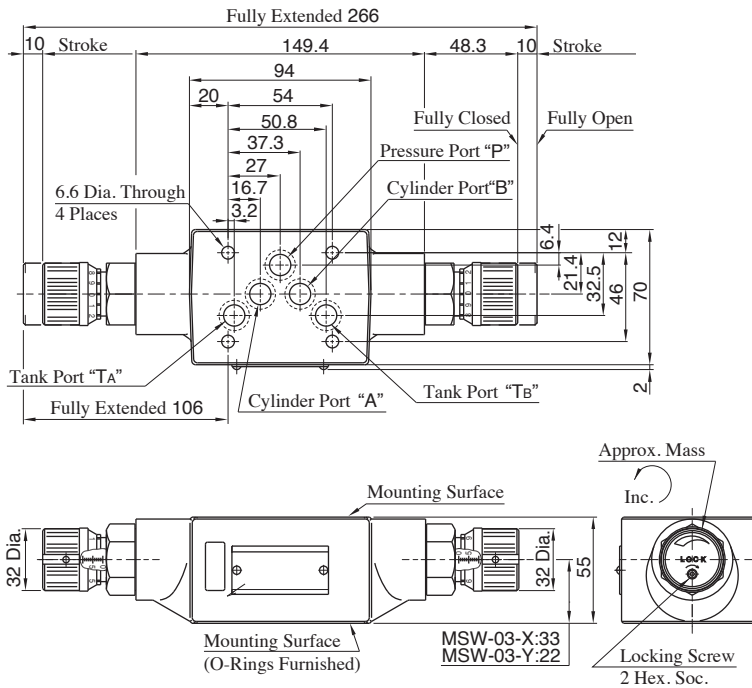
Metered Flow vs. Dial Position



Instructions

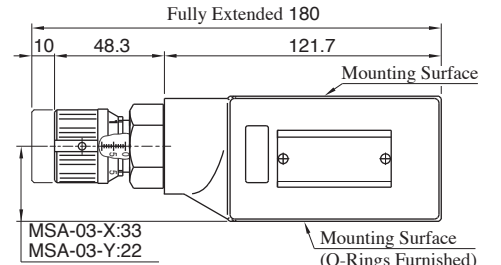
- To make flow adjustment, loosen locking screw for the dial and turn the flow adjustment dial clockwise or anti-clockwise. Be sure to re-tighten the locking screw firmly after the adjustment of the flow rate.

MSW-03-X/Y



Approx. Mass.....3.5 kg

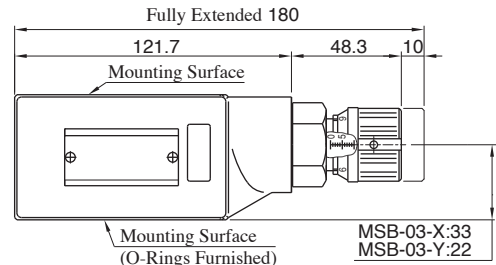
MSA-03-X/Y



Approx. Mass.....2.8 kg

For other dimensions, refer to "MSW-03" in the drawing left.

MSB-03-X/Y

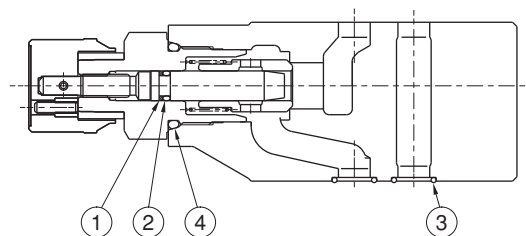


Approx. Mass.....2.8 kg

For other dimensions, refer to "MSW-03" in the drawing left.

List of Seals

MSA-03
MSB-03
MSW-03



MSA-03

- MSB-03 : The flow adjustment part is built in the right side.
- MSW-03 : The flow adjustment part is built in the both left and right sides.

Item	Name of Parts	Part Numbers	Qty.		
			MSA-03	MSB-03	MSW-03
1	Back-up Ring	900-VK411915-2 (P7)	1	1	2
2	O-Ring	OR NBR-70-1 P7-N	1	1	2
3	O-Ring	AS568-014 (NBR-90)	5	5	5
4	O-Ring	OR NBR-90 P24-N	1	1	2

Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MCP-03- *-70	35	120
MCA-03- *-70		
MCB-03- *-70		
MCW-03- *-70		
MCT-03- *-70		

Model Number Designation

MCP	-03	-0	-70
Series Number	Valve Size	Cracking Pressure MPa	Design Number
MCP:Check Valve for P-Line MCA:Check Valve for A-Line MCB:Check Valve for B-Line MCW:Check Valve for A&B-Lines MCT:Check Valve for T-Line	03	0: 0.035 2: 0.2 4: 0.4	70

Instructions

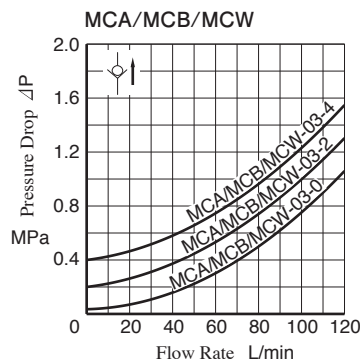
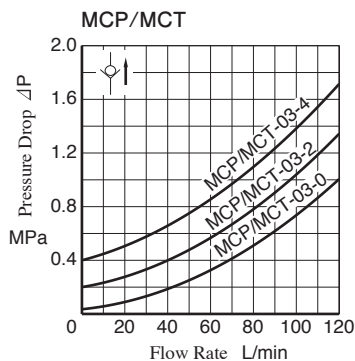
Tank Line Used

Check Valve function of MCT-03 is included in TA-Line.
Therefore, the tank line for a circuit that used this valve must be TA-Line.

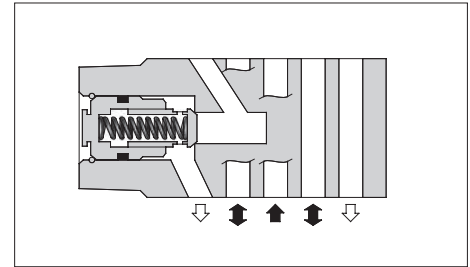
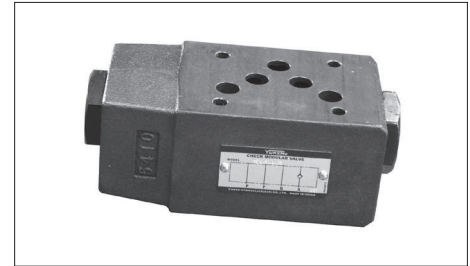
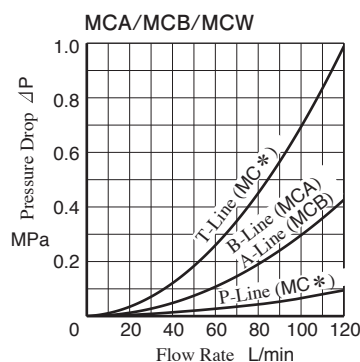
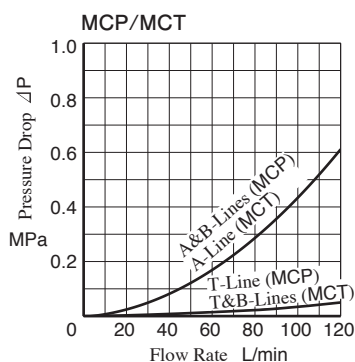
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop for Free Flow

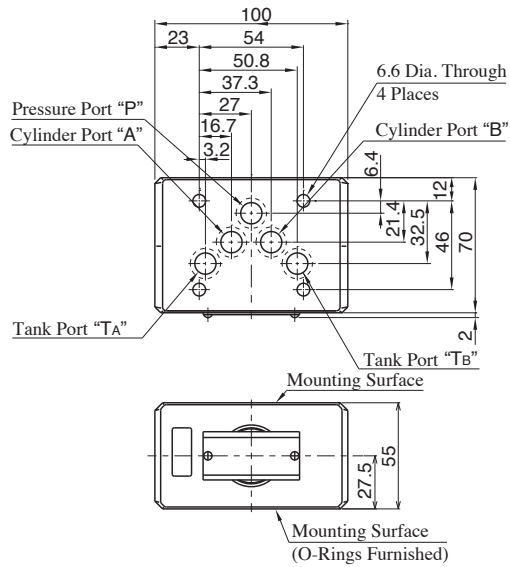


Pressure Drop



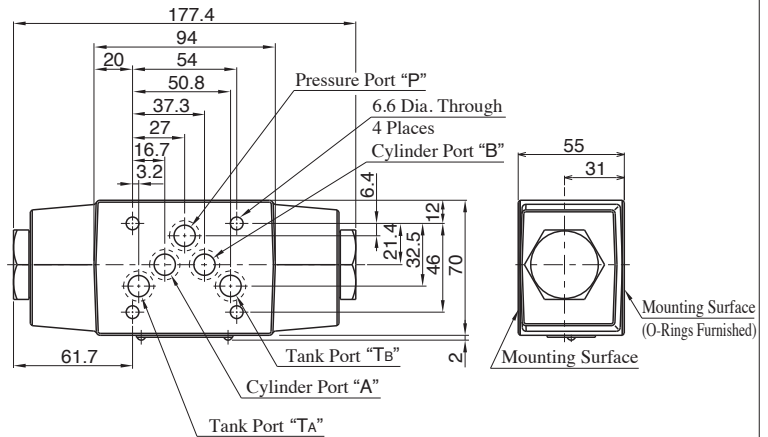
Model Numbers	Graphic Symbols	
MCP-03		
MCA-03		
MCB-03		
MCW-03		
MCT-03		

MCP-03



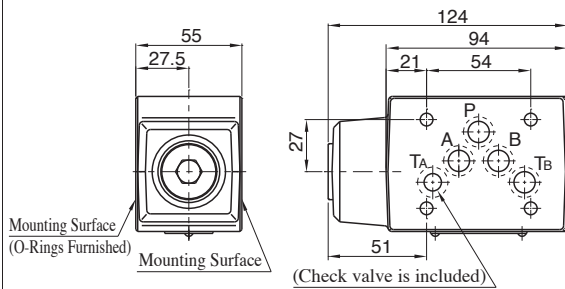
Approx. Mass.....2.6 kg

MCW-03



Approx. Mass.....3.7 kg

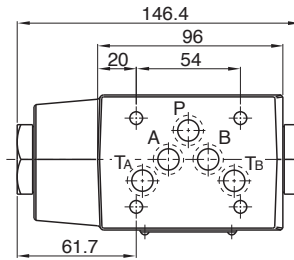
MCT-03



Approx. Mass.....3.0 kg

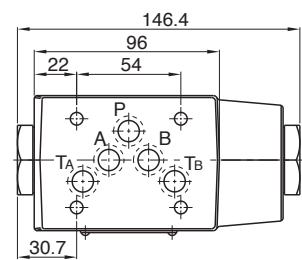
For other dimensions, refer to "MCW-03" in the drawing above.

MCA-03



For other dimensions, refer to "MCW-03" in the drawing above.

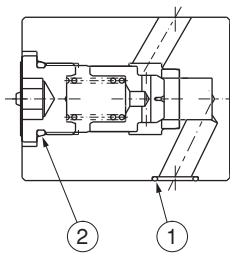
MCB-03



Approx. Mass.....3.0 kg

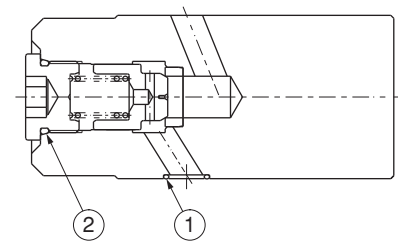
List of Seals

MCP-03



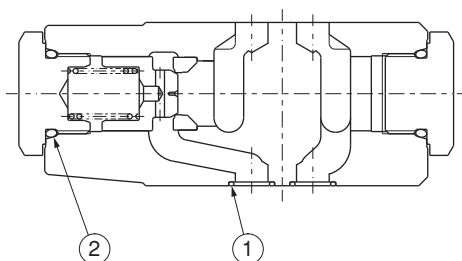
Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-90 P21-N	1

MCT-03



Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-90 P21-N	1

MCA-03 MCB-03 MCW-03



MCA-03

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-90 P24-N	2

- MCB-03: Check valve is assembled on the right side.
- MCW-03: Check valve is assembled on the both sides.

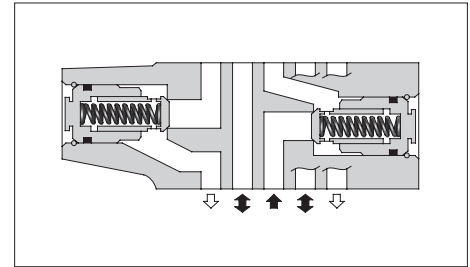
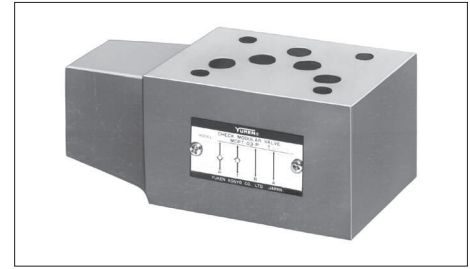
Check Modular Valves For “P&T” Lines

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MCPT-03-P*-T*-10	25	70

Model Number Designation

MCPT	-03	-P0	-T0	-10
Series Number	Valve Size	Cracking Pressure of P-Line MPa	Cracking Pressure of T-Line MPa	Design Number
MCPT: Check Valve for P&T-Lines	03	P0: 0.035 P2: 0.2	P0: 0.035 P2: 0.2	10



Instructions

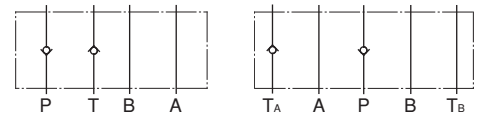
Tank Line Used

Check Valve function of Tank Line is included in TA-Line.
Therefore, the tank line for a circuit that used this valve must be TA-Line.

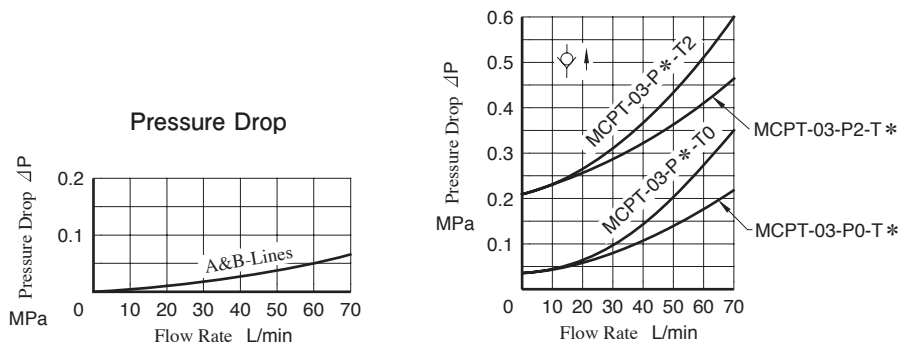
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

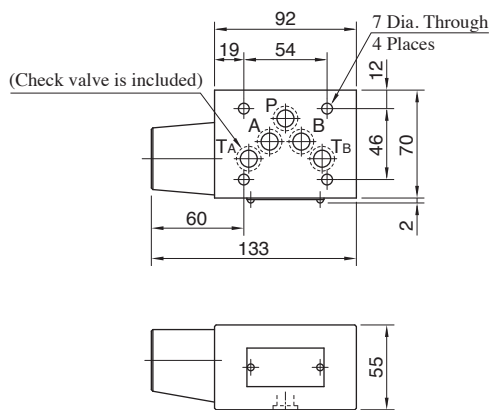
Graphic Symbols



Pressure Drop for Free Flow



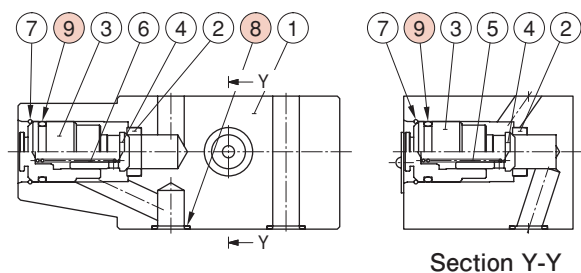
MCPT-03



Approx. Mass.....2.7 kg

List of Seals

MCPT-03



Item	Name of Parts	Part Numbers	Qty.
8	O-Ring	AS568-014 (NBR-90)	5
9	O-Ring	OR NBR-90 P21-N	2

Anti-Cavitation Modular Valves

Specifications

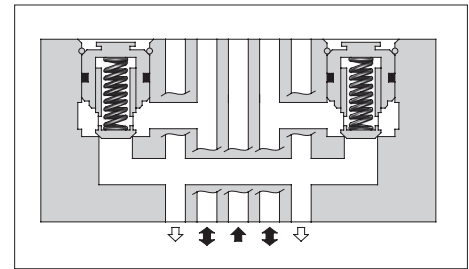
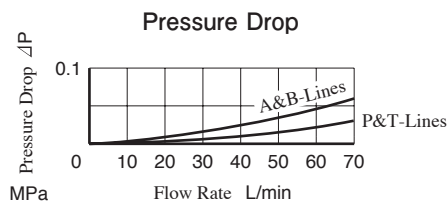
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MAC-03-10	25	70

Model Number Designation

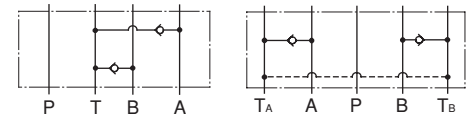
MAC	-03	-10
Series Number	Valve Size	Design Number
MAC: Anti-Cavitation Valve	03	10

Typical Performance Characteristics

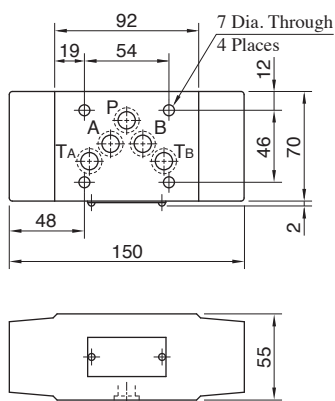
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Graphic Symbols



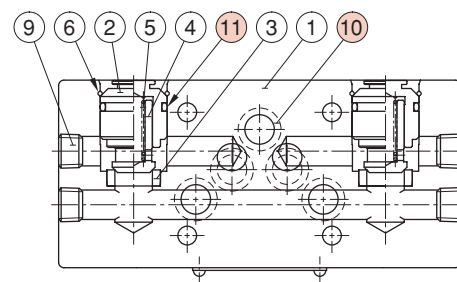
MAC-03



Approx. Mass.....3.8 kg

List of Seals

MAC-03



Item	Name of Parts	Part Numbers	Qty.
10	O-Ring	AS568-014 (NBR-90)	5
11	O-Ring	OR NBR-90 P21-N	2

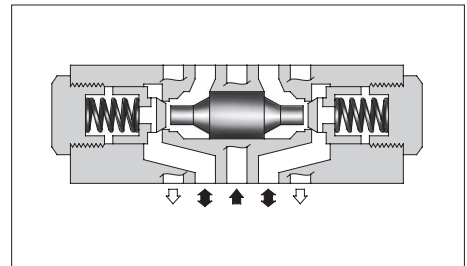
Pilot Operated Check Modular Valves

Specifications

Model Numbers		Max. Operating Pressure MPa	Max. Flow L/min
Standard	MP *-03-* -70	35	120
Low Pilot Pressure Control Type	MP *-03-* -L-70		

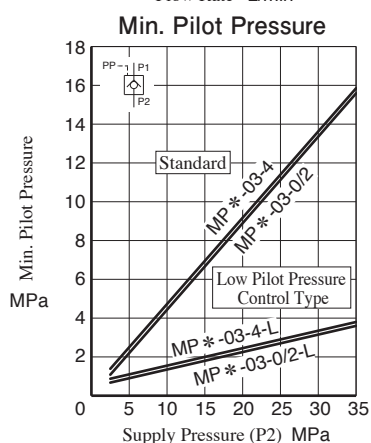
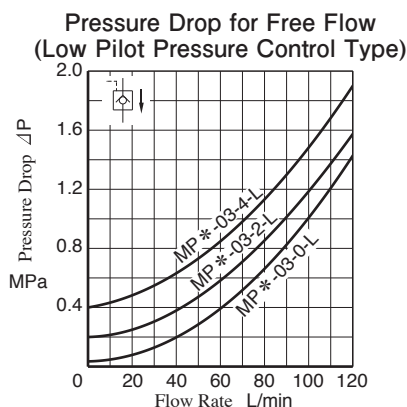
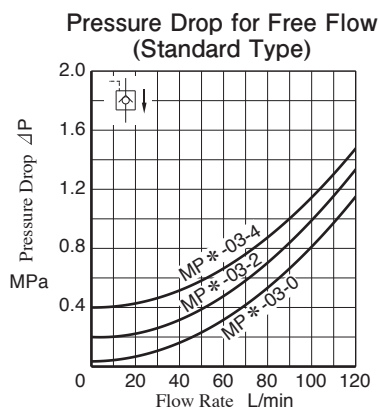
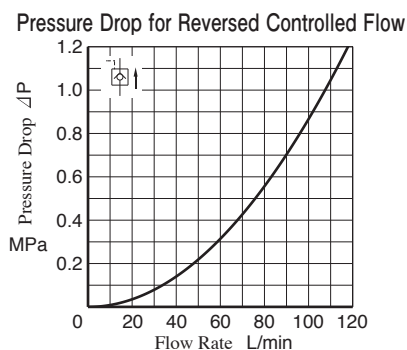
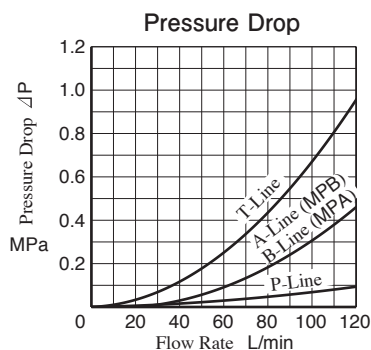
Model Number Designation

MPA	-03	-2	-L	-70
Series Number	Valve Size	Cracking Pressure MPa	Pilot Pressure Control Type	Design Number
MPA: Pilot Operated Check Valve for A-Line MPB: Pilot Operated Check Valve for B-Line MPW: Pilot Operated Check Valve for A&B-Lines	03	0: 0.035 2: 0.2 4: 0.4	None: Standard L: Low Pilot Pressure Control Type	70



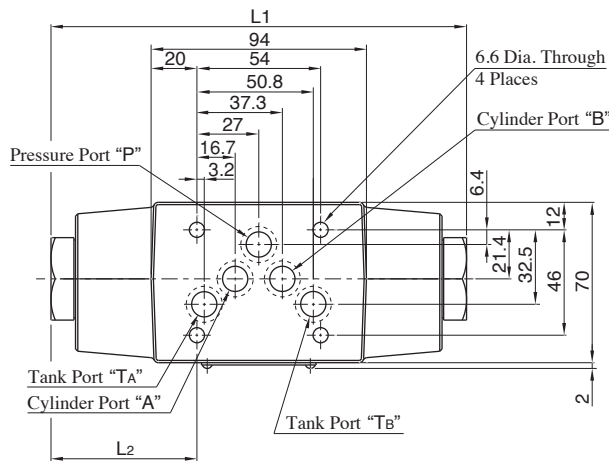
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

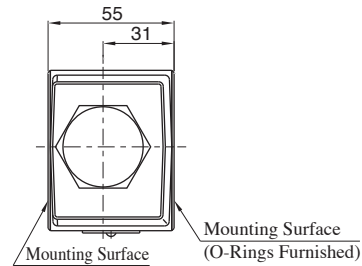


Model Numbers	Graphic Symbols	
MPA-03		
MPB-03		
MPW-03		

MPW-03

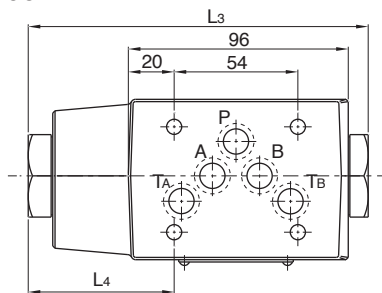


Model Numbers	L1	L2
MPW-03- *	177.4	61.7
MPW-03- *-L	181.4	63.7



Approx. Mass.....3.7 kg

MPA-03

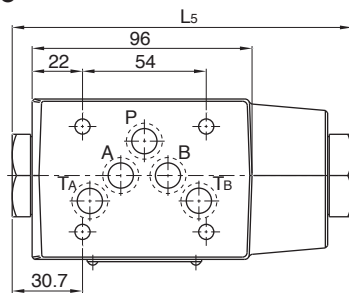


Model Numbers	L3	L4
MPA-03- *	146.4	61.7
MPA-03- *-L	148.4	63.7

Approx. Mass.....3.0 kg

For other dimensions, refer to "MPW-03" in the drawing above.

MPB-03



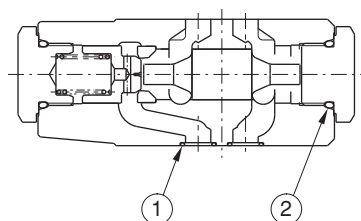
Model Numbers	L5
MPB-03- *	146.4
MPB-03- *-L	148.4

Approx. Mass.....3.0 kg

For other dimensions, refer to "MPW-03" in the drawing above.

List of Seals

MPA-03 MPB-03 MPW-03



MPA-03

- MPB-03: Check valve is assembled on the right side.
- MPW-03: Check valve is assembled on the both left and right side.

Item	Name of Parts	Part Numbers	Qty.
1	O-Ring	AS568-014 (NBR-90)	5
2	O-Ring	OR NBR-90 P24-N	2

End Plates

Blocking plates are used for auxiliary mounting surface or for closing unnecessary circuits. Bypass plates are used for unidirectional circuits that require no solenoid operated directional valves.

Specifications

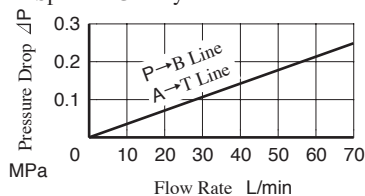
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MDC-03-* -10	25	70

Model Number Designation

MDC	-03	-A	-10
Series Number	Valve Size	Type of Plate	Design Number
MDC: End Plate	03	A: Blocking Plate B: Bypass Plate	10

Pressure Drop

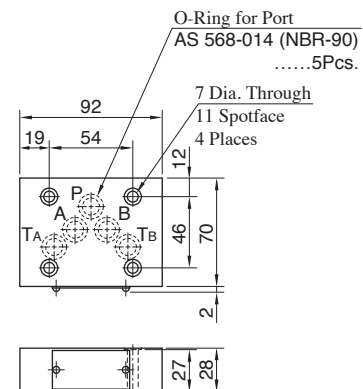
Hydraulic Fluid: Viscosity 35 mm²/s,
Specific Gravity 0.850



Model Numbers	Graphic Symbols
MDC-03 -A	
MDC-03 -B	



MDC-03



Approx. Mass.....1.2 kg

Connecting Plates

These plates are used for detecting pressure of each line.

Model Number Designation

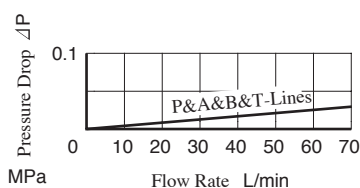
MDS	-03	-10
Series Number	Valve Size	Design Number
MDS: Connecting Plate	03	10

Specifications

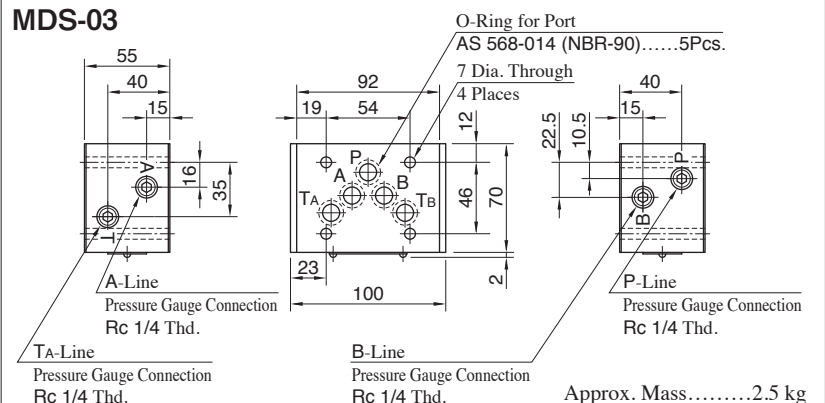
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MDS-03-10	25	70

Pressure Drop

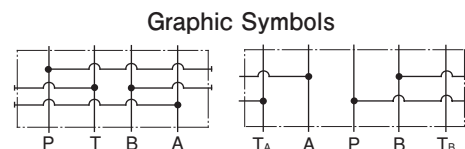
Hydraulic Fluid: Viscosity 35 mm²/s,
Specific Gravity 0.850



MDS-03



Approx. Mass.....2.5 kg

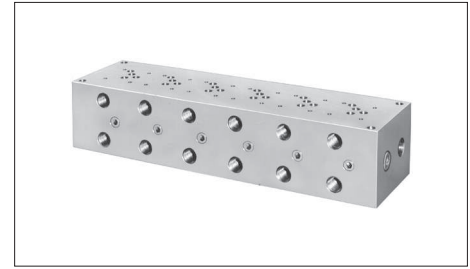


Graphic Symbols

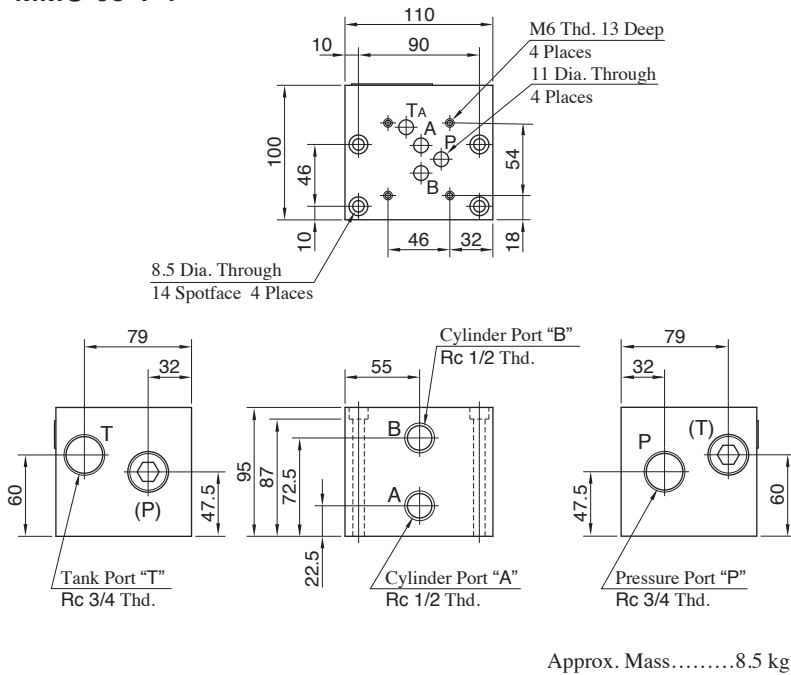
Base Plates For Modular Valves

Model Number Designation

MMC	-03	-T	-6	-21
Series Number	Plate Size	Type of Connection	Number of Stations	Design Number
MMC: Base Plate	03	T: Threaded Connection	1: 1 Station 5: 5 Stations 2: 2 Stations 6: 6 Stations 3: 3 Stations 7: 7 Stations 4: 4 Stations	21



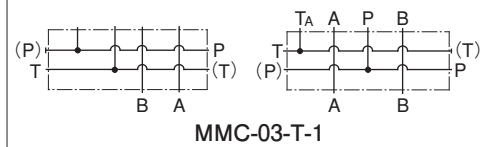
MMC-03-T-1



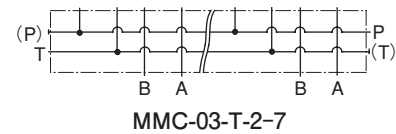
Specifications

Max. Operating Pressure.....25 MPa

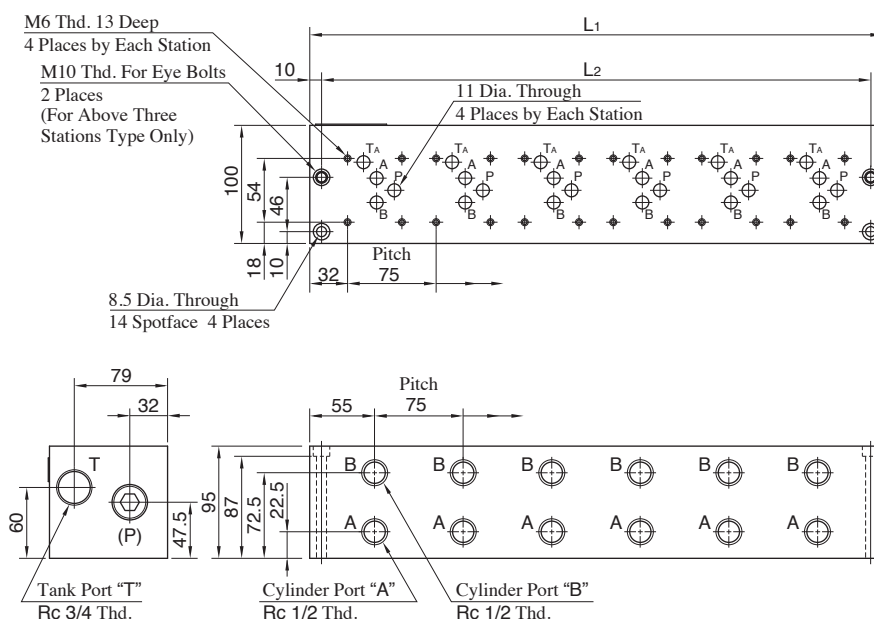
Graphic Symbol Detailed Graphic Symbol



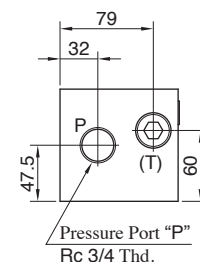
Graphic Symbol



MMC-03-T-2-7

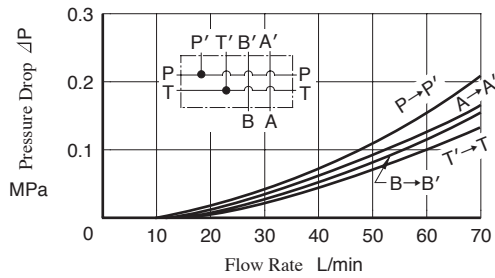


Model Numbers	L1	L2	Mass kg
MMC-03-T-2	185	165	14
MMC-03-T-3	260	240	19.5
MMC-03-T-4	335	315	25
MMC-03-T-5	410	390	30.5
MMC-03-T-6	485	465	36
MMC-03-T-7	560	540	41



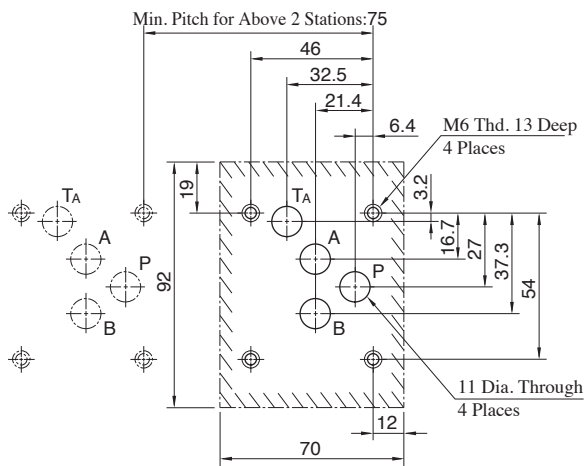
Pressure Drop

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Mounting Surface Dimensions for 03 Series Modular Valve

When the standard base plate (MMC-03) is not used, the following mounting surface must be prepared. Also, the mounting surface must have a good machined finish. ($\sqrt{16}$)



Instructions

- Although two ports are provided for both pressure port "P" and tank port "T", either may be used. However, the ports having (P) or (T) in the drawing are normally plugged. Remove the plugs of the ports when they are used. Make sure that the ports that are not currently used are properly plugged.

Spacer Kits

If 01 Series Modular Valves stacking on the 03 Base Plates, use this spacer.

If use, order by the model number below.

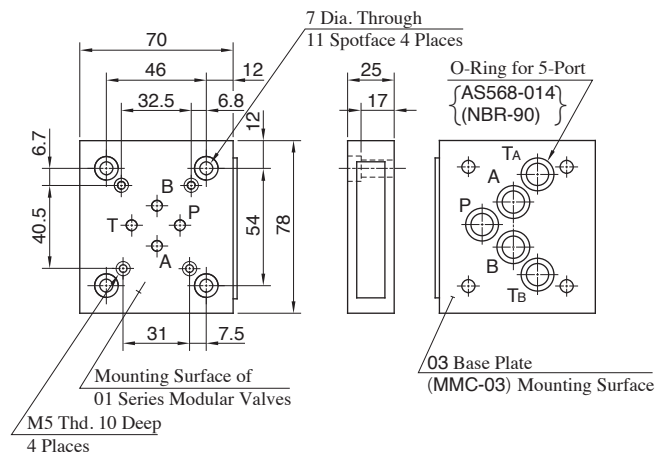
Model Numbers: DSGM-03-4010

Approx. Mass: 1kg

Accessories: Mounting Bolt 4 Pcs. : M6x25L

O-Ring 5 Pcs. : AS568-014 (NBR-90)

DSGM-03-4010



Note:

In the spacer above, 01 side "A" ⇔ 03 side "B", 01 side "B" ⇔ 03 side "A" are connected.

Mounting Bolt Kits For Modular Valves

Valves are mounted with four M6 stud bolts. Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis.

When ordering the mounting bolt kit, be sure to give the bolt kit model number from the table below.

Model Number Designation

MBK	-03	-04	-10
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK: Mounting Bolt Kits for Modular Valve	03	01, 02, 03, 04, 05 (Refer to the following chart)	10

Bolt Kits Selection Chart

Model Numbers	Quantity of valves to be stacked			Approx. Mass (1 Set) g
	Solenoid Operated Directional Valve (*-DSG-03)	End Plate (MDC-03)	Modular Valve or Connecting Plate (M* *-03)	
MBK-03-01-10	1	0	1	120
	0	1		
MBK-03-02-10	1	0	2	160
	0	1		
MBK-03-03-10	1	0	3	200
	0	1		
MBK-03-04-10	1	0	4	240
	0	1		
MBK-03-05-10	1	0	0	40
	0	1		

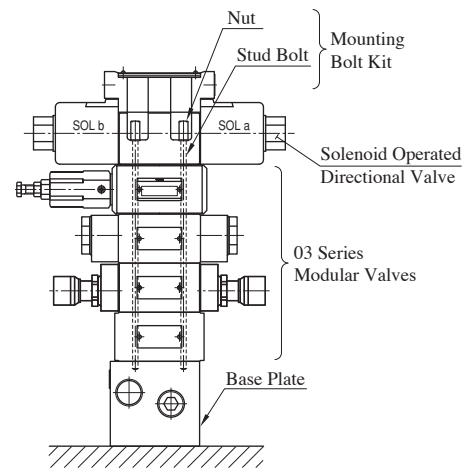


Bolt Kit Composition

Stud Bolt 4 Pcs. } 1 Set
Nut 4 Pcs. }

Note: In case of bolt kit model number having "05", four hexagon socket head cap screws only.

Tightening Torque..... 12-15 Nm

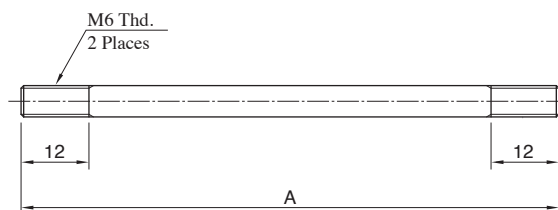


Stacking Example

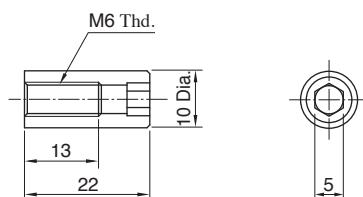
03 Series Modular Valves

MBK-03

Stud Bolt



Nut



Bolt Number	A mm
01	103
02	158
03	213
04	268
05	Socket Head Cap Screw M6x35 L

Interchangeability in Installation between Current and New Design

The following models of 03 Series Modular Valves have changed to 70 design numbers model to operate higher pressure and modification for large flow use.

Name	Model Numbers
Relief Modular Valves	MB *-03- *-70
Reducing Modular Valves	MR *-03- *-70
Throttle and Check Modular Valves	MS *-03- *-70
Check Modular Valves	MC *-03- *-70
Pilot Operated Check Modular Valves	MP *-03- *- *-70

Major Changes

- (1) Max. Operating Pressure (35MPa) & Max. Flow have substantially increased respectively.
- (2) Selectable low pilot operation type as standard model for Pilot Operated Check Modular Valves.

Mounting Interchangeability

Yes

Mounting surface is not changed from current models.

Specifications

Max. Operating Pressure

Name	Current		New	
	Model Numbers	Max. Operating Pressure MPa	Model Numbers	Max. Operating Pressure MPa
Relief Modular Valves	MB *-03- *-30	31.5	MB *-03- *-70	35
Reducing Modular Valves	MR *-03- *-30	25	MR *-03- *-70	
Throttle and Check Modular Valves	MS *-03- *-40		MS *-03- *-70	
Check Modular Valves	MCP/MCT-03- *-10		MC *-03- *-70	
	MCA/MCB/MCW-03- *-20		MP *-03- *-70	
Pilot Operated Check Modular Valves	MP *-03- *-20		MP *-03- *-L-70	
	MP *-03- *-2001			

Max. Flow

Name	Current		New	
	Model Numbers	Max. Flow L/min	Model Numbers	Max. Flow L/min
Relief Modular Valves	MB *-03- *-30	70	MB *-03- *-70	120
Reducing Modular Valves	MR *-03- *-30	70	MR *-03-A-70	80
			MR *-03-B/C/H-70	120
Throttle and Check Modular Valves	MS *-03- *-40	120	MS *-03- *-70	160
Check Modular Valves	MCP/MCT-03- *-10	70	MC *-03- *-70	120
	MCA/MCB/MCW-03- *-20		MP *-03- *-70	
Pilot Operated Check Modular Valves	MP *-03- *-20		MP *-03- *-L-70	
	MP *-03- *-2001			

● Model Number Designation

Function Addition

Name	Model Numbers	Additional Functions
Pilot Operated Check Modular Valves	MP *-03- *-L-70	Low pilot operation type, selectable as standard product

Pressure Adjustment Range

Name	Current		New	
	Model Numbers	Pres. Adj. Range MPa	Model Numbers	Pres. Adj. Range MPa
Relief Modular Valves	MB *-03- *-30	B: ★-7 H: 3.5-31.5	MB *-03- *-70	B: ★-7 C: 3.5-14 K: 7-35
Reducing Modular Valves	MR *-03- *-30	B: 1-7 H: 3.5-24.5	MR *-03- *-70	A: ★-3.5 B: 1-7 C: 3.5-14 H: 7-31.5

Cracking Pressure

Name	Current		New	
	Model Numbers	Cracking Pressure MPa	Model Numbers	Cracking Pressure MPa
Check Modular Valves	MCP/MCT-03- *-10 MCA/MCB/MCW-03- *-20	0: 0.035 2: 0.2	MC *-03- *-70	0: 0.035 2: 0.2 2: 0.4
Pilot Operated Check Modular Valves	MP *-03- *-20	2: 0.2 2: 0.4	MP *-03- *-70	0: 0.035 2: 0.2 4: 0.4
	MP *-03- *-2001		MP *-03- *-L-70	

● Typical Performance Characteristics

Characteristics of all models have been changed.

● Approx. Mass

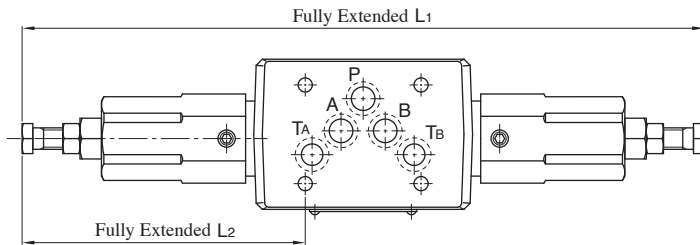
Name	Current		New	
	Model Numbers	Approx. Mass kg	Model Numbers	Approx. Mass kg
Relief Modular Valves	MBP/MBA/MBB-03- *-30	3.1	MBP/MBA/MBB-03- *-70	3.4
	MBW-03- *-30	3.8	MBW-03- *-70	4.0
Reducing Modular Valves	MR *-03- *-30	3.3	MR *-03- *-70	3.8
Throttle and Check Modular Valves	MSA/MSB-03- *-40	3.5	MSA/MSB-03- *-70	2.8
	MSW-03- *-40	3.7	MSW-03- *-70	3.5
Check Modular Valves	MCP-03- *-10	2.5	MCP-03- *-70	2.6
	MCA/MCB-03- *-20	3.5	MCA/MCB-03- *-70	3.0
	MCW-03- *-20	3.5	MCW-03- *-70	3.7
	MCT-03- *-10	2.8	MCT-03- *-70	3.0
Pilot Operated Check Modular Valves	MPA/MPB-03- *-20	3.5	MPA/MPB-03- *-70	3.0
	MPW-03- *-2001	3.5	MPW-03- *-70	3.7

●Dimensions

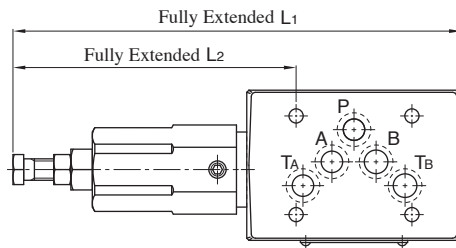
As of fully extended dimensions, height (55mm) and depth (70mm) are same between current and new models. Width is same except for the models below.

(1) Relief Modular Valves

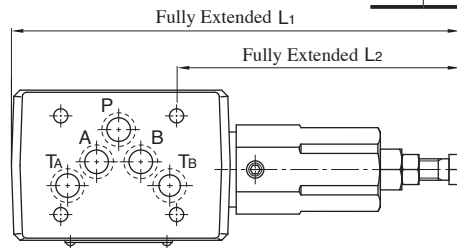
MBW-03



MBP/MBA-03



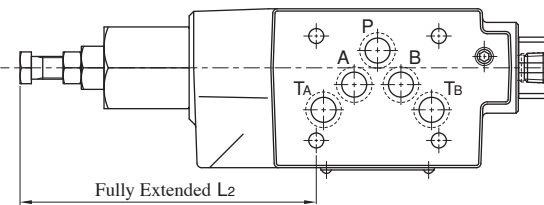
MBB-03



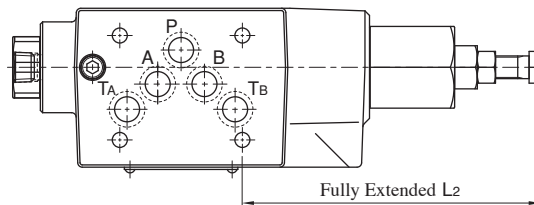
Model Numbers		L1	L2
Current	MBP-03- *-30	214	134
	MBA-03- *-30	214	134
	MBB-03- *-30	214	—
New	MBW-03- *-30	320	133
	MBP-03- *-70	209	132
	MBA-03- *-70	207	132
	MBB-03- *-70	207	—
	MBW-03- *-70	318	132

(2) Reducing Modular Valves

MRP/MRB-03



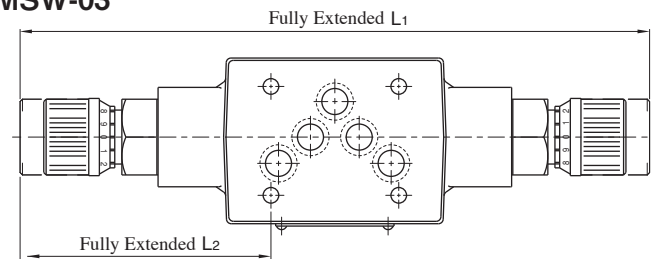
MRA-03



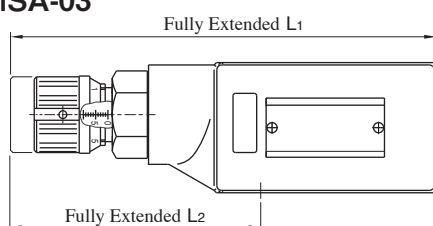
Model Numbers		L2
Current	MR *-03- *-30	131
New	MR *-03- *-70	131.3

(3) Throttle and Check Modular Valves

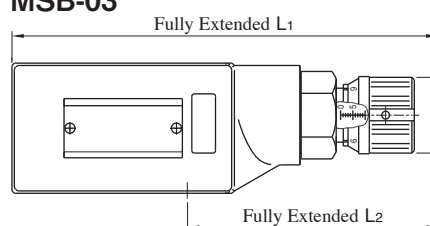
MSW-03



MSA-03



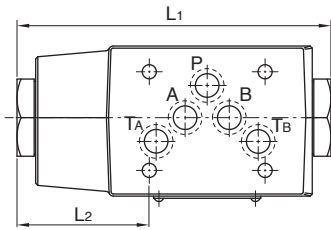
MSB-03



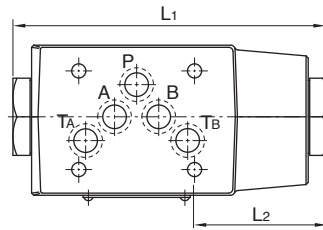
Model Numbers		L1	L2
Current	MSA-03- *-40	193.5	91.5
	MSB-03- *-40	193.5	
	MSW-03- *-40	237	
New	MSA-03- *-70	180	106
	MSB-03- *-70	180	
	MSW-03- *-70	266	

(4) Check Modular Valves

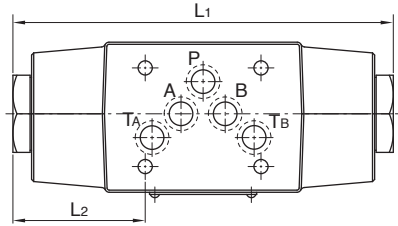
MCA-03



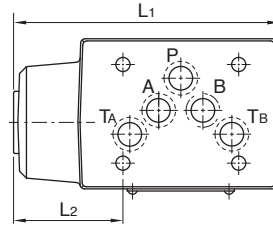
MCB-03



MCW-03



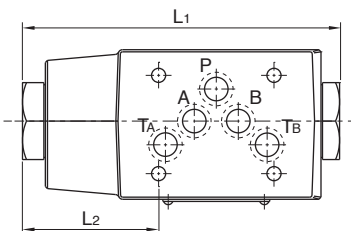
MCT-03



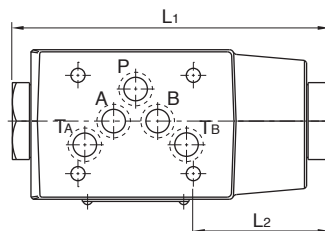
Model Numbers		L ₁	L ₂
Current	MCA/MCB-03- *-20	174	60
	MCW-03- *-20	174	60
	MCT-03- *-10	117	44
New	MCA/MCB-03- *-70	146.4	61.7
	MCW-03- *-70	177.4	61.7
	MCT-03- *-70	124	51

(5) Pilot Operated Check Modular Valves

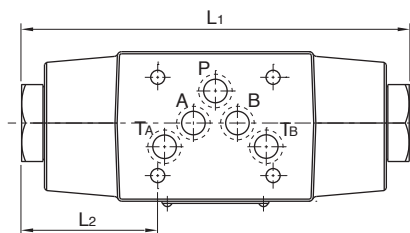
MPA-03- *
MPA-03- *-L



MPB-03- *
MPB-03- *-L



MPW-03- *
MPW-03- *-L



Model Numbers		L ₁	L ₂
Current	MPA/MPB-03- *-20	174	60
	MPW-03- *-20	174	60
	MPA/MPB-03- *-2001	178	62
	MPW-03- *-2001	178	62
New	MPA/MPB-03- *-70	146.4	61.7
	MPW-03- *-70	177.4	61.7
	MPA/MPB-03- *-L-70	148.4	63.7
	MPW-03- *-L-70	181.4	63.7

04 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page	Class	Name and Model Numbers	Graphic Symbols	Page
						P T Y X B A	
Solenoid Operated Directional Valve	(S-) DSHG-04- * - * - * -52		★	Directional Control Valves	Check Valves (for "P-Line") MCP-04- * -10		F-83
					Check Valves (for "T-Line") MCT-04- * -10		F-83
					Pilot Operated Check Valves (for "A-Line") MPA-04- * -10		F-85
					Pilot Operated Check Valves (for "B-Line") MPB-04- * -10		F-85
					Pilot Operated Check Valves (for "A&B-Lines") MPW-04- * -10		F-85
Pressure Control Valves	Reducing Valves (for "P-Line") MRP-04- * -10		F-79	Mounting Bolts	Bolt Kits MBK-04- * -10		F-86
	Reducing Valves (for "A-Line") MRA-04- * -10		F-79				
	Reducing Valves (for "B-Line") MRB-04- * -10		F-79				
	Throttle and Check Valves (for "A-Line", Meter-out) MSA-04-X-10		F-81				
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-04-Y-10		F-81				
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-04-X-10		F-81				
Flow Control Valves	Throttle and Check Valves (for "B-Line", Meter-in) MSB-04-Y-10		F-81				
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-04-X-10		F-81				
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-04-Y-10		F-81				

★Refer to the relevant pages of catalog "E: DIRECTIONAL CONTROLS"

Reducing Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow * L/min
MR *-04-A-10	35	100
B MR *-04-C-10 H		300

★ In case of pressure adjustment range “A” “B”, the maximum flow is limited by the pressure in the secondary side.
Use in the range of refer to “Secondary Side Pressure - Max. Flow Characteristics” below.

Model Number Designation

MRP	-04	-A	-10
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MRP: for P-Line MRA: for A-Line MRB: for B-Line	04	A: 0.7-7 B: 1.5-7 C: 3.5-14 H: 7-25	10

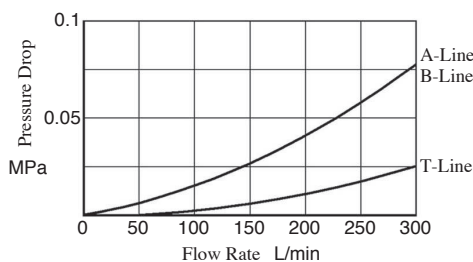
Instructions

- The drain line (Y-port) must be connected to tank directly to keep setting pressure stable. If use solenoid controlled pilot operated directional valves with these modular valves, please select the internal drain type (T-line).
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

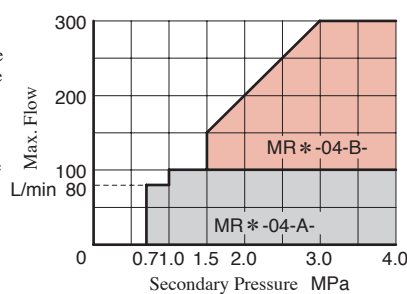
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

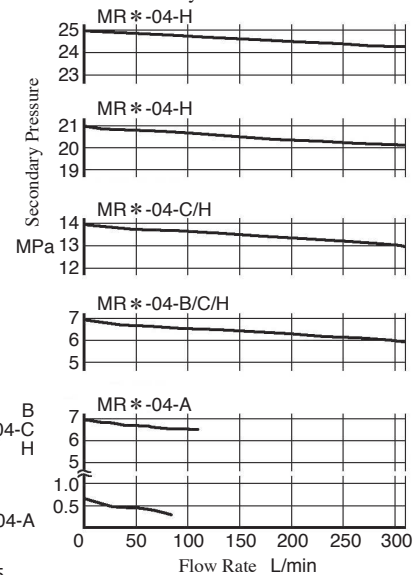
Pressure Drop



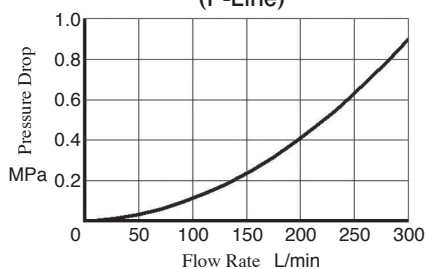
Secondary Pressure vs. Max. Flow



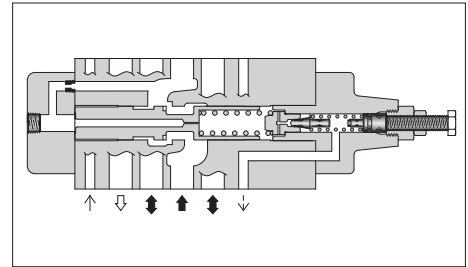
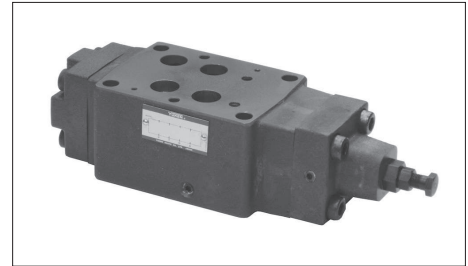
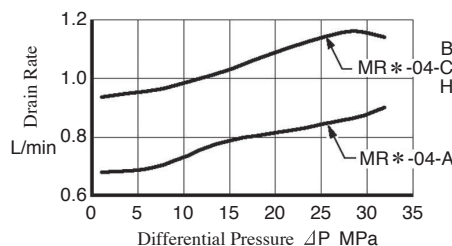
Nominal Override Characteristics
Primary Pressure 35 MPa



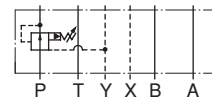
Pres. Drop at Spool Fully Open (P-Line)



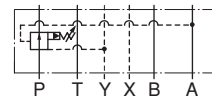
Drain Characteristics



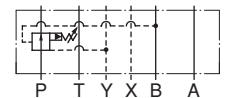
Graphic Symbols



MRP-04

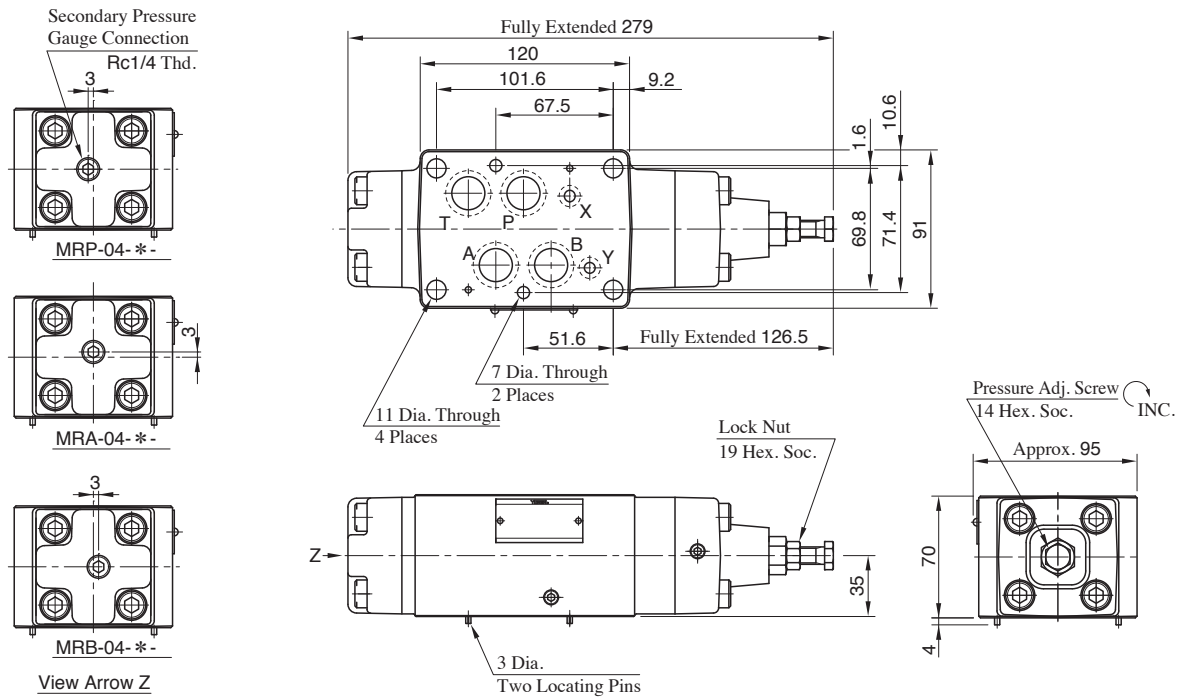


MRA-04



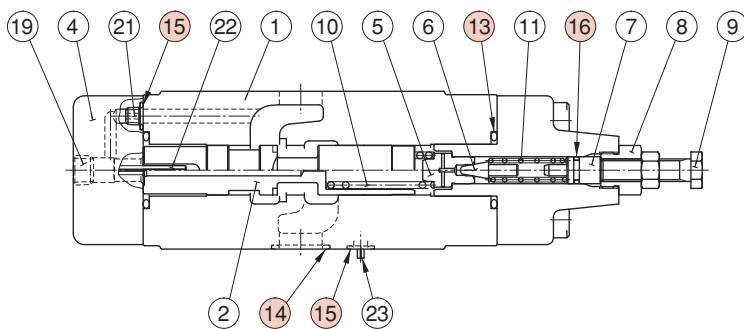
MRB-04

**MRP-04
MRA-04
MRB-04**



List of Seals

**MRP-04
MRA-04
MRB-04**



Item	Name of Parts	Part Numbers	Qty.
13	O-Ring	OR NBR-90 P28-N	2
14	O-Ring	OR NBR-90 P22-N	4
15	O-Ring	OR NBR-90 P9-N	7
16	O-Ring	OR NBR-70-1 P9-N	1

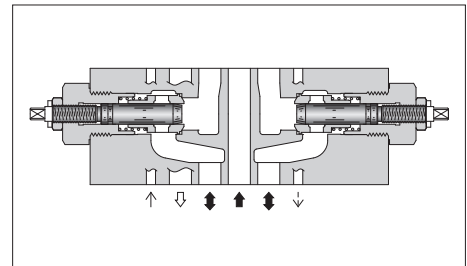
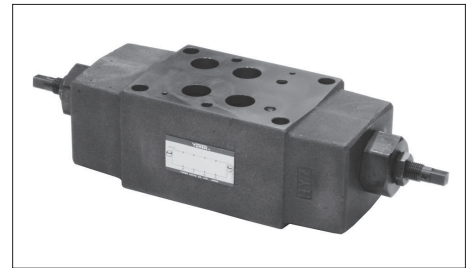
Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS *-04 *-10	35	300

Model Number Designation

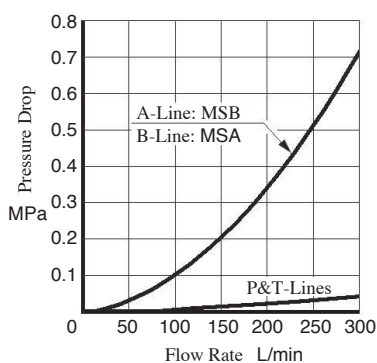
MSA	-04	-X	-10
Series Number	Valve Size	Direction of Flow	Design Number
MSA: For A-Line MSB: For B-Line MSW: For A&B-Lines	04	X: Meter-out Y: Meter-in	10



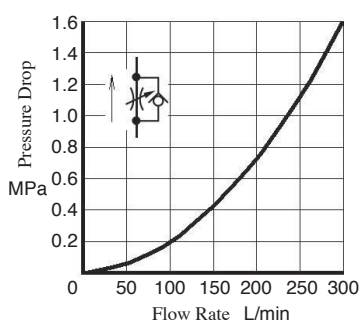
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

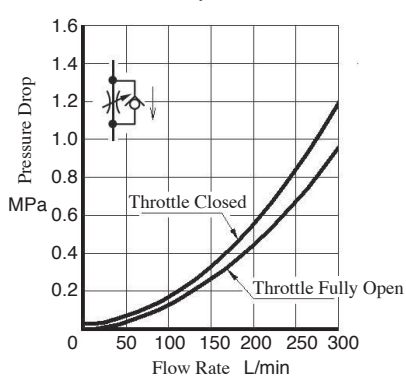
Pressure Drop



Pressure Drop at Throttle Fully Open



Pressure Drop for Free Flow



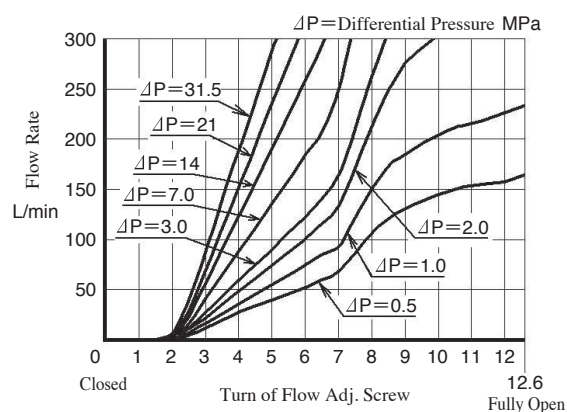
Graphic Symbols

Meter-out	Meter-in
 P T Y X B A MSA-04-X	 P T Y X B A MSA-04-Y
 P T Y X B A MSB-04-X	 P T Y X B A MSB-04-Y
 P T Y X B A MSW-04-X	 P T Y X B A MSW-04-Y

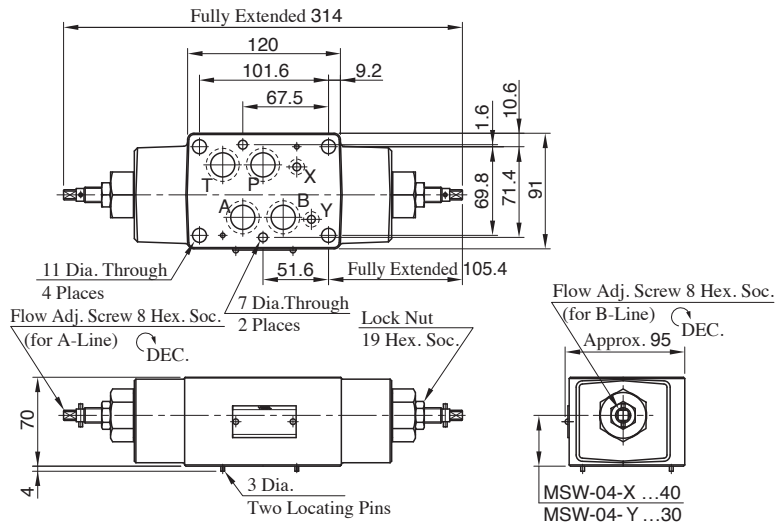
Instructions

- To make flow rate adjustment, loosen lock nut and turn the flow adjustment screw clockwise or anti-clockwise. Turn the screw anti-clockwise, the flow rate increase. Be sure to re-tighten the lock nut firmly after the adjustment of the flow rate is completed.

Metered Flow vs. Screw Position

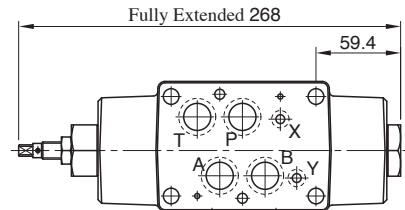


MSW-04-X Y



Approx. Mass.....7.6 kg

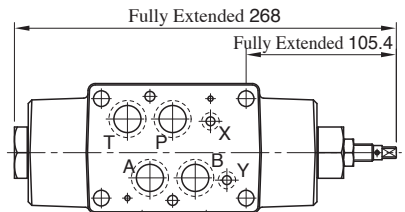
MSA-04-X Y



Approx. Mass.....7.4 kg

For other dimensions, refer to "MSW-04" in the drawing left.

MSB-04-X Y

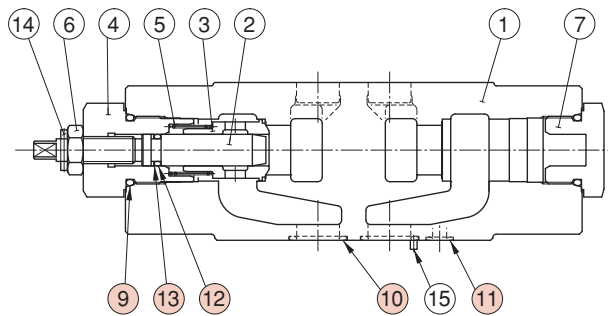


Approx. Mass.....7.4 kg

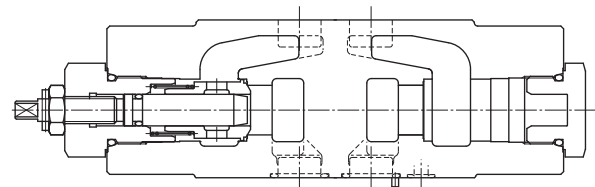
For other dimensions, refer to "MSW-04" in the drawing left.

List of Seals

MSA-04 MSB-04 MSW-04



MSA-04-X



MSA-04-Y

- MSB-04 : The flow adjustment parts is assembled on the right side.
- MSW-04 : The flow adjustment parts is assembled on the both sides.

Item	Name of Parts	Part Numbers	Qty.		
			MSA-04	MSB-04	MSW-04
9	O-Ring	OR NBR-90 P26-N	2	2	2
10	O-Ring	OR NBR-90 P22-N	4	4	4
11	O-Ring	OR NBR-90 P9-N	2	2	2
12	O-Ring	OR NBR-70-1 P10A-N	1	1	2
13	Back-up Ring	BR JIS B 2401-4-T2-P10A	1	1	2

Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MCP-04-* -10	35	300
MCT-04-* -10		

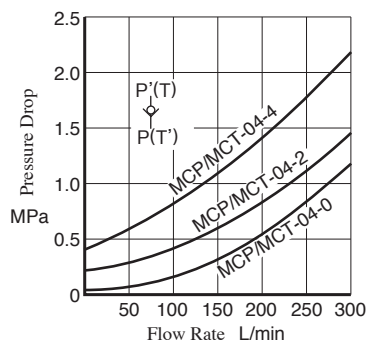
Model Number Designation

MCP	-04	-0	-10
Series Number	Valve Size	Cracking Pressure MPa	Design Number
MCP: Check Valve for P-Line	04	0: 0.035	10
MCT: Check Valve for T-Line		2: 0.2 4: 0.4	10

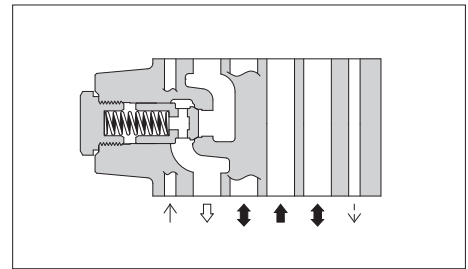
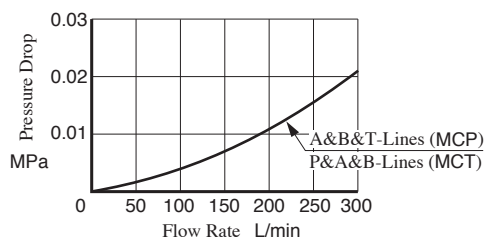
Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop for Free Flow



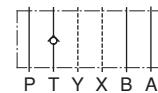
Pressure Drop



Graphic Symbols

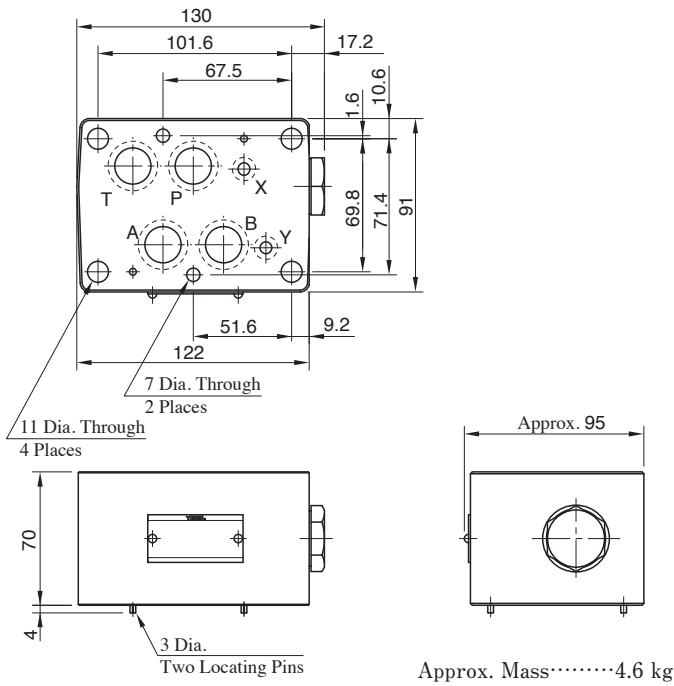


MCP-04

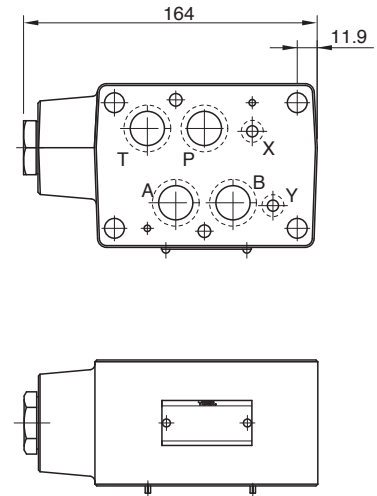


MCT-04

MCP-04



MCT-04

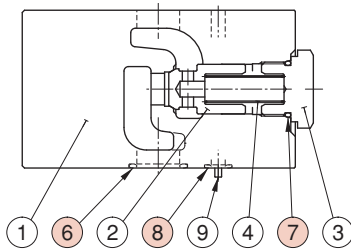


Approx. Mass.....5.4 kg

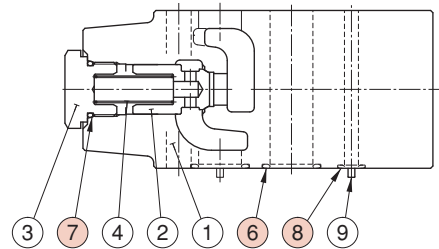
For other dimensions, refer to "MCP-04" in the drawing left.

List of Seals

MCP-04



MCT-04



Item	Name of Parts	Part Numbers	Qty.
6	O-Ring	OR NBR-90 P22-N	4
7	O-Ring	OR NBR-90 P21-N	1
8	O-Ring	OR NBR-90 P9-N	2

Pilot Operated Check Modular Valves

Specifications

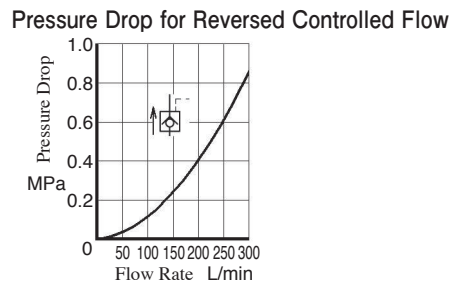
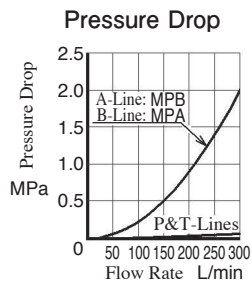
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP*-04-* -10	35	300

Model Number Designation

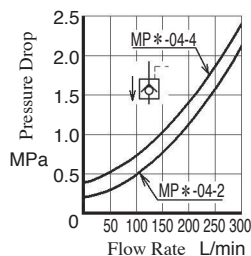
MPA	-04	-2	-10
Series Number	Valve Size	Cracking Pressure MPa	Design Number
MPA: For A-Line MPB: For B-Line MPW: For A&B-Lines	Pilot Operated Check Valve	04 2: 0.2 4: 0.4	10

Typical Performance Characteristics

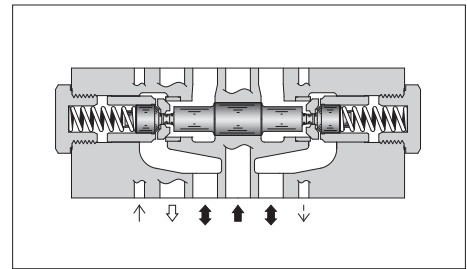
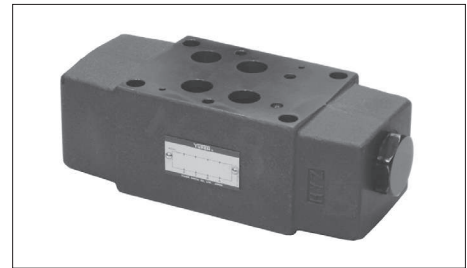
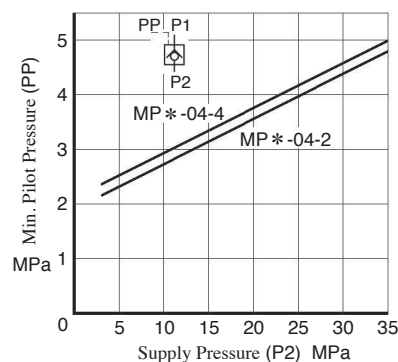
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



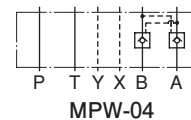
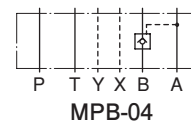
Pressure Drop for Free Flow



Min. Pilot Pressure

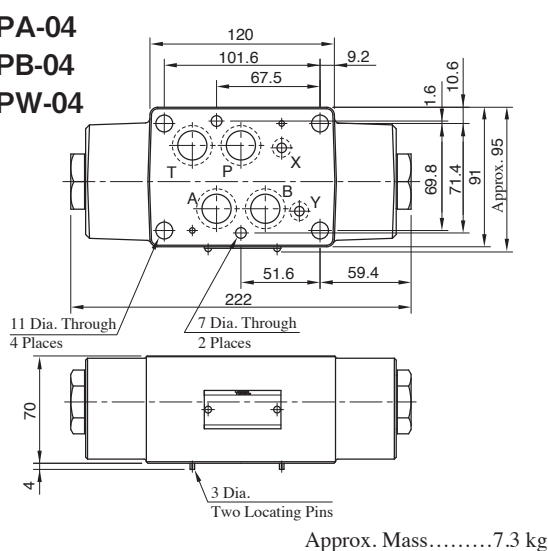


Graphic Symbols



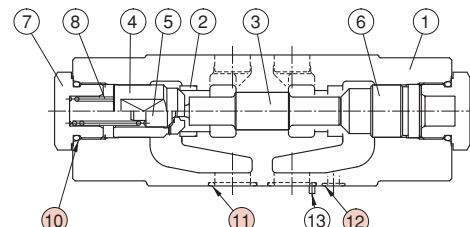
04 Series Modular Valves

MPA-04 MPB-04 MPW-04



List of Seals

MPA-04 MPB-04 MPW-04



MPA-04

- MPB-04: The Check Valve is assembled on the right side.
- MPW-04: The Check Valve is assembled on the both sides.

Item	Name of Parts	Part Numbers	Qty.
10	O-Ring	OR NBR-90 P26-N	2
11	O-Ring	OR NBR-90 P22-N	4
12	O-Ring	OR NBR-90 P9-N	2

Mounting Bolt Kits For Modular Valves

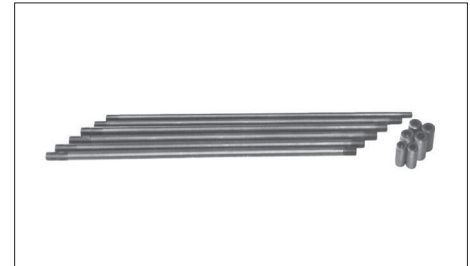
Valves are mounted with six stud bolts (M6×2, M10×4). Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis. When ordering the mounting bolt kit, be sure to give the bolt kit model number from the table below.

Model Number Designation

MBK	-04	-01	-10
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK: Mounting Bolt Kits for Modular Valves	04	01, 02, 03, 04 (Refer to the selection chart below)	10

Bolt Kits Selection Chart

Bolt Kit Model Numbers	Quantity of Valves to be Stacked		Approx. Mass (1 set) kg
	Sol. Cont. Pilot Operated Directional Valves (DSHG-04, 52Design)	Modular Valve	
MBK-04-01-10	1	1	0.6
MBK-04-02-10	1	2	0.8
MBK-04-03-10	1	3	1.0
MBK-04-04-10	1	4	1.2

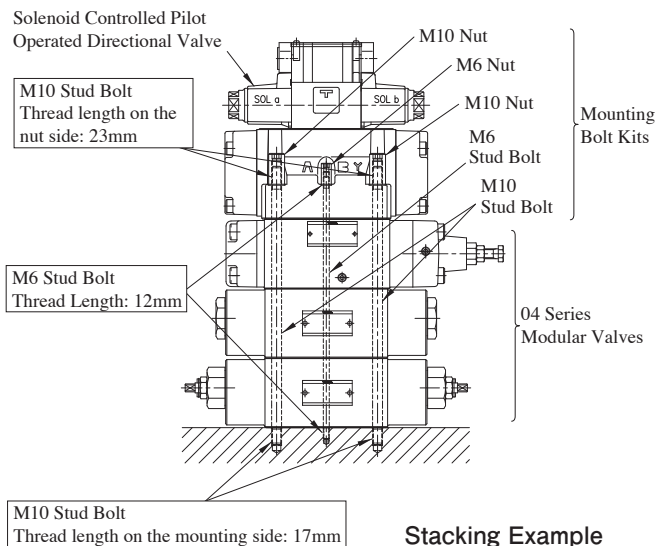


Bolt Kit Composition

M6 Stud Bolt	 2 Pcs.	} 1 Set
M6 Nut	 2 Pcs.	
M10 Stud Bolt	 4 Pcs.	
M10 Nut	 4 Pcs.	

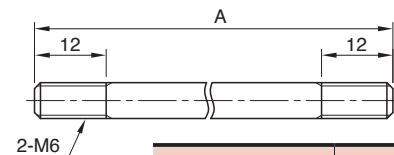
Tightening Torque

M6	 12-15 Nm
M10	 45-55 Nm



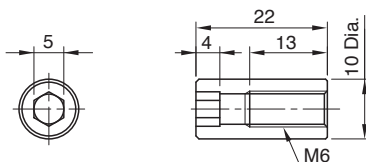
MBK-04

Stud Bolt M6

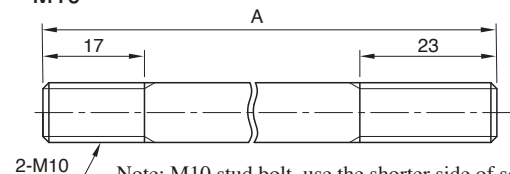


Model Numbers	A	
	M6	M10
MBK-04-01-10	125	140
MBK-04-02-10	195	210
MBK-04-03-10	265	280
MBK-04-04-10	335	350

Nut M6

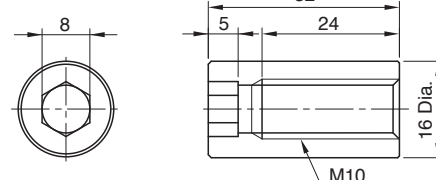


M10



Note: M10 stud bolt, use the shorter side of screw part to the mounting surface side, the longer side to the nut side.
About more details, refer to the stacking example of the 04 series modular valves.

M10

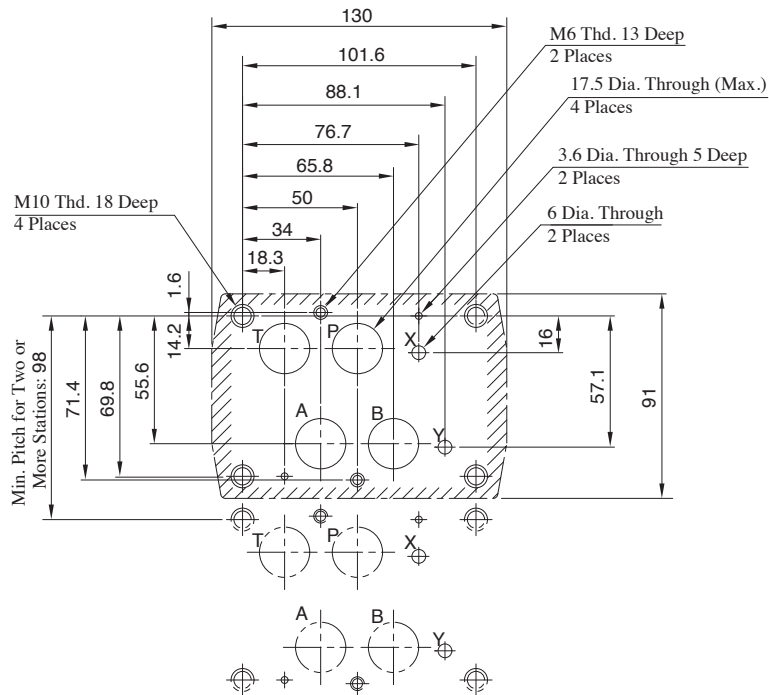


— Mounting Surface Dimensions for 04 Series Modular Valve —

When mounting 04 series modular valve, be sure to use a sub-plate for 1/2 solenoid controlled pilot operated directional valves

Name	Model Numbers	Page
Sub-plate for 1/2 Solenoid Controlled Pilot Operated Directional Valves	DHGM-04 * -20	F-108

Also, when no sub-plates are used, be sure to use the following mounting surface.



Note: The mounting surface of shaded parts above has a good machined finish. ($\sqrt{1.6}$)

06 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page	Class	Name and Model Numbers	Graphic Symbols	Page
						P T Y X B A	
Pressure Control Valves	★1 Solenoid Controlled Pilot Operated Directional Valve (S-) DSHG-06- * - * - * -53		★2	Directional Control Valves	Pilot Operated Check Valves (for "A-Line", Internal Pilot- Internal Drain Type) MPA-06- * -70		F-93
	Reducing Valves (for "P-Line") MRP-06- * -70		F-89		Pilot Operated Check Valves (for "A-Line", External Pilot- External Drain Type) MPA-06 * - * -X-70		F-93
	Reducing Valves (for "A-Line") MRA-06- * -70		F-89		Pilot Operated Check Valves (for "A-Line", External Pilot- Internal Drain Type) MPA-06 * - * -Y-70		F-93
	Reducing Valves (for "B-Line") MRB-06- * -70		F-89		Pilot Operated Check Valves (for "B-Line", Internal Pilot- Internal Drain Type) MPB-06- * - * -70		F-93
Flow Control Valves	Throttle and Check Valves (for "A-Line", Meter-out) MSA-06-X-70		F-91		Pilot Operated Check Valves (for "B-Line", External Pilot- External Drain Type) MPB-06 * - * -X-70		F-93
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-06-Y-70		F-91		Pilot Operated Check Valves (for "B-Line", External Pilot- Internal Drain Type) MPB-06 * - * -Y-70		F-93
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-06-X-70		F-91		Pilot Operated Check Valves (for "A&B-Lines", Internal Pilot- Internal Drain Type) MPW-06- * -70		F-93
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-06-Y-70		F-91	Mounting Bolts	Bolt Kits MBK-06- * -70		F-96
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-06-X-70		F-91				
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-06-Y-70		F-91				

★1. Because drain ports "V" and "W" are not provided for solenoid controlled pilot operated directional valves of Pressure Centered Type (3H*) and models with Pilot Piston (P*), those valves cannot be used in combination with modular valves.

★2. Refer to the relevant pages of catalog “E: DIRECTIONAL CONTROLS”

★1. Because drain ports "V" and "W" are not provided for solenoid controlled pilot operated directional valves of Pressure Centered Type (3H*) and models with Pilot Piston (P*), those valves cannot be used in combination with modular valves.

★2. Refer to the relevant pages of catalog "E: DIRECTIONAL CONTROLS"

Reducing Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow * L/min
MR *-06-A-70	35	125
B		500
MR *-06-C-70 H		

★ In the pressure adjustment ranges "A" and "B", maximum flow rates are limited by the pressure setting on the secondary side. See the "Secondary Pressure vs. Max. Flow" of this page, use the valve at the maximum flow rate within a zone highlighted with .

Model Number Designation

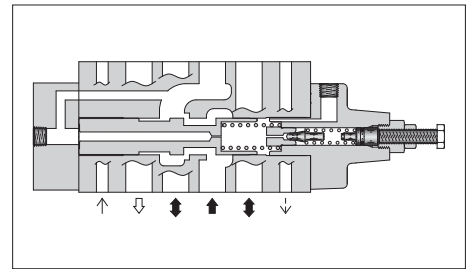
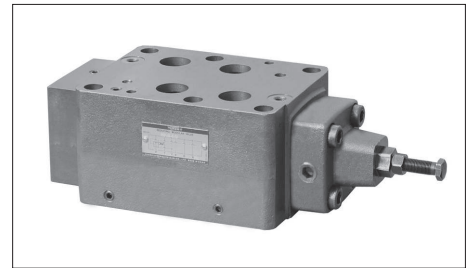
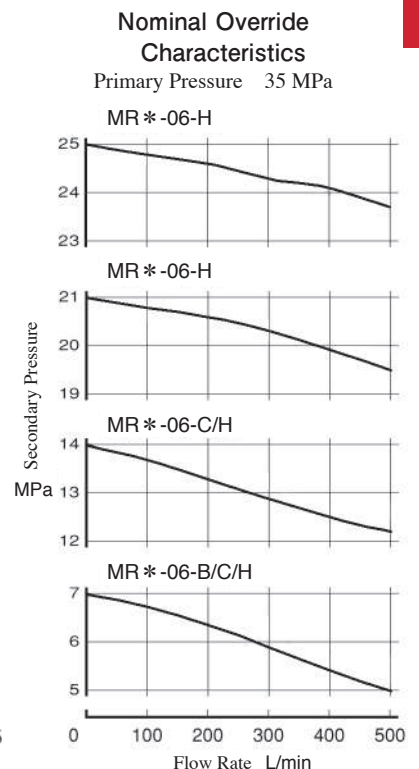
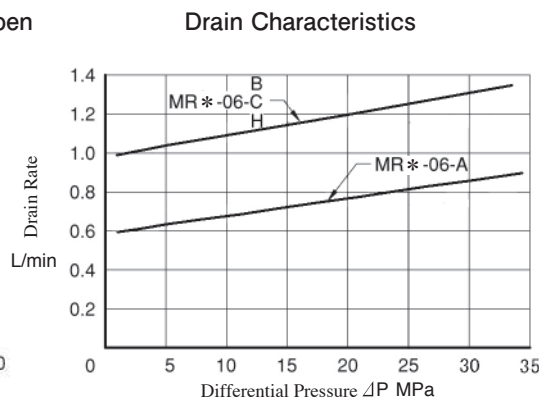
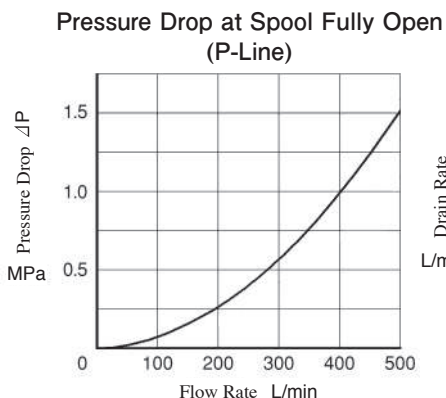
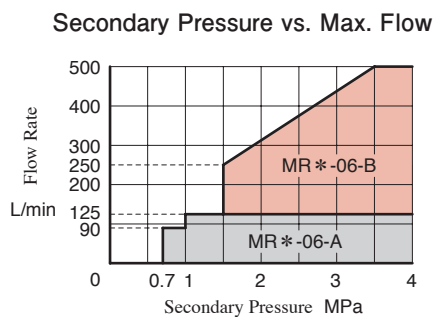
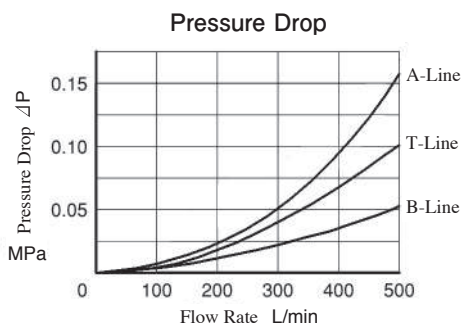
MRP	-06	-A	-70
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MRP: For P-Line MRA: For A-Line MRB: For B-Line	06	A: 0.7-7 B: 1.5-7 C: 3.5-14 H: 7-25	70
Reducing Valve			

Instructions

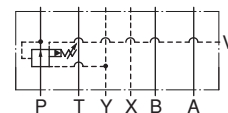
- Connect Drain Line (Y port) to oil tank independently so as to obtain stable pressure setting. At the same time, the solenoid controlled pilot operated directional valve to be used in combination with this valve must be of internal drain type (with T).
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

Typical Performance Characteristics

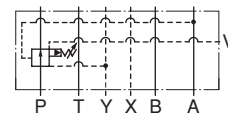
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



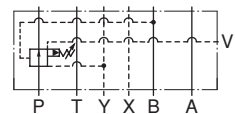
Graphic Symbols



MRP-06

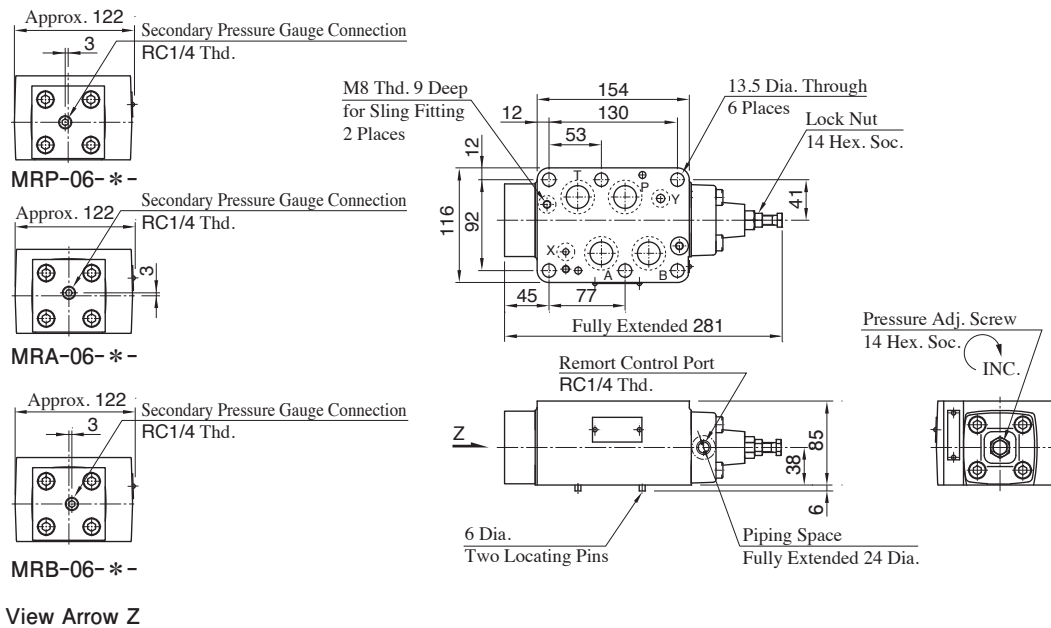


MRA-06



MRB-06

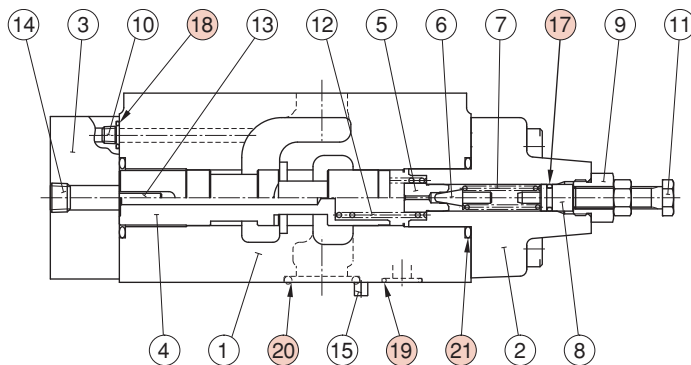
**MRP-06
MRA-06
MRB-06**



Approx. Mass.....11.1 kg

List of Seals

**MRP-06
MRA-06
MRB-06**



Item	Name of Parts	Part Numbers	Qty.
17	O-Ring	OR NBR-70-1 P9-N	1
18	O-Ring	OR NBR-90 P9-N	5
19	O-Ring	OR NBR-90 P14-N	2
20	O-Ring	OR NBR-90 P28-N	4
21	O-Ring	OR NBR-90 P30-N	2

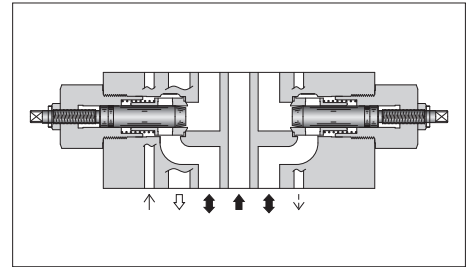
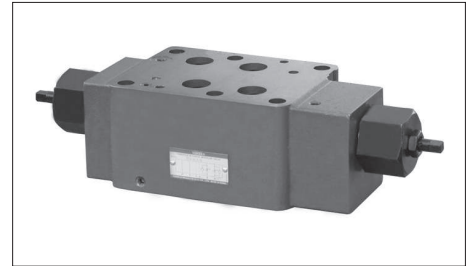
Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS *-06-* -70	35	500

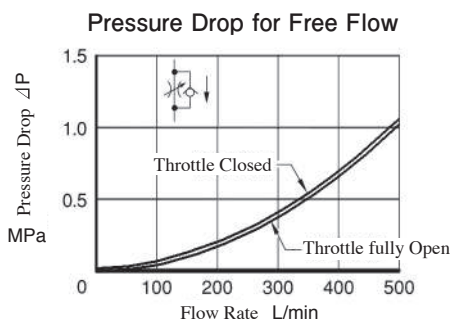
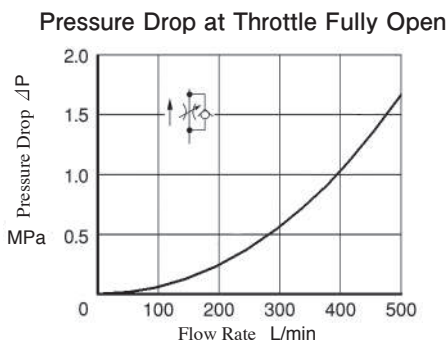
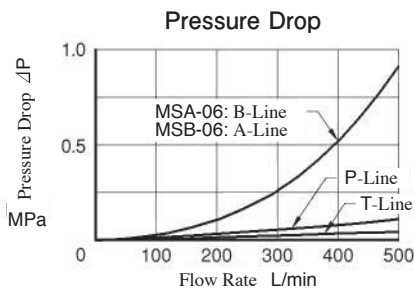
Model Number Designation

MSA	-06	-X	-70
Series Number	Valve Size	Direction of Flow	Design Number
MSA: For A-Line MSB: For B-Line MSW: For A&B-Line	06	X: Meter-out Y: Meter-in	70



Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



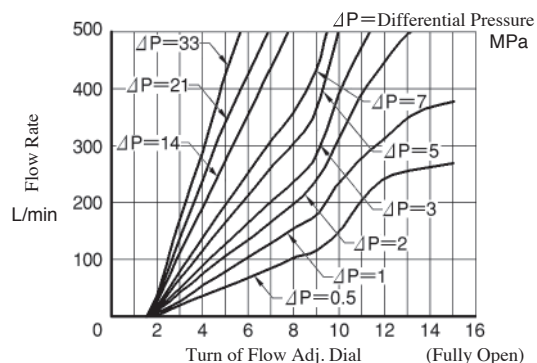
Graphic Symbols

Meter-out	Meter-in
MSA-06-X	MSA-06-Y
MSB-06-X	MSB-06-Y
MSW-06-X	MSW-06-Y

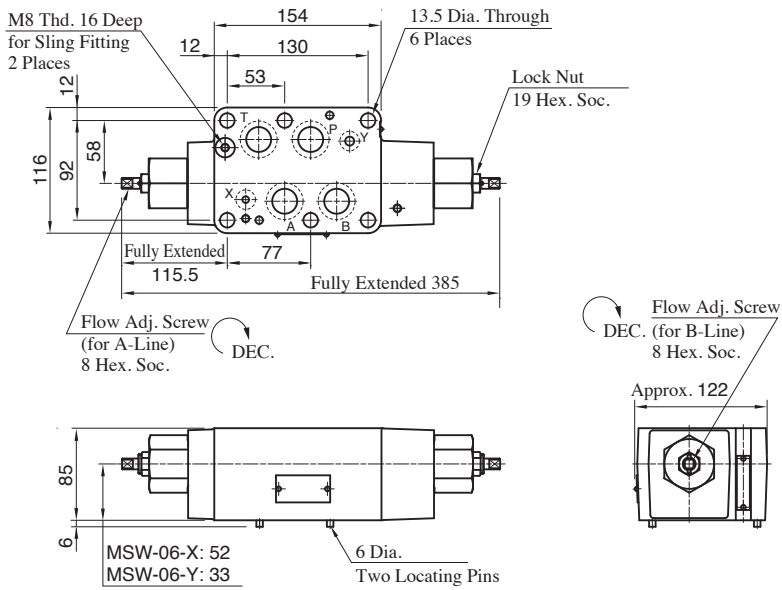
Instructions

- To make flow rate adjustment, loosen lock nut and turn the flow adjustment screw clockwise or anti-clockwise. To throttle the flow, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after the adjustment of the flow rate is completed.

Metered Flow vs. Screw Position

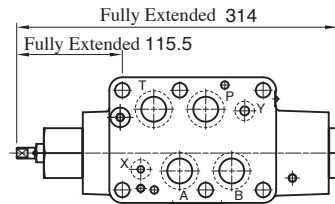


MSW-06-X Y



Approx. Mass.....12.2 kg

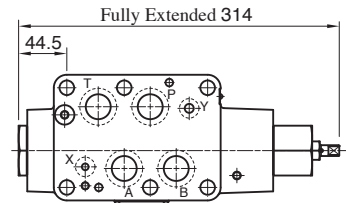
MSA-06-X Y



Approx. Mass.....12 kg

For other dimensions, refer to "MSW-06" in the drawing left.

MSB-06-X Y

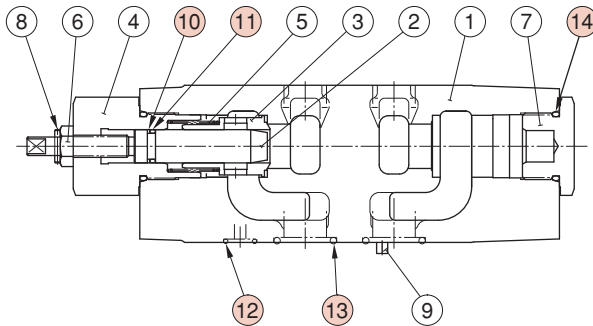


Approx. Mass.....12 kg

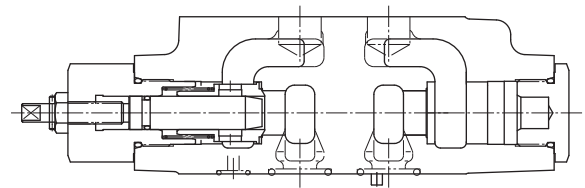
For other dimensions, refer to "MSW-06" in the drawing left.

List of Seals

MSA-06 MSB-06 MSW-06



MSA-06-X

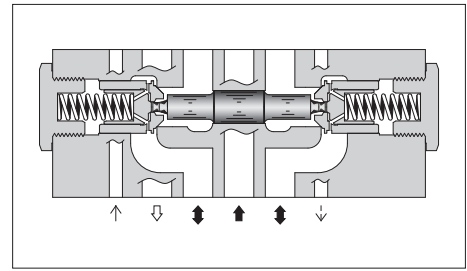
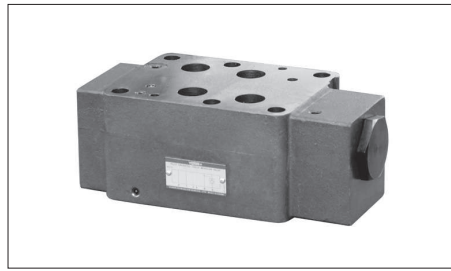


MSA-06-Y

- MSB-06 : The flow adjustment part is assembled on the right side.
- MSW-06 : The flow adjustment part is assembled on the both sides.

Item	Name of Parts	Part Numbers	Qty.		
			MSA-06	MSB-06	MSW-06
10	Back-up Ring	BR JIS B 2401-4-T2-P14	1	1	2
11	O-Ring	OR NBR-70-1 P14-N	1	1	2
12	O-Ring	OR NBR-90 P14-N	2	2	2
13	O-Ring	OR NBR-90 P28-N	4	4	4
14	O-Ring	OR NBR-90 P32-N	2	2	2

Pilot Operated Check Modular Valves



Model Number Designation

MPA	-06	S	-2	-X	-70
Series Number	Valve Size	Port Tapping Feature of Pilot-Drain Port ^{★1}	Cracking Pressure MPa	Pilot-Drain Connection ^{★2}	Design Number
MPA: For A-Line MPB: For B-Line MPW: For A&B-Line	06	None: Rc $\frac{3}{8}$ S: G $\frac{3}{8}$	2: 0.2 4: 0.4	None: Internal Pilot-Internal Drain X: External Pilot-External Drain Y: External Pilot-Internal Drain	70

★1. This item applies only to External Pilot or External Drain Type.

★2. Only "None: Internal Pilot-Internal Drain Type" is available for MPW (for "A&B-Lines").

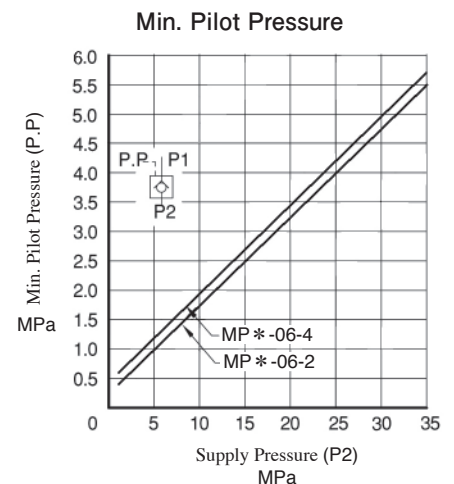
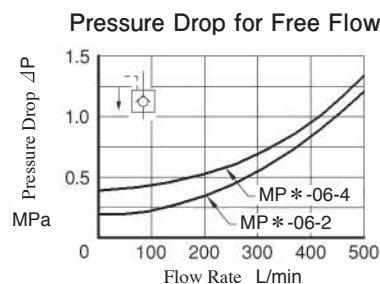
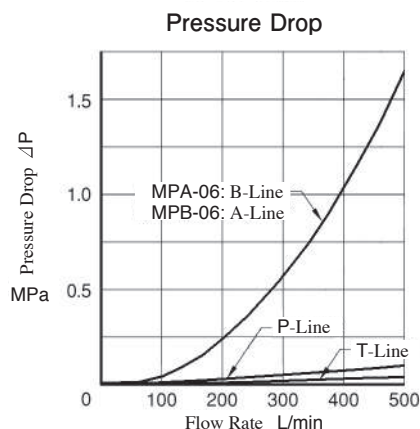
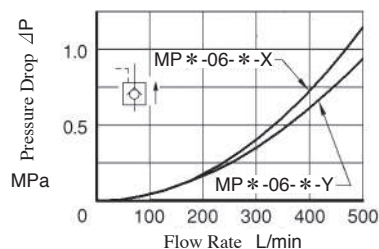
Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP *-06 *- *- *-70	35	500

Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850

Pressure Drop for Reversed Controlled Flow

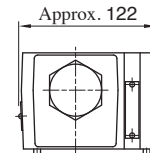
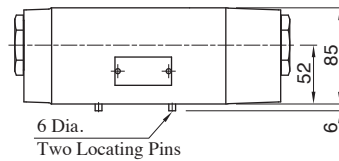
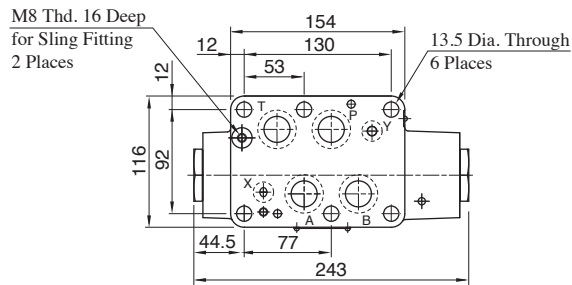


Graphic Symbols

Pilot-Drain Type Model Numbers	Internal Pilot-Internal Drain Type	External Pilot-External Drain Type	External Pilot-Internal Drain Type
MPA-06	 MPA-06 *	 MPA-06 *- *-X	 MPA-06 *- *-Y
MPB-06	 MPB-06 *	 MPB-06 *- *-X	 MPB-06 *- *-Y
MPW-06	 MPW-06 *		

● Internal Pilot - Internal Drain Type

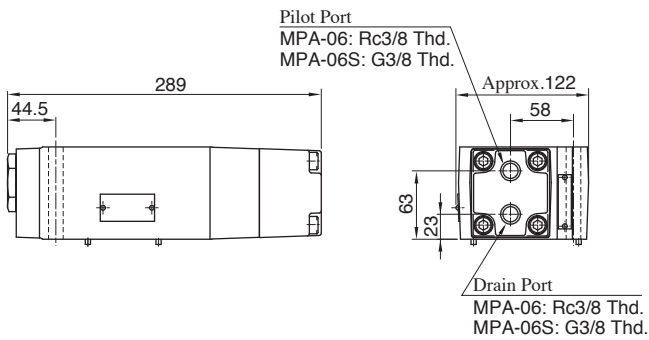
MPA-06
MPB-06
MPW-06



Approx. Mass.....11.6 kg

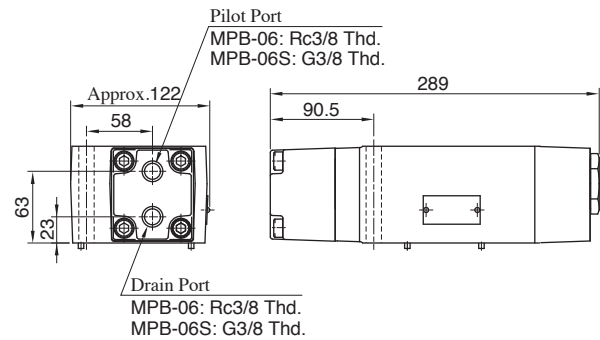
● External Pilot - External Drain Type

MPA-06 * - * -X



Approx. Mass.....13 kg

MPB-06 * - * -X

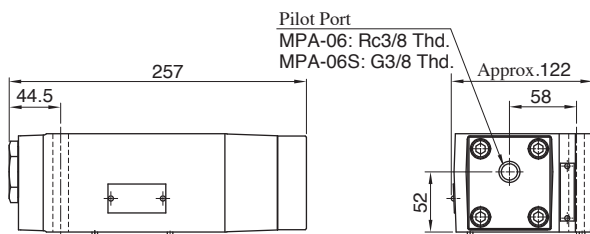


Approx. Mass.....13 kg

For other dimensions, refer to "Internal Pilot-Internal Drain Type" in the drawing above.

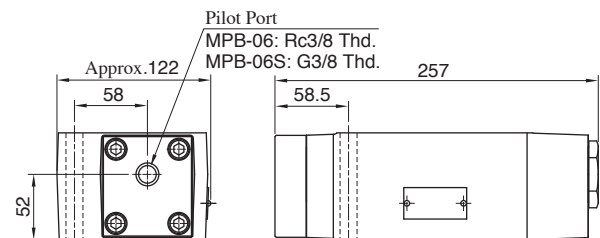
● External Pilot - Internal Drain Type

MPA-06 * - * -Y



Approx. Mass.....11.6 kg

MPB-06 * - * -Y



Approx. Mass.....11.6 kg

For other dimensions, refer to "Internal Pilot-Internal Drain Type" in the drawing above.

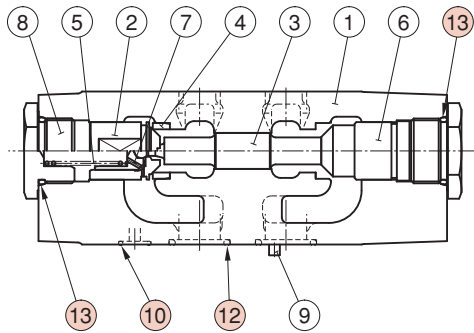
List of Seals

MPA-06

MPB-06

MPW-06

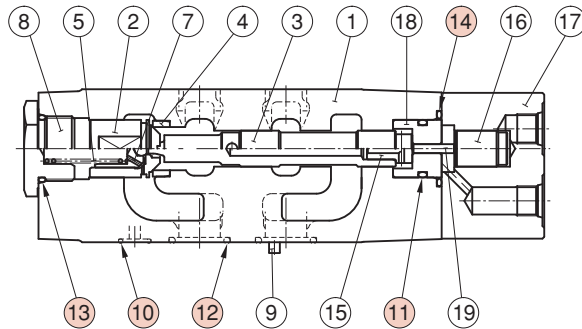
Internal Pilot - Internal Drain Type



MPA-06

- MPB-06: The Check Valve is assembled on the right side.
- MPW-06: The Check Valve is assembled on the both sides.

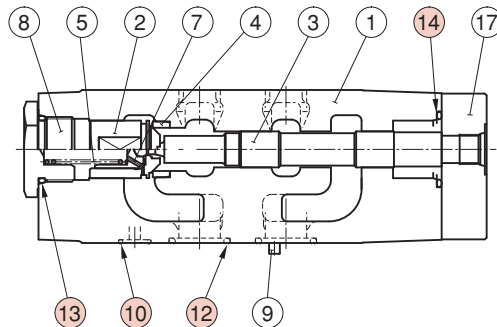
External Pilot - External Drain Type



MPA-06 * - * -X

- MPB-06: The Check Valve is assembled on the right side.

External Pilot - Internal Drain Type



MPA-06 * - * -Y

- MPB-06: The Check Valve is assembled on the right side.

Item	Name of Parts	Part Numbers	Qty.		
			Internal Pilot - Internal Drain Type	External Pilot - External Drain Type	External Pilot - Internal Drain Type
10	O-Ring	OR NBR-90 P14-N	2	2	2
11	O-Ring	OR NBR-70-1 P26-N	—	1	—
12	O-Ring	OR NBR-90 P28-N	4	4	4
13	O-Ring	OR NBR-90 P32-N	2	1	1
14	O-Ring	OR NBR-90 P36-N	—	1	1

Mounting Bolt Kits For Modular Valves

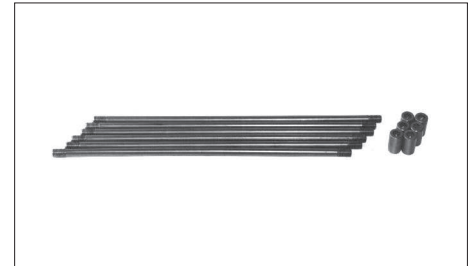
Valves are mounted with six stud bolts. Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis. When ordering the mounting bolt kit, be sure to give the bolt kit model number from the table below.

Model Number Designation

MBK	-06	-01	-70
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK: Mounting Bolt Kits for Modular Valves	06	01, 02, 03, 04 (Refer to the chart below)	70

Bolt Kits Selection Chart

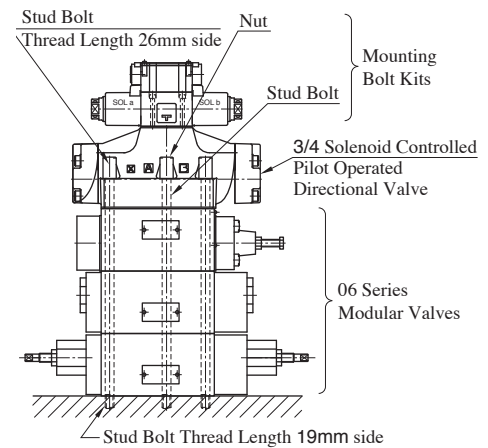
Bolt Kit Model Numbers	Quantity of Valves to be Stacked		Approx. Mass (1 Set) kg
	Sol. Cont. Pilot Operated Directional Valves (DSHG-06, 53Design)	Modular Valve	
MBK-06-01-70	1	1	1.2
MBK-06-02-70	1	2	1.7
MBK-06-03-70	1	3	2.1
MBK-06-04-70	1	4	2.6



Bolt Kit Composition

Stud Bolt..... 6 Pcs. } 1 Set
Nut 6 Pcs. }

● **Tightening Torque** :..... 70-100 Nm
[If the operating pressure is more than 25 MPa 90-100 Nm]



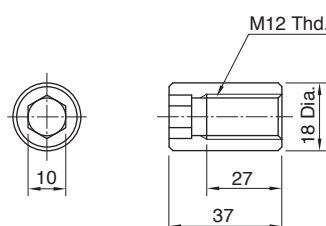
Stacking Example

MBK-06

● Stud Bolt



● Nut



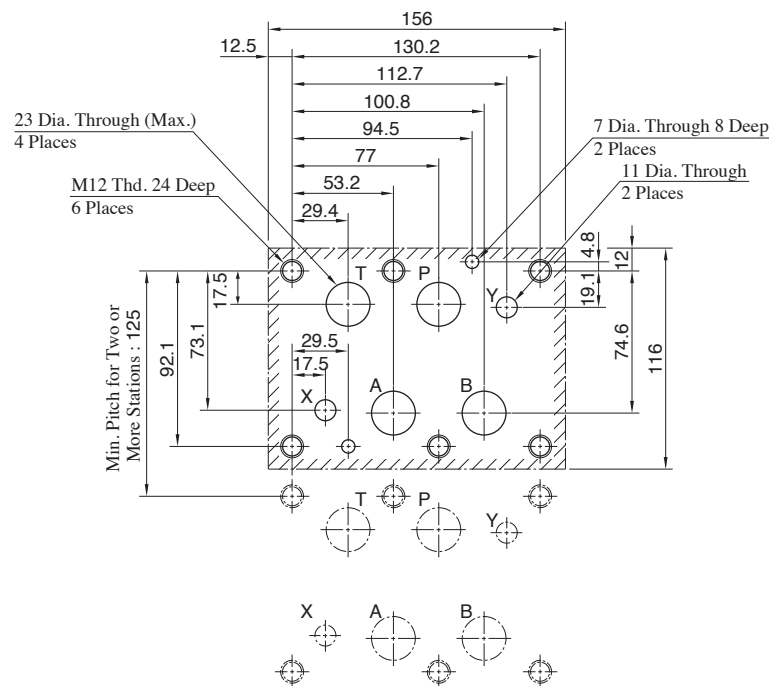
Bolt Number	A mm
01	168
02	253
03	338
04	423

— Mounting Surface Dimensions for 06 Series Modular Valve —

When mounting 06 series modular valve, be sure to use a sub-plate for 3/4 solenoid controlled pilot operated directional valves.

Name	Model Numbers	Page
Sub-plate for 3/4 Solenoid Controlled Pilot Operated Directional Valves	DHGM-06 * -50	F-109

Also, when no sub-plates are used, be sure to use the following mounting surface.



Note: The mounting surface of shaded parts above has a good machined finish. ($\sqrt{6}$)

— Interchangeability in Installation between Current and New Design —

06 Series Modular Valves have changed from 30 to 70 design numbers model to operate higher max. pressure. The mounting surface has no changes.

But if use the operating pressure as more than 25 MPa, have to select design No. 70 bolt kits (MBK-06).

Mounting bolt kits of design No. 70, the length of both sides screw is different, so refer to the stacking example about 06 series model valves on page F-96.

If current and new designs in mixed use, the max. pressure is equal to the current design's pressure.

10 Series Modular Valves

Type of Modular Valve

Class	Name and Model Numbers	Graphic Symbols	Page	Class	Name and Model Numbers	Graphic Symbols	Page
						P T Y X B A	
★1	Solenoid Controlled Pilot Operated Directional Valve (S-) DSHG-10- * - * - * -43		★2		Pilot Operated Check Valves (for "A-Line", Internal Pilot- Internal Drain Type) MPA-10- * -30		F-103
Pressure Control Valves	Reducing Valves (for "P-Line") MRP-10- * -30		F-99		Pilot Operated Check Valves (for "A-Line", External Pilot- External Drain Type) MPA-10 * - *-X-30		F-103
	Reducing Valves (for "A-Line") MRA-10- * -30		F-99		Pilot Operated Check Valves (for "A-Line", External Pilot- Internal Drain Type) MPA-10 * - *-Y-30		F-103
	Reducing Valves (for "B-Line") MRB-10- * -30		F-99		Pilot Operated Check Valves (for "B-Line", Internal Pilot- Internal Drain Type) MPB-10- * -30		F-103
					Pilot Operated Check Valves (for "B-Line", External Pilot- External Drain Type) MPB-10 * - *-X-30		F-103
Flow Control Valves	Throttle and Check Valves (for "A-Line", Meter-out) MSA-10-X-30		F-101		Pilot Operated Check Valves (for "B-Line", External Pilot- Internal Drain Type) MPB-10 * - *-Y-30		F-103
	Throttle and Check Valves (for "A-Line", Meter-in) MSA-10-Y-30		F-101		Pilot Operated Check Valves (for "A&B-Lines", Internal Pilot- Internal Drain Type) MPW-10- * -30		F-103
	Throttle and Check Valves (for "B-Line", Meter-out) MSB-10-X-30		F-101	Mounting Bolts	Bolt Kits MBK-10- * -10		F-106
	Throttle and Check Valves (for "B-Line", Meter-in) MSB-10-Y-30		F-101				
	Throttle and Check Valves (for "A&B-Lines", Meter-out) MSW-10-X-30		F-101				
	Throttle and Check Valves (for "A&B-Lines", Meter-in) MSW-10-Y-30		F-101				

★1. Because drain ports "V" and "W" are not provided for solenoid controlled pilot operated directional valves of Pressure Centered Type (3H*) and models with Pilot Piston (P*), those valves cannot be used in combination with modular valves.

★2. Refer to the relevant pages of catalog "E: DIRECTIONAL CONTROLS"

Reducing Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow * L/min
MR*-10-A-30	25	250
B		
MR*-10-C-30		800
H		

★ In the pressure adjustment ranges "A" and "B", maximum flow rates are limited by the pressure setting on the secondary side. See the "Secondary Pressure vs. Max. Flow" of this page, use the valve at the maximum flow rate within a zone highlighted with .

Model Number Designation

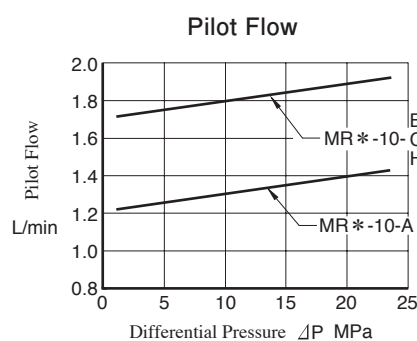
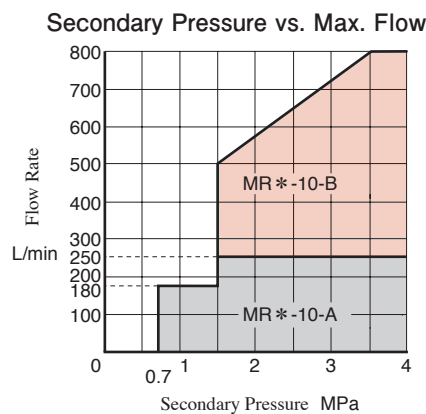
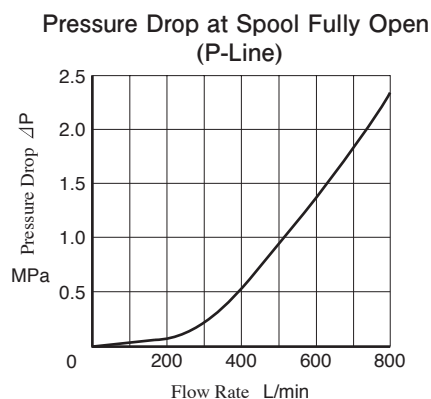
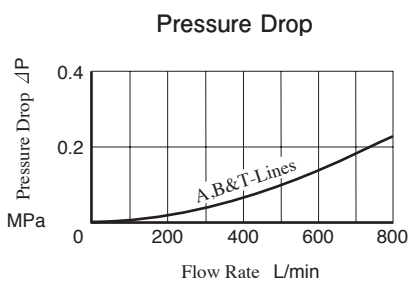
MRP	-10	-B	-30
Series Number	Valve Size	Pres. Adj. Range MPa	Design Number
MRP: For P-Line MRA: For A-Line MRB: For B-Line	10	A: 0.7-7 B: 1.5-7 C: 3.5-14 H: 7-21	30
Reducing Valve			

Instructions

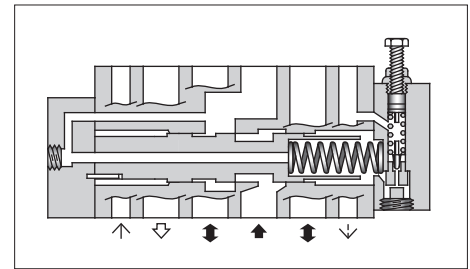
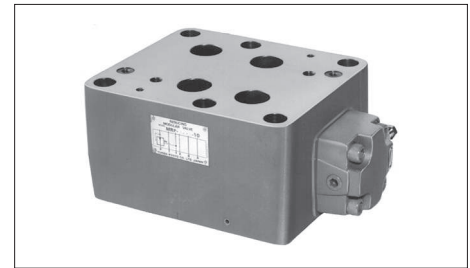
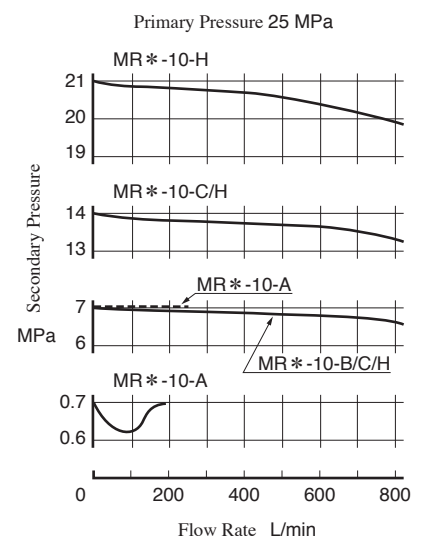
- Connect Drain Line (Y port) to oil tank independently so as to obtain stable pressure setting. At the same time, the solenoid controlled pilot operated directional valve to be used in combination with this valve must be of internal drain type (with T).
- To make pressure adjustment, loosen the lock nut and turn the pressure adjustment screw clockwise or anti-clockwise. For an increase of pressure, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after making adjustment to the pressure.

Typical Performance Characteristics

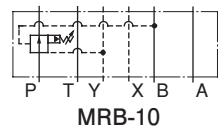
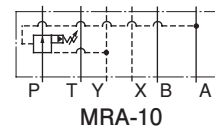
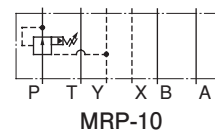
Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



Nominal Override Characteristics

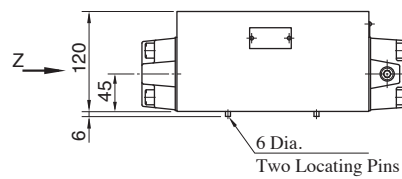
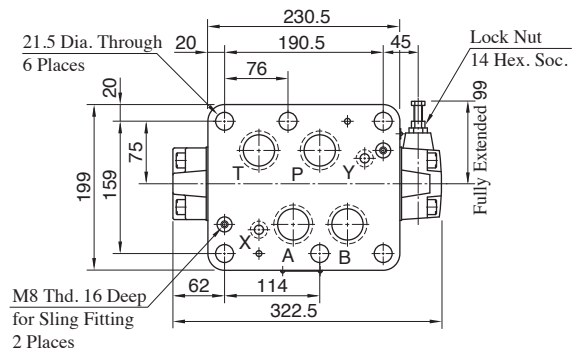
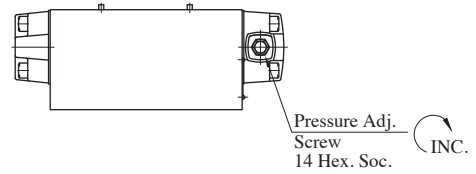
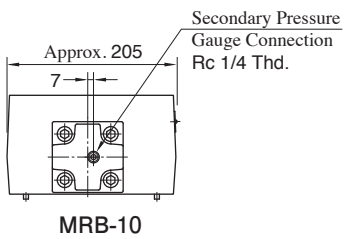
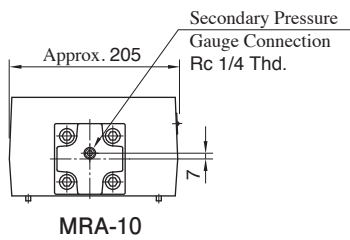
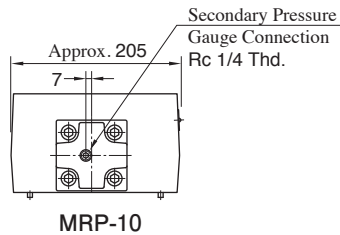


Graphic Symbols



**MRP-10
MRA-10
MRB-10**

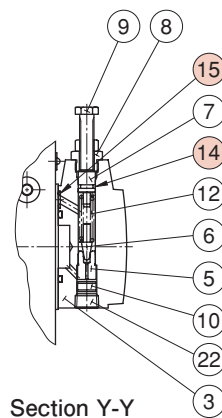
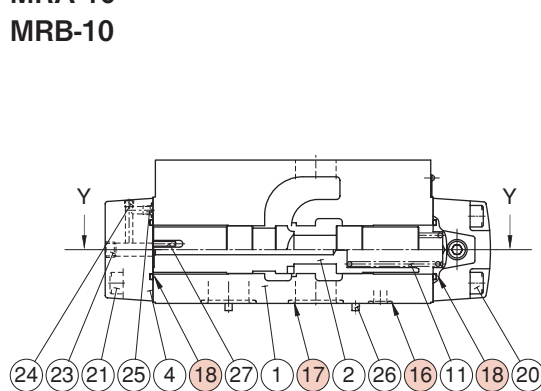
View Arrow Z



Approx. Mass. 36.6 kg

List of Seals

**MRP-10
MRA-10
MRB-10**



Item	Name of Parts	Part Numbers	Qty.
14	O-Ring	OR NBR-70-1 P9-N	1
15	O-Ring	OR NBR-90 P9-N	5
16	O-Ring	OR NBR-90 P16-N	2
17	O-Ring	OR NBR-90 P40-N	4
18	O-Ring	OR NBR-90 P44-N	2

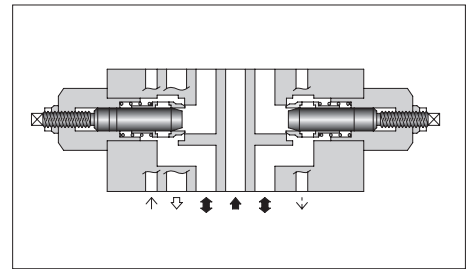
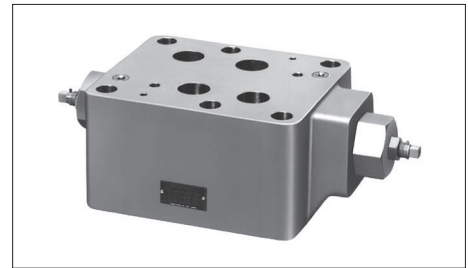
Throttle and Check Modular Valves

Specifications

Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MS*-10-* -30	25	800

Model Number Designation

MSA	-10	-X	-30
Series Number	Valve Size	Direction of Flow	Design Number
MSA: For A-Line MSB: For B-Line MSW: For A&B-Line	10	X: Meter-out Y: Meter-in	30

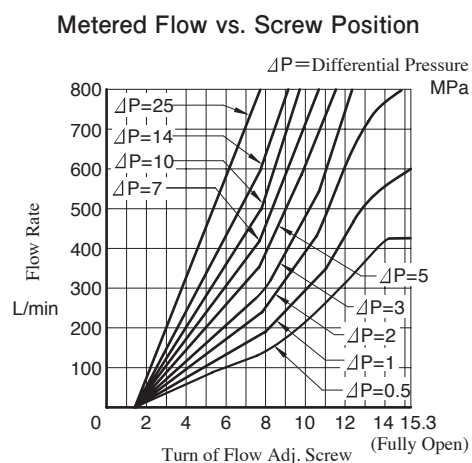
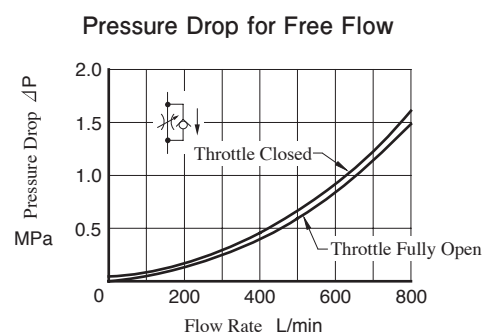
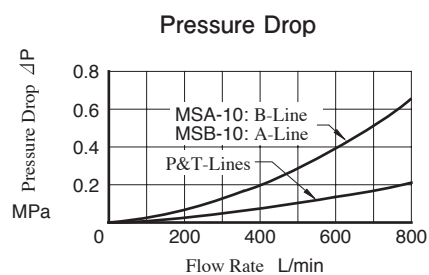


Graphic Symbols

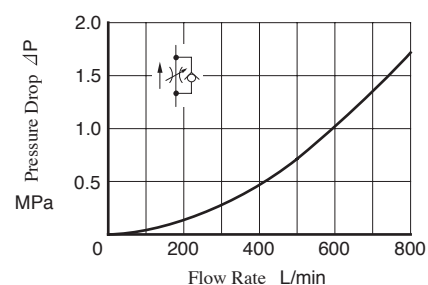
Meter-out	Meter-in
P T Y X B A MSA-10-X	P T Y X B A MSA-10-Y
P T Y X B A MSB-10-X	P T Y X B A MSB-10-Y
P T Y X B A MSW-10-X	P T Y X B A MSW-10-Y

Instructions

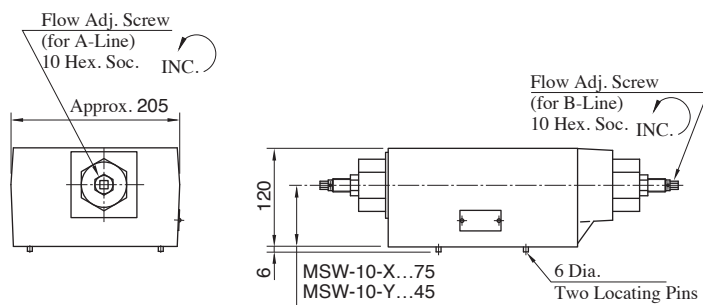
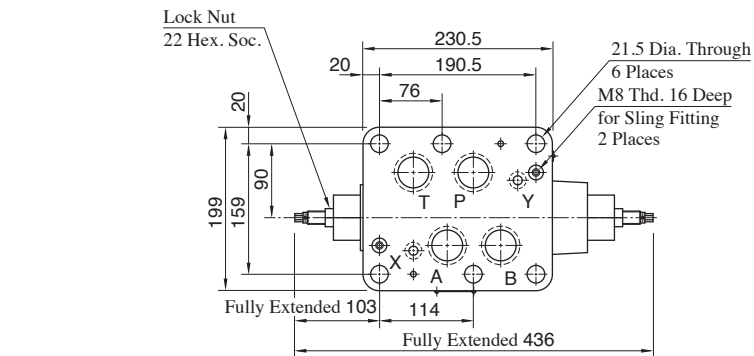
- To make flow rate adjustment, loosen the lock nut and turn the flow adjustment screw clockwise or anti-clockwise. To throttle the flow, turn the screw clockwise. Be sure to re-tighten the lock nut firmly after the adjustment of the flow rate is completed.



Pressure Drop at Throttle Fully Open

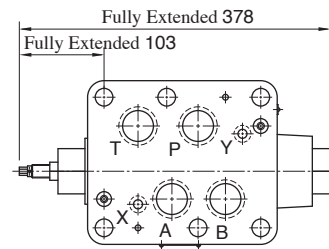


MSW-10-X_Y



Approx. Mass.....35.7 kg

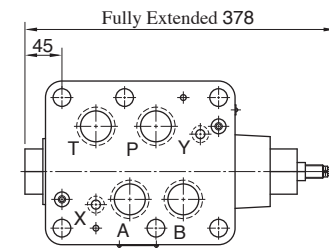
MSA-10-X_Y



Approx. Mass.....35 kg

For other dimensions, refer to "MSW-10" in the drawing left.

MSB-10-X_Y

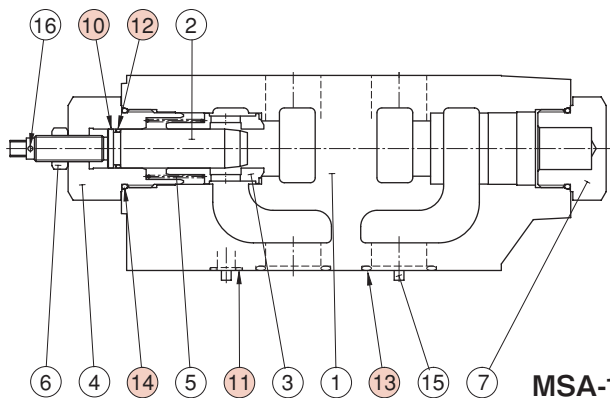


Approx. Mass.....35 kg

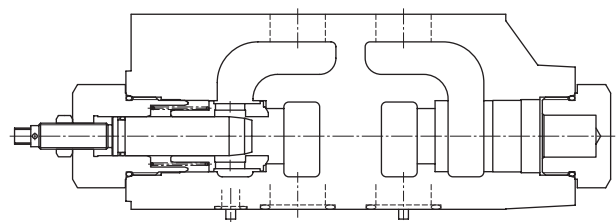
For other dimensions, refer to "MSW-10" in the drawing left.

List of Seals

MSA-10 MSB-10 MSW-10



MSA-10-X

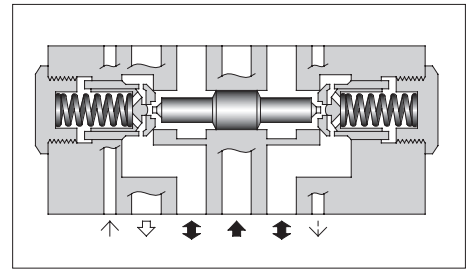
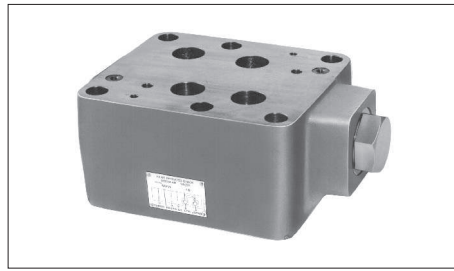


MSA-10-Y

- MSB-10 : The flow adjustment part is assembled on the right side.
- MSW-10 : The flow adjustment part is assembled on the both sides.

Item	Name of Parts	Part Numbers	Qty.		
			MSA-10	MSB-10	MSW-10
10	Back-up Ring	BR JIS B 2407-4-T2-P20	1	1	2
11	O-Ring	OR NBR-90 P16-N	2	2	2
12	O-Ring	OR NBR-70-1 P20-N	1	1	2
13	O-Ring	OR NBR-90 P40-N	4	4	4
14	O-Ring	OR NBR-90 P44-N	2	2	2

Pilot Operated Check Modular Valves



Model Number Designation

MPA	-10	S	-2	-X	-30
Series Number	Valve Size	Port Tapping Feature of Pilot-Drain Port ^{★1}	Cracking Pressure MPa	Pilot-Drain Connection	Design Number
MPA: For A-Line } Pilot Operated MPB: For B-Line } Check Valve	10	None: Rc3/8 S: G3/8	2: 0.2 4: 0.4	None: Internal Pilot-Internal Drain X : External Pilot-External Drain Y : External Pilot-Internal Drain	30
MPW: For A&B-Lines } Pilot Operated Check Valve		—		None: Internal Pilot-Internal Drain	

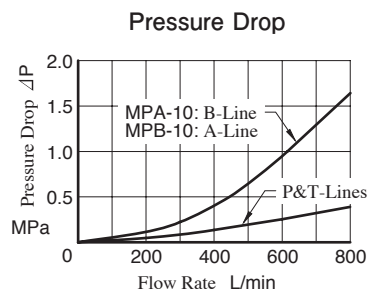
★1. This item applies only to External Pilot or External Drain Type.

Specifications

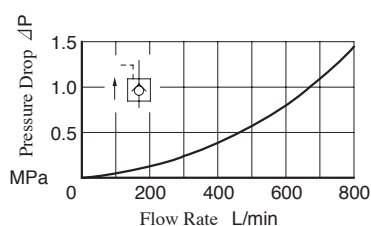
Model Numbers	Max. Operating Pressure MPa	Max. Flow L/min
MP *-10 *- *- *-30	25	800

Typical Performance Characteristics

Hydraulic Fluid: Viscosity 35 mm²/s, Specific Gravity 0.850



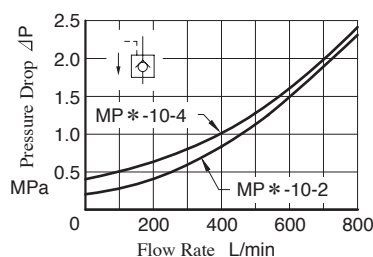
Pressure Drop for Reversed Controlled Flow



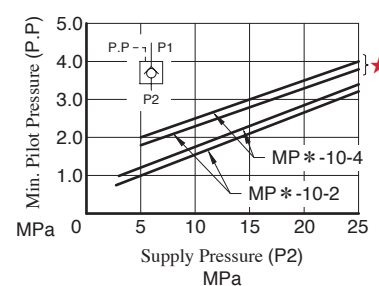
Graphic Symbols

Pilot-Drain type Model Numbers	Internal Pilot-Internal Drain Type	External Pilot-External Drain Type	External Pilot-Internal Drain Type
MPA-10 MPA-10-*			
MPB-10 MPB-10-*			
MPW-10 MPW-10-*		—	—

Pressure Drop for Free Flow



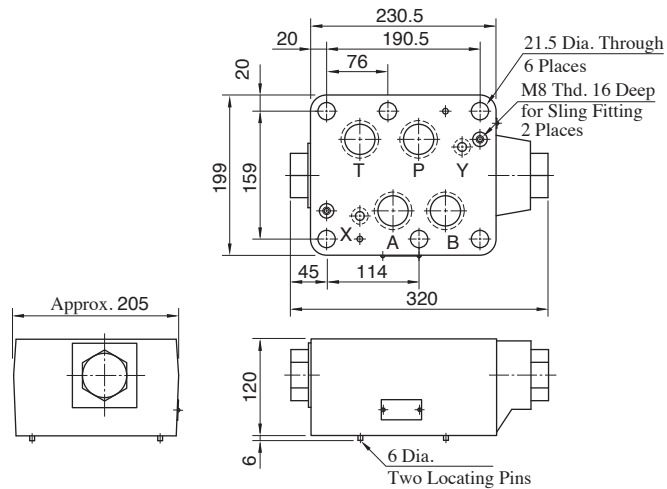
Min. Pilot Pressure



★ In case of 500 L/min or more.

● Internal Pilot - Internal Drain Type

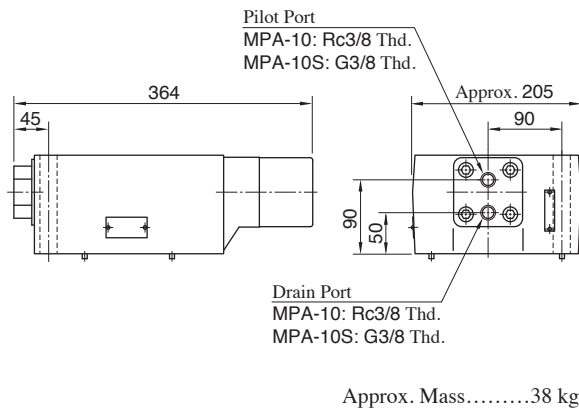
MPA-10
MPB-10
MPW-10



Approx. Mass.....36.5 kg

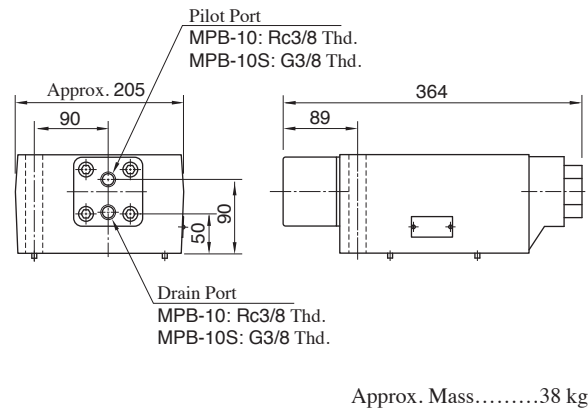
● External Pilot - External Drain Type

MPA-10* - *-X



Approx. Mass.....38 kg

MPB-10* - *-X

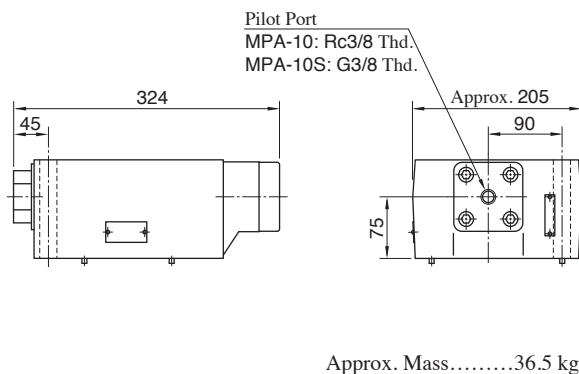


Approx. Mass.....38 kg

For other dimensions, refer to "Internal Pilot-Internal Drain Type" in the drawing above.

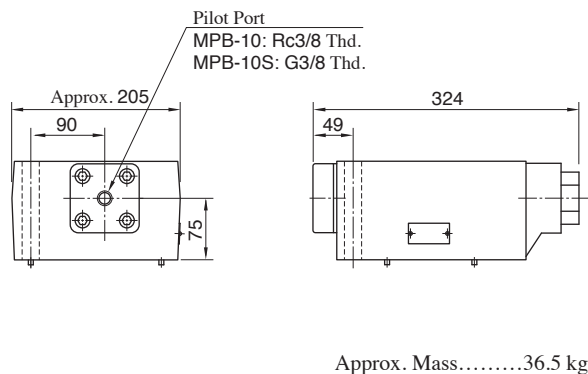
● External Pilot - Internal Drain Type

MPA-10* - *-Y



Approx. Mass.....36.5 kg

MPB-10* - *-Y



Approx. Mass.....36.5 kg

For other dimensions, refer to "Internal Pilot-Internal Drain Type" in the drawing above.

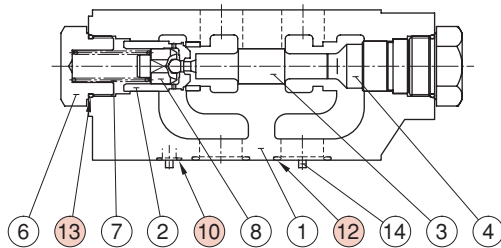
List of Seals

MPA-10

MPB-10

MPW-10

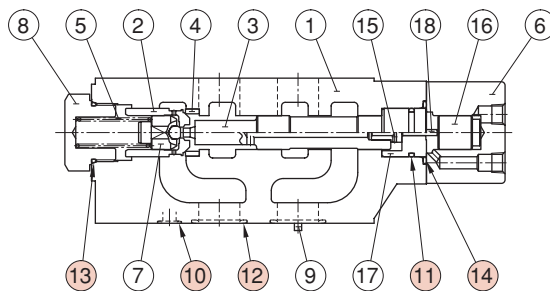
Internal Pilot - Internal Drain Type



MPA-10

- MPB-10 : The check valve is assembled on the right side.
- MPW-10 : The check valve is assembled on the both sides.

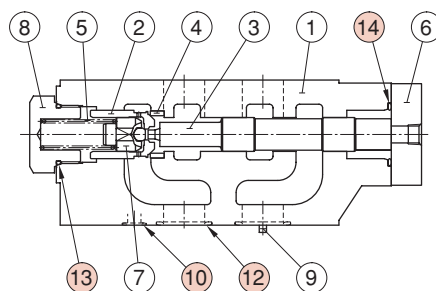
External Pilot - External Drain Type



MPA-10*--X**

- MPB-10 : The check valve is assembled on the right side.

External Pilot - Internal Drain Type



MPA-10*--Y**

- MPB-10 : The check valve is assembled on the right side.

Item	Name of Parts	Part Numbers	Qty.		
			Internal Pilot- Internal Drain	External Pilot- External Drain	External Pilot- Internal Drain
10	O-Ring	OR NBR-90 P16-N	2	2	2
11	O-Ring	OR NBR-90 P34-N	—	1	—
12	O-Ring	OR NBR-90 P40-N	4	4	4
13	O-Ring	OR NBR-90 P44-N	2	1	1
14	O-Ring	OR NBR-90 P46-N	—	1	1

Mounting Bolt Kits For Modular Valves

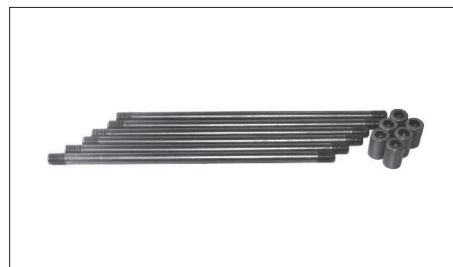
Valves are mounted with six stud bolts. Valve combination varies according to the circuit type. Hence, the mounting bolt kits are available on a combination type basis. When ordering the mounting bolt kit, be sure to give the bolt kit model number from the table below.

Model Number Designation

MBK	-10	-04	-10
Series Number	Size of Modular Valve	Bolt Number	Design Number
MBK: Mounting Bolt Kits for Modular Valves	10	01, 02, 03, 04 (Refer to the chart below)	10

Bolt Kits Selection Chart

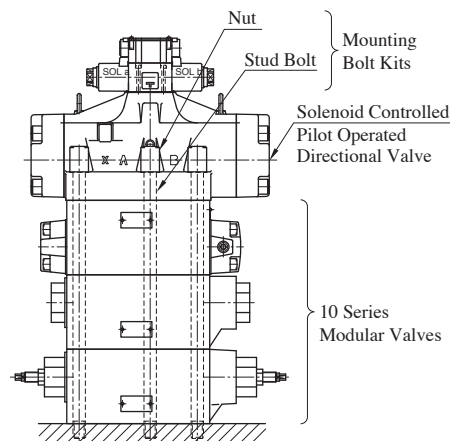
Model Numbers	Quantity of Valves to be Stacked		Approx. Mass (1 Set) kg
	Sol. Cont. Pilot Operated Directional Valves (DSHG-10)	Modular Valve	
MBK-10-01-10	1	1	3.9
MBK-10-02-10	1	2	5.7
MBK-10-03-10	1	3	7.4
MBK-10-04-10	1	4	9.2



Bolt Kit Composition

Stud Bolt 6 Pcs. } 1 Set
Nut 6 Pcs. }

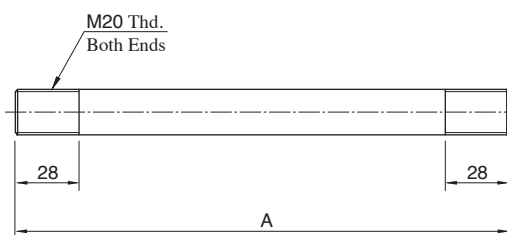
● Tightening Torque...150-170 Nm



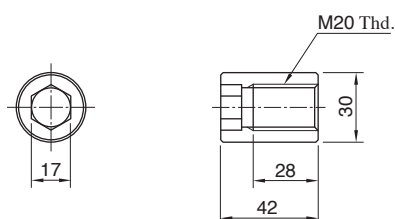
Stacking Example

MBK-10

● Stud Bolt



● Nut



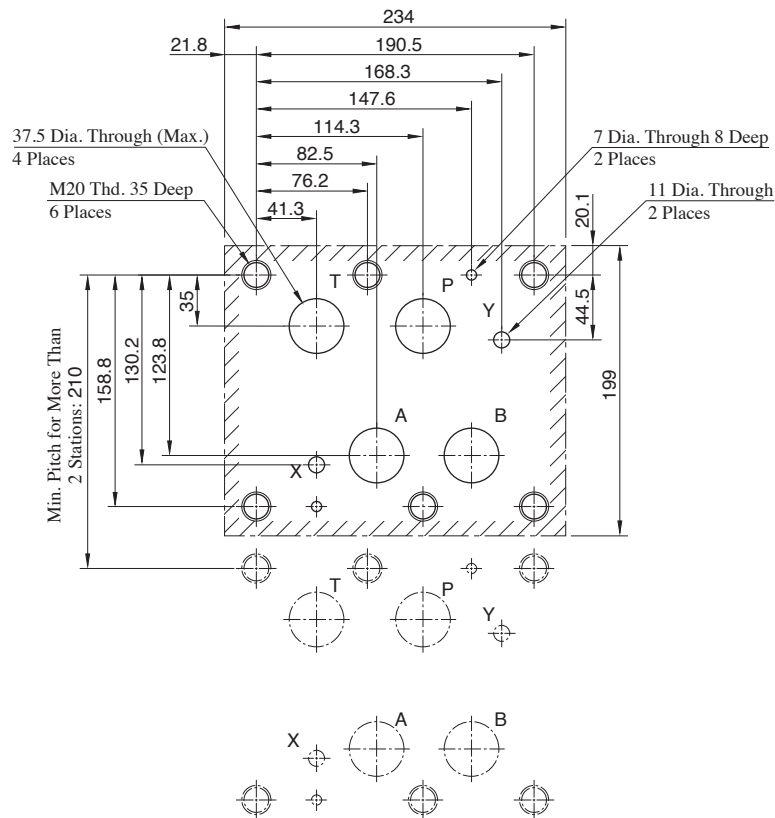
Bolt Number	A mm
01	217
02	337
03	457
04	577

— Mounting Surface Dimensions for 10 Series Modular Valve —

When mounting 10 series modular valve, be sure to use a sub-plate for 1-1/4 solenoid controlled pilot operated directional valves.

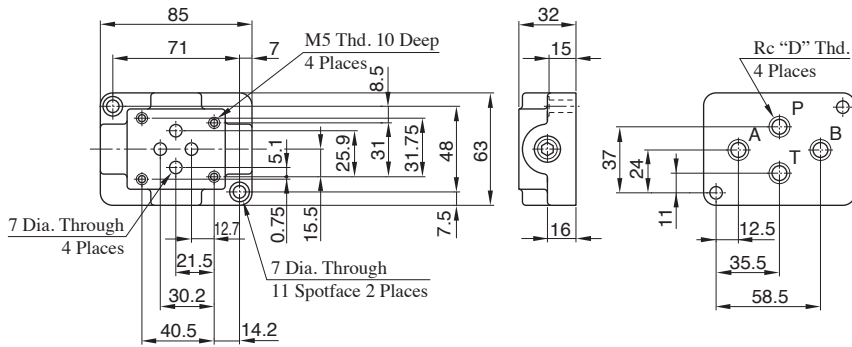
Name	Sub-plate Model Numbers	Page
Sub-plate for 1-1/4 Solenoid Controlled Pilot Operated Directional Valves	DHGM-10*-40	F-109

When no sub-plates are used, be sure to use the following mounting surface.



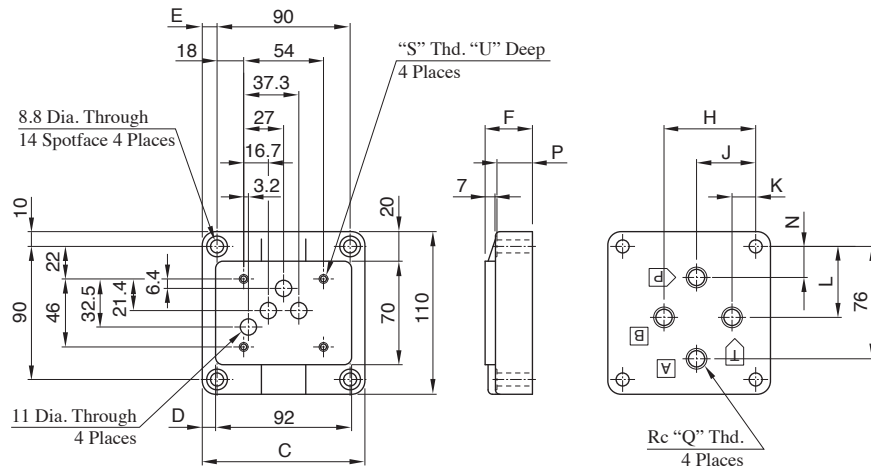
Note: The mounting surface of shaded parts above has a good machined finish. ($\frac{1}{16}$)

■ Sub Plate : DSGM-01、01X、01Y



Model Numbers	D
DSGM-01-31	$\frac{1}{8}$
DSGM-01X-31	$\frac{1}{4}$
DSGM-01Y-31	$\frac{3}{8}$

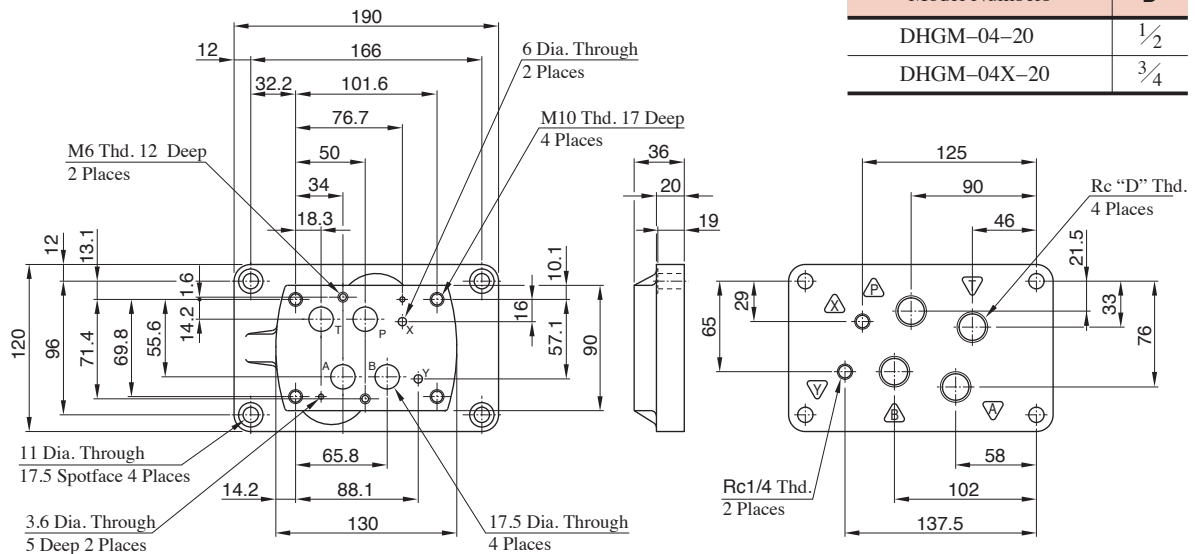
■ Sub Plate : DSGM-03 / 03X / 03Y



Model Numbers	C	D	E	F	H	J	K	L	N	P	Q
DSGM-03-40/4002	110	9	10	32	62	40	16	48	21	24	$\frac{3}{8}$
DSGM-03X-40/4002											$\frac{1}{2}$
DSGM-03Y-40/4002	120	14	15	50	80	45	10	47	16	42	$\frac{3}{4}$

Model Numbers	S	U	Remarks
DSGM-03 *-40	M6	13	Standard
DSGM-03 *-4002	M8	14	Option

■ Sub Plate : DHGM-04, 04X



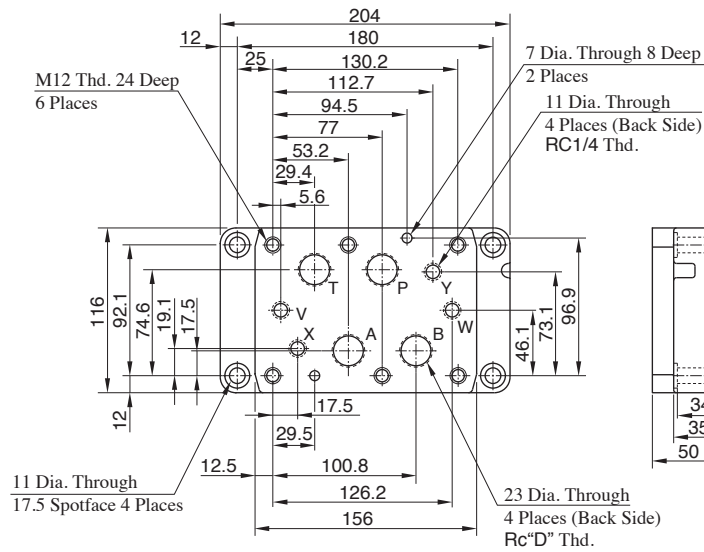
Model Numbers	D
DHGM-04-20	$\frac{1}{2}$
DHGM-04X-20	$\frac{3}{4}$

Note: Use Division of Port "X" & "Y"

Pilot Pressure Port "X"	Drain Port "Y"
Use only with external type valves. If use internal type valves, have to plug.	Use as drain port only with external type valves. If use internal type valves, have to plug.

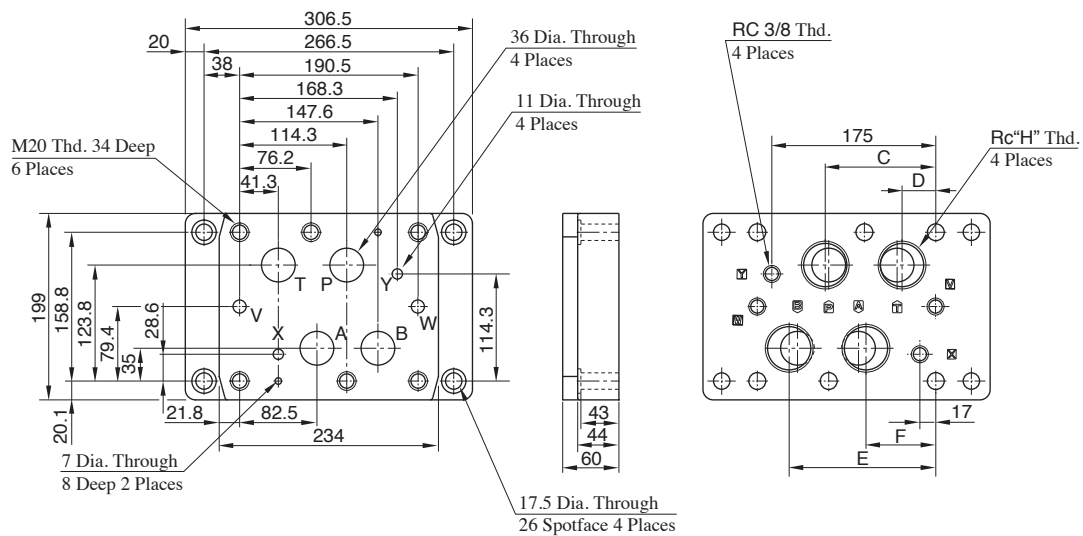
Sub Plate

DHGM-06, 06X



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

DHGM-10, 10X



Model Numbers	C	D	E	F	H
DHGM-10-40	114	41	147.5	82.5	1 1/4
DHGM-10X-40	118	36	156.5	74.5	1 1/2

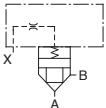
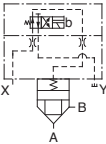
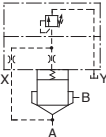
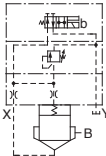
Note: Use Division of "X", "Y", "V" & "W" Port

Model and Type of Valve	Pilot Pressure Port "X"	Pilot Drain Port "Y"	Drain Port "V"	Drain Port "W"
Spring Centered, No Spring, Spring Offset	Use only with external type valves. If use with internal type valves, have to plug.	Use as drain port only with external type valves. If use internal type valves, have to plug.★	Not Use (Need Not Plug)	
Pressure Centered			Use	Not Use (Need Not Plug)
Pilot Piston with Both Ends			Use	Use
Pilot Piston with Port "A" Side			Use	Not Use (Need Not Plug)
Pilot Piston with Port "B" Side			Not Use (Need Not Plug)	Use

★ The screw is on the body side of valve, so plug either sub-plate or body.



LOGIC VALVES

Valve Type	Graphic Symbols	Maximum Operating Pressure MPa	Rated Flow L/min																Page
			1	2	3	5	10	20	30	50	100	200	300	500	1000	3000	6000		
Directional Control Logic Valves Directional and Flow Control Logic Valves		31.5	LD																G-4
Solenoid Operated Directional Control Logic Valves			LDS																G-5
Relief Logic Valves			LB																G-6
Solenoid Controlled Relief Logic Valves			LBS																G-7

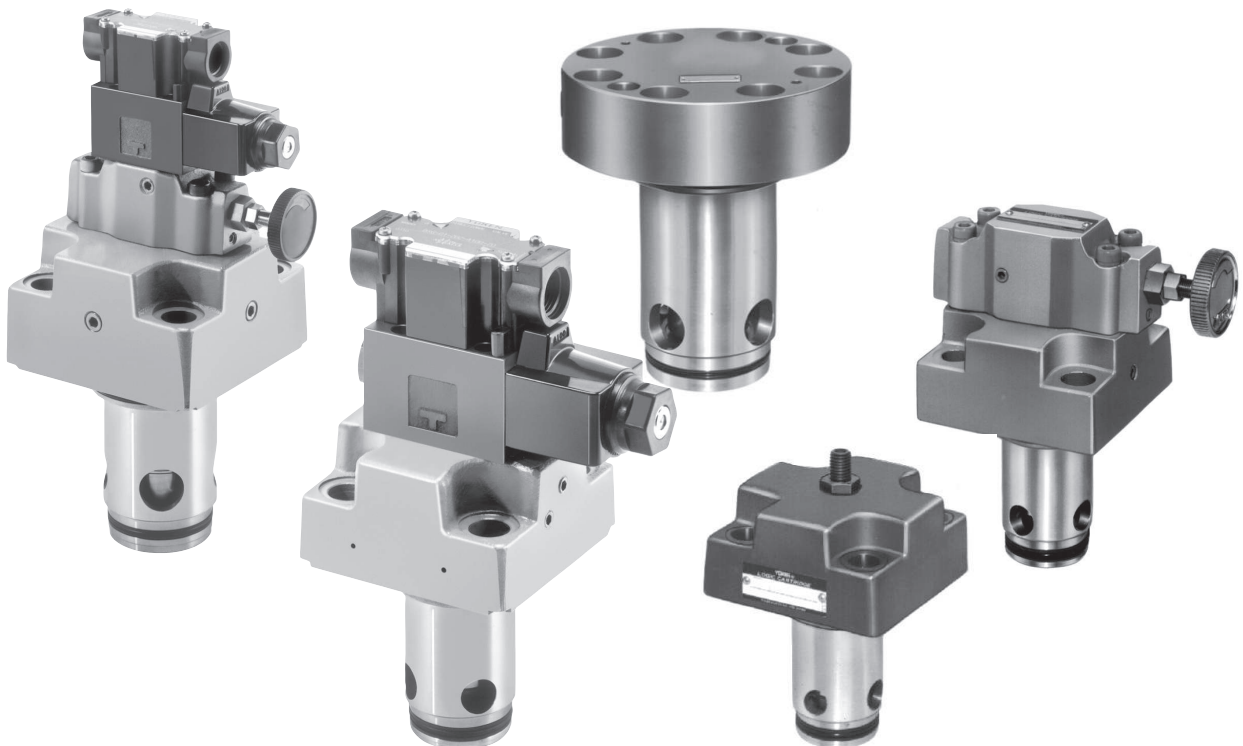
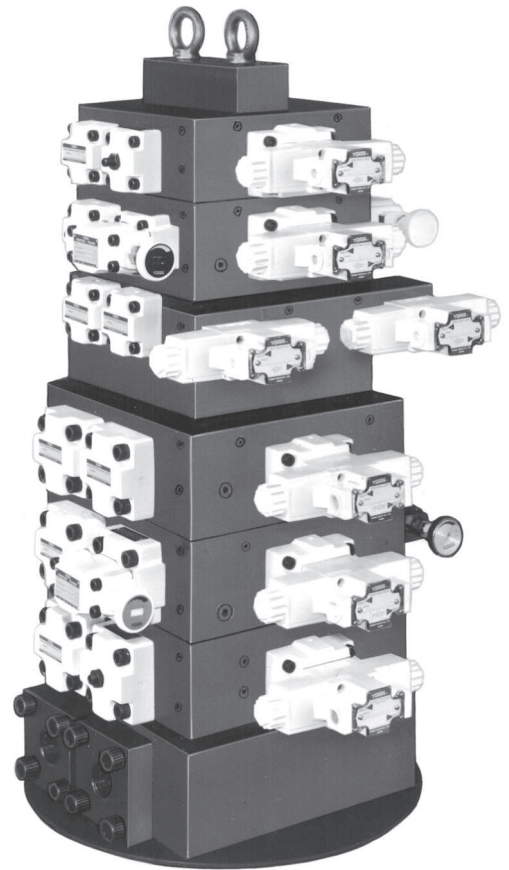
Consult Yuken when detailed material such as dimensions figures is required.

Logic Valves

Yuken Logic Valves comprise cartridge typed elements and covers with pilot passages. Various types may be combined for direction, flow rate and pressure control. Yuken Logic Valves can be incorporated in manifold blocks to form optimum integrated hydraulic circuits and compact hydraulic power units. Being a poppet type, the elements permit high-pressure, high flow rates, high speed and shockless shifting with low pressure drop. Typical applications include steel mill equipment, injection moulding machines, machine tools and so on. In addition, YUKEN's logic valves meet the cavity specifications (element insertion holes and cover mounting dimensions) of the ISO standard (ISO7368 TWO-PORT SLIP-IN CARTRIDGE VALVES CAVITIES).

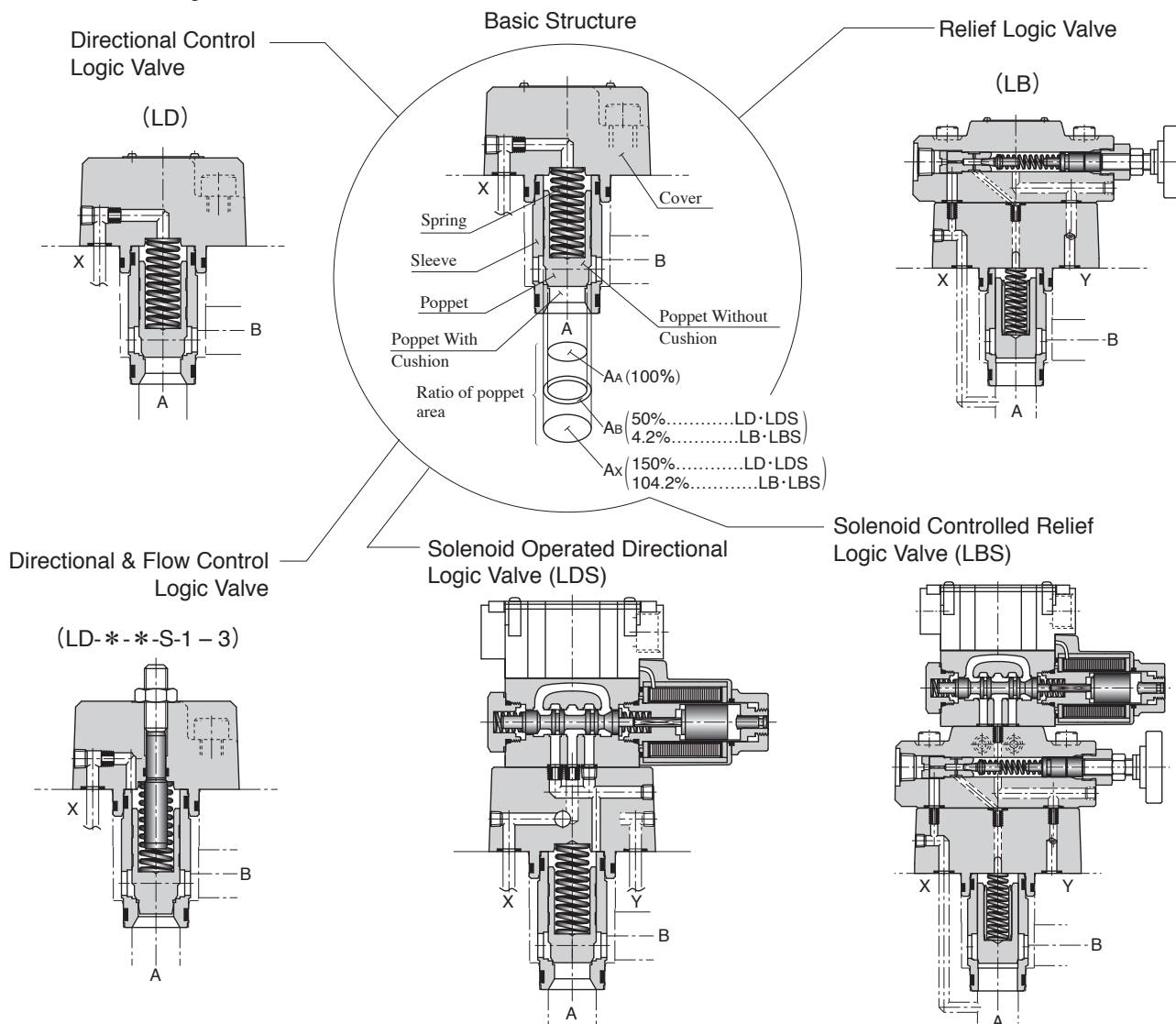
Features

- Multifunction performance in terms of direction, flow and pressure can be obtained by combining elements and covers.
- Poppet-type elements virtually eliminate internal leakage and hydraulic locking. Because there are no overlaps, response times are very high, permitting high-speed shifting.
- For high pressure, large capacity systems, optimum performance is achieved with low pressure losses.
- Since the logic valves are directly incorporated in cavities provided in blocks, the system is free from problems related to piping such as oil leakage, vibration and noise, and higher reliability is achieved.
- Multifunction logic valves permit compact integrated hydraulic systems which reduce manifold dimensions and mass and achieve lower cost conventional types.



Structure and Functions

As shown below, a logic valve consists of a cover, a sleeve, a poppet and a spring incorporated in a block. Although it is a simple two-port valve designed to open and close the poppet in accordance with the pressure signals from the pilot line, it serves as a multifunctional valve for controlling the direction, flow and pressure by controlling the pressure signals. Standard covers have several pressure signal ports (pilot ports) and control valves for control purposes are available. The covers are spigot mounted. There is no risk of oil leakage.

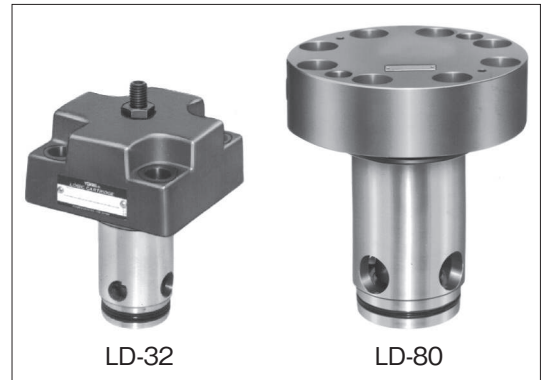


Functions, working area ratios and features

Functions	Graphic Symbols	Working area ratios (AA : AB)	Features
Direction		2 : 1	● Poppet Shape Without cushion (LD LDS - * - *) : High-speed shift ● With cushion (LD LDS - * - * - S) : Shockless shift ● No leakage between port A and B. ● Flow A to B and B to A are possible. ● Response time and shock can be adjusted by orifice selection.
Direction and Flow			● Poppet Shape With cushion (LD - * - * - S - 1/3) : Flow control ● No leakage between port A to B. ● Flow A to B only is possible. ● Response time and shock can be adjusted by orifice selection.
Relief		24 : 1	● Remote and unloading control is possible with vent circuit. (LB - * - *) ● Two or three pressure controls are possible in combination of solenoid operated directional valve and pilot relief valve. (LBS - * - *)

Directional Control/Directional & Flow Control Logic Valves

These valves are 2-way directional valves designed to open and close the circuits in accordance with pressure signals from the pilot lines. They are used as multifunctional valves for controlling flow directions or flow directions and rates. Standard covers are available so that optimum valves can be selected for control purposes.



Specifications

Model No.	(NOTE) Rated Flow L/min	Max. Operating Pressure MPa	Cracking Pressure MPa	Ratio of Poppet Area	Mass kg
LD-16	130	31.5	Refer to Model No. Designation	2 : 1 (Annular area 50%)	1.6
LD-25	350				3.0
LD-32	500				5.3
LD-40	850				9.1
LD-50	1400				14.8
LD-63	2100				29.8
LD-80	3400				48
LD-100	5500				86

Note: The rated flow is values with a pressure drop of 0.3 MPa, fluid viscosity 35 mm²/s.

Model Number Designation

LD-32-05-S-1-X05-12

- LD-32-05-S-1-X05-12
- Design number (LD-80,100.....11)
- Designation of orifice
- Location of orifice (see the table right)
 - None : no orifice
 - X : Pilot port X
 - Z1 : Pilot port Z1
 - S : Port leading to spring
- Cover type (See the table right)
 - None, 1, 2, 3, 4, 5
- Poppet shape★
 - None : Without cushion
 - S : With cushion
- Cracking pressure (A→B)
 - None : No Spring
 - 05 : 0.05 MPa
 - 20 : 0.2 MPa
- Valve Size : 16, 25, 32, 40, 50, 63, 80, 100
- Directional control logic valves/Directional & flow control logic valves

★Poppet shapes

The type without a cushion and the type with a cushion are both suitable for high-speed shifting and shockless shifting respectively. For directional and flow control logic valves, be sure to specify "poppet with cushions".

List of Cover Types

Cover Type Designation	Graphic Symbols	Valve Size							
		16	25	32	40	50	63	80	100
Directional Control	Standard (None)		○	○	○	○	○	○	○
	With Check Valve (4)		○	○	○	○	○	—	—
	With Shuttle Valve (5)		○	○	○	○	○	—	—
Directional & Flow Control	With Stroke Adjuster (1)		○	○	○	○	○	○	○
	With Check Valve & Stroke Adjuster (2)		○	○	○	○	○	—	—
	With Shuttle Valve & Stroke Adjuster (3)		○	○	○	○	○	—	—

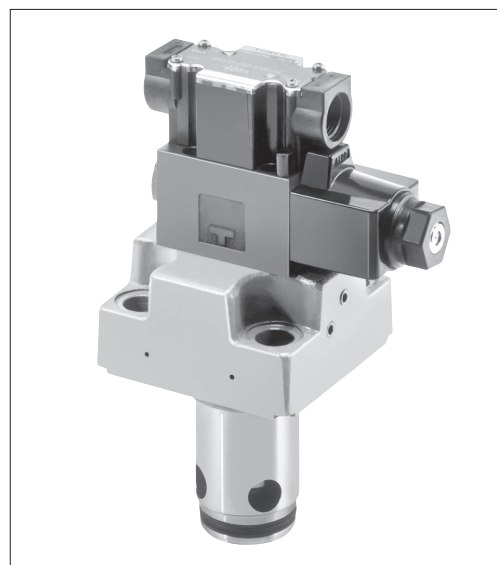
Solenoid Operated Directional Control Logic Valves

These solenoid operated directional control logic valves are composed of directional control valves and solenoid operated directional valves combined together. The solenoid operated directional valves serve to switch pilot lines and the directional control valves are used to control the direction of the main circuits. Standard covers provided with various control valves are available to provide optimum control.

Specifications

Model No.	(NOTE) Rated Flow L/min	Max. Operating Pressure MPa	Cracking Pressure MPa	Ratio of Poppet Area	Mass kg
LDS-25	350	31.5	Refer to Model No. Designation	2 : 1 (Annular area 50 %)	4.2
LDS-32	500				6.5
LDS-40	850				10.3
LDS-50	1400				18.6
LDS-63	2100				33.6

Note: The rated flow is values with a pressure drop of 0.3 MPa, fluid viscosity 35 mm²/s.



Model Number Designation

LDS-32-05-S-1-O-X 05-A100-C-N-14

Design No.

LDS-50, 63.....13

Type of electrical conduit connection

None : Terminal box (standard)

N : Plug-in connector (option)

Type of manual override

None : Manual override pin (standard)

C : Push button and lock nut (option)

Coil type

A* : AC, R* : AC→DC rectified

D* : DC, RQ* : AC→DC rectified
(quick return)
(LDS-50, 63)

Designation of orifice

Location of orifice

None : No orifice

P : Pilot port P, B : Pilot port B

A : Pilot port A, X : Pilot port X

Solenoid operated valve

None : With solenoid operated valve

O : Without solenoid operated valve

Cover type (See the table right) 1, 2, 3, 4, 5, 6

Poppet shape None : Without cushion

S : With cushion

Cracking pressure None : No spring
(A→B) 05 : 0.05 MPa
20 : 0.2 MPa

Valve Size : 25, 32, 40, 50, 63

Solenoid operated directional control logic valve

Normally Open with Shuttle Valve (6)						

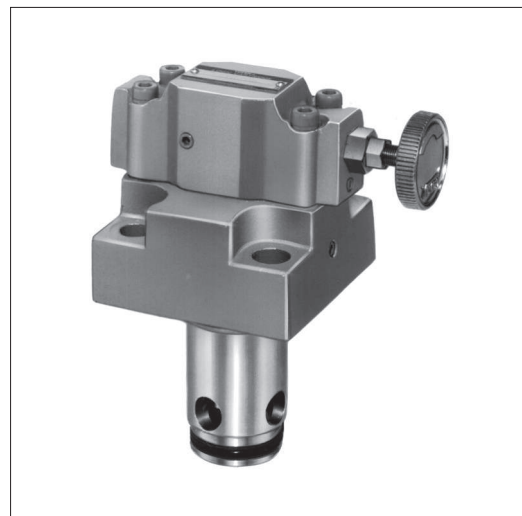
Note: In case of LDS- * - * - * - * -O (without solenoid operated valve), the graphic symbol for the solenoid operated valve is excluded.

List of Cover Types

Cover Type Designation	Graphic Symbols	Valve Size				
		25	32	40	50	63
Normally Closed (1)						
Normally Open (2)						
Normally Closed with Shuttle Valve (3)						
Normally Open with Shuttle Valve (4)						
Normally Closed with Shuttle Valve (5)						

Relief Logic Valves

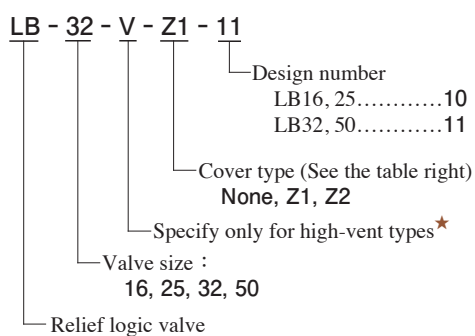
These relief logic valves are used to protect pumps and control valves from excessive pressure and control the pressures of their hydraulic lines at constant levels. With the help of vent lines (Z1 or Z2 port), they are also capable of remote and unload control.



Specifications

Model No.	Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max. Flow L/min	Mass kg
LB-16-**-*-10	31.5	0.5 - 31.5	125	3.6
LB-25-**-*-10			250	4.5
LB-32-**-*-11			500	6.7
LB-50-**-*-11			1200	16.1

Model Number Designation



★Use high-vent pressure types if the shifting time from unloading to on-loading is reduced.

List of Cover Types

Cover Type Designation	Graphic Symbols	Valve Size			
		16	25	32	50
Standard (None)		○	○	○	○
Vent Controlled (Z1)		○	○	○	○
Vent Controlled (Z2)		○	○	○	○

Solenoid Controlled Relief Logic Valves

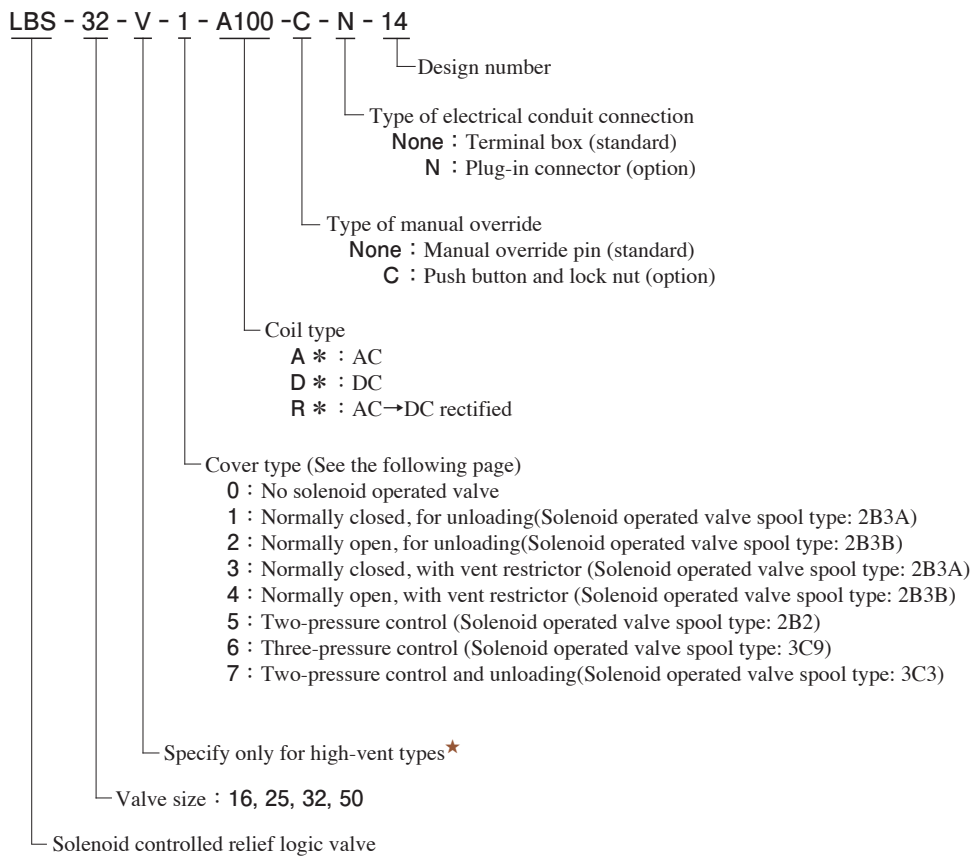
These solenoid controlled relief logic valves are composite control valves having solenoid controlled directional and pilot relief valves and vent restrictors combined together. They are used to put pumps into unloading operation, with the solenoid controlled directional valves serving to select pilot lines, or to place hydraulic system two or three pressure controls, with the pilot relief valves in action.



Specifications

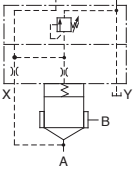
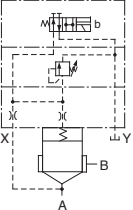
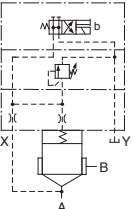
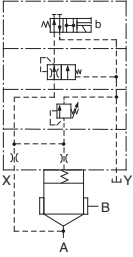
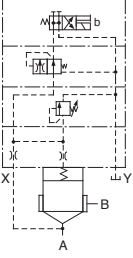
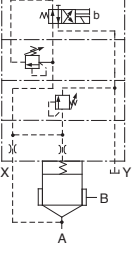
Model Numbers	Max. Operating Pressure MPa	Pres. Adj. Range MPa	Max. Flow L/min	Mass kg
LBS-16-**-**-14	31.5	0.5 - 31.5	125	3.6 - 8.5
LBS-25-**-**-14			250	4.5 - 9.4
LBS-32-**-**-14			500	6.7 - 11.6
LBS-50-**-**-14			1200	16.1 - 21.0

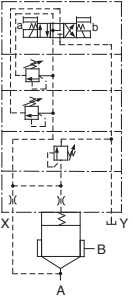
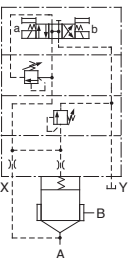
Model Number Designation



★Use high-vent pressure types if the shifting time from unloading to on-loading is reduced.

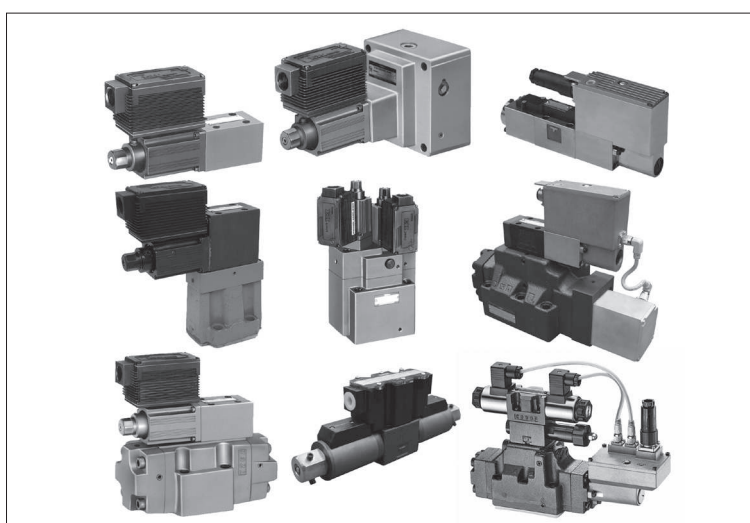
List of Cover Type (LBS)

Cover Type Designation	Graphic Symbols	Valve Size			
		16	25	32	50
Without Solenoid Valve (0)		○	○	○	○
Normally Closed for Unloading (1)		○	○	○	○
Normally Open for Unloading (2)		○	○	○	○
Normally Closed with Vent Restrictor (3)		○	○	○	○
Normally Open with Vent Restrictor (4)		○	○	○	○
Two Pressure Control (5)		○	○	○	○

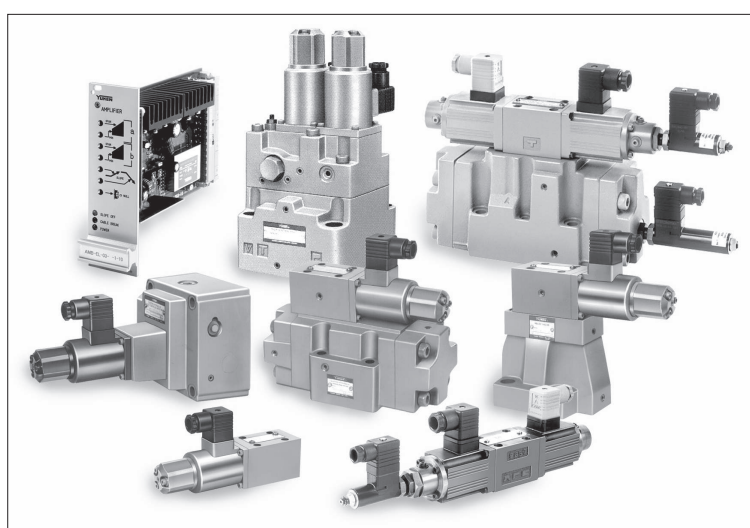
Cover Type Designation	Graphic Symbols	Valve Size			
		16	25	32	50
Three Pressure Control (6)		○	○	○	○
Two Pressure Control and Unloading (7)		○	○	○	○

PROPORTIONAL ELECTRO-HYDRAULIC CONTROLS

- **EEI Series-Hybrid Components** Page H-3
Proportional Electro-Hydraulic Control Valves



- **E Series** Page H-89
Proportional Electro-Hydraulic Controls

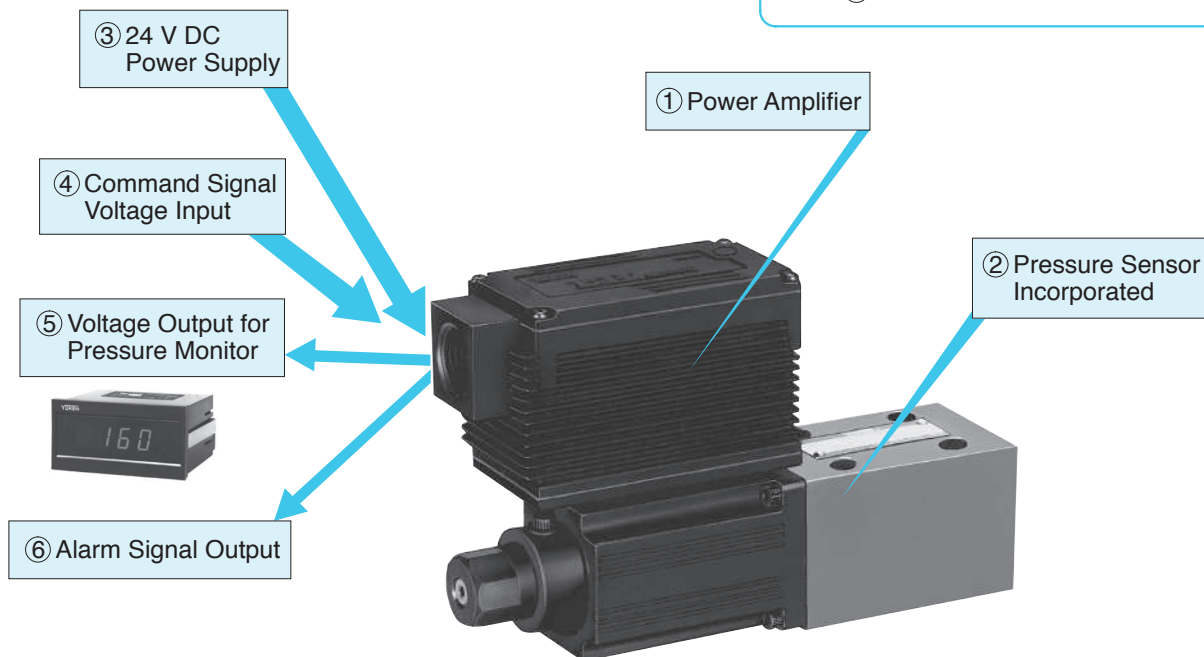


High-accuracy, simple, convenient

EH Series realizes your dreams.

Why simple ?

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



Details of Proportional Electro-Hydraulic Relief Valve

Why high-accuracy ?

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

- ★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

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.

EH Series-Hybrid Components

Proportional Electro-Hydraulic Controls

Type	Graphic Symbol	Max. Operating Pressure MPa	Maximum Flow L/min																Page
			1	2	3	5	10	20	30	50	100	200	300	500	1000	1500			
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

Model Numbers	EHDG-01 *	
Descriptions		
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 k Ω	
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.

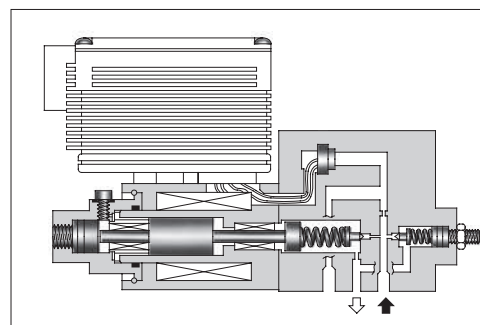
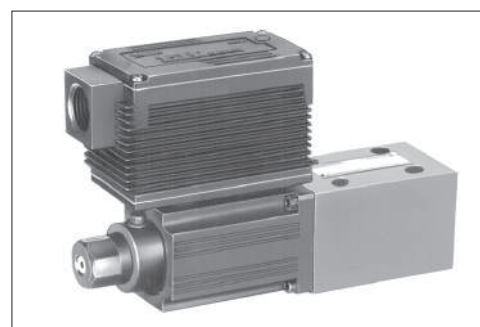
Model Number Designation

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	None : Without Safety Valve 1 : With Safety Valve	PN : Without Orifice (Standard)	T15 T13 T11 * ²	M10 : Standard Orifice	50
					S : Open-Loop with Sensor L : Closed-Loop * ¹					

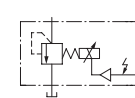
*¹ For closed-loop models, specify applicable control code "V" even though the valve may not be used as vent control of relief valve.

*² Standard of T-line Orifice.
Pres. Adj. Range B:T15, C:T13, H:T11.

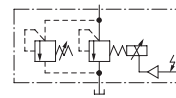
*³ Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.



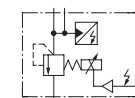
Graphic Symbols



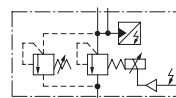
Open-Loop Type



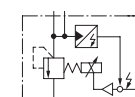
Open-Loop Type with Safety Valve



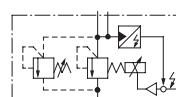
Open-Loop Type with Sensor



Open-Loop Type with Safety Valve & Sensor



Closed-Loop Type



Closed-Loop Type with Safety Valve

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.
(∇)

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 cm³.

● Low Flow Rates

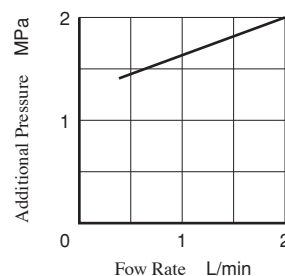
The preselected pressure may become unstable. To avoid such pressure instability, the flow rate should not be lower than 0.3 L/min.

● 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:

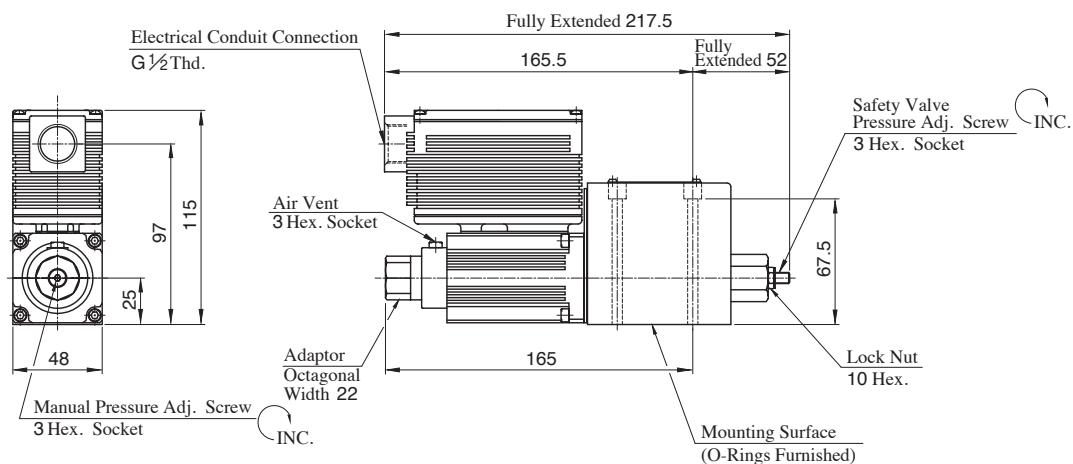
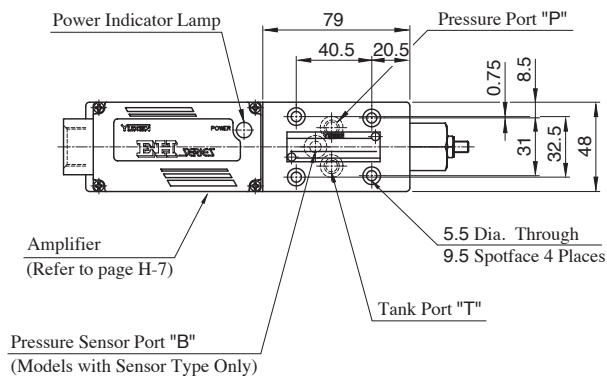
Pressure setting = (Operating pressure upper limit) + (Additional pressure indicated below)

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



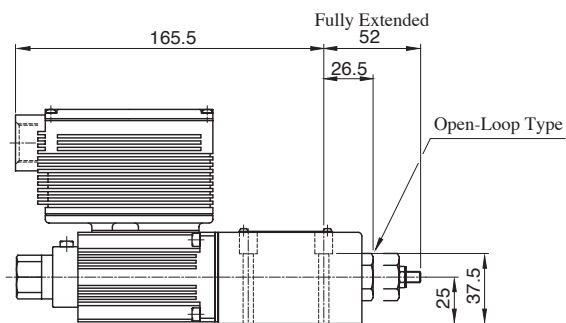
EHDG-01 * - * -S-1-PNT * M10-50 : Open-Loop Type with Sensor and Safety Valve

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



EHDG-01 * - * -PNT * -50 :
Open-Loop Type

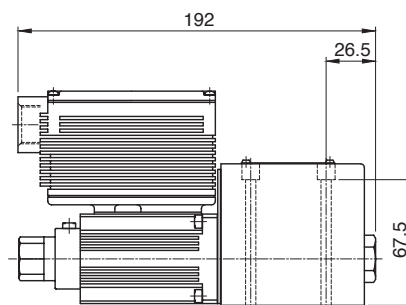
EHDG-01 * - * -1-PNT * -50 :
Open-Loop Type with Safety Valve



Mass.....2.2 kg

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

EHDG-01 * - * -L-PNT * M10-50 :
Closed-Loop Type

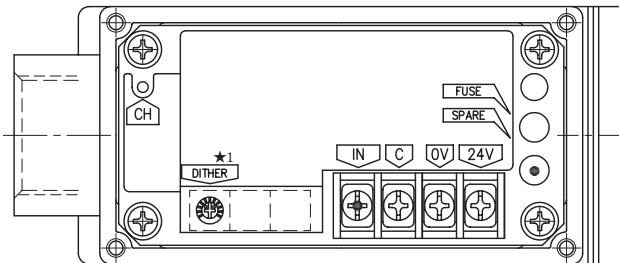


Mass.....2.9 kg

Detail of Amplifier

Connecting Terminal

Open-Loop Type



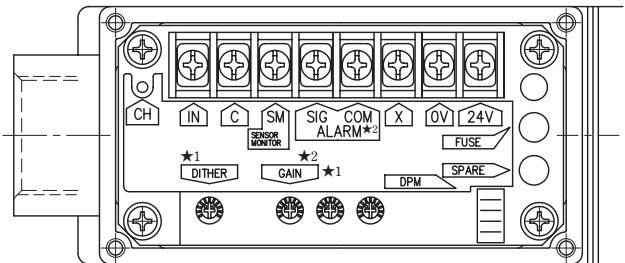
Terminal	Name
IN	Input Signal (+)
C	Input Signal (COM)
0 V	Power Supply
24V	
CH	Output Current Check (to C)

★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	<table border="1"> <tr> <td>SIG</td><td rowspan="2">Alarm Output ★2</td></tr> <tr> <td>COM</td></tr> </table>	SIG	Alarm Output ★2	COM
SIG	Alarm Output ★2			
COM				
X	(Open)			
0 V	Power Supply			
24V				
CH	Output Current Check (to C)			

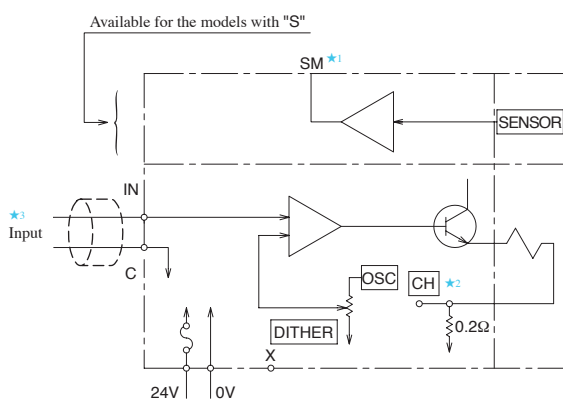
★2. GAIN/ALARM

GAIN adjusting volume is not available for open-loop type with sensor.

Circuit Schematic

Open-Loop Type

Open-Loop Type with Sensor

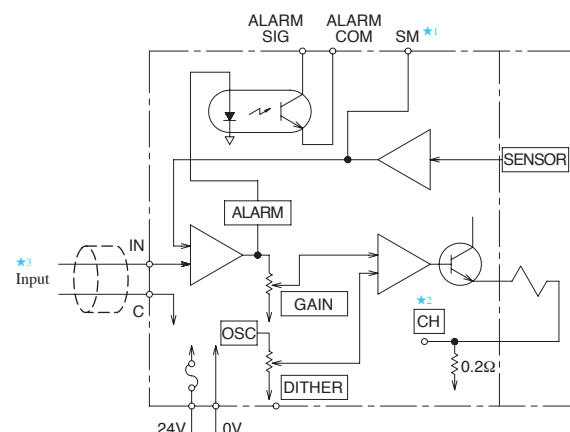


★1. For "SM" terminal, external instruments should have input impedance of more than 10 kΩ.

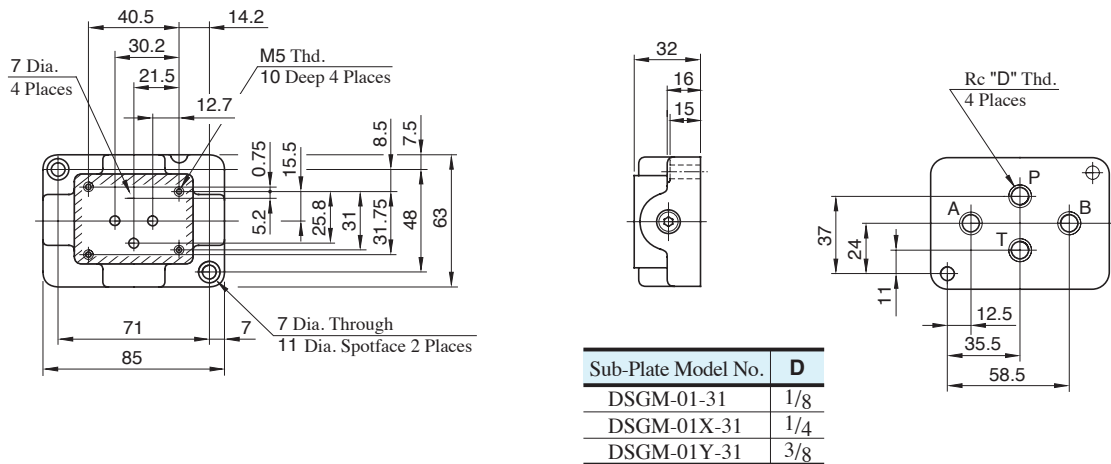
★2. For "CH" terminal, external instruments should have input impedance of more than 10 kΩ.

★3. Use shielded cable for "Input" connection. The ground of the shielded cable must be connected to input signal side.

Closed-Loop Type



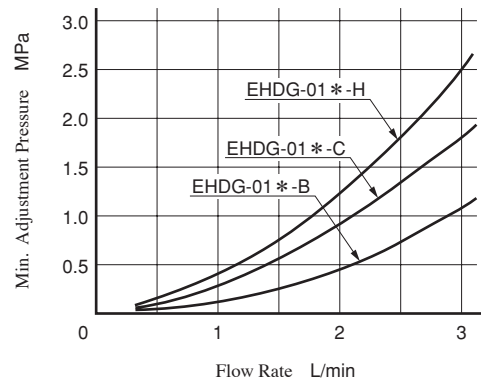
Sub-Plates : DSGM-01, 01X, 01Y



Min. Adjustment Pressure

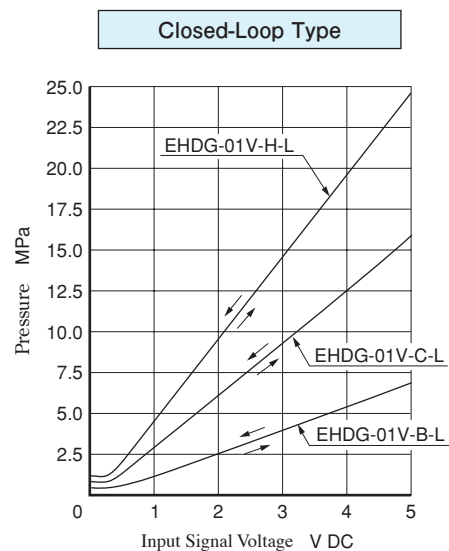
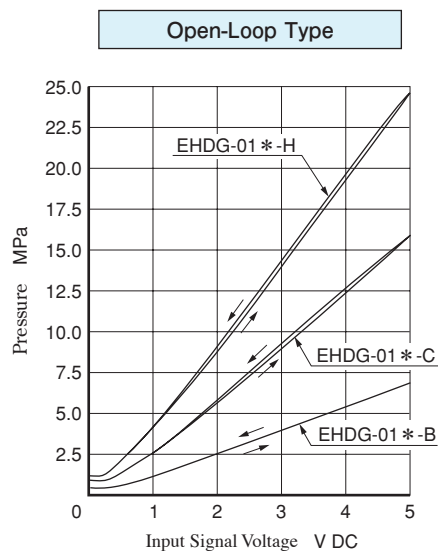
B
EHDG-01 *-C
H

Viscosity: 30 mm²/s



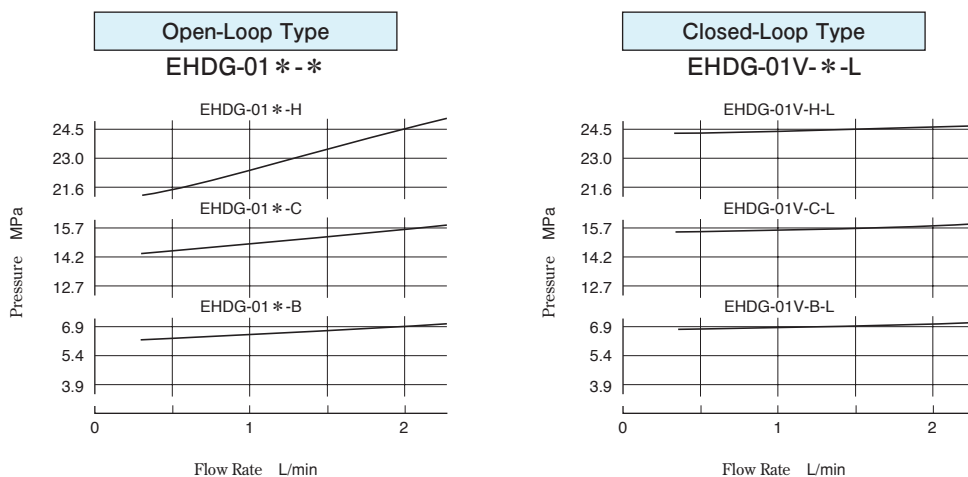
Input Signal Voltage vs. Pressure

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



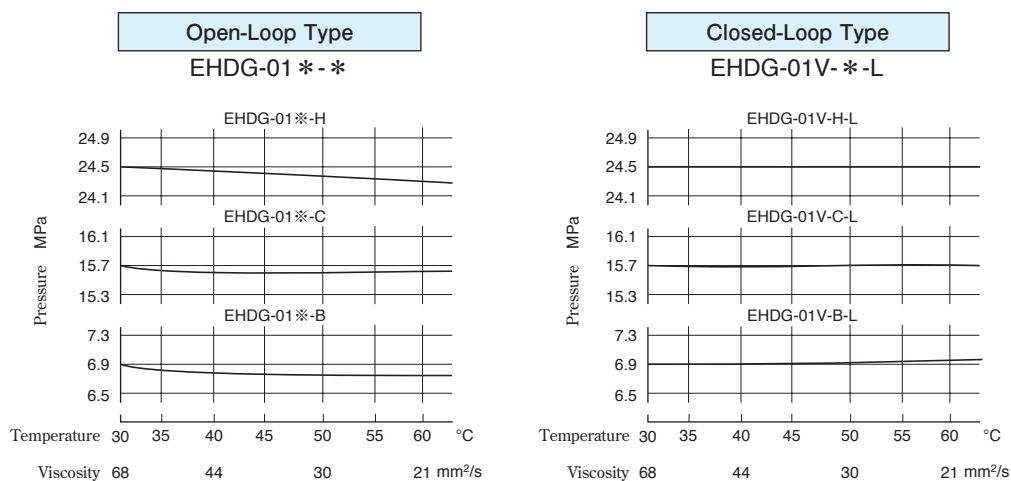
Flow Rate vs. Pressure

Viscosity : 30 mm²/s



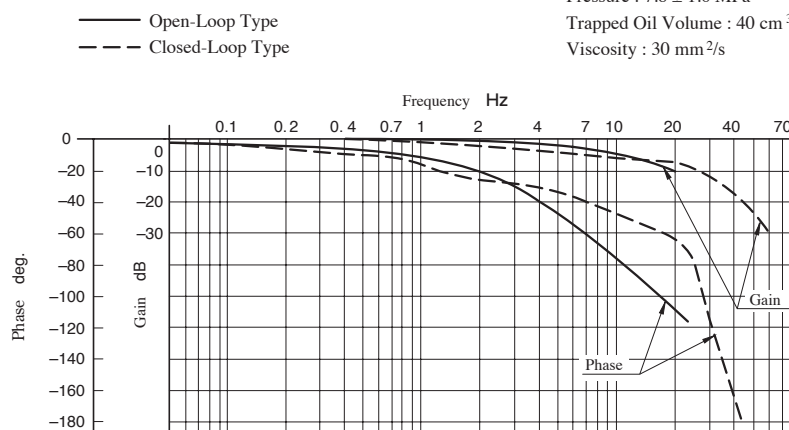
Viscosity vs. Pressure

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



Frequency Response

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



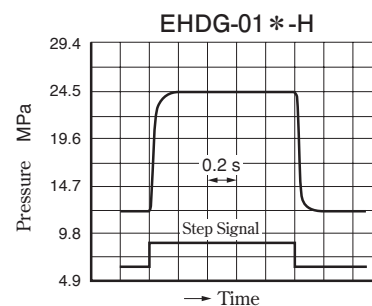
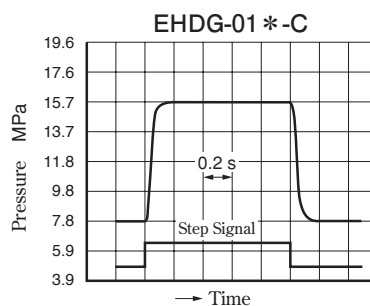
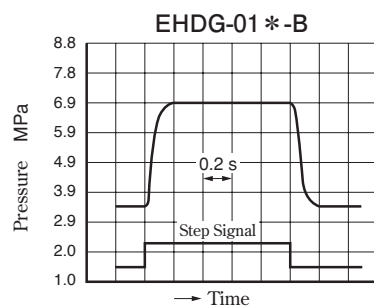
Step Response (Example)

The step responses below are those obtained when the valve itself is tested independently.

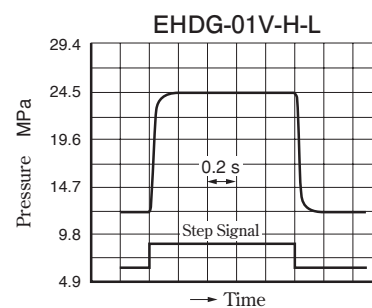
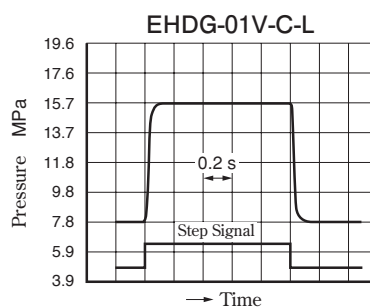
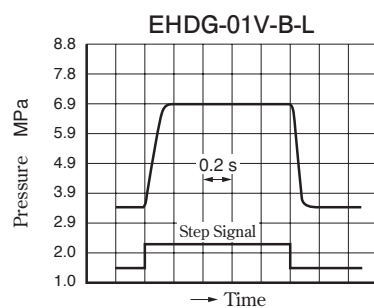
The step responses may differ from them when the valve is used in combinations with other control valves.

Flow Rate : 2 L/min
Trapped Oil Volume : 40 cm³
Viscosity : 30 mm²/s

Open-Loop Type



Closed-Loop Type



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

Model Numbers	SB1110	SB1190
Descriptions		
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 k Ω	
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

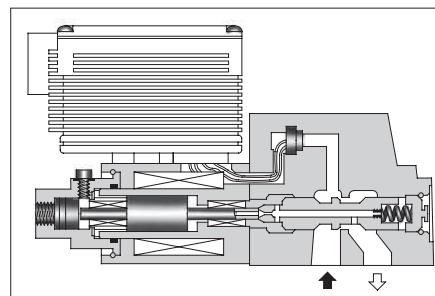
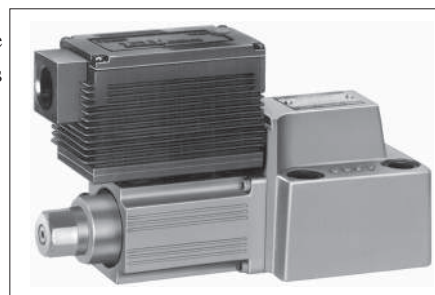
★1. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Model Number Designation

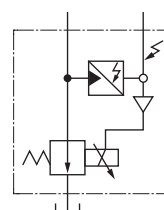
SB1110	-B	-20
Series Number	Pres. Adj. Range MPa	Design Number
SB1110: Proportional Electro-Hydraulic Pressure Control Valve (3/8, Sub-Plate Mounting)	B: 0.2^{★1} - 6.9 H: 0.2^{★1} - 24.5	20
SB1190: Proportional Electro-Hydraulic Pressure Control Valve (3/4, Sub-Plate Mounting)	B: 0.2^{★1} - 7.0	10

★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.



Graphic Symbol



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.
($\frac{1}{8}$)

Instructions

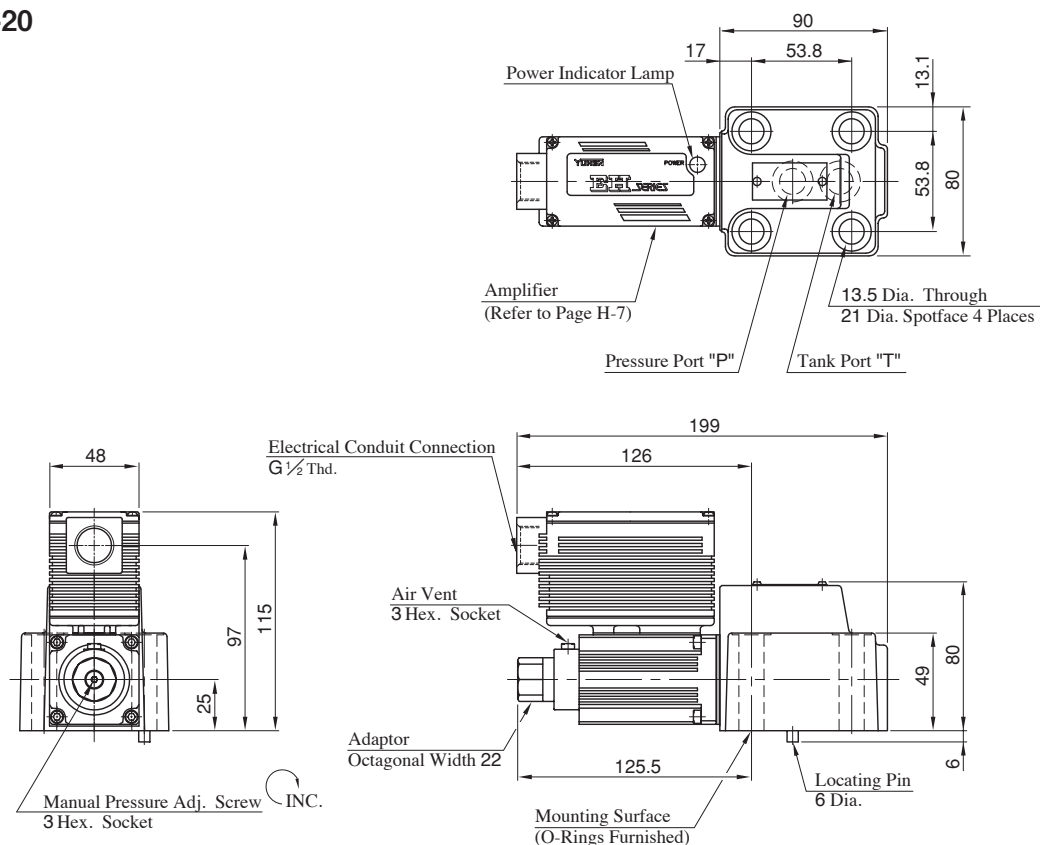
- Safety Valve**
As the function of safety valve has not been included in the valve itself, provide safety valve in the hydraulic circuit if required.
- Piping to the Reservoir**
The tank port should be connected directly to the reservoir. Be sure the end of pipe is dipped into the oil in the reservoir.
- Low Flow Rates**
The preselected pressure may become instable. To avoid such pressure instability, the flow rate should not be lower than minimum flow.

Accessories

Mounting Bolts

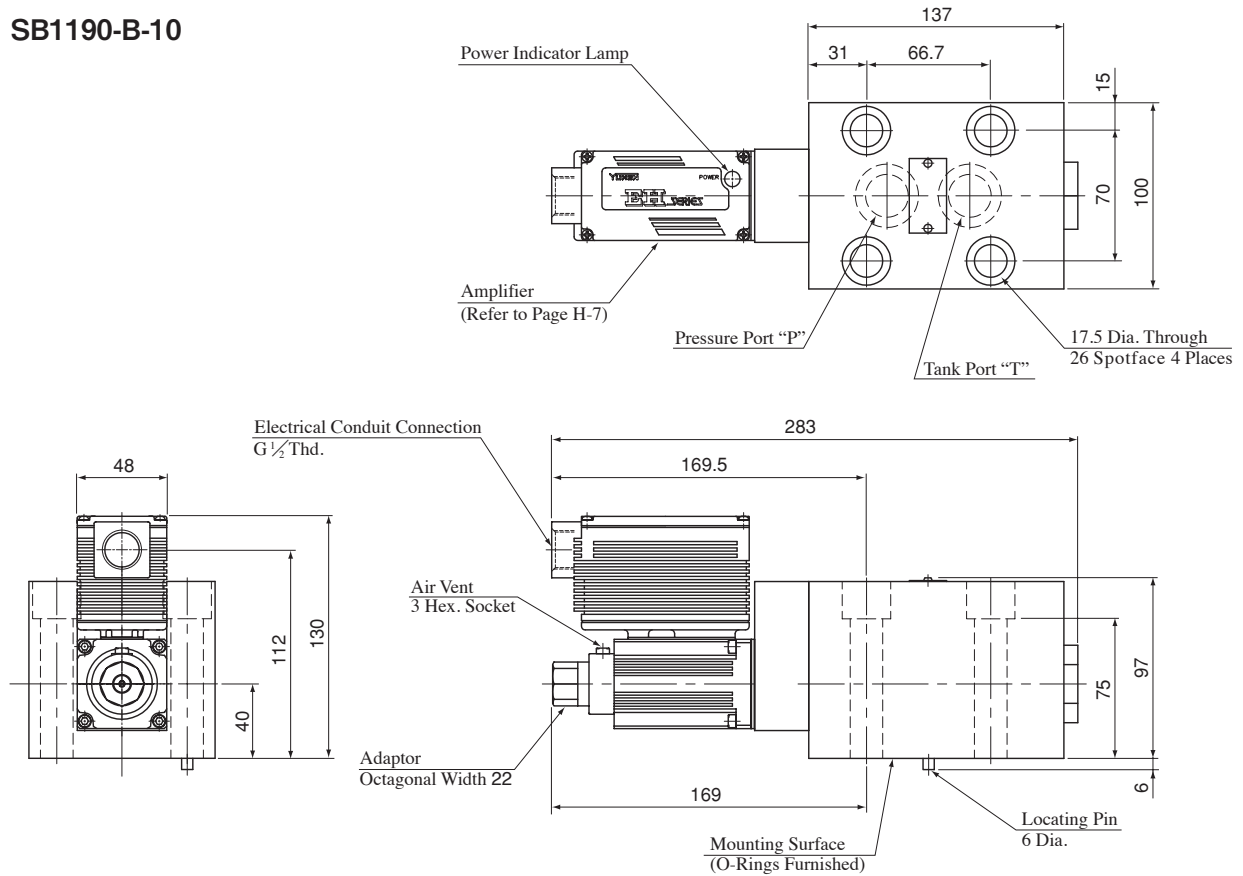
Model Numbers	Socket Head Cap Screw
SB1110	M12 × 65 L.....4 Pcs.
SB1190	M16 × 100 L.....4 Pcs.

SB1110- *-20

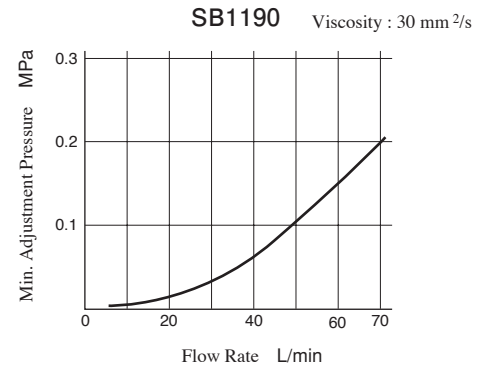
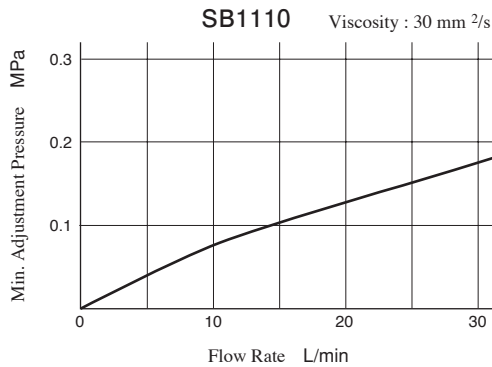


- Sub-plate is common to that of EBG-03. Refer to page H-18 for the dimensions of mounting surface.

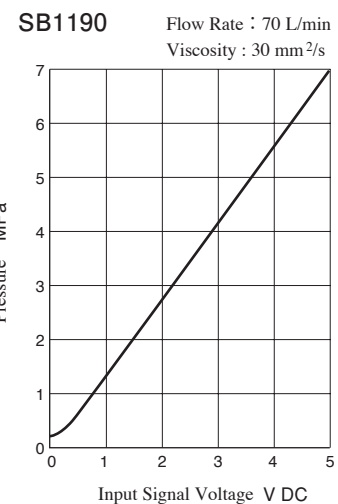
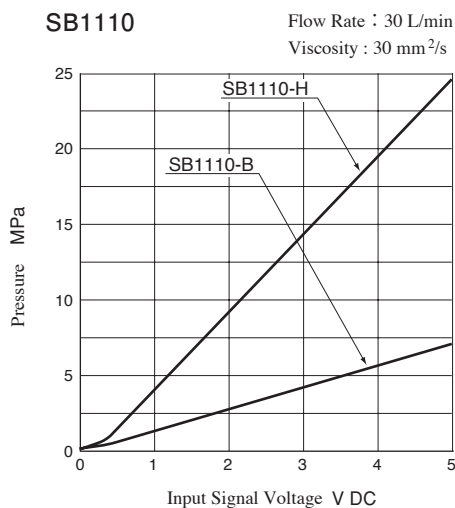
SB1190-B-10



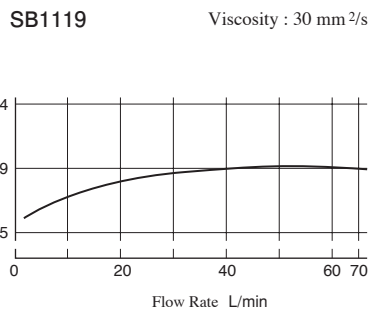
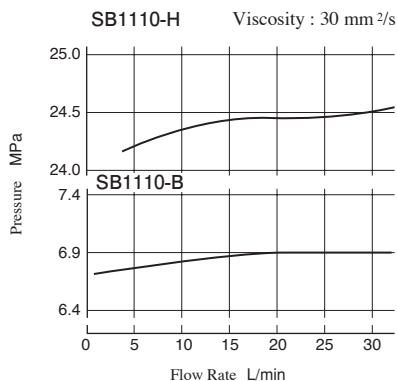
Min. Adjustment Pressure



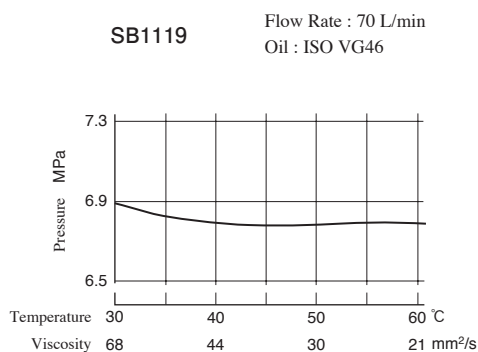
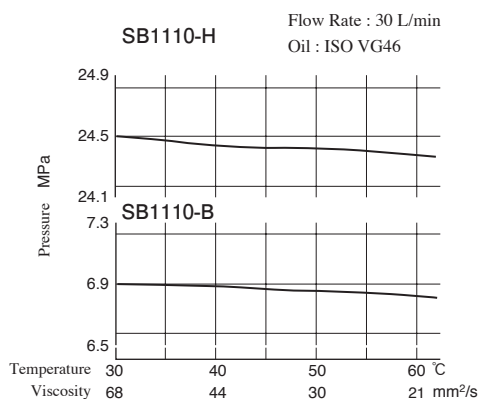
Input Signal Voltage vs. Pressure



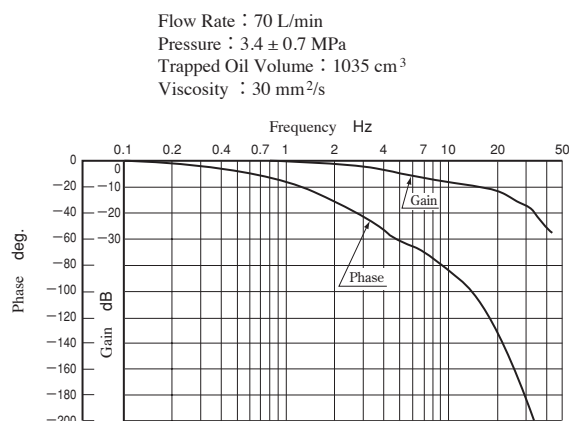
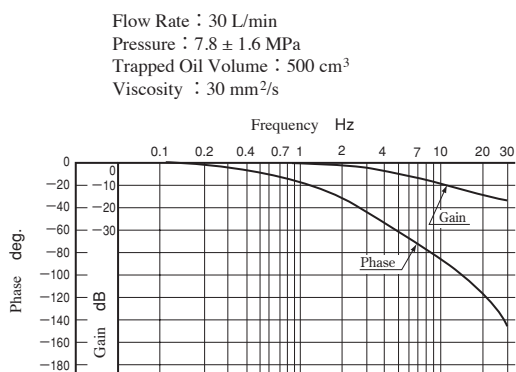
Flow Rate vs. Pressure



Viscosity vs. Pressure

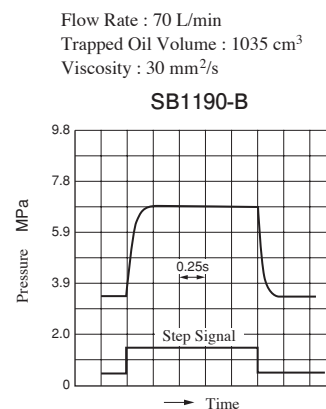
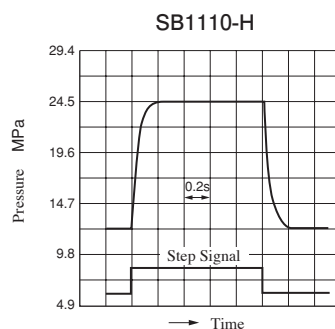
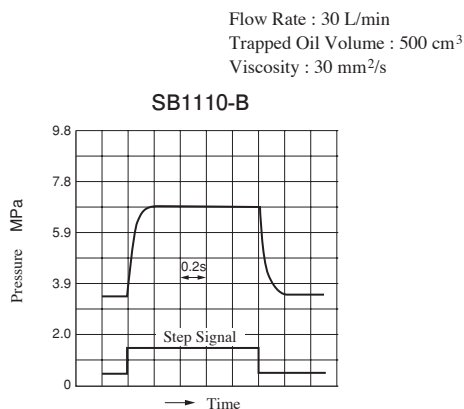


Frequency Response



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.



Proportional Electro-Hydraulic Relief Valves

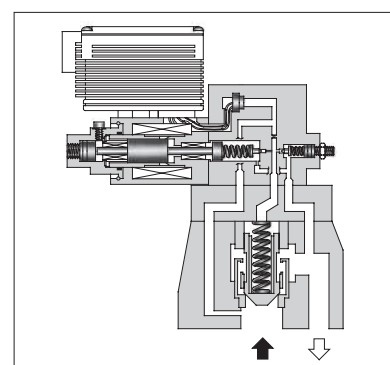
These valves, consist of a small size but high performance EH series electro-hydraulic proportional pilot relief valve and a low noise type relief valve. The valves control the system pressure proportionally through a controlled input voltage.

Specifications

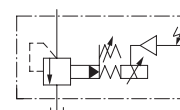
Model Numbers	EHBG-03	EHBG-06	EHBG-10
Descriptions			
Max. Operating Pres.	24.5 MPa		
Max. Flow	100 L/min	200 L/min	400 L/min
Min. Flow	3 L/min	3 L/min	3 L/min
Pressure Adjustment Range	Refer to Model Number Designation		
Coil Resistance	10 Ω		
Hysteresis	2% (1%) ^{★1} or less		
Repeatability	1% ^{★2} 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.

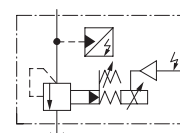
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.



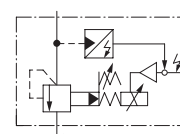
Graphic Symbols



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.
($\sqrt{6}$)

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.

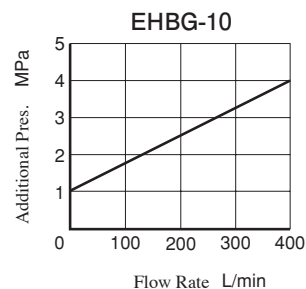
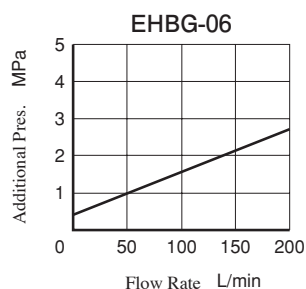
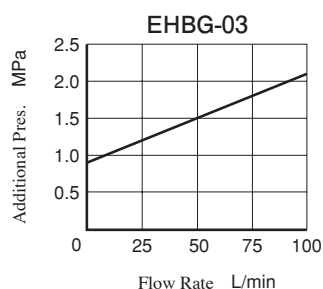
Additional Pressures for Safety Valves at Shipment

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;

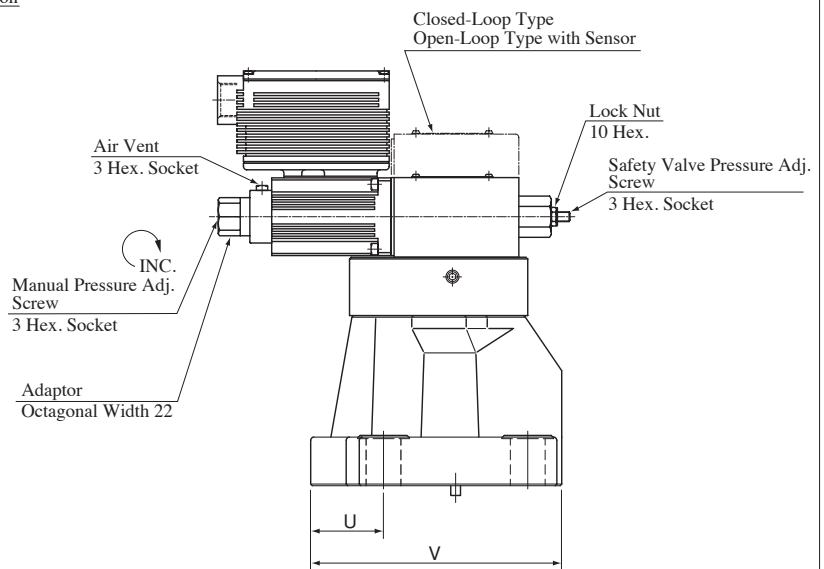
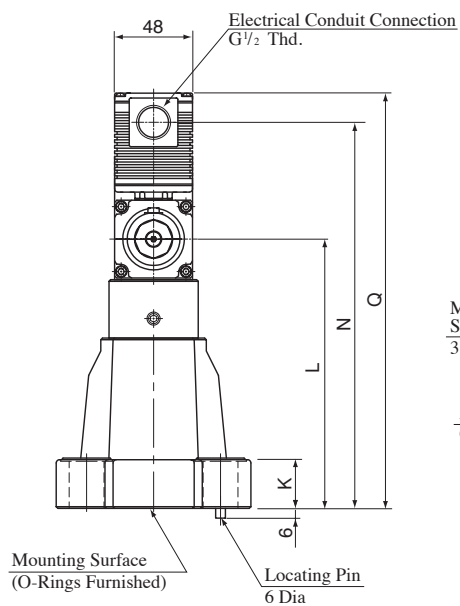
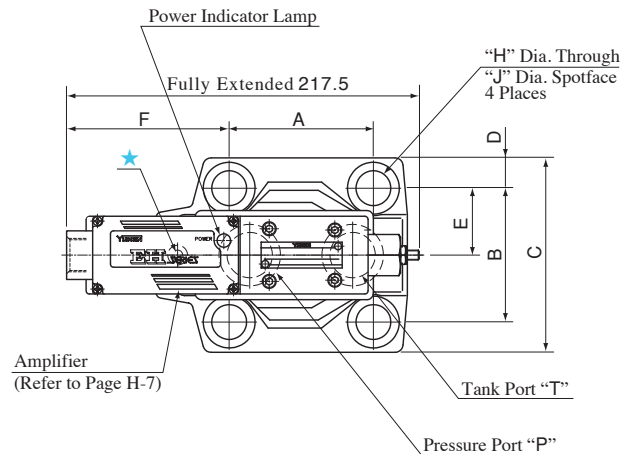
$$\text{Pressure Setting} = (\text{Operating Pressure Upper Limit}) + (\text{Additional Pressure Indicated Below})$$

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



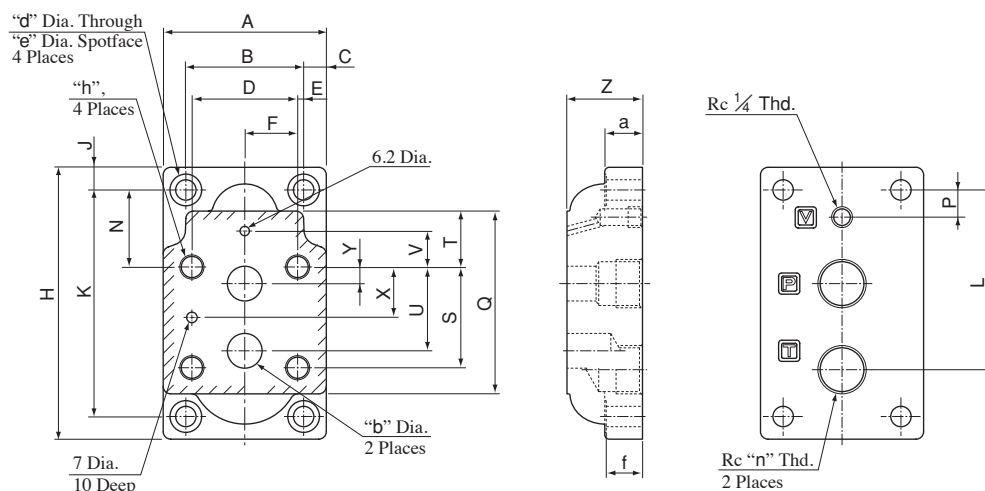
★ This port connection is not used.

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



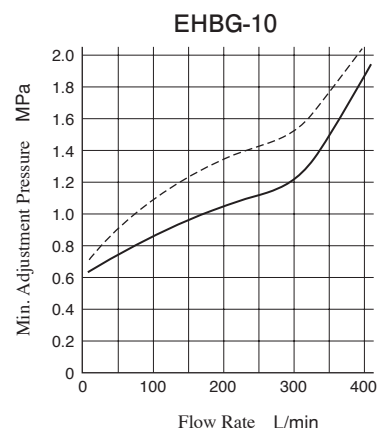
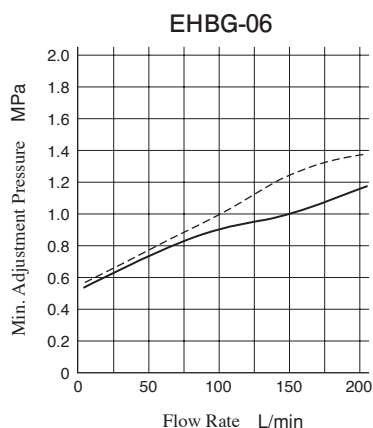
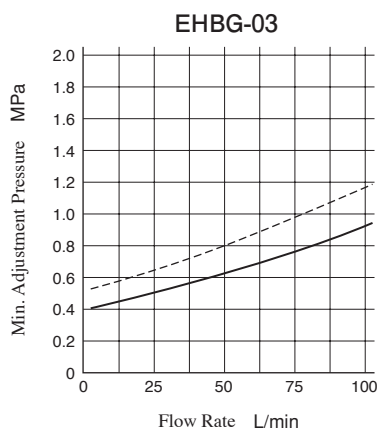
Model No.	A	B	C	D	E	F	H	J	K	L	N	P	Q	S
BGM-03	86	60	13	53.8	3.1	26.9	149	13	123	86	32	26	97	53.8
BGM-03X										95		21		
BGM-06	108	78	15	70	4	35	180	15	150	106.5	51	27.2	121	66.7
BGM-06X										119		18		
BGM-10	126	94	16	82.6	5.7	41.3	227	16	195	138.2	62	30.2	154	88.9
BGM-10X										158		17		

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

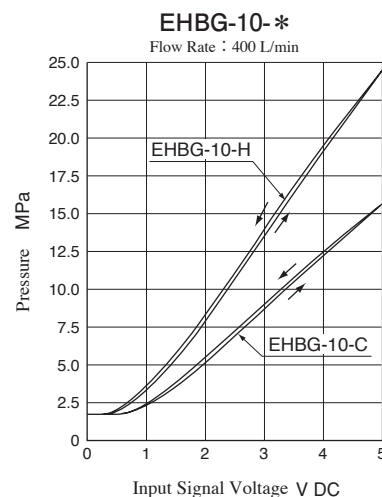
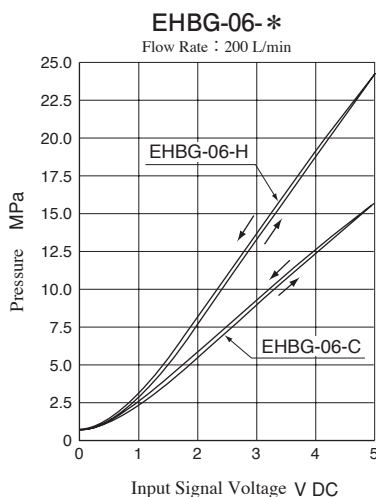
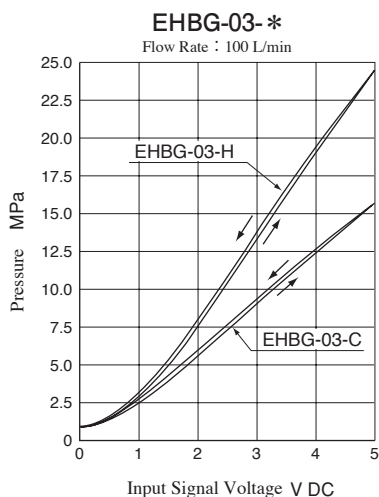
Viscosity : 30 mm²/s



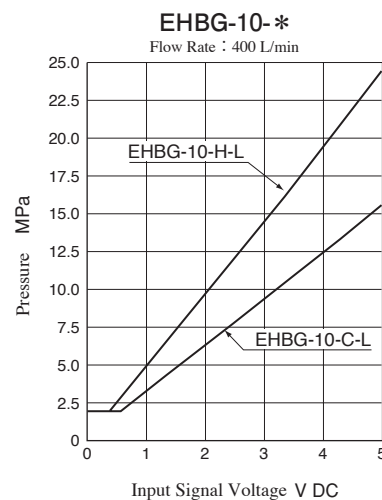
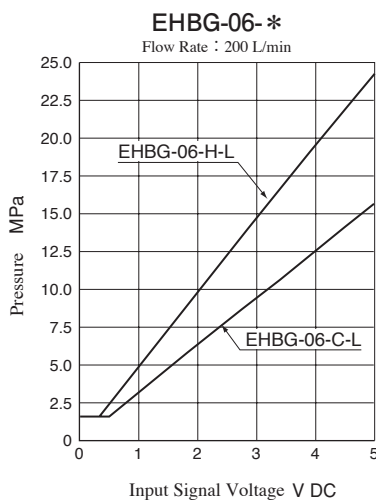
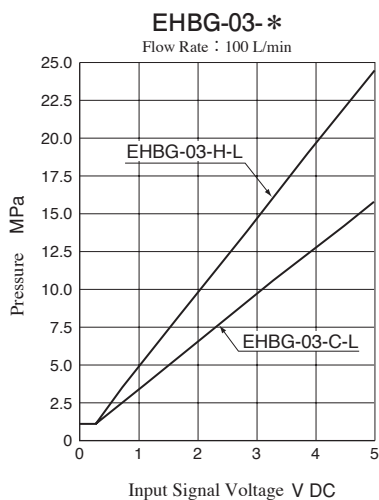
Input Signal Voltage vs. Pressure

Open-Loop Type

Viscosity : 30 mm²/s

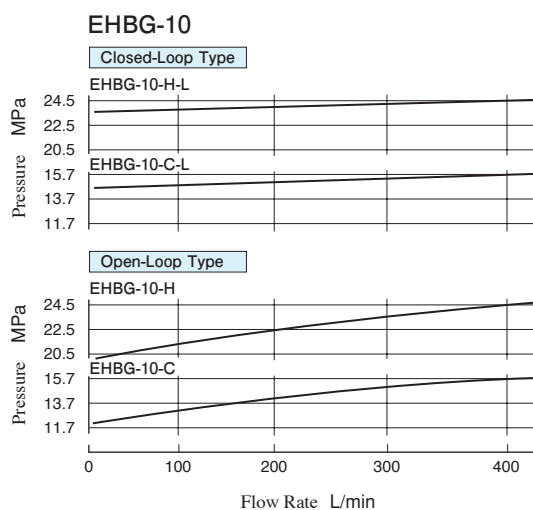
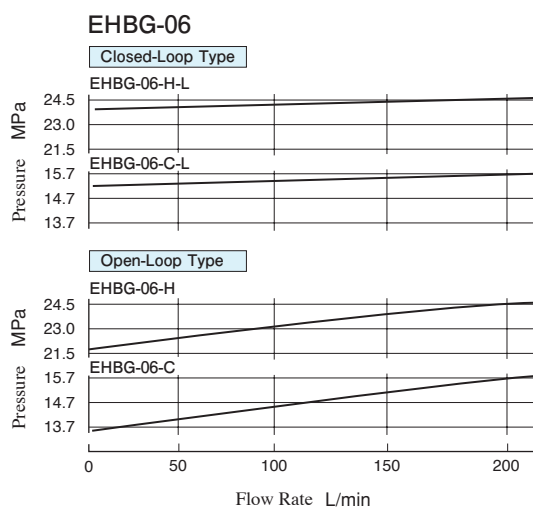
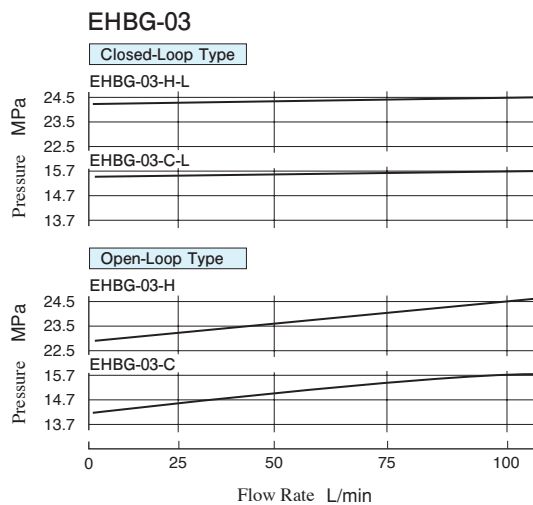


Closed-Loop Type



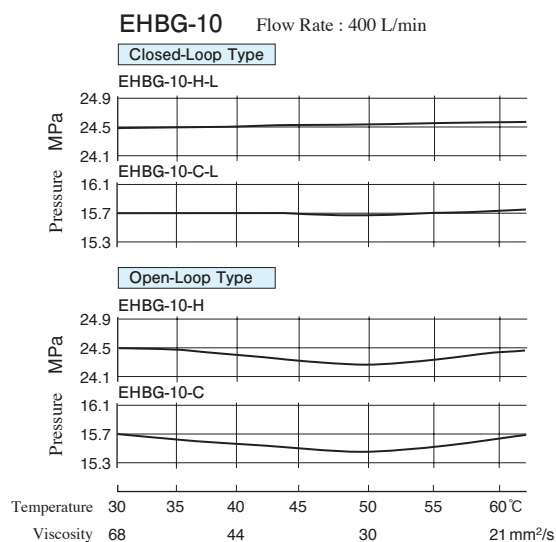
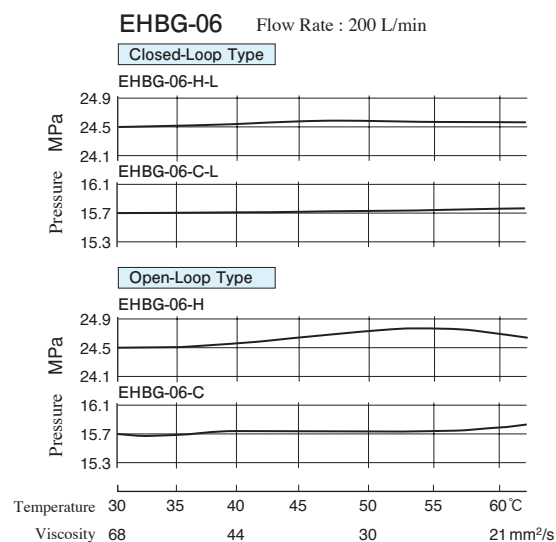
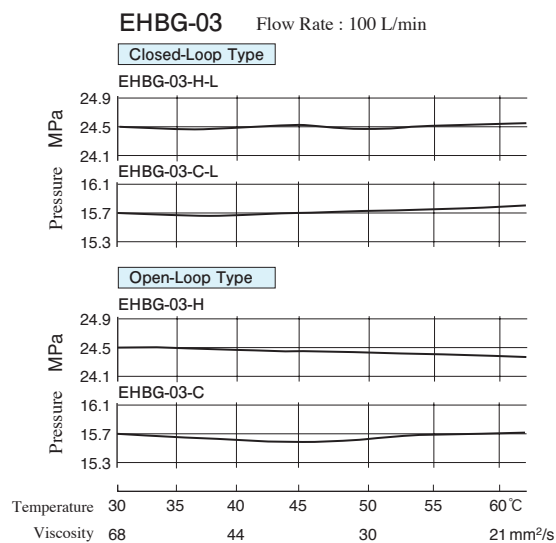
Flow Rate vs. Pressure

Viscosity : 30 mm²/s



Viscosity vs. Pressure

Oil : ISO VG46 Oil



Step Response (Example)

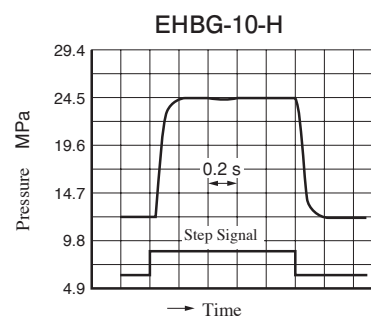
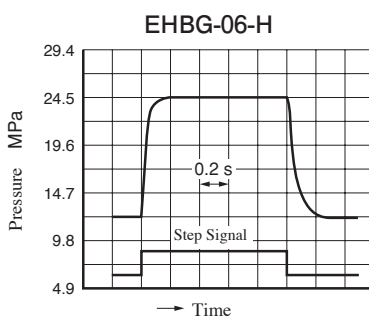
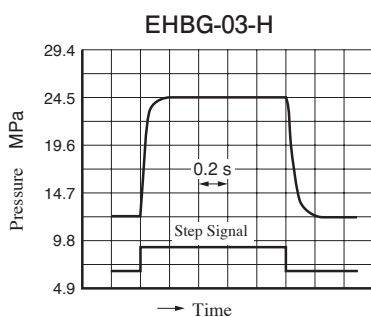
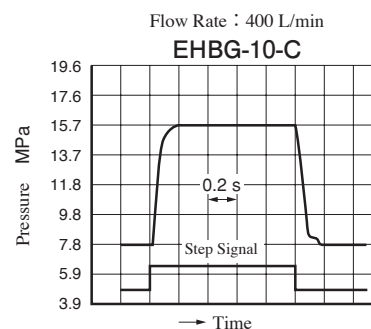
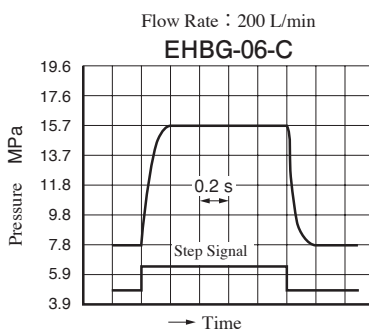
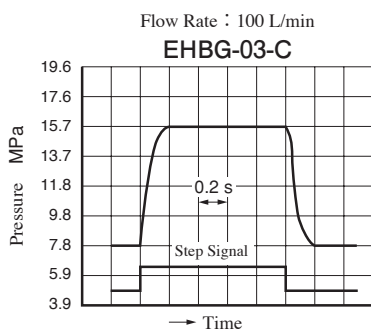
The step responses below are those obtained when the valve itself is tested independently.

The step responses may differ from them when the valve is used in combinations with other control valves.

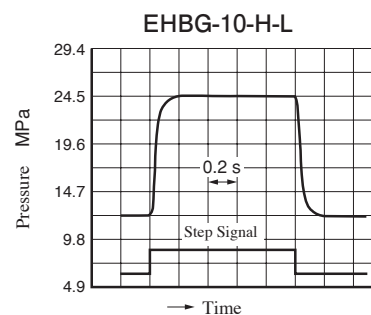
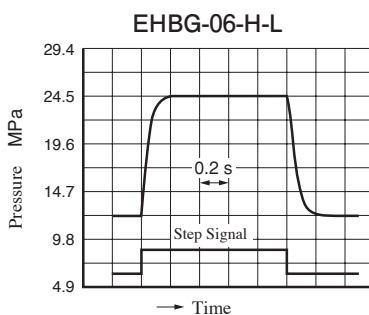
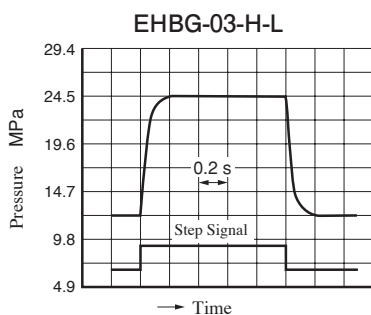
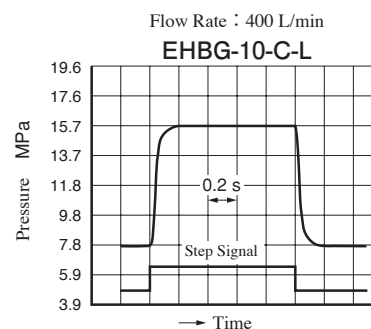
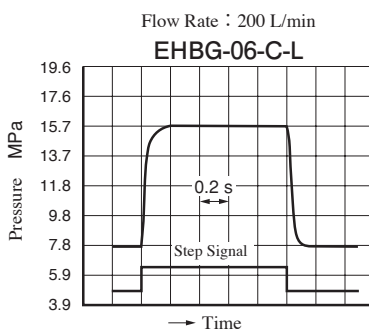
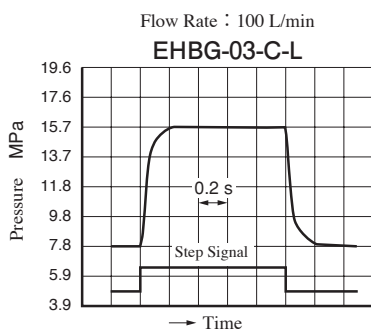
Trapped Oil Volume : 1 L

Viscosity : 30 mm²/s

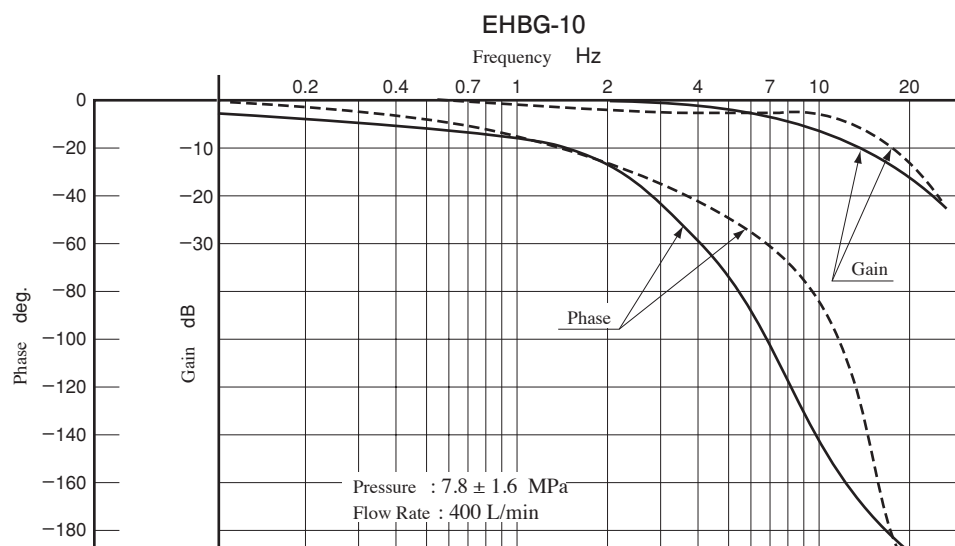
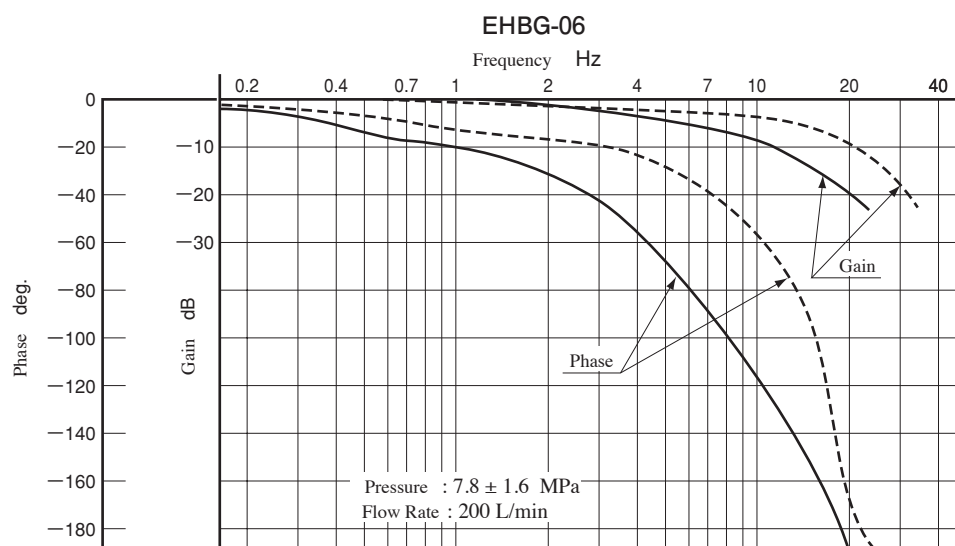
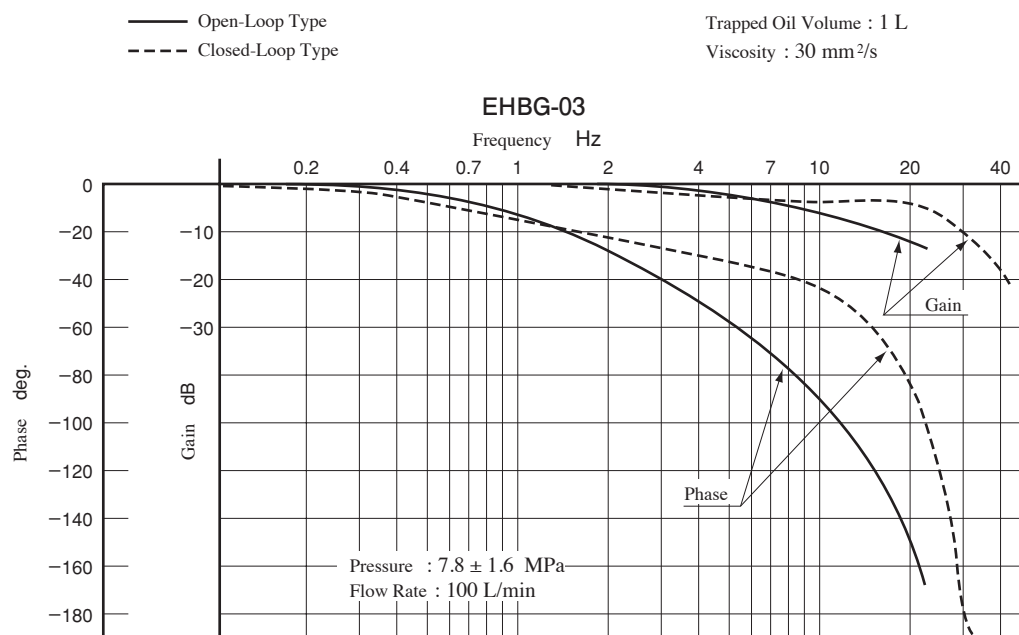
Open-Loop Type



Closed-Loop Type



Frequency Response



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.

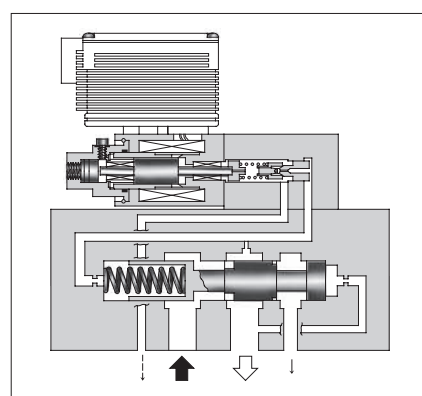
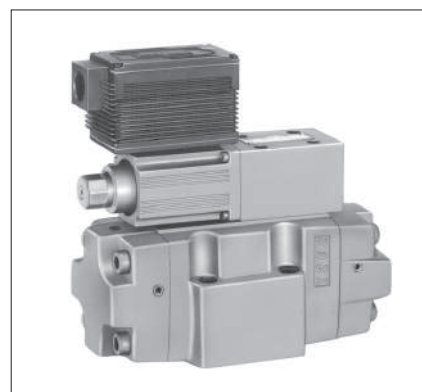
Moreover, a good response speed in reducing the pressure even at a large load capacity can be obtained with the relief function of the valves.

Specifications

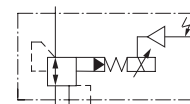
Model Numbers	EHRBG-06	EHRBG-10
Descriptions		
Max. Operating Pres. MPa	24.5	
Max. Flow L/min	100	250
Max. Relieving Flow L/min	35 ^{★1}	15 ^{★1}
Pressure Adjustment Range	Refer to Model Number Designation	
Coil Resistance	10 Ω	
Hysteresis	3% or less	
Repeatability	1% ^{★2} or less	
Frequency Response	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.

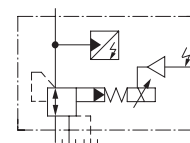
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.



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	$\frac{3}{4}$	3.0
EHRBG-10	ERBGM-10-10	$1\frac{1}{4}$	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. ($\frac{1}{6}$)

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.

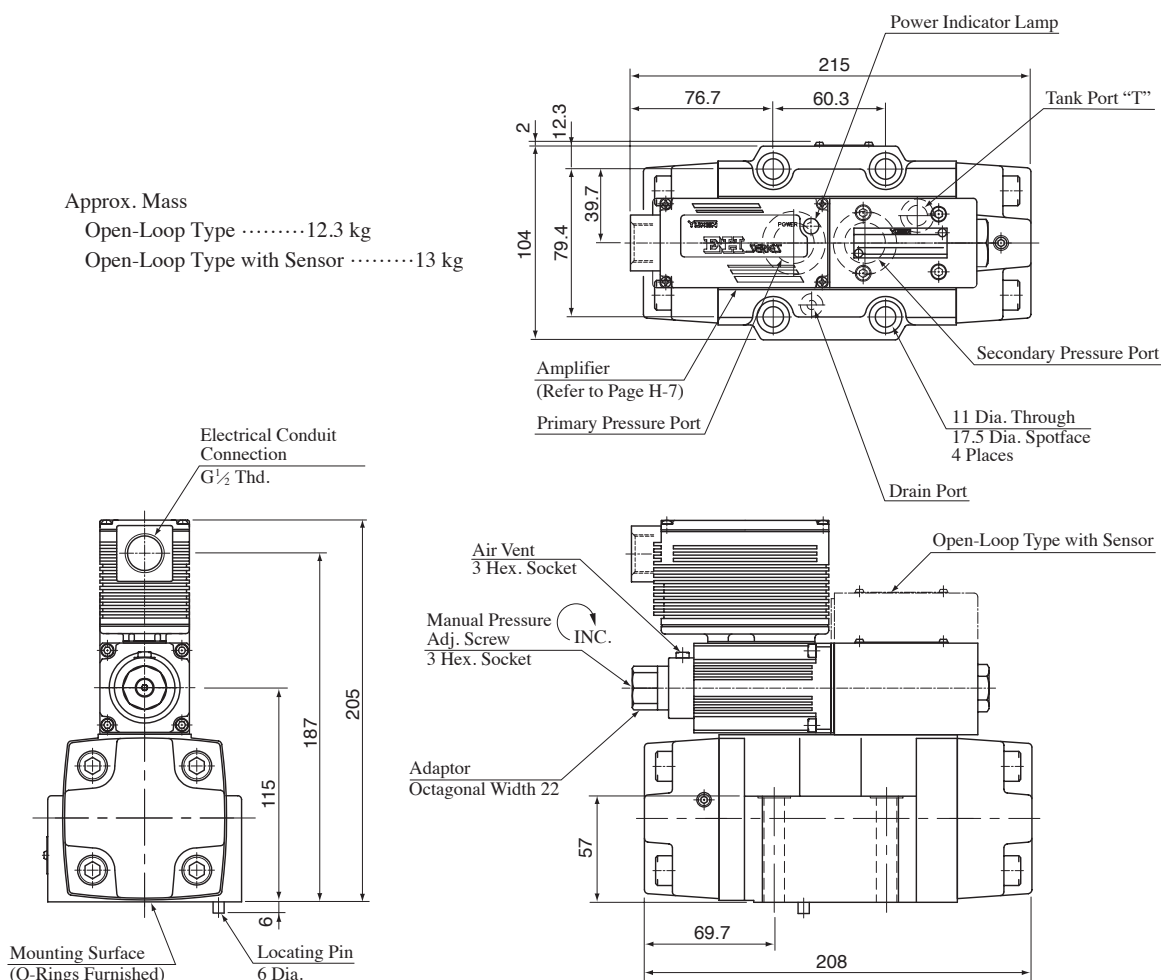
●EHRBG-06- * -50 : Open-Loop Type

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

Approx. Mass

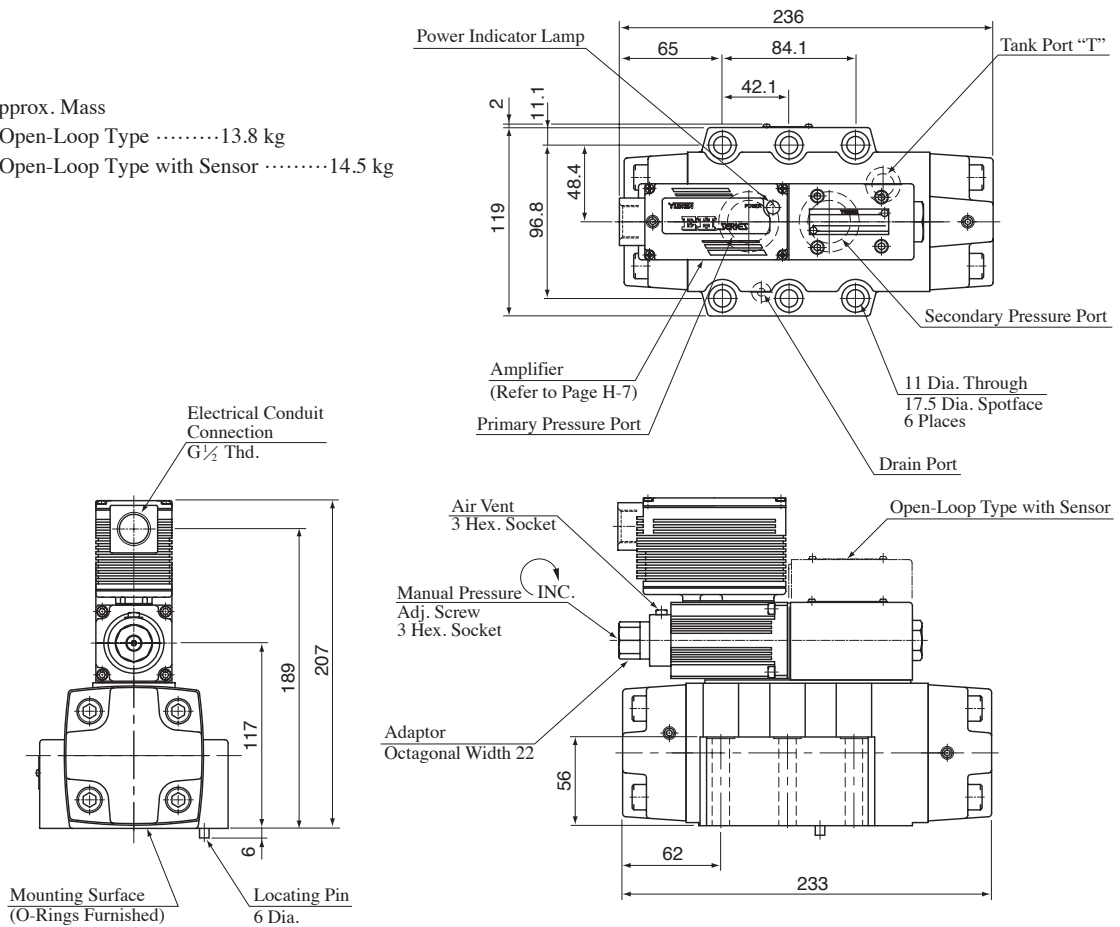
Open-Loop Type 12.3 kg

Open-Loop Type with Sensor 13 kg



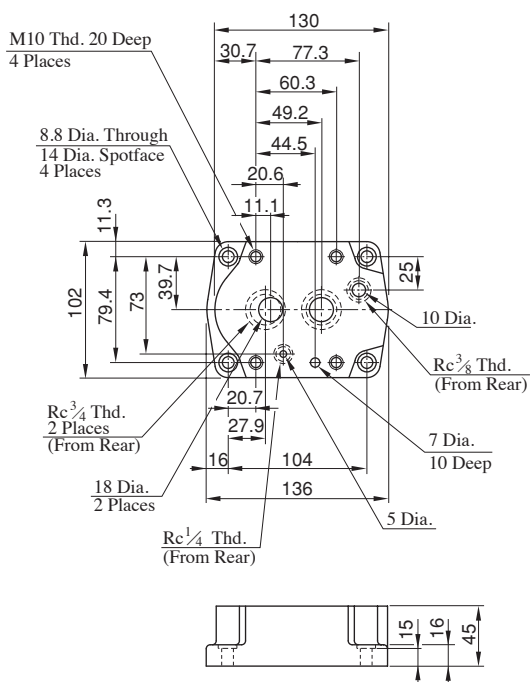
- **EHRBG-10-* -50 : Open-Loop Type**
- **EHRBG-10-* -S-50 : Open-Loop Type with Sensor**

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

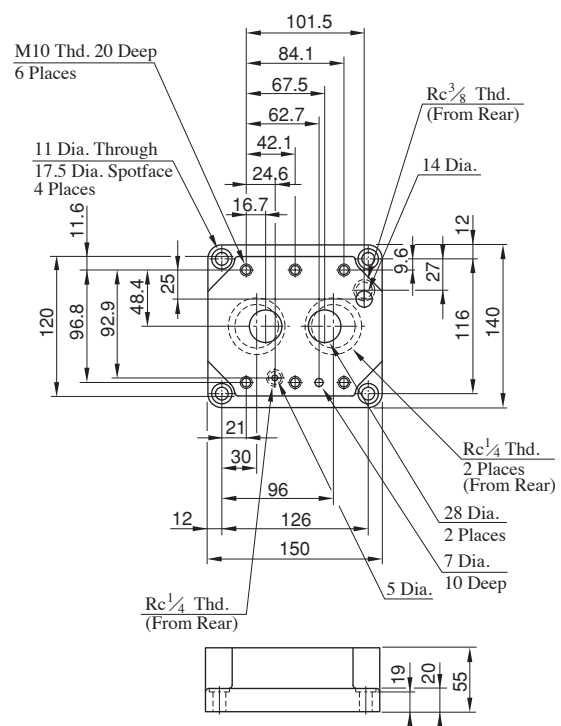


Sub-Plates

ERBGM-06

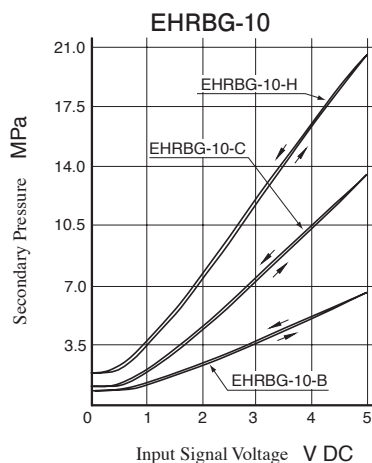
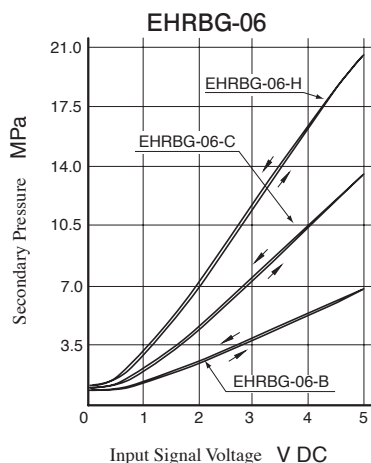


ERBGM-10

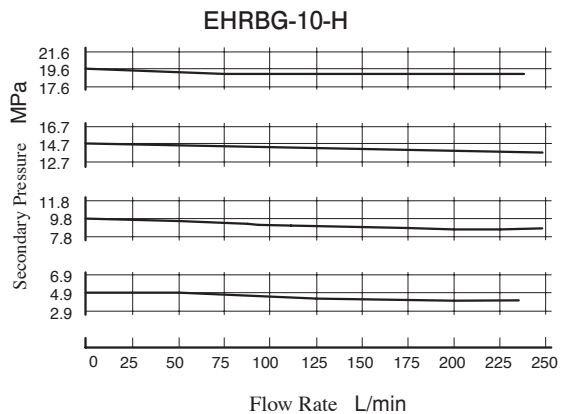
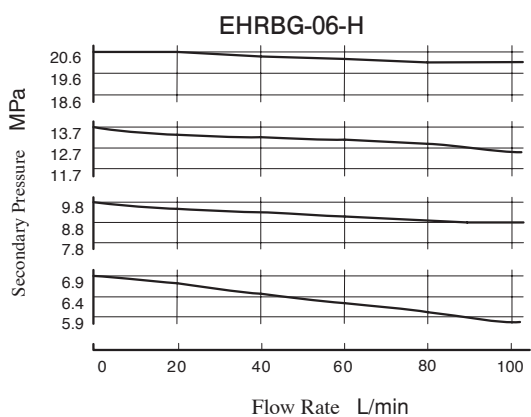
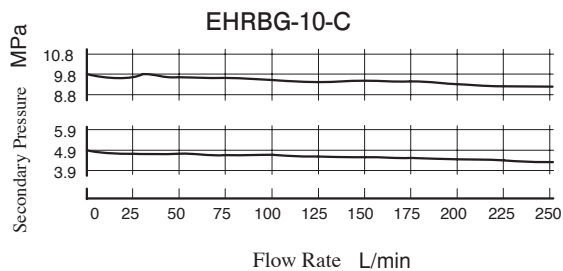
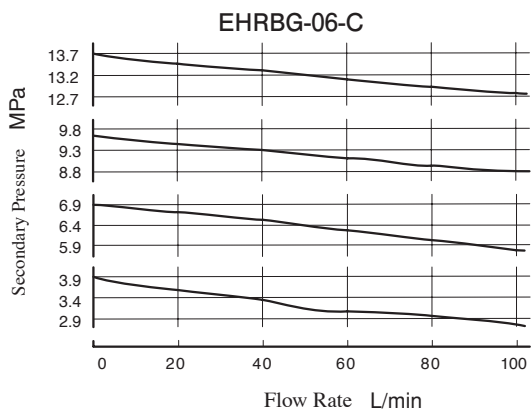
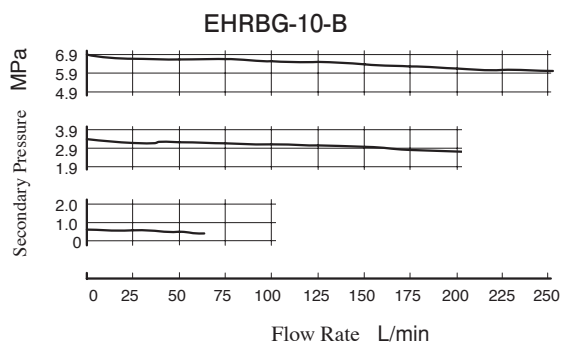
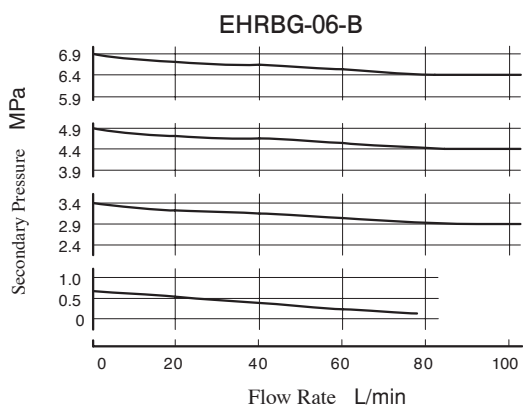


Input Signal Voltage vs. Secondary Pressure

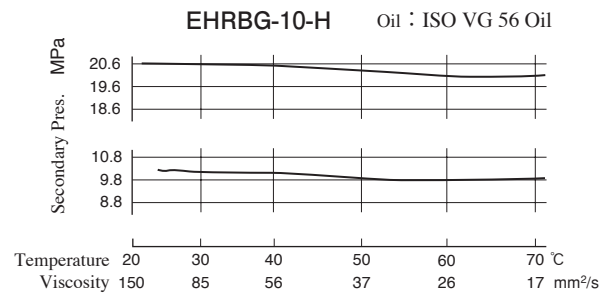
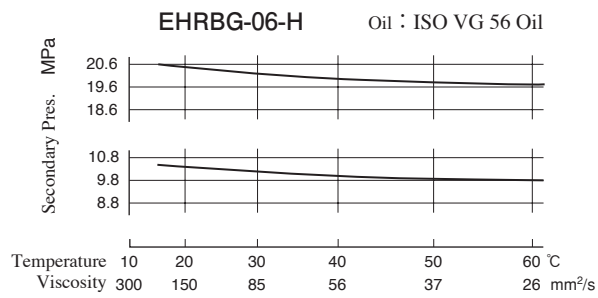
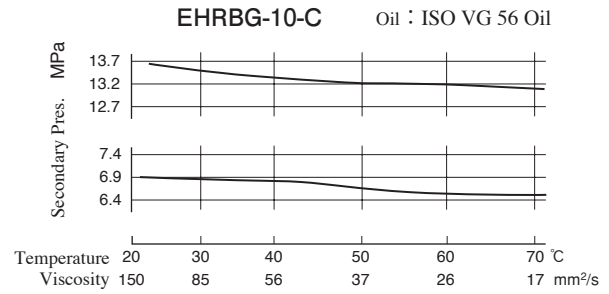
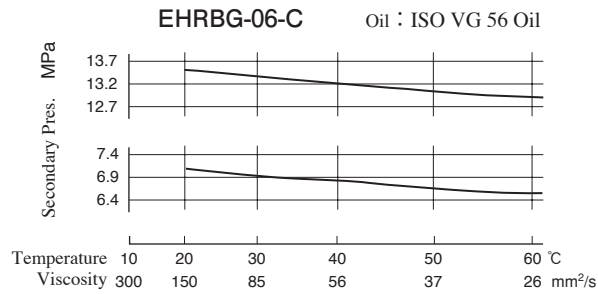
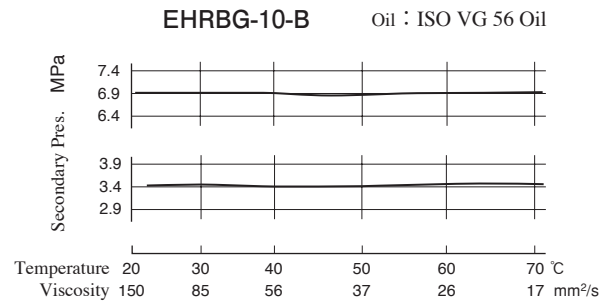
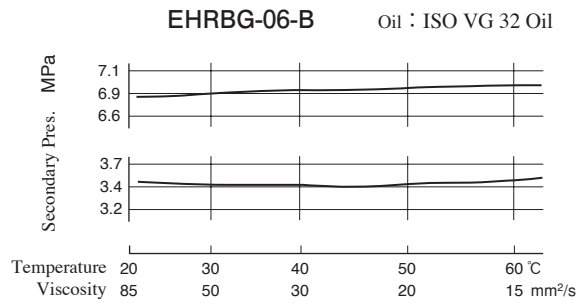
Primary Pressure : 24.5 MPa
Viscosity : 30 mm²/s



Flow vs. Secondary Pressure



Viscosity vs. Secondary Pressure



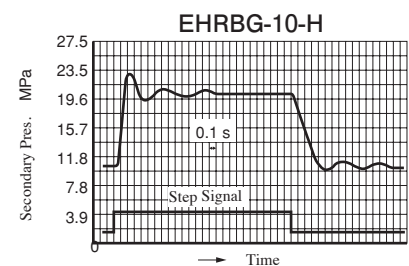
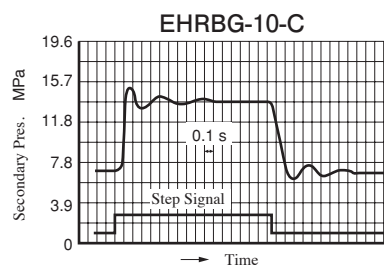
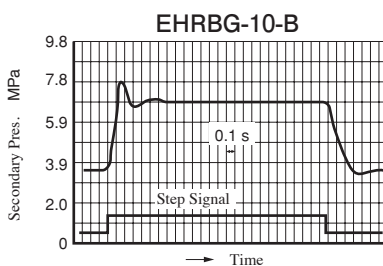
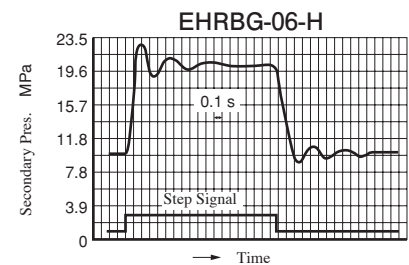
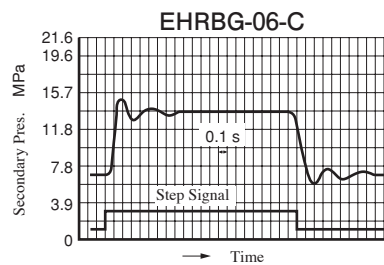
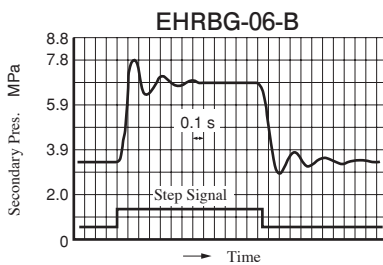
Step Response (Example)

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

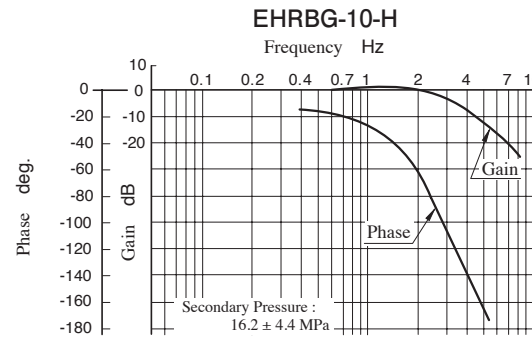
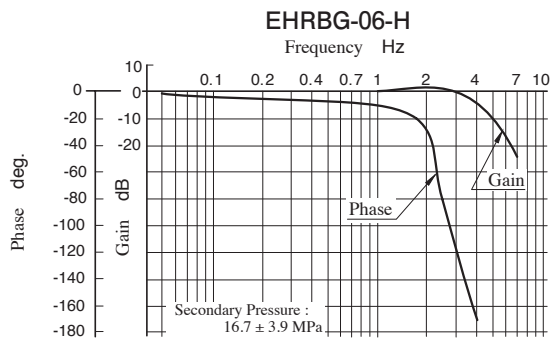
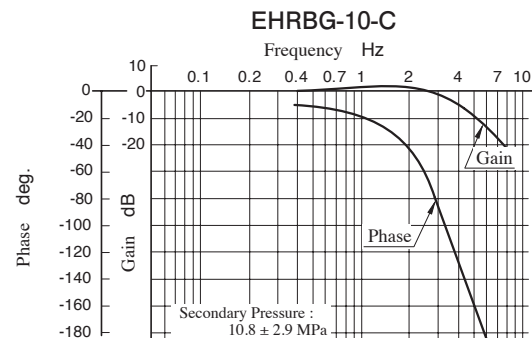
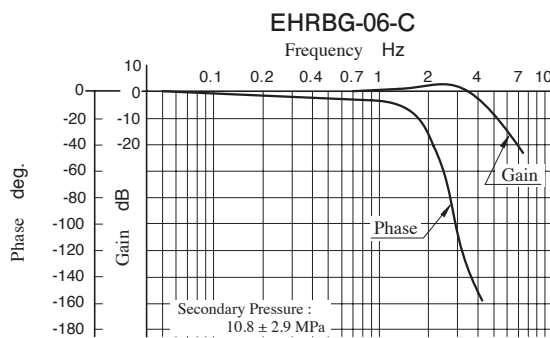
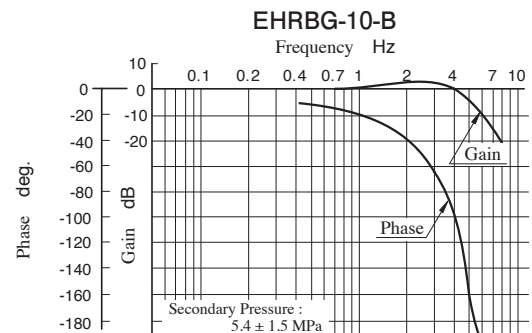
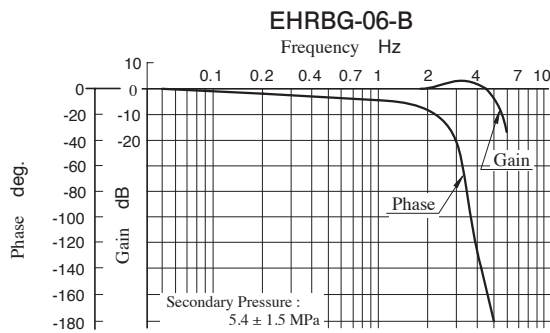
Trapped Oil Volume : 20 L

Viscosity : 30 mm²/s



Frequency Response

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



Proportional Electro-Hydraulic Flow Control (and Check) Valves

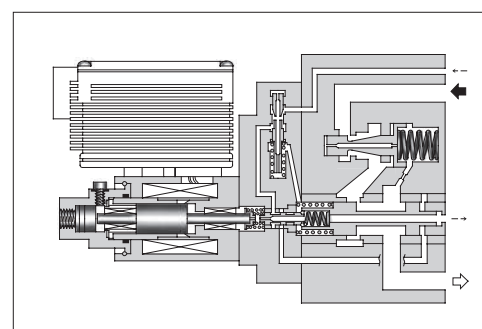
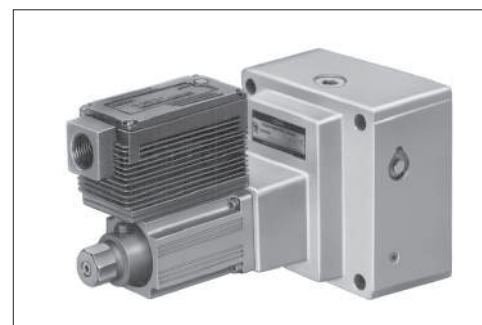
The system flow rate can be controlled remotely as desired by regulating input voltage. Further, since pressure and temperature compensation functions are provided, the preselected flow rate is not affected by pressure (load) or temperature (fluid viscosity).

Specifications

Model Numbers	EHF*G-03- 60 125	EHF*G-06-250
Descriptions		
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 at Transition 2.6	1 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 k Ω	
Ambient Temperature	0 - 50°C (With Circulated Air)	
Mass	10 kg	25 kg

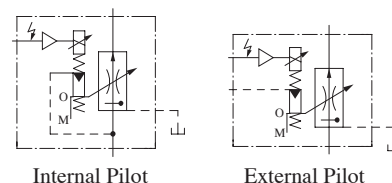
★1. Minimum differential pressure means fine pressure compensation at inlet and outlet port.

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



Graphic Symbols

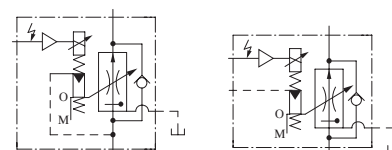
● EHFG



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	G: Sub-Plate Mounting	03	60 : 60 125 : 125	None: Internal Pilot	50
EHFC: Proportional Electro-Hydraulic Flow Control and Check Valve		06	250 : 250	E: External Pilot	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. (√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.

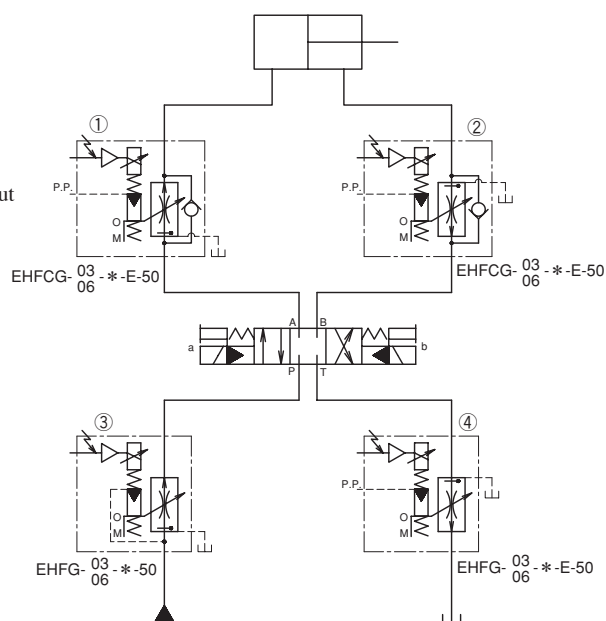
③

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

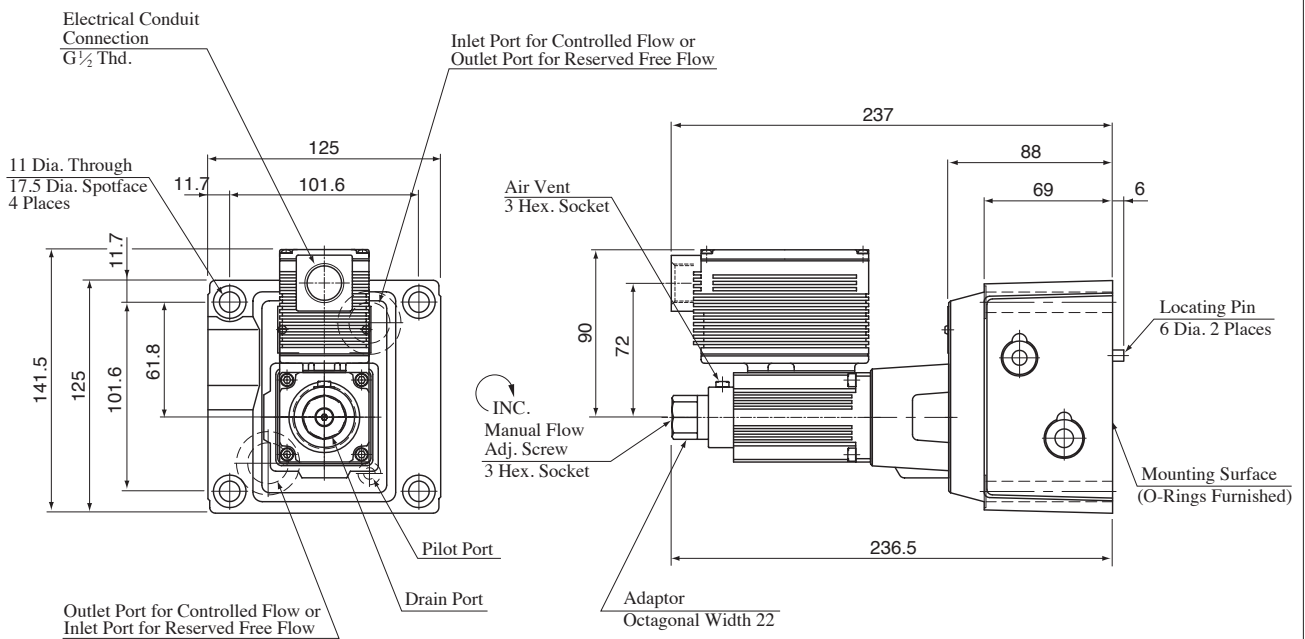
④

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

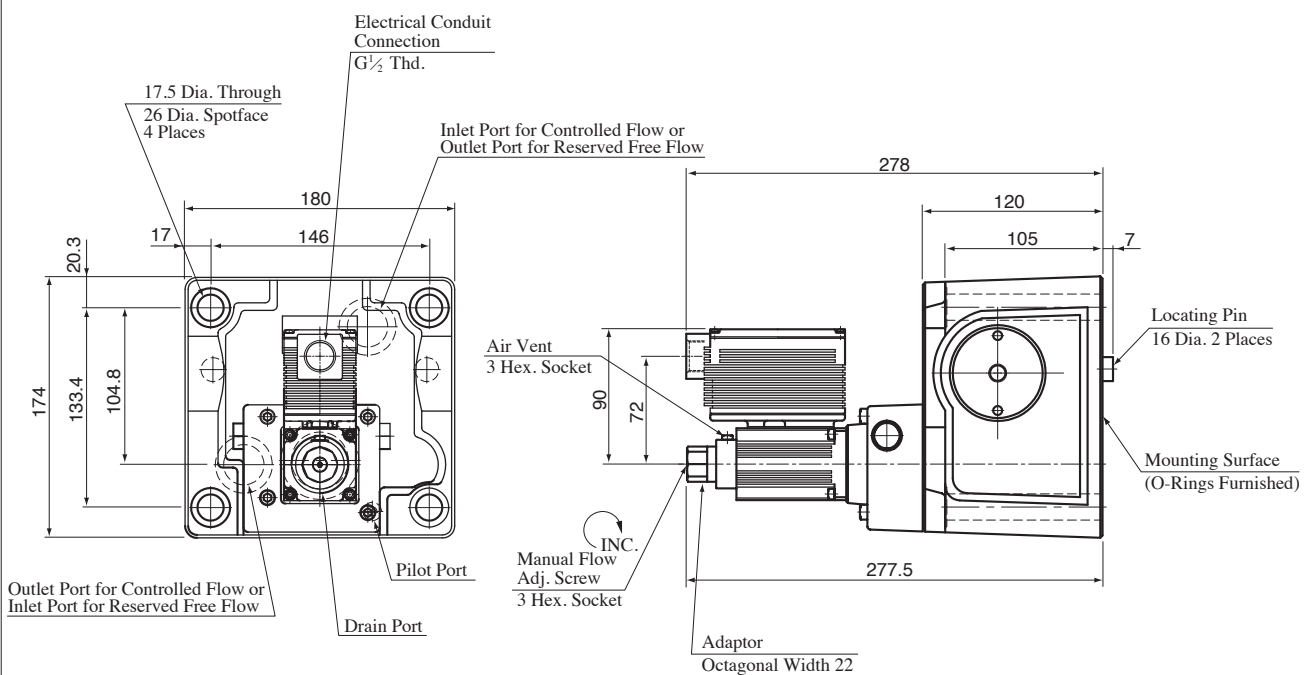
[Example of Circuit]



**EHFG
EHFCG⁻⁰³**

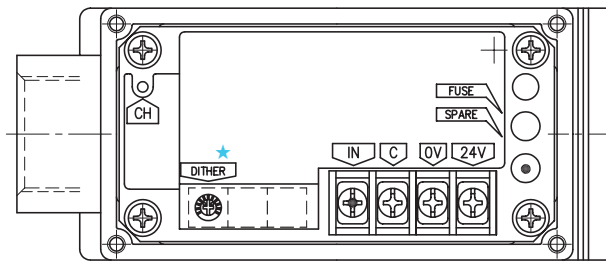


**EHFG
EHFCG⁻⁰⁶**



Detail of Amplifier

Connecting Terminals

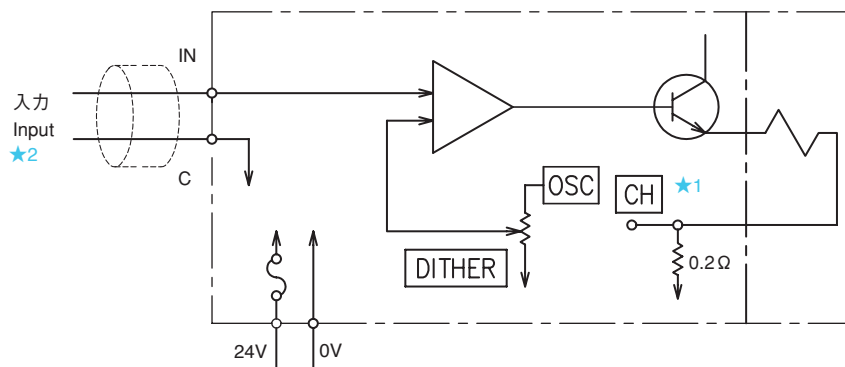


★DITHER

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)

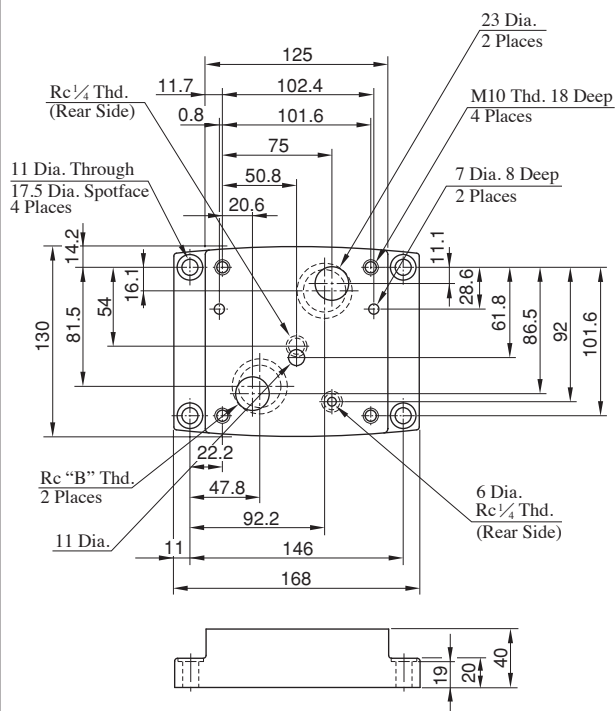
Circuit Schematic



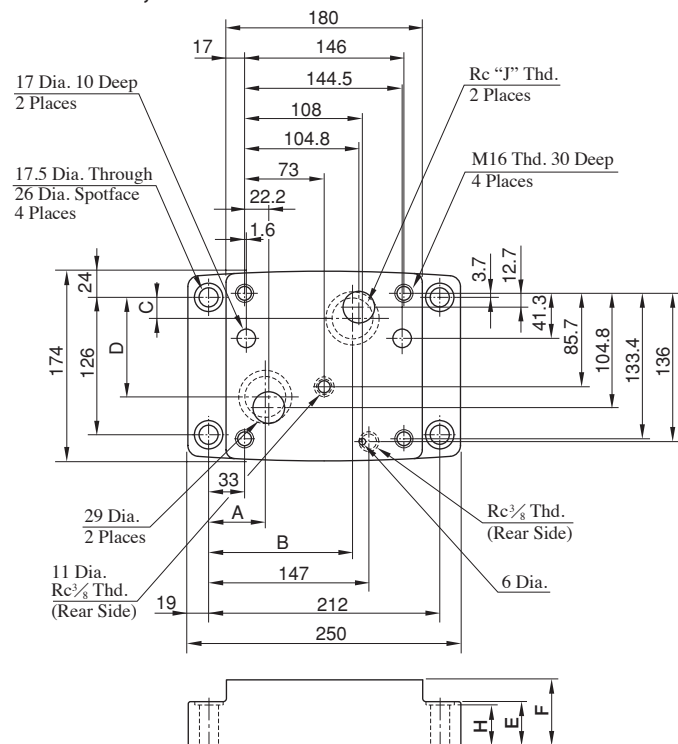
★1. For “CH” terminal, external instruments should have input impedance of more than 10 kΩ.

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

EFGM-06X, 06Y



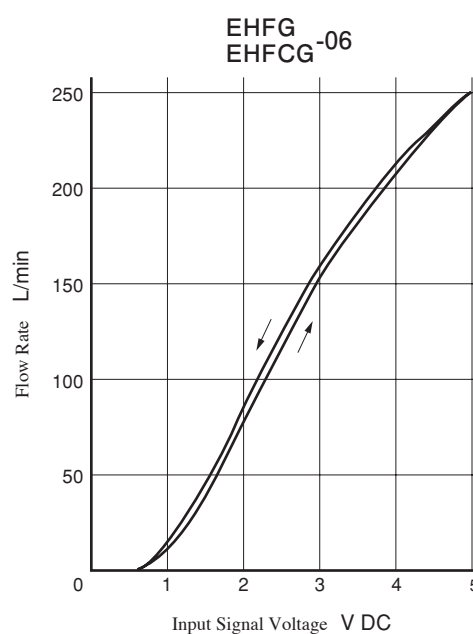
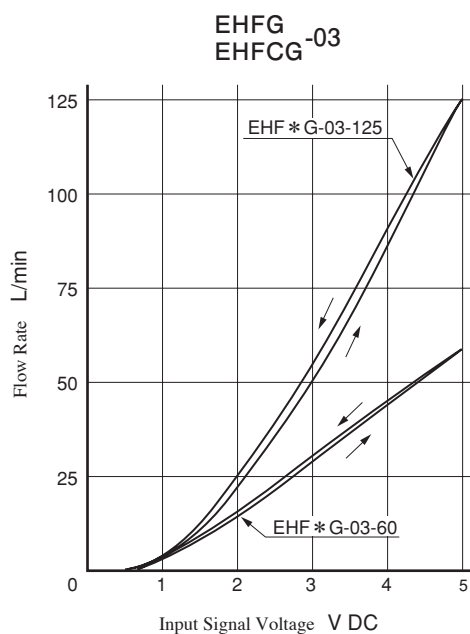
Sub-Plate Model Numbers	B
EFGM-03Y-30	3/4
EFGM-03Z-30	1



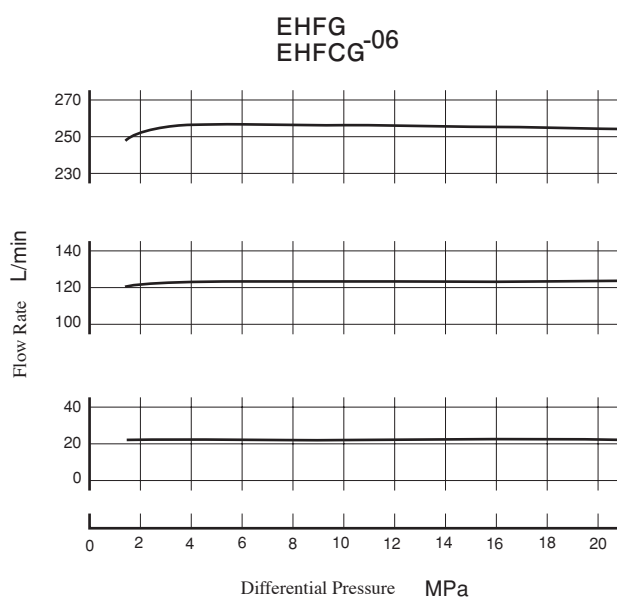
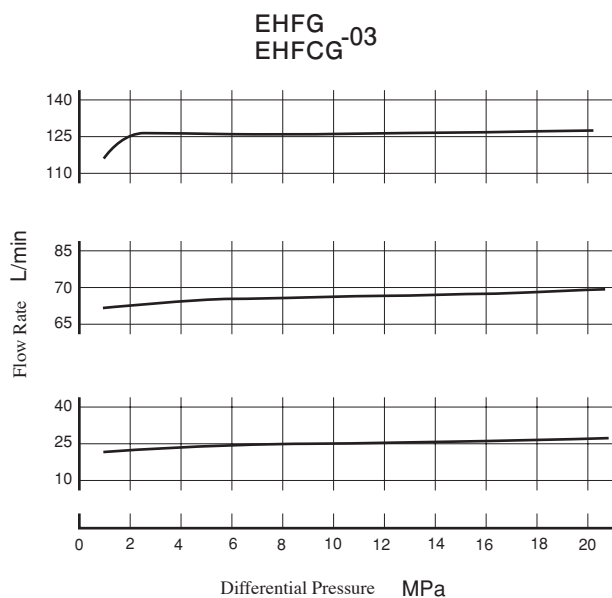
Sub-Plate Model Numbers	A	B	C	D	E	F	H	J
EFGM-06X-30	55.2	137.8	14.3	101.1	35	45	34	1
EFGM-06Y-30	52	132	19.3	91.3	40	60	39	1 1/4

■ Input Signal Voltage vs. Flow Rate

Viscosity : 30 mm²/s

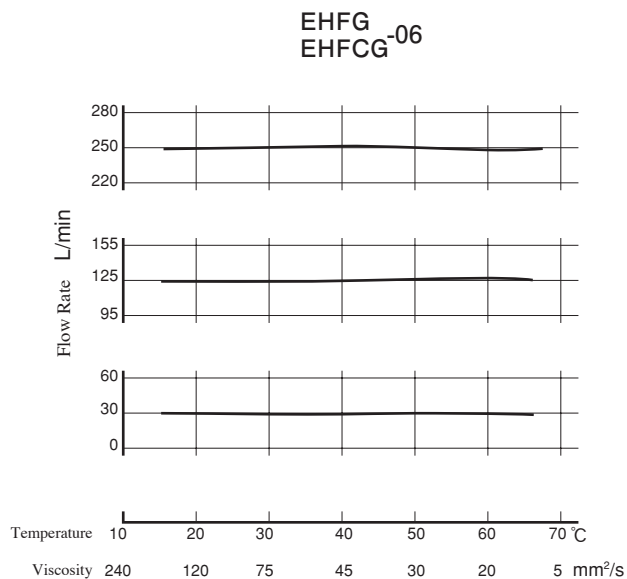
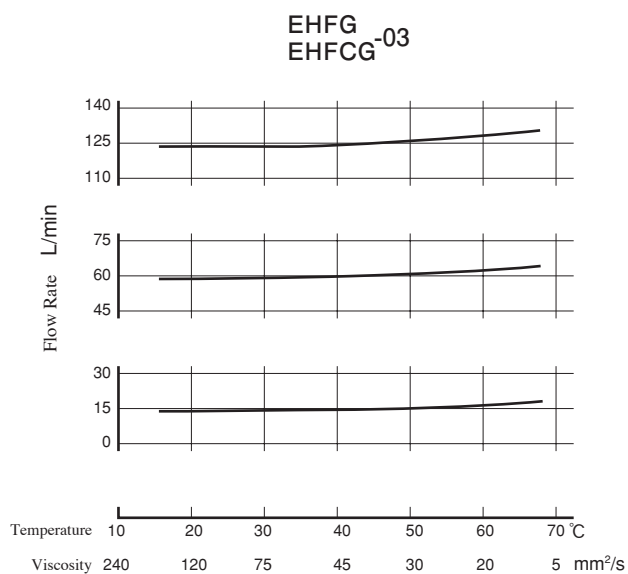


Differential Pressure vs. Flow Rate



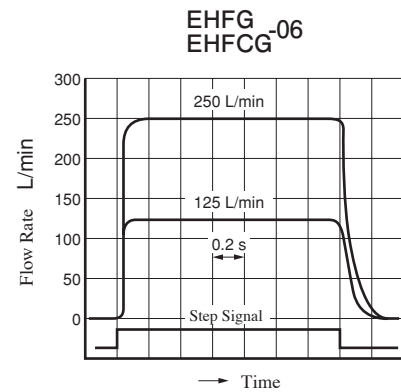
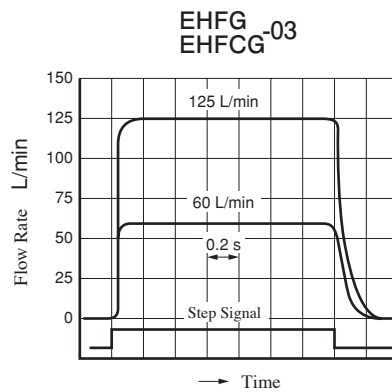
Viscosity vs. Flow Rate

Oil : ISO VG 46 Oil



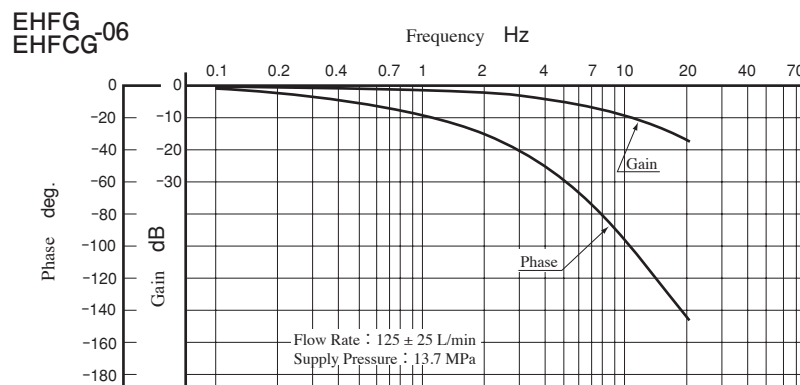
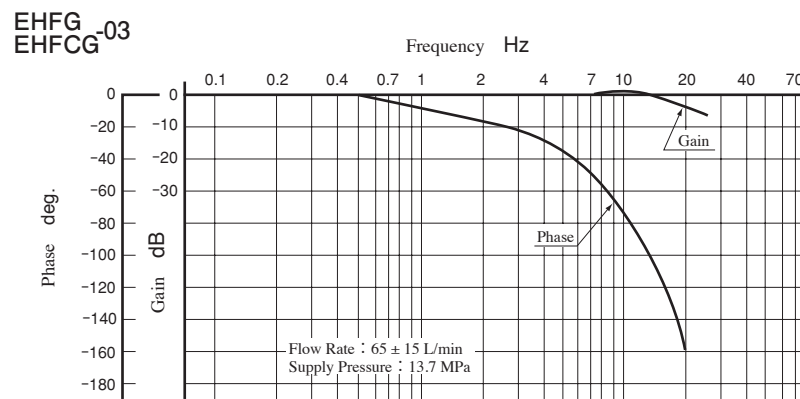
Step Response (Example)

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.



Frequency Response

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



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

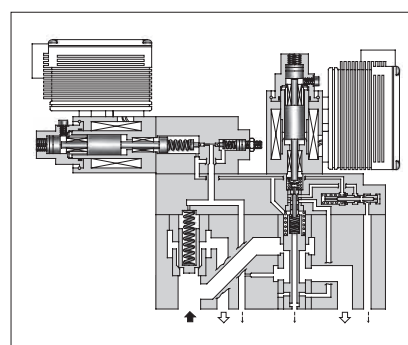
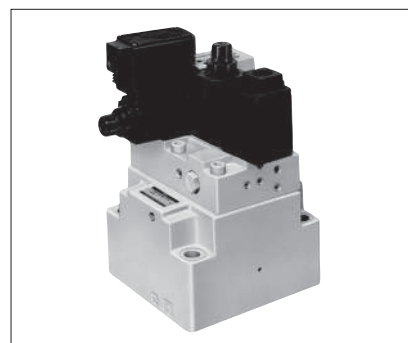
Model Numbers		EHFBG-03-*	EHFBG-06-250	EHFBG-10-500
Descriptions				
Max. Operating Pressure	MPa	24.5	24.5	24.5
Max. Flow	L/min	60 : 60 125 : 125	250	500
Metered Flow Capacity	L/min	60 : 1-60 125 : 1-125	2.5-250	5-500
Min. Pilot Pressure	MPa	1.5	1.5	1.5
Pilot Flow	at Normal	1	1	1
	at Transition	3	4	6
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	Adj. Range:C	1.2-15.7	1.4-15.7
		MPa	Adj. Range:H	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.

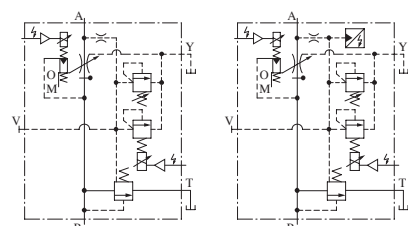
Model Number Designation

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	None: Internal Pilot E : External Pilot	None: Open-Loop	50
		06	250				50
		10	500	C, H : See Specifications		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.

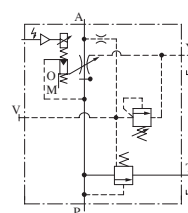


Graphic Symbols



Models with Proportional Pilot Relief Valve

Models with Proportional Pilot Relief Valve and Sensor



Models without Proportional Pilot Relief Valve



External Pilot Pres. Connection

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. ($\frac{1}{16}$)
- 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.

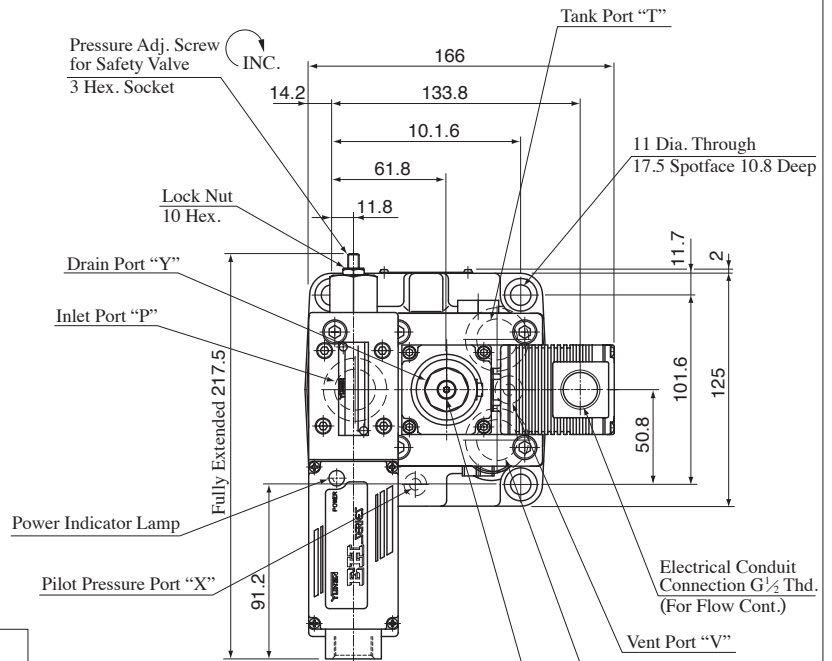
● Safety Valve Pressure Setting

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

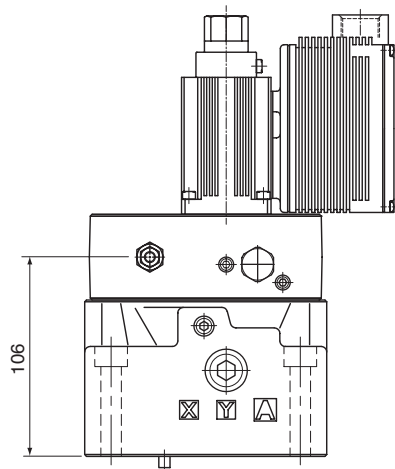
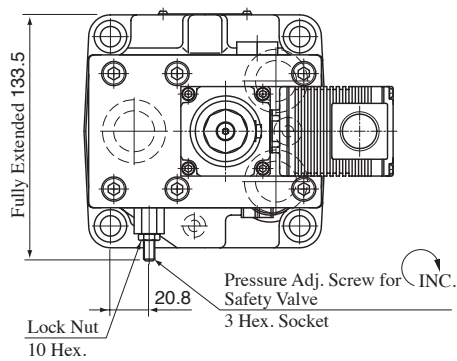
Therefore, adjust this pressure setting as needed to suit the pressure used.

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

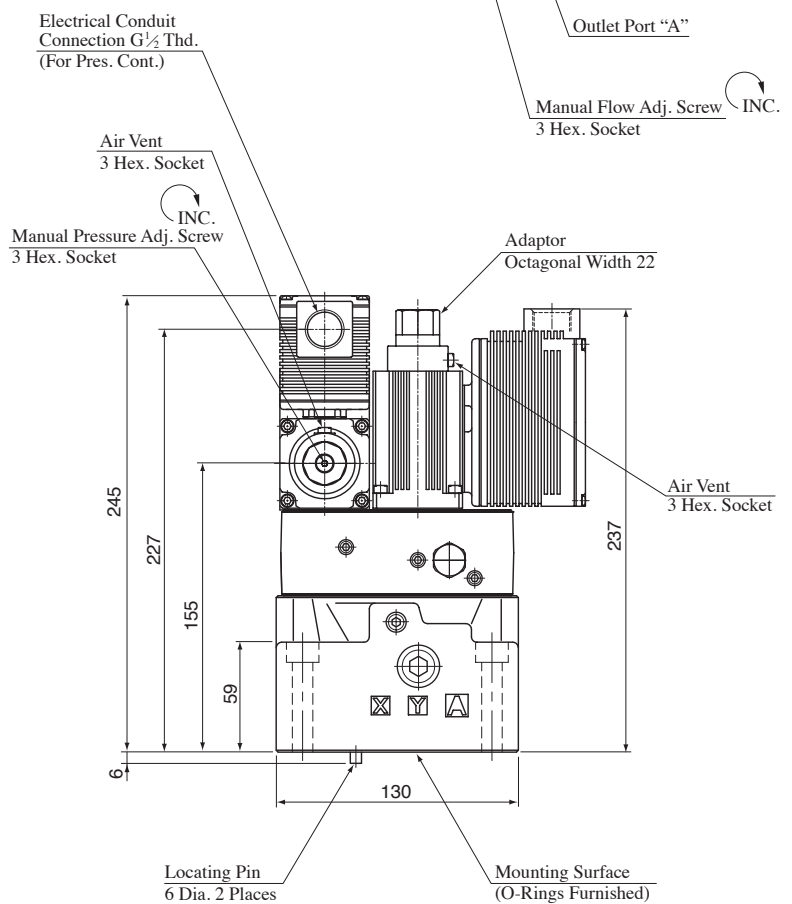
EHFBG-03-⁶⁰/₁₂₅-^C/_H (-E)-* -50



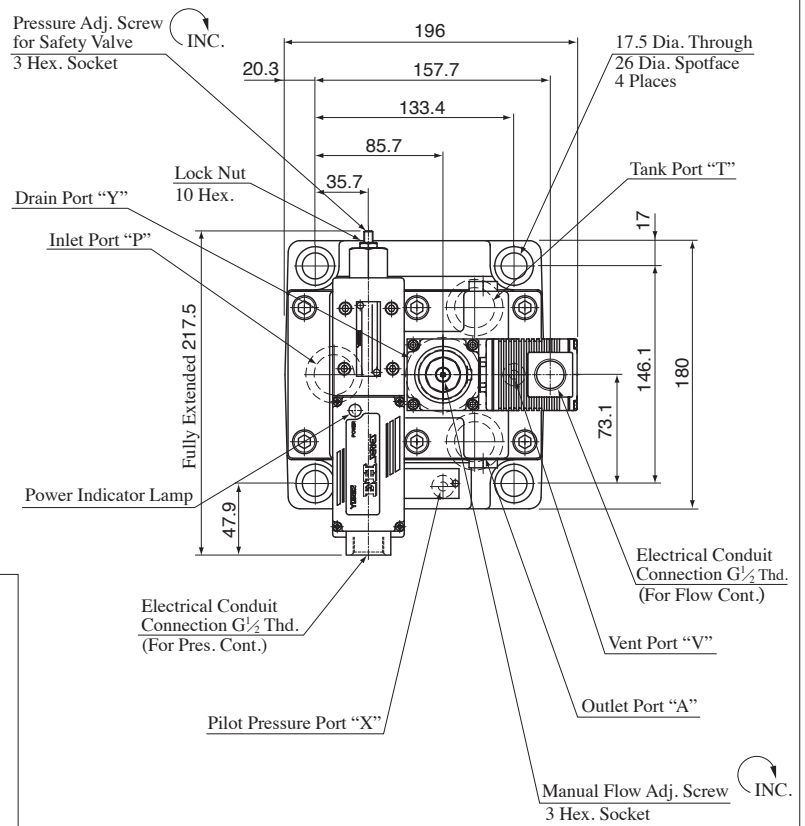
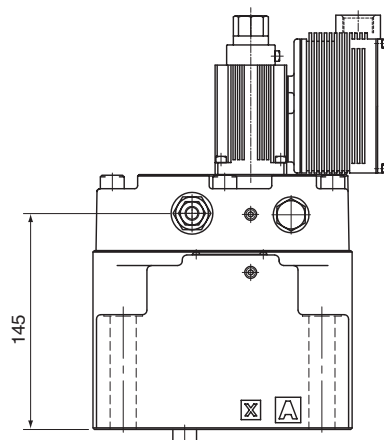
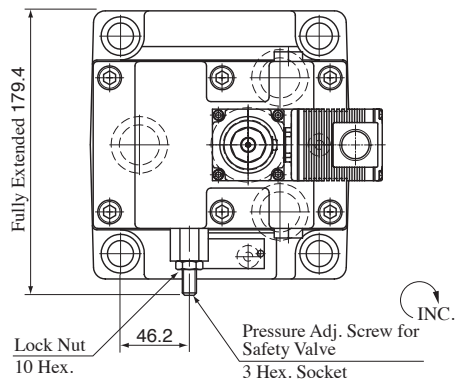
EHFBG-03-⁶⁰/₁₂₅ (-E)-50



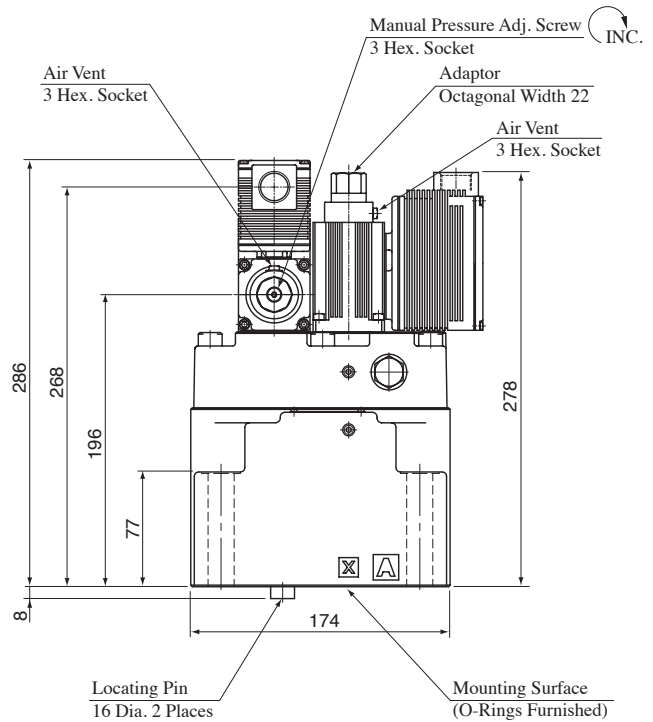
For other dimensions, refer to right drawing.
Mass 14.8 kg



Mass 17 kg
(Models with Sensor 17.7 kg)

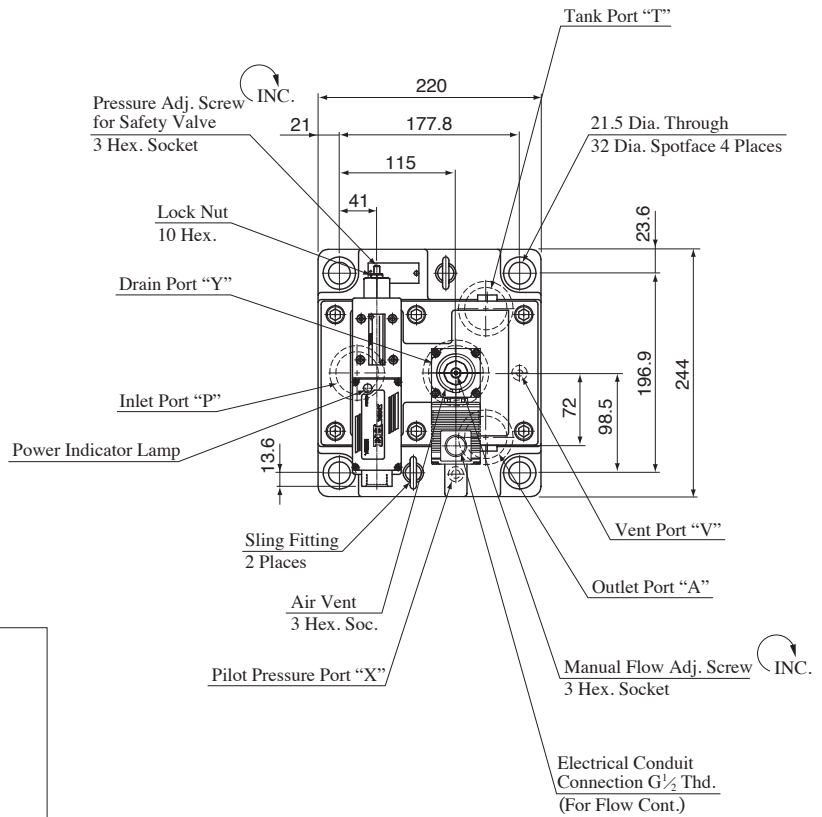
EHFBG-06-250-C_H(-E)-* -50

EHFBG-06-250(-E)-50


For other dimensions, refer to right drawing.
Mass 21.8 kg

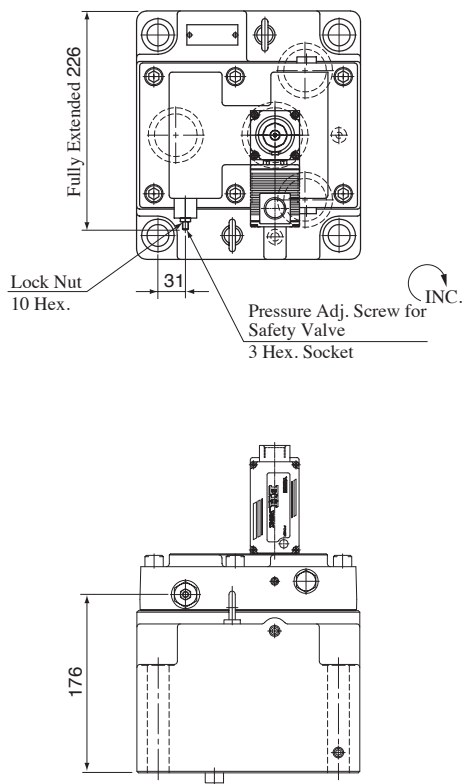


Mass 24 kg
(Models with Sensor 24.7 kg)

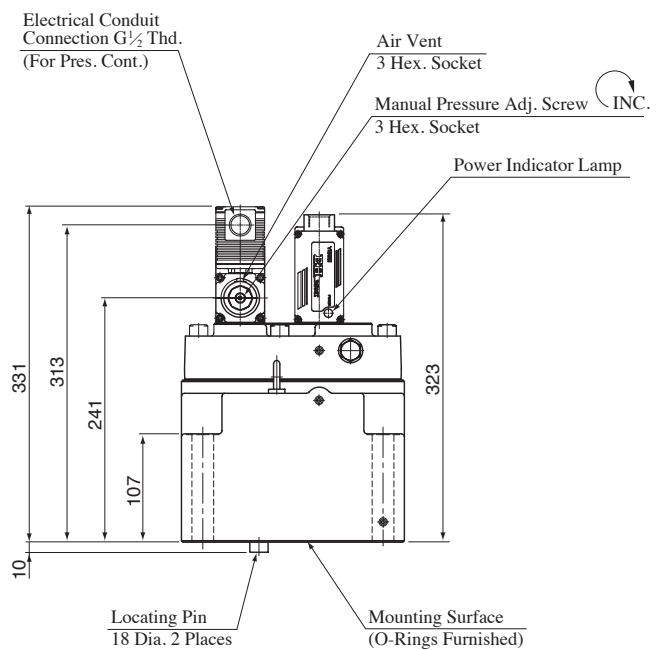
EHFBG-10-500-^C_H(-E)-*-50



EHFBG-10-500(-E)-50



For other dimensions, refer to right drawing.
Mass 61.8 kg

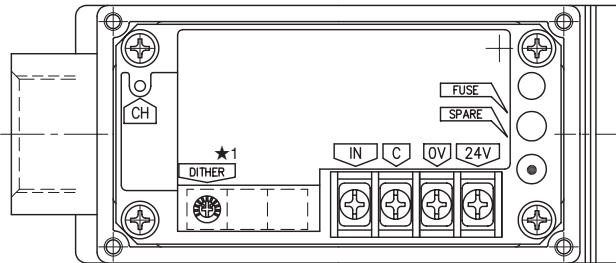


Mass..... 64 kg
(Models with Sensor..... 64.7 kg)

Detail of Amplifier

Connecting Terminal

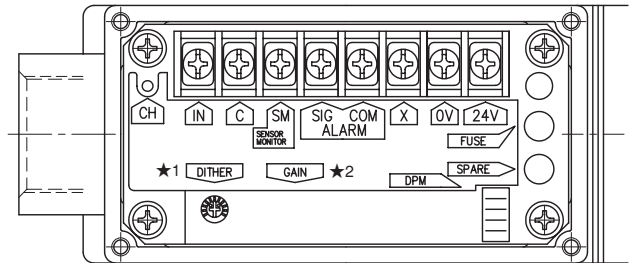
- Flow Control
- Pressure Controls...Open-Loop Type



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.

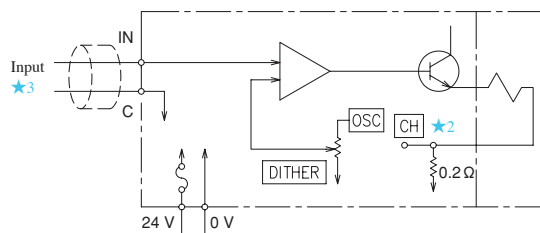
Pressure Controls...Open-Loop Type with Sensor



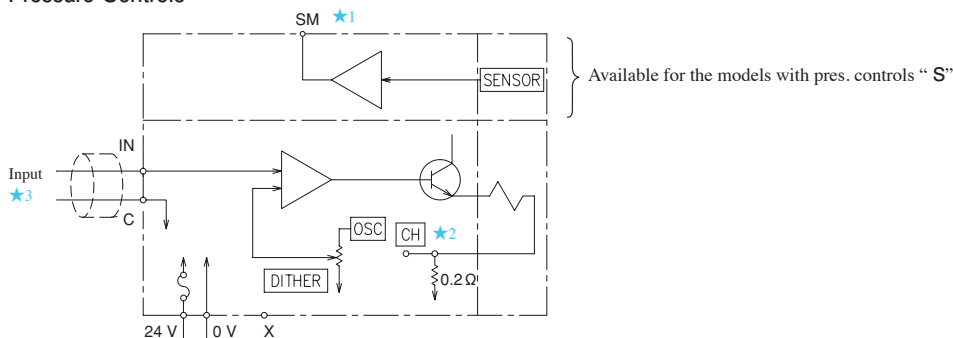
Terminal		Name	
IN		Input Signal (+)	
C		Input Signal (COM)	
SM		Sensor Monitor (to C)	
ALARM	SIG	}	(Open)
	COM		
X		(Open)	
0 V		}	Power Supply
24 V			
CH		Output Current Check (to C)	

Circuit Schematic

Flow Controls



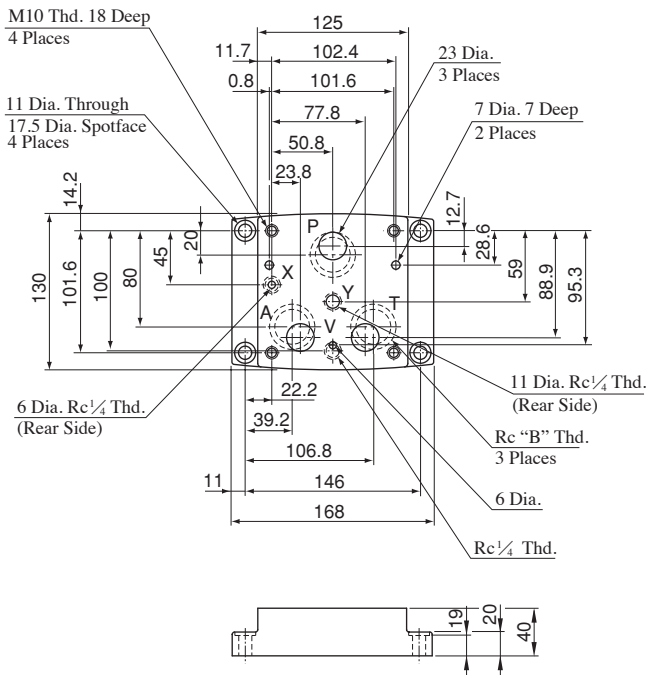
Pressure Controls



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

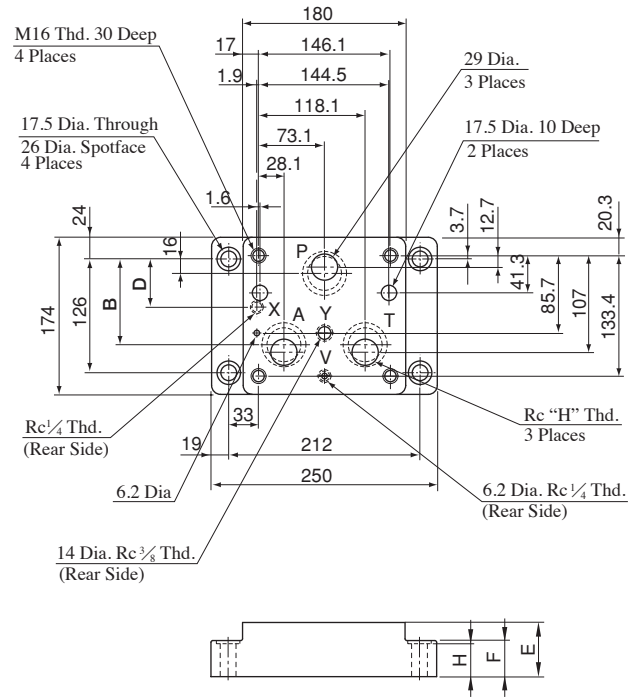
Sub-Plate

EFBGM-03Y-20 03Z



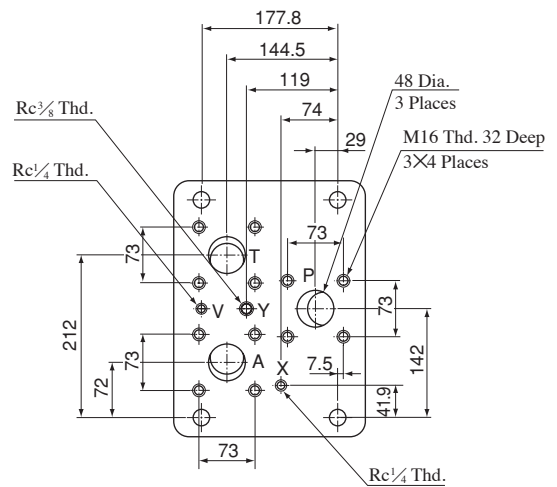
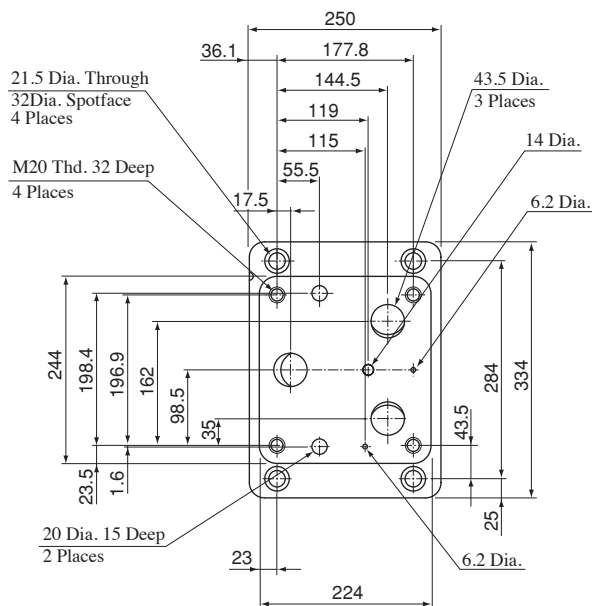
Sub-Plate Model Numbers	B
EFBGM-03Y-20	3/4
EFBGM-03Z-20	1

EFBGM-06X-20 06Y



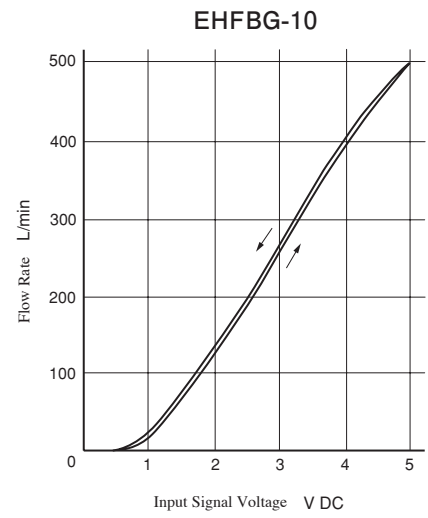
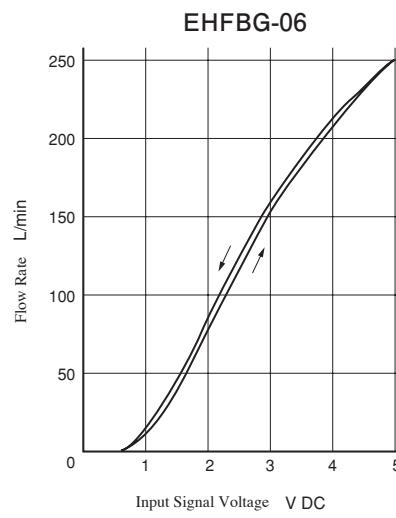
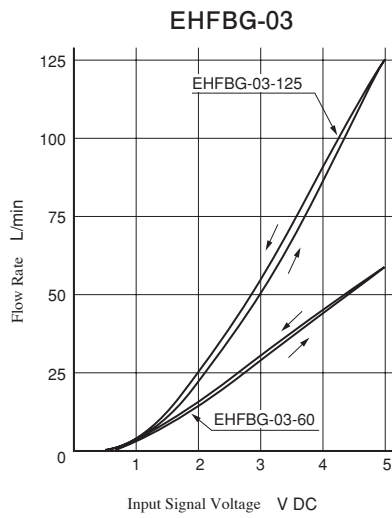
Sub-Plate Model Numbers	B	D	E	F	H
EFBGM-06X-20	107	67	45	35	1
EFBGM-06Y-20	95	57	60	40	1 1/4

EFBGM-10Y-20



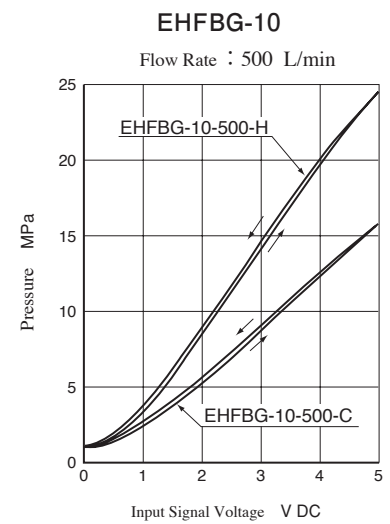
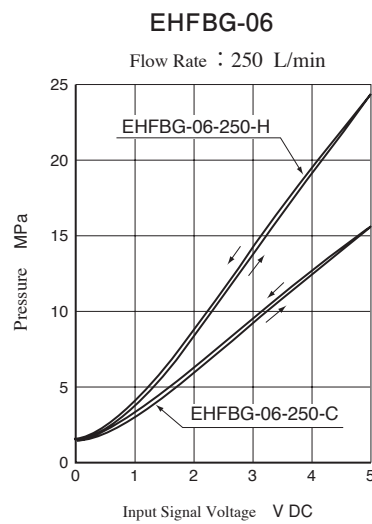
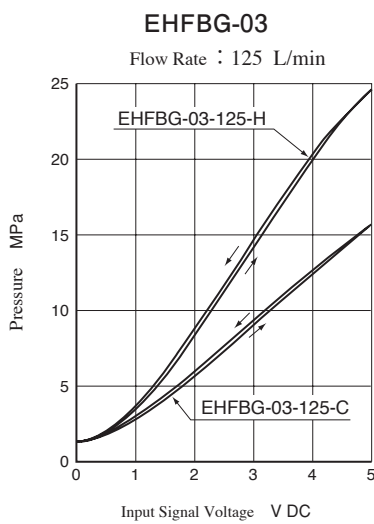
Input Signal Voltage vs. Flow

Viscosity : 30 mm²/s



Input Signal Voltage vs. Pressure

Viscosity : 30 mm²/s

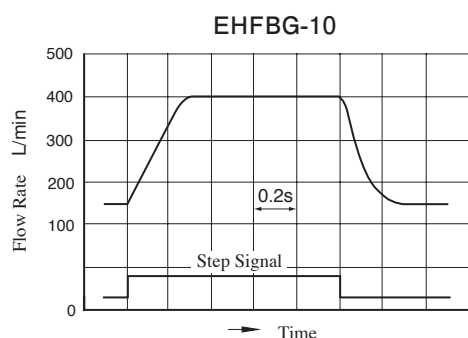
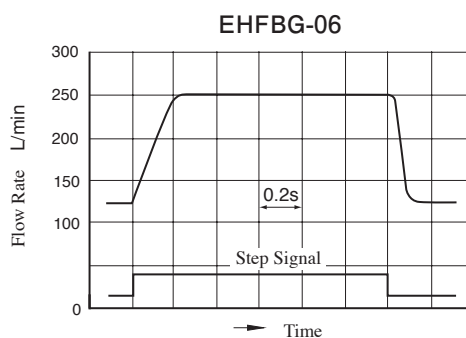
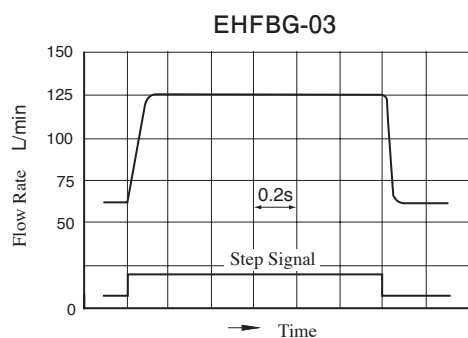


Step Response (Flow Controls)

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.

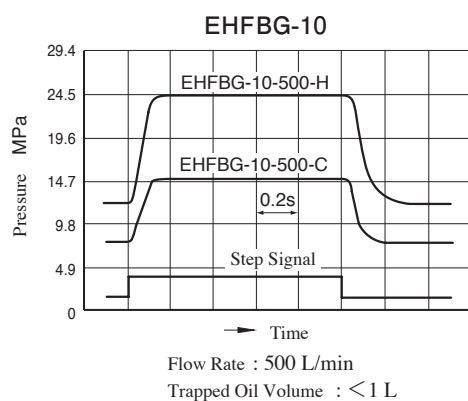
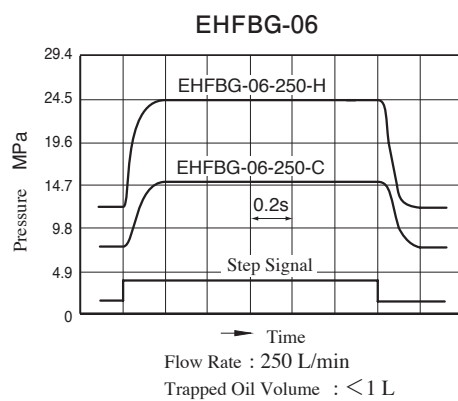
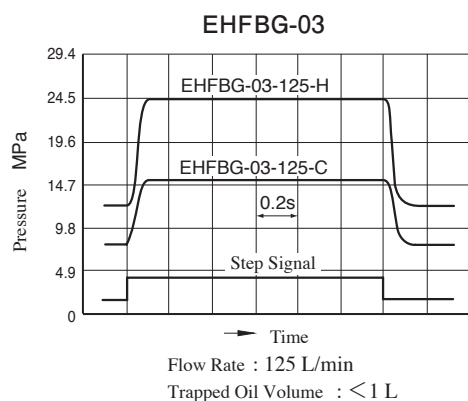


Step Response (Pressure Controls)

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.



High Flow Series

Proportional Electro-Hydraulic Flow Control and Relief Valves

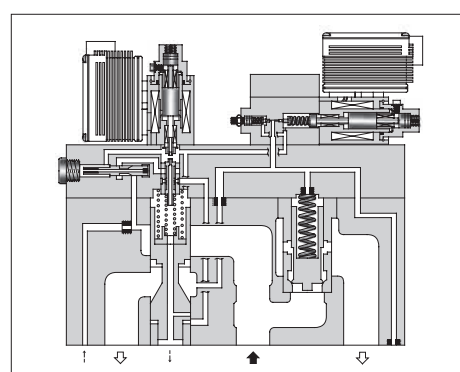
This flow control and relief valve is a energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.

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.

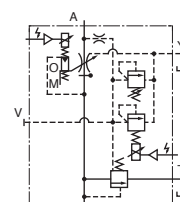
Specifications

Model Numbers		EHFBG-03-250	EHFBG-06-500
Descriptions			
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	

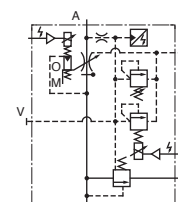
- ★1. The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.
- ★2. The specifications for pressure controls is applied to models with pilot relief valve.
(Ex. EHFBG-03-125-C- *-50)
- ★3. Pressure adjustment range of the valves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



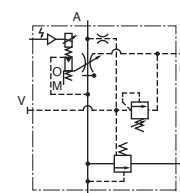
Graphic Symbols



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 C, H : See Specifications	None: Internal Pilot E: External Pilot	None: Open-Loop S: Open-Loop with Sensor	50
		06	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-03-250	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.

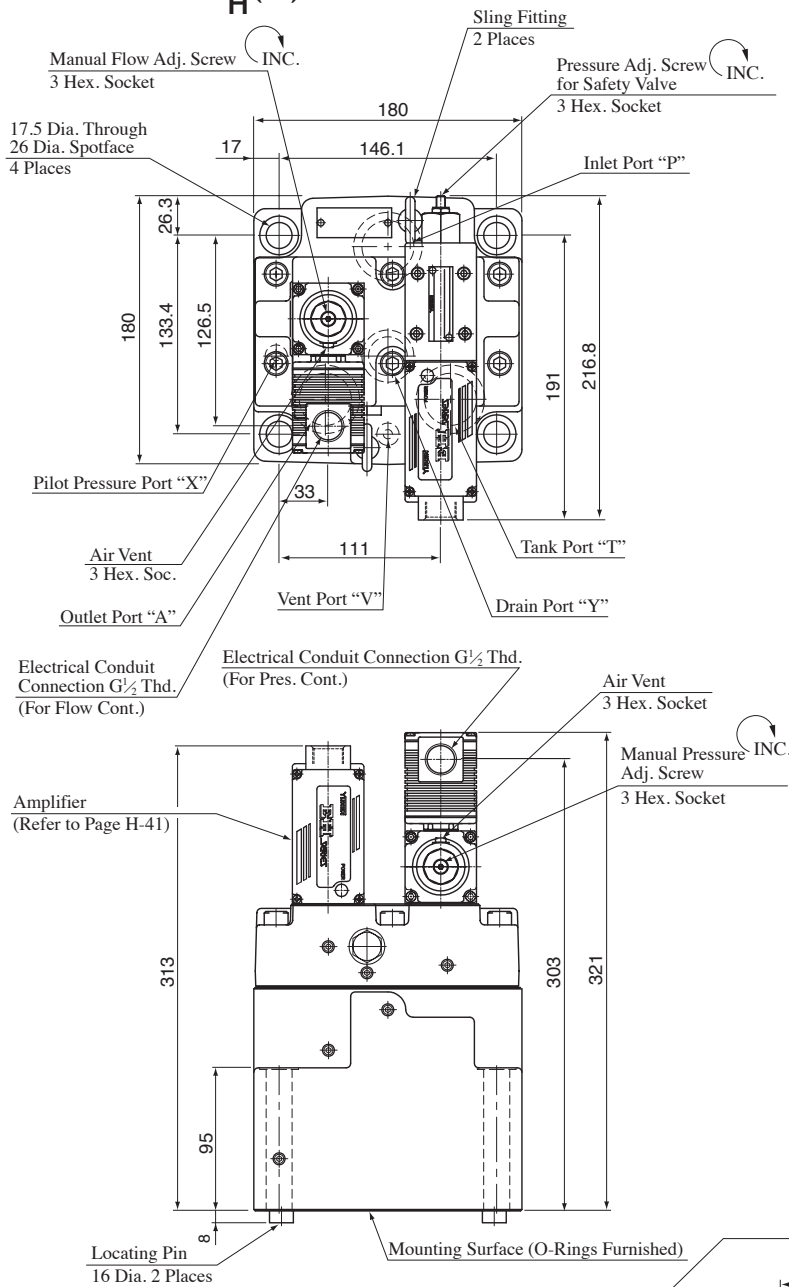
● Safety Valve Pressure Setting

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-06-500-^C_H(-E)-* -50



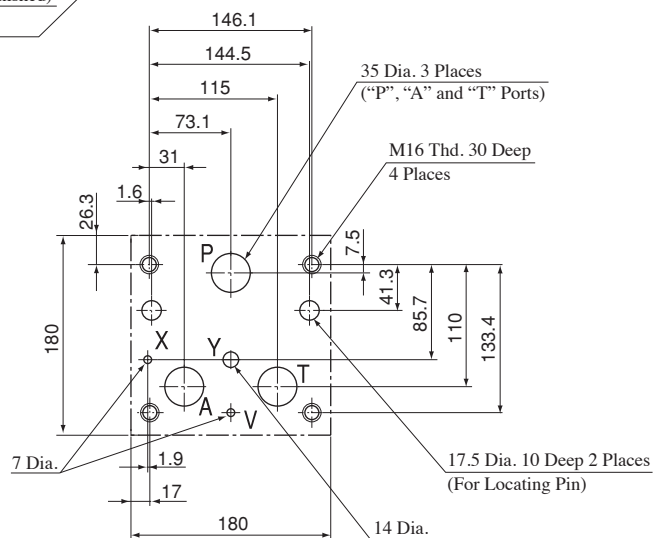
Dimensions of Valve Mounting Surface

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

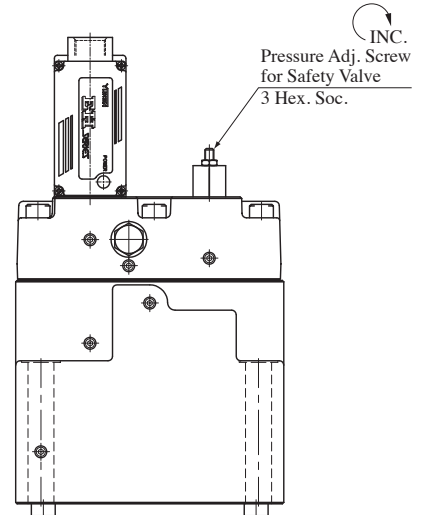
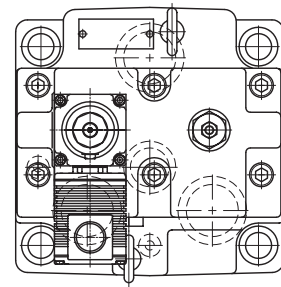
Mounting Interchangeability with Conventional Models

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.)



EHFBG-06-500(-E)-* -50



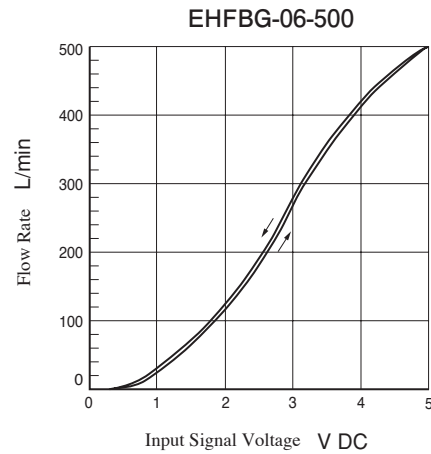
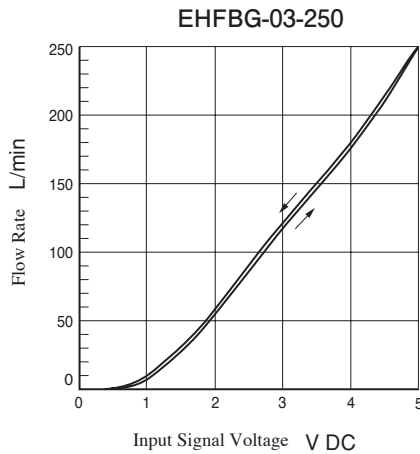
Mass 33.8 kg

For other dimensions, refer to left drawing.

Mass 36 kg

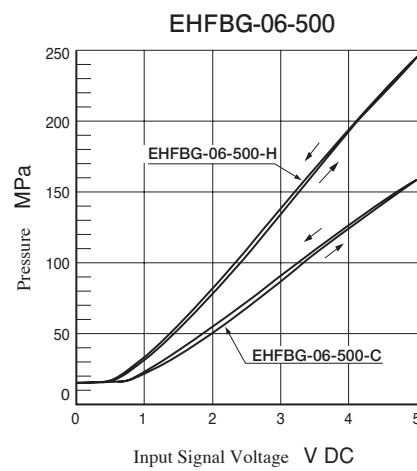
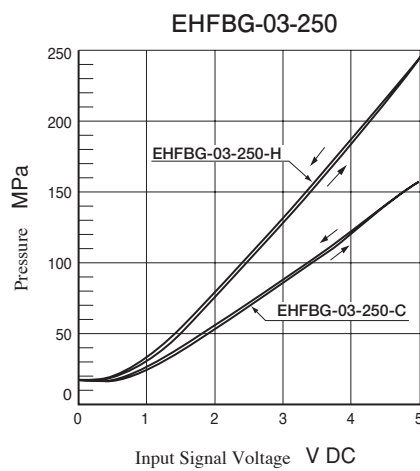
Input Signal Voltage vs. Flow

Viscosity : 30 mm²/s



Input Signal Voltage vs. Pressure

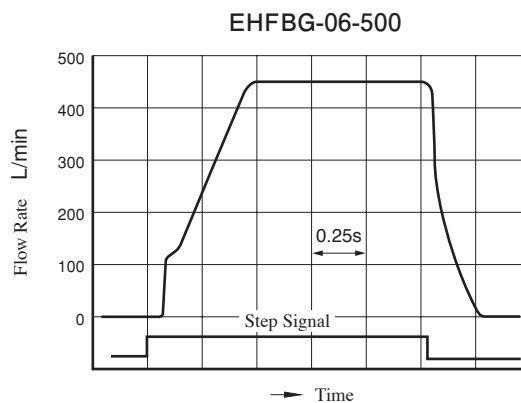
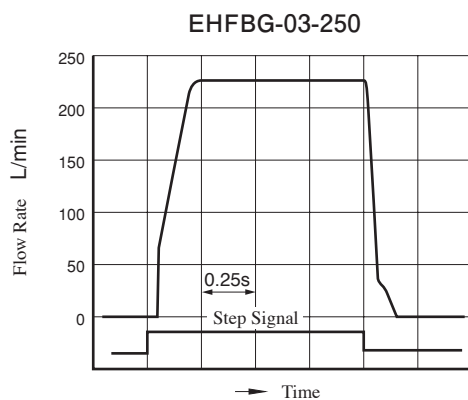
Viscosity : 30 mm²/s



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.

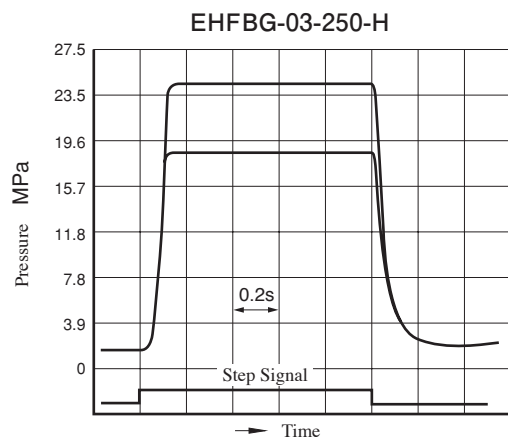
Viscosity : 30 mm²/s



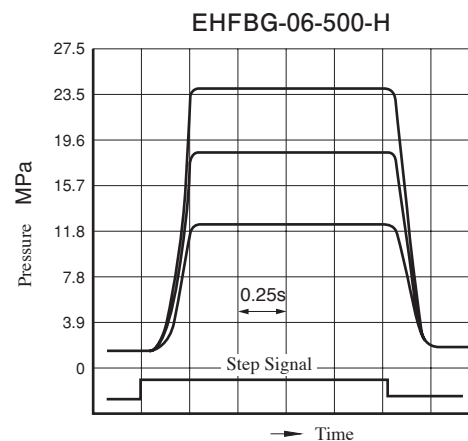
Step Response (Pressure Controls)

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



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



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

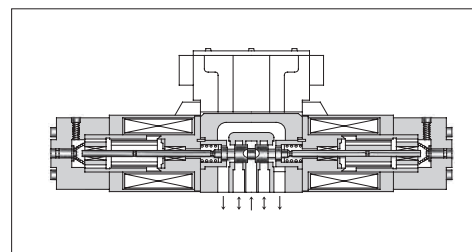
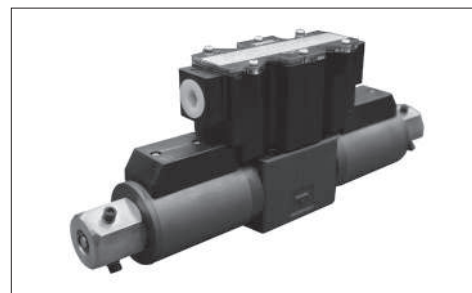
Proportional Electro-Hydraulic Directional and Flow Control Valves

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

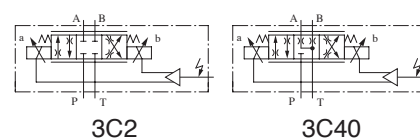
Model Numbers		EHDFG-01	EHDFG-03
Descriptions			
Max. Operating Pressure	MPa	25	25
Max. Tank Line Back Pres.	MPa	7	7
Rated Flow [Valve ΔP 7 MPa]	L/min	30	60
Hysteresis		5% or less	
Repeatability		1% [★] or less	
Frequency Response		20 (Phase: -90°)	17 (Phase: -90°)
Coil Resistance		10.5 Ω	8.0 Ω
Supply 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 k Ω 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 k Ω	10 k Ω
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.

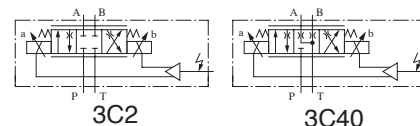


Graphic Symbols

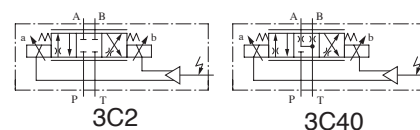
● Meter-in • Meter-out Control



● 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	30
		03	60	3C40	X : Meter-in Y : Meter-out	30

★ 1. Spool type shown under the neutral position.

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

Accessories

Mounting Bolts

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

Sub-Plate

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

★ Refer to Page H-8.

● Sub-plates are available. Specify sub-plate model from the table left. When sub-plates are not used, the mounting surface should have a good machined finish. ($\sqrt{\text{V}}$)

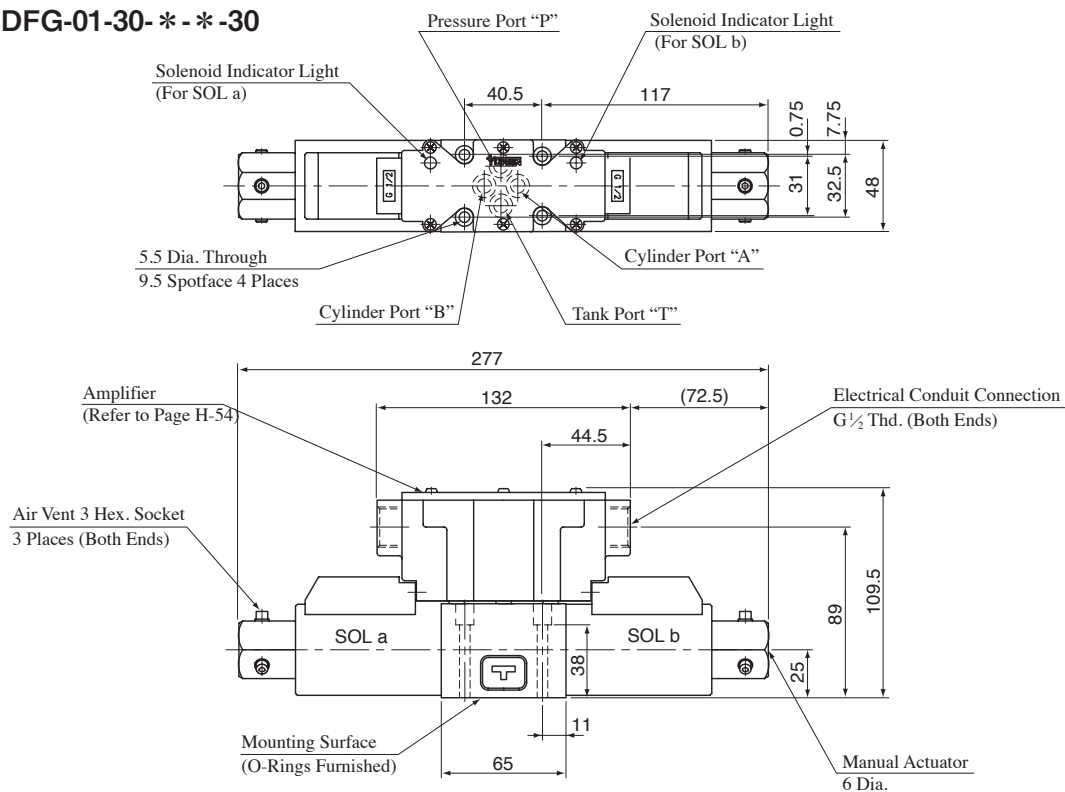
Instructions

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.

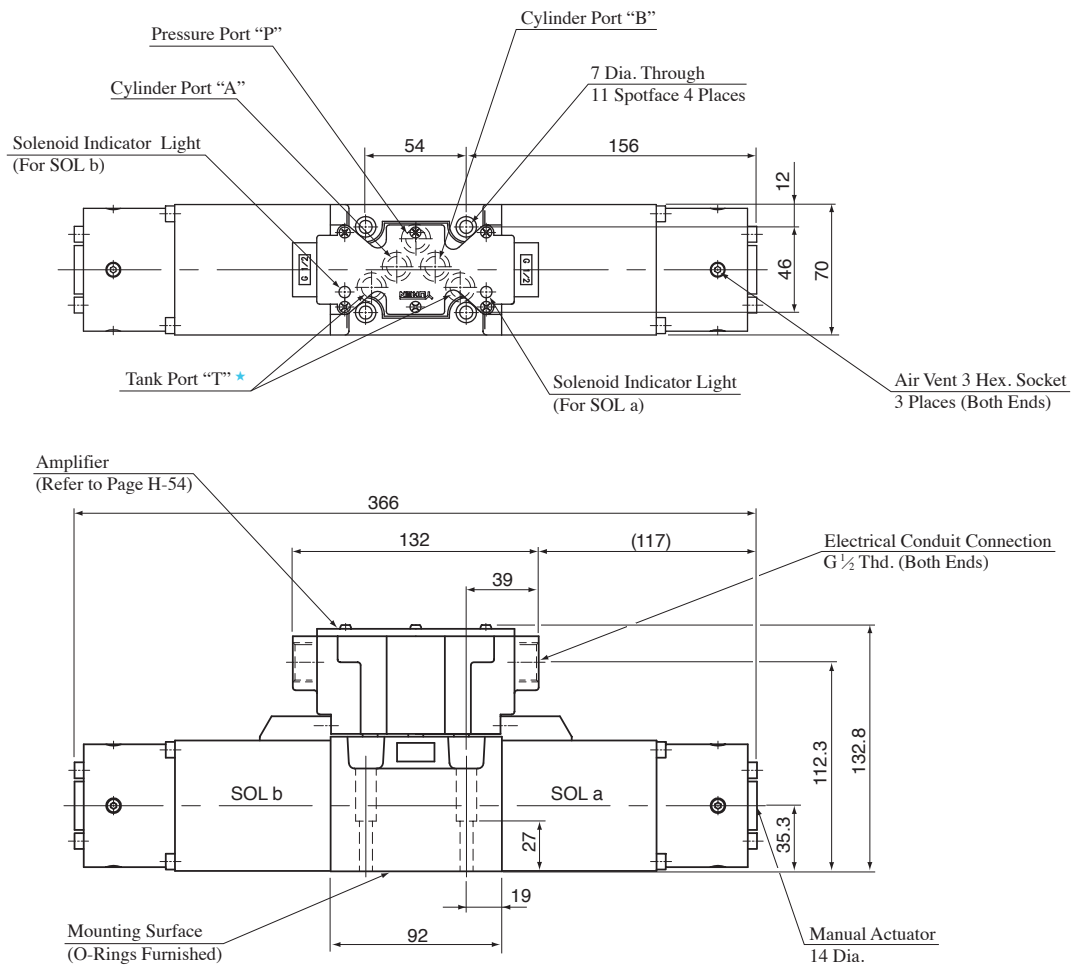
The pipe from the tank port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

EHDFG-01-30-*-30

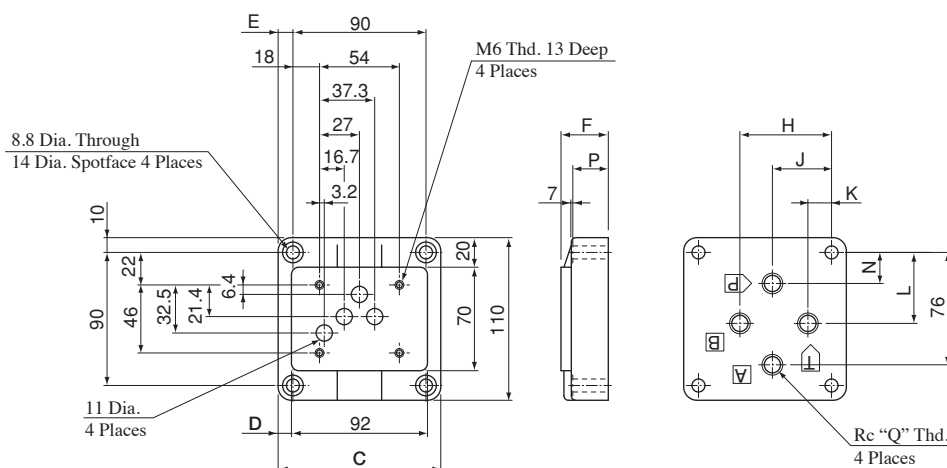


Note : Sub-plate is common to that of EHDG-01.

Refer to page H-8 for the dimensions of mounting surface.

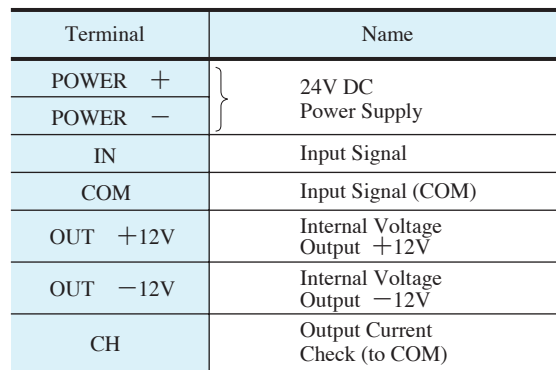
EHDFG-03-60- * - * -30


★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

- Connecting Terminal

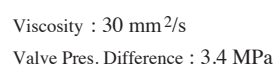


- The adjusting volume is set to minimum at shipping. Set a delay time according to the machine conditions.

The diagram shows a 2-channel differential amplifier circuit. It has two input channels, each with a 1.3kΩ resistor and a 12V supply. The circuit includes two comparators (SPAN a, SPAN b), two delay blocks (DELAY a, DELAY b), a differential amplifier (MIN), and a dithering block (DITHER). The output is connected to a 0.1μF capacitor and a 12V supply.

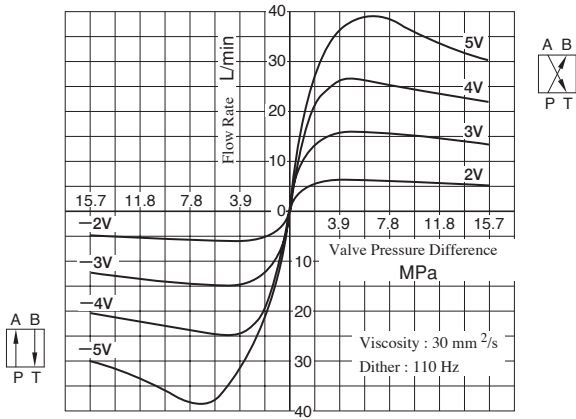
- ★1. For “CH” terminal, external instruments should have input impedance of more than 10 kΩ.
- ★2. Use shielded cable for “Input” connection.
The ground of shielded cable must be connected to input signal side.
- ★3. Internal output voltage $\pm 12\text{V}$ terminal is used when input signal voltage is controlled by variable resistor. Volume of 1 kΩ - 2 kΩ should be used.

■ Input Signal Voltage vs Flow

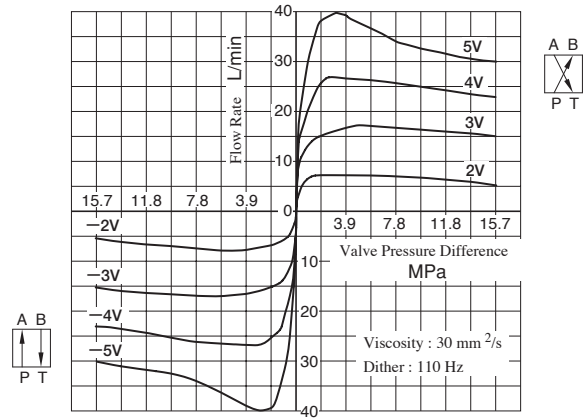


Differential Pressure vs. Metered Flow

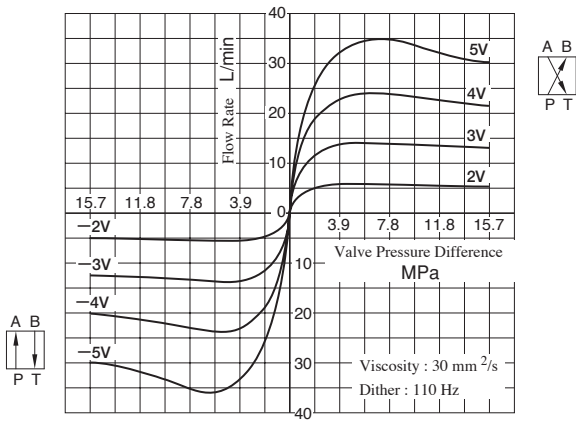
EHDFG-01-30-* -XY-30



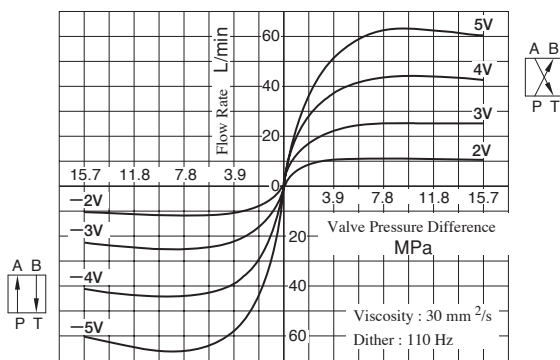
EHDFG-01-30-* -X-30



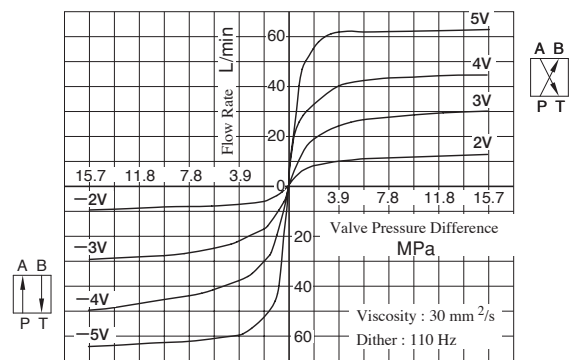
EHDFG-01-30-* -Y-30



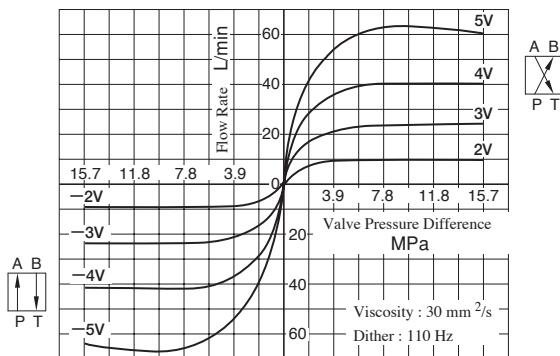
EHDFG-03-60-* -XY-30



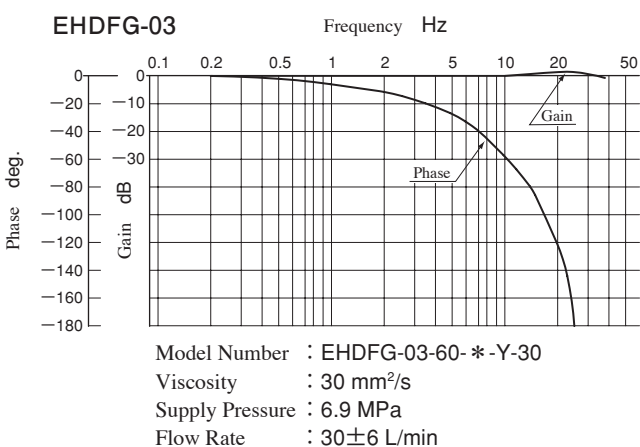
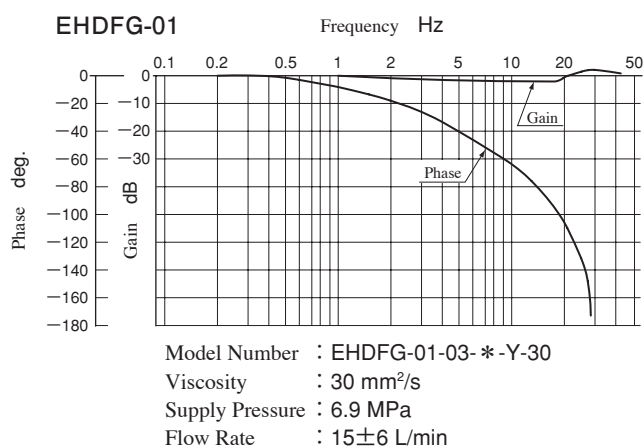
EHDFG-03-60-* -X-30



EHDFG-03-60-* -Y-30

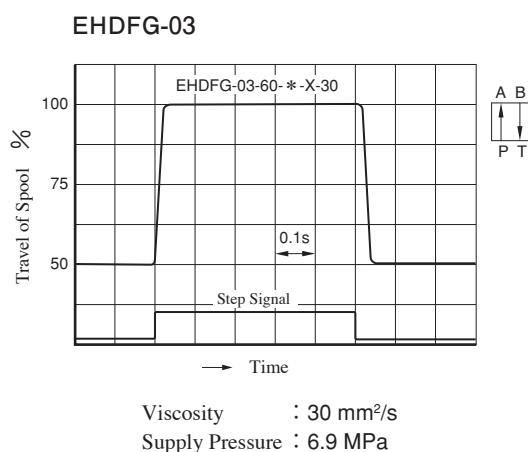
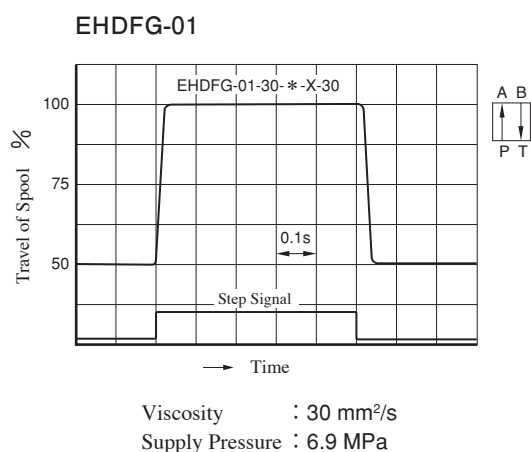


Frequency Response (Travel of Spool)



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.

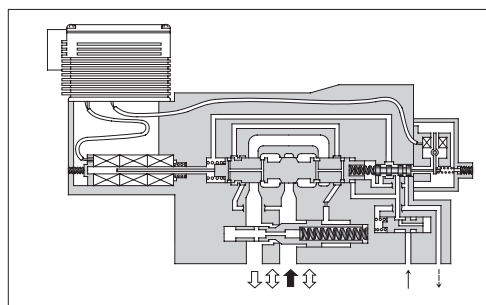
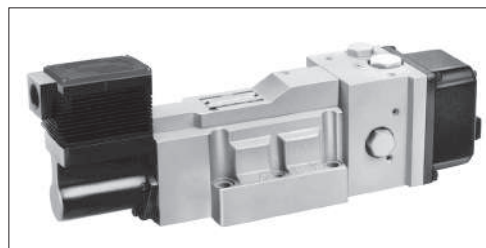


High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

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.



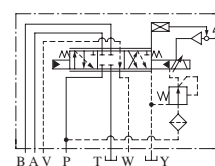
Specifications

Model Numbers		EHDFG-04	EHDFG-06
Descriptions			
Max. Operating Pressure	MPa	15.7	15.7
Rated Flow	L/min	130	280
Valve Pres. Difference: 1.5 MPa			
Min. Required Pilot Pressure	MPa	1.5	1.5
Min. Required Pilot Flow	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)	

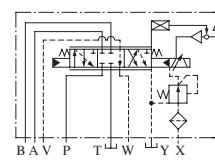
★ The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols

● Models without Pressure Compensator Valve

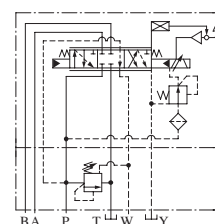


Internal Pilot



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. (1/8")

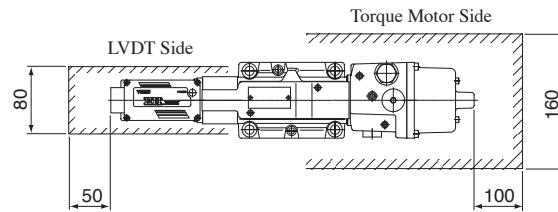
Instructions

● Back Pressure to Drain Port

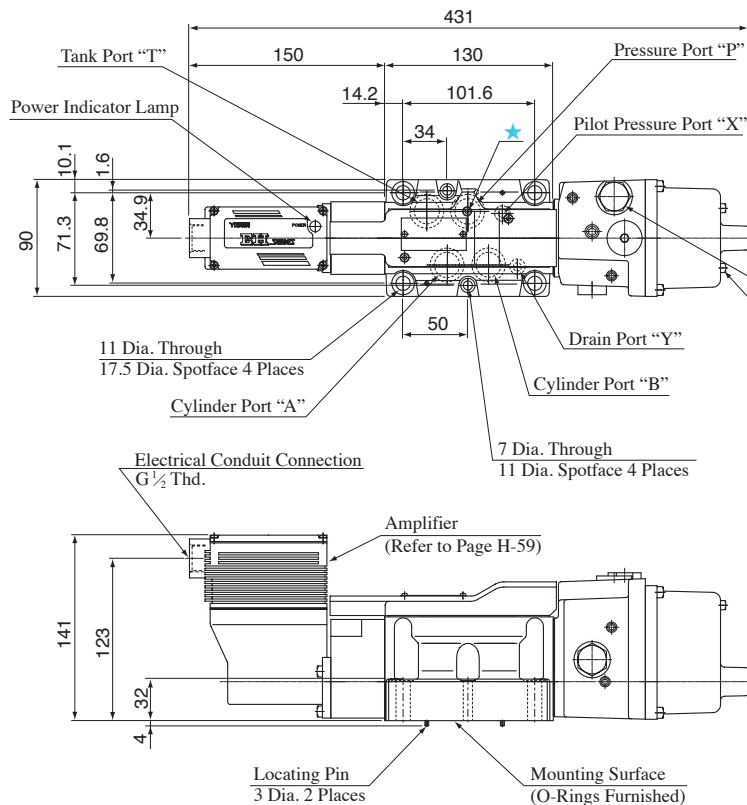
The drain port should be connected directly to the oil tank with a back pressure of not more than 0.1 MPa.

● Installation Condition (Protection from Magnetic Field of DC SOL)

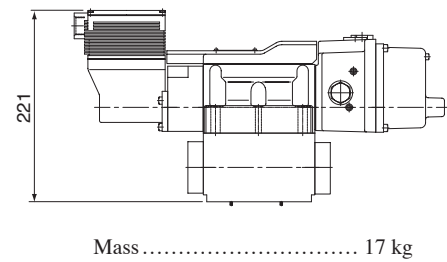
If a DC SOL. is installed near this valve, the magnetic field of DC SOL. may affect the control flow rate. Therefore, install the DC SOL. outside the area shown below.



EHDFG-04-130- * - * -10



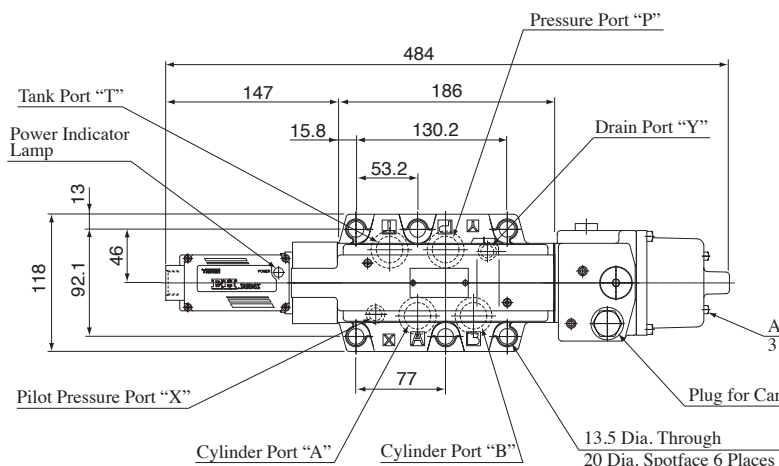
EHDFG-04-130- * - * -CB-10



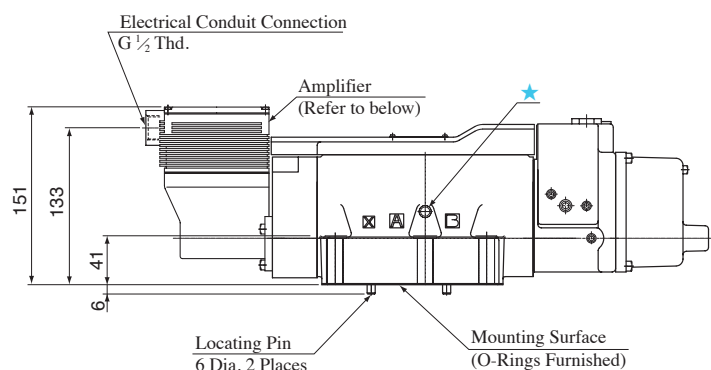
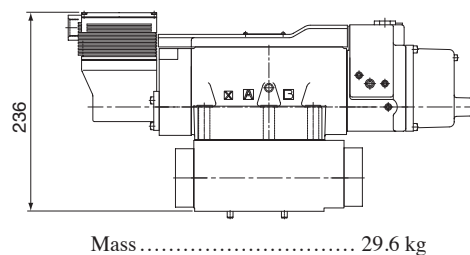
★ For alternation of model from external pilot pressure to internal pilot pressure, take out another inner screw plug behind this plug.

Mass 10.5 kg

EHDFG-06-280- * - * -10



EHDFG-06-280- * - * -CB-10

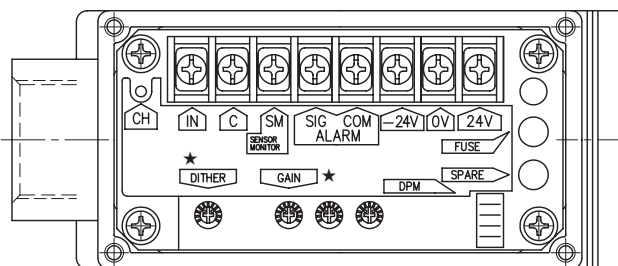


★ For alternation of model from external pilot pressure to internal pilot pressure, take out another inner screw plug behind this plug.

Mass 18.5 kg

Detail of Amplifier

Connecting Terminal

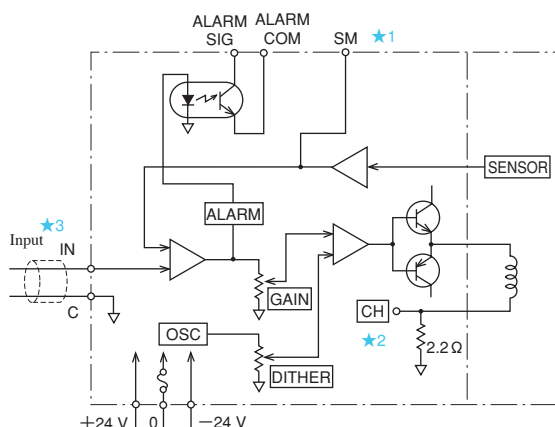


Terminal	Name
IN	Input Signal (±)
C	Input Signal (COM)
SM	Sensor Monitor (to C)
ALARM	Alarm Output
SIG	
COM	
-24V	Power Supply
0V	
24V	
CH	Output Current Check (to C)

★ DITHER / GAIN

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

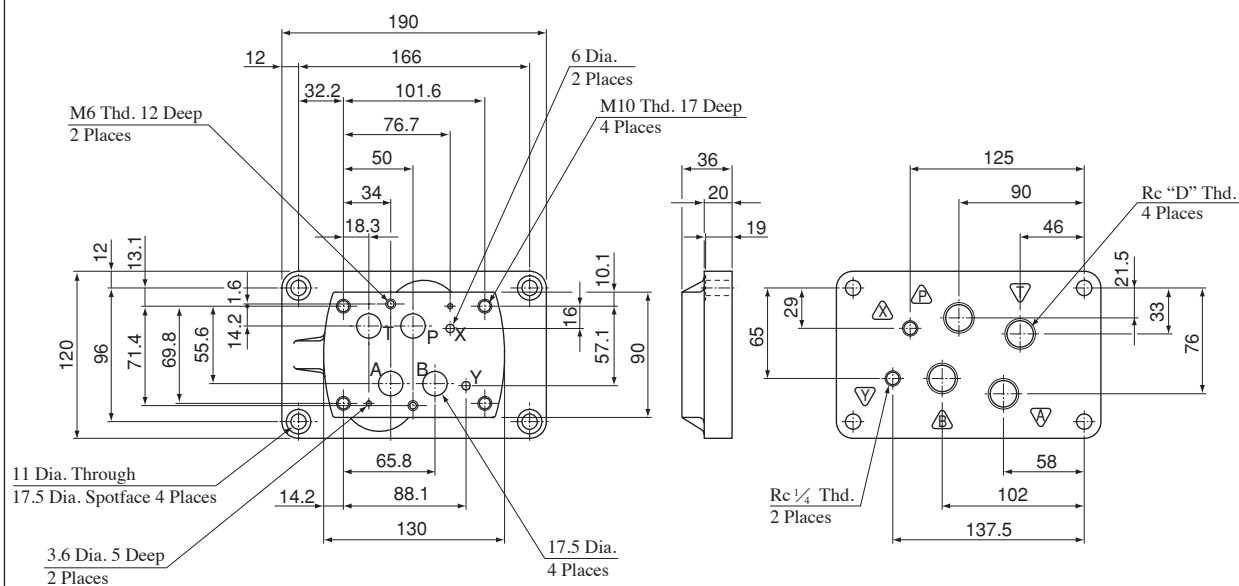
Circuit Schematic



- ★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.

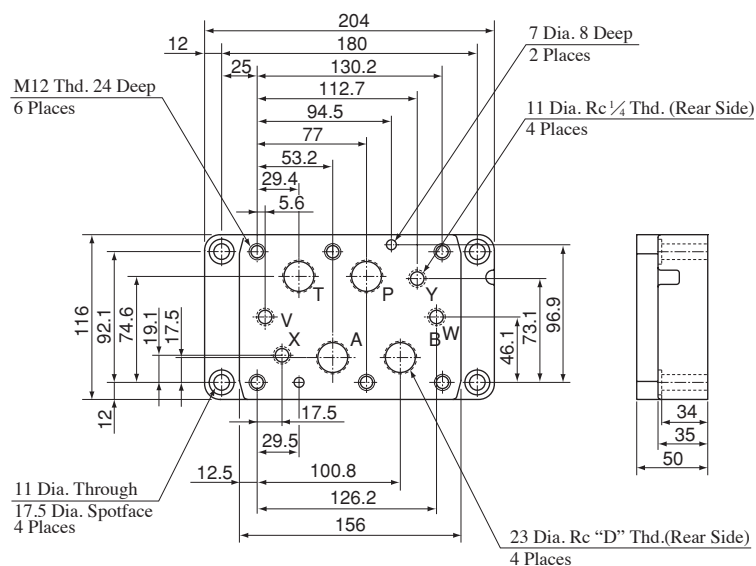
■ Sub-Plate

DHGM-04, 04X



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

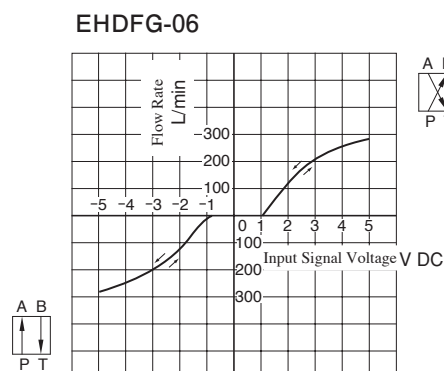
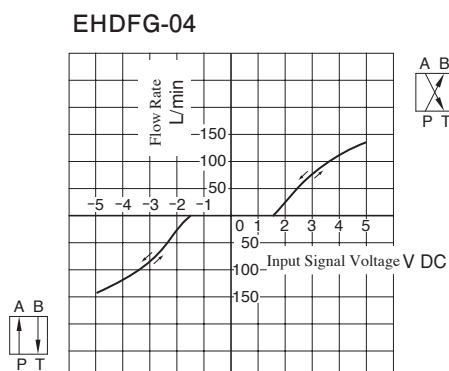
DHGM-06, 06X



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

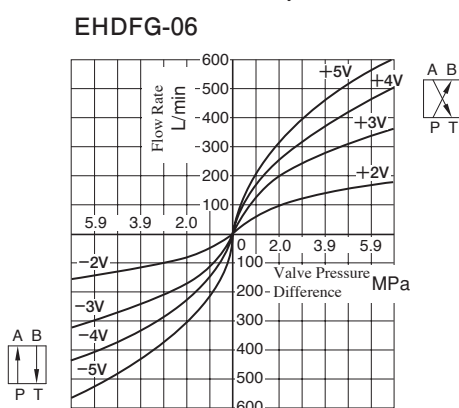
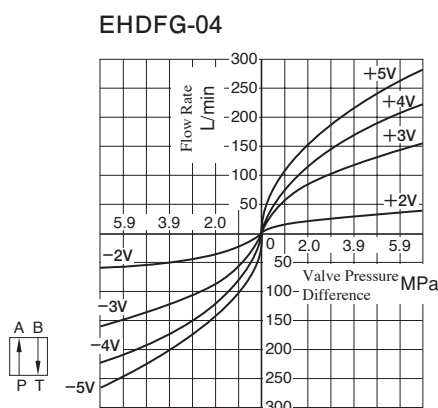
Input Signal Voltage vs. Flow

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

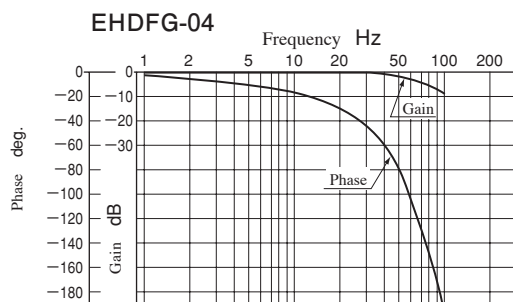


Differential Pressure vs. Metered Flow

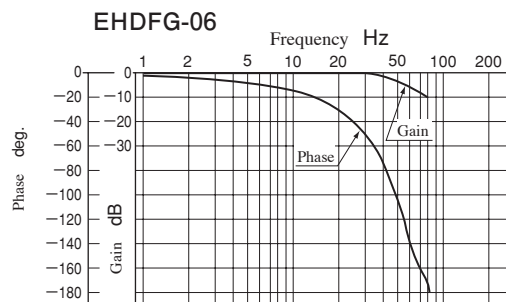
Viscosity : 30 mm²/s



Frequency Response (Travel of Spool)



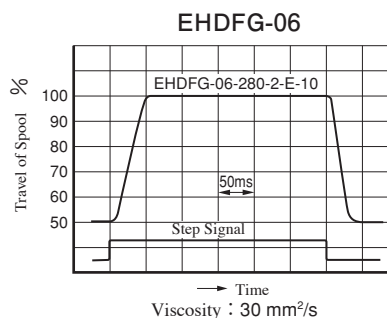
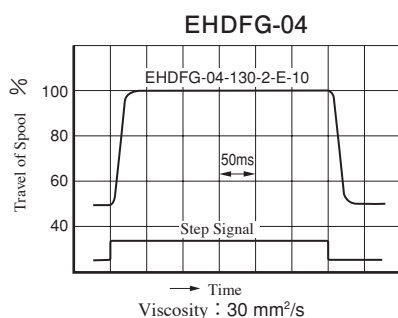
Model Number : EHDFG-04-130-2-E-10
Viscosity : 30 mm²/s
Pilot Pressure : 15.7 MPa
Travel of Spool : ±10% of Rated Travel



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

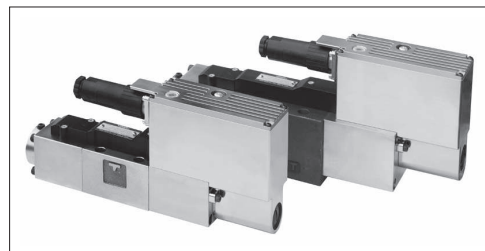
The step responses below are those obtained when the valve itself is tested independently.
The step responses may differ from them when the valve is used in combination with other control valves.



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

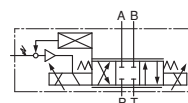
These valves are closed-loop, high response type proportional electro-hydraulic directional and flow control valves with OBE (on board electronics). Two direct type models with a maximum rated flow rate up to 80 L/min (@ $\Delta P = 1$ MPa) are available. The addition of OBE to the well-received ELDFG 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.

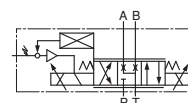


Graphic Symbols

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	EH : OBE Type	10 20 35	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
		03		40 80					

★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

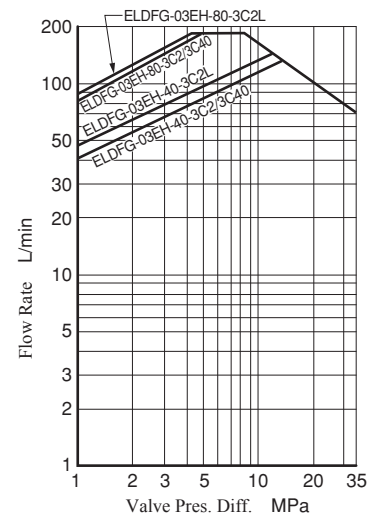
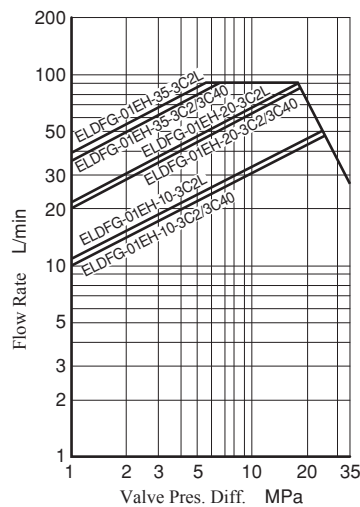
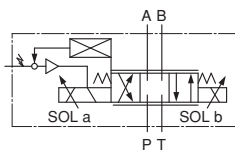
Note) The connector is separately available. Use a 6 + PE connector [EN175201 Part 804].

Instructions

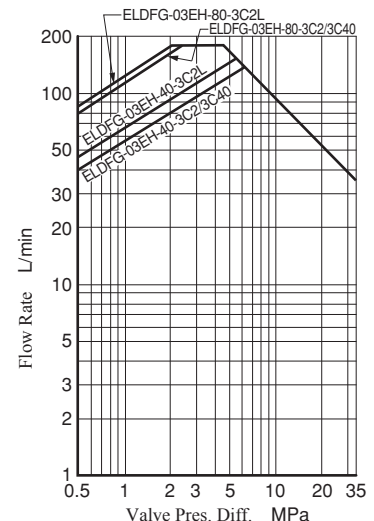
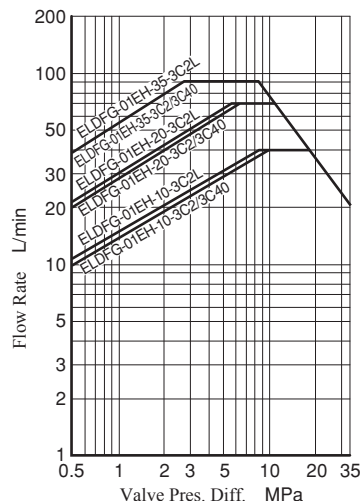
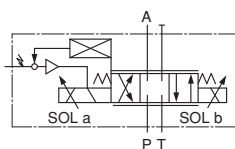
Take care of filling the valve tank port with the hydraulic oil at any time. However, check valve with cracking pressure 0.04 MPa approx. shall be provided as required. The pipe from the tank port should be connected to the reservoir directly and the end of the pipe must always be in the oil.

Range of Flow Control

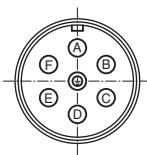
Control Method: 4-Way Valve



Control Method: 3-Way Valve



Electrical Specification

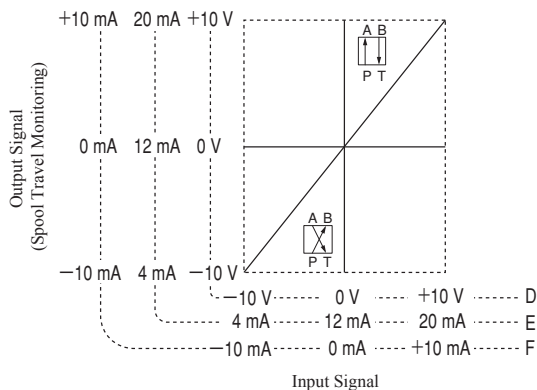


Valve Model		ELDFG- * EH- * -D	ELDFG- * EH- * -E	ELDFG- * EH- * -F
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+) (Differential) ^{★1}	0 - ±10 V	4 - 20 mA	0 - ±10 mA
Pin E	Input (-) (Differential) ^{★1}	Ri ≥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

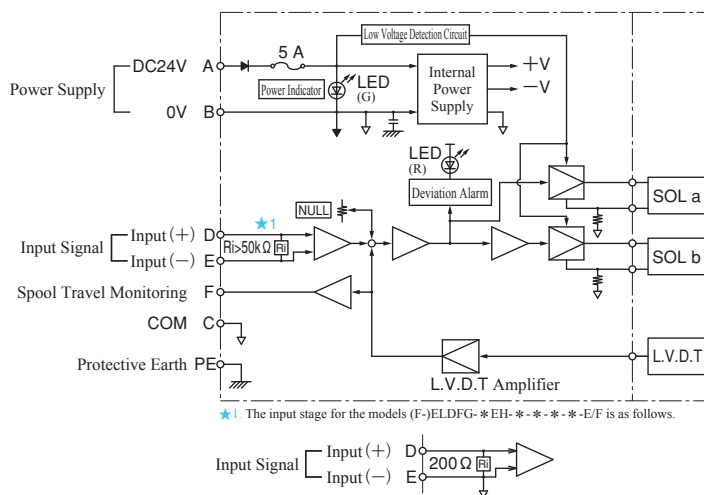
★1. Differential input signals can be used only for the valves with the voltage signal specifications of ±10 V (ELDFG- * EH- * -D).

★2. The recommended load resistance is 200 Ω.

I/O Signal Characteristics



Circuit Schematic



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.

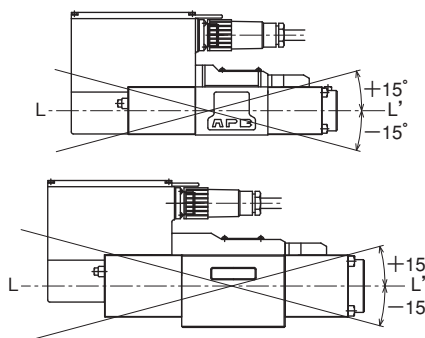
Condition: Electric System OFF

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	—	
ELDFG- * * EH- * -3C40-XY-C	Neutral	A, B, T Connection	
ELDFG-01EH- * - * -XY-A	about 20%	PABT Position	
ELDFG-03EH- * - * -XY-A	about 17%	PBAT Position	
ELDFG-01EH- * - * -XY-B	about 20%	PBAT Position	
ELDFG-03EH- * - * -XY-B	about 17%	PBAT Position	

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

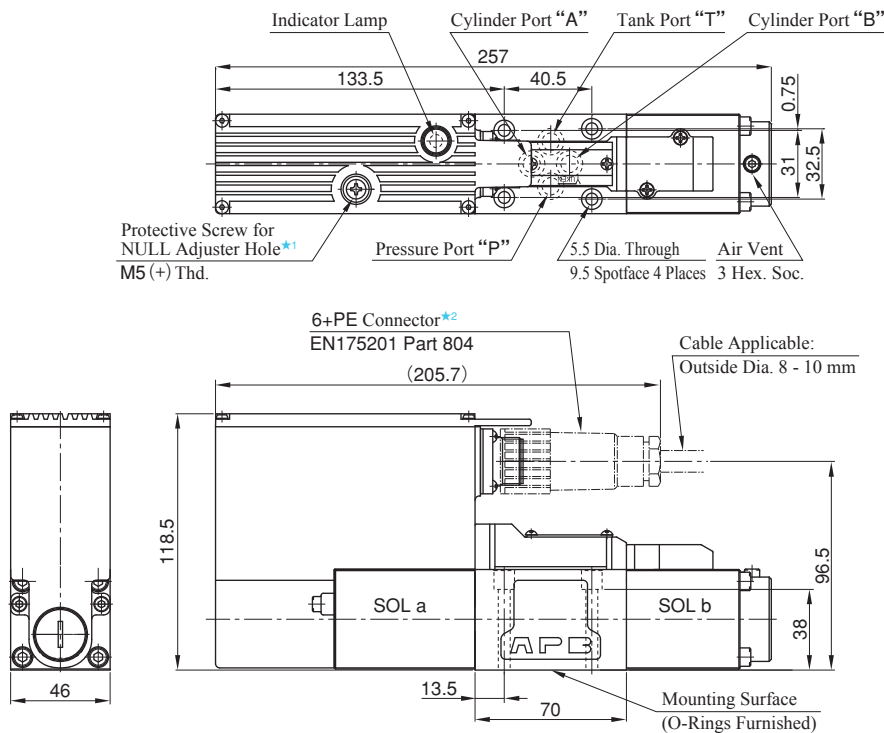
Mounting Position

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

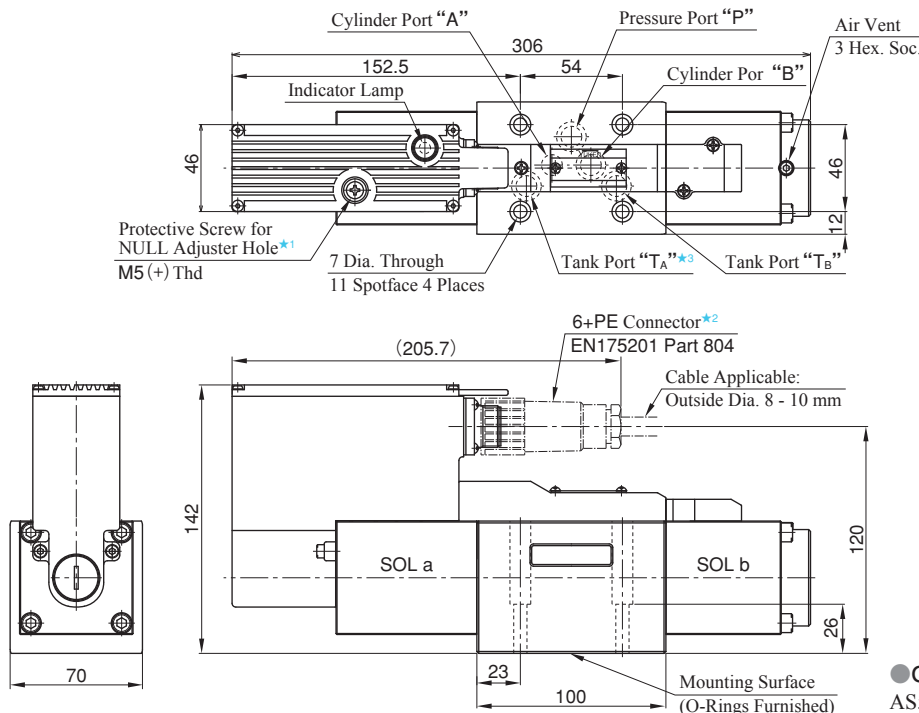
★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.

★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

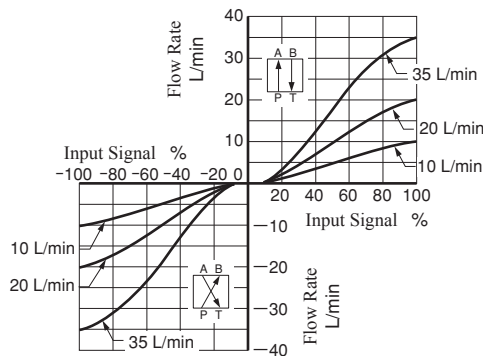
★3. With standard sub-plates, one ("TA") of the two tank ports is used, but either one may be used.

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

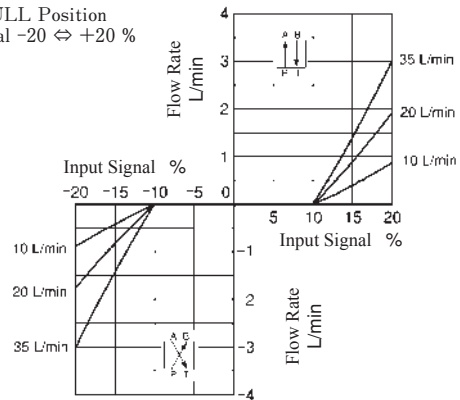
No-Load Flow Characteristics

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

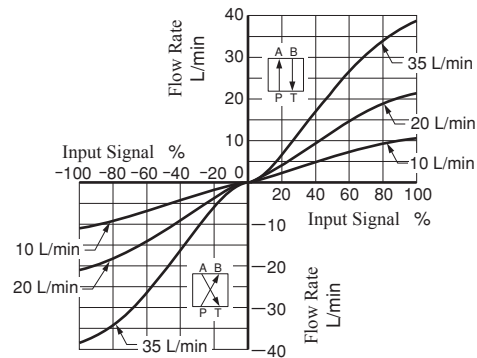
ELDFG-01EH- *-3C2/3C40-XY- *- *-10



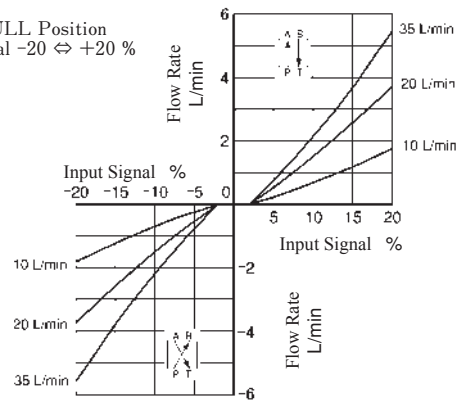
Around NULL Position
Input Signal -20 ⇔ +20 %



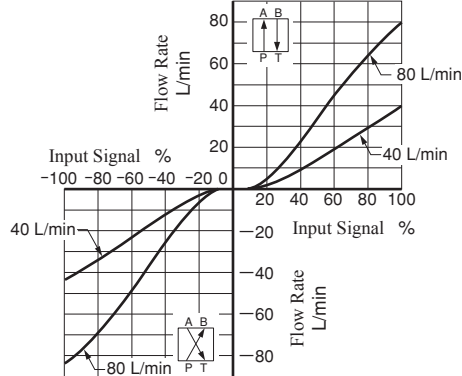
ELDFG-01EH- *-3C2L-XY- *- *-10



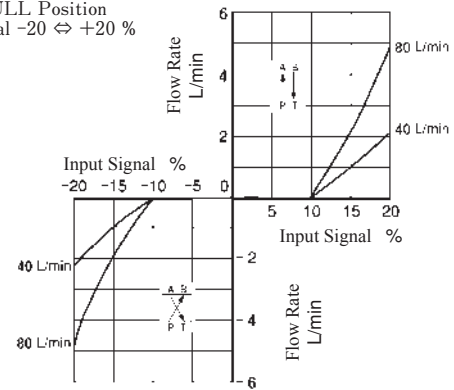
Around NULL Position
Input Signal -20 ⇔ +20 %



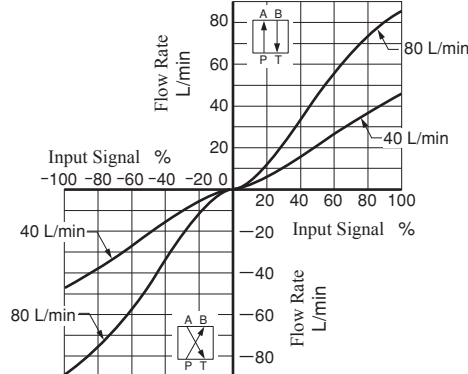
ELDFG-03EH- *-3C2/3C40-XY- *- *-10



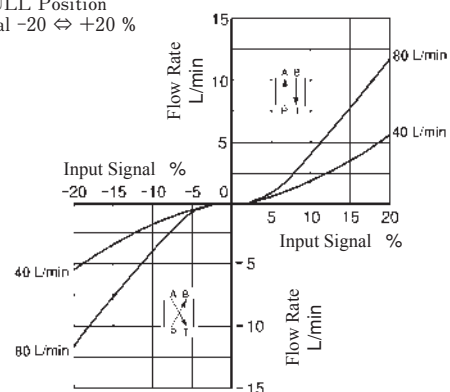
Around NULL Position
Input Signal -20 ⇔ +20 %



ELDFG-03EH- *-3C2L-XY- *- *-10



Around NULL Position
Input Signal -20 ⇔ +20 %

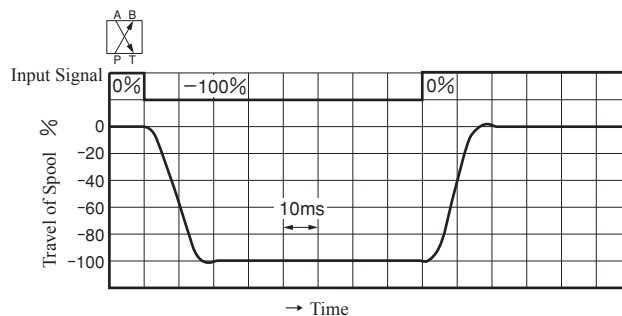
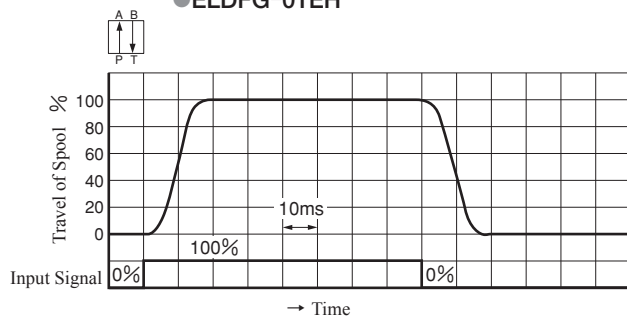


Step Response (Example)

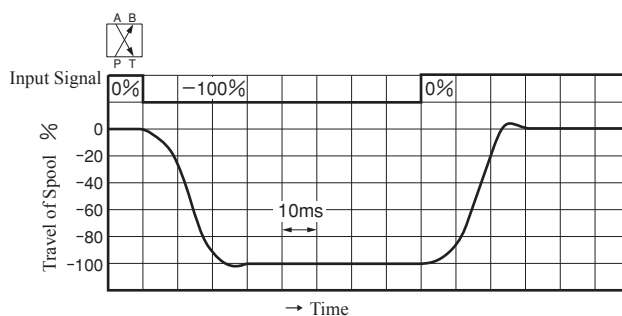
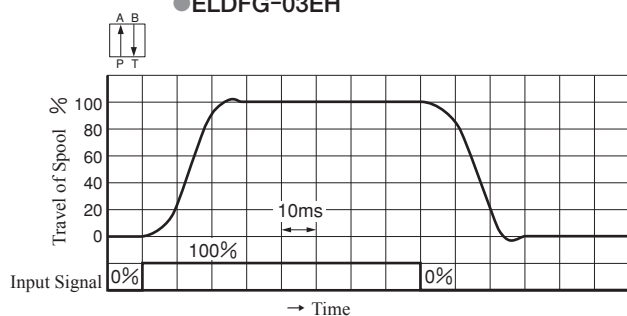
〈Conditions〉 ● Hydraulic Circuit: Port A/B Closed ● Input Signal: 0 ↔ 100% ● Viscosity: 30 mm²/s

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

● ELDFG-01EH



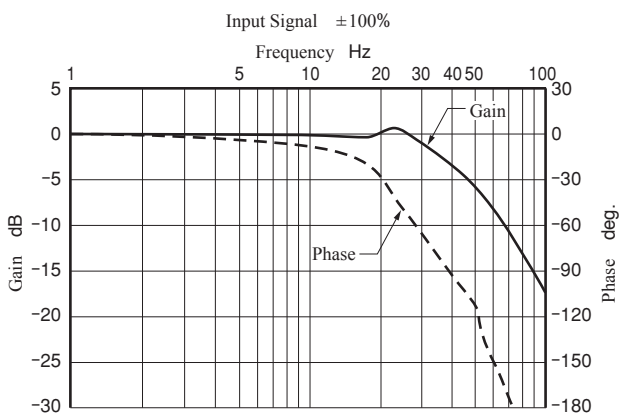
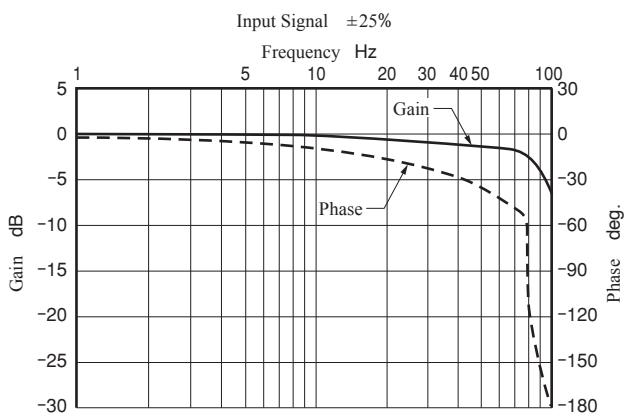
● ELDFG-03EH



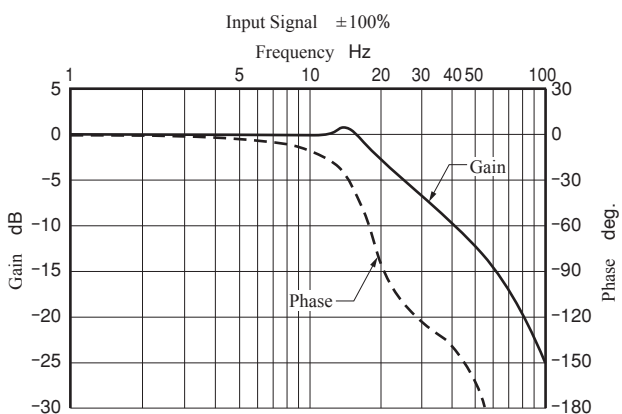
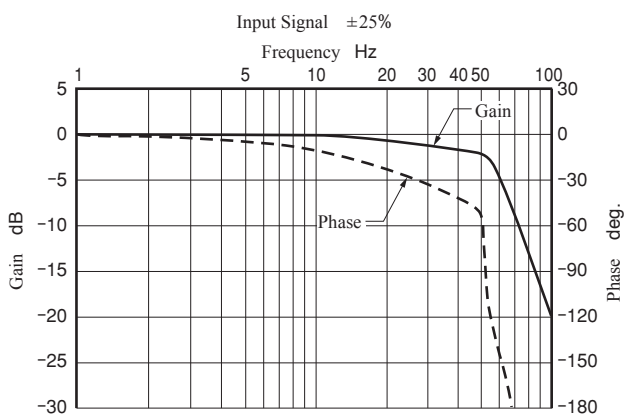
Frequency Response

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

● ELDFG-01EH

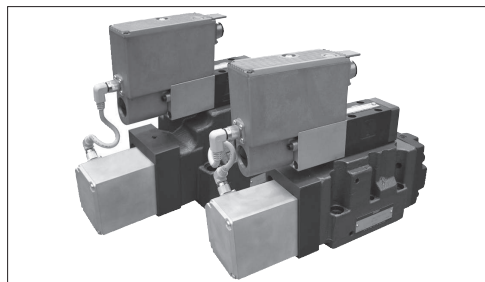


● ELDFG-03EH



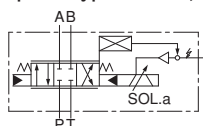
High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves (Two Stage Type)

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.

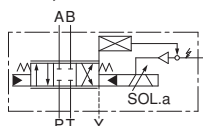


Graphic Symbols

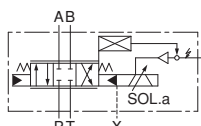
● Spool Type "3C2", "3C2P", "3C2L"



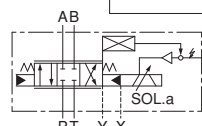
Internal Pilot
Internal Drain Type



Internal Pilot
External Drain Type

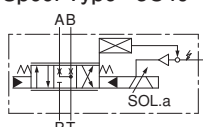


External Pilot
Internal Drain Type

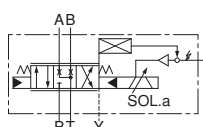


External Pilot
External Drain Type

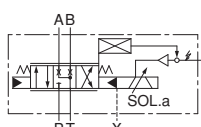
● Spool Type "3C40"



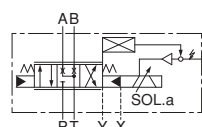
Internal Pilot
Internal Drain Type



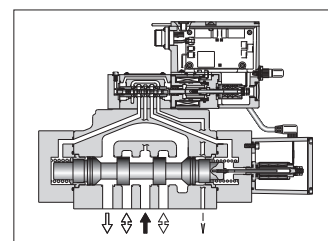
Internal Pilot
External Drain Type



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

Model Numbers			ELDFHG-03EH-100-3C2L	ELDFHG-03EH-100-*	ELDFHG-04EH	ELDFHG-06EH-350	ELDFHG-06EH-500	ELDFHG-10EH	
Descriptions									
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			°C	-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 Load 3)					
Coil Resistance at 20 °C			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.

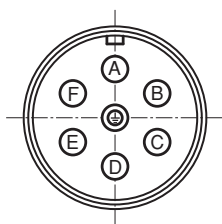
Details of the Valve Fail-Safe Functions

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

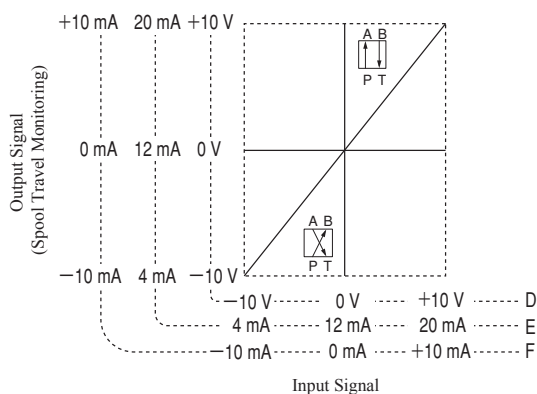


Input Signal		Voltage Signal "D"	Current Signal "E"	Current Signal "F"
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+)(Differential) ^{★2}	0±10 V	4-20 mA	0±10 mA
Pin E	Input (-)(Differential) ^{★2}	$R_i \geq 50 \text{ k}\Omega$	$R_i = 200 \Omega$	$R_i = 200 \Omega$
Pin F	Spool Travel Monitoring	0±10 V	4-20 mA	0±10 mA
		$R_L \geq 10 \text{ k}\Omega$	$R_L = 100-500 \Omega^{\star 1}$	$R_L = 100-500 \Omega^{\star 1}$
Pin	Protective Earth	—		

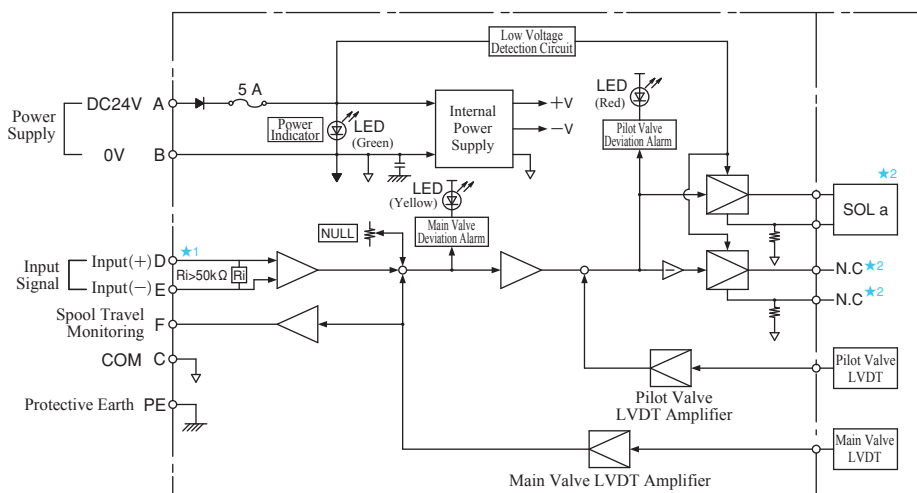
★1. The recommended load resistance is 200 Ω .

★2. Differential input signals can be used only for the valves with the voltage signal specifications of $\pm 10\text{V}$.
(ELDFHG- $\star$ EH- $\star$ -D)

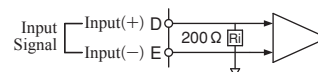
I/O Signal Characteristics



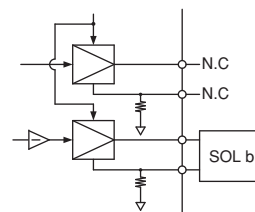
Block Diagram



★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 $\times$ 35L	4	12.9 - 15.9
ELDFHG-04EH	Hex. Socket Head Cap Screw: M6 $\times$ 55L	2	
	Hex. Socket Head Cap Screw: M10 $\times$ 60L	4	60.6 - 74.1
ELDFHG-06EH	Hex. Socket Head Cap Screw: M12 $\times$ 85L	6	104 - 127
ELDFHG-10EH	Hex. Socket Head Cap Screw: M20 $\times$ 90L		493 - 603

Instructions

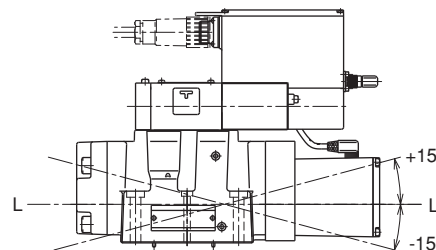
Take care of filling the valve tank port with the hydraulic oil at any time.

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.

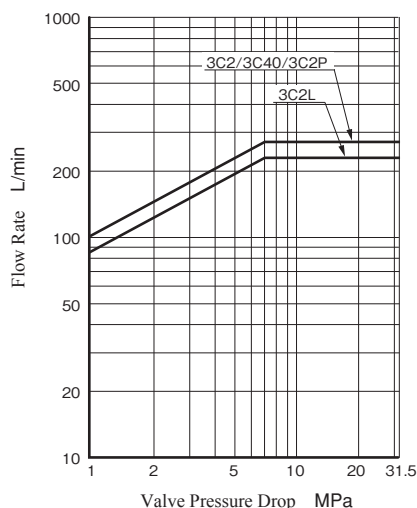
Mounting Position

Mount the valve with the angle of the axis line L-L' within about $\pm 15^\circ$ 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.

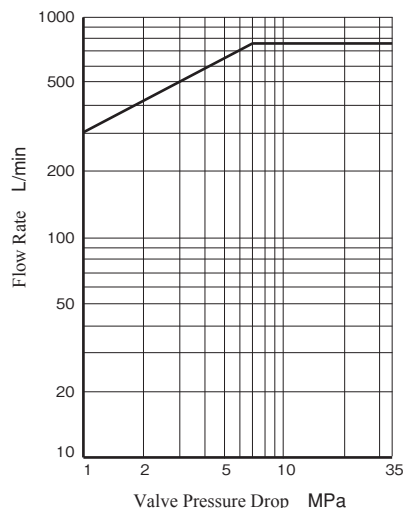


The Effective Range of The Fail-Safe Function

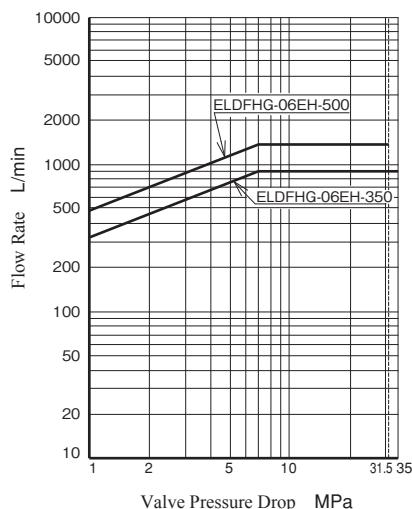
ELDFHG-03EH-100-3C2/3C40/3C2P/3C2L



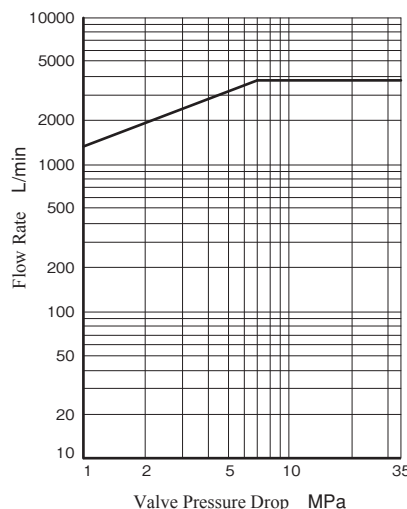
ELDFHG-04EH



ELDFHG-06EH

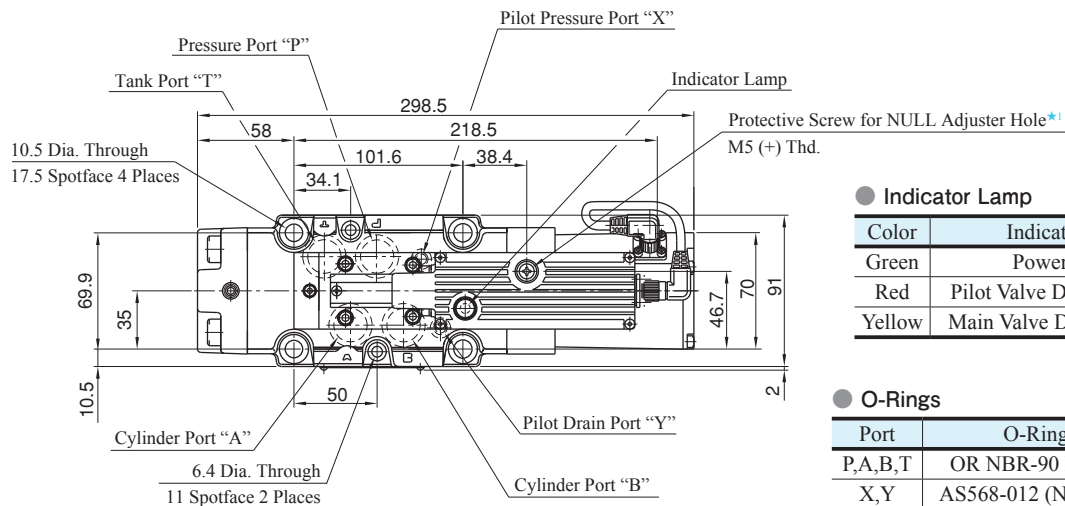


ELDFHG-10EH



ELDFHG-04EH-280-* -XY-* *- *- *-10

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

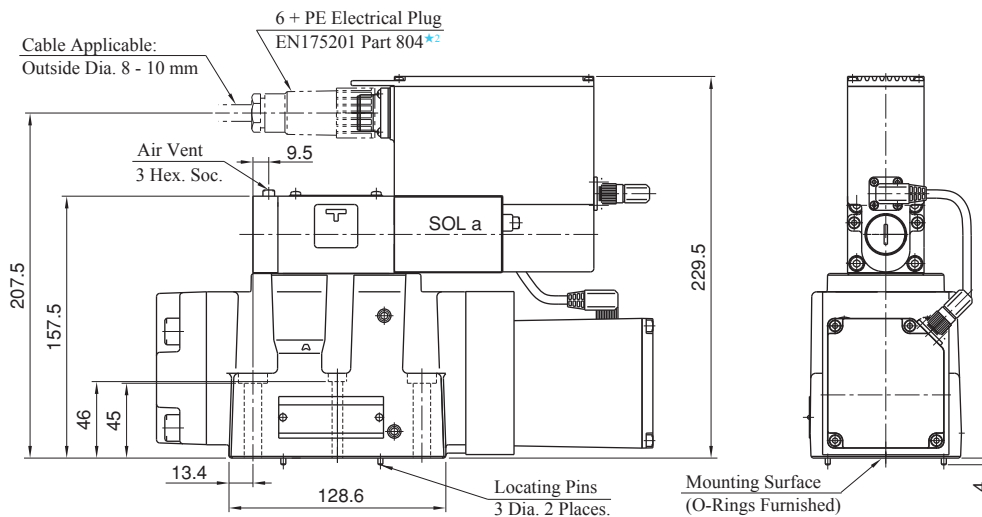


Indicator Lamp

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

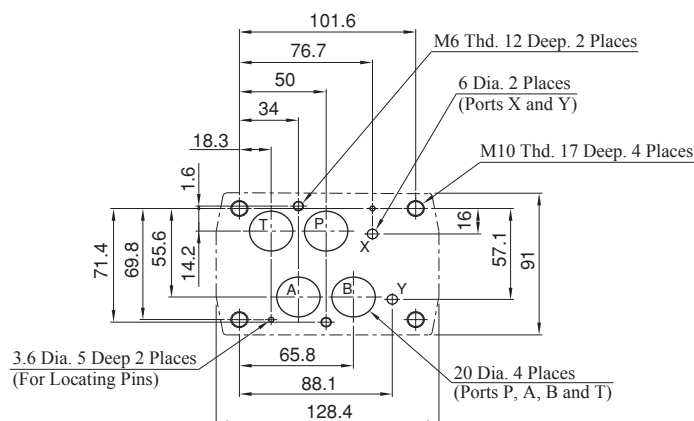


- ★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.
- ★2. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately. YUKEN parts number: TK290457-1

Dimensions of Mounting Surface

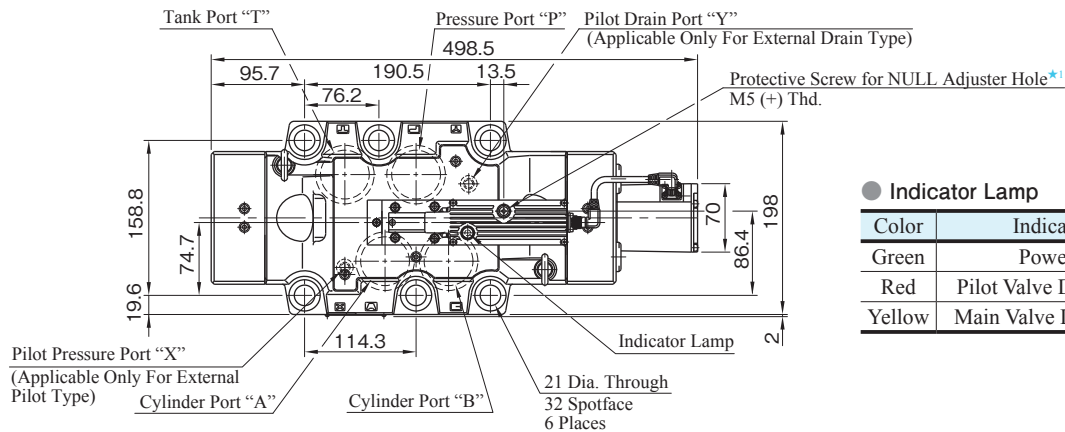
Prepare the mounting surface as shown below.

The mounting surface should have a good machined finish. ($\sqrt{16}$)



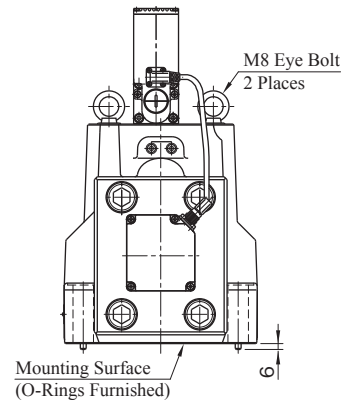
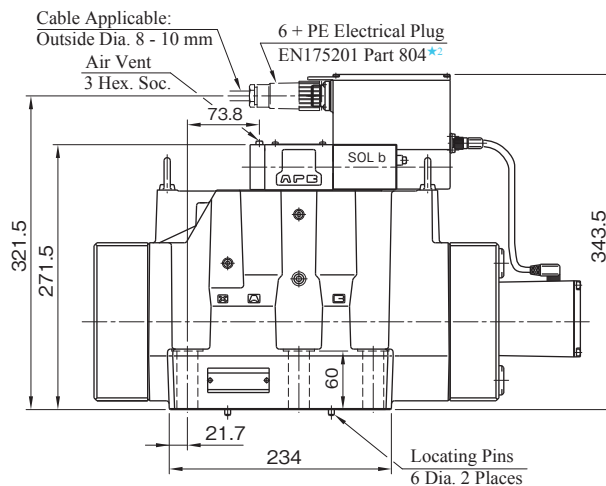
ELDFHG-10EH-1440-* -XY-* -*-10

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

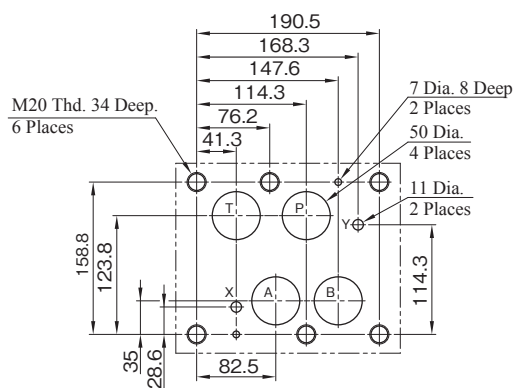
★1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.

★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

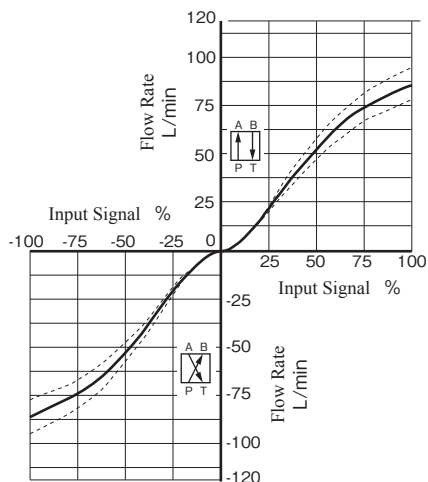
The mounting surface should have a good machined finish. ($\frac{1}{64}$)



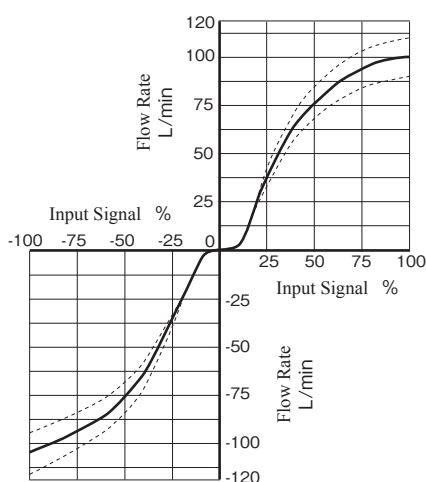
No-Load Flow Characteristics

〈Conditions〉 ● Valve Pressure Difference: 1 MPa (4-Way Valve/Pressure Difference per Land: 0.5 MPa)
● Viscosity: 30 mm²/s

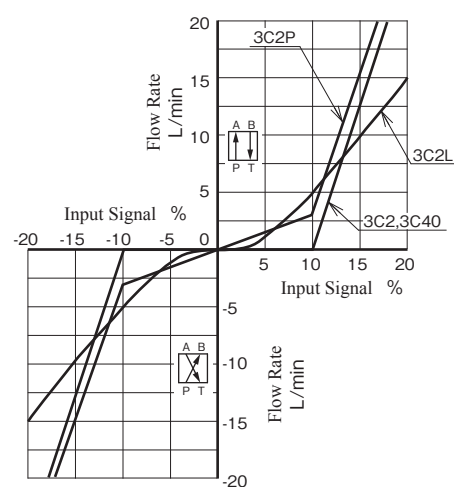
ELDFHG-03EH-100-3C2L



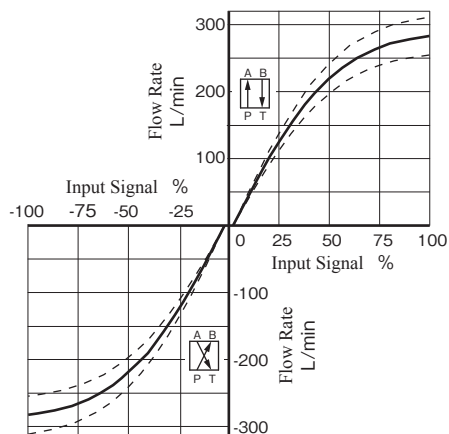
ELDFHG-03EH-100-3C2/3C40/3C2P



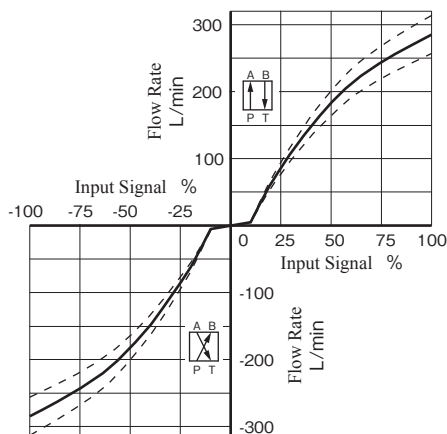
Around Null Position
Input Signal -20↔+20%



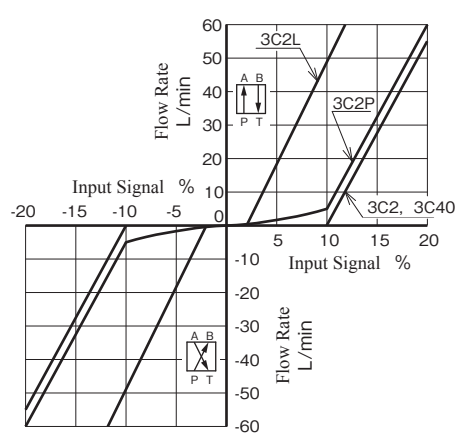
ELDFHG-04EH-280-3C2L



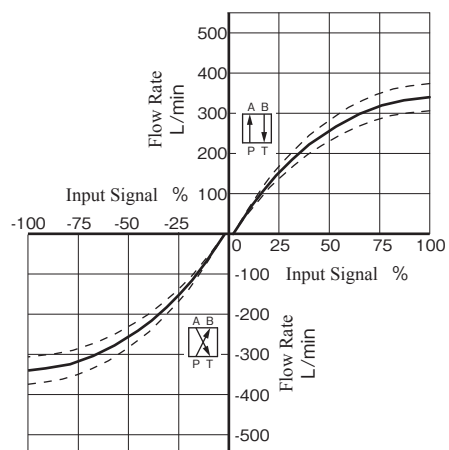
ELDFHG-04EH-280-3C2/3C40/3C2P



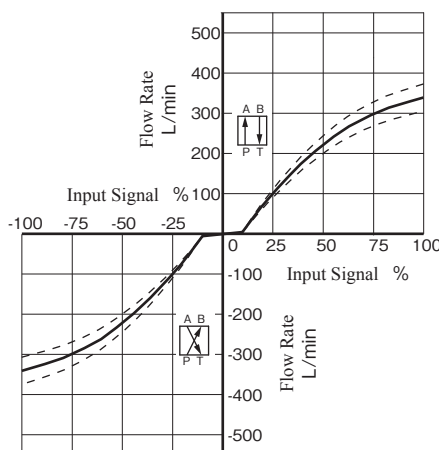
Around Null Position
Input Signal -20↔+20%



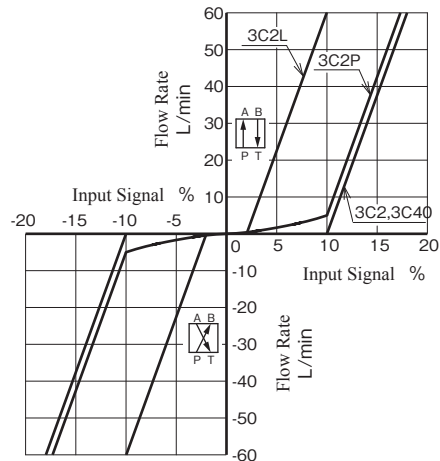
ELDFHG-06EH-350-3C2L



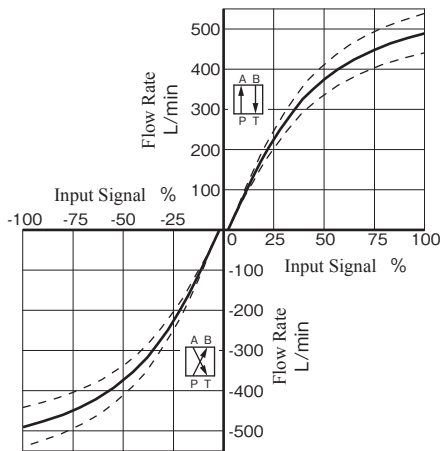
ELDFHG-06EH-350-3C2/3C40/3C2P



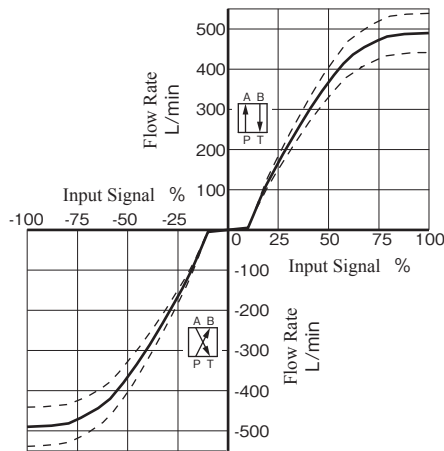
Around Null Position
Input Signal -20↔+20%



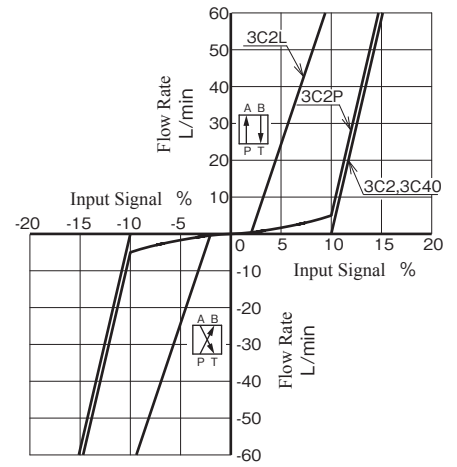
ELDFHG-06EH-500-3C2L



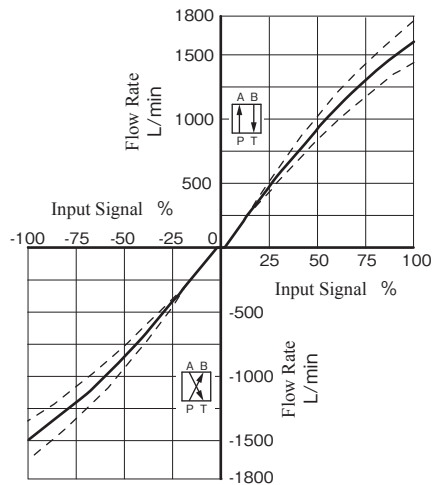
ELDFHG-06EH-500-3C2/3C40/3C2P



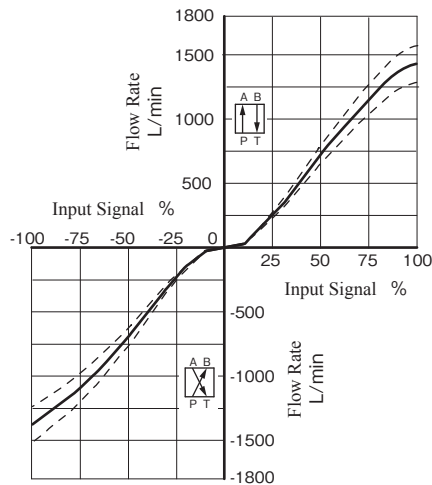
Around Null Position
Input Signal -20↔+20%



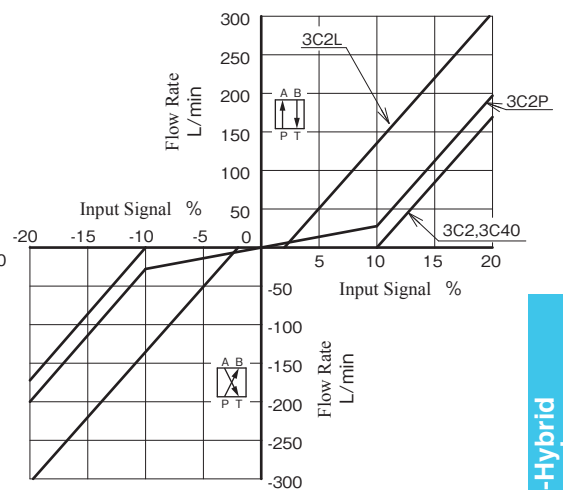
ELDFHG-10EH-1440-3C2L



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



Around Null Position
Input Signal -20↔+20%

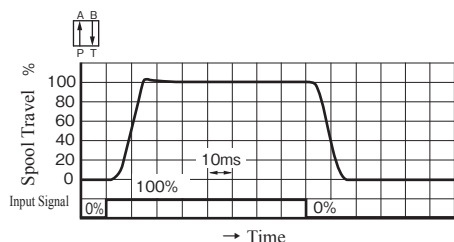


Step Response (Example)

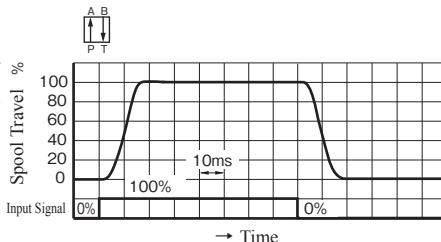
<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply Pressure and Pilot Pressure: 14 MPa
 ● Input Signal: 0⇔100% ● Viscosity: 30 mm²/s

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

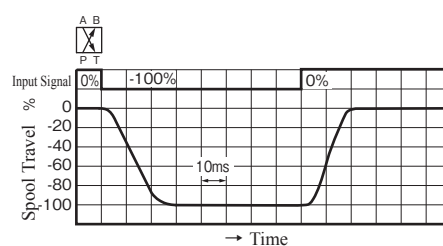
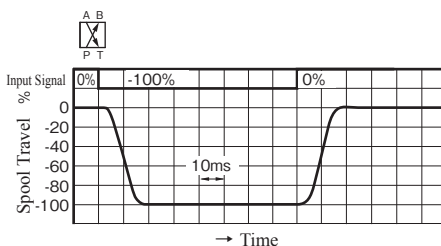
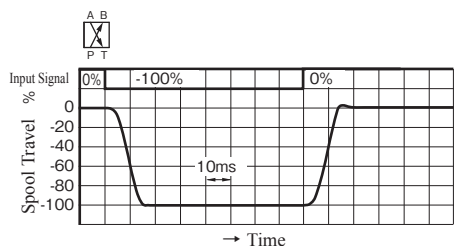
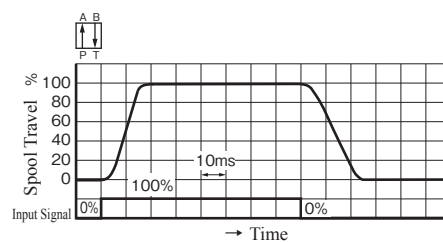
ELDFHG-03EH-100-3C2/3C40/3C2P



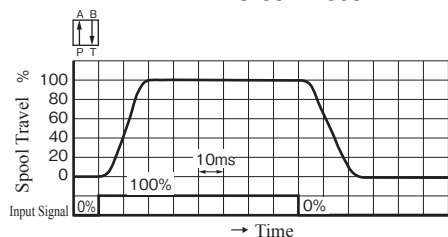
ELDFHG-03EH-100-3C2L



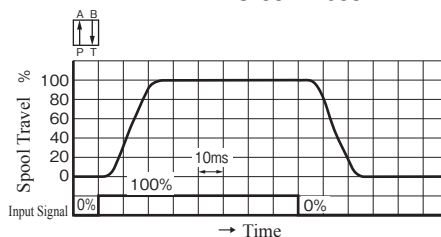
ELDFHG-04EH



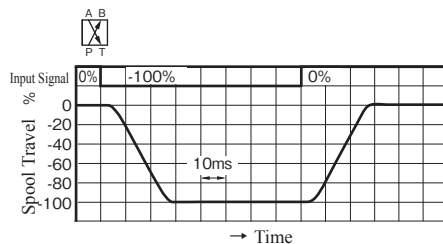
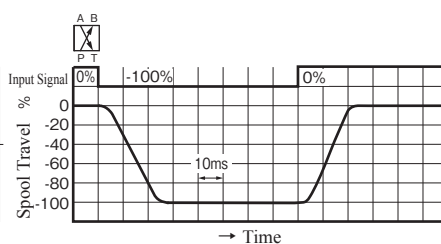
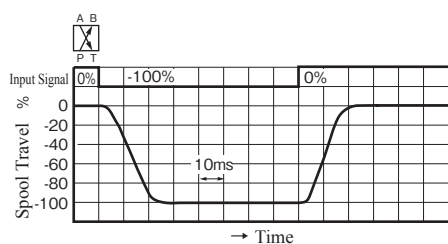
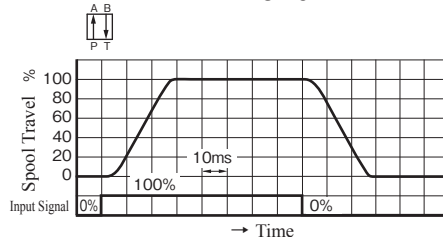
ELDFHG-06EH-350



ELDFHG-06EH-500



ELDFHG-10EH

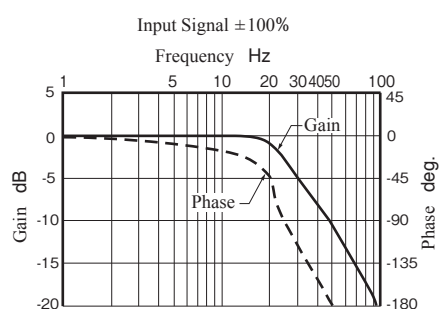
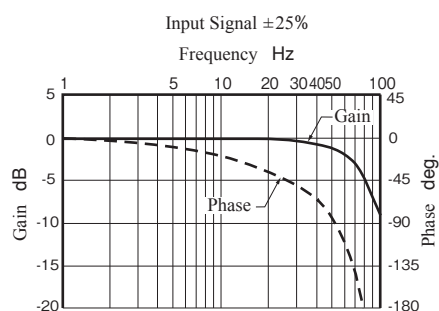


Frequency Response (Example)

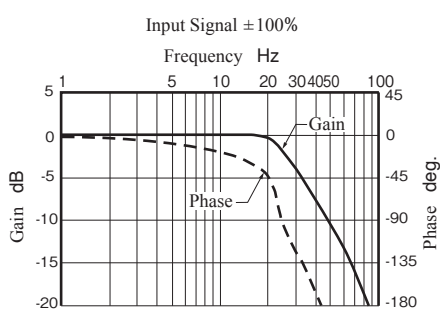
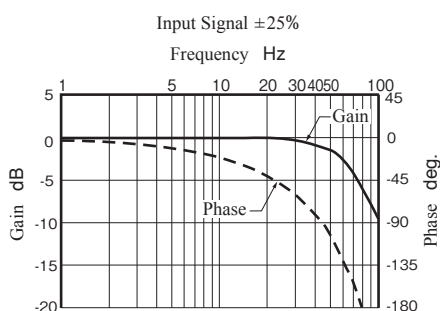
〈Conditions〉 ● Hydraulic Circuit: Port A/B Closed ● Supply Pressure and Pilot Pressure: 14 MPa
● Viscosity: 30 mm²/s

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

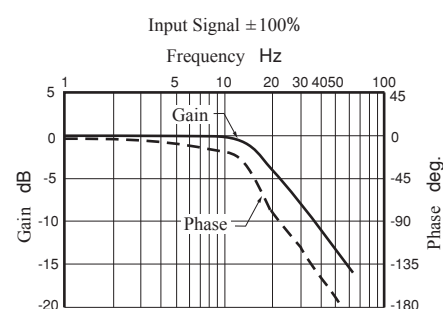
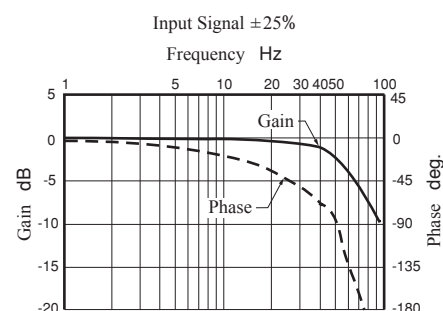
ELDFHG-03EH-100-3C2/3C40/3C2P



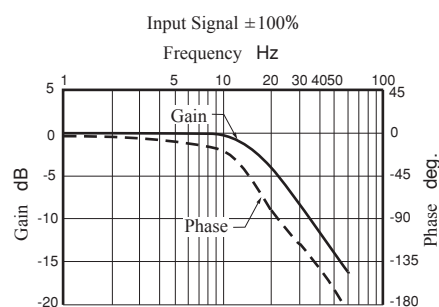
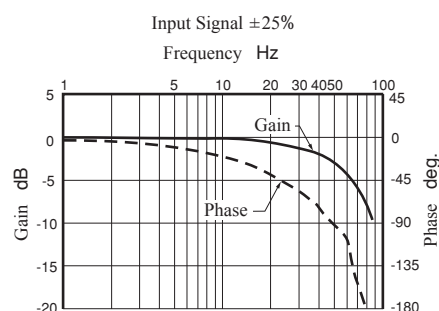
ELDFHG-03EH-100-3C2L



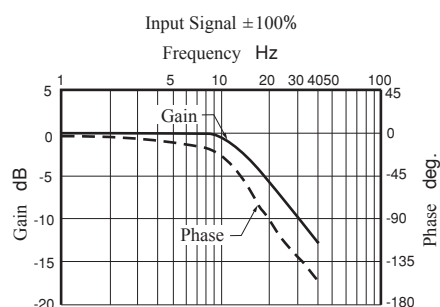
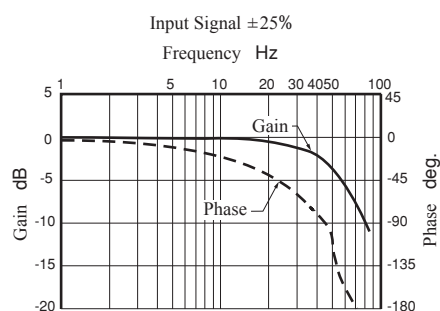
ELDFHG-04EH



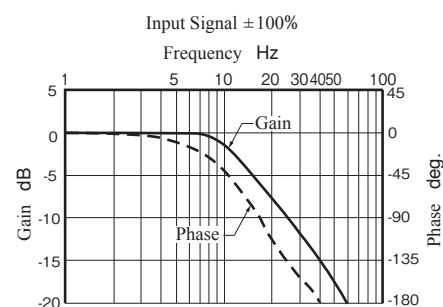
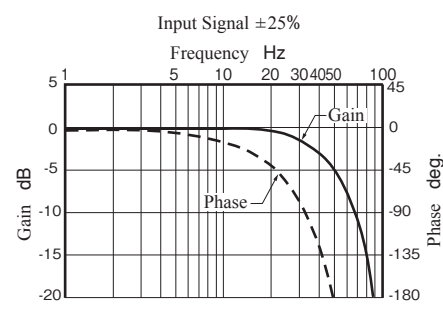
ELDFHG-06EH-350



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**

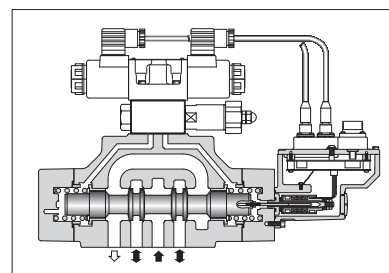
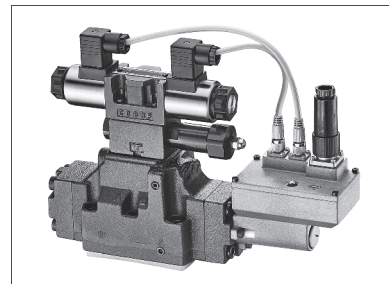
Hysteresis : 0.5 % or less

- **Safety**

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

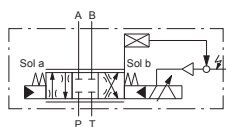
- **High Flow**

Significantly increased flow rate compared to current products

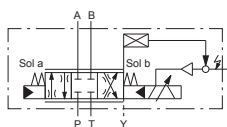


Graphic Symbols

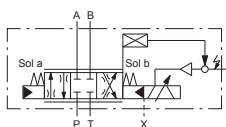
- **Spool Type “3C2” , “3C21, “3C22”**



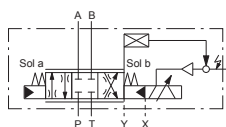
Internal Pilot
Internal Drain Type



Internal Pilot
External Drain Type

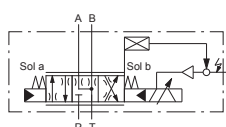


External Pilot
Internal Drain Type

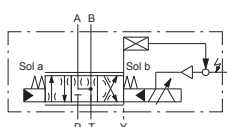


External Pilot
External Drain Type

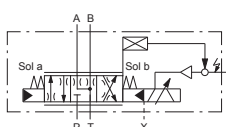
- **Spool Type “3C40”**



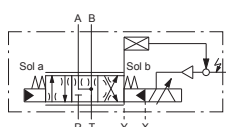
Internal Pilot
Internal Drain Type



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			3C21(P→B, B→T) :120 3C22(P→A, A→T)	3C2, 3C40 : 200	3C21(P→B, B→T) :230 3C22(P→A, A→T)	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 °C			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 mm²/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.

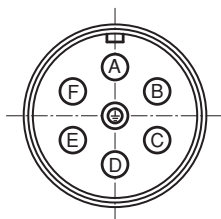
Model Number Designation

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)	10	
			200 : 200 L/min	3C2 3C40					E: Current Signal 4 to 20 mA (PABT Flow with 12 to 20 mA Input)		
	06		350 : 350 L/min	3C2 3C40 3C21 3C22					F: Current Signal ± 10 mA (PABT Flow with Positive Input)		
			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

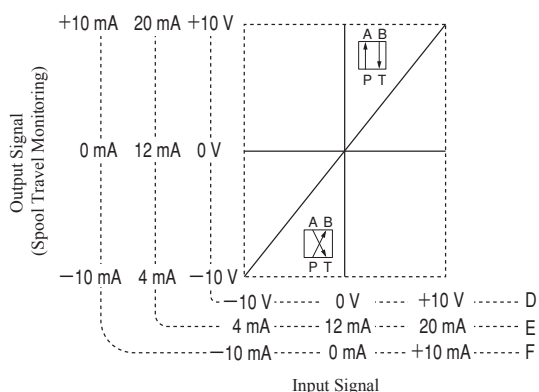


Input Signal		Voltage Signal “D”	Current Signal “E”	Current Signal “F”
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+)(Differential) ^{★1}	0 - ± 10 V	4 - 20 mA	0 - ± 10 mA
Pin E	Input (-)(Differential) ^{★1}	$R_i \geq 50$ k Ω	$R_i = 200$ Ω	$R_i = 200$ Ω
Pin F	Spool Travel Monitoring	0 - ± 10 V $R_L \geq 10$ k Ω	4 - 20 mA $R_L = 100 - 500$ Ω ^{★2}	0 - ± 10 mA $R_L = 100 - 500$ Ω ^{★2}
Pin	Protective Earth	—		

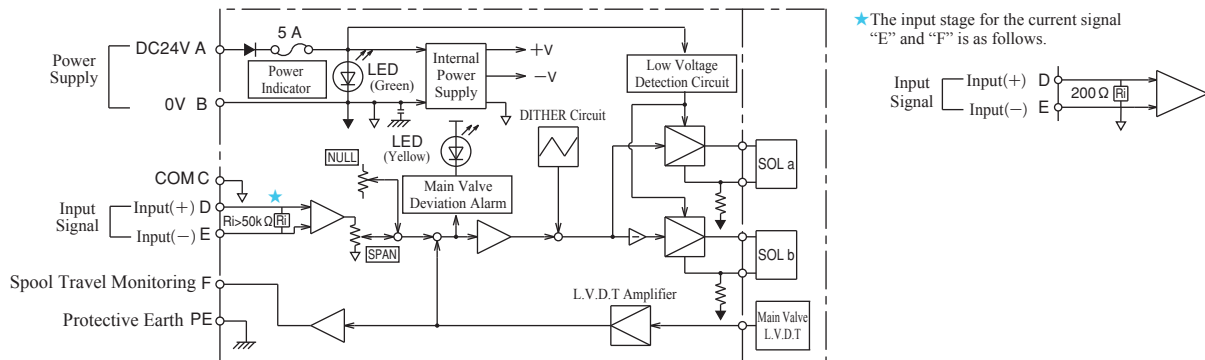
★1. Differential input signals can be used only for the valves with the voltage signal specifications of ± 10 V. (ECDFHG-★EH-★-D)

★2. The recommended load resistance is 200 Ω .

I/O Signal Characteristics



Block Diagram



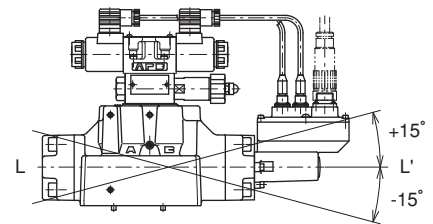
Accessories

● 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

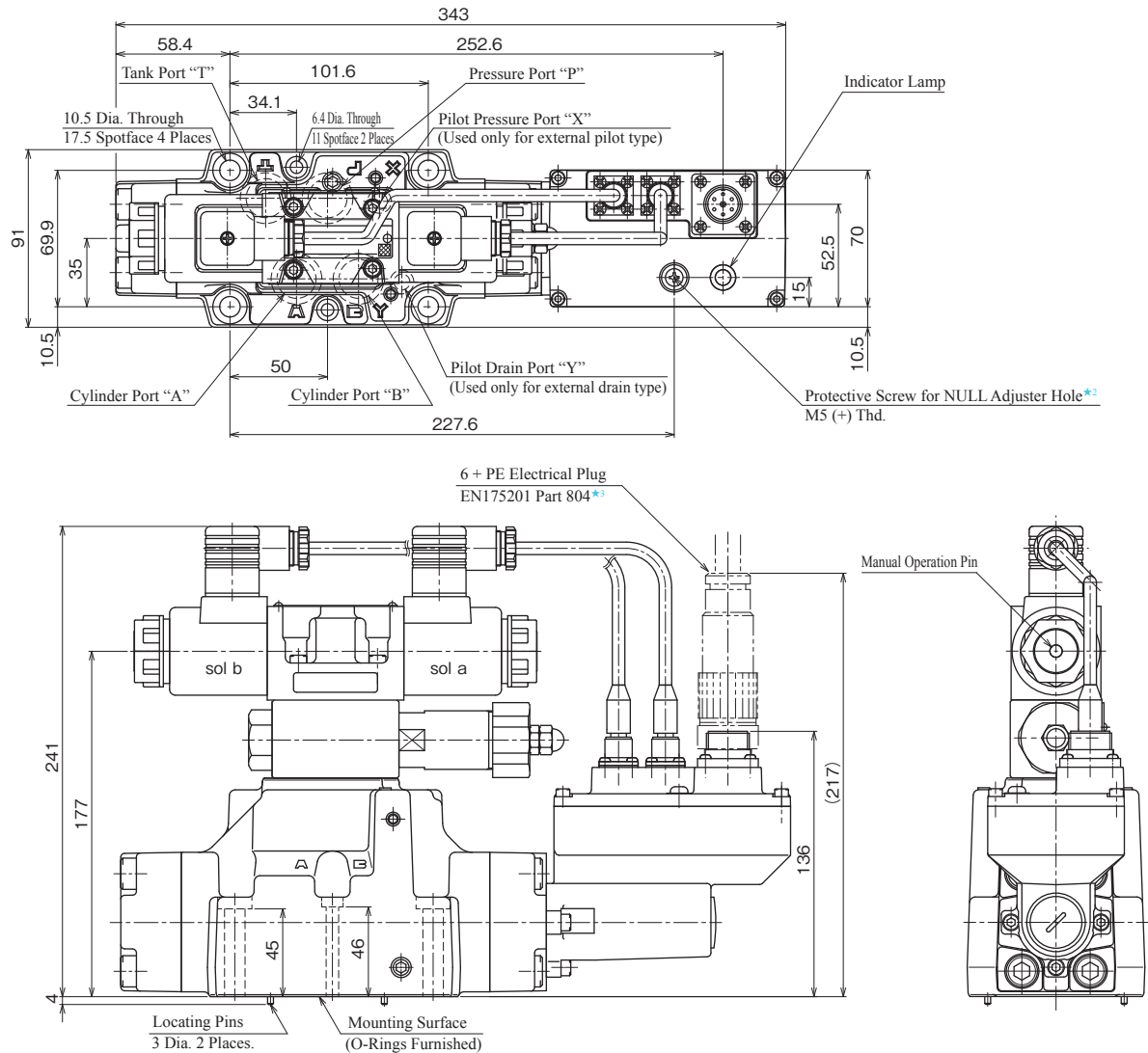
Mounting Position

Mount the valve with the angle of the axis line L-L' within about $\pm 15^\circ$ 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

● Dimensions of Mounting Surface

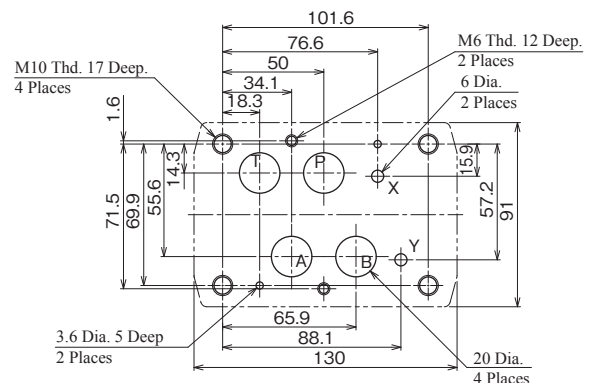
Prepare the mounting surface as shown in the figure below.

The mounting surface should have a good machined finish ($\sqrt{1.6}$).

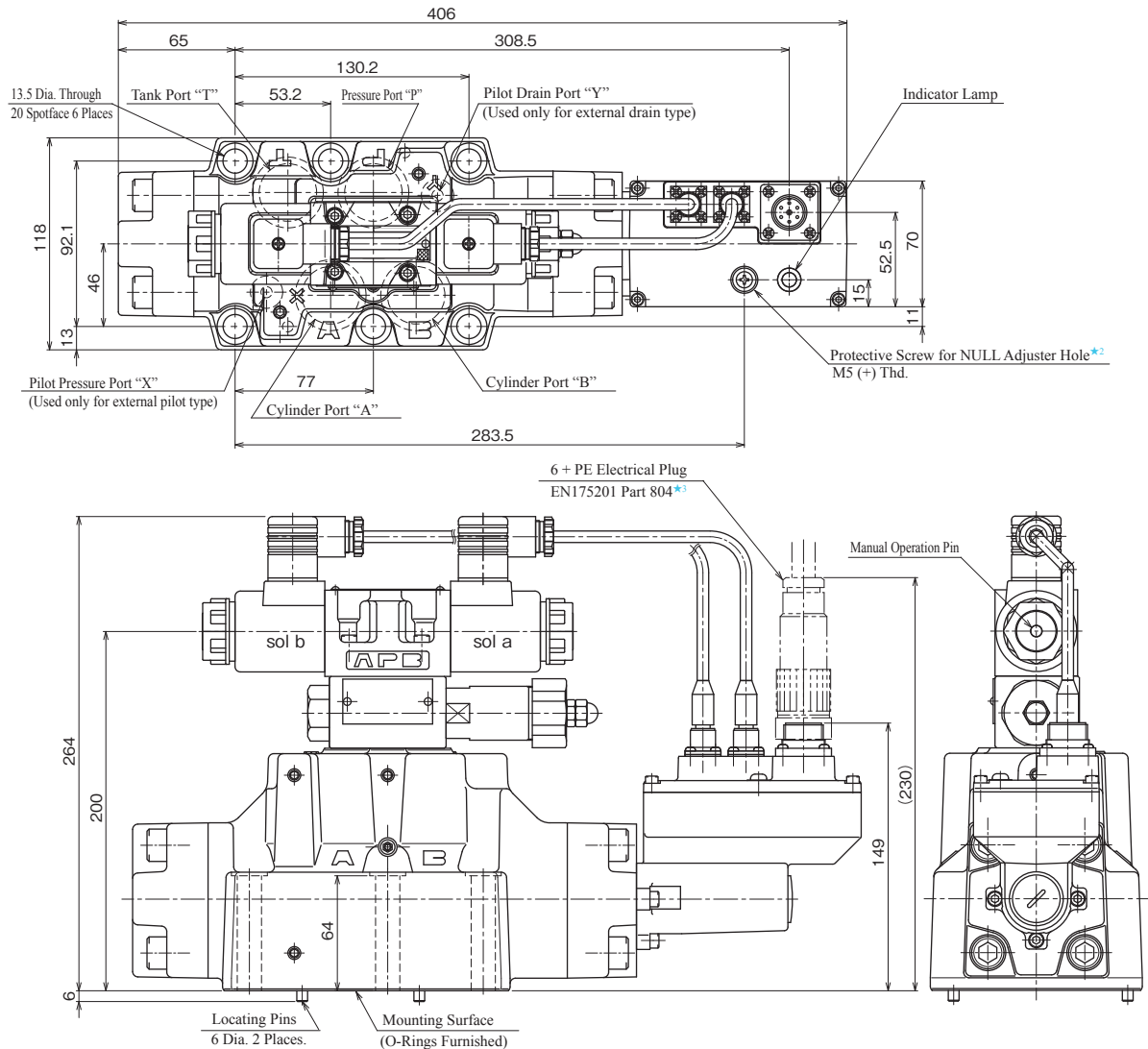
● O-Rings

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



ECDFHG-06EH

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

Indicator Lamp

Color	Indicator Lamp
Green	Power Supply
Yellow	Main Valve Deviation Alarm

Dimensions of Mounting Surface

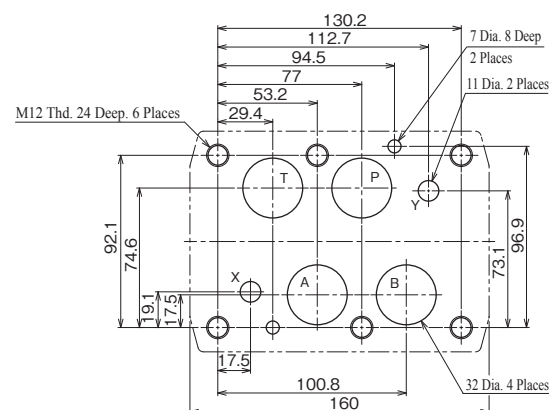
Prepare the mounting surface as shown in the figure below.

 The mounting surface should have a good machined finish ($\sqrt{16}$).

O-Rings

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

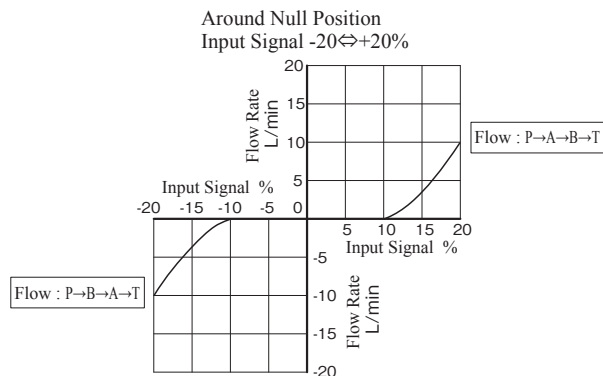
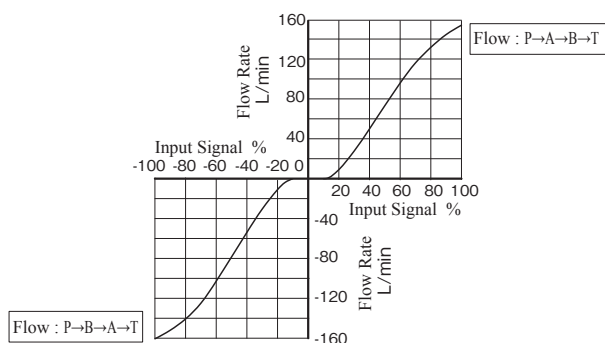
- ★1. This valve can be mounted on ISO mounting surface. However, in this case, the pressure loss becomes large and the rated flow rate cannot be achieved.
- ★2. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.
- ★3. The 6 + PE Electrical Plug is not included with the valve. Prepare it separately.
YUKEN parts number: TK290457-1



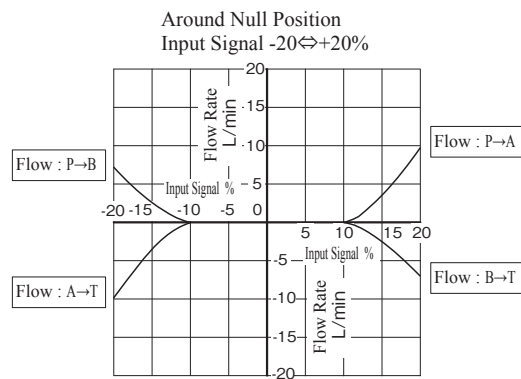
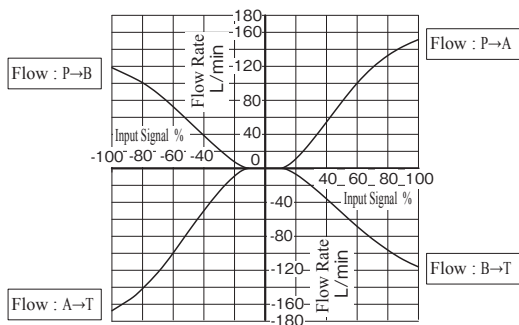
No-Load Flow Characteristics

〈Conditions〉 ● Valve Pressure Difference: 1 MPa (4-Way Valve/Pressure Difference per Land: 0.5 MPa)
● Viscosity: 30 mm²/s

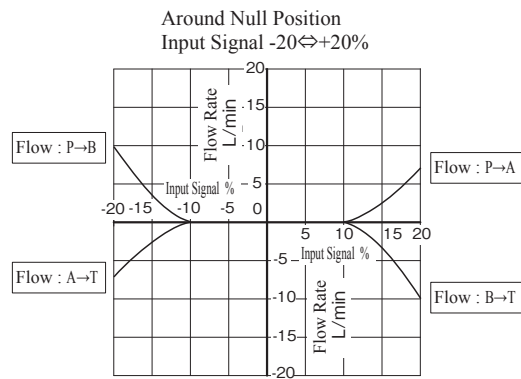
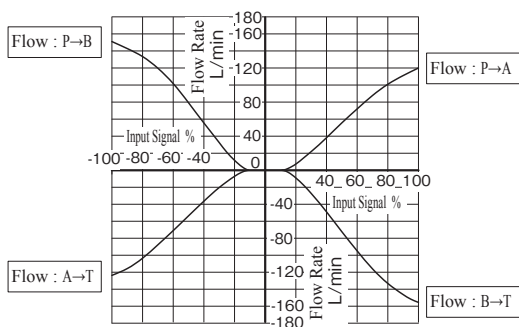
ECDFHG-04EH-150-3C2/3C40



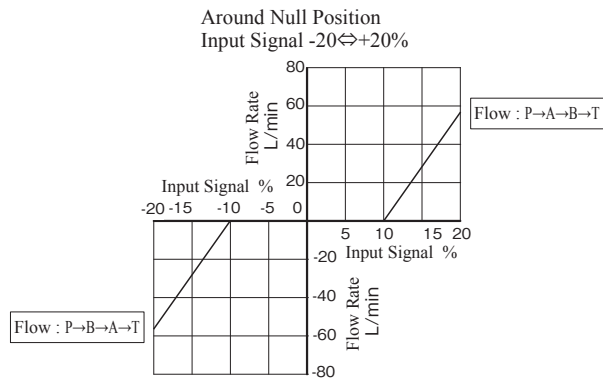
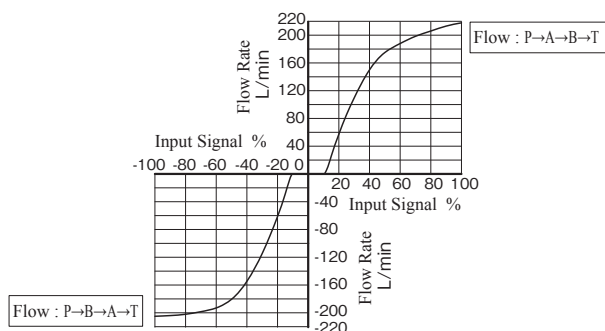
ECDFHG-04EH-150-3C21

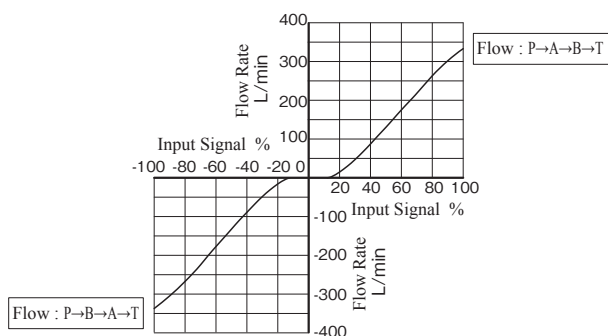
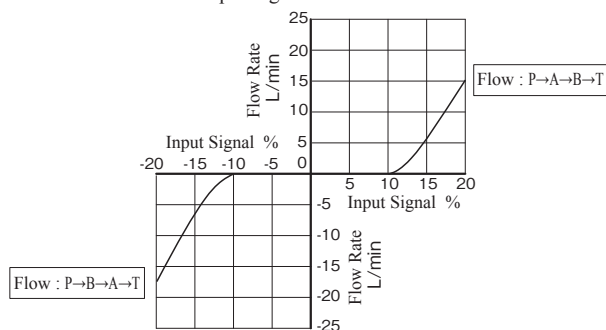
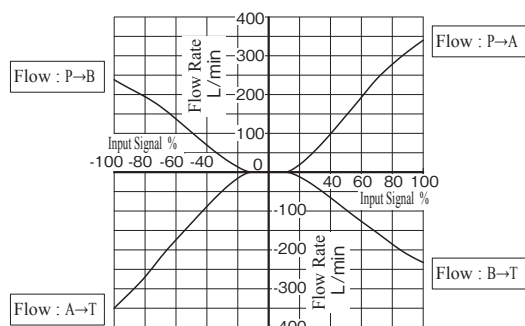
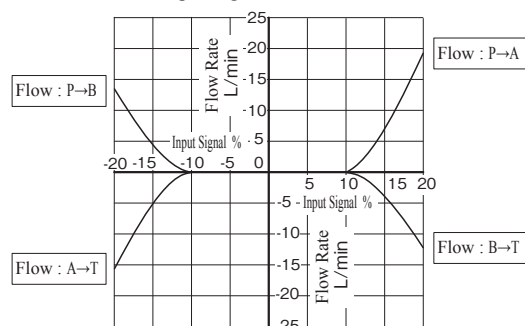
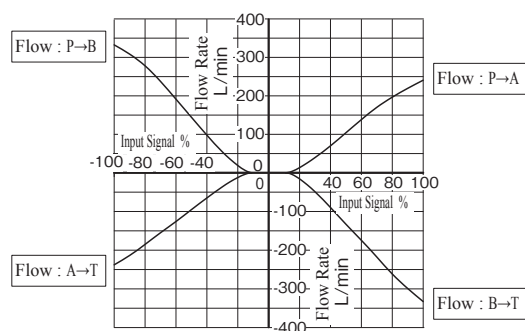
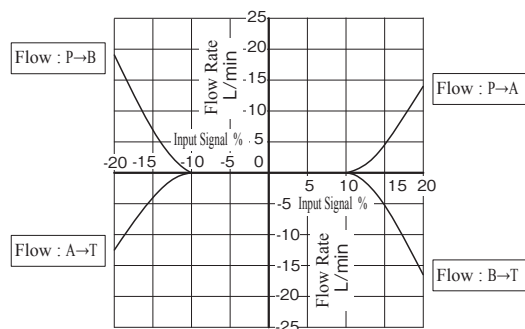
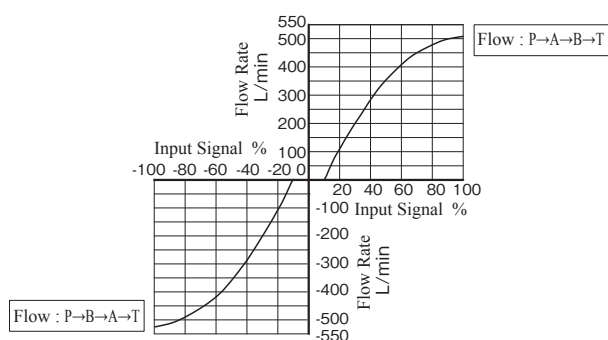
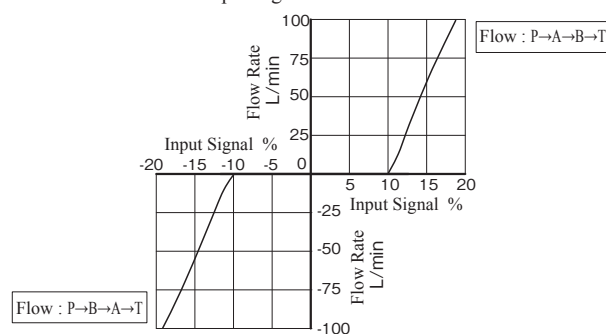


ECDFHG-04EH-150-3C22



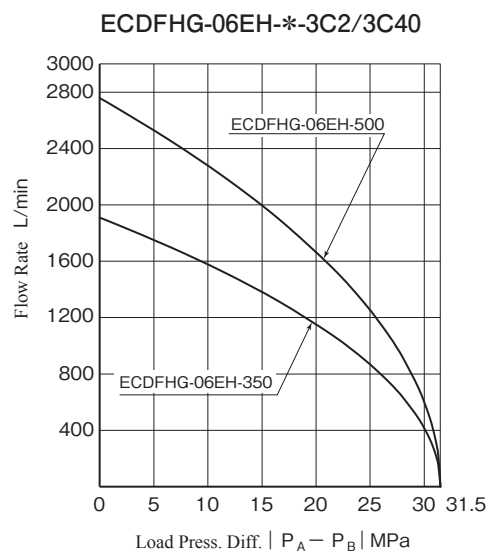
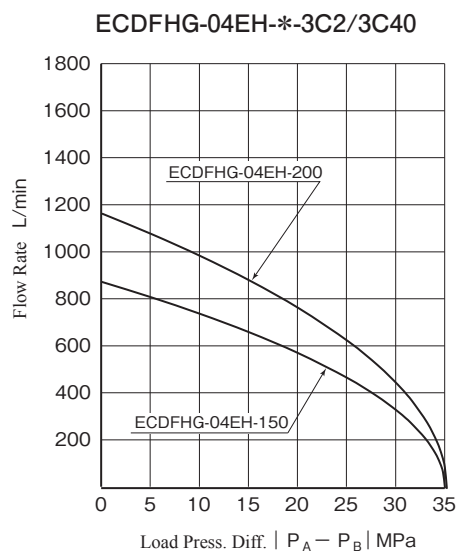
ECDFHG-04EH-200-3C2/3C40



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



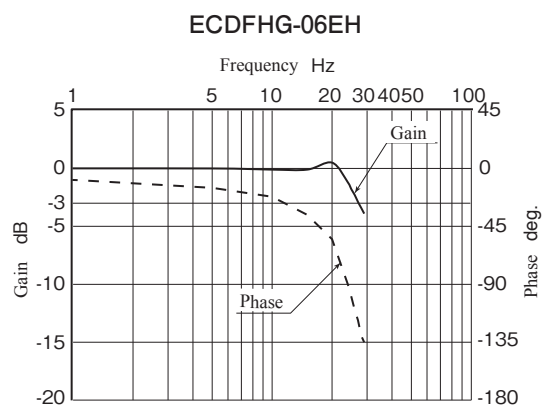
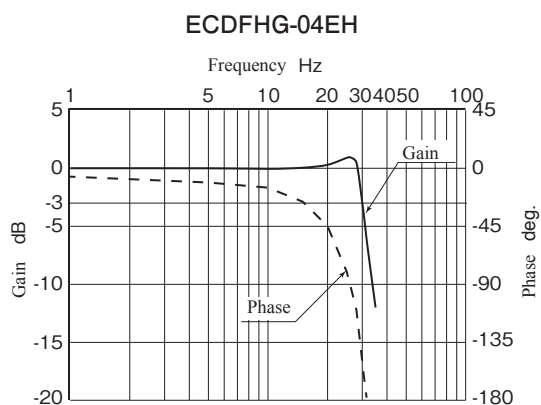
Frequency Response

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

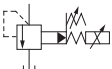
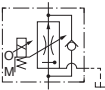
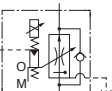
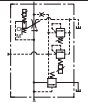
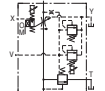
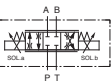
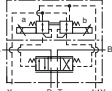
● Viscosity: 30 mm²/s

● Amplitude: 50±25%

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



E Series Proportional Electro-Hydraulic Controls

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

Power Amplifiers Page H-172

Setting Adjusters Page H-194

Hydraulic Fluids

Fluid Types

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

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

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

Recommended Fluid Viscosity and Temperature

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

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

Control of Contamination

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

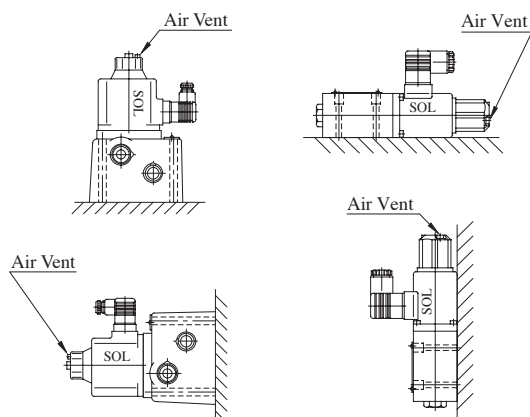
Instructions

■ Mounting

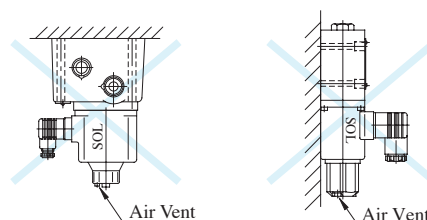
Be sure that the air vent faces up.

In addition, if the valve is mounted vertically, the minimum adjustment pressure is 0.2 MPa or higher.

[Good example]



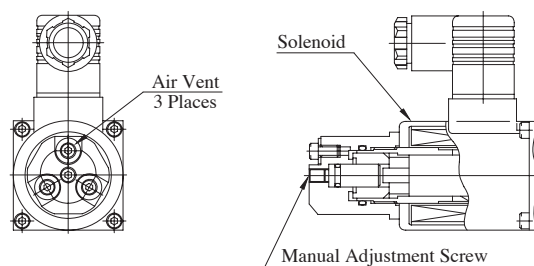
[Bad example]



■ Air Bleeding

To ensure stable control, bleed the air from solenoid completely and fill its core with oil.

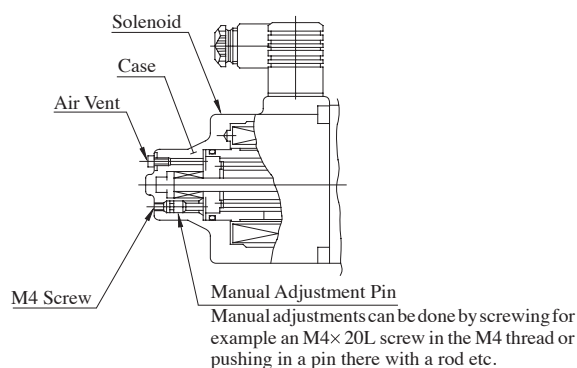
Bleeding can be done by slowly loosening one of the air vents at the end of the solenoid. Choose one of the three air vents which is expected to work most effectively (see the figure to the right).



■ 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).

10 Ω Series Solenoid



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

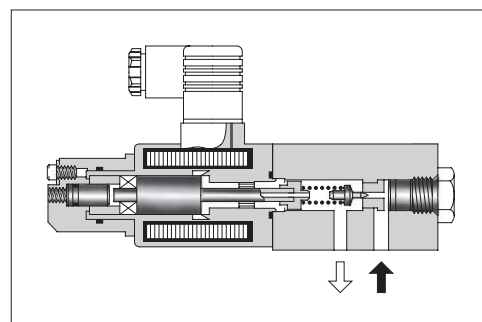
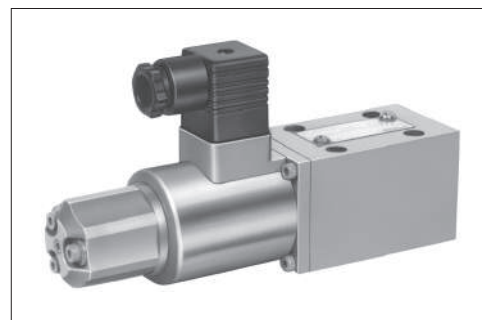
Name	Model Numbers	Design Number		Installation Interchangeability	Major Changes	Page
		Current	New			
Pilot Relief Valves	EDG-01	50	51	YES	● Solenoid Ass'y Change	H-98
Relief Valves	EBG-03	50	51	YES	● Pilot Valve Change EDG-01V, 50→51 Design	H-107
	EBG-06	50	51	YES		
	EBG-10	50	51	YES		
Relieving and 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		YES		
	EFBG-06	50・51	61	YES		
		60		YES		
High Flow Series Flow Control and Relief Valves	EFBG-10	50	51	YES		
	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

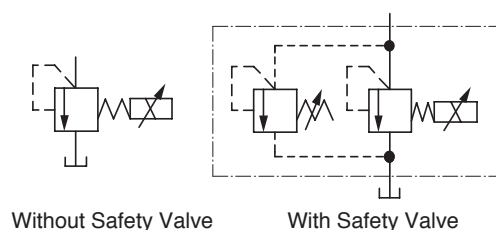
This valve consists of a small DC solenoid and a direct-acting relief valve. It serves as a pilot valve for a low flow rate hydraulic system or a proportional electro-hydraulic control valve and controls the pressure in proportion to the input current. Note that this valve is used in conjunction with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

Specifications

Model Numbers	EDG-01	
Descriptions		
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



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	B: 0.5 - 6.9	None: Without Safety Valve 1 : With Safety Valve	PN: Without Orifice (Standard)	T15	51
			V : Vent Control of Relief Valve (Omit if not required)	C: 1.0 - 15.7			T13	
				H: 1.2 - 24.5			T11	

★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.

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. ($\frac{1}{16}$)
- Sub-plates are those for 1/8 solenoid operated directional valves. For dimensions, 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 40cm³.

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)

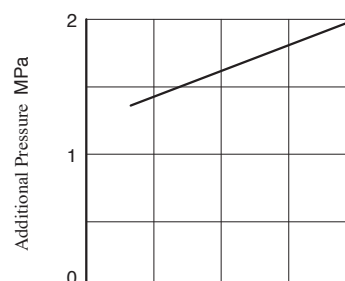
Safety Valve Pressure Setting

The pressure of the safety 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.

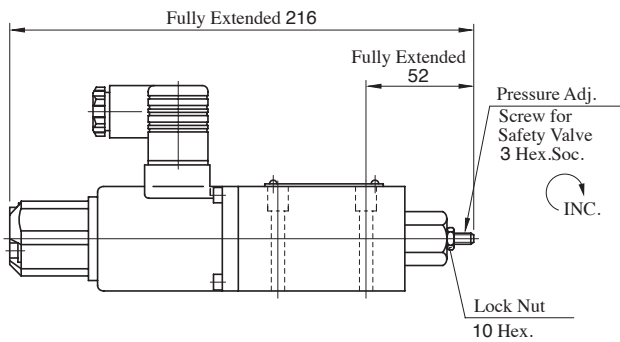
Setting pressure = (Operating pressure upper limit) + (Additional pressure indicated below)

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

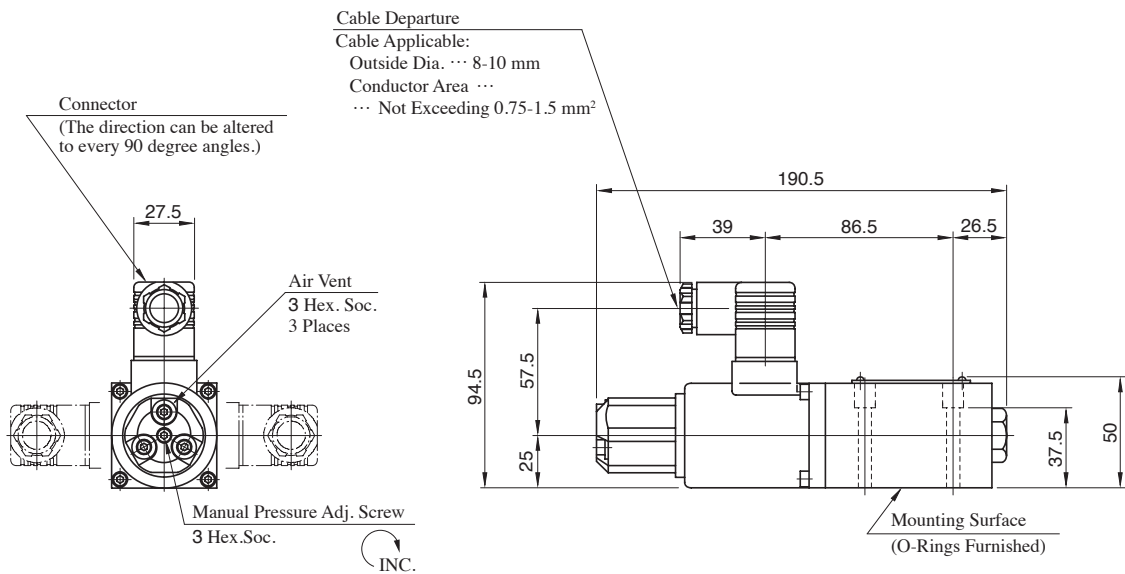
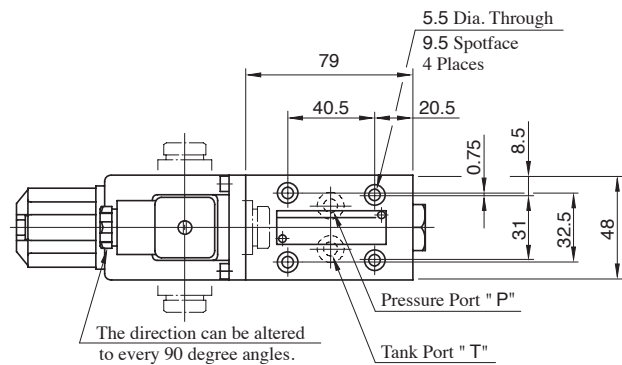
With Safety Valve



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

EDG-01*-PNT*-51

Without Safety Valve

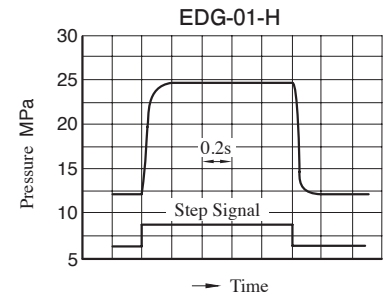
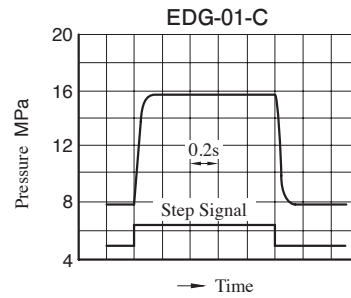
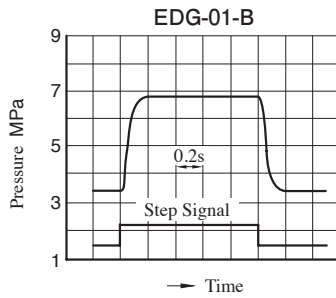


Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-8) in common use.

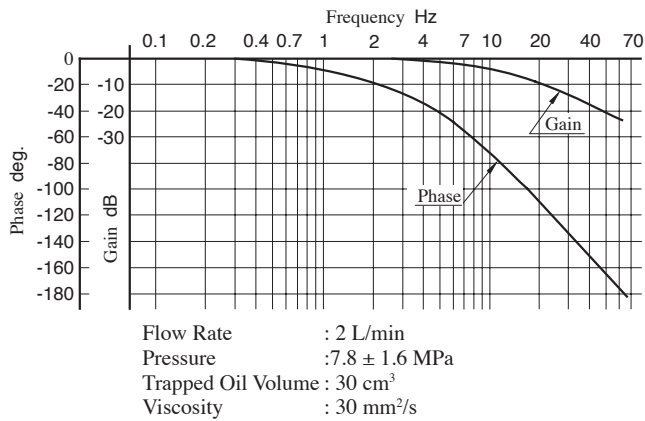
Step Response (Example)

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

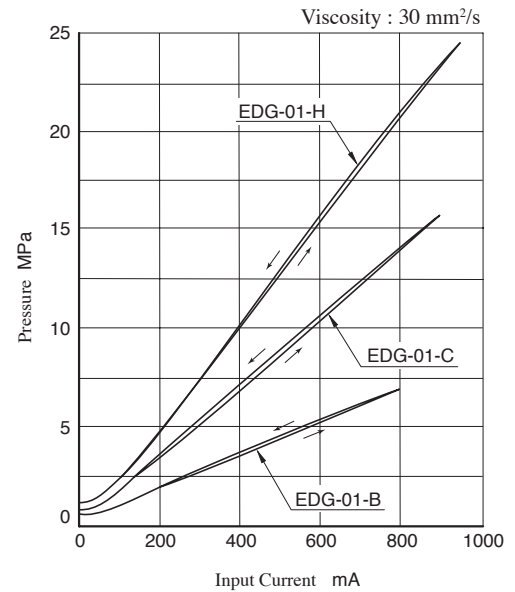
Flow Rate : 2 L/min
Trapped Oil Volume : 40 cm³
Viscosity : 30 mm²/s



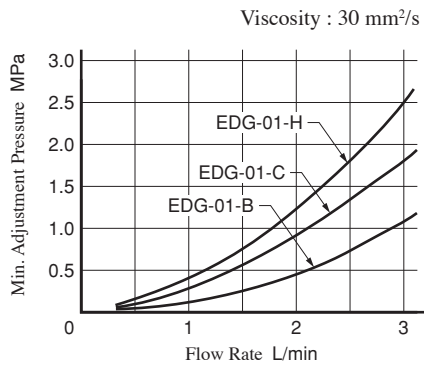
Frequency Response



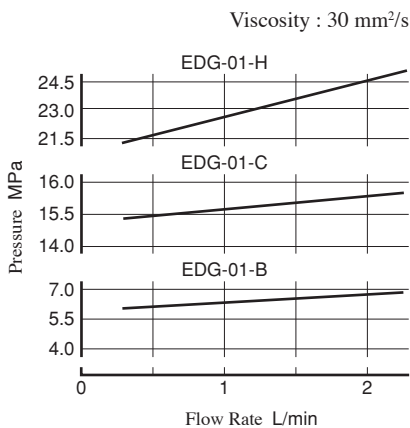
Control Pressure vs. Input Current



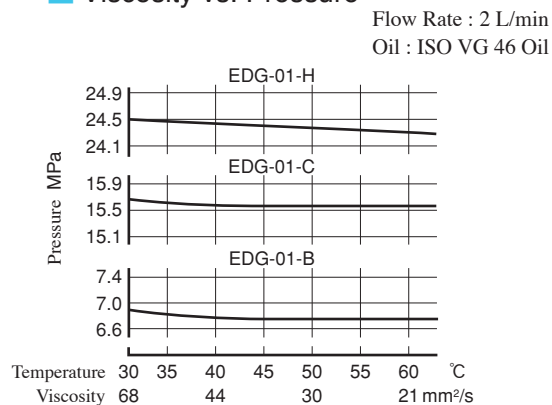
Min. Adjustment Pressure



Flow Rate vs. Pressure



Viscosity vs. Pressure

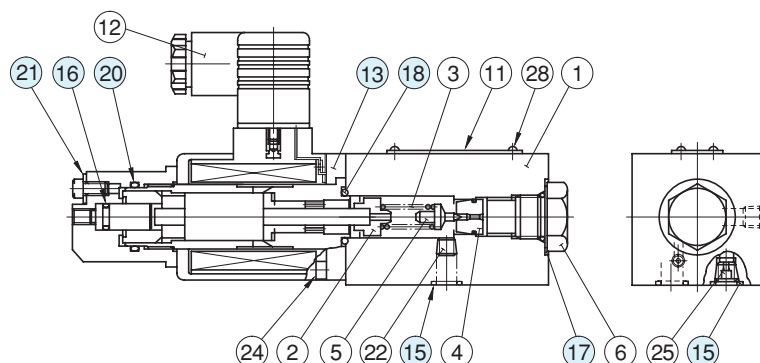


List of Seals and Solenoid Ass'y

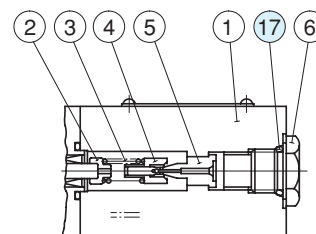
Without Safety Valve

EDG-01*-PNT*-51

EDG-01V*-PNT*-5103



EDG-01*-PNT*-5101

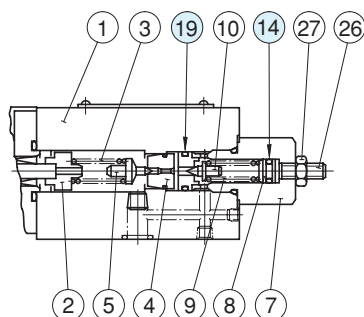


With Safety Valve

EDG-01*-1-PNT*-51

EDG-01V*-1-PNT*-5103

EDG-01V*-1-PNT20-5197



List of Seals

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

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

Solenoid Ass'y

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

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

Pilot Valve

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

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

■ Interchangeability between Current and New Design

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

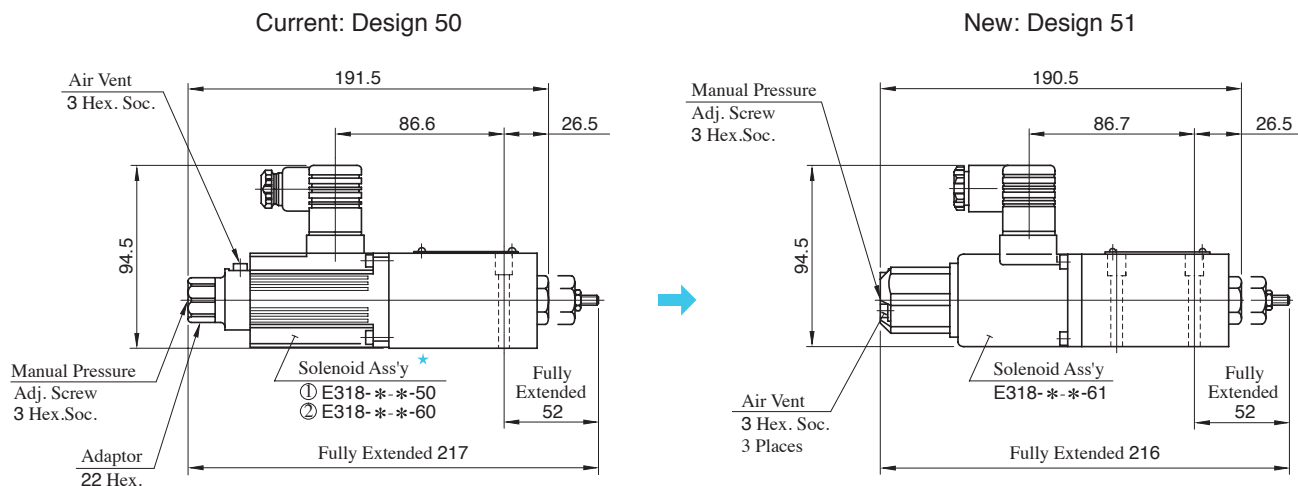
● Specifications and Characteristics

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

Other specifications remain unchanged.

● Mounting Interchangeability

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



★ 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.

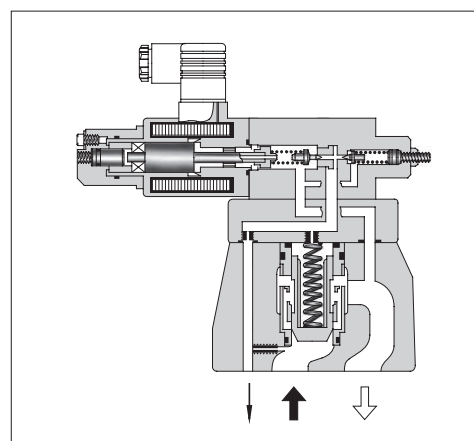
Proportional Electro-Hydraulic Relief Valves

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.

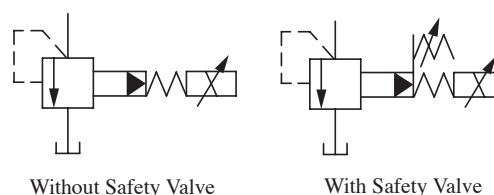
With this valve, it is possible to regulate the system pressure in proportion to the input current. Note that this valve is used in conjunction with the applicable power amplifier.

Specifications

Model Numbers		EBG-03	EBG-06	EBG-10
Descriptions				
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



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	C: * -15.7 ^{★1} H: * -24.5 ^{★1}	None: With Safety Valve T: Without Safety Valve	51
		06			
		10			

★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. ($\frac{1}{16}$)
- 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

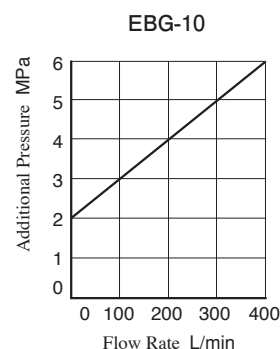
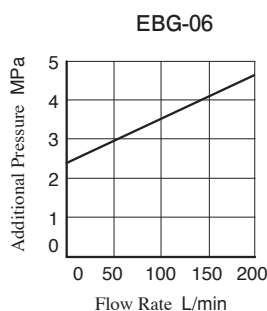
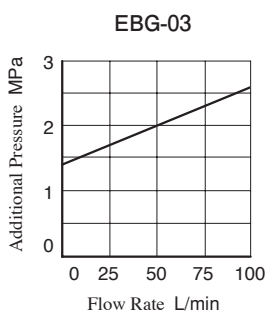
At shipment, the pressure of safety valves is set to the upper limits of the adjustable pressure ranges plus the extra as shown below.

Additional Pressures for Safety Valves at Shipment

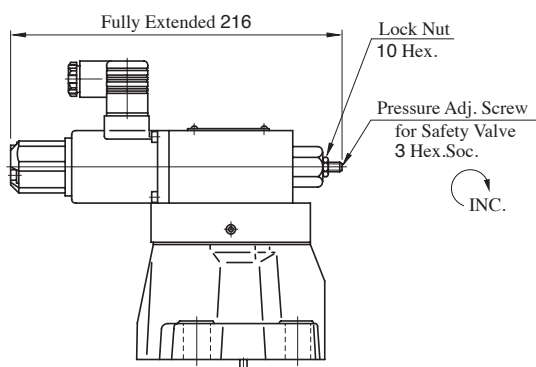
Valve Model Numbers	Additional Pressures at Shipment MPa
EBG-03	2.0 (at 50 L/min)
EBG-06	3.5 (at 100 L/min)
EBG-10	4.0 (at 200 L/min)

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)

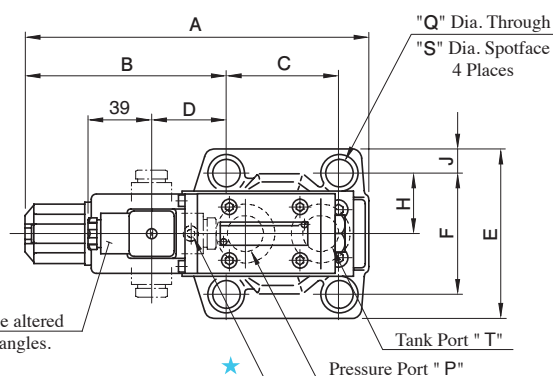


To lower the setting pressure, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

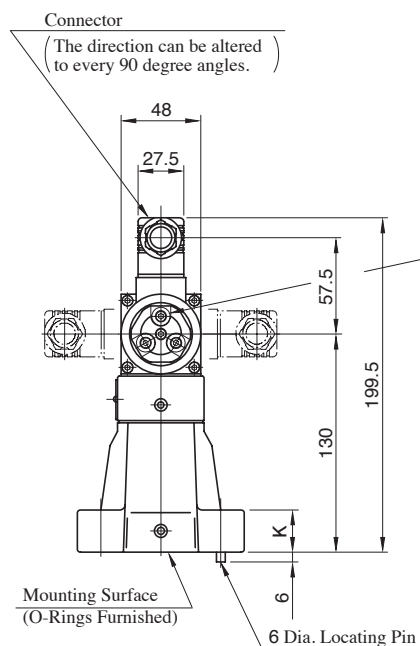
**EBG-03
06 -*-51**
With Safety Valve


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

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

**EBG-03
06 -*-T-51**
Without Safety Valve


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

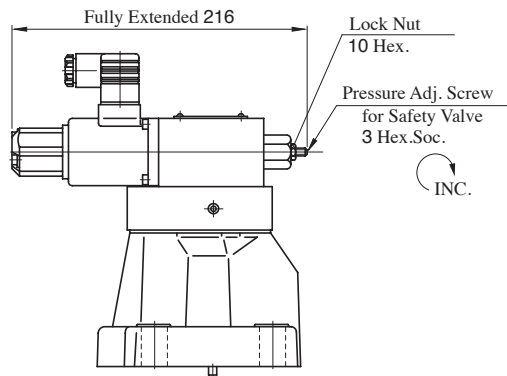


Model Numbers	Dimensions mm												
	A	B	C	D	E	F	H	J	K	L	N	Q	S
EBG-03	197.5	117.6	53.8	40.2	76	53.8	26.9	11.1	21.5	106	26.1	13.5	21
EBG-06	205.5	119.5	66.7	42.1	98	70	35	14	26	122	36	17.5	26

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

EBG-10- *-51

With Safety Valve

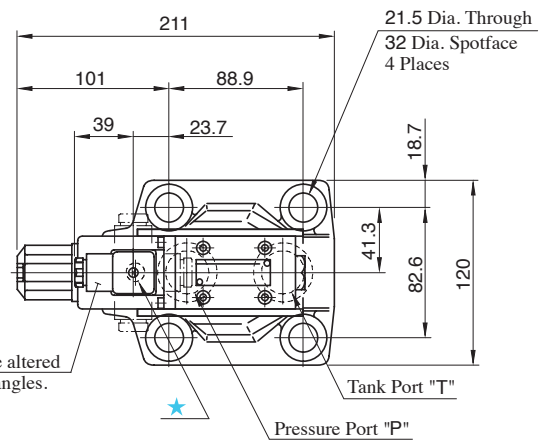


● For other dimensions, refer to the without safety valve.

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

EBG-10- *-T-51

Without Safety Valve

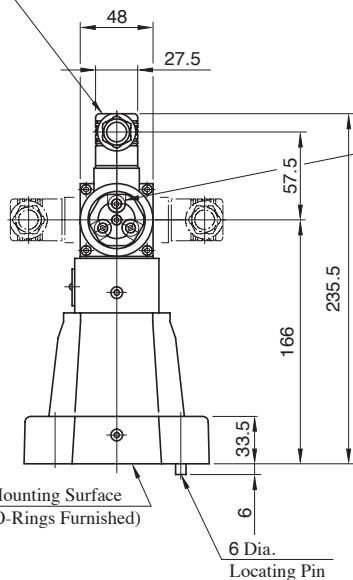


The direction can be altered
to every 90 degree angles.

★ 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.

Connector

(The direction can be altered
to every 90 degree angles.)



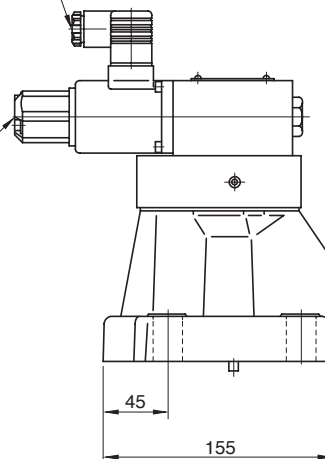
Cable Departure

Cable Applicable:
Outside Dia. ... 8-10 mm
Conductor Area
... Not Exceeding 0.75-1.5 mm²

Air Vent
3 Hex.Soc.
3 Places

Manual Pressure
Adj. Screw
3 Hex.Soc.

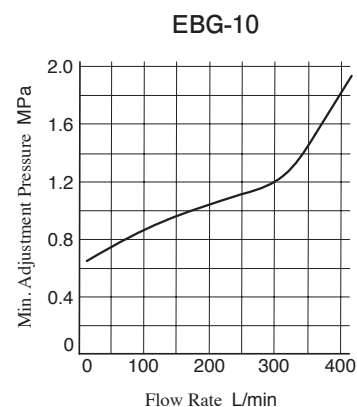
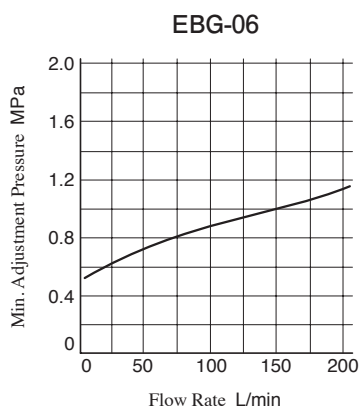
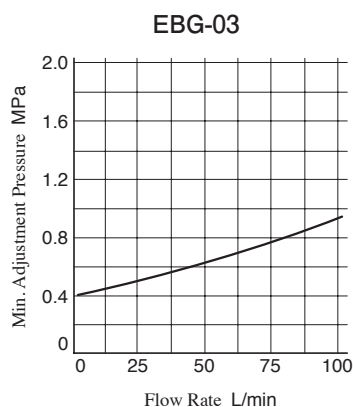
INC.



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

Min. Adjustment Pressure

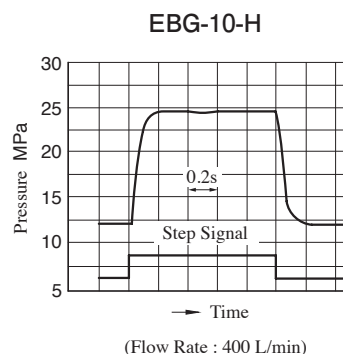
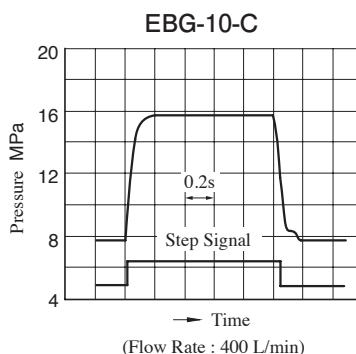
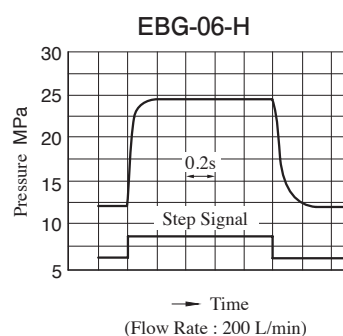
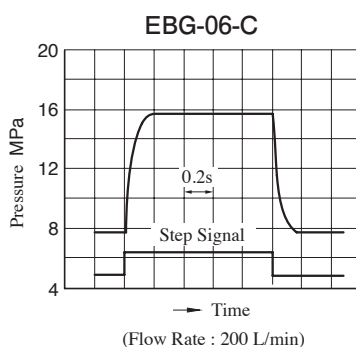
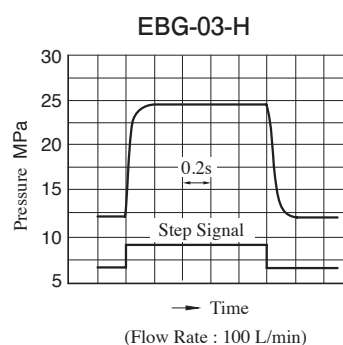
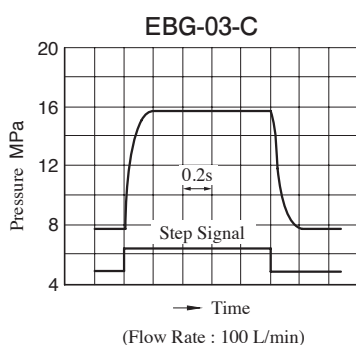
Viscosity : 30 mm²/s



Step Response (Example)

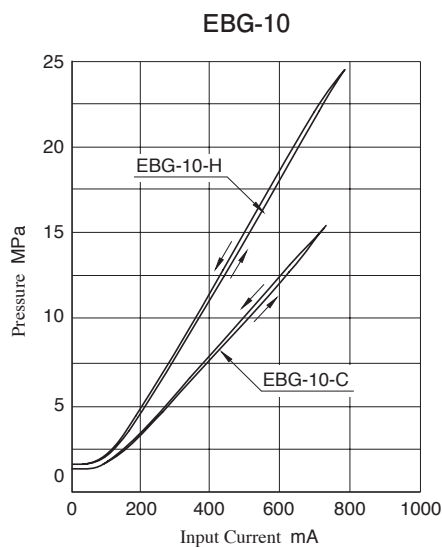
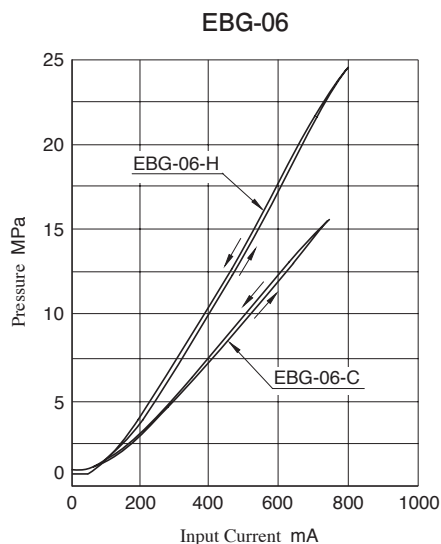
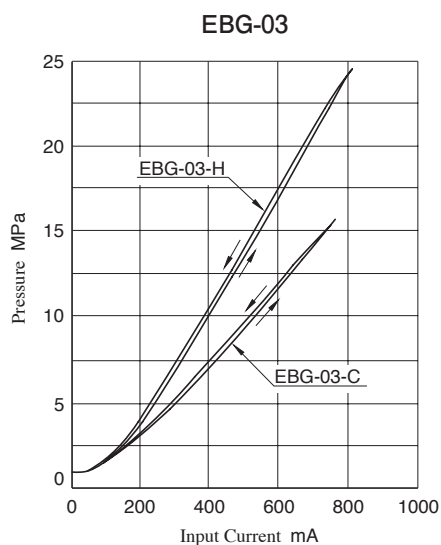
These Characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

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



Input Current vs. Pressure

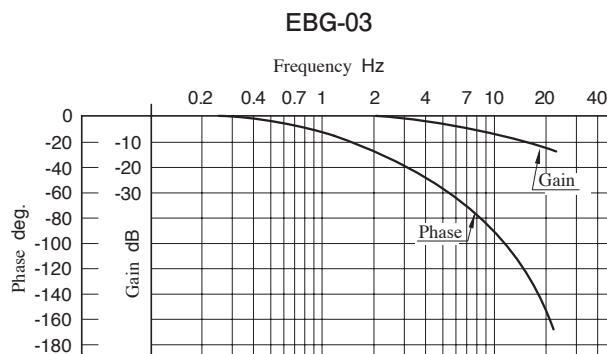
Viscosity : 30 mm²/s



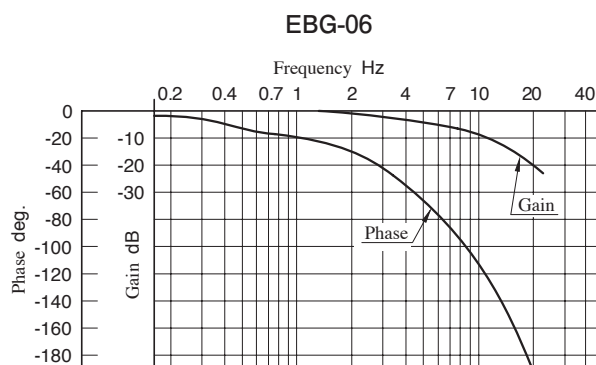
Frequency Response

Trapped Oil Volume : 1 L

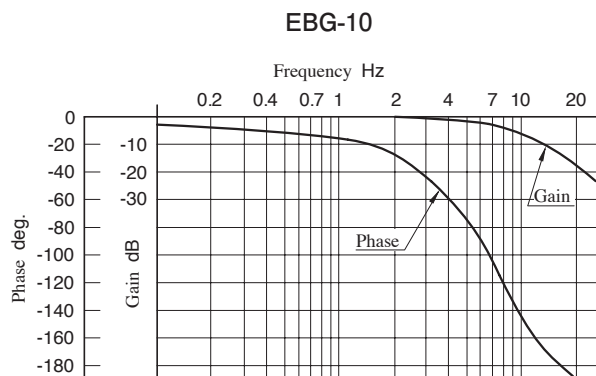
Viscosity : 30 mm²/s



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



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



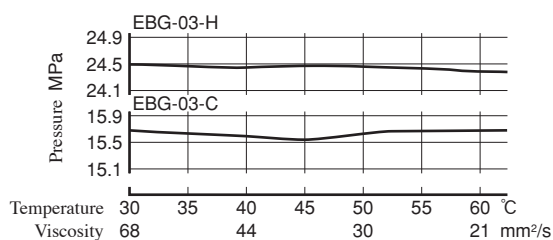
Pressure : 7.8 ± 1.6 MPa
Flow Rate : 400 L/min

Viscosity vs. Pressure

Oil : ISO VG 46

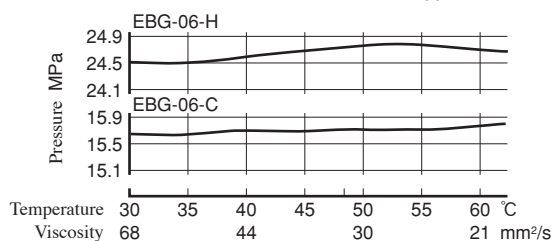
EBG-03

Flow Rate : 100 L/min



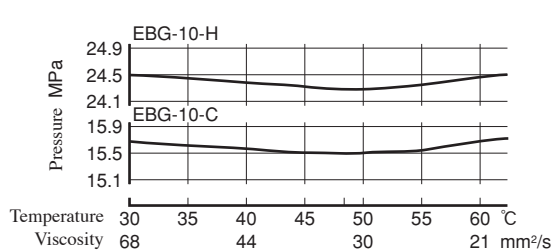
EBG-06

Flow Rate : 200 L/min



EBG-10

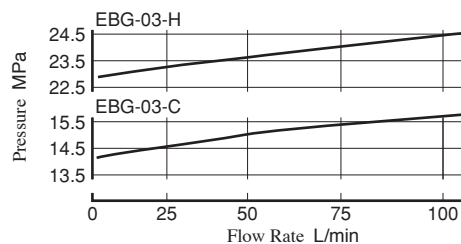
Flow Rate : 400 L/min



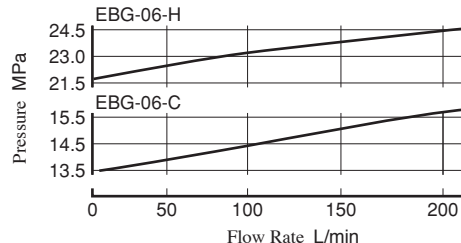
Flow Rate vs. Pressure

Viscosity : 30 mm²/s

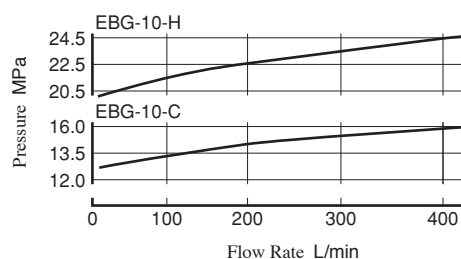
EBG-03



EBG-06

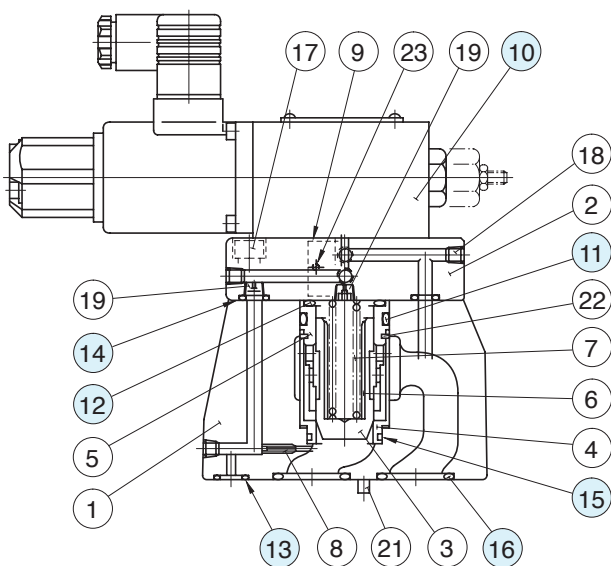


EBG-10



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).

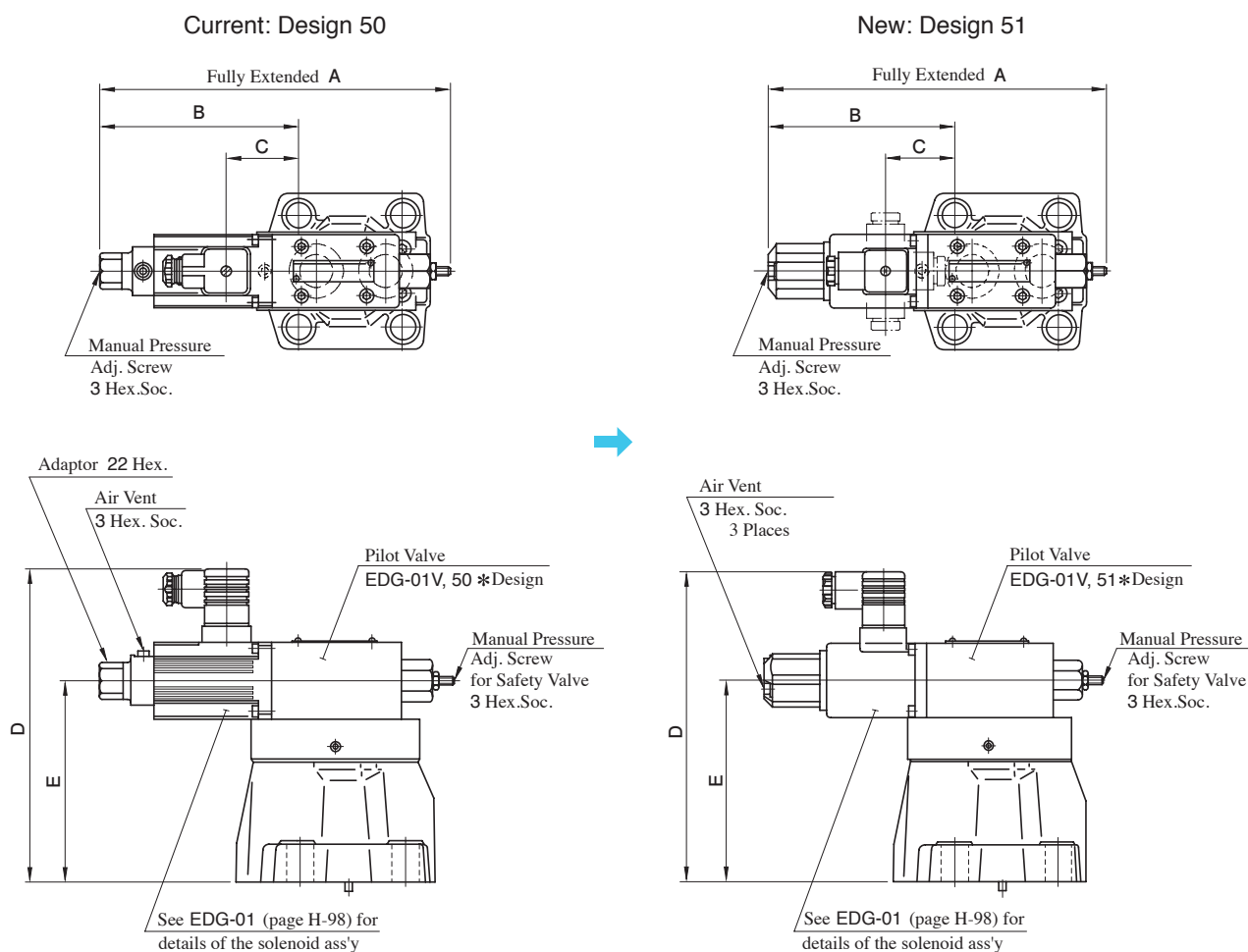
Specifications and Characteristics

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.



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.

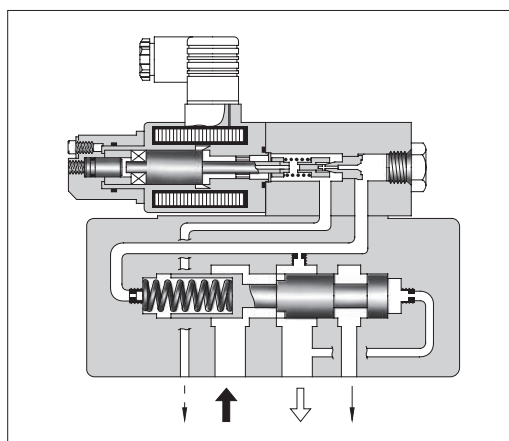
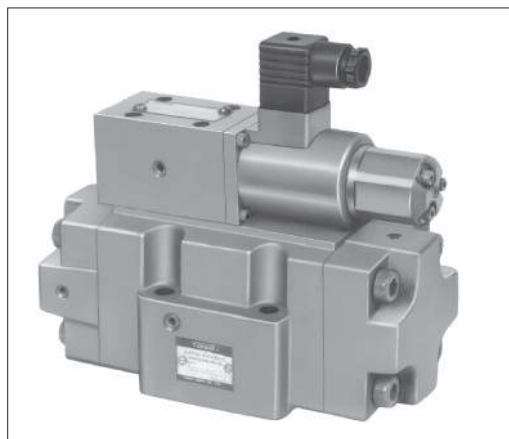
With this valve, it is possible to regulate the system pressure in proportion to the input current.

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.

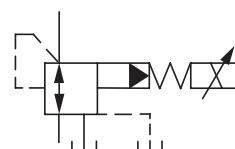
■ Specifications

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

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



Graphic Symbol



■ Model Number Designation

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

Accessories

Mounting Bolts

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

Applicable Power Amplifiers

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

Model Numbers : AME-D-10- *- *-20

AME-D2-1010-11

AMN-D-10 (For DC power supply)

SK1022- *- *-11

SK1015-11 (For DC power supply)

Sub-Plates

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

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish. ($\frac{1}{16}$ "/)

Instructions

Primary Pressure Required for Preselected Pressure

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

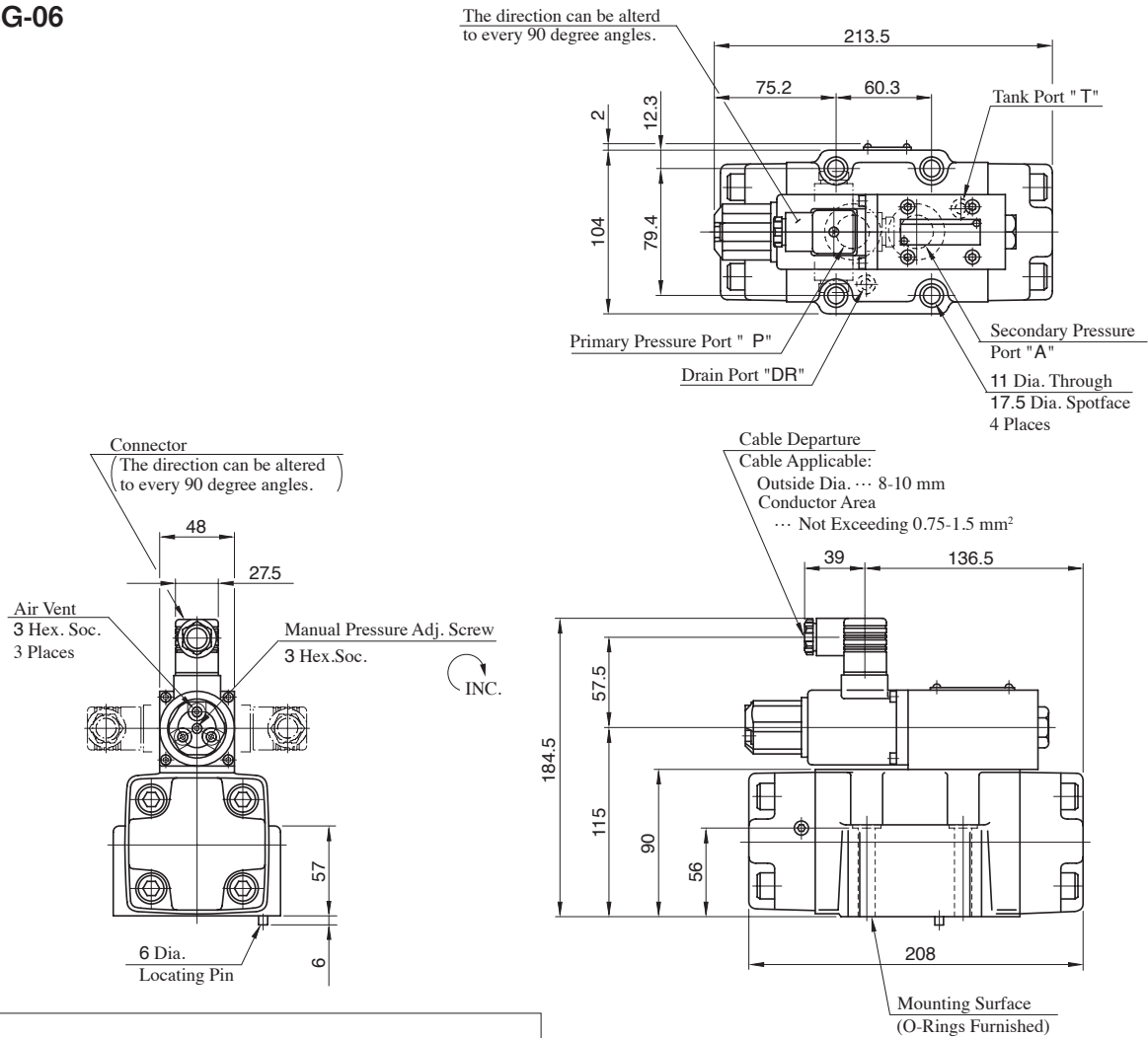
Drain Back Pressure

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

Trapped Oil Volume

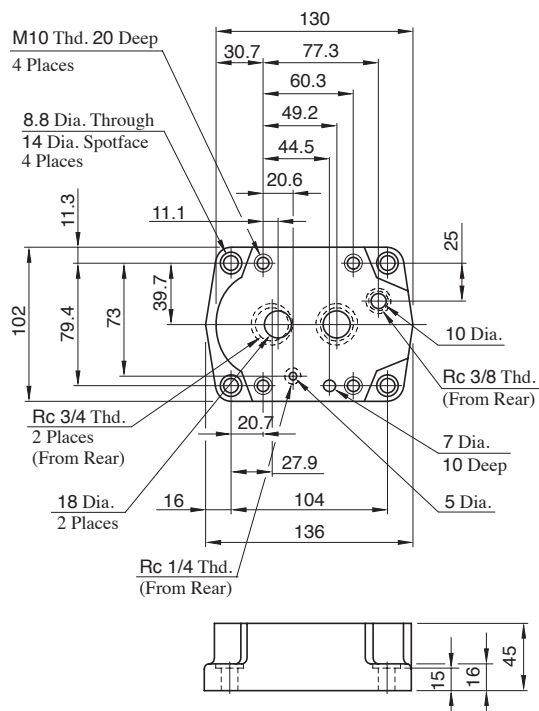
The recommended secondary side trapped oil volume is about 20 liters. Note that the trapped oil volume must not be lower than 1.4 liters.

ERBG-06

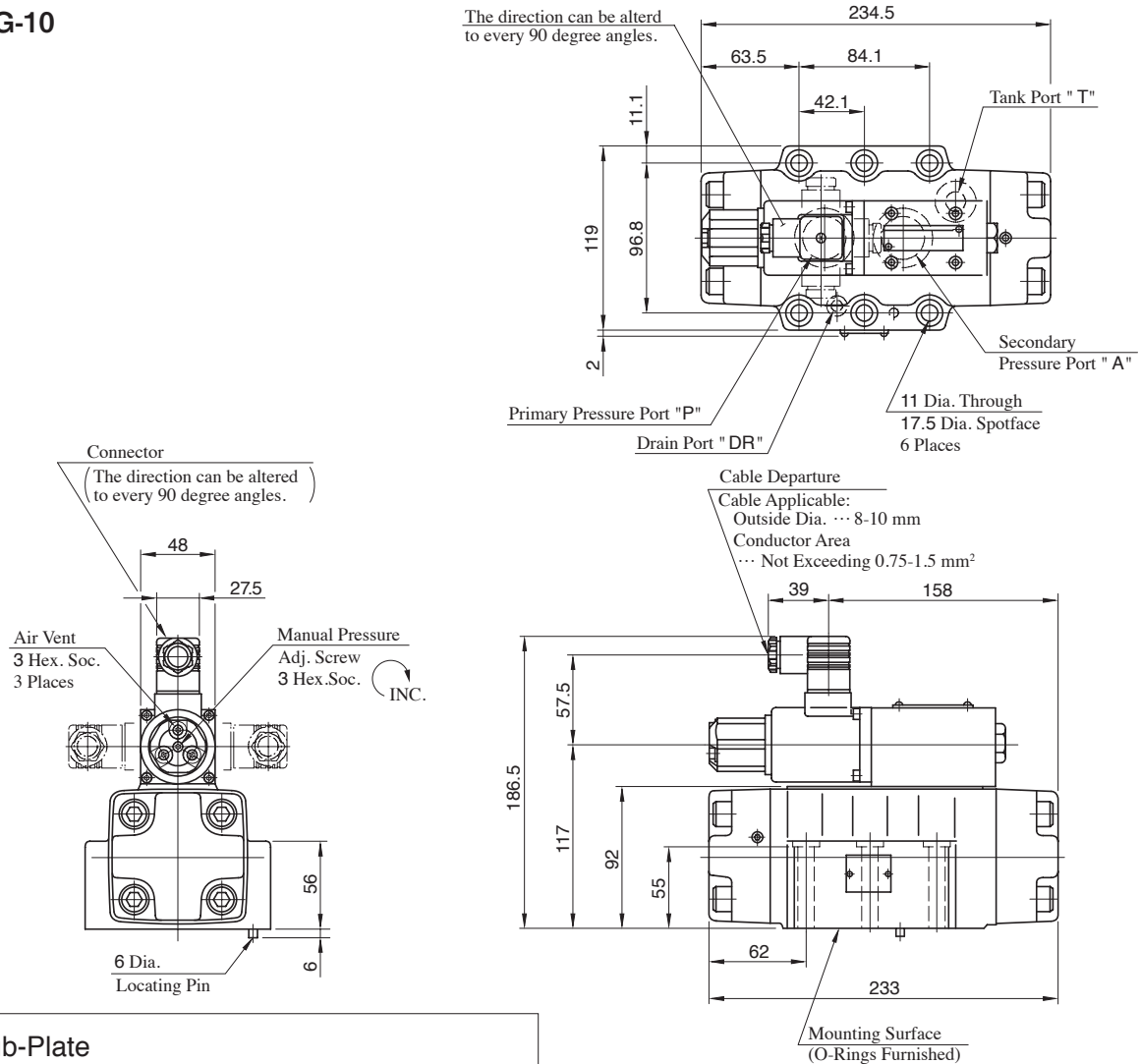


Sub-Plate

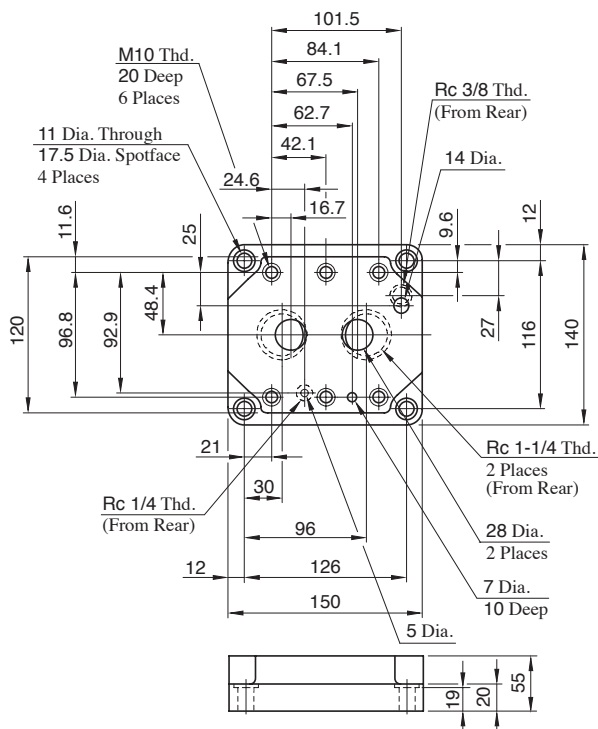
ERBGM-06



ERBG-10



**Sub-Plate
ERBGM-10**



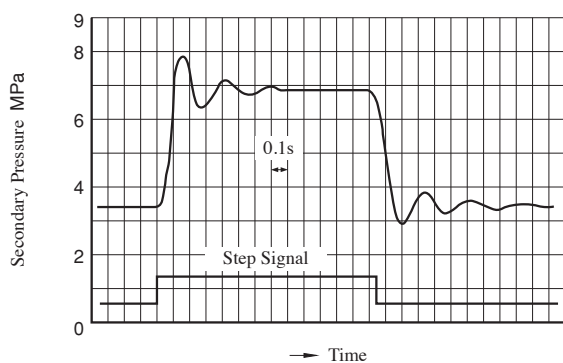
Step Response (Example)

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

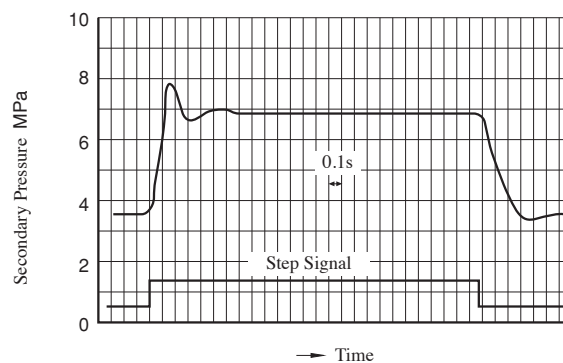
The step response varies by trapped oil volume.

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

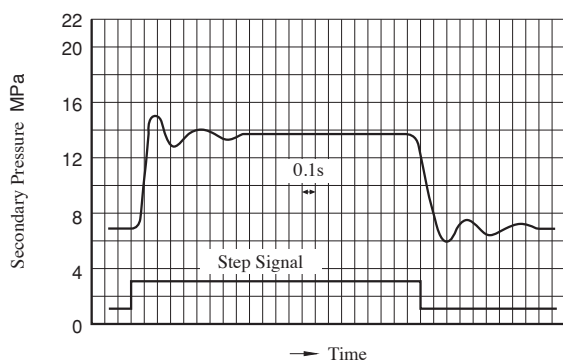
ERBG-06-B



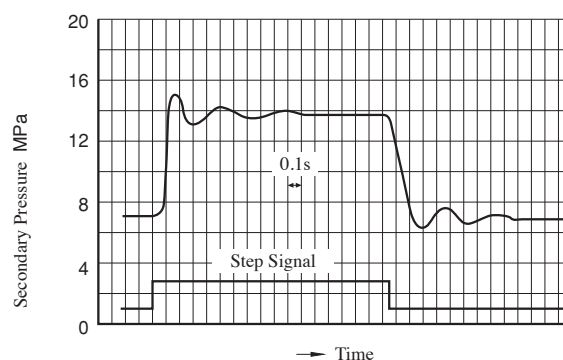
ERBG-10-B



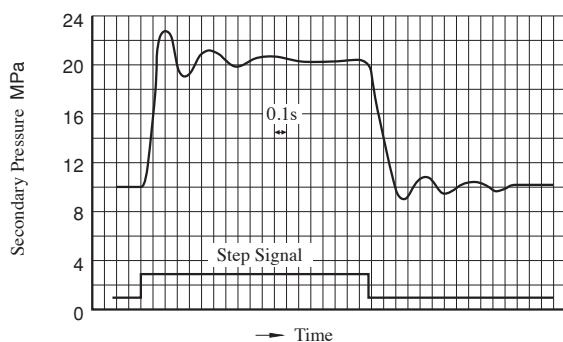
ERBG-06-C



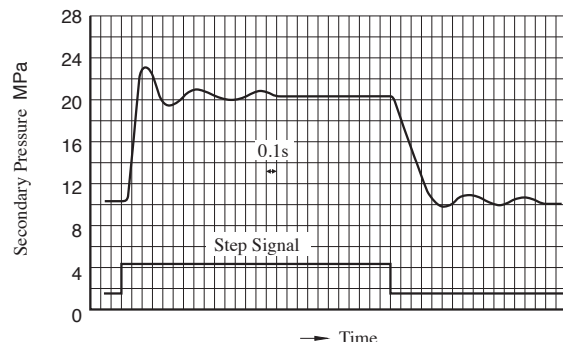
ERBG-10-C



ERBG-06-H

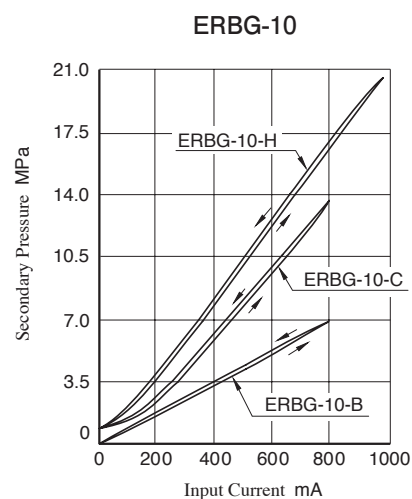
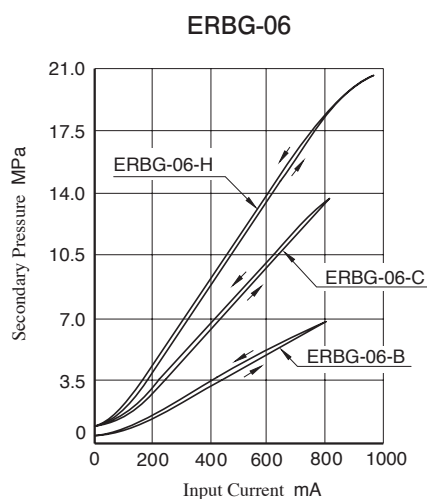


ERBG-10-H



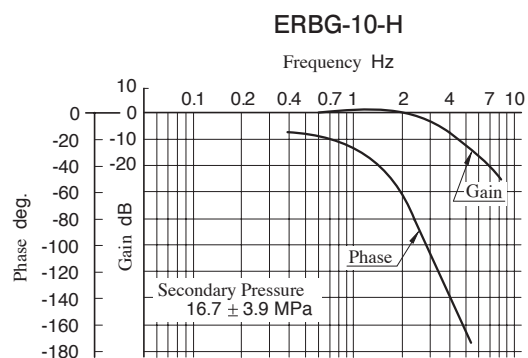
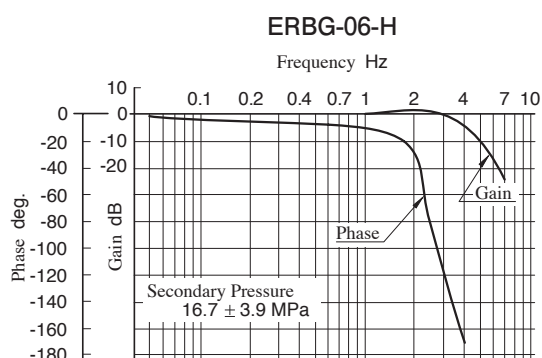
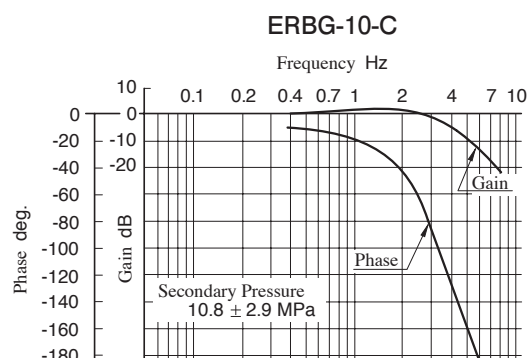
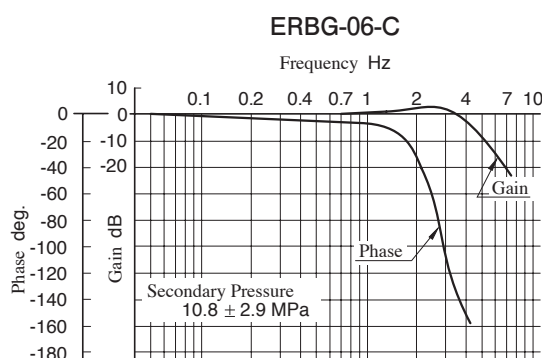
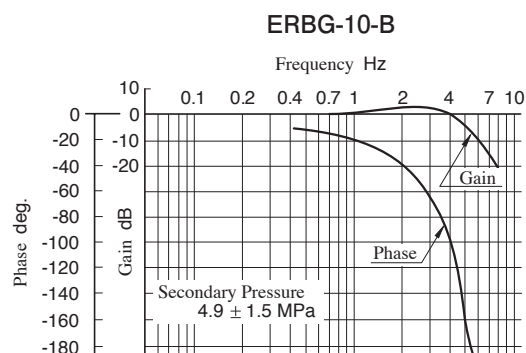
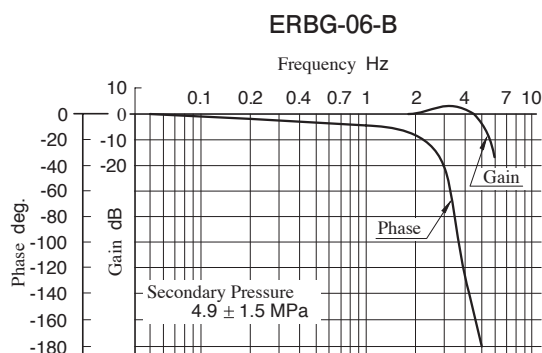
Input Current vs. Secondary Pressure

Primary Pressure : 24.5 MPa
Viscosity : 30 mm²/s



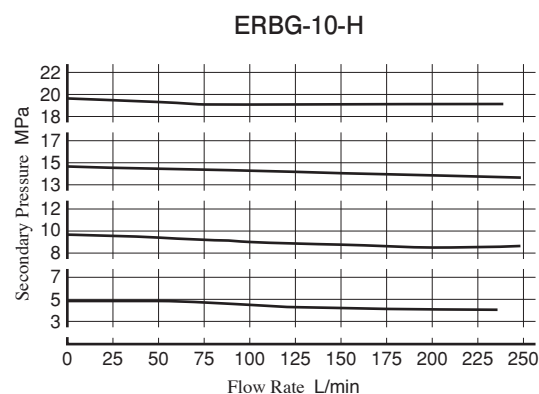
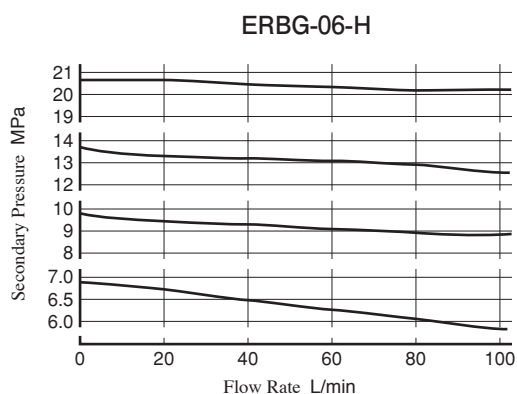
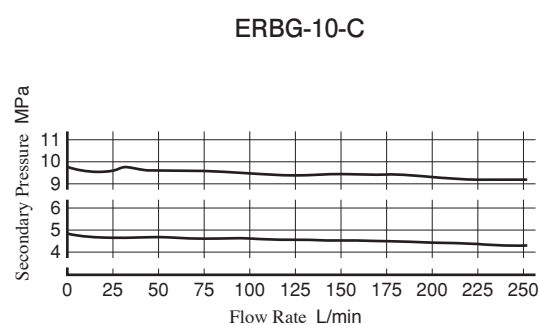
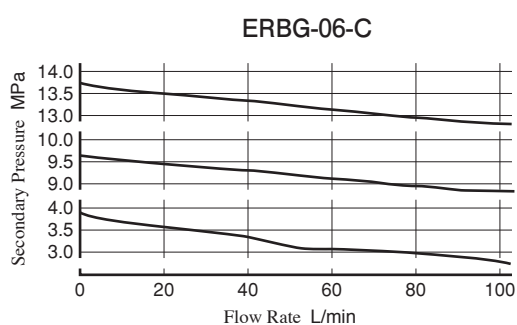
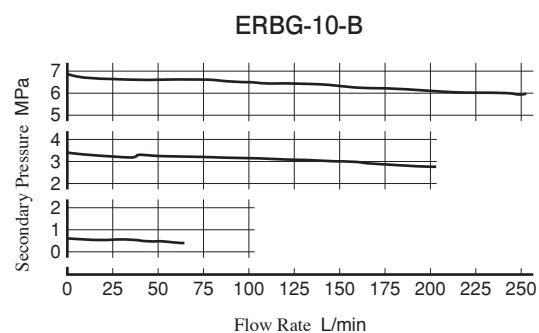
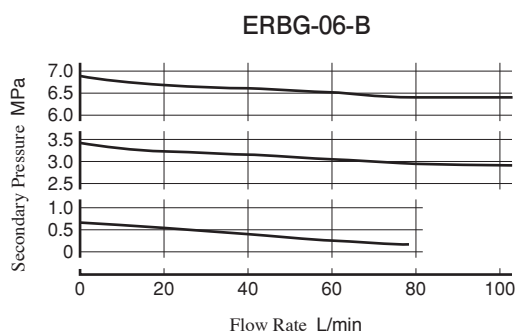
Frequency Response

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



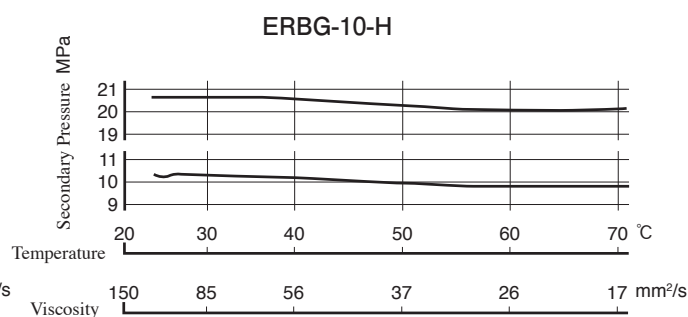
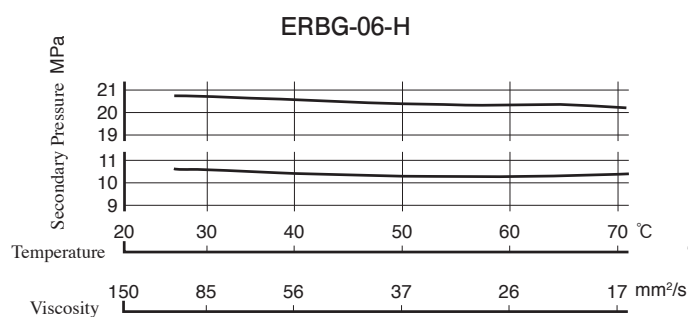
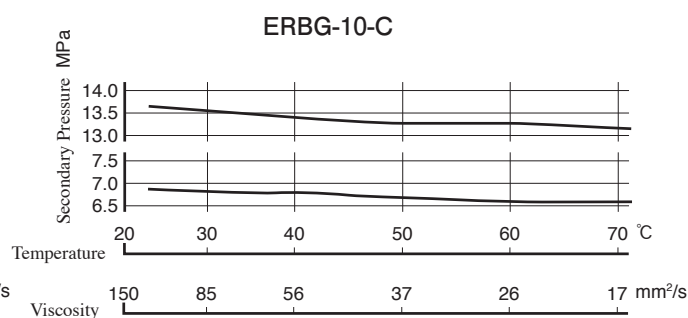
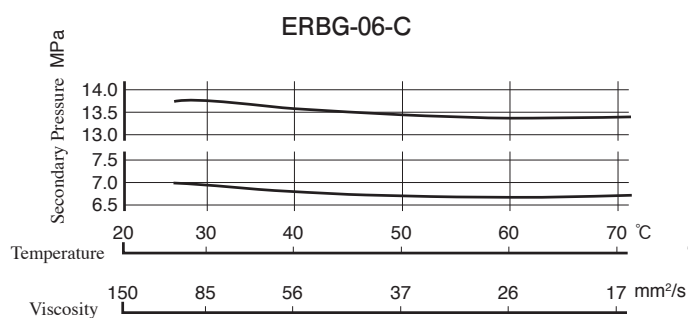
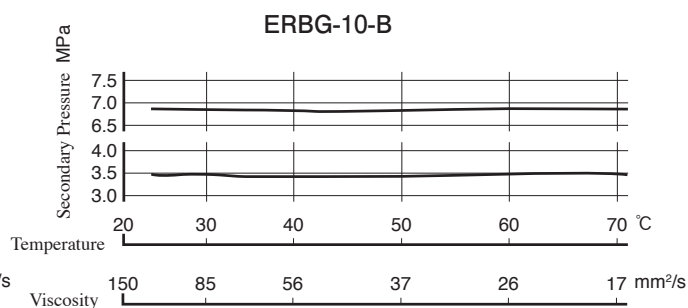
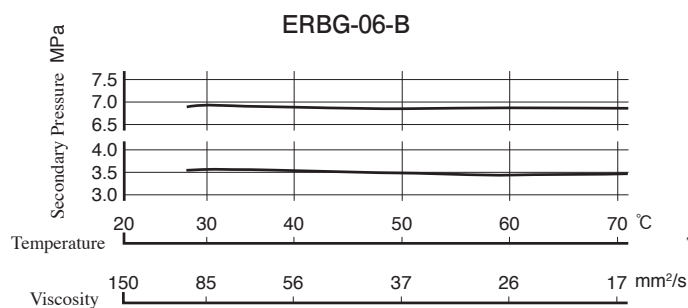
■ Flow Rate vs. Secondary Pressure

Viscosity : 30 mm²/s

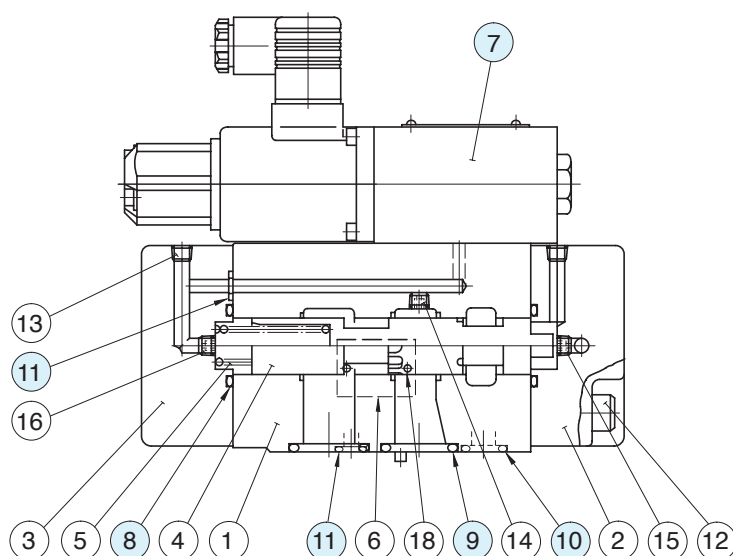


■ Viscosity vs. Secondary Pressure

Oil: ISO VG32



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

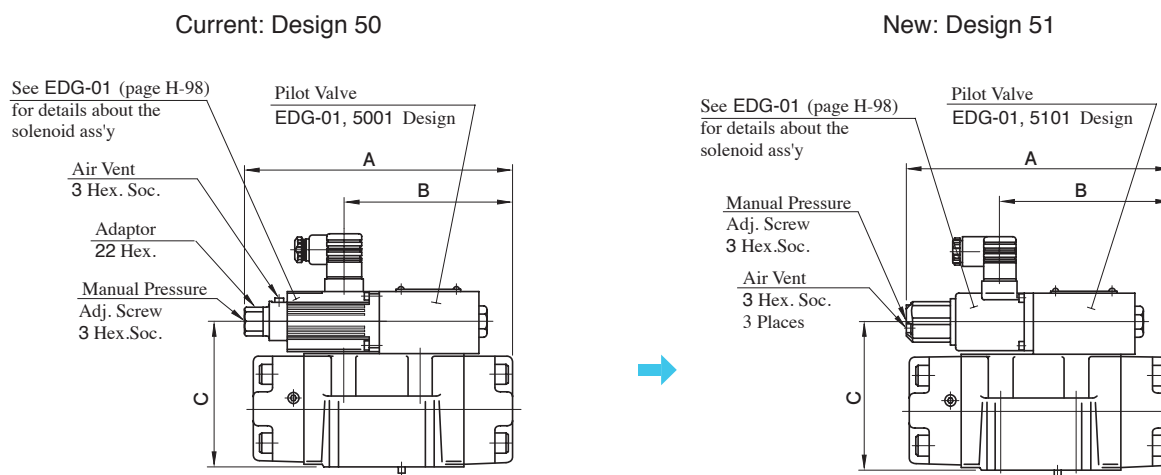
ERBG-06/10 series valves have changed model from 50 to 51 design in line with the model change of pilot valve (EDG-01).

● 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.



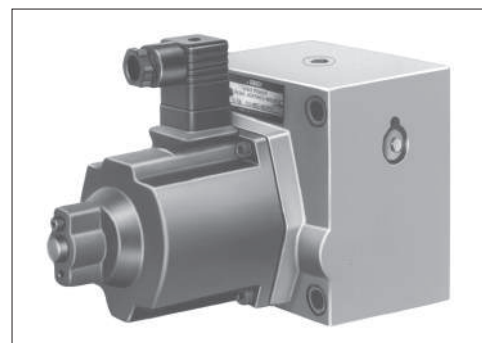
Model Numbers		A	B	C
Current	ERBG-06- *-50	214.5	136.5	115
New	ERBG-06- *-51	213.5	136.5	115
Current	ERBG-10- *-50	235.5	158	117
New	ERBG-10- *-51	234.5	158	117

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).

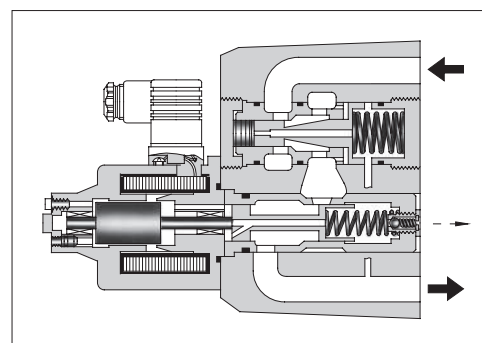
This valve is ideal for use where actuator startup, stop, and speed changes are to be implemented without producing a shock. Note that this valve is used in conjunction with the applicable power amplifier.



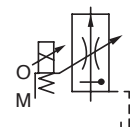
Specifications

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

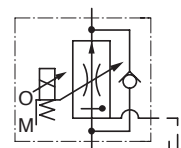
★ Min. pressure difference required between inlet and outlet ports to maintain function as pressure compensator.



Graphic Symbols



EFG-*



EFCG-*

Model Number Designation

EFC	G	-02	-10	-N	-31
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pres. Compensator Stroke Adjustment	Design Number
EF: Proportional Electro-Hydraulic Flow Control Valve	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★
EFC: Proportional Electro-Hydraulic Flow Control and Check Valve		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. (1/5)
- When ordering the EFGM-10Y, please order "F3" Series Pipe Flange Kits separately. Please inquire separately for details on the "F3" Series Pipe Flange Kits.

Models with Pressure Compensator Stroke Adjustment Screw

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

Instructions

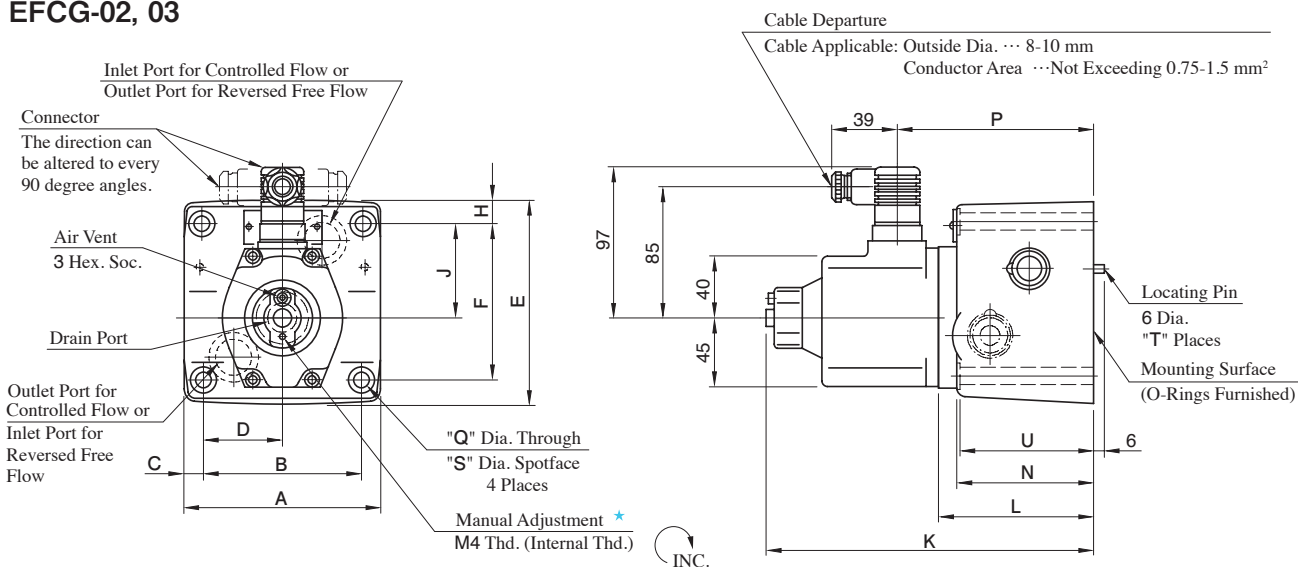
Drain Back Pressure

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

Models with Check Valve

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

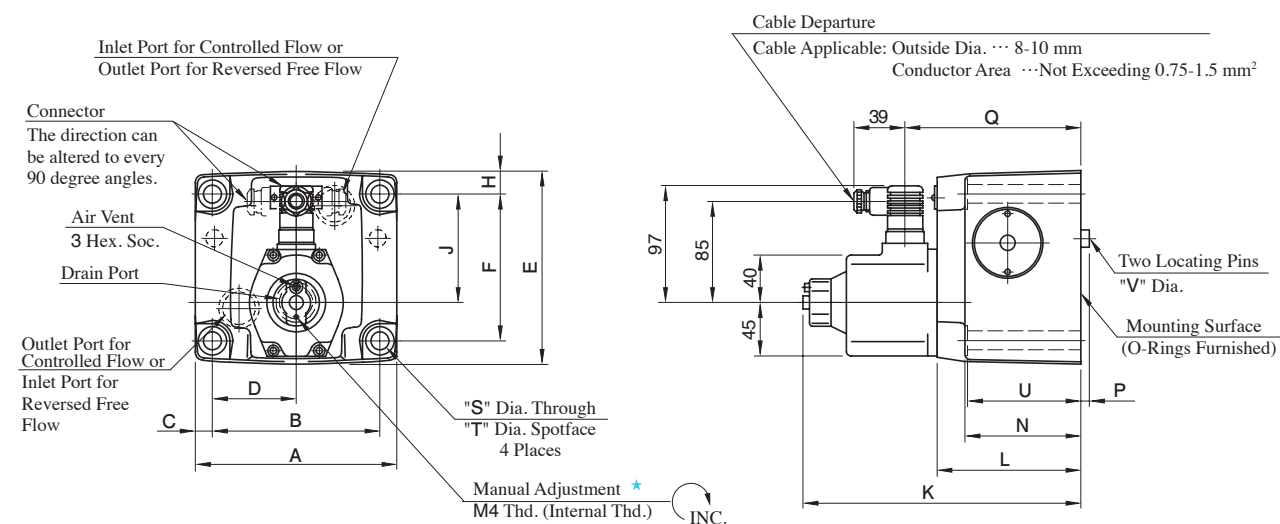
EFG-02, 03
EFCG-02, 03



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

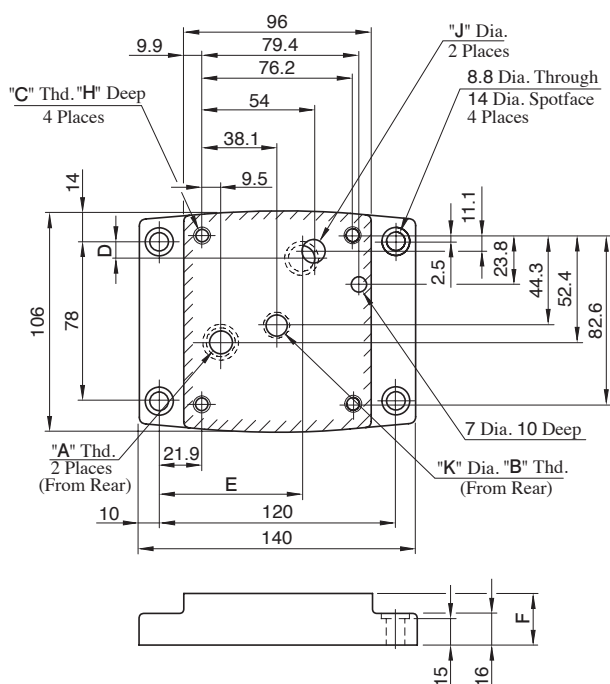
Model Numbers	Dimensions mm															U
	A	B	C	D	E	F	H	J	K	L	N	P	Q	S	T	
EF*G-02	96	76.2	9.9	38.1	106	82.6	11.7	46.3	195	81	66	108	8.8	14	1	65
EF*G-03	125	101.6	11.7	50.8	130	101.6	14.2	61.8	212	98	85	125	11	17.5	2	84

EFG-06, 10
EFCG-06, 10



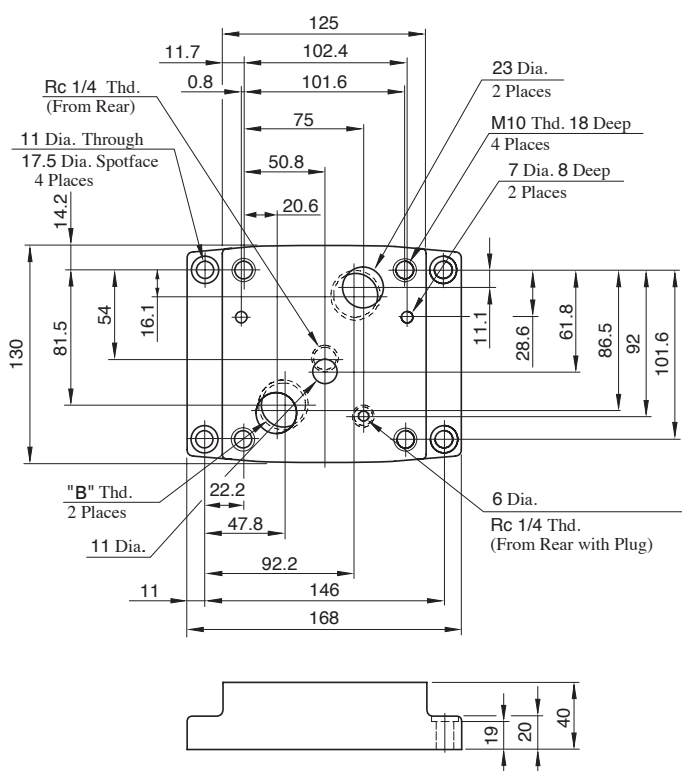
★ Manual adjustment can be done by screwing for example an M4 × 20 L screw in the M4 thread or pushing in a rod etc. there.

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

Sub-Plate
EFGM-02X, 02Y


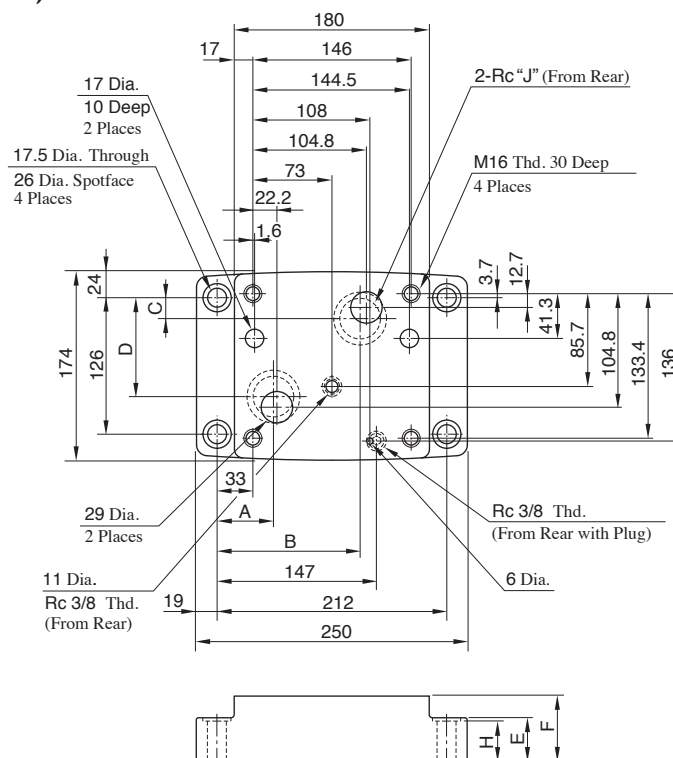
Sub-Plate Model Numbers	Thread Size		
	"A" Thd.	"B" Thd.	"C" Thd.
EFGM-02X-20	Rc 3/8	Rc 1/4	M8
EFGM-02Y-20	Rc 1/2		

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

EFGM-03Y, 03Z (3001D)


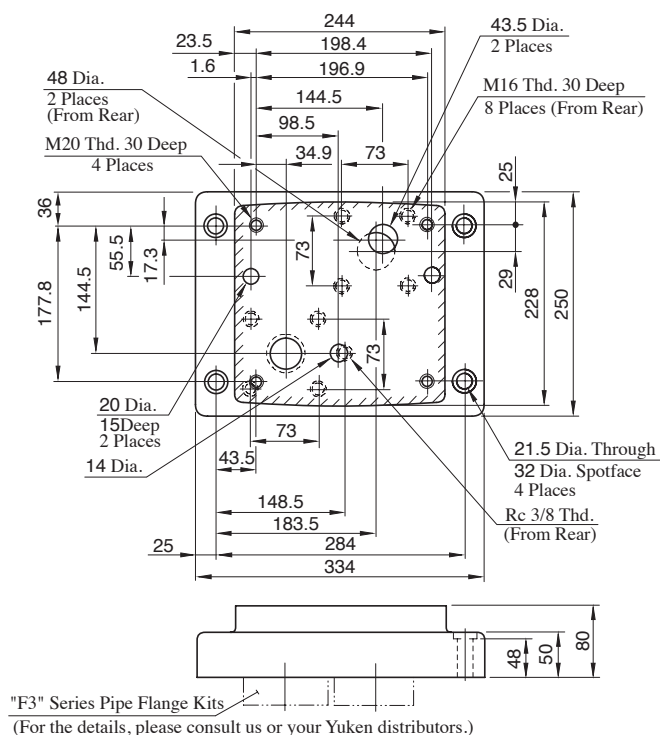
Sub-Plate Model Numbers	Thread Size
	"B" Thd.
EFGM-03Y-3001	Rc 3/4
EFGM-03Z-3001	Rc 1

■ Sub-Plate
EFGM-06X, 06Y (3001D)



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

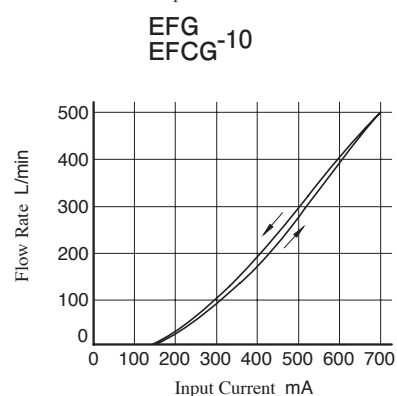
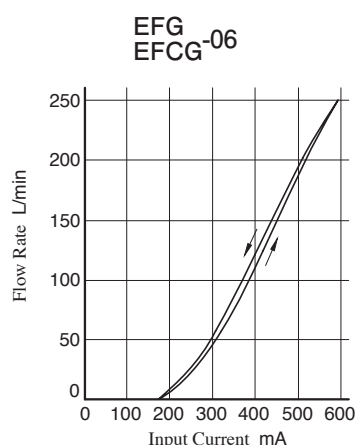
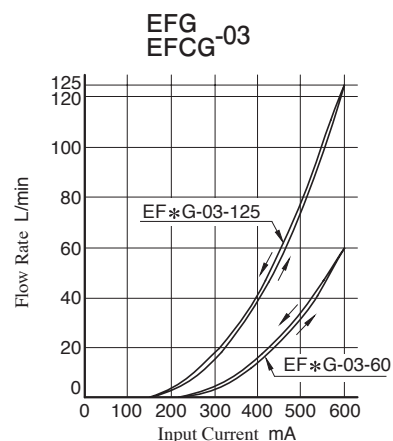
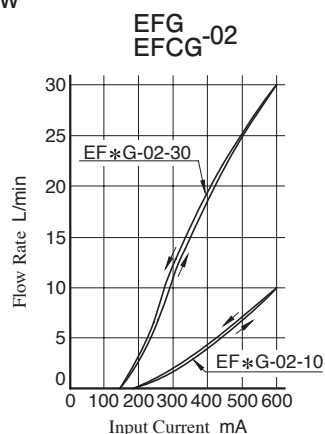
EFGM-10Y



"F3" Series Pipe Flange Kits
(For the details, please consult us or your Yuken distributors.)

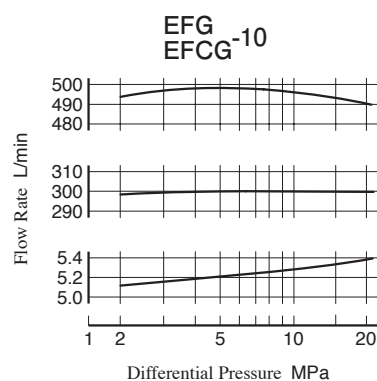
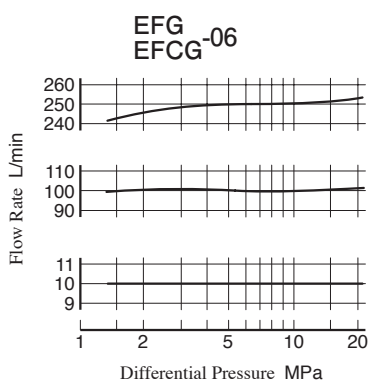
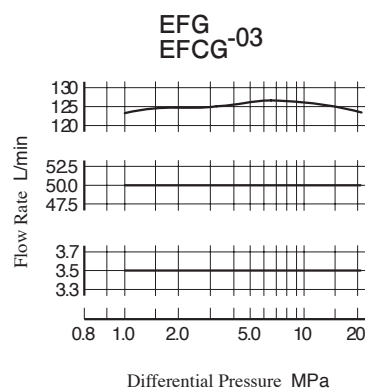
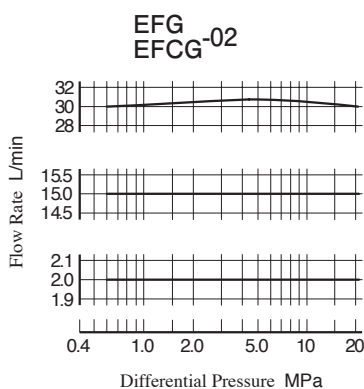
Input Current vs. Flow

Viscosity: 30 mm²/s



Differential Pressure vs. Metered Flow

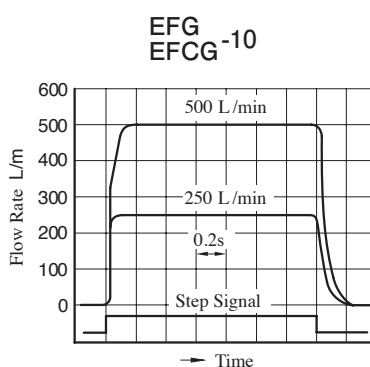
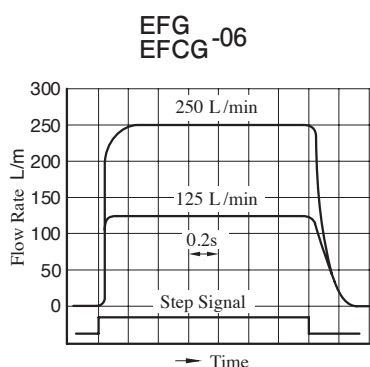
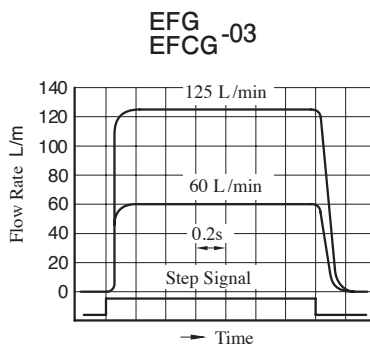
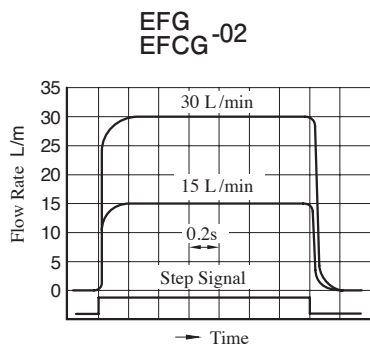
Viscosity: 30 mm²/s



Step Response

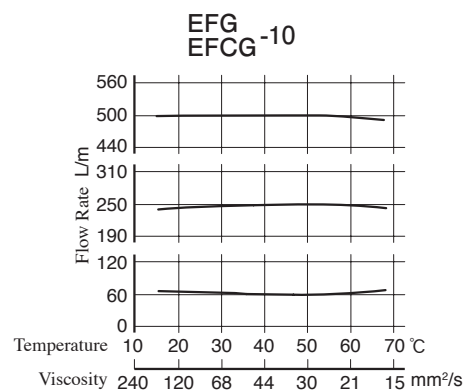
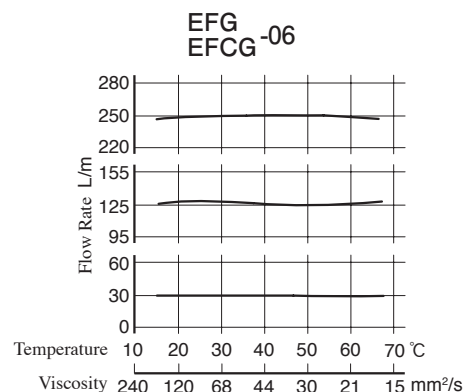
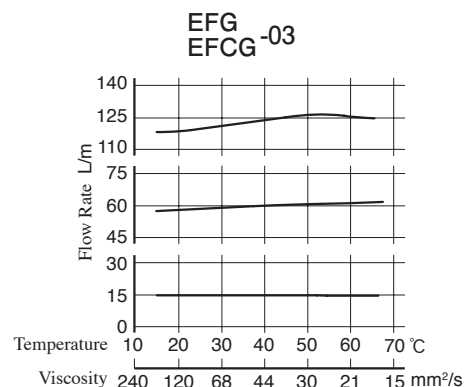
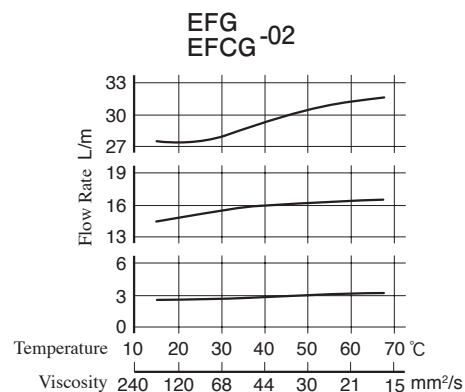
Viscosity: 30 mm²/s

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



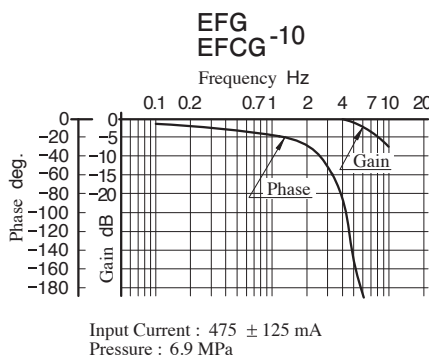
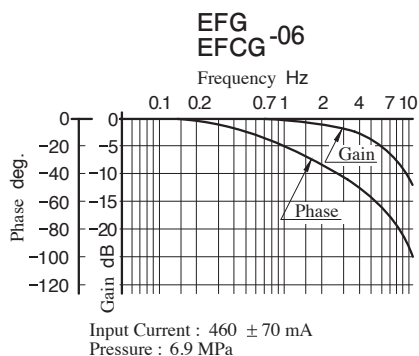
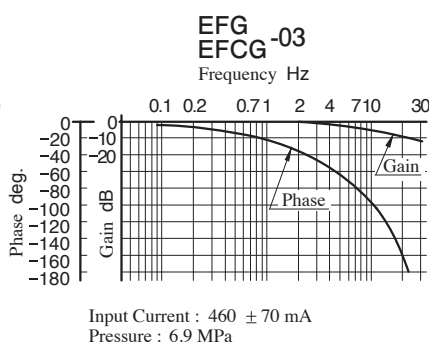
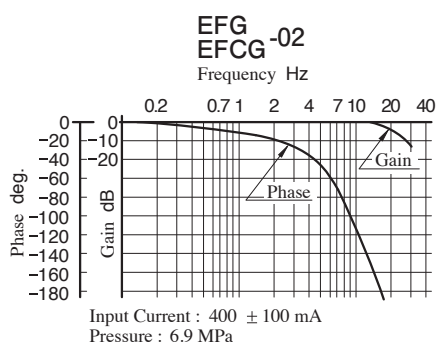
Viscosity vs. Flow

Oil: ISO VG 46



Frequency Response

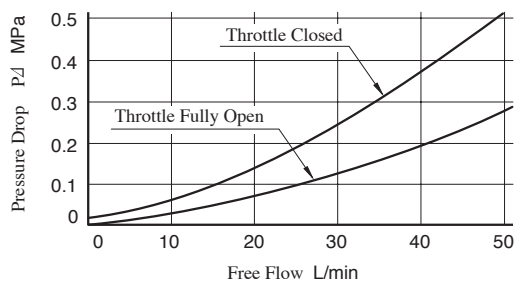
Viscosity: 30 mm²/s



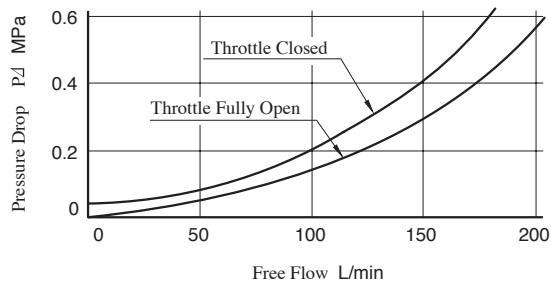
Pressure Drop for Reversed Free Flow (Only for "EFCG" Models)

Oil Viscosity: 35 mm²/s
Specific Gravity: 0.850

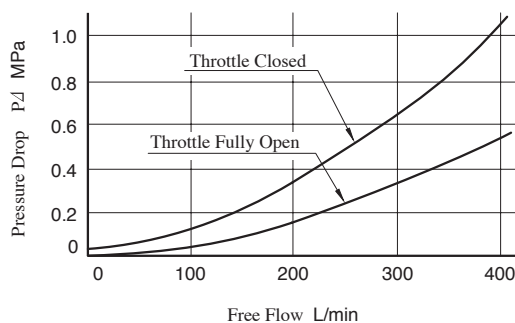
EFCG-02



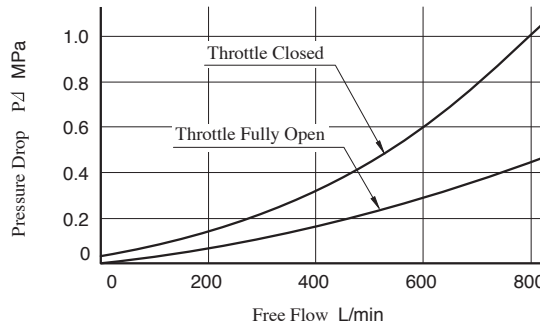
EFCG-03



EFCG-06



EFCG-10



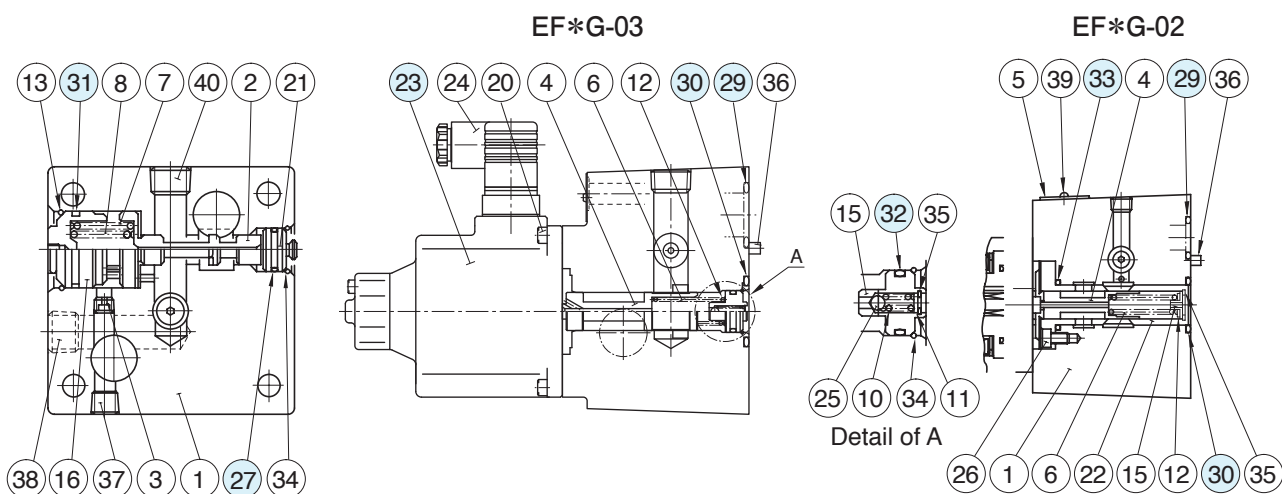
- For any other viscosity, multiply the factors in the table below.

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

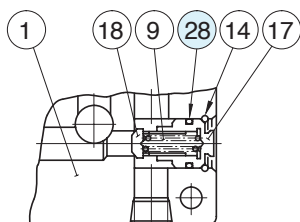
- For any other specific gravity (G'), the pressure drop ($\Delta P'$) may be obtained from the formula below.
 $\Delta P' = \Delta P (G'/0.850)$

List of Seals and Solenoid Ass'y

EFG
EFCG-02, 03



With Check Valve (EFCG-02, 03)



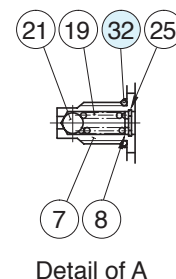
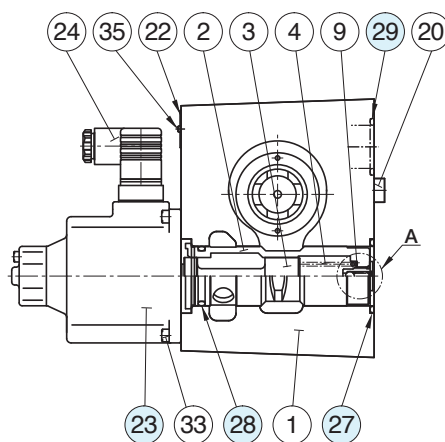
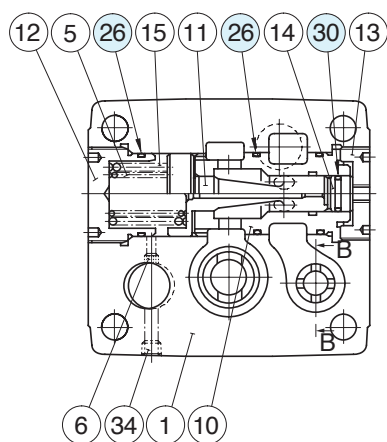
List of Seals and Solenoid Ass'y

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

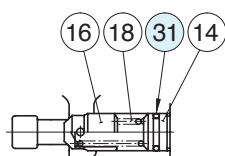
Note 1: The connector assembly GDM-211-B-11 (Item 24) is not included in the solenoid assembly.

List of Seals and Solenoid Ass'y

**EFG
EFCG-06, 10**



With Check Valve (EFCG-06, 10)



Section B-B

List of Seals and Solenoid Ass'y

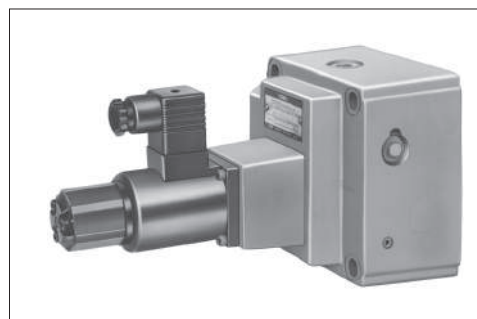
Item	Name of Parts	Part Numbers		Qty.
		EF * G-06	EF * G-10	
23	Solenoid Ass'y	E321-45-20	E321-45-20	1
26	O-Ring	OR NBR-90 P50-N	OR NBR-90 G75-N	3
27	O-Ring	OR NBR-90 P44-N	OR NBR-90 G60-N	1
28	O-Ring	OR NBR-90 P34-N	OR NBR-90 P50-N	1
29	O-Ring	OR NBR-90 P32-N	OR NBR-90 P48-N	2
30	O-Ring	OR NBR-90 P21-N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

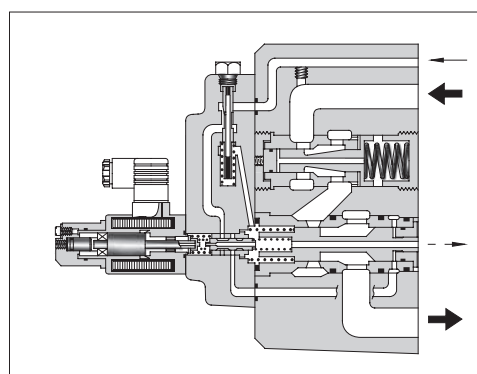


Specifications

Model Numbers		EFG -03- 60 EFCG 125	EFG -06-250 EFCG
Descriptions			
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

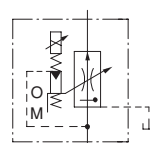
★1. Min. pressure difference required between inlet and outlet ports to maintain function as pressure compensator.

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



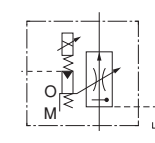
Graphic Symbols

Internal Pilot

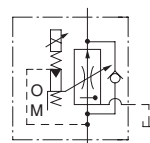


EFG-*

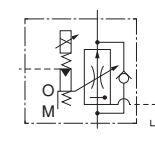
External Pilot



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. ($\sqrt{1.6}$)

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.

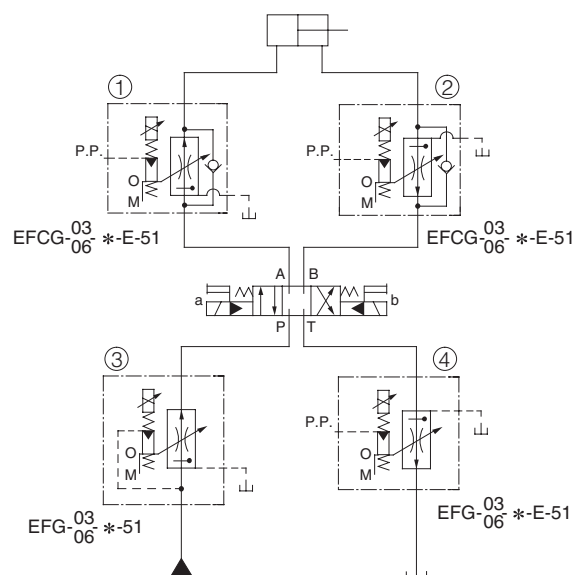
③

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

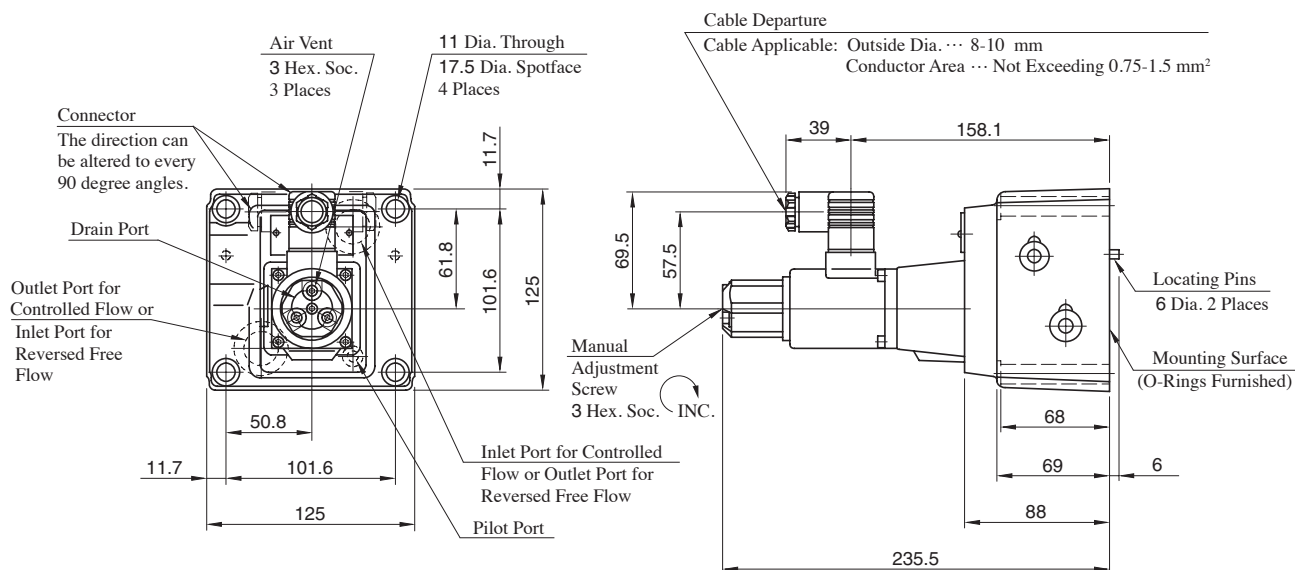
④

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

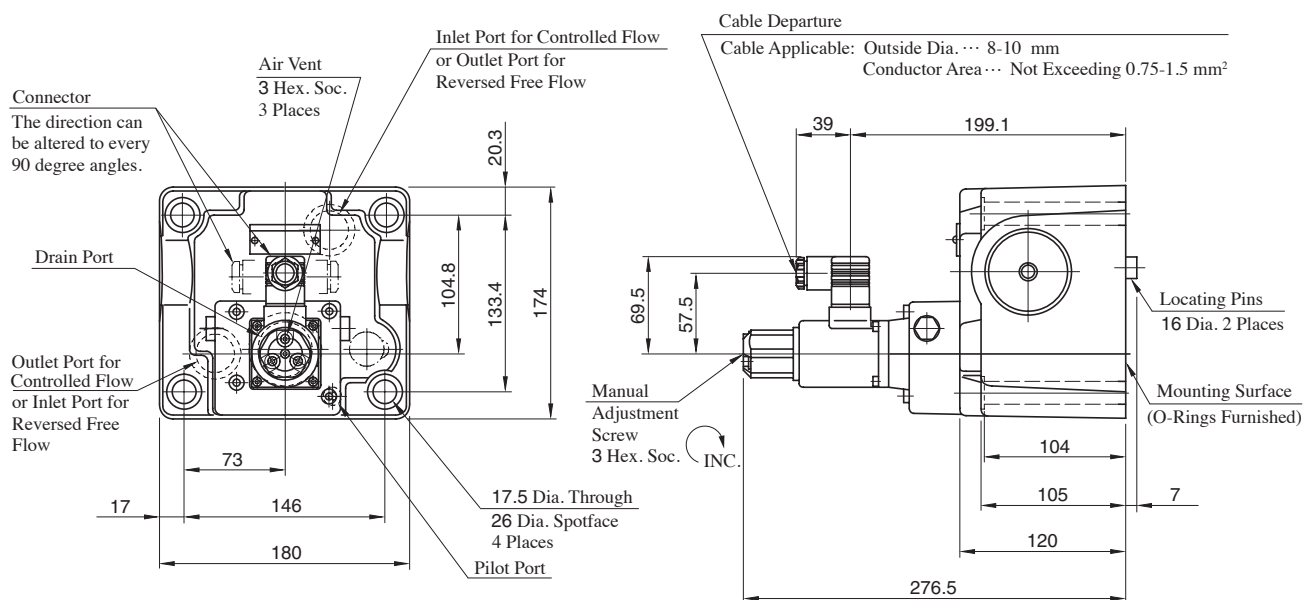
[Example of Circuit]

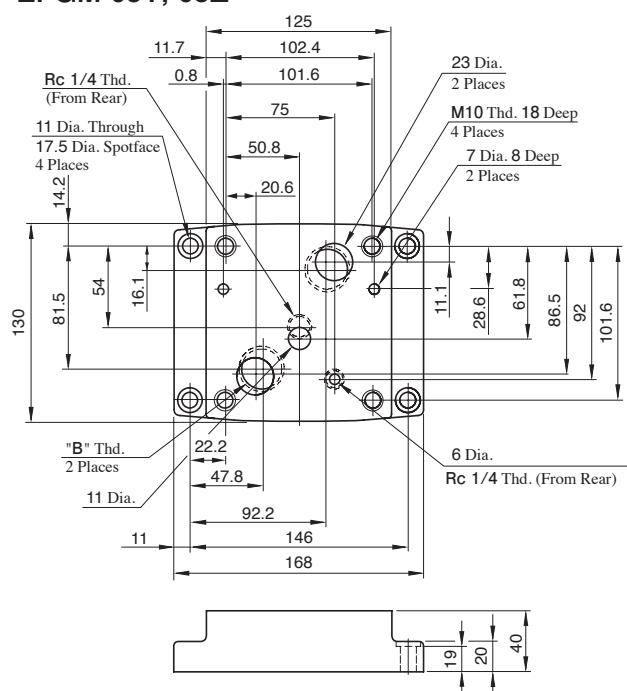


**EFG
EFCG-03**

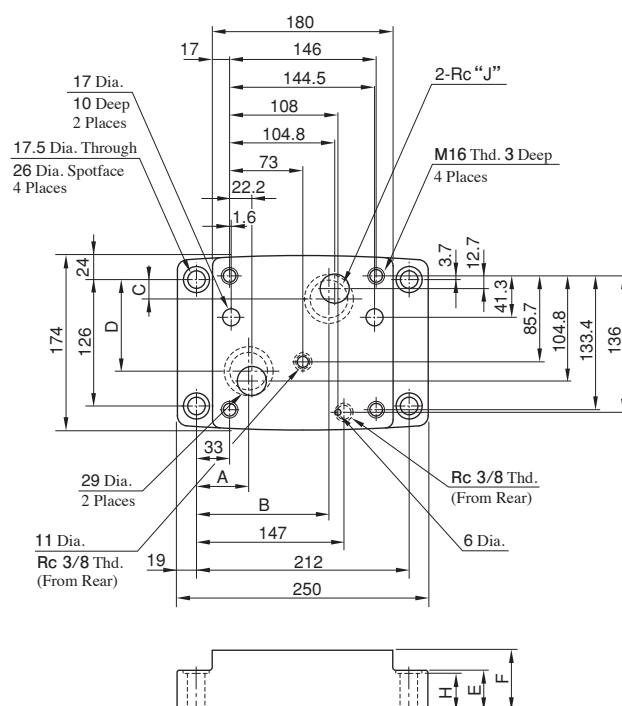


**EFG
EFCG-06**



Sub-Plate
EFGM-03Y, 03Z


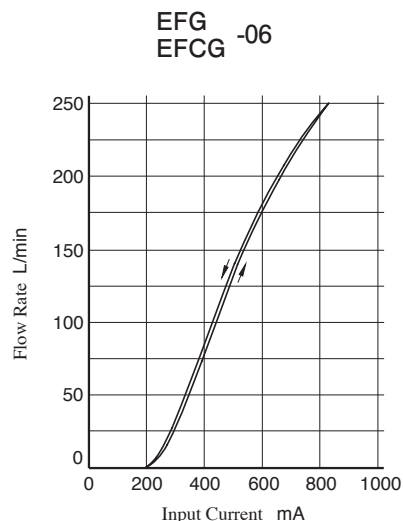
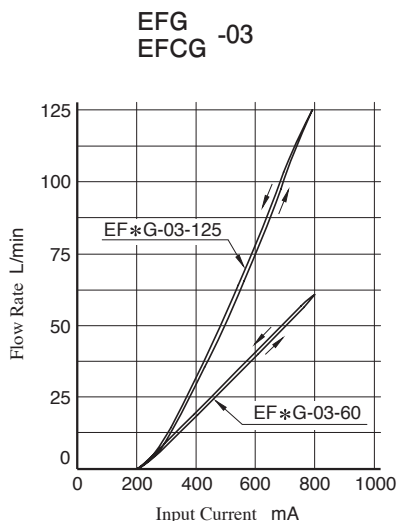
Sub-Plate Model Numbers	Thread Size
	"B" Thd.
EFGM-03Y-30	Rc 3/4
EFGM-03Z-30	Rc 1

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

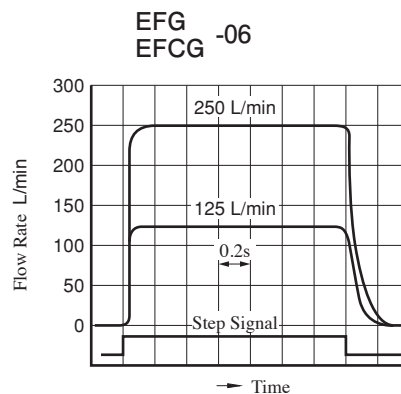
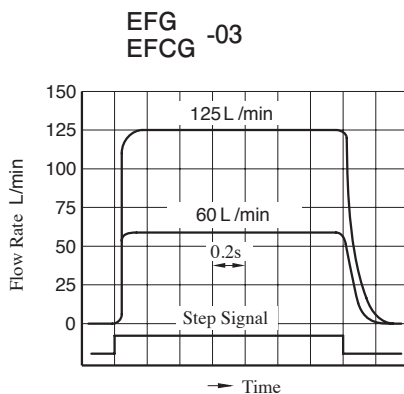
Viscosity: 30 mm²/s



Step Response

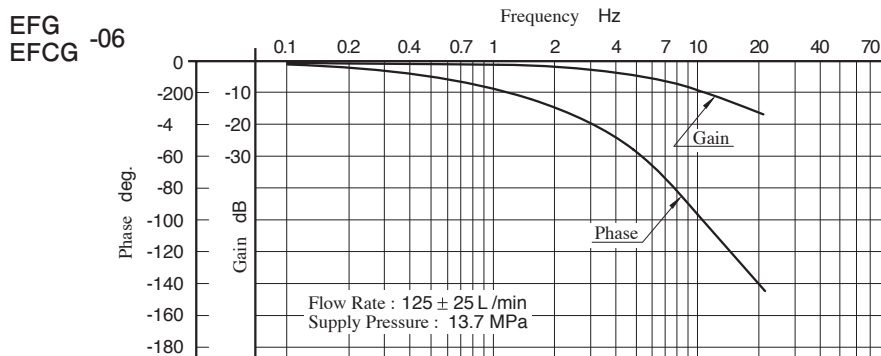
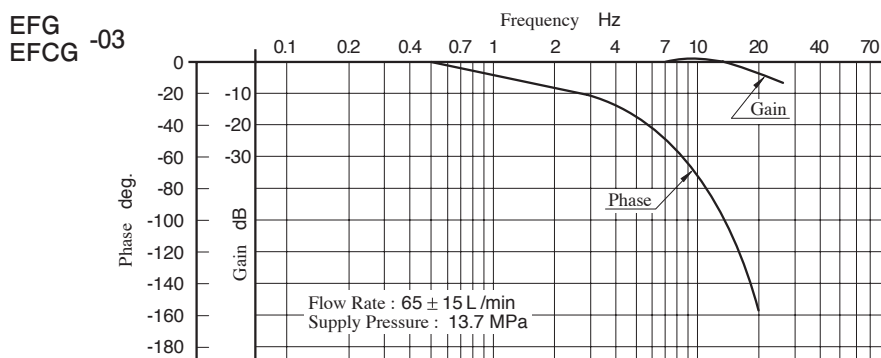
These characteristics have been obtained by measuring on each valve. Therefore, they may vary according to a hydraulic circuit to be used.

Viscosity: 30 mm²/s

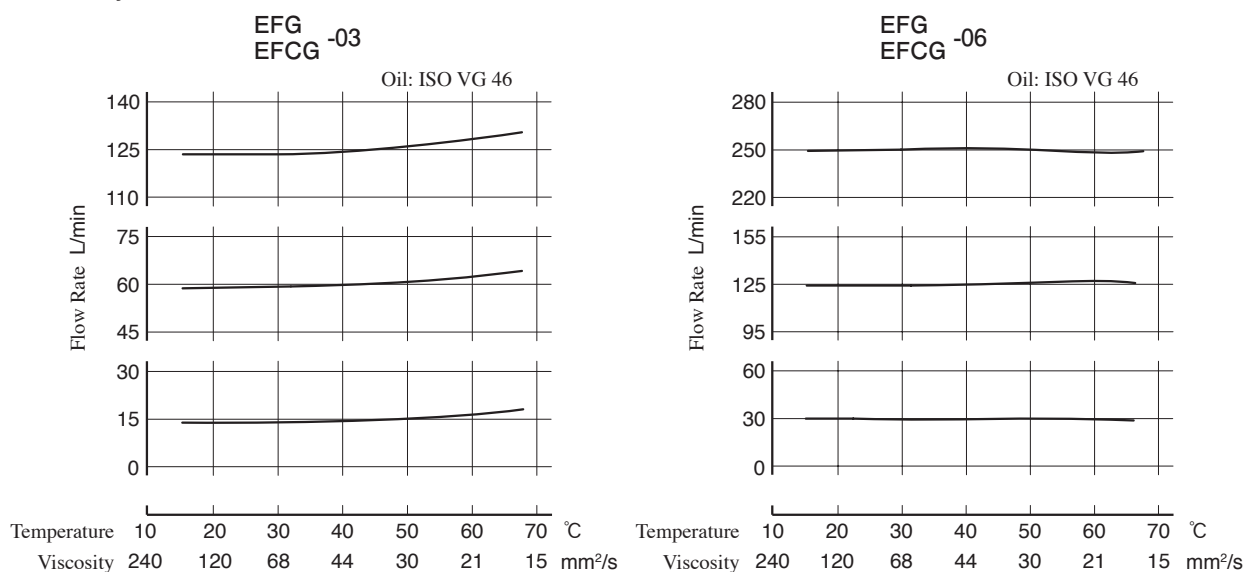


Frequency Response

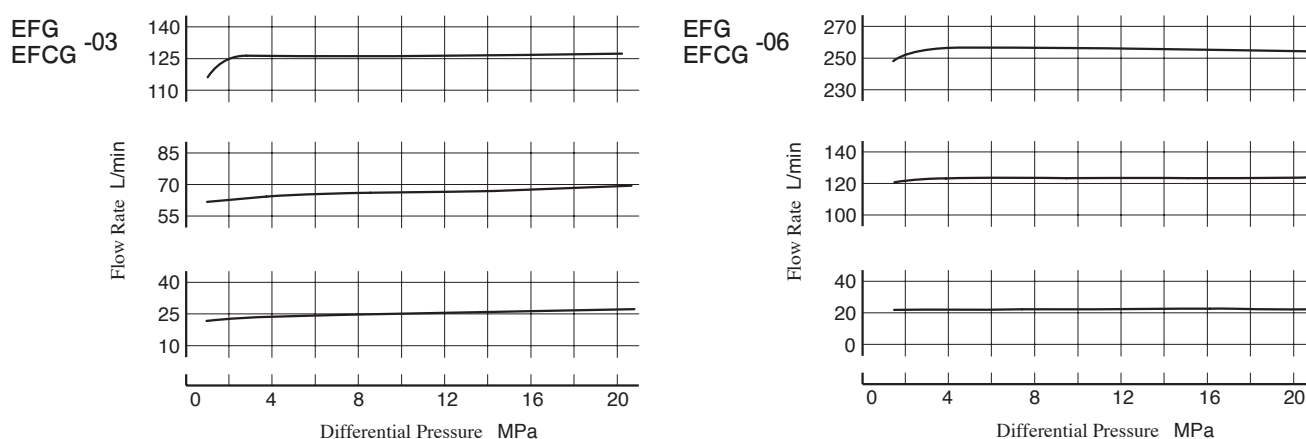
Viscosity: 30 mm²/s



Viscosity vs. Flow



Differential Pressure vs. Metered Flow



Interchangeability between Current and New Design

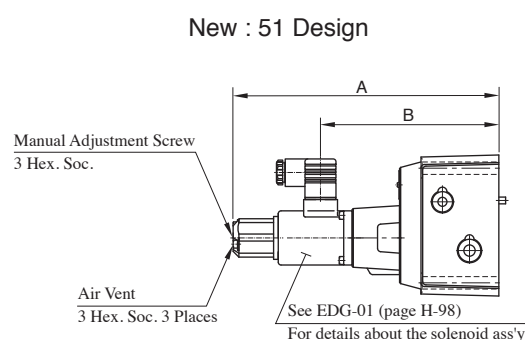
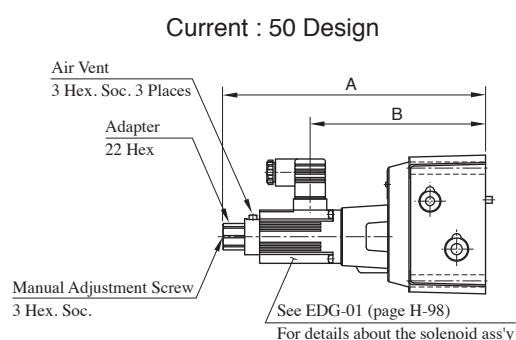
Specifications and Characteristics

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

Installation Interchangeability

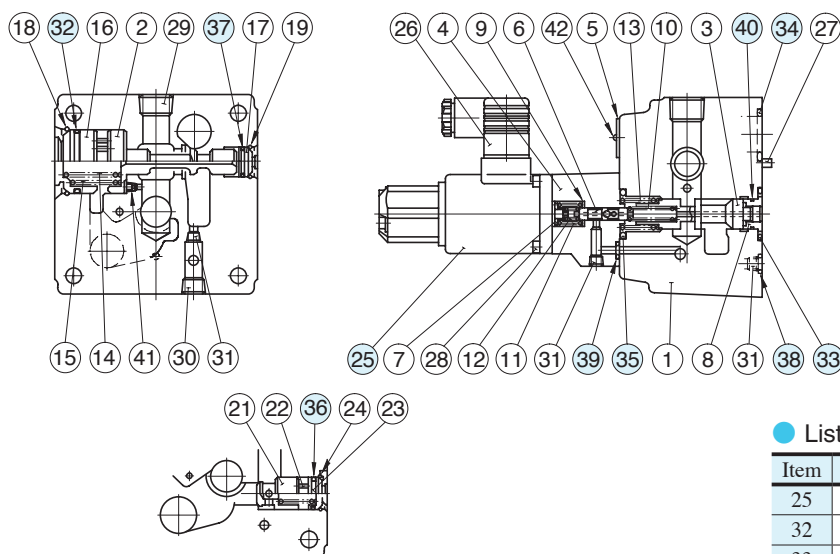
There is an interchangeability in the mounting dimensions between current and new design, however, note that because of improvements made on the solenoids, the overall shapes and dimensions have been changed as shown below.

Model Numbers	A	B
(Current) 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



List of Seals and Solenoid Ass'y

**EFG
EFCG-03**



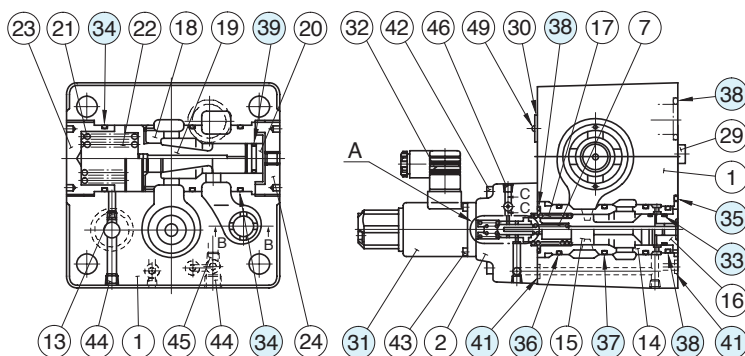
With Check Valve (EFCG-03)

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**

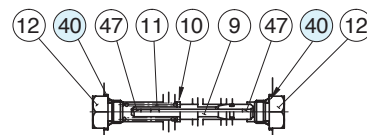


With Check Valve (EFCG-06)

Detail of "A"

Section B-B

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



Detail of Section C-C

● 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.

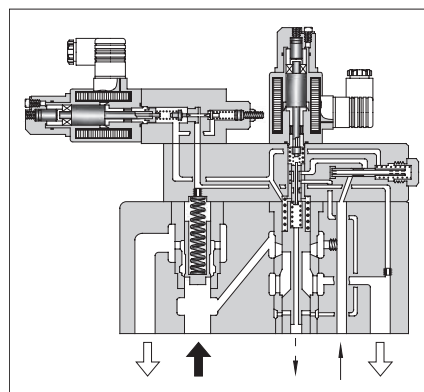
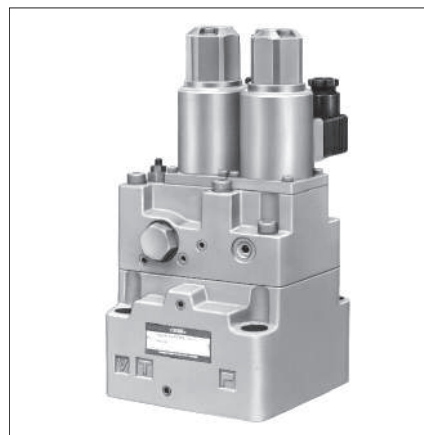
Further, since a temperature compensation function is incorporated, this valve provides consistent flow control without respect to the fluid temperature.

Specifications

Model Numbers		EFBG-03-125 - * - * -61	EFBG-06-250 - * - * -61	EFBG-10-500 - * - * -61
Descriptions				
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
★1 Pressure Controls	★2 Pres. Adj. Range MPa	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)

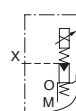
★2. The maximum pressure adjustment range of the models without proportional pilot relief valves is 24.5 MPa.



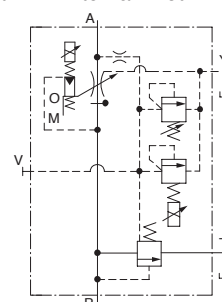
Graphic Symbols

With Proportional Pilot Relief Valve

External Pilot

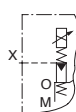


Internal Pilot

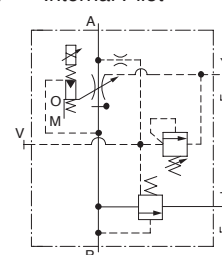


Without Proportional Pilot Relief Valve

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			61
		10	500	None: Without Proportional Pilot Relief Valve	E: External Pilot	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. (1/6)

★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.

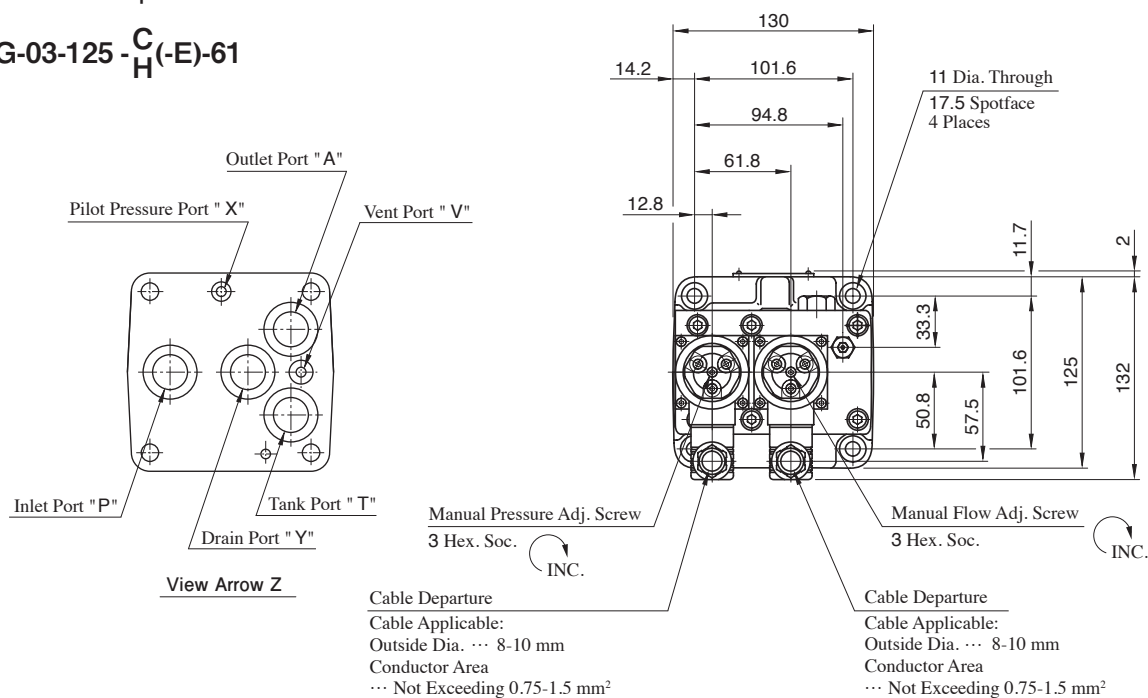
Safety Valve Pressure Setting

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.

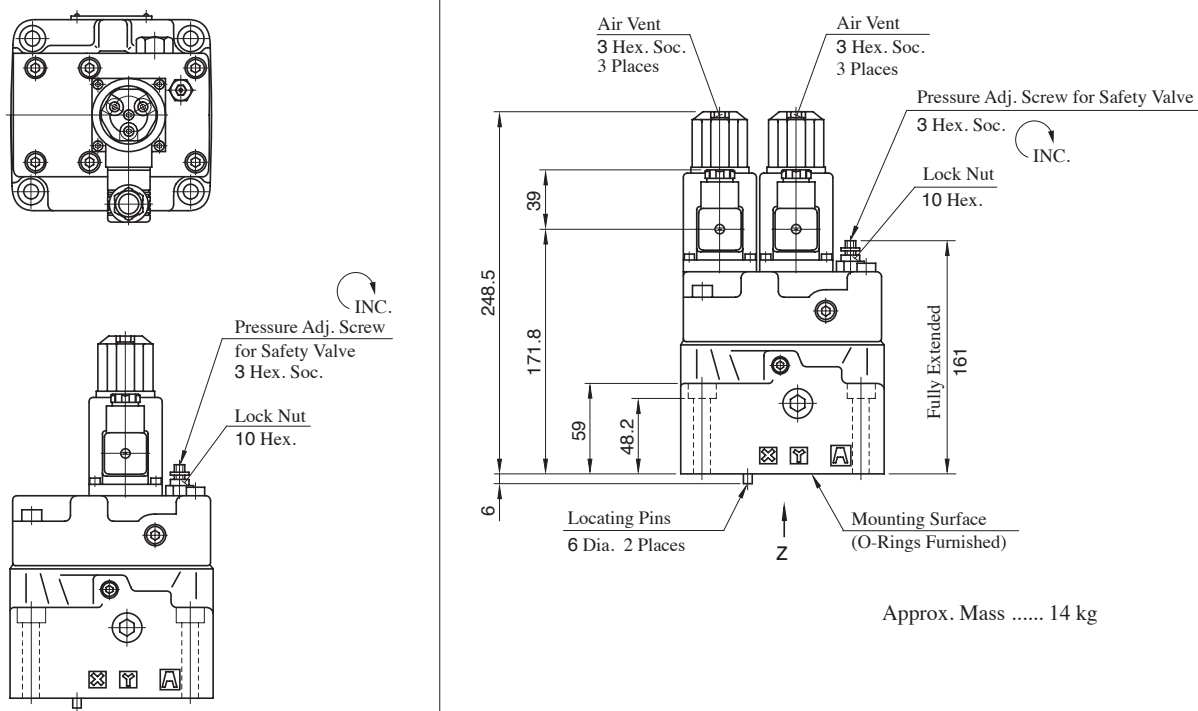
Models with Proportional Pilot Relief Valve

EFBG-03-125 - $\frac{C}{H}(-E)-61$



Models without Proportional Pilot Relief Valve

EFBG-03-125(-E)-61

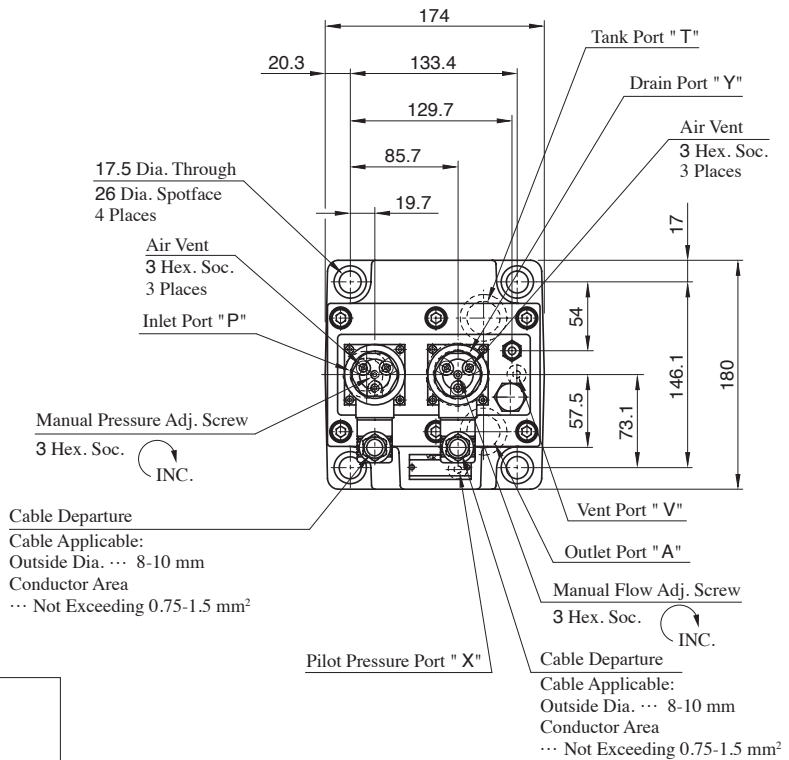


● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass 13.3 kg

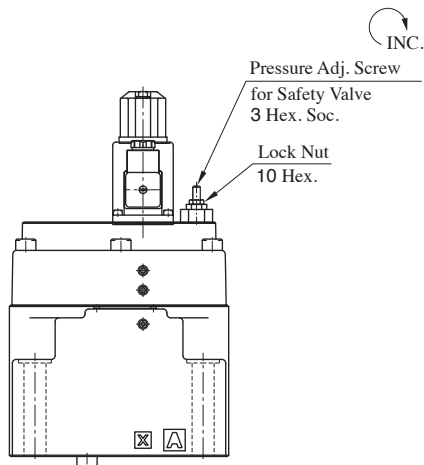
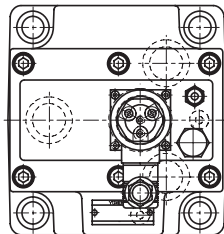
Models with Proportional Pilot Relief Valve

EFBG-06-250 - $\frac{C}{H}(-E)-61$



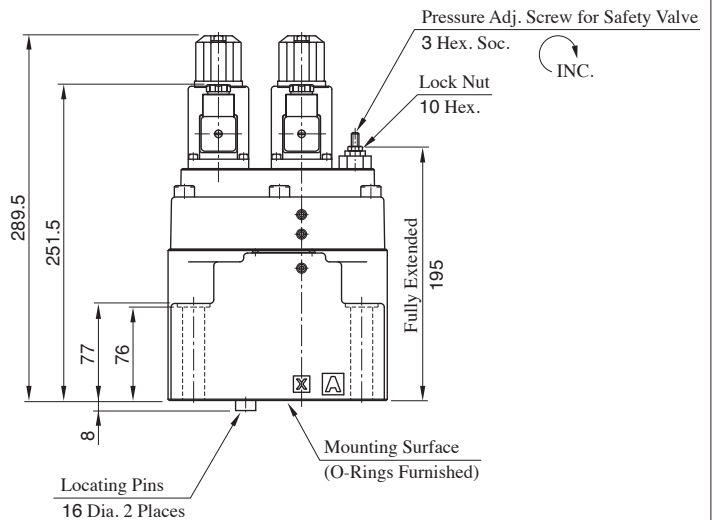
Models without Proportional Pilot Relief Valve

EFBG-06-250(-E)-61



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

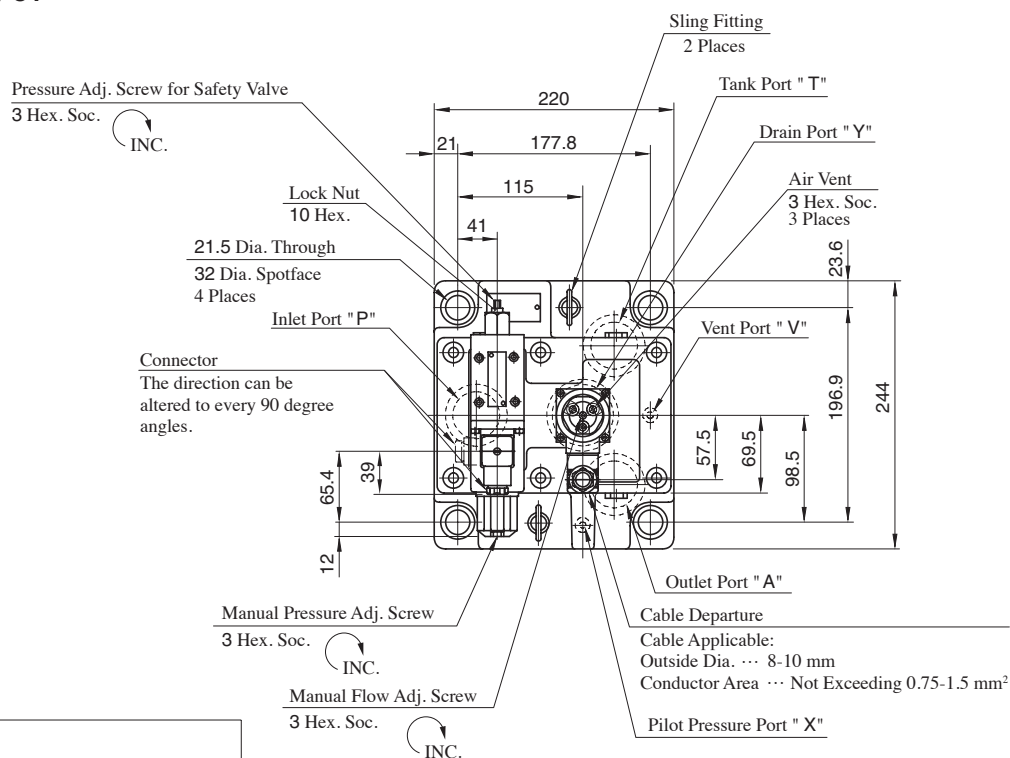
Approx. Mass 21.3 kg



Approx. Mass 22 kg

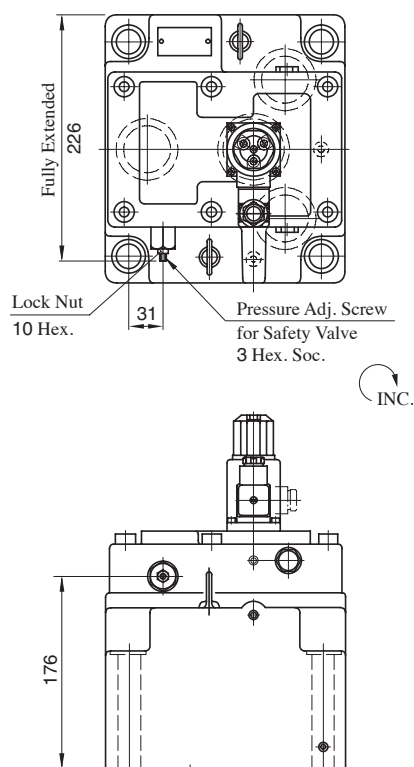
Models with Proportional Pilot Relief Valve

EFBG-10-500 - $C_H(-E)-51$



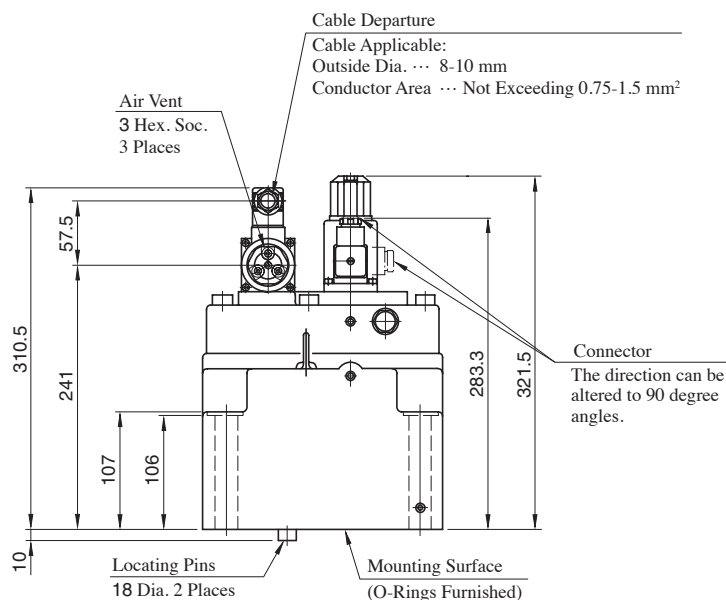
Models without Proportional Pilot Relief Valve

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

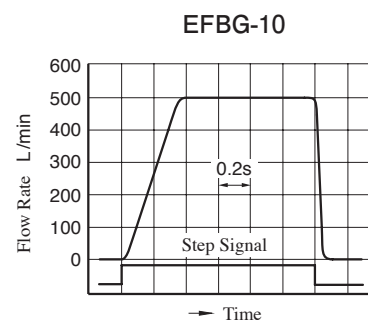
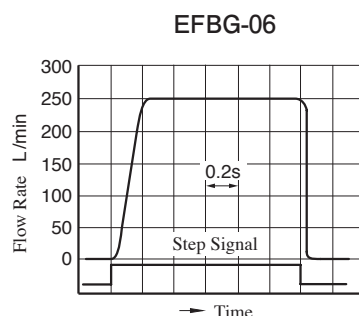
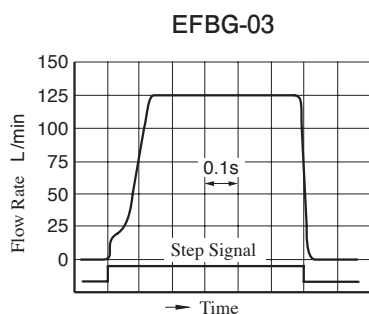
Step Response

These characteristics have been obtained by measuring on each valve.

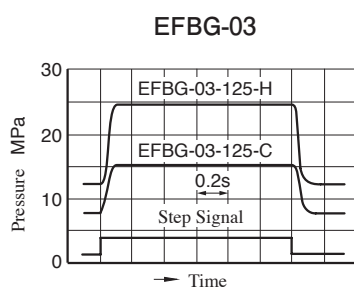
Therefore, they may vary according to a hydraulic circuit to be used.

Viscosity: 30 mm²/s

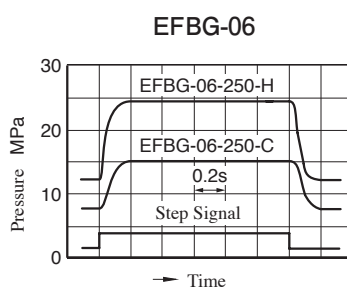
Flow Controls



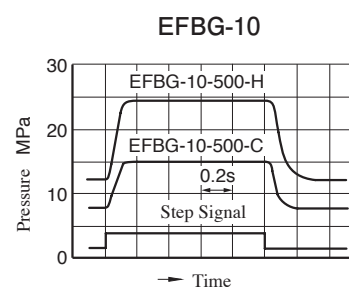
Pressure Controls



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



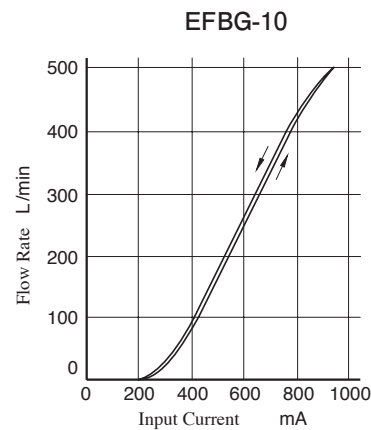
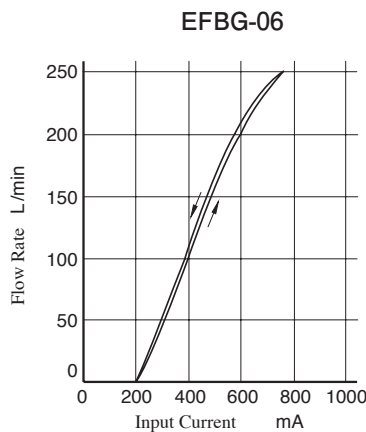
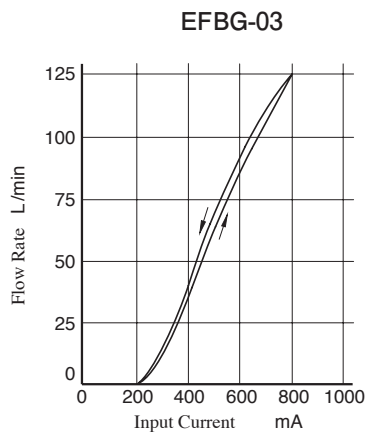
Flow Rate : 250 L/min
Trapped Oil Volume : < 1 L



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

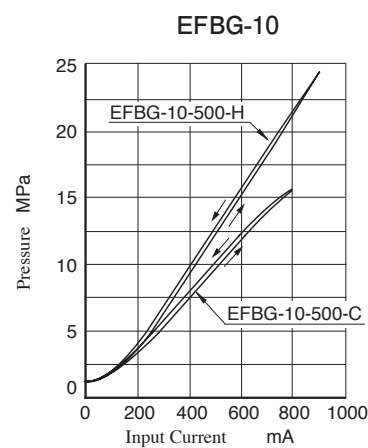
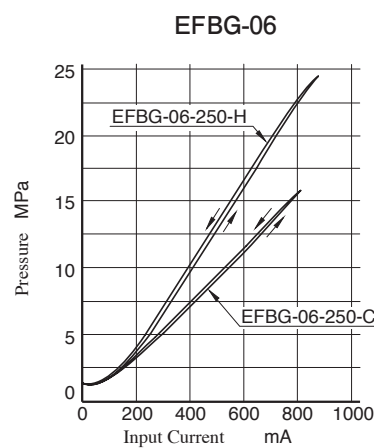
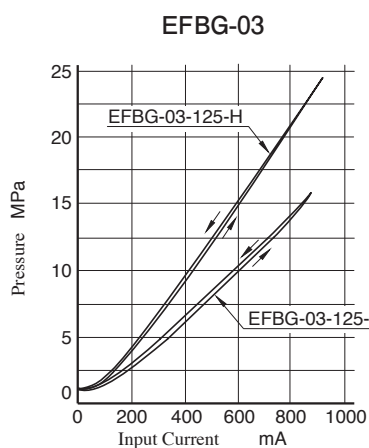
Input Current vs. Flow

Viscosity: 30 mm²/s



Input Current vs. Pressure

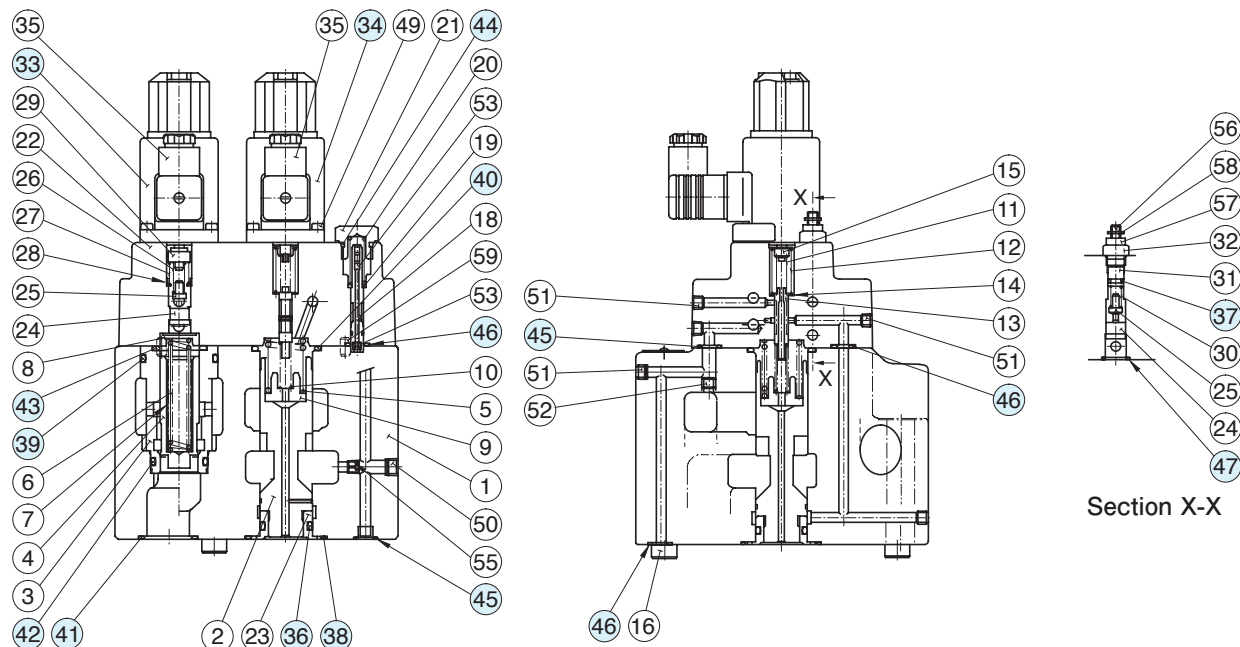
Viscosity: 30 mm²/s



List of Seals and Solenoid Ass'y

EFBG-03-125-**-61

EFBG-06-250-**-61



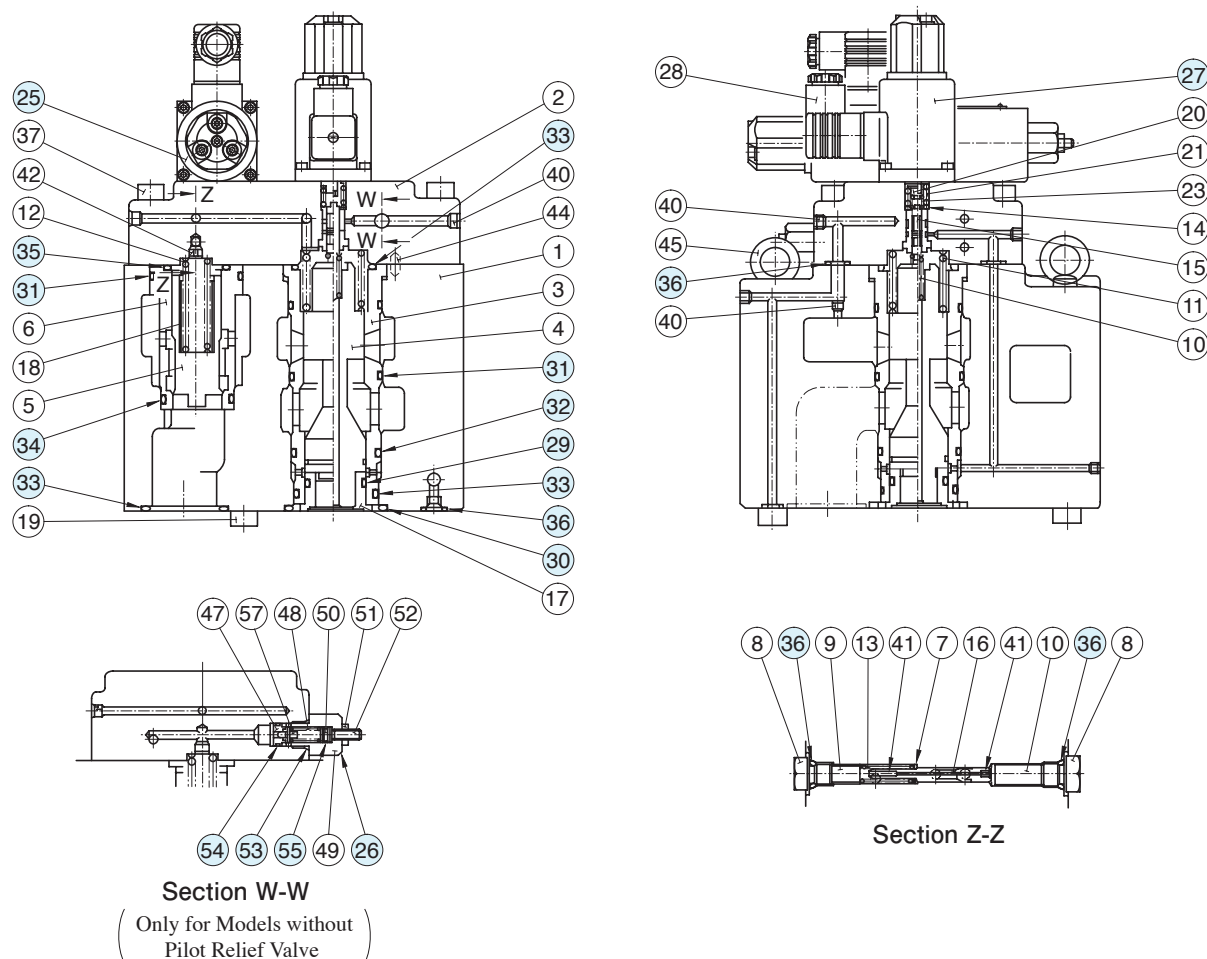
List of Seals and Solenoid Ass'y

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-03-125 C(E)-61 06 250	E318-Y06M1-04-61	E318-Y06M1-28-61
EFBG-03-125 E(E)-61 06 250		
EFBG-03-125 (E)-61 06 250	—	

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

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.

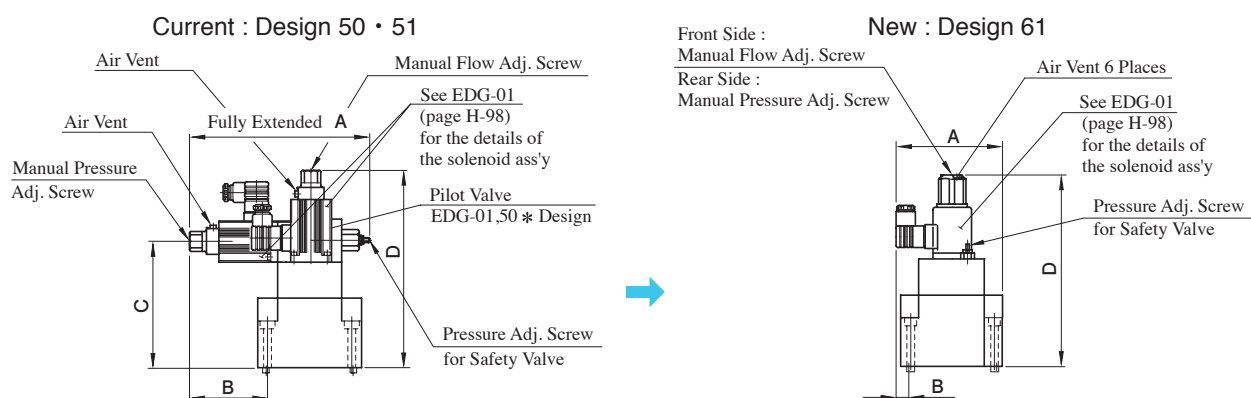
No changes in specifications and characteristics between current and new design.

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.



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

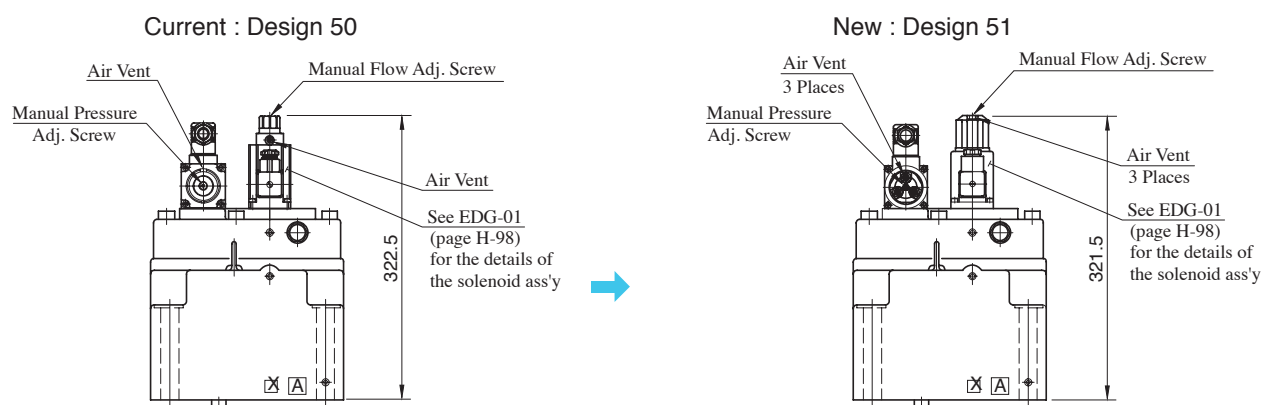
60 Design → 61 Design

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.



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.

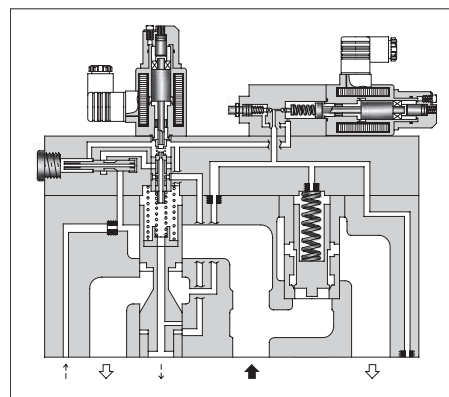
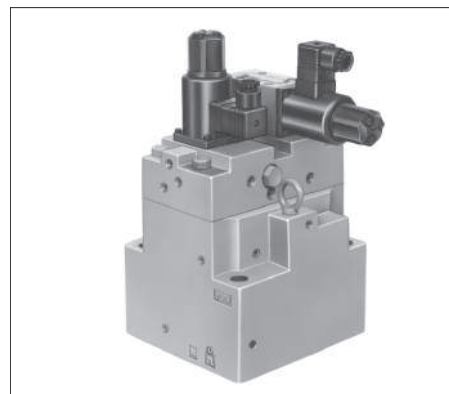
For the High Flow Series, double maximum flow rate [03 size: 125→250 L/min, 06 size: 250→500 L/min, 10 size: 500→1000 L/min] enables a smaller valve size than conventional products; compact-sized devices can be provided.

Specifications

Model No.		EFBG-03 -250-*-*-51	EFBG-06 -500-*-*-51	EFBG-10 -1000-*-*-51
Descriptions				
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
		at Transition	4	6
Flow Controls	Rated Current	mA	830	780
	Coil Resistance	Ω	10	10
	Differential Pressure	MPa	0.8	0.9
	Hysteresis		3% or less	3% or less
	Repeatability		1% or less	1% or less
Pressure Controls	Pres. Adj. Range	MPa	C: 1.6-15.7 H: 1.8-24.5	C: 1.5-15.7 H: 1.5-24.5
	Rated Current	mA	C: 850 H: 870	C: 800 H: 900
	Coil Resistance	Ω	10	10
	Hysteresis		3% or less	3% or less
	Repeatability		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)

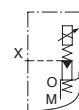
★2. The maximum pressure adjustment range of the valves without proportional pilot relief valves is 24.5 MPa.



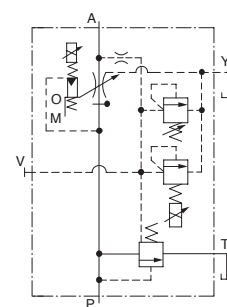
Graphic Symbols

With Proportional Pilot Relief Valve

External Pilot

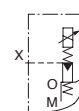


Internal Pilot

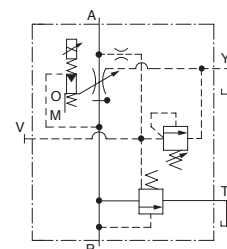


Without Proportional Pilot Relief Valve

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			51
		10	1000	None: Without Proportional Pilot Relief Valve	E: External Pilot	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)	—
03 125 EFBG-06- 500 -C(-E)-51 10 1000 H	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)

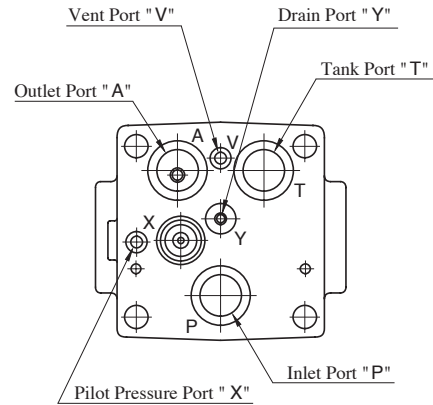
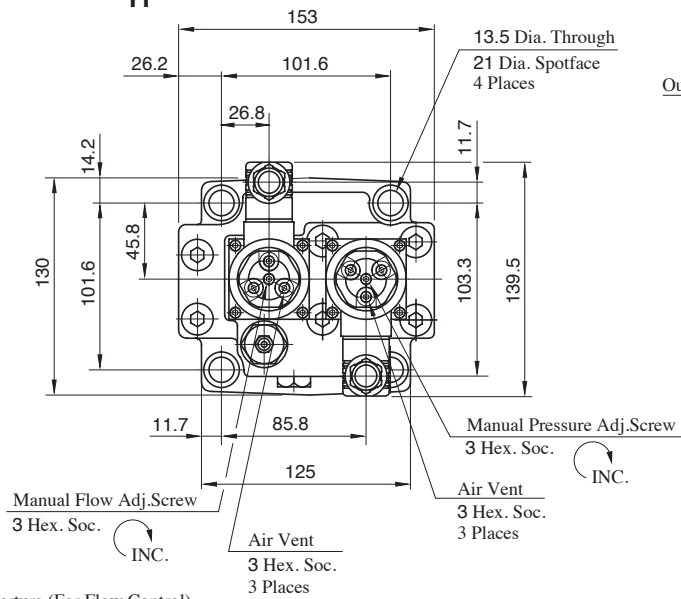
• EFBG-03

There is no interchangeability in installation.

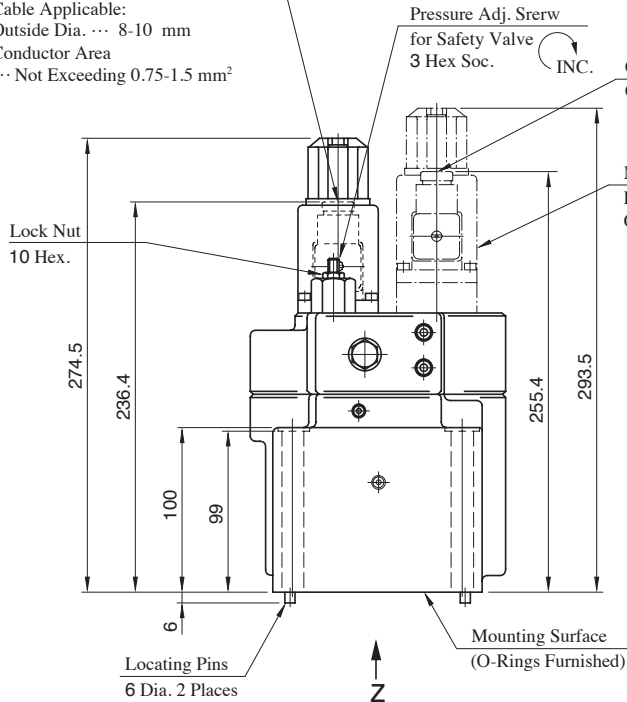
• EFBG-06/10

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 - C_H(-E)-51, EFBG-03-250 (-E)-51



Cable Departure (For Flow Control)
Cable Applicable:
Outside Dia. ... 8-10 mm
Conductor Area ... Not Exceeding 0.75-1.5 mm²

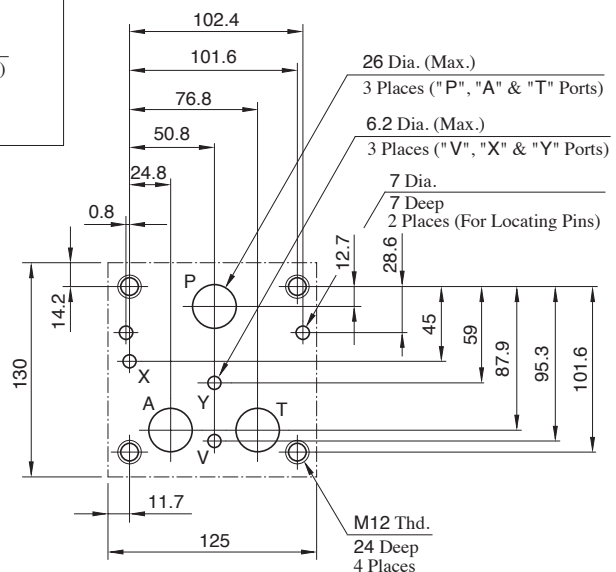


Cable Departure (For Pressure Control)
Cable Applicable:
Outside Dia. ... 8-10 mm
Conductor Area ... Not Exceeding 0.75-1.5 mm²

Approx. Mass 19 kg

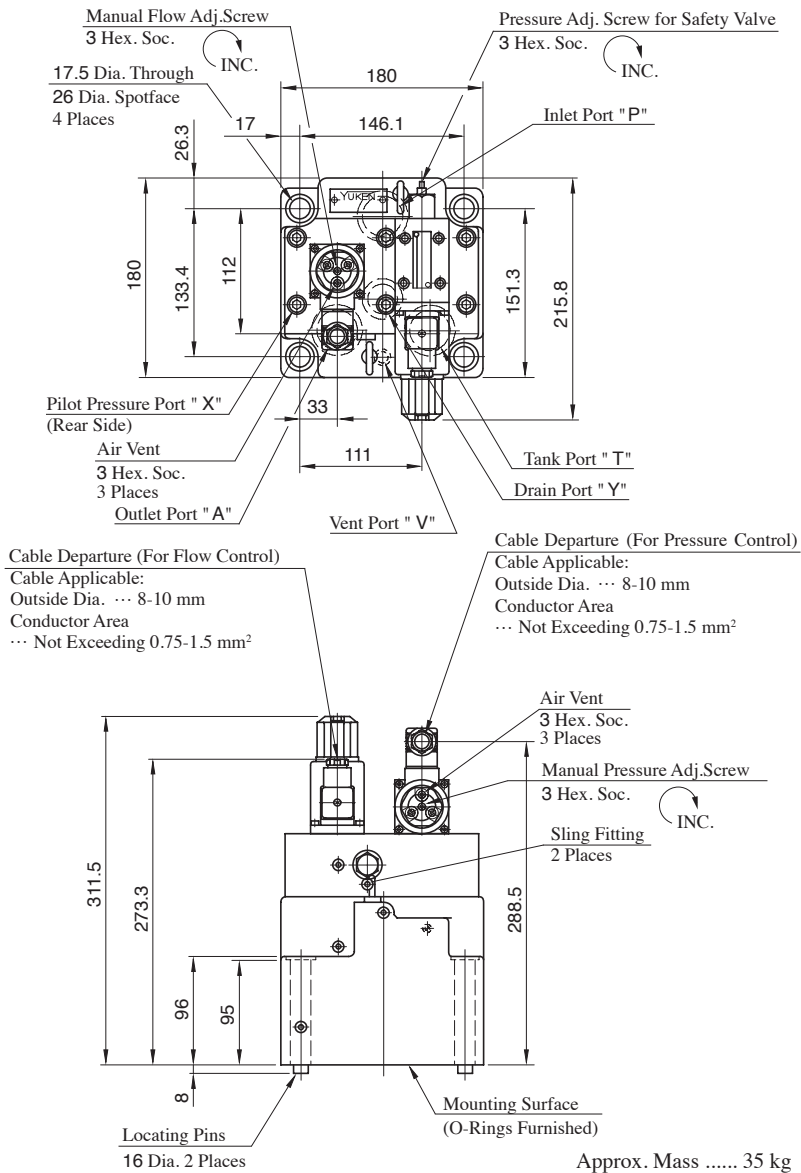
Dimensions of Valve Mounting Surface

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



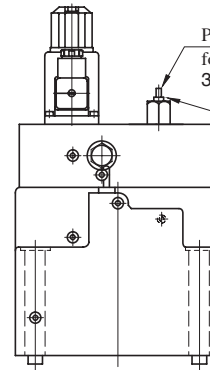
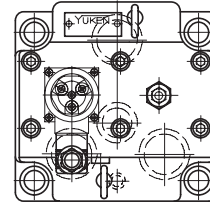
Models with Proportional Pilot Relief Valve

EFBG-06-500 -^C_H(-E)-51



Models without Proportional Pilot Relief Valve

EFBG-06-500(-E)-51

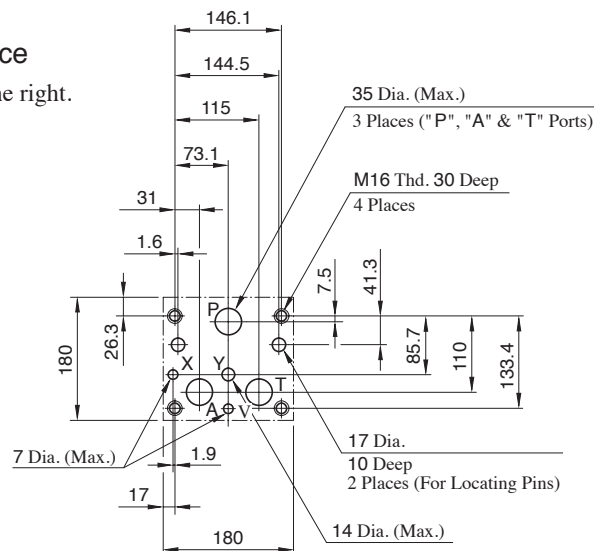


● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass 33 kg

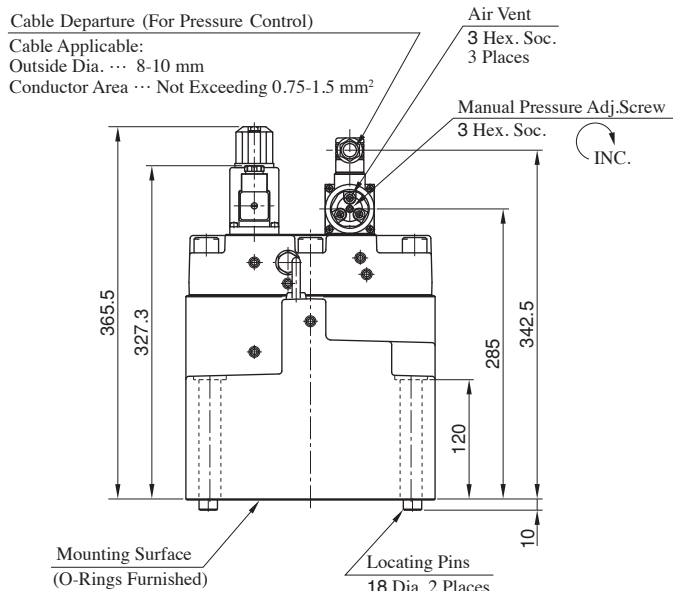
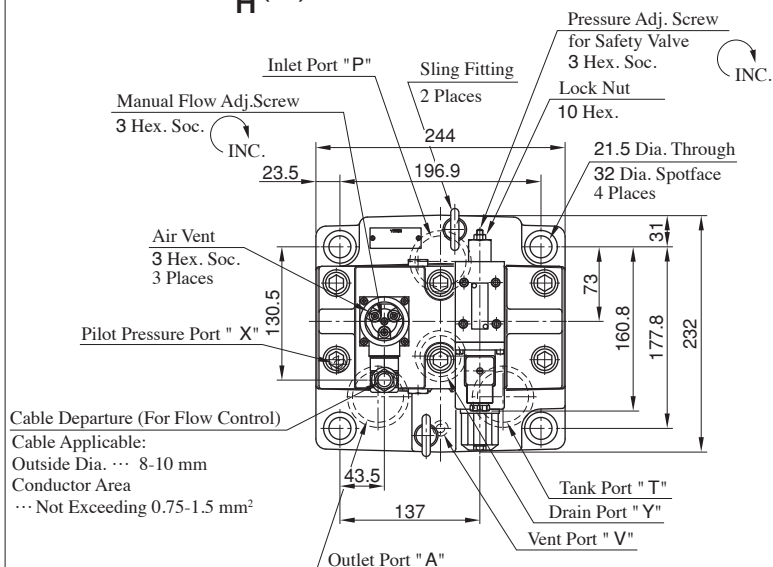
Dimensions of Valve Mounting Surface

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



Models with Proportional Pilot Relief Valve

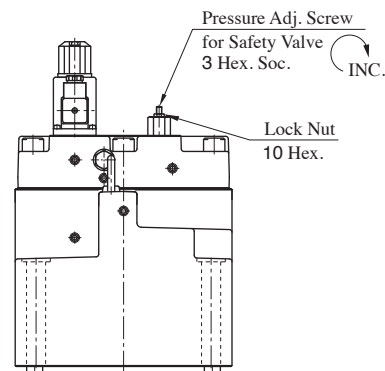
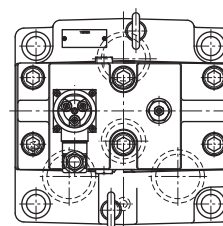
EFBG-10-1000-C_H(-E)-51



Approx. Mass 76 kg

Models without Proportional Pilot Relief Valve

EFBG-10-1000(-E)-51

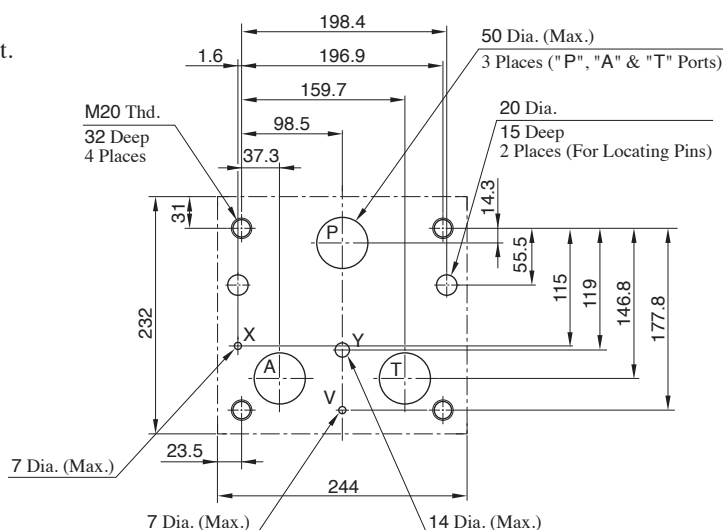


● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass 74 kg

Dimensions of Valve Mounting Surface

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

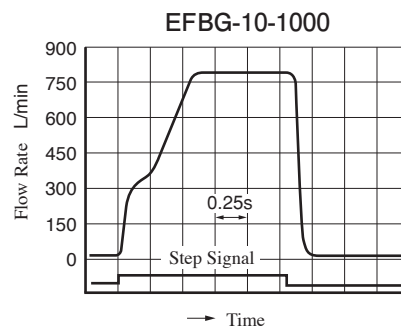
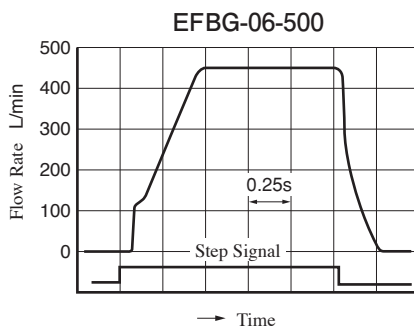
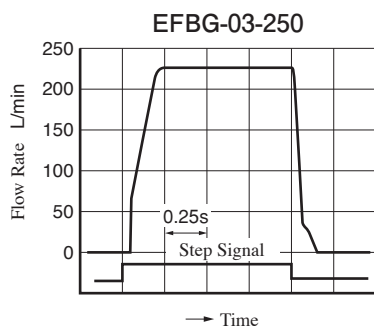


Step Response

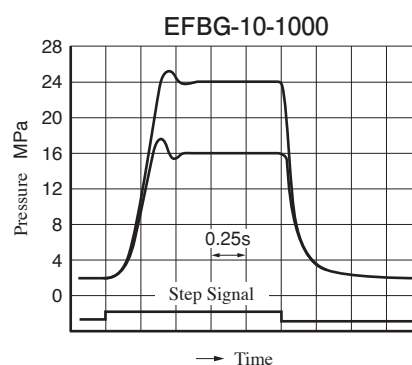
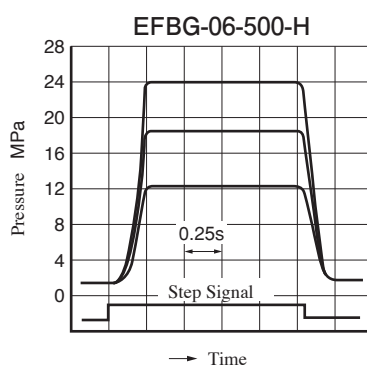
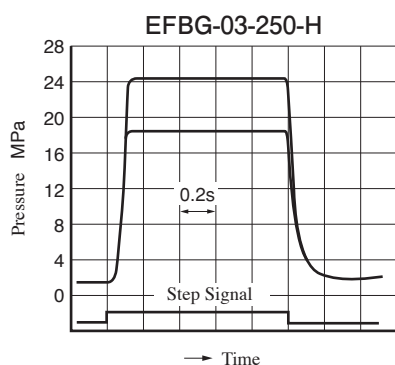
These characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

Viscosity: 30mm²/s

Flow Controls

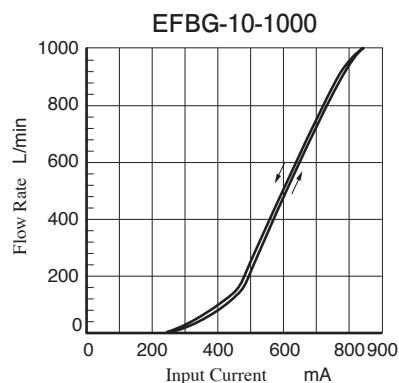
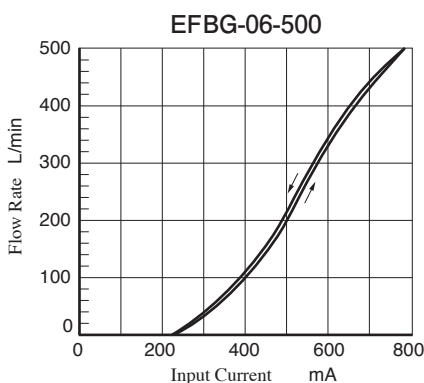
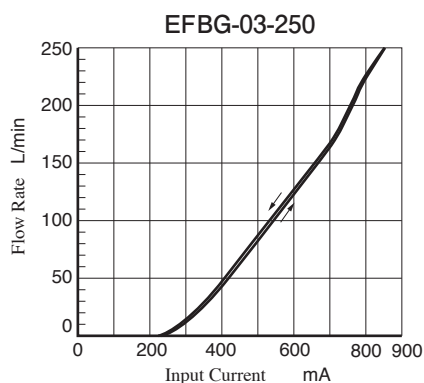


Pressure Controls



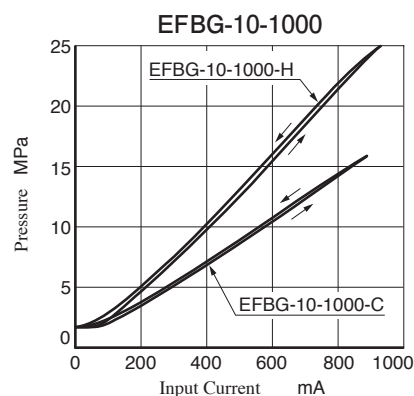
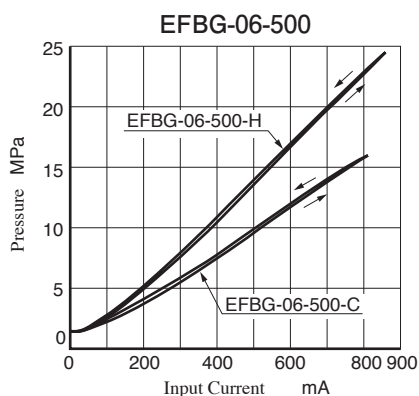
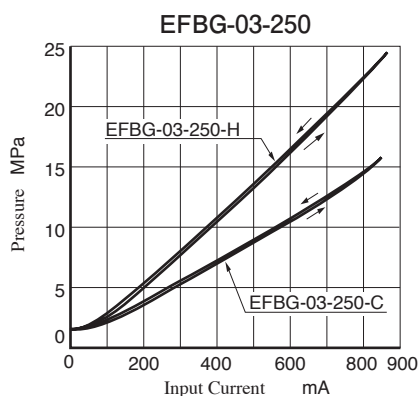
Input Current vs. Flow

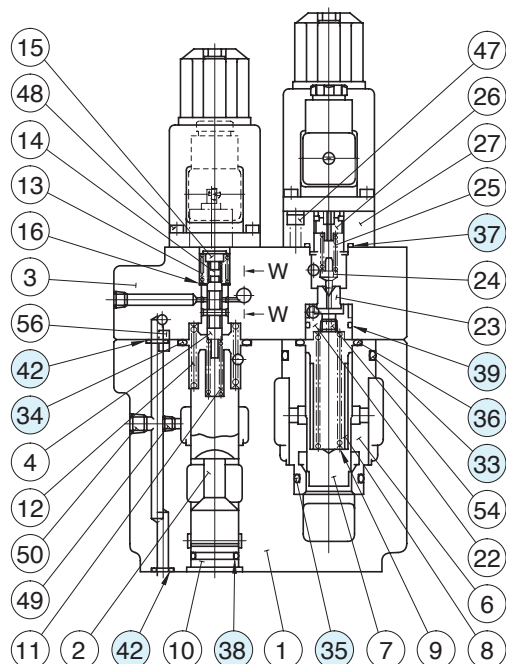
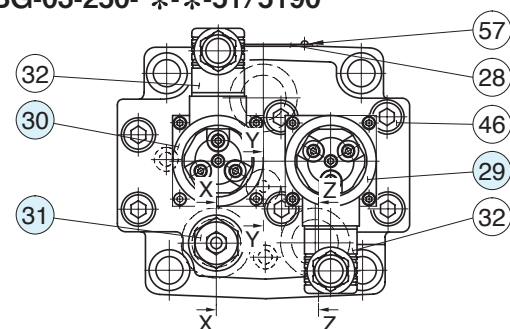
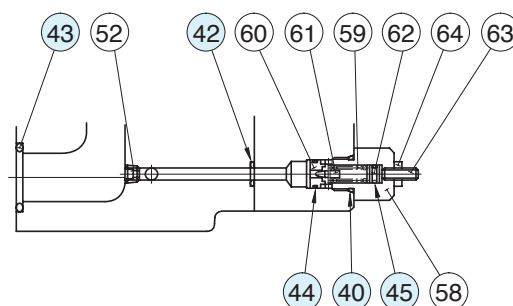
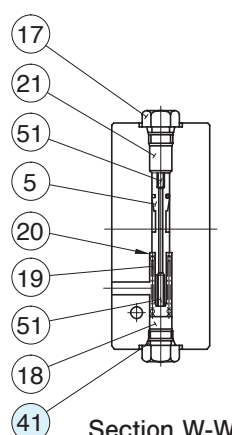
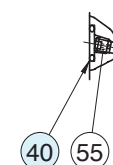
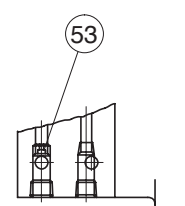
Viscosity: 30mm²/s



Input Current vs. Pressure

Viscosity: 30mm²/s



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

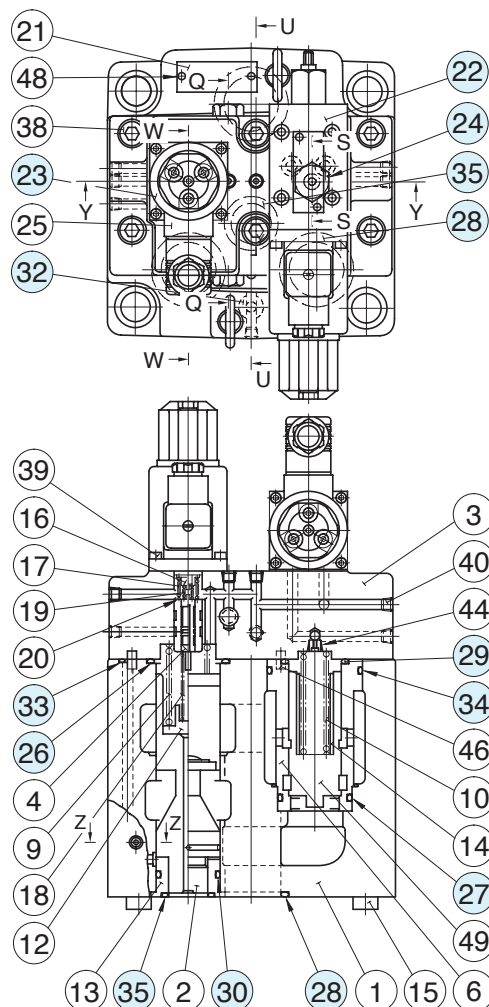
Valve Model Numbers	②⑨ Solenoid Ass'y Model No.	③⑩ Solenoid Ass'y Model No.	③① Safety Valve Model No.
EFBG-03-250-C/H(-E)-51	E318-Y06M1-04-61	E318-Y06M1-28-61	SB1094-2002
EFBG-03-250(-E)-51	—		

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.

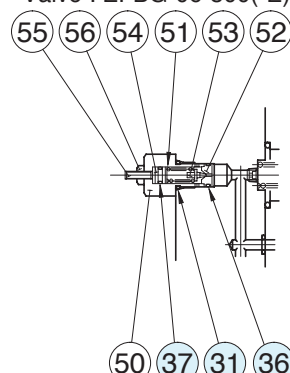
List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

EFBG-06-500- *- *-51/5190

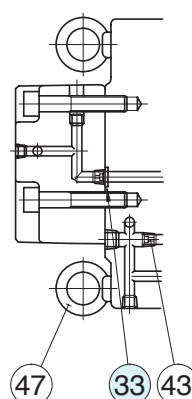


Detail of Safety Valve (Item 24)

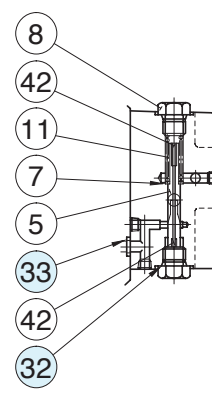
[Models Without Pilot Relief Valve : EFBG-06-500(-E)]



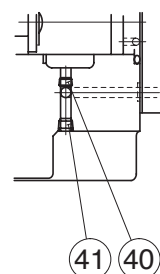
Section S-S



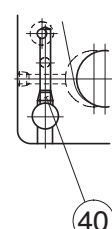
Section U-U



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★

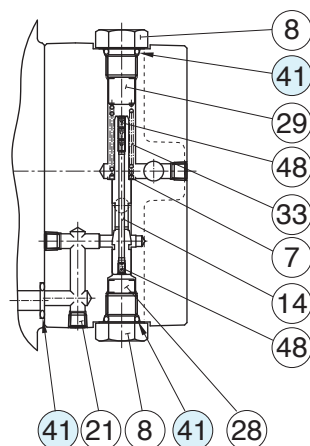
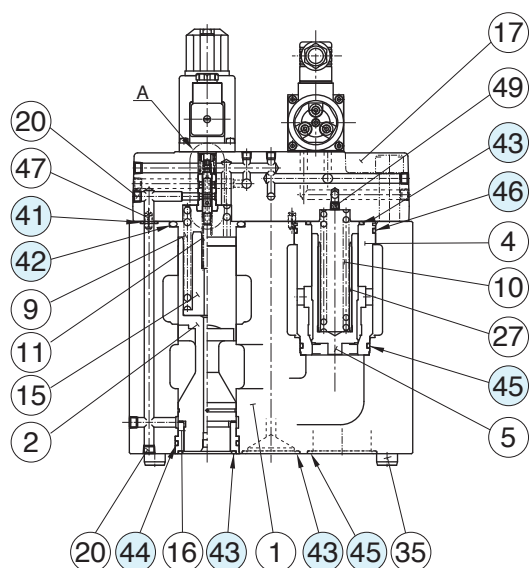
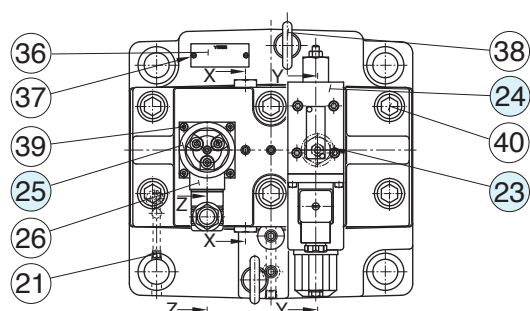
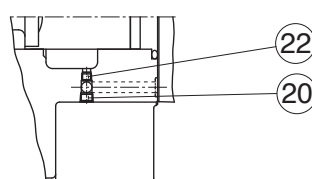
★O-rings, item 31, 36 and 37, are used only without the proportional pilot relief valve [(EFBG-06-500(-E)).

Pilot Valve, Solenoid Ass'y and Safety Valve

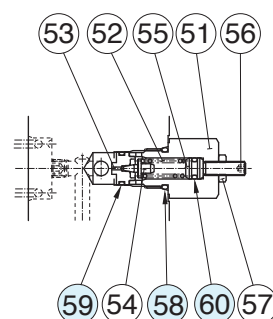
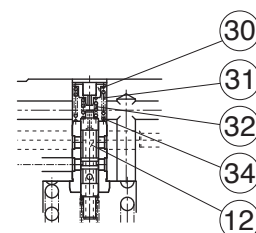
Valve Model Numbers	② Pilot Valve Model Numbers	③ Solenoid Ass'y Model No.	④ Safety Valve Model No.
EFBG-06-500-C(-E)-51	EDG-01V-C-1-PNT11-5103	E318-Y06M1-28-61	—
EFBG-06-500-H(-E)-51	EDG-01V-H-1-PNT11-5103		—
EFBG-06-500(-E)-51	—		SB1094-2002

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

Section X-X

Section Z-Z

Detail of Safety Valve (Item 23)
[Models Without Pilot Relief]
Valve : EFBG-10-1000(-E)


Section Y-Y

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.

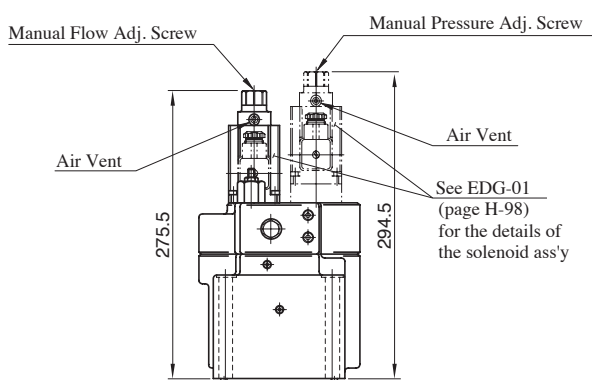
No changes in specifications and characteristics between current and new design.

Mounting Interchangeability

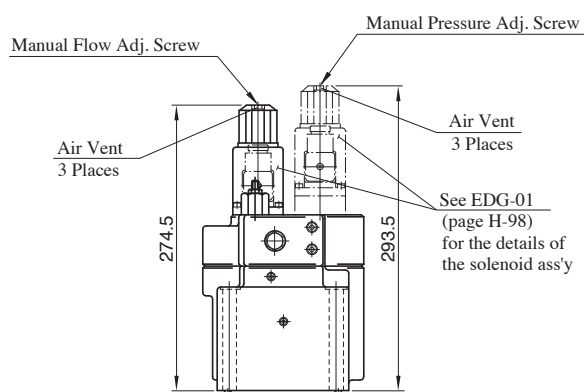
There is an interchangeability in the mounting dimensions between current and new design, however, note that because of improvements made on the solenoids, the overall shapes have been changed as shown below.

• EFBG-03

Current : Design 50

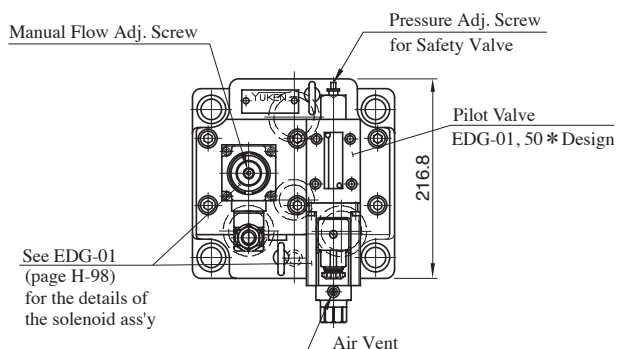


New : Design 51

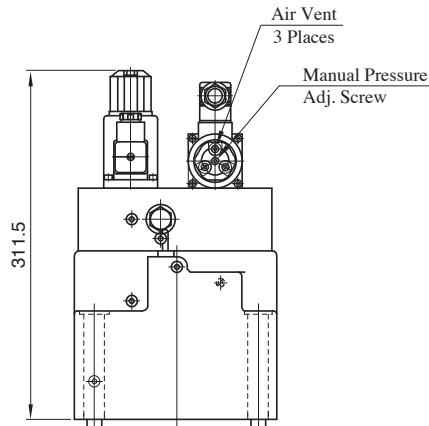
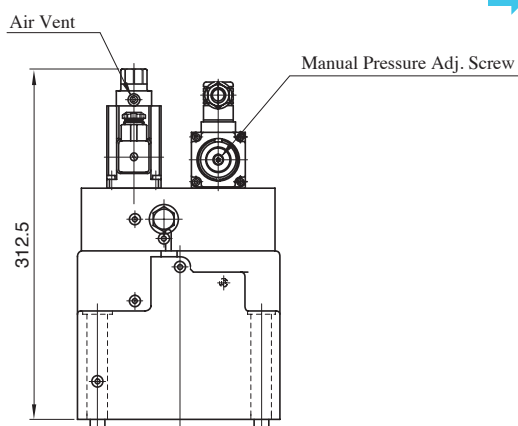
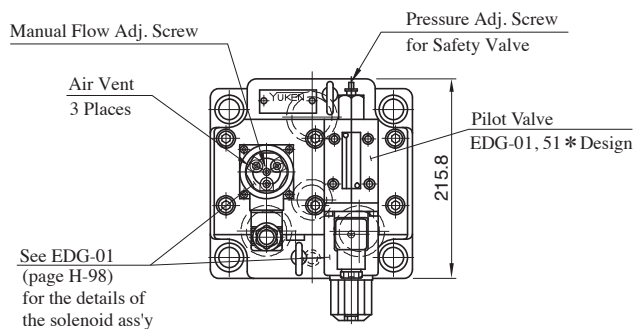


• EFBG-06/10

Current : Design 50



New : Design 51



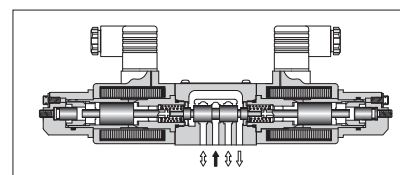
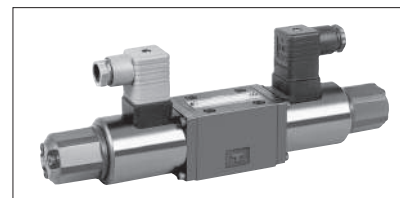
Shockless Type Proportional Electro-Hydraulic Directional and Flow Control Valves

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.

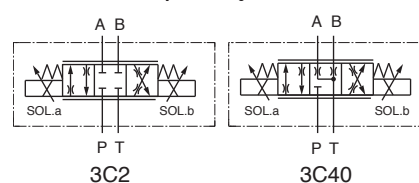
In combination with the newly developed digital amplifiers, the further enhancement of maneuverability and repeatability of the valves can be realized.

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 $\leftrightarrow$ 100%)		100 ms or less
Frequency Response (50% $\pm$ 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 $\times$ 45 L	4	5~7

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. ($\frac{1}{16}$)
- Sub-plates are those for 1/8 solenoid operated directional valves. For dimensions, see page H-8.

Applicable Power Amplifiers

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

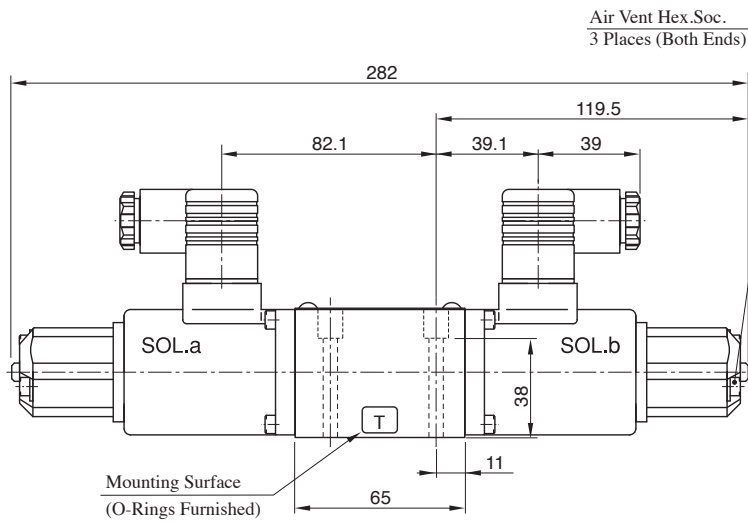
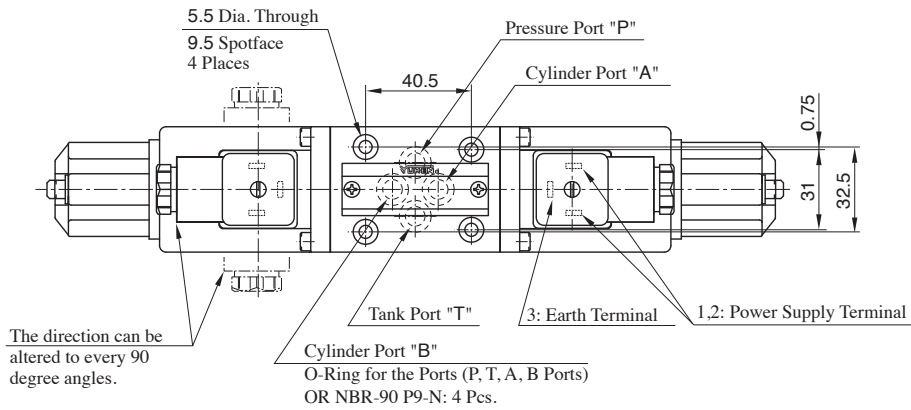
Control Type	Model No.
Pattern Control	AMN-G-10
Analog Control	AMN-W-10

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.

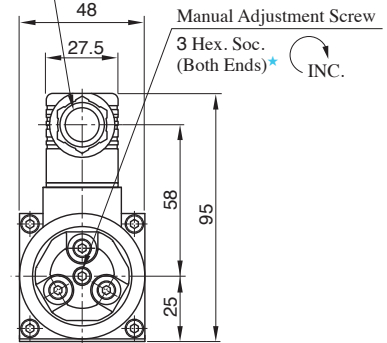
EDFG-01-30-3C *-XY-50

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



Cable Departure

Cable Applicable:
Outside Dia ... 8-10mm
Conductor Area ...
Not Exceeding 0.75-1.5mm²

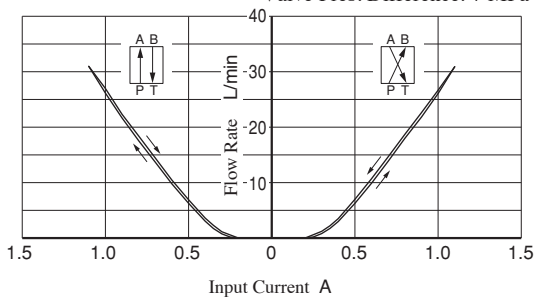


★ Under normal conditions, however, this screw must be kept in its original position.

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

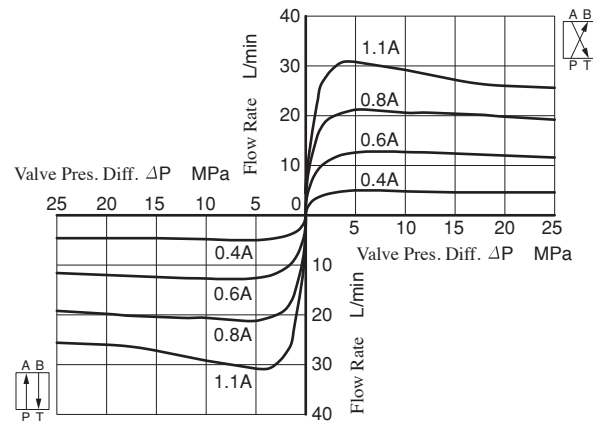
Input Current vs. Flow

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

Model No.		EDFHG-03	EDFHG-04	EDFHG-06
Descriptions				
Max. Operating Pressure	MPa	25		
Rated Flow ^{★1}	L/min	100	140	280
at Valve Pressure Difference: 1.0 MPa				
Pilot Pressure ^{★2}	MPa	1.5 - 16		
Pilot Flow	L/min	at Normal	1	1
		at Transition	3	4
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

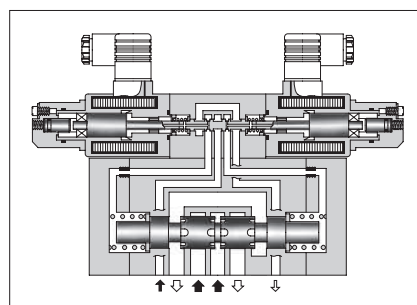
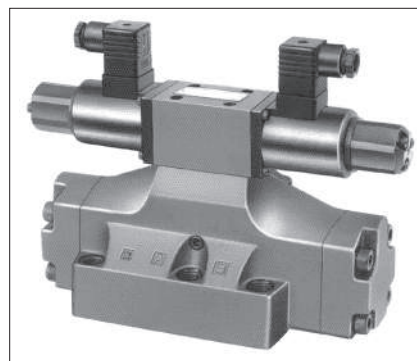
★1. The rated flow rate is valid at a differential pressure of 1.0 MPa of “P→A(B)” or “A(B)→T.”

★2. Take care to keep the difference between the pilot pressure and drain port back pressure consistently greater than 1.5 MPa.

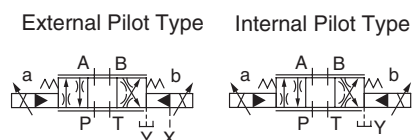
★3. To obtain stable performance, keep the drain port back pressure low and minimize its fluctuations.

★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



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. ($\sqrt{\text{ }}$)
- Sub-plates are those for solenoid controlled pilot operated directional valves. For details, contact 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.

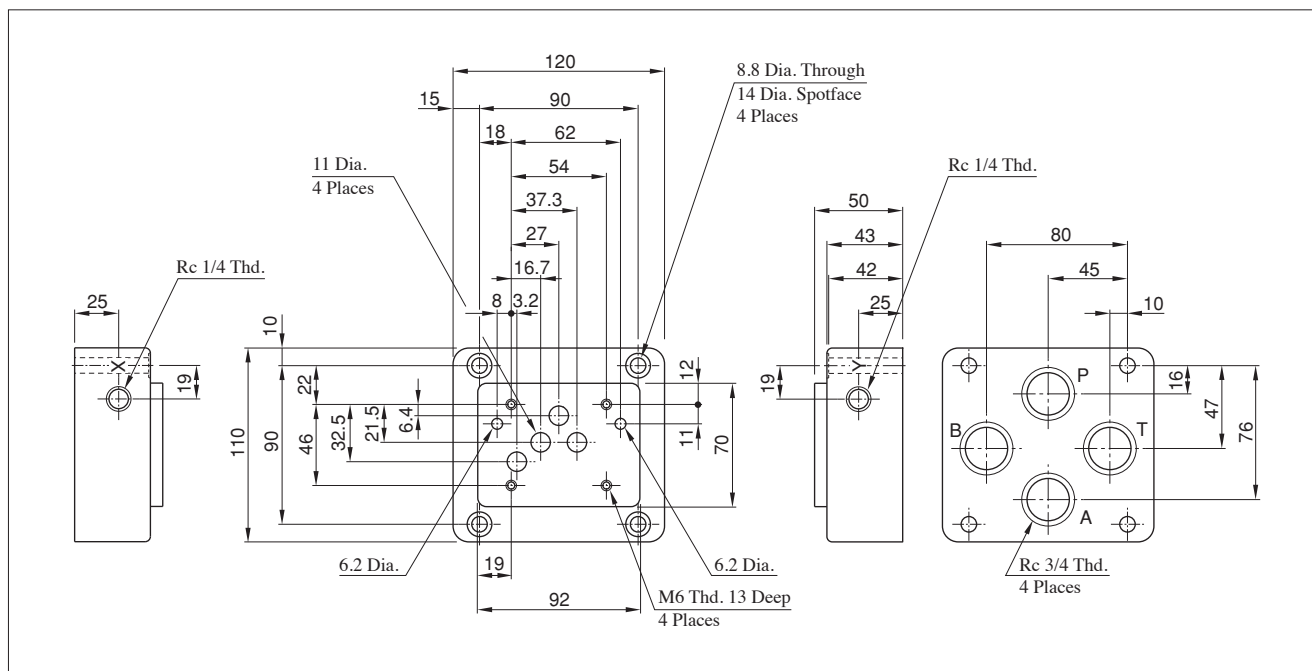
During Piping

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.

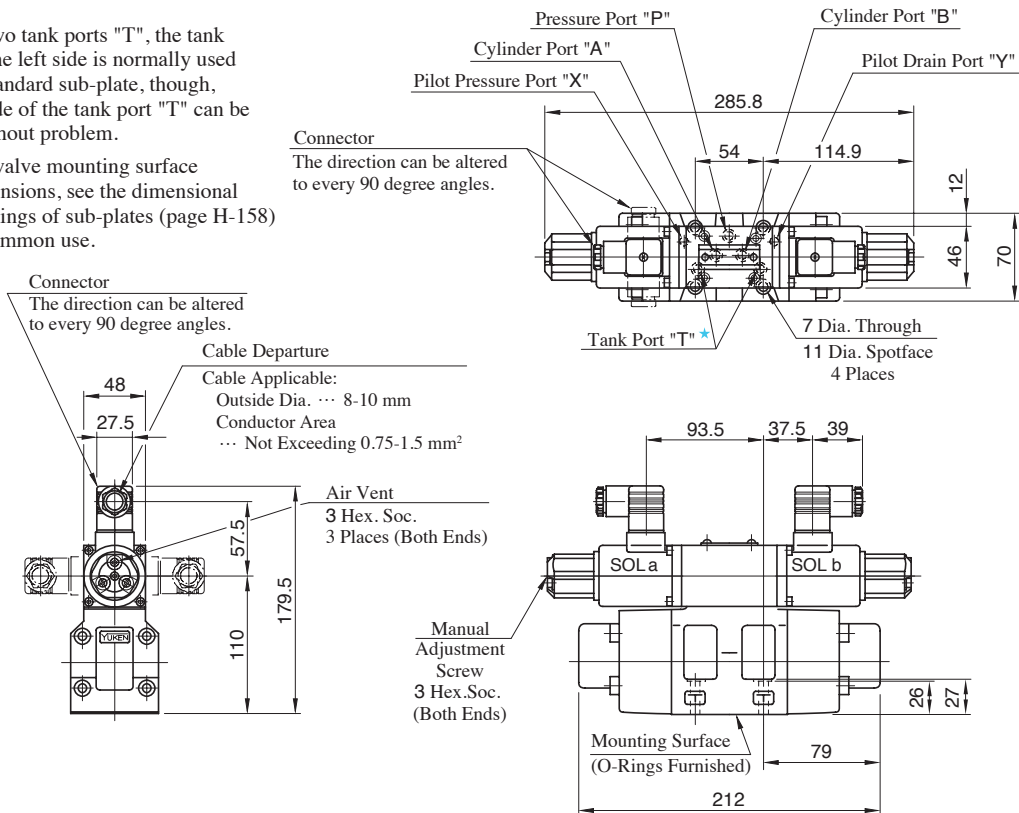
Sub Plates: DHGM-03Y



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.

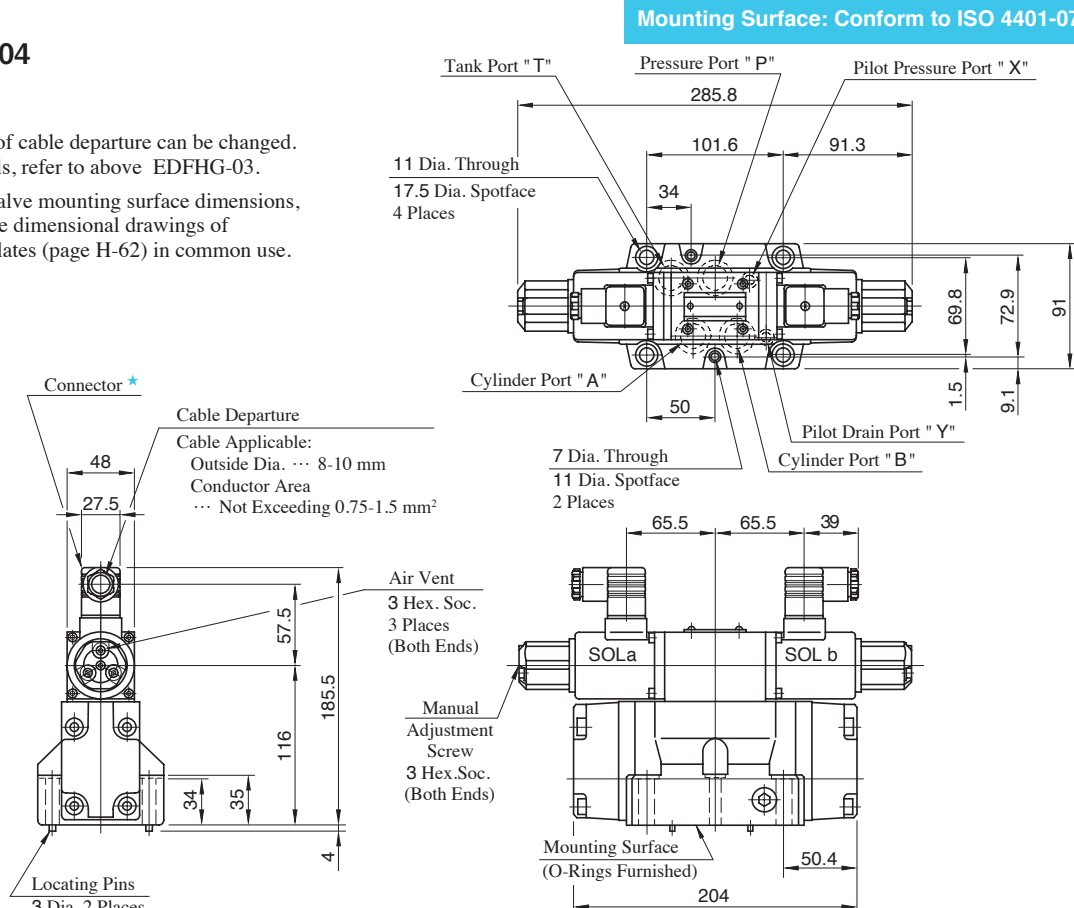
Note) For valve mounting surface dimensions, see the dimensional drawings of sub-plates (page H-158) in common use.



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.

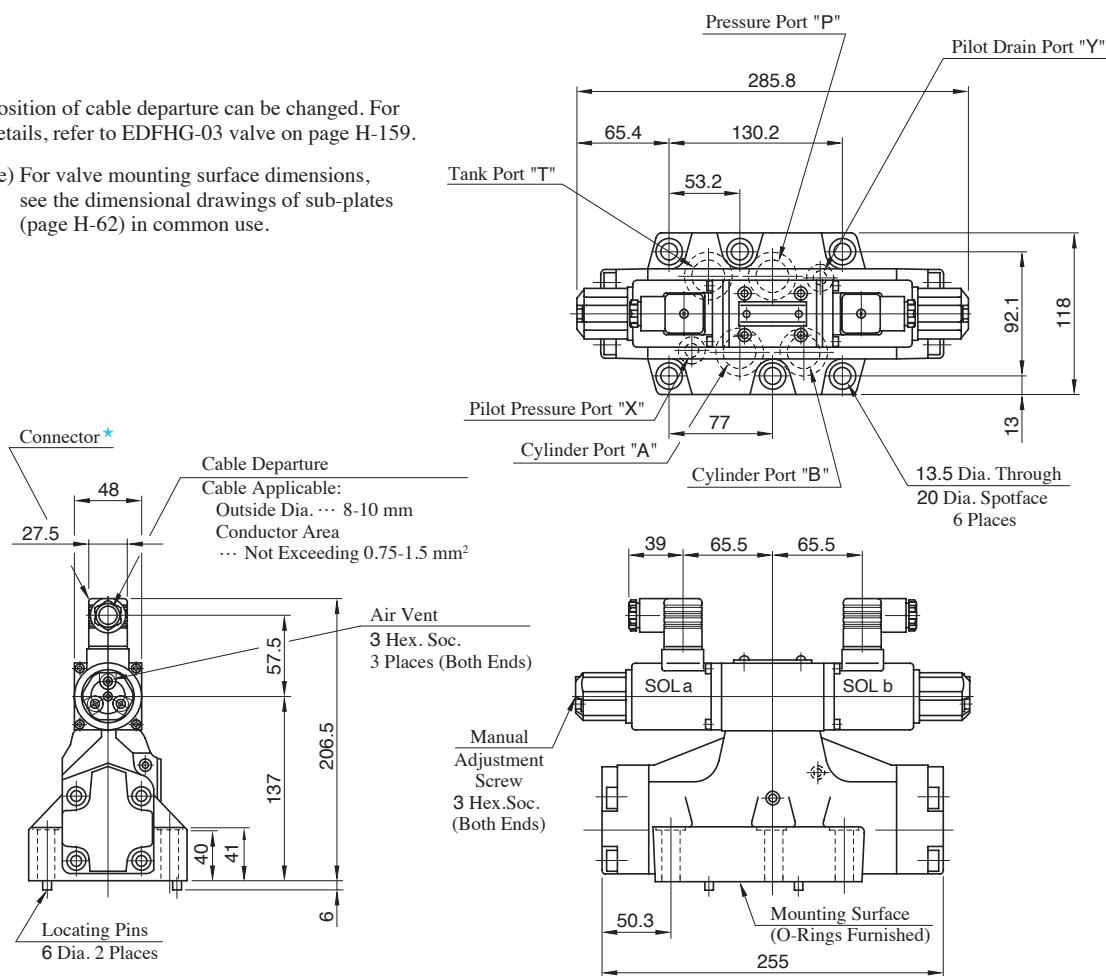


EDFHG-06

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

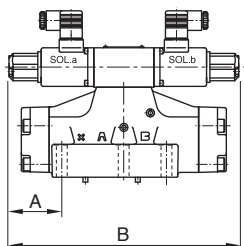
Specifications and Characteristics

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.



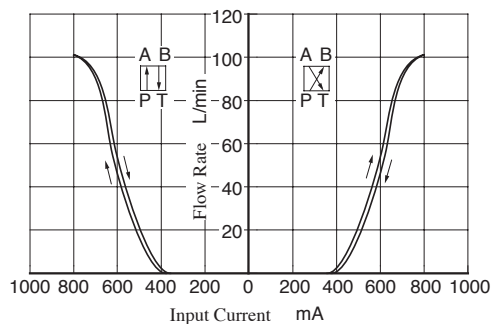
Model Numbers		A	B
(Current)	EDFHG-03-100- *- *- *-30	117.9	287.8
(New)	EDFHG-03-100- *- *- *-31	116.9	285.8
(Current)	EDFHG-04-140- *- *- *-30	93.9	287.8
(New)	EDFHG-04-140- *- *- *-31	92.9	285.8
(Current)	EDFHG-06-280- *- *- *-30	66.4	287.8
(New)	EDFHG-06-280- *- *- *-31	65.4	285.8

Input Current vs. Flow

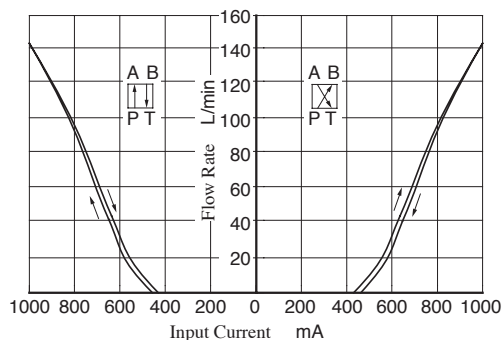
Viscosity : 30 mm²/s

Valve Pres. Difference : P → A (B), B (A) → T 1 MPa

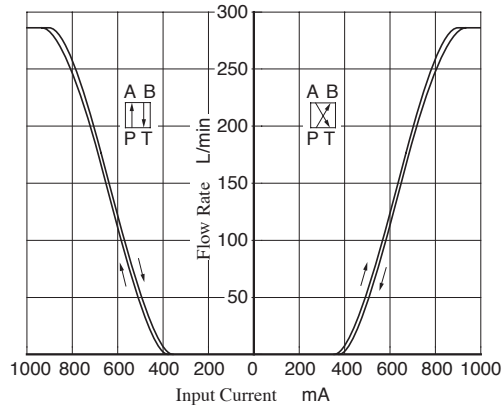
EDFHG-03



EDFHG-04



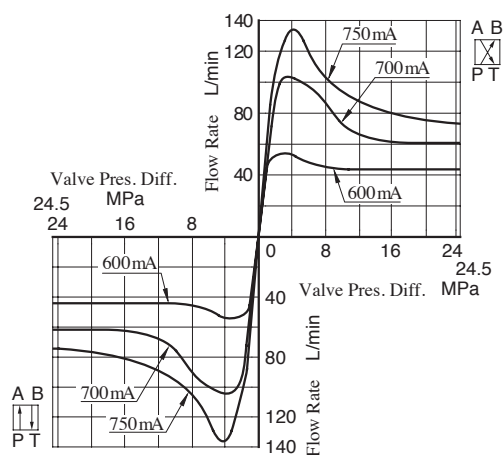
EDFHG-06



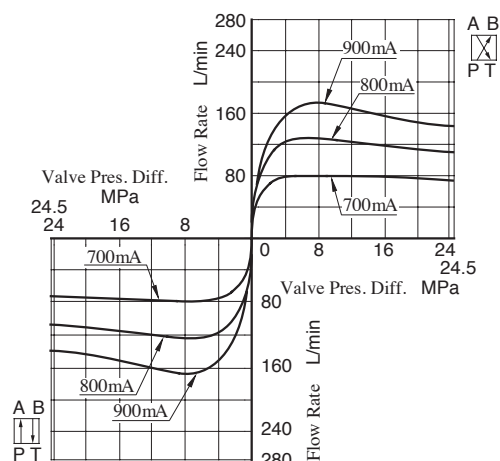
Valve Pressure Difference vs. Flow

Viscosity : 30 mm²/s

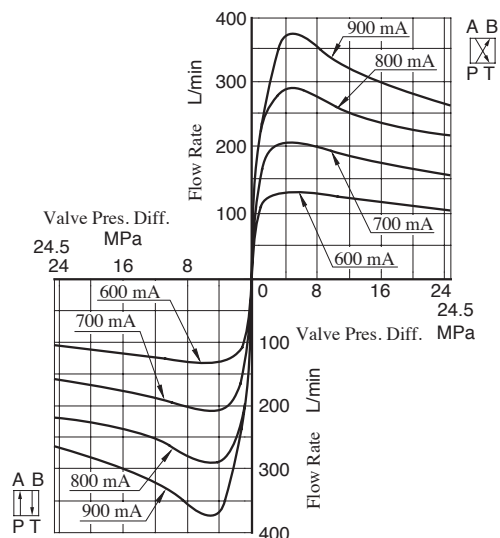
EDFHG-03



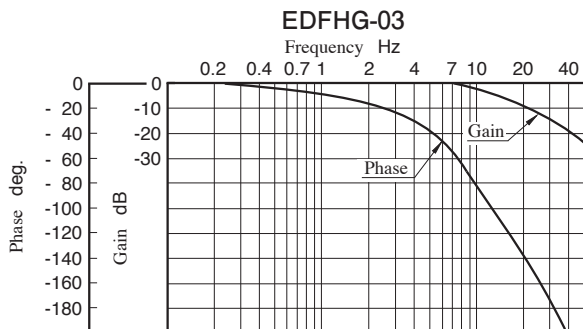
EDFHG-04



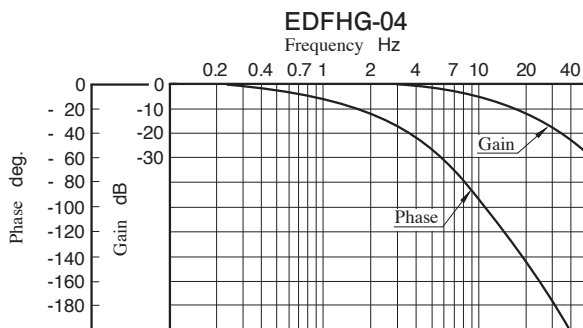
EDFHG-06



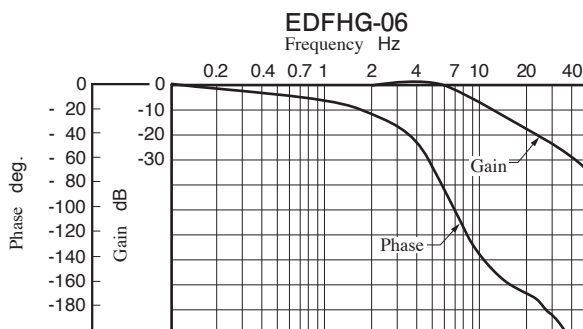
Frequency Response



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



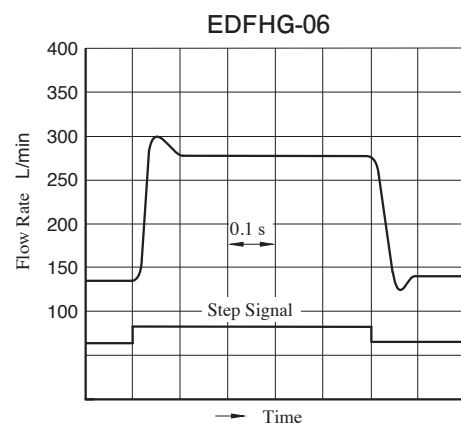
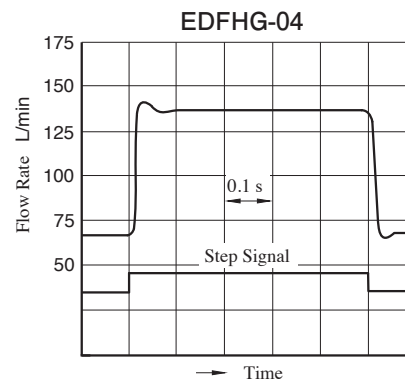
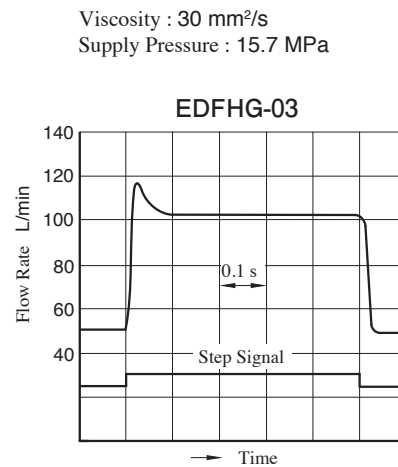
Model Number : EDFHG-04-140-3C2-E-31
 Viscosity : 30 mm²/s
 Pilot Pressure : 15.7 MPa
 Travel of Spool : ±10% of Maximum Stroke



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.



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.

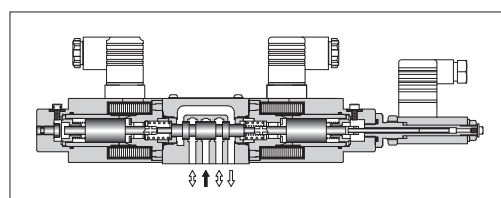
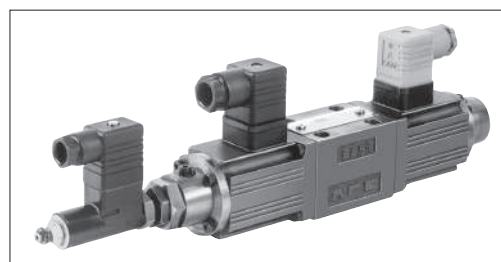
Direct Operated Type Directional and Flow Control Valves

This product can be interchanged with the simplified servo valve to perform position control and pressure control.

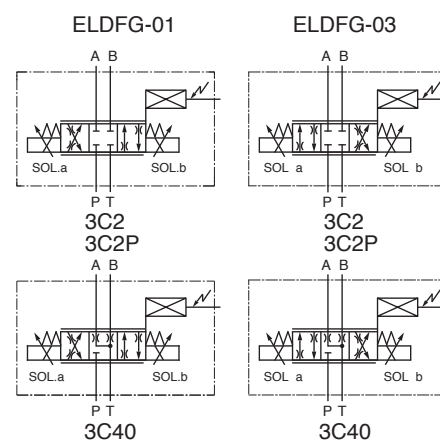
Compared to nozzle flapper type servo valve, this product has excellent contamination-related problems.

Specifications

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

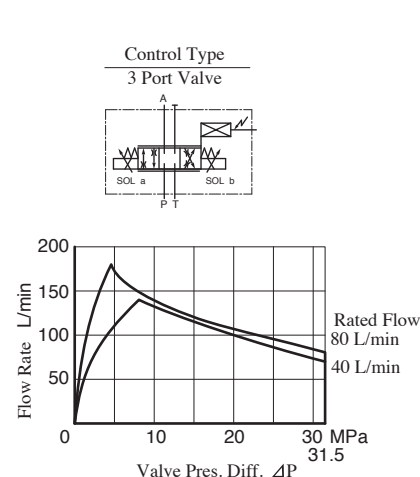
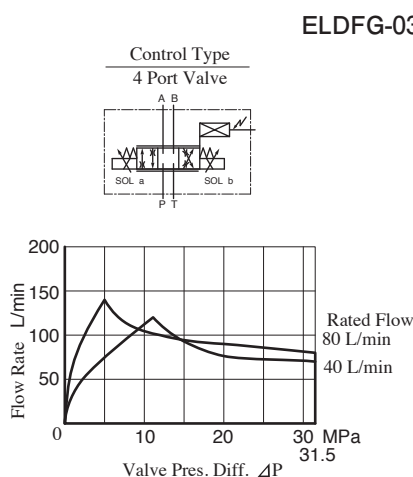
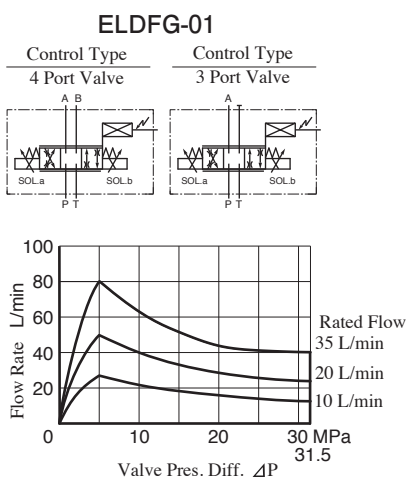


Graphic Symbols



Range of Flow Control

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



★ Valve pressure difference “ ΔP ” is reference by follows. In addition, “P”, “A”, “B”, “T”, are pressure of each port.

4 Port Valve: $\Delta P = [(P-A) + (B-T)]$ or $[(P-B) + (A-T)]$

3 Port Valve: $\Delta P = (P-A)$ 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	   (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. ($\sqrt{16}$)
- The Sub-plates are those for 1/8 and 3/8 solenoid operated directional valves. For dimensions, see pages H-8 and H-53.

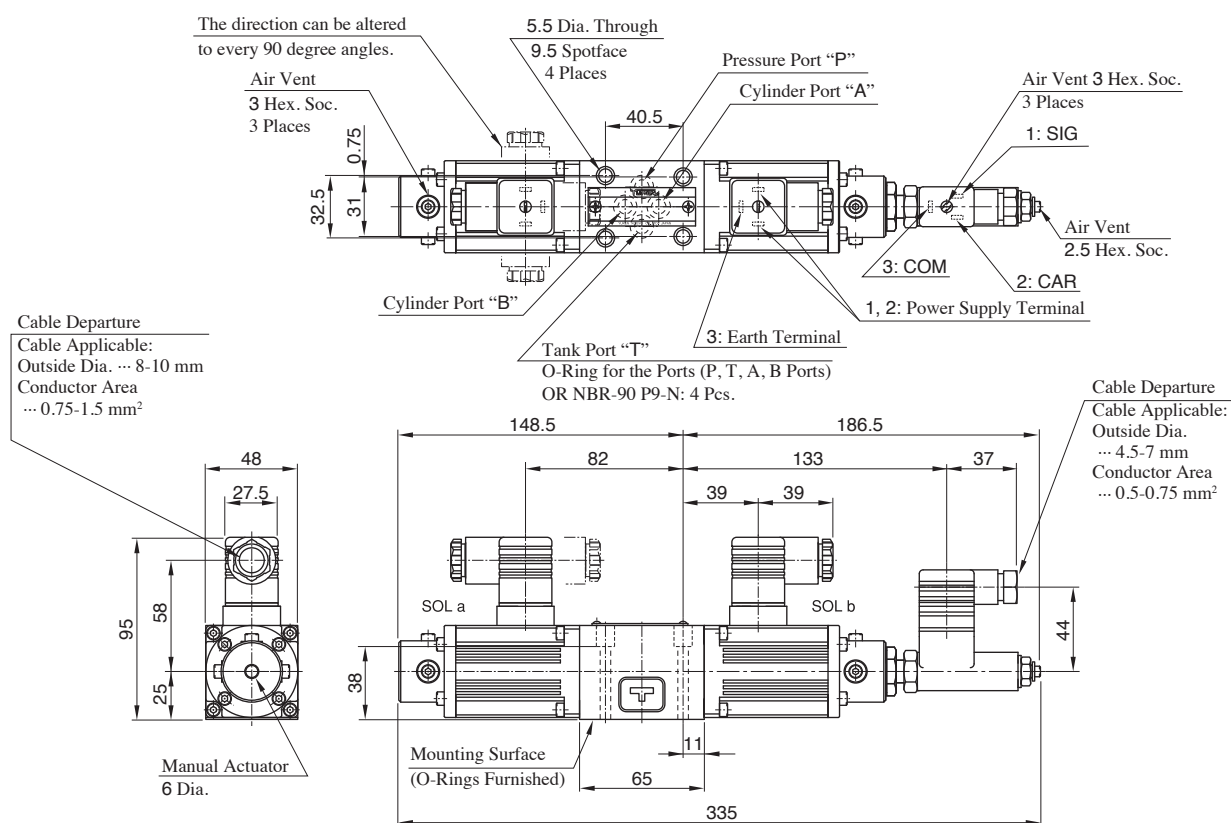
Applicable Power Amplifiers

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

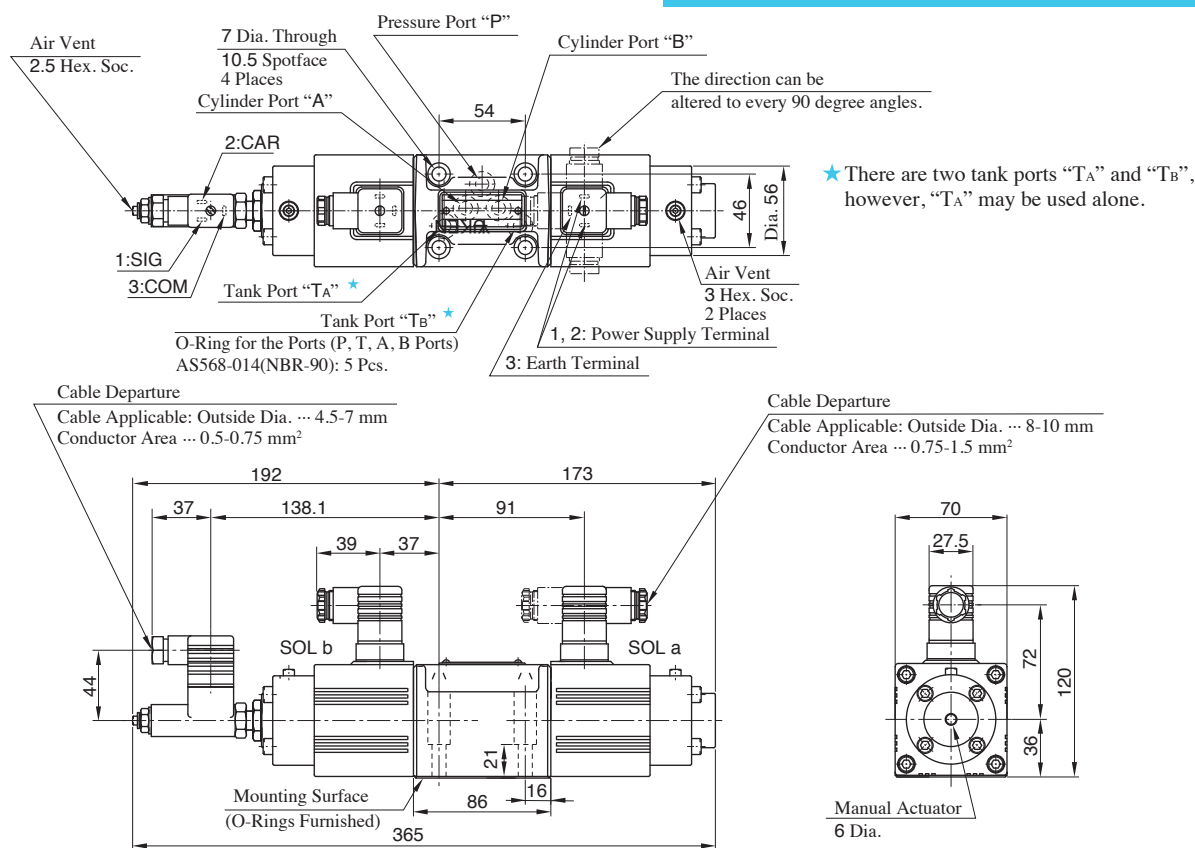
Valve Model Numbers	Power Amplifier Model Numbers
ELDFG-01- * $\frac{3}{4}$ C2 3C40	AMN-L-01-1-10 AMB-EL-01-★- * -20
ELDFG-01- * -3C2P	AMN-L-01-3-2P-10 AMB-EL-01-2P-★- * -20
ELDFG-03- * $\frac{3}{4}$ C2 3C40	AMB-EL-03-1- * -20
ELDFG-03- * -3C2P	AMB-EL-03-2P-1- * -20

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.

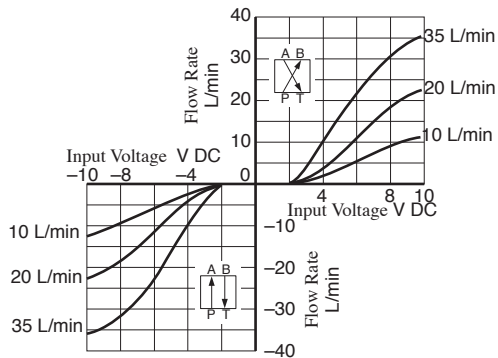
ELDFG-03-*-* -XY-10
Mounting Surface: Conform to ISO4401-05-04-0-05


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

Input Voltage vs. Flow Rate

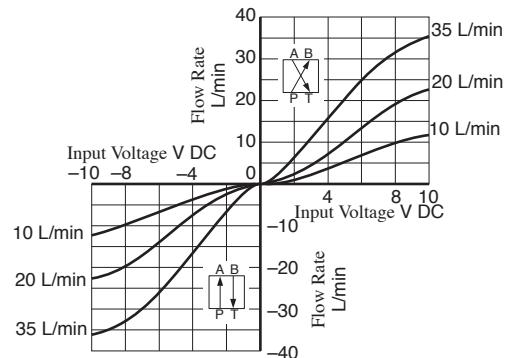
ELDFG-01-**-3C2/3C40

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



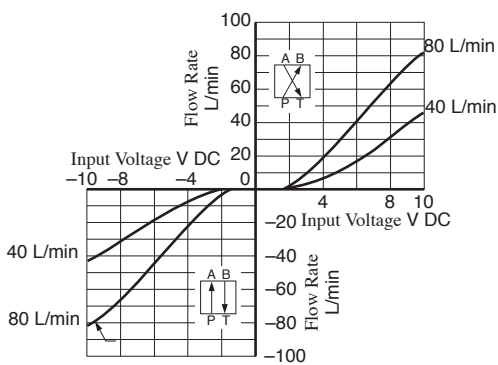
ELDFG-01-**-3C2P

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



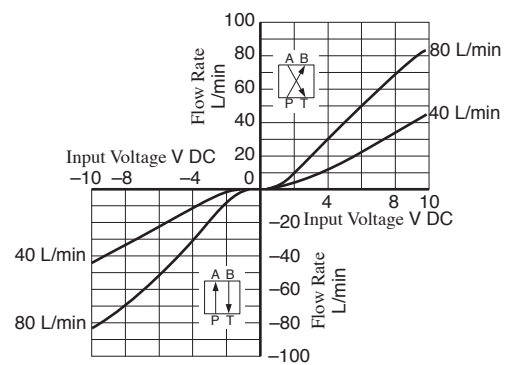
ELDFG-03-**-3C2/3C40

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



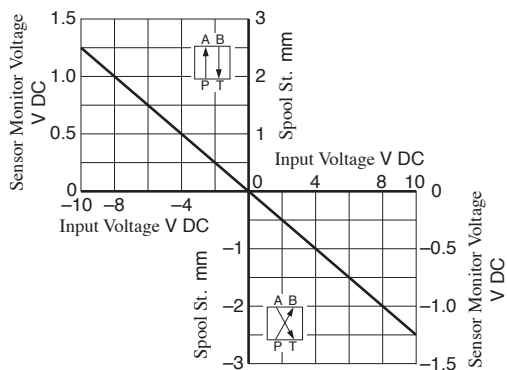
ELDFG-03-**-3C2P

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

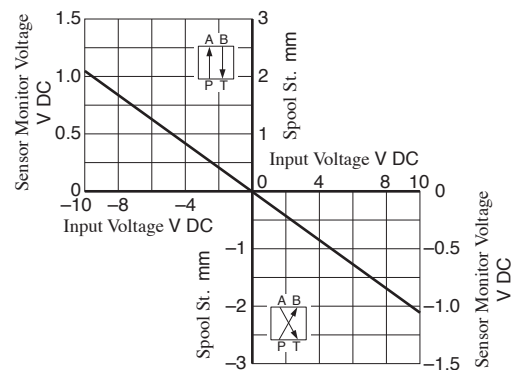


Input Voltage vs. Spool St.

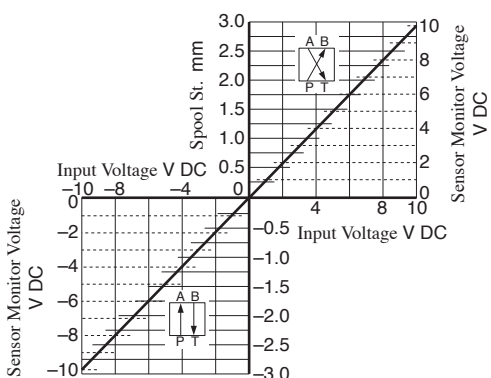
ELDFG-01-**-3C2/3C40



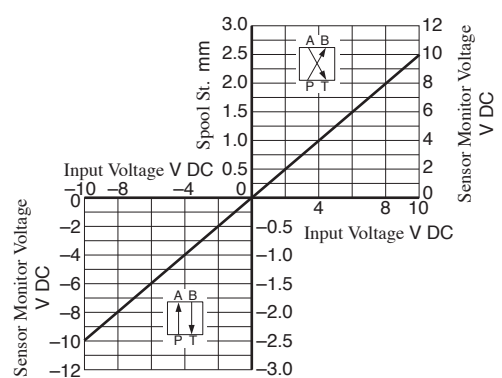
ELDFG-01-**-3C2P



ELDFG-03-**-3C2/3C40



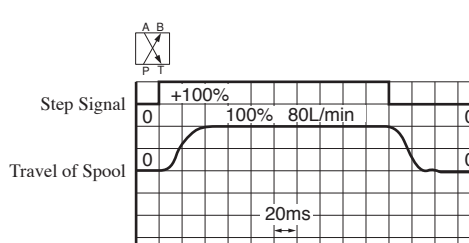
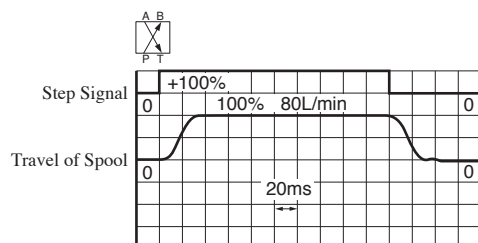
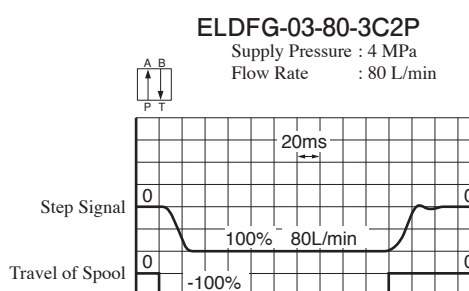
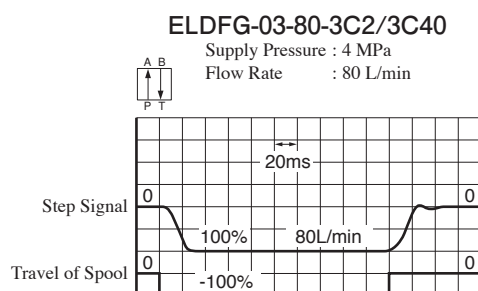
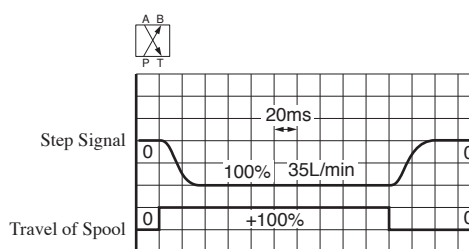
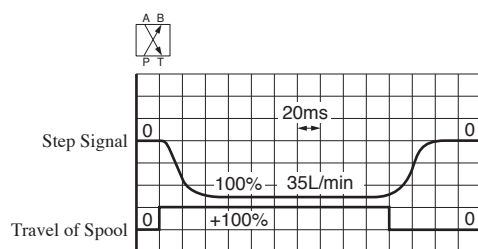
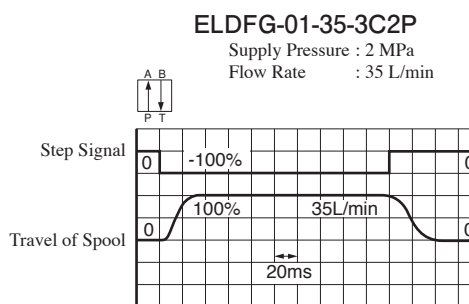
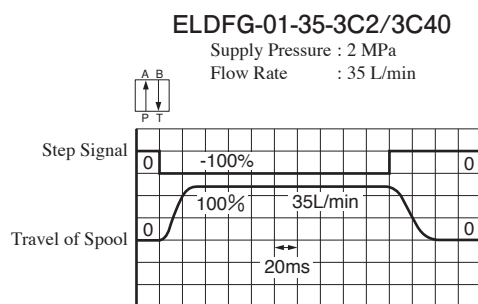
ELDFG-03-**-3C2P



Step Response (Example)

Viscosity : 30 mm²/s

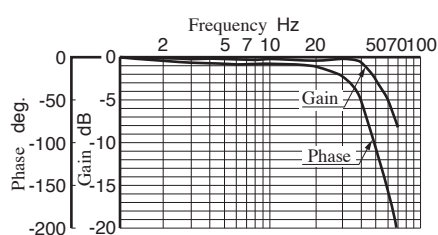
The values were measured on independent valves. They vary by circuit.



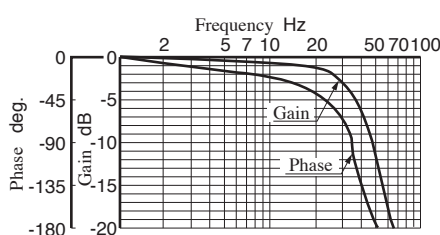
Frequency Response

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

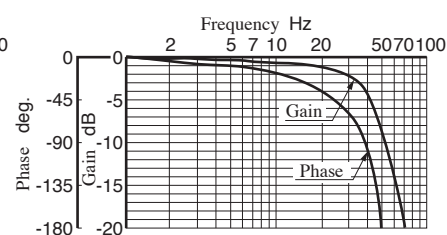
ELDFG-01-35-3C2/3C40/3C2P



ELDFG-03-80-3C2/3C40



ELDFG-03-80-3C2P

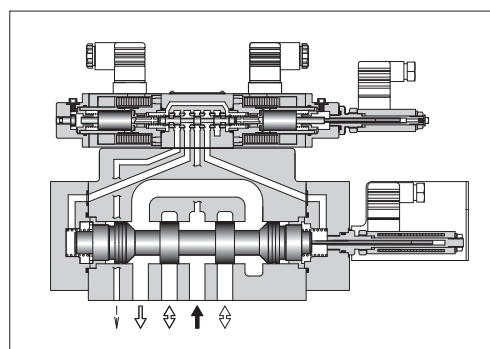
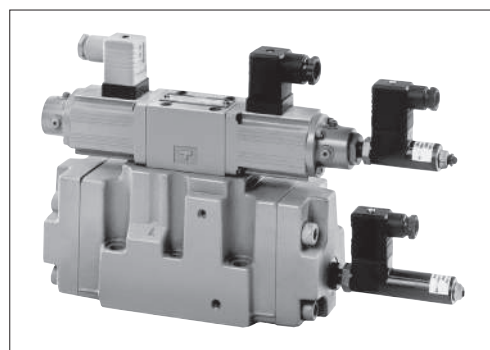


Two Stage Type Directional and Flow Control Valves

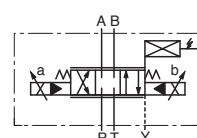
Specifications

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 (Typical Rating) (0↔100%) 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:  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

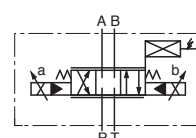
- ★1. Return pressure should be less than the actual supply pressure.
 ★2. Pilot pressure should be between 1.5 MPa and 31.5 MPa, and should exceed 60% of the actual supply pressure to main valve.
 ★3. Pilot flow is calculated with the above step response time at pilot pressure 14 MPa.
 ★4. Added up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



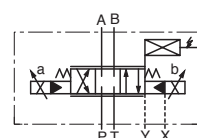
Graphic Symbols



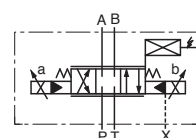
Internal Pilot /
External Drain Type



Internal Pilot /
Internal Drain Type



External Pilot /
External Drain Type



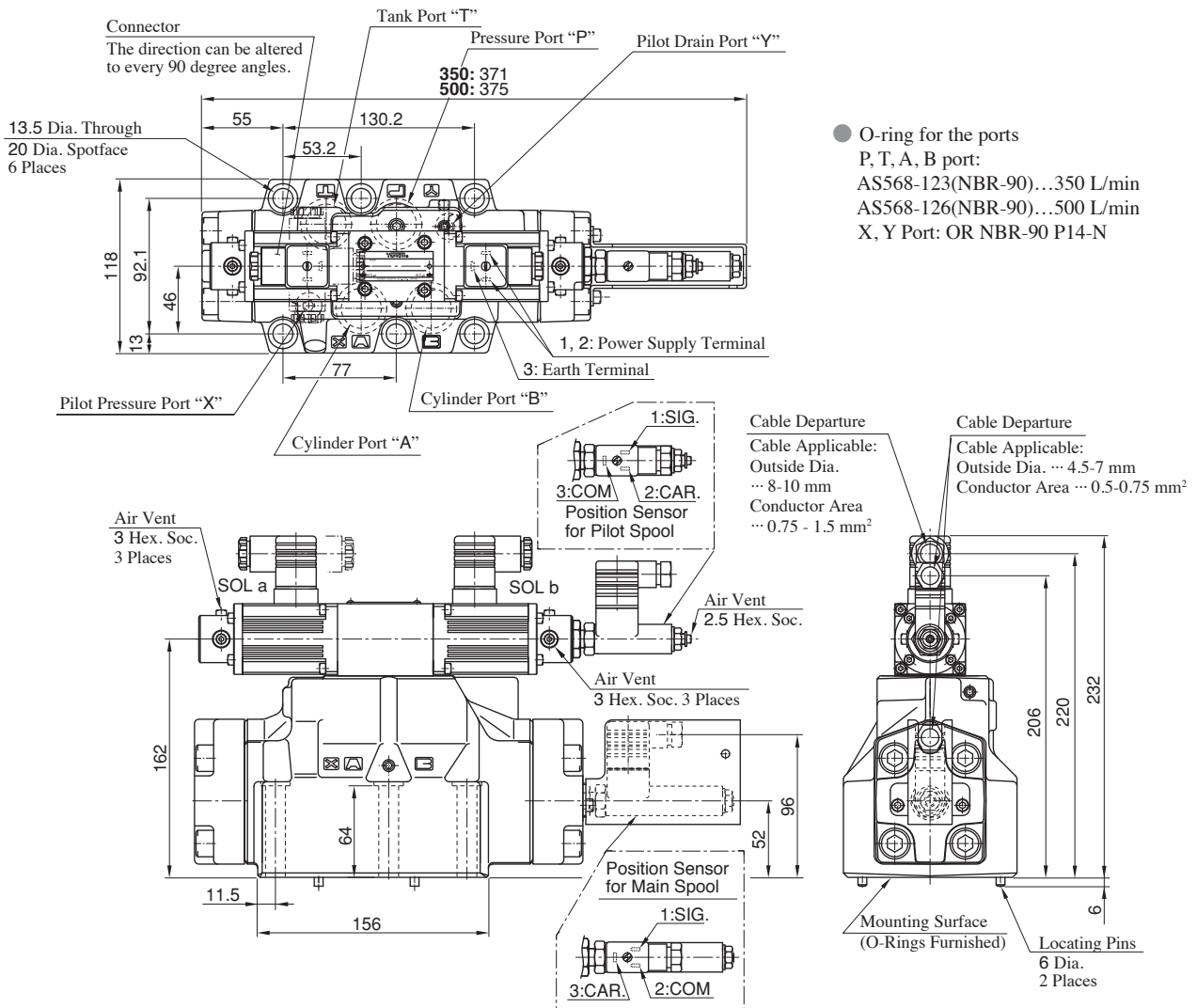
External Pilot /
Internal Drain Type

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

ELDFHG-06-*-XY-*-10

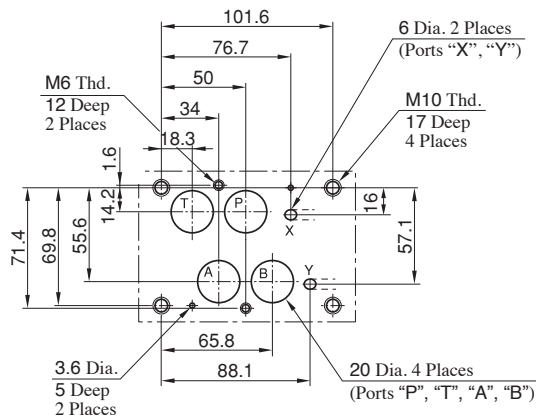
Mounting Surface: Conform to ISO4401-08-08-0-05



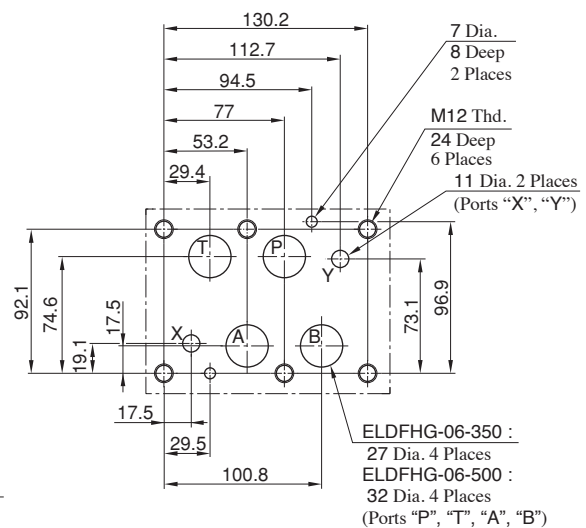
Dimensions of Valve Mounting Surface

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

● ELDFHG-04

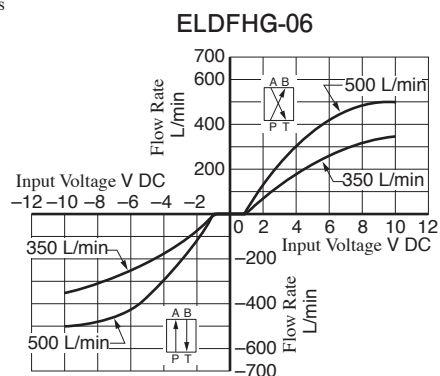
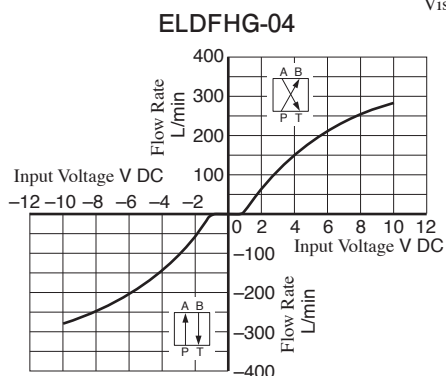


● ELDFHG-06



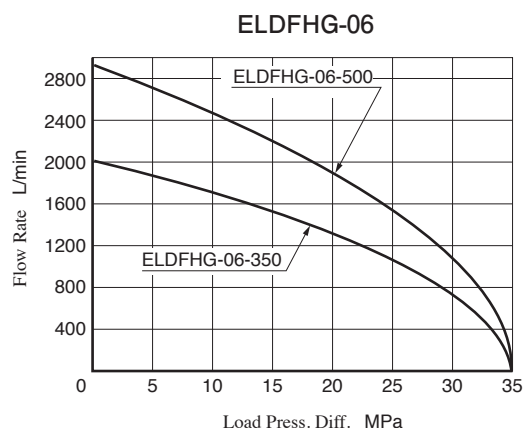
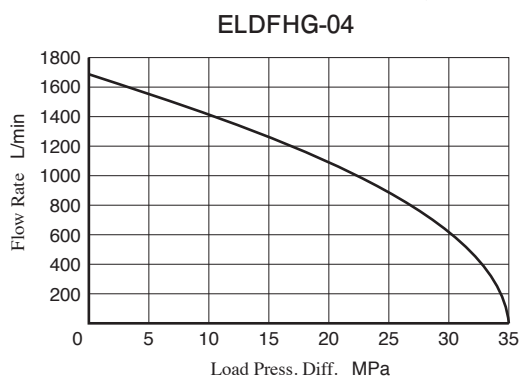
Input Voltage vs. Flow Rate

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



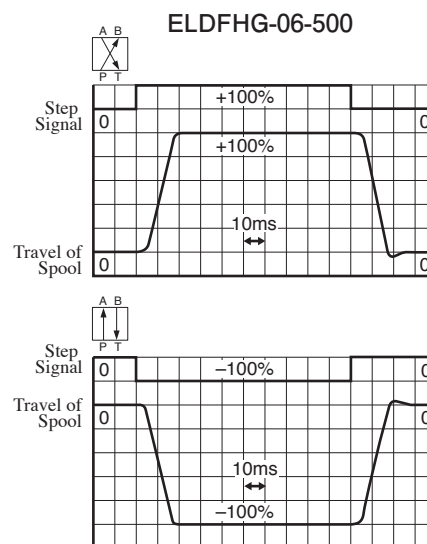
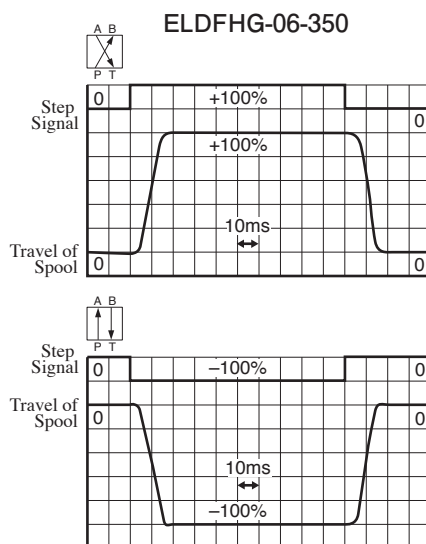
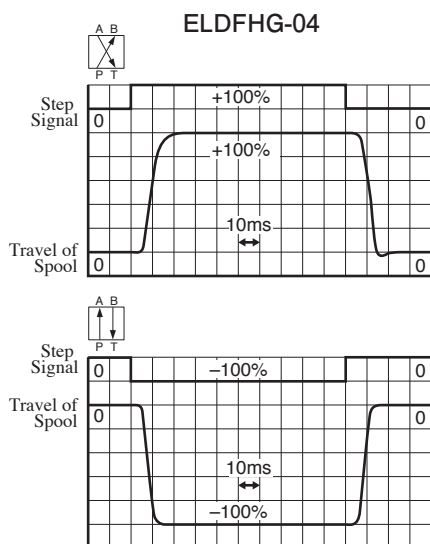
Load Flow Characteristics

Viscosity : 30 mm²/s



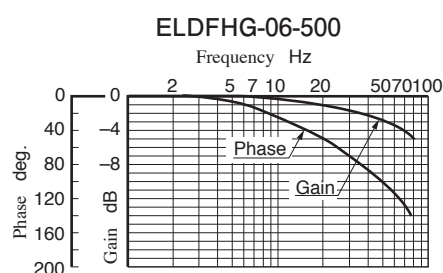
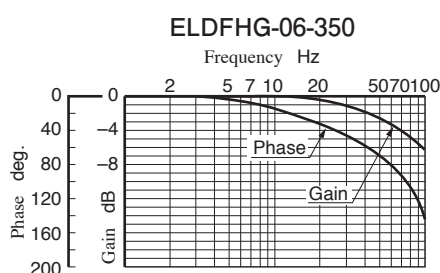
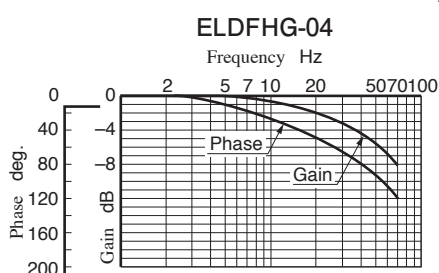
Step Response (Example)

Viscosity : 30 mm²/s



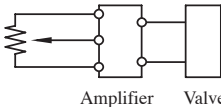
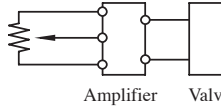
Frequency Response

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



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 are 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. Variable Resistor 1 kΩ  Amplifier Valve
	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. Variable Resistor  Amplifier Valve 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 10 Ω 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

Model No.	AME-D-10-*-20	SK1022-A-*-11	SK1022-B-*-11	SK1015-11
Descriptions				
Type of Function	DC Input Type	DC Input Feedback Type	DC Input Feedback Type	DC Input Type
Max. Output Current	1 A (10 Ω Solenoid)	1 A (10 Ω Solenoid)	1 A (10 Ω Solenoid)	0.9 A (10 Ω Solenoid)
Max. Input Voltage	+ 10 V DC	+ 10 V DC	+ 10 V DC	+ 10 V DC
Feedback Voltage	—	0 to -10V	0 to +10V	—
Input Impedance	10 k Ω	50 k Ω	50 k Ω	50 k Ω
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 / $^{\circ}$ C	0.2 mA / $^{\circ}$ C	0.2 mA / $^{\circ}$ C	1 mA / $^{\circ}$ C
Power Supply	100 V AC, 200 V AC (50/60 Hz) [★]	100 V AC, 200/220 V AC $\pm$ 10% (50/60 Hz)		22-30 V DC
Power Input (Max.)	55 VA	45 VA	45 VA	25 VA
Ambient Temperature	0 - 50 $^{\circ}$ C	0 - 50 $^{\circ}$ C	0 - 50 $^{\circ}$ C	0 - 50 $^{\circ}$ C
External Setting Resistance	1 k Ω	1 k Ω	1 k Ω	10 k Ω
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.

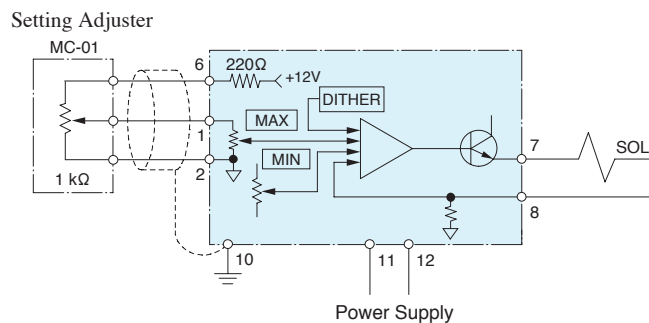
Instructions

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 k Ω (in case of model SK1015, use 10 k Ω) for the setting adjuster.

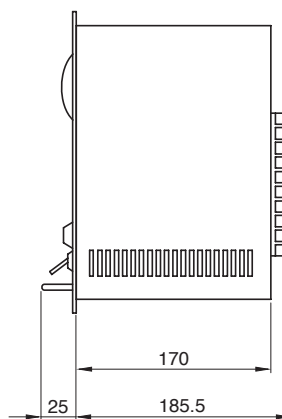
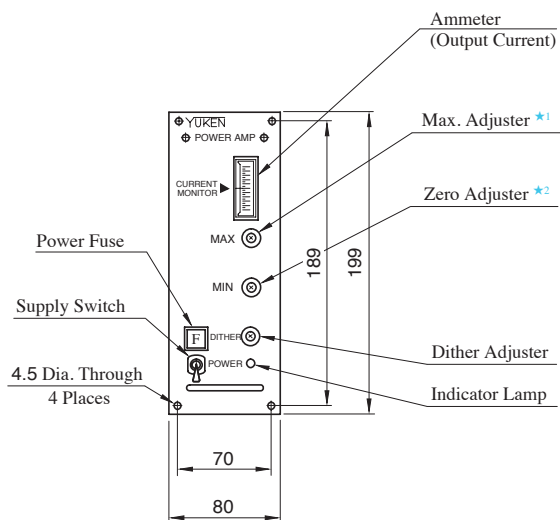
AME-D-10

[Example Diagram]

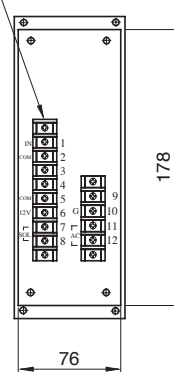


● Detail of Terminal Board

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 SOL
8	Output to Valve SOL
9	—
10	Ground G
11	Power Supply
12	100/200 VAC



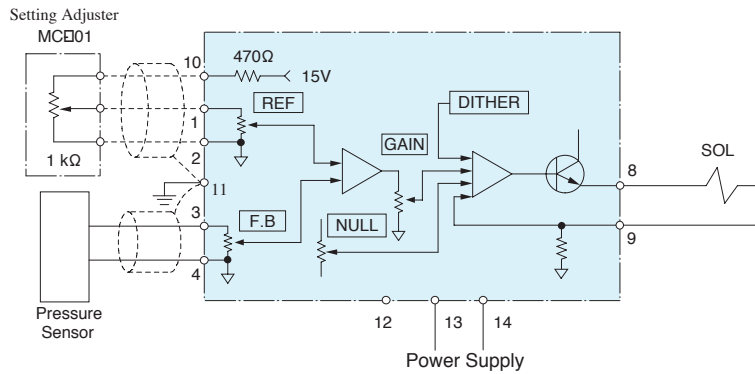
Terminal Board
(Refer to table above)



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

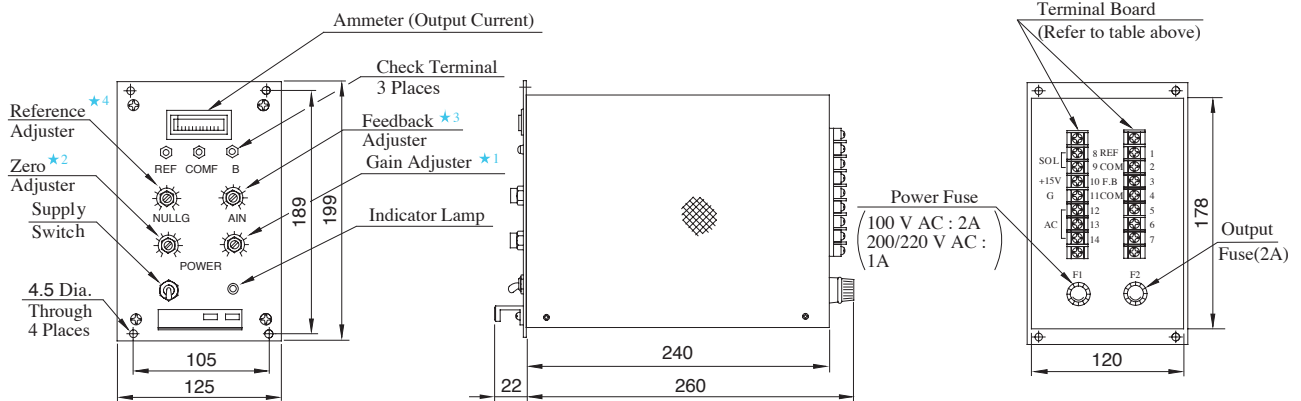
SK1022-A B

[Example Diagram]



Detail of Terminal Board

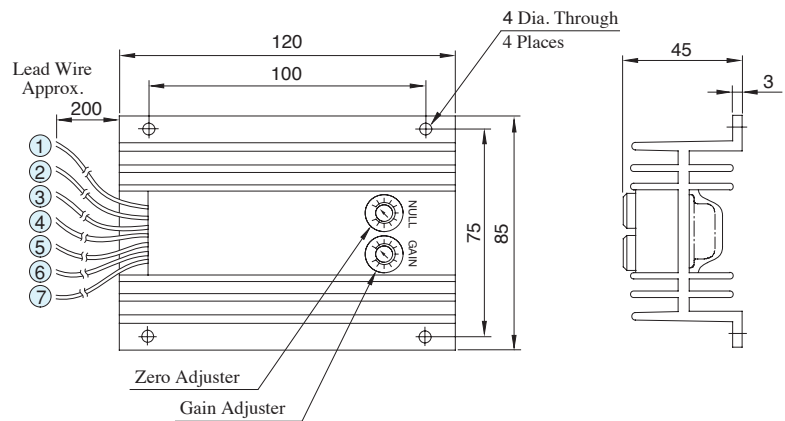
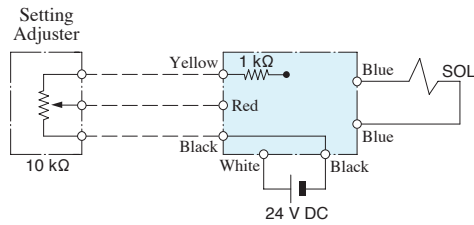
Terminal Number	Name
1	Input Signal REF
2	Input Signal COM
3	Feedback Signal F.B
4	Feedback Signal COM
5	—
6	—
7	—
8	Output to Valve Solenoid SOL
9	SOL
10	Power Supply for Setting Adjuster (+15V (10 V at 1 kΩ))
11	Ground G
12	Power Supply
13	100 V AC, 200V AC : 13, 14
14	220 V AC : 12, 14



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

SK1015

[Example Diagram]



● Lead Wire Detail

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

■ Instructions

● Supply Switch

The power amplifier has no power supply switch.

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

Compact Power Amplifiers For 10Ω Series Control Valves

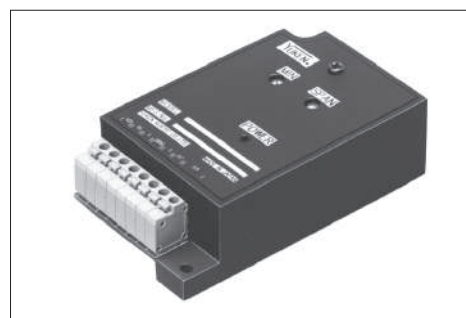
Compact power amplifiers for 10Ω proportional solenoids. The power supply is 24 V DC. It uses a new circuitry to be slow to heat.

Model Number Designation

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

Specifications

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



Applicable to Valve

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

Instructions

Power Supply of the Outside Setting Adjuster

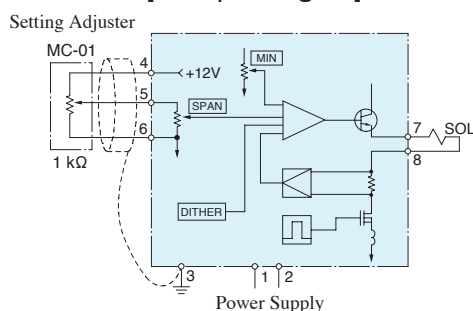
When the power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 1 kΩ for the setting adjuster.

Supply Switch

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

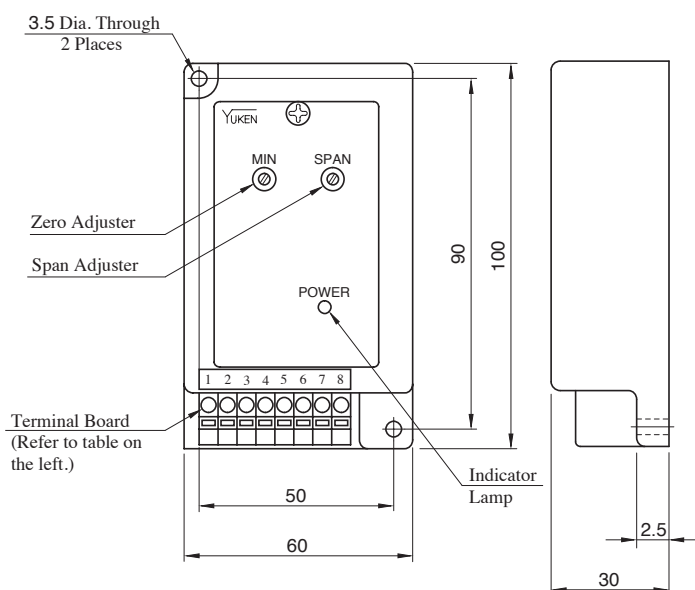
AMN-D

[Example Diagram]



Detail of Terminal Board

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

Model Numbers	AME-D-AC-50	AME-D-DC-50	AME-D-S-AC-50	AME-D-S-DC-50	AME-DF-S-AC-50	AME-DF-S-DC-50	AME-T-S- *-22
Descriptions	DC Input Type				DC Input Feedback Type		Slow Up Down Type
Type of Fuction							
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

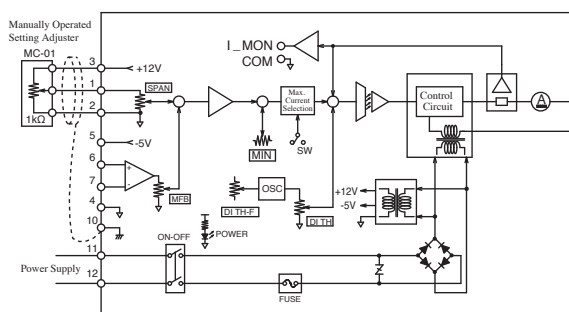
★Before shipment, the max. output current is set to 0.8 A.

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.

[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

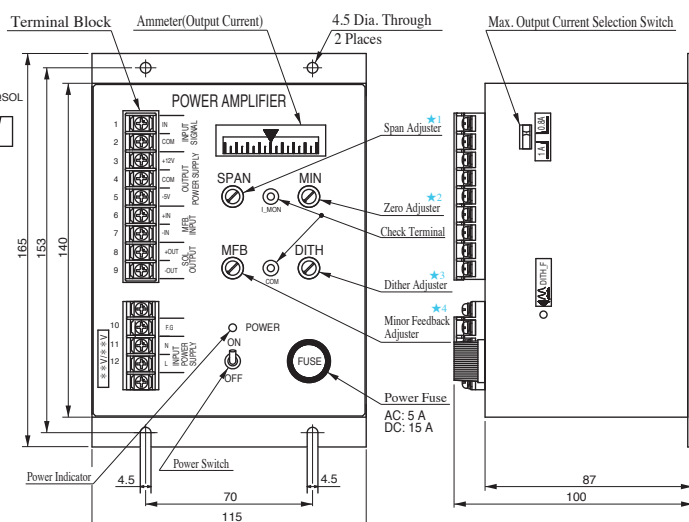
AC specifications: 5A 250V (Dia. 6.4×30 mm) 1 pc

DC specifications: 15A 250V (Dia. 6.4×30 mm) 1 pc

Test Pins (Manufactured by MAC8)

OP6-1 (Red) 1 pc

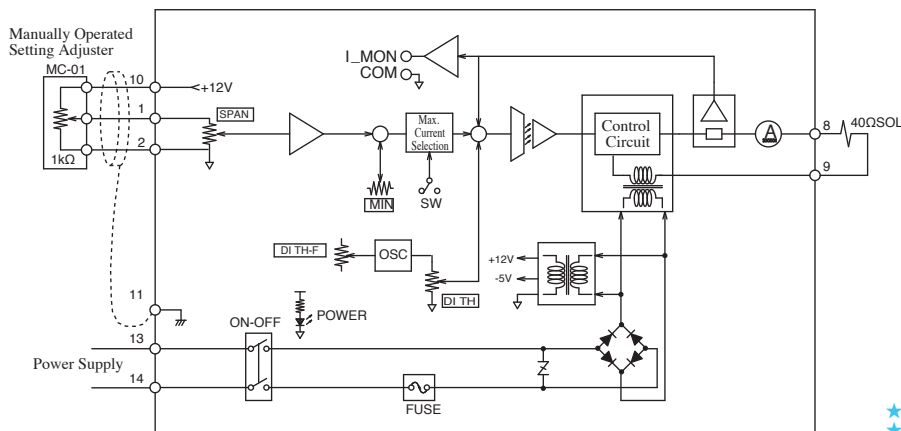
OP6-1 (Black) 1 pc



- ★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

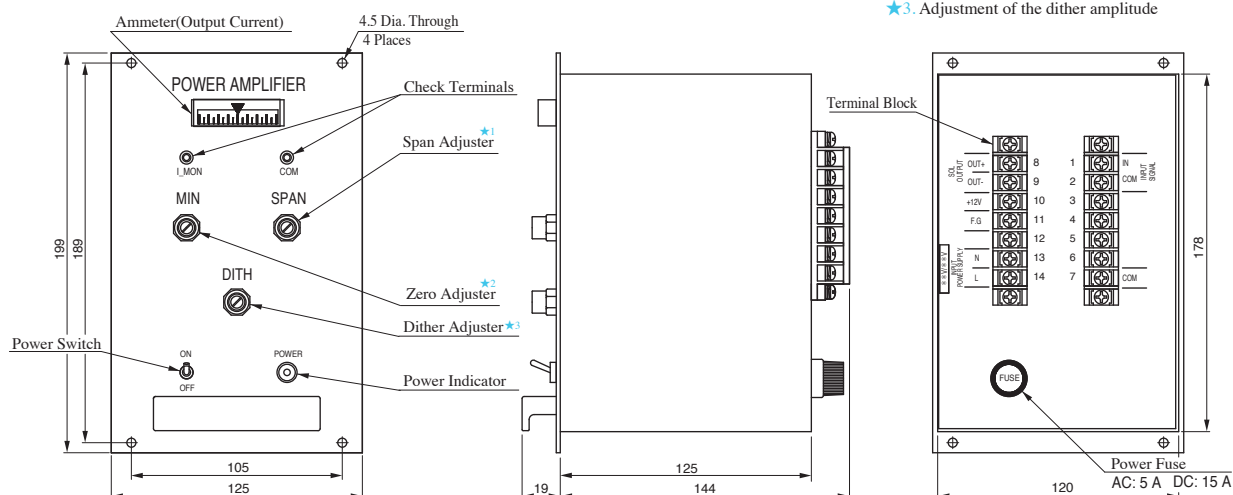
AC specifications: 5A 250V (Dia. 6.4×30 mm) 1 pc

DC specifications: 15A 250V (Dia. 6.4×30 mm) 1 pc

Test Pins (Manufactured by MAC8)

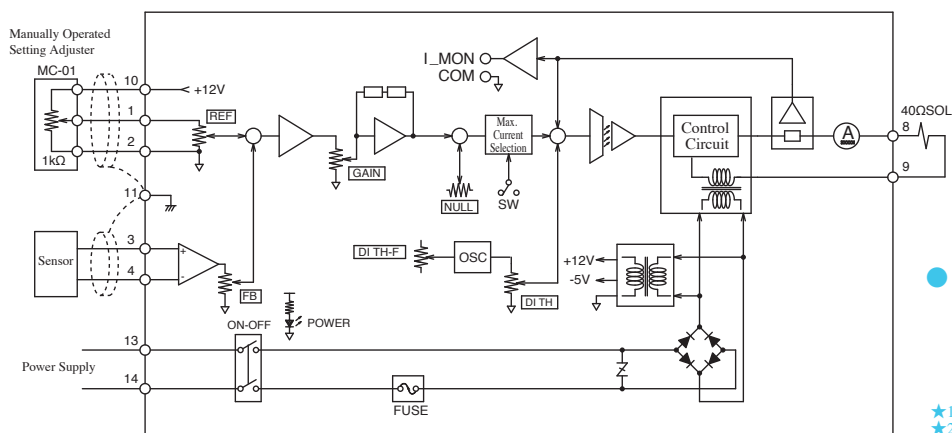
OP6-1 (Red) 3 pcs.

- ★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. 6.4x30 mm) 1 pc

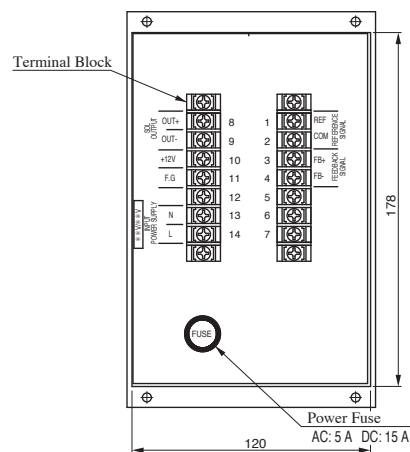
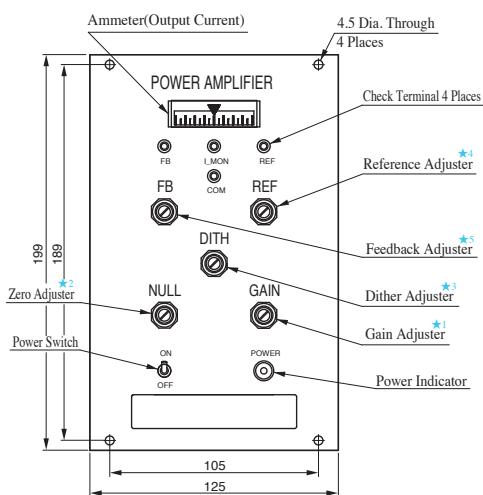
DC specifications: 15A 250V (Dia. 6.4x30 mm) 1 pc

Test Pins (Manufactured by MAC8)

OP6-1 (Red) 3 pcs.

OP6-1 (Black) 1 pc

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



Interchangeability between Current and New Design

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

Affected Models

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

Changes

[AME-D/AME-DF]

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

[AME-D]

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

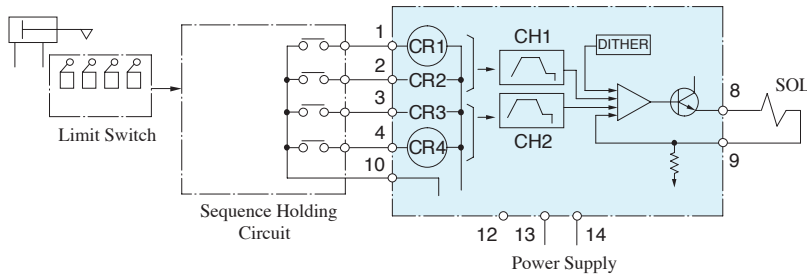
Installation Interchangeability

Yes

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

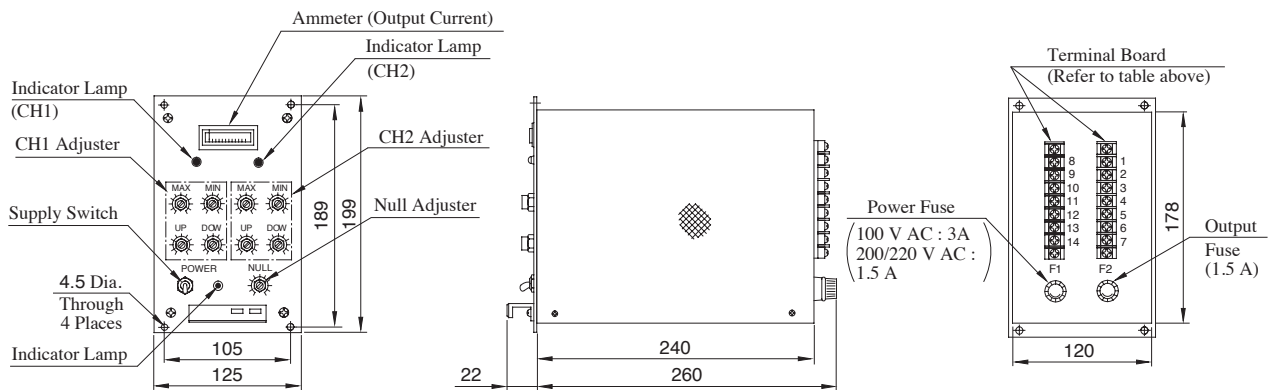
AME-T-S

[Example Diagram]

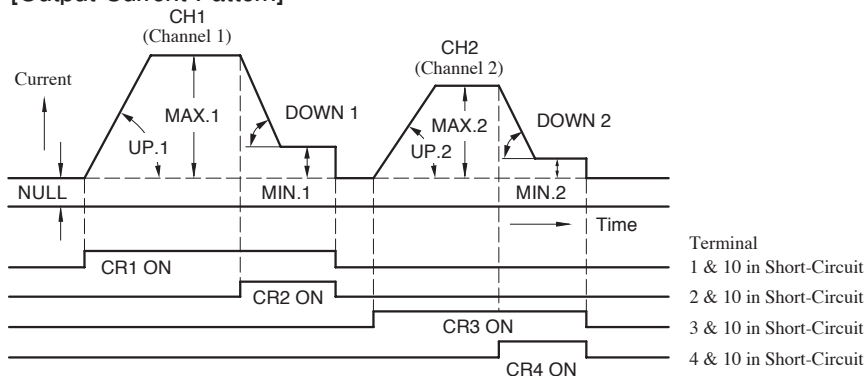


● Detail of Terminal Board

Terminal Number	Name
1	Input Command CR1
2	Input Command CR2
3	Input Command CR3
4	Input Command CR4
5	—
6	—
7	—
8	Output to Valve Solenoid SOL
9	SOL
10	Input Command CR. COM
11	Ground G
12	Power Supply
13	100 V AC, 200 V AC: 13, 14
14	220 V AC: 12, 14



[Output Current Pattern]



Note) 1. CR1 to CR4: Relays in the power amplifier.

The output patterns CH1 and CH2 can not be obtained simultaneously nor can they be transmitted halfway to another pattern.

2. The words such as MAX, MIN, UP and DOWN show the volume adjustment of the power amplifier.

■ How to Calculate Accelerating and Decelerating Time (Example)

Question: Wish to accelerate and decelerate the actuator in between 5 L/min and 25 L/min in the use of proportional flow control valve model EFG-02-30.

In such case, what are the maximum and minimum time adjustable for the acceleration and deceleration?

Answer: The input current for EFG-02-30 at the flow rate of 5 L/min and 25 L/min can be obtained respectively from the chart below. The chart shows:

Input current at 5 L/min 300 mA

Input current at 25 L/min 520 mA

Then, the difference between the above two can be obtained with the following formula:

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

While, the specification for the model AME-T-S shows the amplifier's gradient for acceleration or deceleration as being between 0.05 s/100 mA and 1.0 s/100 mA (which means that the minimum time is 0.05 second and the maximum time is 1.0 second for every 100 mA variation).

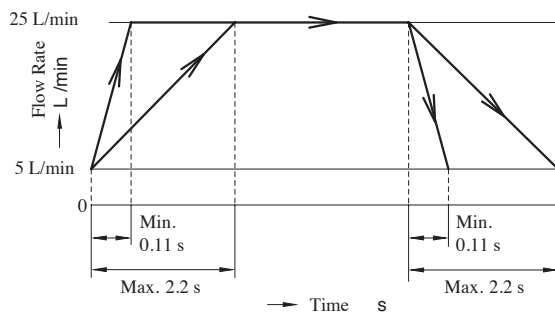
Therefore, the minimum and maximum adjustable time can be obtained as follows:

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

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

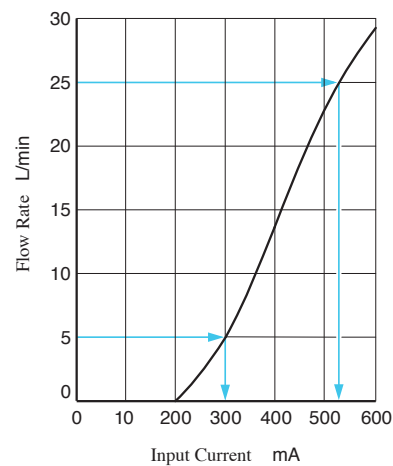
The result above are as illustrated on the below.

[Flow Pattern]



[Input Current vs. Flow]

EFG-02



Power Amplifiers For 10Ω - 10Ω Series Control Valves

These power amplifiers can drive two solenoid of 10 Ω load simultaneously or separately, and the control can be done in the same way even though the object is separated by pressure system and flow rate system. Although the display of control unit on the front panel is **PRESS** and **FLOW**, they are exactly the same circuit, so there is no distinction between the two system when used.



Model Number Designation

AME	-D2	-1010	-11
Series Number	Type of Function	Coil Resistance of Valve	Design Number
AME	D2: DC Input Type	1010: 10 Ω × 2	11

Specifications

Model No.	AME-D2-1010-11
Descriptions	
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 Valve

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

Applicable to Piston Pump

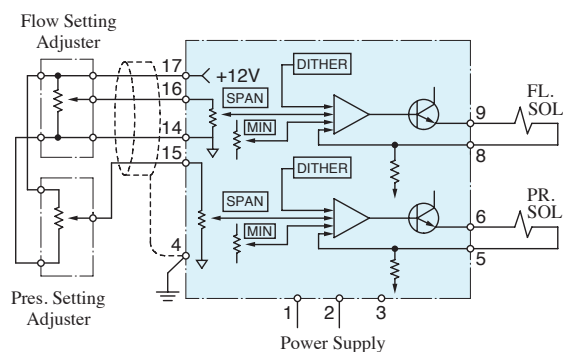
Name of Pump	Model Numbers
"A" Series Variable Displacement Piston Pump	A16 A22 A37 * R-04 A56
Proportional Electro-Hydraulic Load Sensing Type	Also, double pumps combined with the models listed above and fixed displacement vane pumps.

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.

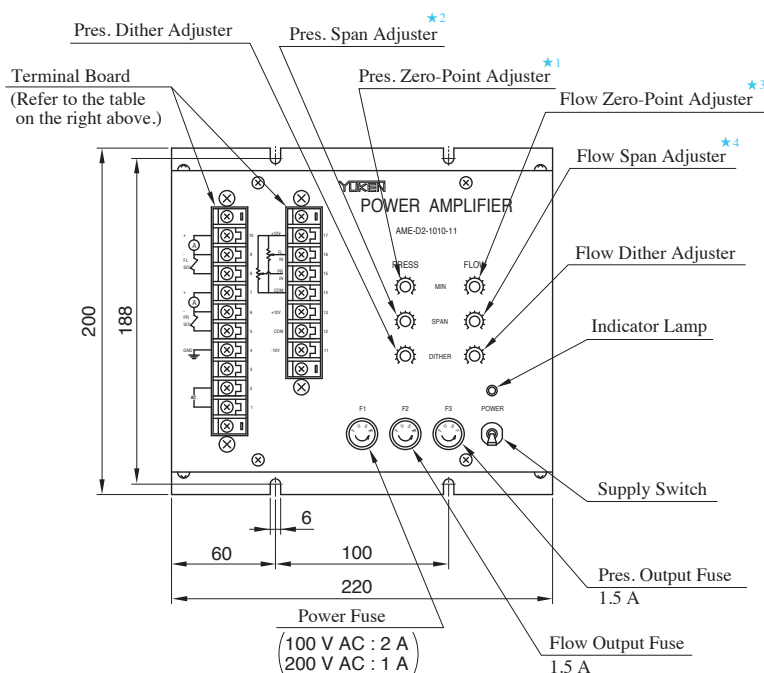
AME-D2-1010-11

[Example Diagram]



● Detail of Terminal Board

Terminal Number	Name
1	Power Supply
2	
3	
4	Ground G
5	Output to Pressure Control
6	Valve Solenoid PR. SOL
7	Ammeter
8	Output to Flow Control
9	Valve Solenoid FL. SOL
10	Ammeter
11	-12 V OUT -12 V
12	Common COM
13	+12 V OUT +12 V
14	Common COM
15	Input Signal for PRES. PR.IN
16	Input Signal for FLOW FL.IN
17	+12 V OUT +12 V



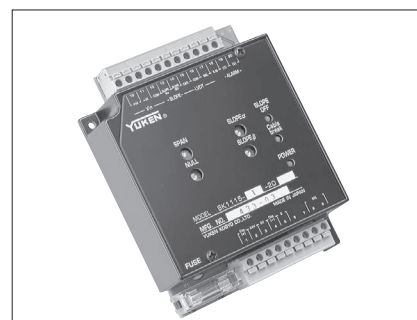
- ★1. Minimum Pressure Setting
- ★2. Variable Pressure Range Setting
- ★3. Minimum Flow Setting
- ★4. Variable Flow Range Setting

Power Amplifiers For Flow Control and Relief Valves

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

Specifications

Model No.	SK1115- *-20
Descriptions	
Type of Function	DC Input Type
Max. Output Current	2.5 A
Max. Input Voltage	0 - +10 V DC
Input Impedance	10 k Ω
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	20
	2 : For ELFBG-03 -170	

Instructions

Supply Switch

The power amplifier has no power supply switch.

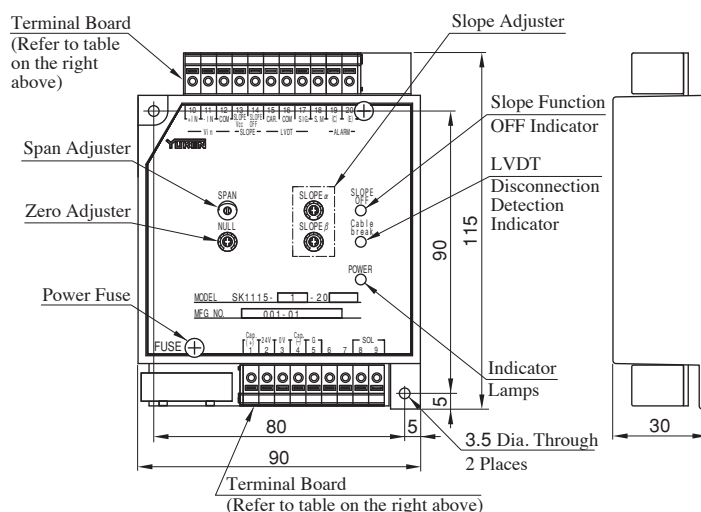
As soon as it is connected to a power supply, it comes to be alive.

Provide a power switch externally.

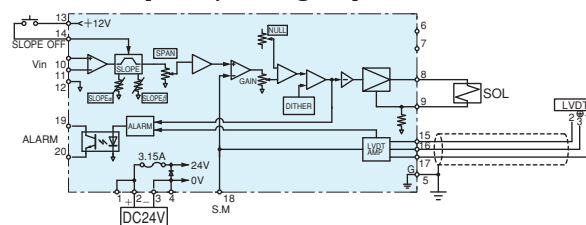
Applicable to Valve

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

SK1115- *-20



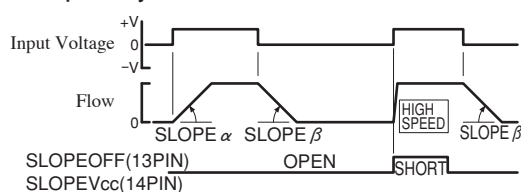
[Example Diagram]



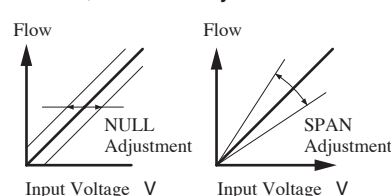
Detail of Terminal Board

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

Slope Adjuster



NULL, SPAN Adjuster



Power Amplifiers For Shockless Type Directional and Flow Control Valves

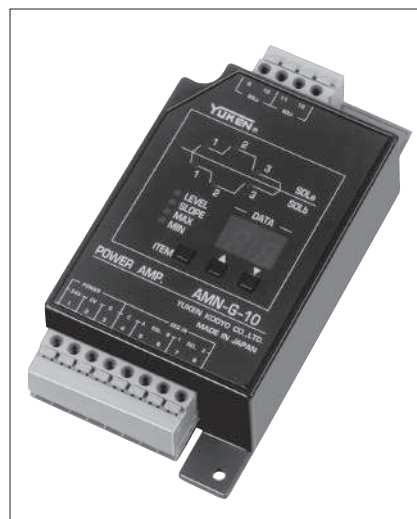
These power amplifiers are used to drive the shockless type proportional and flow control valves.

Model Number Designation

AMN	-G	-10
Series Number	Type of Function	Design Number
AMN	G : Shockless Directional and Flow Control Type	10
	W : DC Input Type	10

Applicable to Valve

Name of Valve	Model Numbers
Shockless Type Proportional Directional and Flow Control Valves	EDFG-01



Specifications

Model Numbers		AMN-G-10	AMN-W-10
Descriptions			
Max. Output Current		1.3 A (10 Ω Solenoid)	
Setting Resolution		0 - 99 % (1 % Units)	—
Number of Preselection Pattern		SOLa : 3 Patterns SOLb : 3 Patterns	—
Sequence Input	Input Current	10 mA/24 V	—
	Voltage Range	10 - 28 V DC	—
Maximum Input Voltage		—	-10 V DC : SOLa +10 V DC : SOLb
Input Impedance		—	10 k Ω
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 / $^{\circ}$ C	
Power Supply		24 V DC (Power Supply Range : 20 - 30 V)	
Power Input		25 W	
Ambient Temperature		0 - 50 $^{\circ}$ C	
Ambient Humidity		90 % RH or less	
Approx. Mass		0.2 kg	

Instructions

Power Supply of the Outside Setting Adjuster

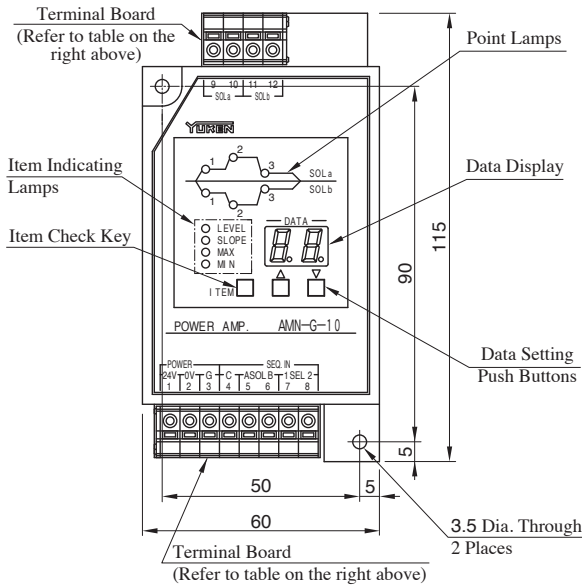
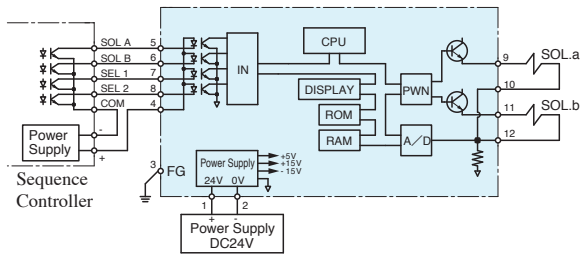
When DC input type (AMN-W) power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 2 k Ω for the setting adjuster.

Supply Switch

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

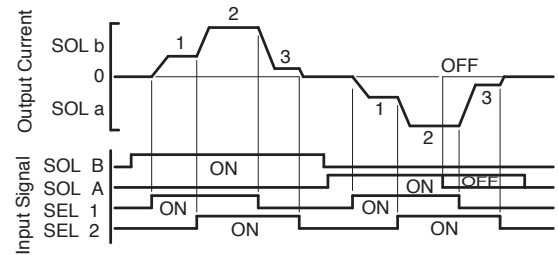
AMN-G-10

[Example Diagram]



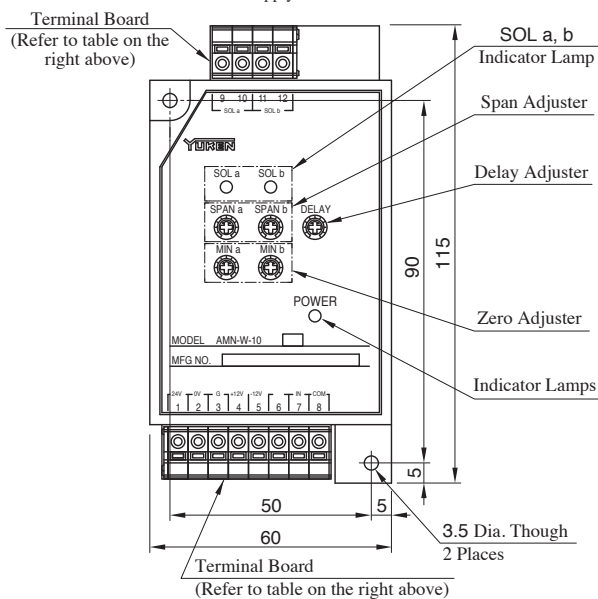
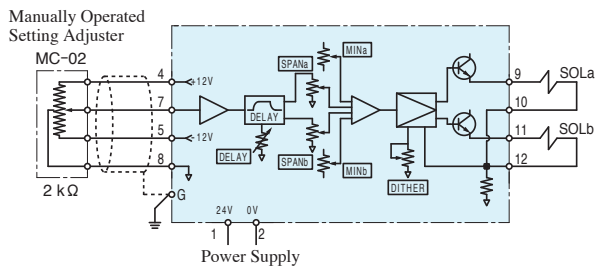
● Detail of Terminal Board

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



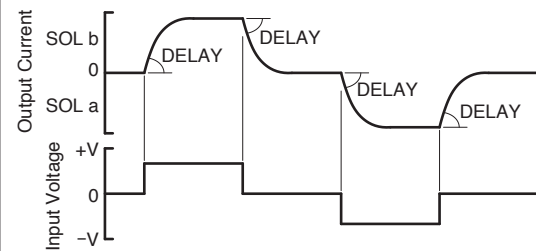
AMN-W-10

[Example Diagram]



● Detail of Terminal Board

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



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.	SK1091-D24-10
Descriptions	
Max. Output Current	1 A (10 Ω Solenoid)
Max. Input Voltage	-10 V DC for SOL a +10 V DC for SOL b
Input Impedance	10 k Ω
Max. Gain	1 A / ± 5 V
Dither	Variable
Delay Time Adjustment Range	0.15 - 3 s
Temperature Drift (Max.)	0.2 mA / $^{\circ}$ 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 $^{\circ}$ C
Ambient Humidity	90 % RH or less
External Setting Resistance	2 k Ω
Approx. Mass	1.0 kg

Instructions

Power Supply for the Setting Adjuster

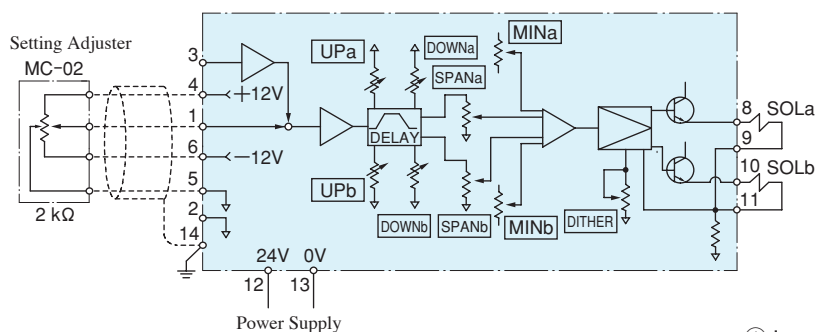
Power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometer of which impedance is 2 k Ω for the setting adjuster.

Power Switch

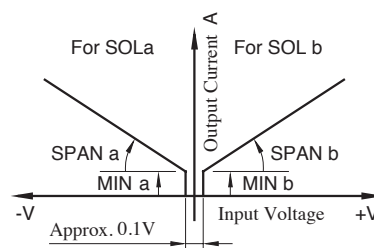
The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

SK1091-D24-10

[Example Diagram]

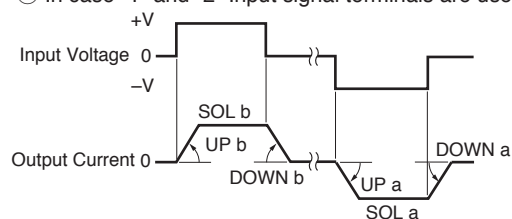


[Input-Output Characteristics]

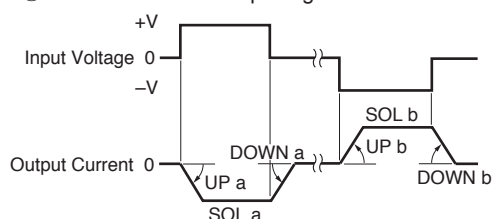


[Delay Function]

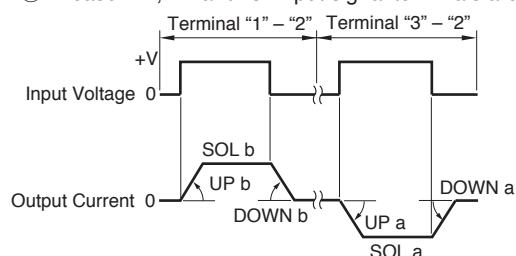
① In case "1" and "2" Input signal terminals are used.



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



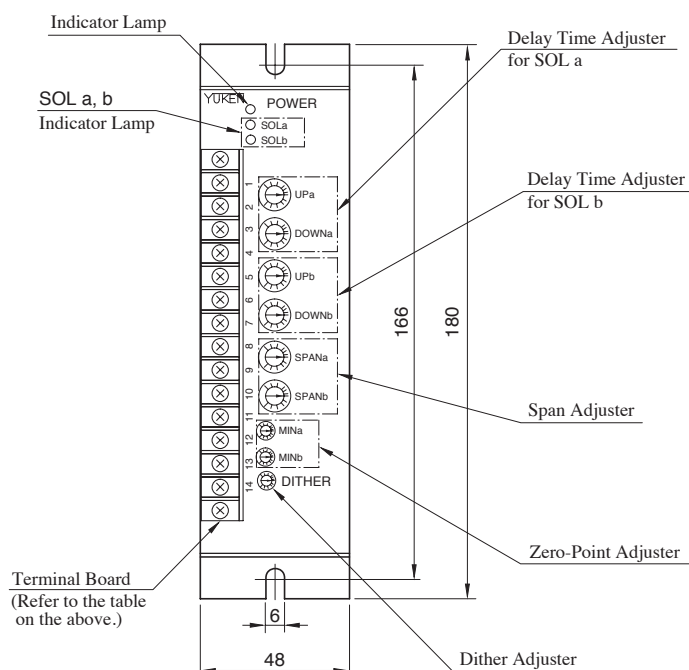
③ In case "1", "2" and "3" Input signal terminals are used.



● Detail of Terminal Board

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

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



Power Amplifiers

For High Response Type Directional and Flow Control Valves

These power amplifiers are used to drive the high response type proportional electro-hydraulic directional and flow control valves.

A compact AMN-L model and a euro card type AMB-EL model are available.

The single height [3U: 100 × 160 mm] is employed for the euro card size of the AMB-EL model.



AMN-L



AMB-EL

Model Number Designation

AMN-L

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

AMB-EL

AMB	-EL	-03	-2P	-1	-A	-20
Series Number	Type of Function	Size of Applicable Valve	Applicable Spool Type	Compensation	I/O signal type	Design Number
AMB	EL: DC Input Type Directional and Flow Control with Miner feedback	01: 01 Size	None: 3C2, 3C40 2P: 3C2P	★1	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

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

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

Applicable to Valve

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

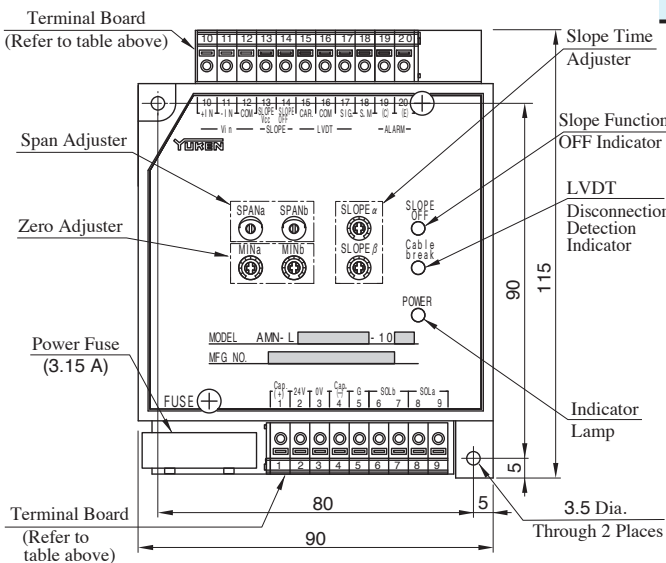
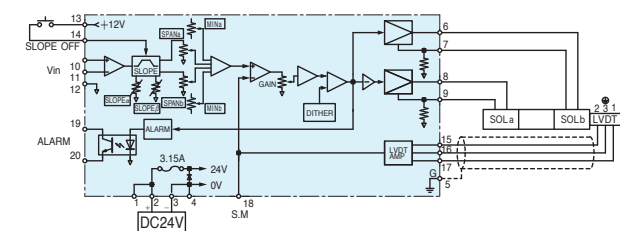
Instructions

Power Switch

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

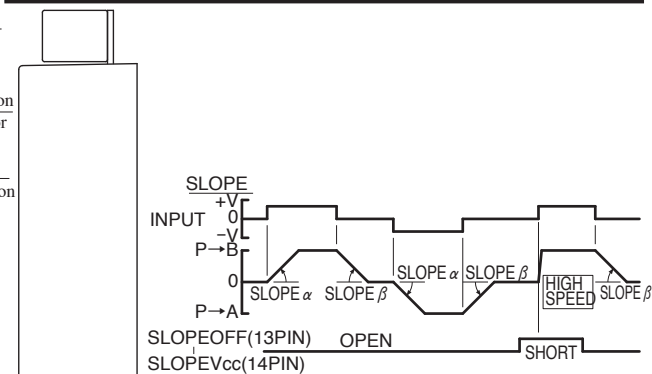
AMN-L-01-1-10

[Example Diagram]



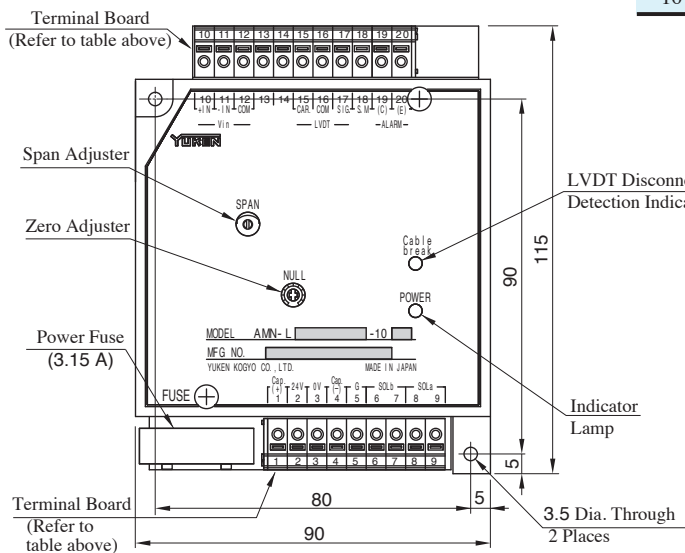
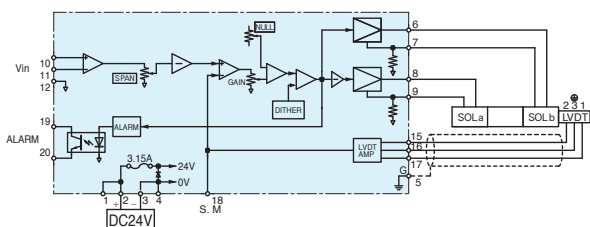
Detail of Terminal Board

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



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

[Example Diagram]



Detail of Terminal Board

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



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

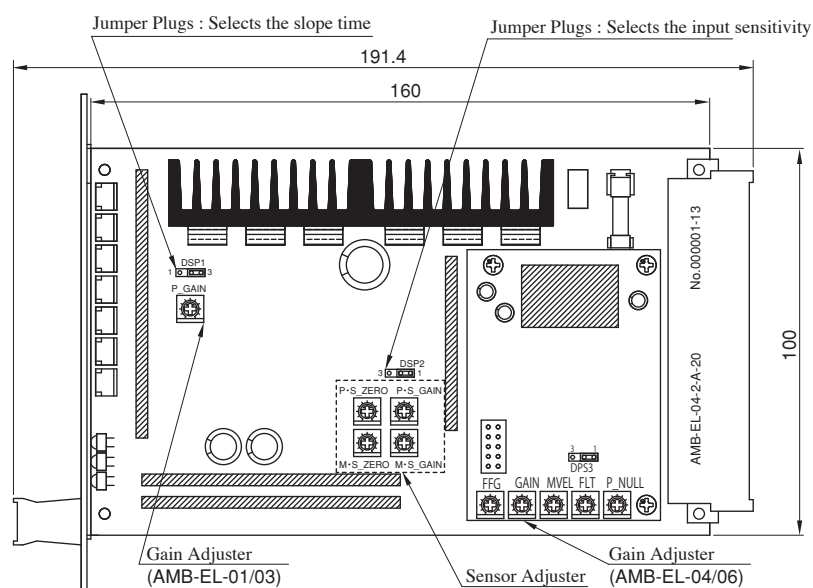
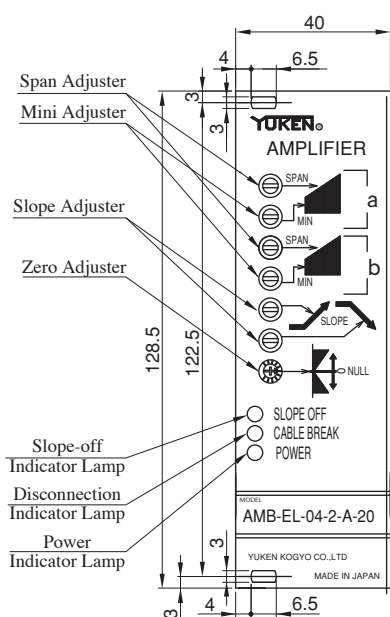
This power amplifier requires connector cards for connection. A connector card attached model is also available.
Please ask for details if interested.

● 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.
b18	Power Supply +24V	z18	Carrier (No.3) See "Sensor Connection"
b20	Slope Off	z20	Signal (No.1)
b22	COM (No.3) ^{★1} Connected to pilot valve sensor.	z22	—
b24	Signal (No.1) See "Sensor Connection"	z24	Alarm Output (-)
b26	Carrier (No.2) See "Sensor Connection"	z26	Alarm Output (+)
b28	Output 24V	z28	Stroke Monitor Signal (P) ^{★2}
b30	Output 24V	z30	Stroke Monitor Signal (S) ^{★3}
b32	FG	z32	—

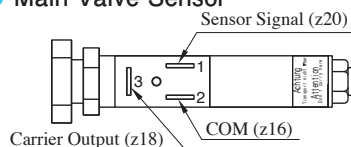
See the "Sensor Connection" diagram on the bottom left.

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

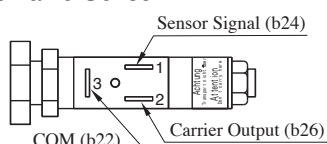


■ Sensor Connection

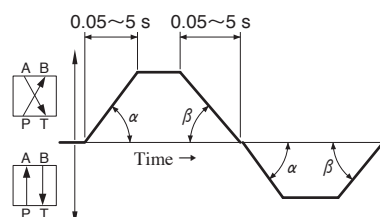
● Main Valve Sensor



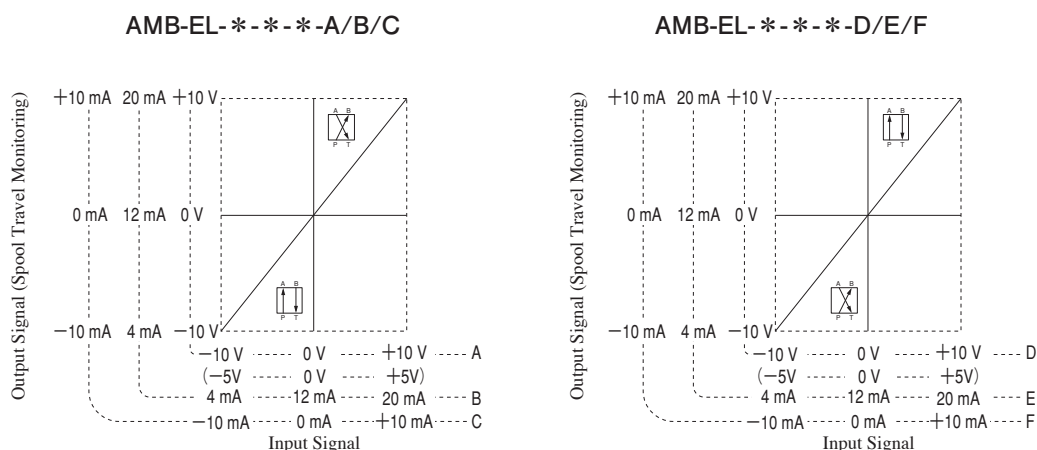
● Pilot Valve Sensor



■ Lamp Pattern



I/O Signal Characteristics



Interchangeability in Installation Current and New Design

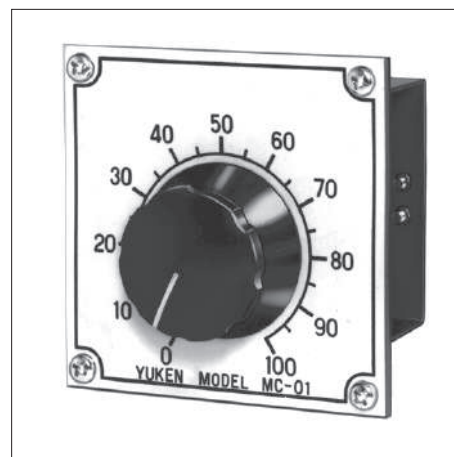
The power amplifier AMB-EL models were remodeled because I/O signal types were added, and the design number was changed from 10 to 20.

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.

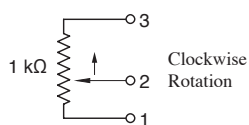


Type	Model Number	Function
Manually Operated Setting Adjuster	MC-01	This is the simplest setting adjuster, consisting of a trimmer (1 k Ω) and a dial.
	MC-02	Consisting of a center-tapped trimmer (1 k Ω - 1 k Ω) and a dial, this setting adjuster is ideal for a servo system.
6-point Setting Adjuster	AMC-V6-S-*-10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

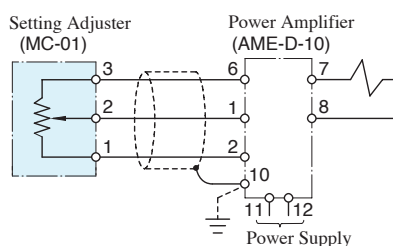
Manually Operated Setting Adjuster

MC-01

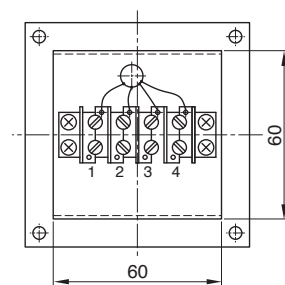
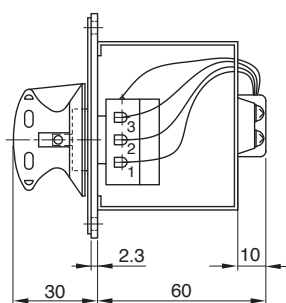
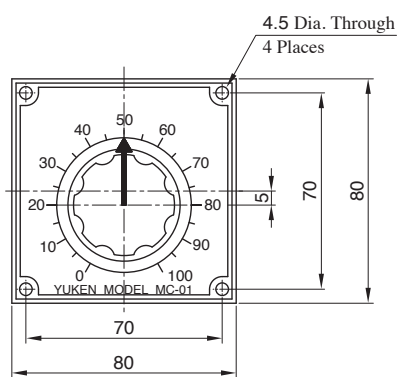
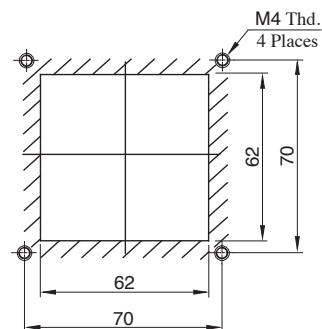
[Electric Circuit]



[Example Diagram]



[Mounting Panel]



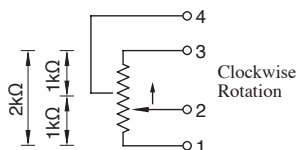
Approx. Mass.....0.5 kg

MC-02

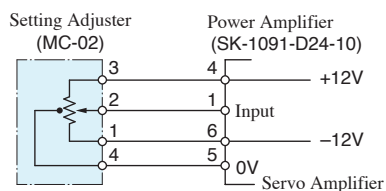
[How to Use]

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.

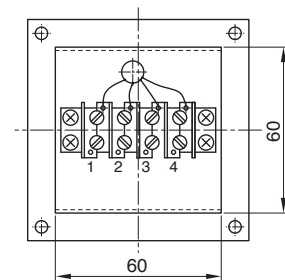
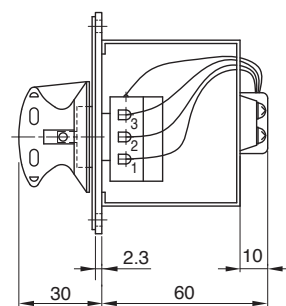
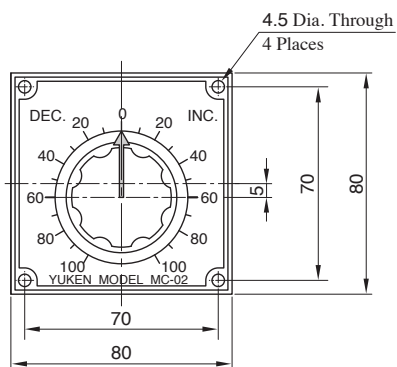
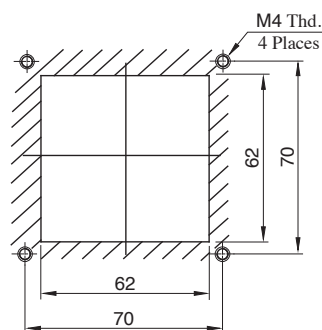
[Electric Circuit]



[Example Diagram]



[Mounting Panel]



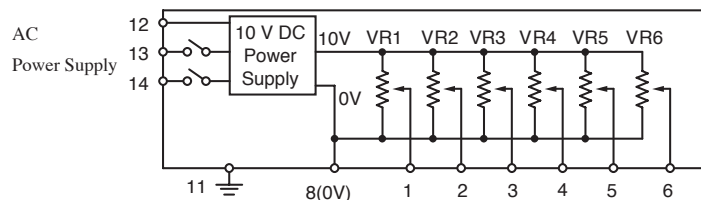
Approx. Mass.....0.5 kg

6-Point Setting Adjuster

AMC-V6-S-*-10

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

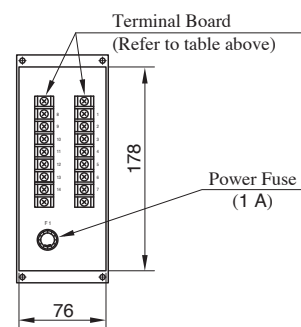
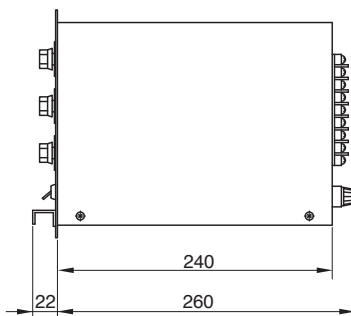
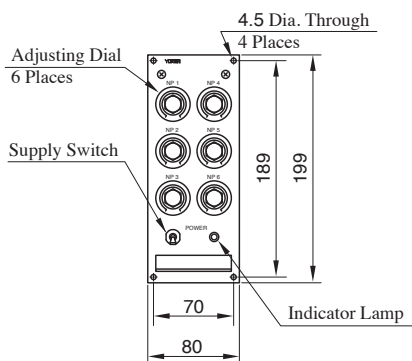
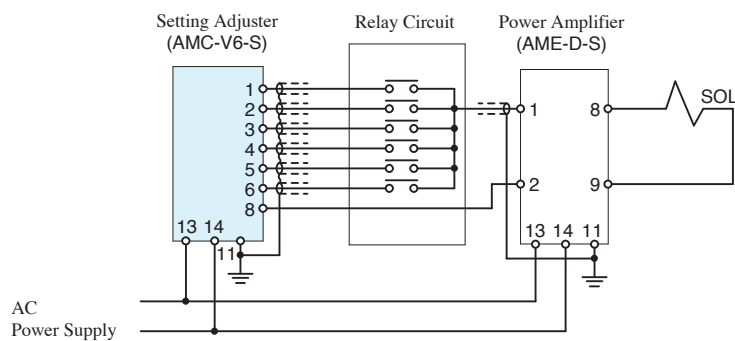
[Electric Circuit]



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
14	85- 265 VAC

[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.	AMC-T-20
Descriptions	
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 (to be selected by DIP switch) Curve Compensation Signal : 3 Types
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 transistor 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

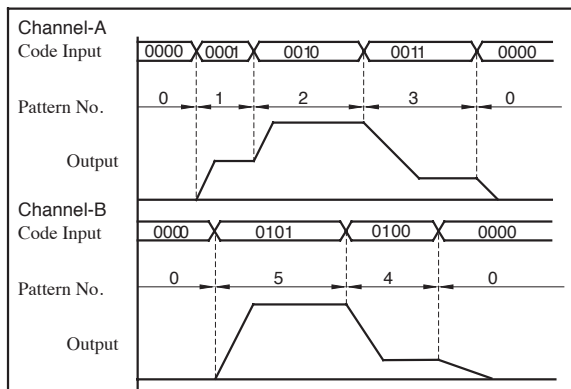
- Since this controller incorporates a micro computer, do subject it to undue electrical noise.

Control Modes

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

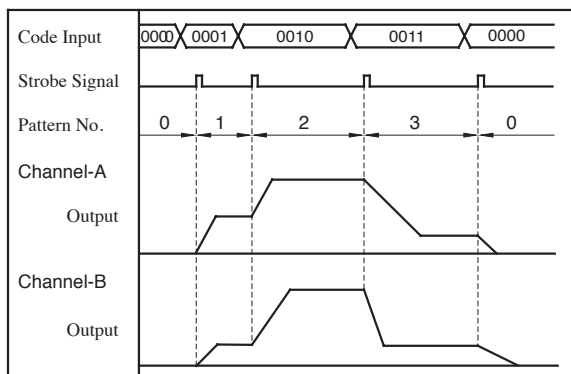
Control Mode 1

Channels A and B generate optional slopes independently each other.



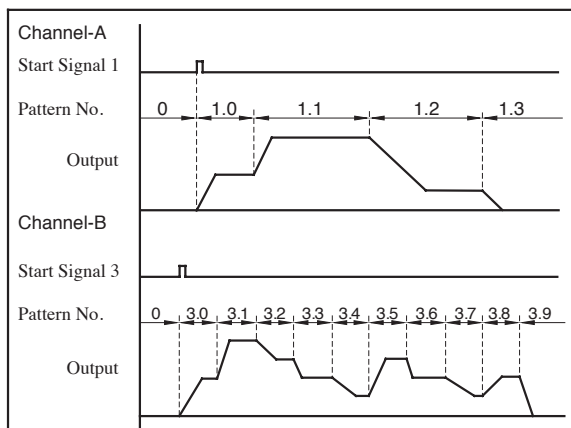
Control Mode 2

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



Control Mode 3

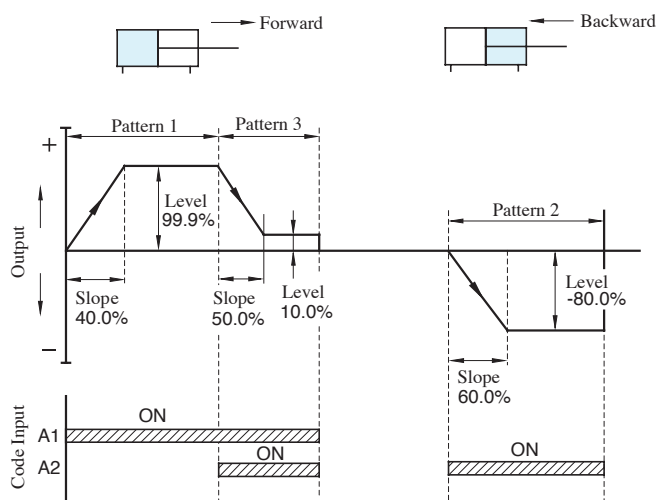
The internal timer is activated by a start signal, causing the slopes to be generated successively in memory. Channels A and B operate independently.



Setting Example

Control Mode 1 Channel - A

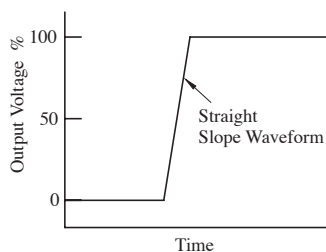
Code Input				Pattern No.	Setting %		Remarks
A8	A4	A2	A1		Level	Slope	
OFF	OFF	OFF	OFF	0	0	0	Stop
OFF	OFF	OFF	ON	1	99.9	40.0	Cylinder forward acceleration
OFF	OFF	ON	OFF	2	-80.0	60.0	Cylinder backward acceleration
OFF	OFF	ON	ON	3	10.0	50.0	Cylinder forward deceleration
~~							
ON	ON	ON	ON	15	10.0	10.0	



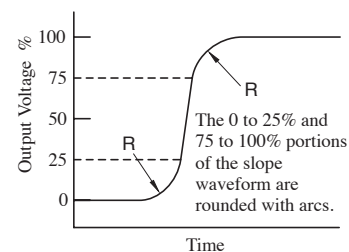
Slope Type

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

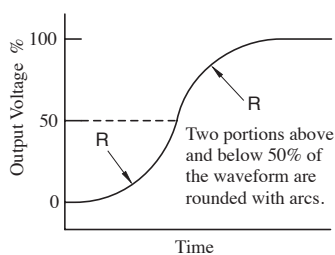
Type 1



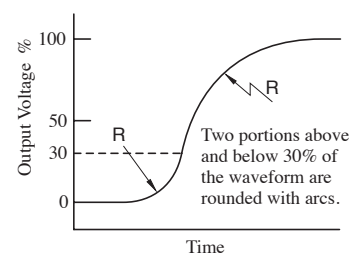
Type 2



Type 3

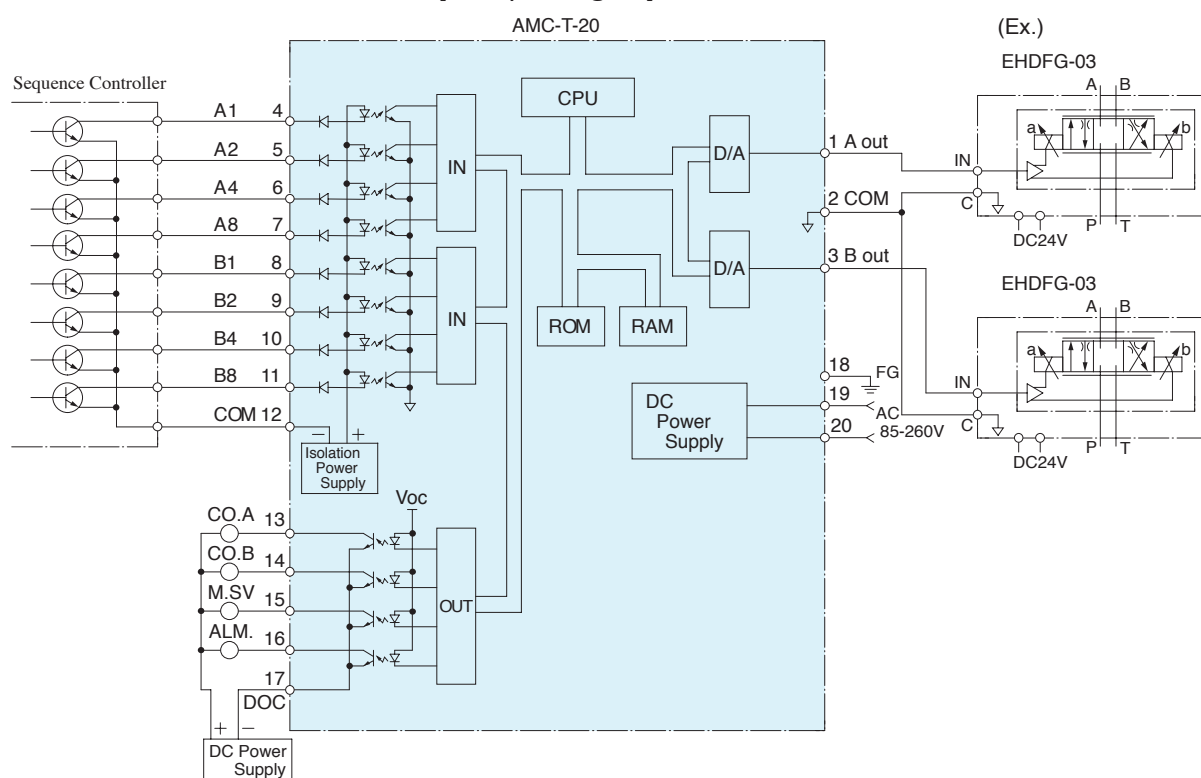


Type 4



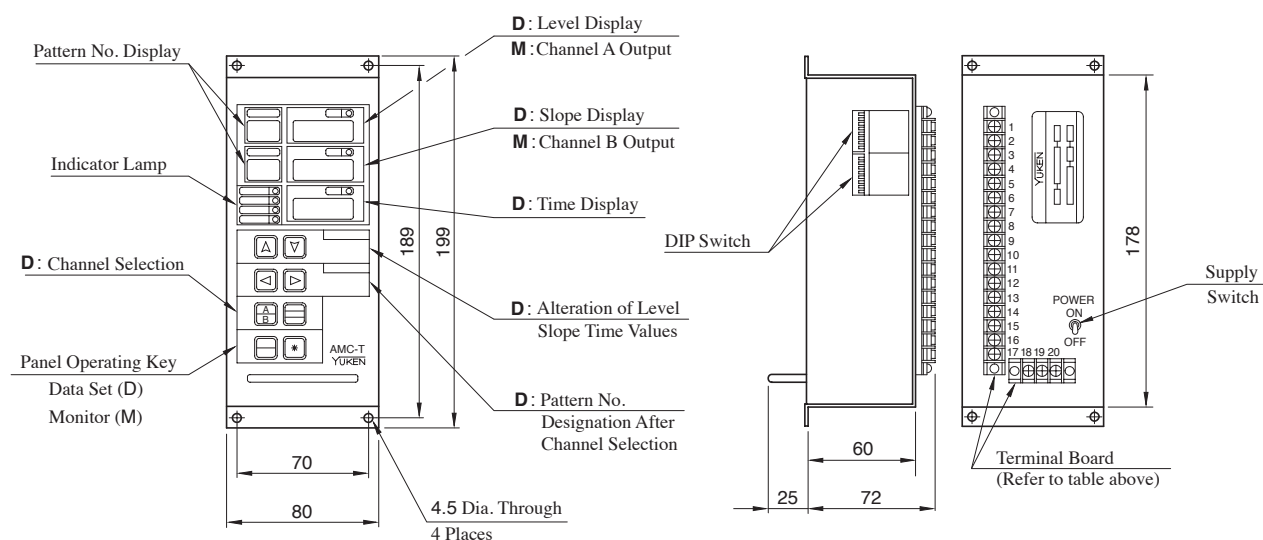
AMC-T-20

[Example Diagram]



● Detail of Terminal Board

Terminal Number	Name	Terminal Number	Name
1	Channel A Output	11	Code Input B8
2	Common	12	Code Input Common DCOM
3	Channel B Output	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
10	Code Input B4	20	
			AC



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 transistor open collector Max. 30 V, 50 mA	Output from transistor 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

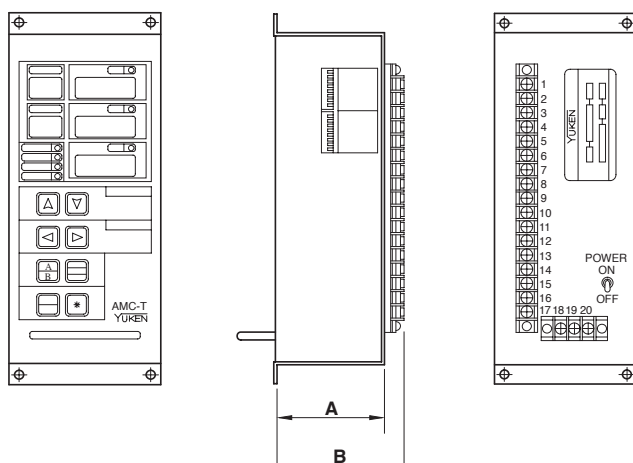
Terminal

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

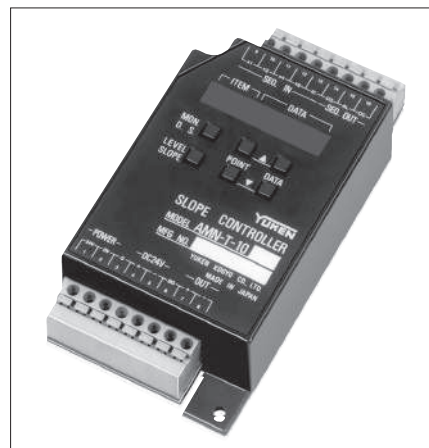
This slope controller is considerably smaller and lighter compared to conventional slope controllers.

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	AMN-T-10
Descriptions	
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	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.

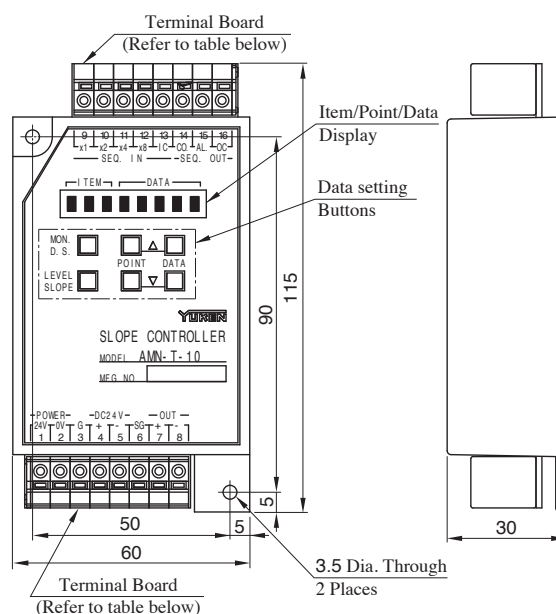
★². A fixed time means that the slope endpoint time remains unchanged when the level is changed.

★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.

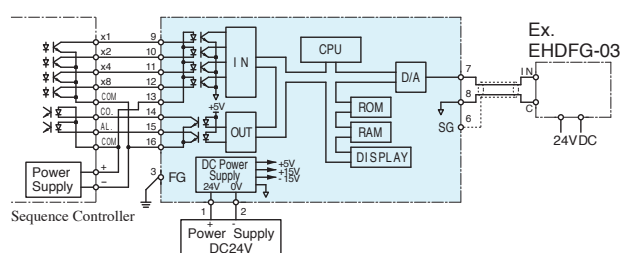
AMN-T-10



Detail of Terminal Board

Terminal Number	Name	Terminal Number	Name
1	Power Supply +24V	9	Sequence Input x1
2	Power Supply 0V	10	Sequence Input x2
3	Frame Ground G	11	Sequence Input x4
4	Internal Power Supply +24V	12	Sequence Input x8
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]



SERVO VALVES

Valve Type		Maximum Operating Pressure MPa	Rated Flow L/min (Valve Pressure Difference:7 MPa)															Page
			1	2	5	10	20	30	50	100	200	300	500	1000	2000	5000		
High-Speed Linear Servo Valves	Direct Type	35	LSVG-03 4 10 20 40 60															I-5
	Two Stage Type	35	LSVHG-04 750															I-10
		900 : 35 1300 : 31.5	LSVHG-06 900 1300															
		35	LSVHG-10 3800															
OBE Type Linear Servo Valves (Std. Type)	Direct Type	35	LSVG-01EH 4 10 20															I-22
		35	LSVG-03EH 40 60															
	Two Stage Type	31.5	LSVHG-03EH 210 230 270															I-31
		35	LSVHG-04EH 580 750 900															
		900 : 35 1300 : 31.5	LSVHG-06EH 820 1300															
		35	LSVHG-10EH 3800															
		OBE Type Linear Servo Valves (High Performance Type)	Two Stage Type	31.5	LSVHG-03EH-※-S 60 100 160													
35	LSVHG-04EH-※-S 100 200 280 450																	
35	LSVHG-06EH-※-S 500 900																	

■ Linear Servo Amplifier AMLS-※ Page I-19

■ Servo Amplifiers & Controllers SK1056/AMS-※ Page I-61

Hydraulic Fluids

Type of Fluids

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

Petroleum Base Oils	Use fluids equivalent to ISO VG32 or VG46.
Synthetic Fluids	Use phosphate ester or polyol ester type. When phosphate ester type fluid is used, prefix "F-" to the model number because a special seal (fluororubber) will be used.
Water Containing Fluids	Use water-glycol fluids. Water-glycol fluids cannot be used for valves "without Y port" (wet type: LSVG-*EH-* <u>W</u>) or "without DR port" (wet type pilot valve: LSVHG-*EH-* <u>W</u>).

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

Recommended Viscosity and Temperature

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

Viscosity	Temperature
15 - 400 mm ² /s	-15 - +60 °C

Control of Contamination

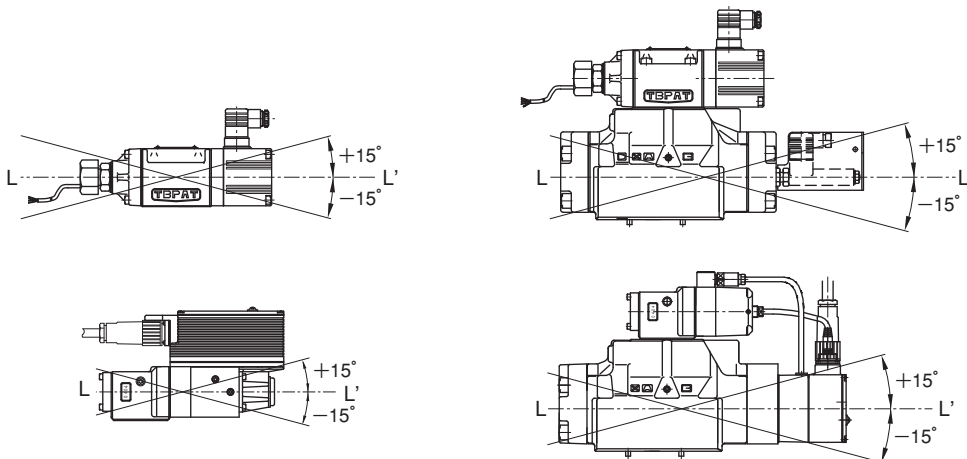
Keep the hydraulic fluid clean and provide a line filter so that contamination of the fluid will not obstruct proper valve operation. To assure long life of linear servo valves, it is recommended to improve fluid cleanliness before use.

Contamination Level	Line Filter
NAS1638 Class 10 ISO4406 21/19/15	Absolute 20 μm

Instructions

Mounting

Mount the valve with the angle of the axis line L-L' within about ±15° from the horizontal plane, as shown below. The valve must be mounted in such a way that the spool axis direction is not matched with the main vibration direction; otherwise, an external force may cause the spool to malfunction.



Installation Requirements

Avoid installing the valve in a strong magnetic field. Especially, the position sensor for detecting the spool position is affected by the magnetic field. Keep the valve away from devices that generate magnetic fields, such as solenoid operated directional valves. At the same time, a magnetic field generated by the valve may affect other devices; any device vulnerable to magnetic fields must not be installed near the valve.

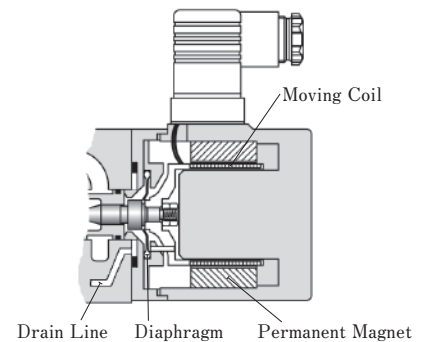
Drain Piping (LSVG: Y Port/LSVHG: DR Port)

LSVG/LSVHG series high speed linear servo valves have a diaphragm mechanism that keeps the inside of the linear motor dry in order to meet the requirements below.

- 1) Keeping response characteristics almost unchanged when fluid viscosity varies (the response characteristics of existing proportional/servo valves vary with changes in fluid viscosity).
- 2) Protecting moving coils from iron powder or moisture in hydraulic fluids.

A special drain port is provided to define the upper limit of pressure for the diaphragm, if any, so that the valve performance is maintained. For valve installation, provide a drain line by taking into account the following piping considerations.

- ① Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.
 - ② The drain line should be open to the air (the line end must not contact the fluid).
- ★ There are two types of pilot valves available: a dry type good in response characteristics and a wet type that eliminates the Y or DR port to improve usability.



Cable Length for I/O Signals

- 1) High speed linear servo valves (amplifier-separated type)
Use a cable of up to 30 m in length.
Consult us for customized products (Model: LSVG-03/LSVHG-04, 06) that allow the use of a cable of up to 200 m in length.
- 2) OBE (on-board electronics) type liner servo valves
The maximum cable length depends on the I/O signal type. See the table below.

I/O Signal Type	Valve Model Number	Max. Cable Length
±10 V	LSV (H) G- * * EH- * * - * - * - A * / D * -10	50 m★
4 - 20 mA	LSV (H) G- * * EH- * * - * - * - B * / E * -10	300 m
±10 mA	LSV (H) G- * * EH- * * - * - * - C * / F * -10	

★ Consult us when the cable length exceeds 50 m.

For both valve types in 1) and 2), pay attention to ensure that the power cable resistance is within 1 Ω and is as low as possible.

Electrical Failure and Safety Measures for Startup

Provide a separate safety circuit (e.g. uninterruptible power supply), if required, to securely continue/stop the operation of the hydraulic actuator for safety in case of electrical failure (power failure, cable disconnection, etc.) or upon startup.

Supply Pressure

The servo valves are designed to operate at constant supply pressure; variations in supply pressure should be avoided as much as possible. Especially, for systems requiring high accuracy, the circuit must be designed to keep the supply pressure constant. Ideally, an accumulator will be installed in the supply pressure line near the servo valve to avoid supply pressure fluctuations during pressure transients.

Pressure at the Return Port

The return port of the servo valve may be subject to a considerably high pressure depending on the circuit type. However, it should be used at atmospheric pressure or similar pressure as much as possible. The pressure at the return port should be equal to or below actual supply pressure.

Disassembly/Reassembly

Linear servo valves consist of high precision components. You are prohibited from disassembling or reassembling the valves; otherwise, the designed valve performance may be degraded.

Valve Pressure Difference/Load Pressure Difference

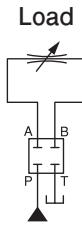
This catalog uses two terms related to pressure differences: “valve pressure difference” (used for the range of flow control and no-load flow characteristics) and “load pressure difference” (used for load flow characteristics). The terms are described below.

Valve Pressure Difference

Suppose that, in the circuit shown on the right, the fluid flows from P to A and from B to T. In this case, the sum of the pressure differences between P and A and between B and T is the pressure difference of this valve. For this four-way valve, the valve pressure difference “ ΔP ” is:

$$\text{Valve Pressure Difference} = [(\text{Pres. at P}) - (\text{Pres. at A})] + [(\text{Pres. at B}) - (\text{Pres. at T})].$$

In relation to the flow rate, an increase in the flow through the valve with a constant valve opening leads to an increase in the valve pressure difference due to increased flow resistance at the control part.



Load Pressure Difference

In the circuit above, the absolute pressure difference between A and B is the load pressure difference.

$$\text{Load Pressure Difference} = |(\text{Pres. at A}) - (\text{Pres. at B})|$$

If the resistance of piping, etc. is ignored, the difference between the supply pressure and the load pressure difference is the valve pressure difference of the linear servo valve. Therefore, a smaller load pressure difference means a larger valve pressure difference, allowing increasing the flow rate through the valve.

Flow Rate

In this catalog, the rated flow tolerance is $\pm 10\%$

The flow rate depends on the viscosity and specific gravity of each hydraulic fluid.

- Multiply each viscosity by the corresponding coefficient in the table below.

Viscosity mm ² /s	15	20	30	40	50	60	70	80	90	100
Coefficient	1.19	1.11	1.00	0.93	0.88	0.84	0.81	0.78	0.76	0.74

- Use the following formula to obtain the flow rate corresponding to a specific gravity. $Q' = Q \sqrt{(0.85/G')}$
- Use the following formula to obtain the relationship between the flow rate and the pressure for a servo valve.

$$Q_X = Q_{\text{rate}} \sqrt{\frac{\Delta P_X}{7}}$$

where

Q_X : Flow rate to be determined;

Q_{rate} : Rated flow rate (at $\Delta P = 7$ MPa); and

ΔP_X : Valve pressure difference in the actual circuit.

Direct type High-Speed Linear Servo Valves

Direct type high speed linear servo valves use a compact and powerful linear motor as an actuator and have an extremely simple structure that connects the linear motor moving coil, the spool, and the position sensor in series.

● High accuracy

These valves have a low hysteresis of 0.1 % or less, achieving high accuracy. They allow the main unit to operate with much higher repeatability.

● High response characteristics

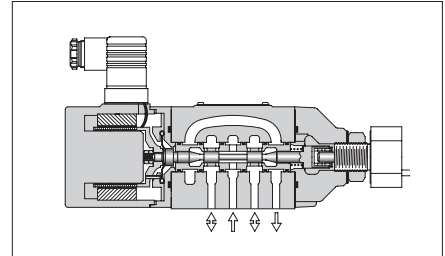
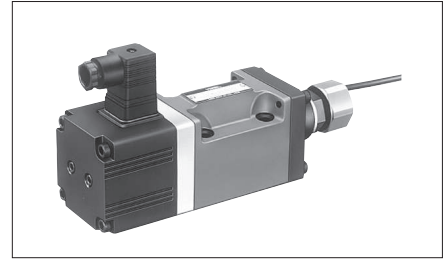
The valves provide significantly high levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 2 ms (0 <=> 100 %)★, and the frequency response is 450 Hz/-90° (±25 % amplitude)★. Thus, the valves ensure that the main unit can achieve unprecedented high response.
(★: Representative values)

● Excellent vibration-proof characteristics

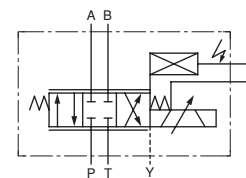
With a simple structure, the valves offer high vibration resistance.

● Excellent contamination resistance

The valves are also featured by excellent contamination resistance since they have a simple structure that directly connects the linear motor moving coil, the spool, and the position sensor. Compared to conventional servo valves for which the permissible contamination level is up to NAS 1638 class 7, the direct type linear servo valves can accept a contamination level of up to NAS 1638 class 10. These valves can contribute to greatly reducing the cost of fluid management.



Graphic Symbols



Model Number Designation

F—	LSVG	—03	—40	—R	—10
Fluid Type	Series Number	Valve Size	Rated Flow @ $\Delta P = 7 \text{ MPa}$	Cable Departure Direction	Design Number
F : Special Seals for Phosphate Ester Type Fluid (Omit if not required)	LSVG : Direct Type High Speed Linear Servo Valves	03	4 : 4 L/min 10 : 10 L/min 20 : 20 L/min 40 : 40 L/min 60 : 60 L/min	(Viewed from the linear motor side) None : Upper (Standard) R : Right L : Left	10

Exclusive Amplifiers

To ensure stable performance, it is recommended to use Yuken's AMLS series linear servo amplifiers.

Valve Model Number	Amplifier Model
LSVG-03-4/10/20/40	AMLS-A-D * - * -10
LSVG-03-60	AMLS-B-D * - * -10

Accessories

Mounting Bolt	Bolt Tightening Torque
Hex. Soc. Head Cap Screw: M8×65L...4 Pieces	30.8 - 37.7 Nm

Specifications

The specifications below are for use with a 48 V DC type exclusive amplifier; for use with a 24 V DC type amplifier, see the values in parentheses.

Model Numbers			LSVG-03-4/10/20/40	LSVG-03-60
Descriptions				
Rated Flow @ $\Delta P = 7 \text{ MPa}$ ⁽¹⁾	L/min		4, 10, 20, 40	60
Max. Operating Pressure	MPa		35	
Proof Pres. at Return Port	MPa		35	
Drain Port (Y Port) Permissible Back Pres. ⁽²⁾	MPa		0.05	
Internal Leakage (PS = 14 MPa) (Viscosity: 32 mm ² /s)	L/min		1.7 or less	
Hysteresis	%		0.1 or less	
Step Response (0 $\leftrightarrow$ 100 %, Typical) ⁽³⁾	ms		2 (3)	3 (4)
Frequency Response (± 25 % Amplitude, Typical) ⁽³⁾	Gain: -3 dB	Hz	350 (300)	330 (240)
	Phase: -90°	Hz	450 (370)	410 (330)
Vibration Proof ⁽⁴⁾			Frequency: 10 - 60 Hz, Amplitude: 4 mm, Acceleration: 7.8 - 282 m/s ² Frequency: 61 - 2000 Hz, Amplitude: 4 - 0.0038 mm, Acceleration: 294 m/s ²	
Protection			IP 64	
Ambient Temperature			-15 - +60	
Spool Type			Neutral/Zero Lap	
Spool Stroke to Stops			± 0.5	± 0.75
Polarity			See the description about I/O signal characteristics on page I-19	
Linear Motor Specification	Current	A	2 [Max. 6]	
	Coil Resistance	Ω	4.5 [at 20 °C]	
Mass			5	

Note: ⁽¹⁾ Use the valves so that the relationship between the valve pressure difference and the flow rate, as specified below in "Range of Flow Control", is met.

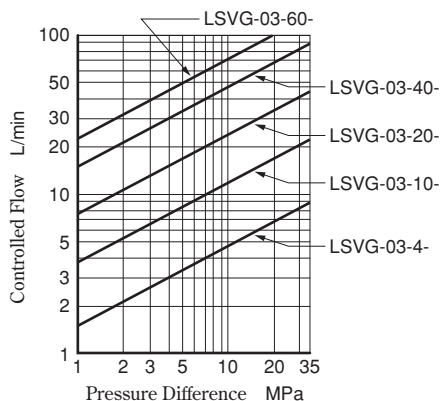
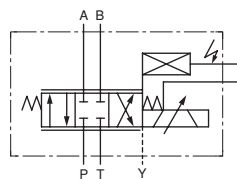
⁽²⁾ Back pressure at the drain port (Y) should be 0.05 MPa or less and not be a negative pressure.

⁽³⁾ This value is measured for each valve; it may vary depending on the actual circuit.

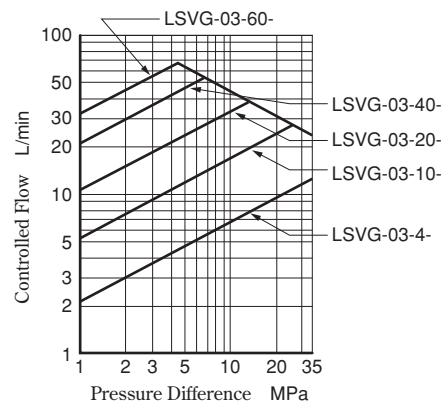
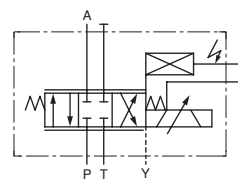
⁽⁴⁾ There are restrictions on the mounting position; refer to the instructions for details.

Range of Flow Control

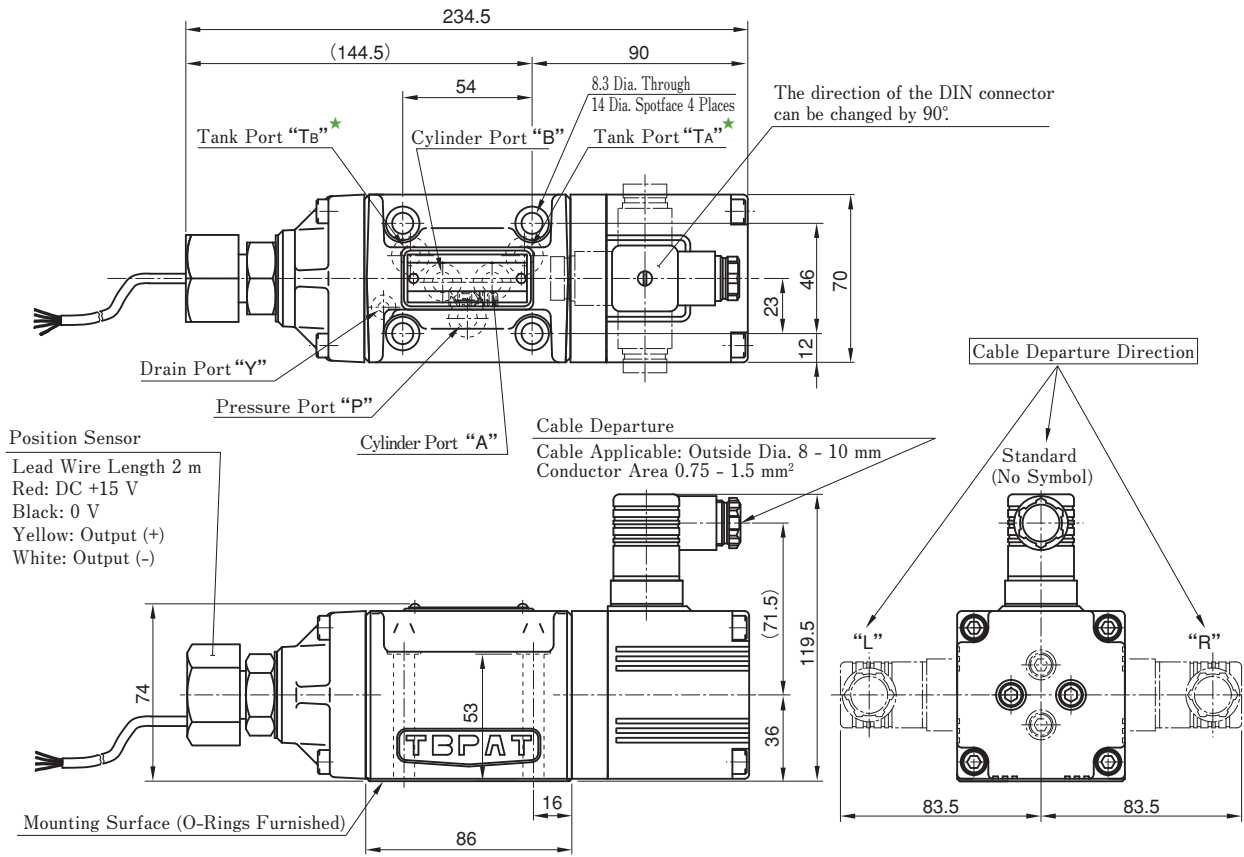
Control Method: 4-Way Valve



Control Method: 3-Way Valve



LSVG-03



Note) Refer to the wiring diagram on page I-21 for detailed connection between the DIN connector/position sensor and the amplifier.

● O-Rings for the Ports

Port	O-Ring Size	Qty.
P, A, B, T	AS568-014 (NBR-90)	5
Y	OR NBR-90 P7-N	1

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

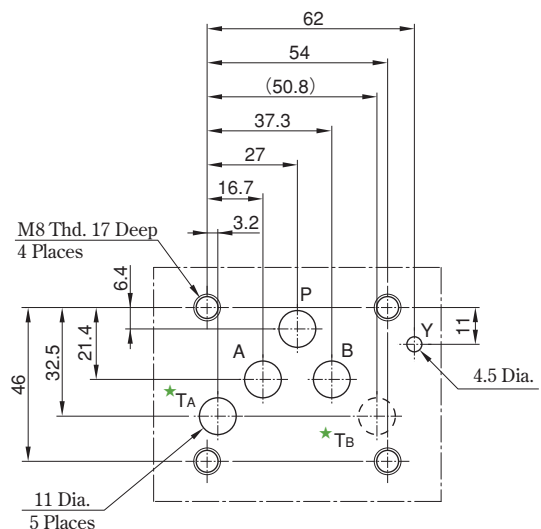
【Mounting Surface】

Prepare a mounting surface shown on the right. Basically, the dimensions of the mounting surface conform to the ISO standard, but the specifications for valve mounting screws are different as follows.

Consult us for valves available with M6 mounting screws.

	ISO 4401-05-04-0-94	Mounting Surface for LSVG-03
Valve Mounting Screw	M6	M8

The mounting surface should have a good machined finish. ($\frac{1}{64}$)



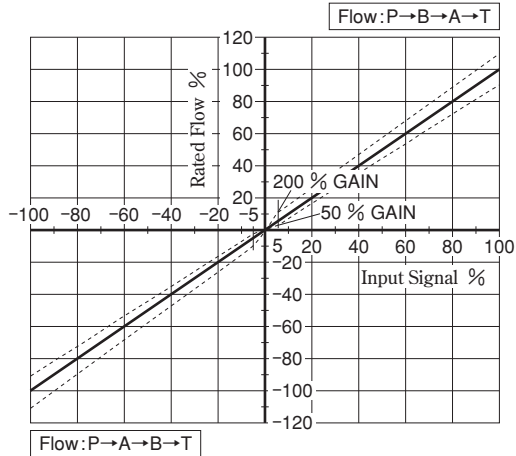
★ There are two tank ports "Ta" and "Tb"; however, "Ta" may be used alone.

Characteristics of LSVG-03-4/10/20/40/60 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

<Conditions>

● Valve Pressure Difference : 7 MPa

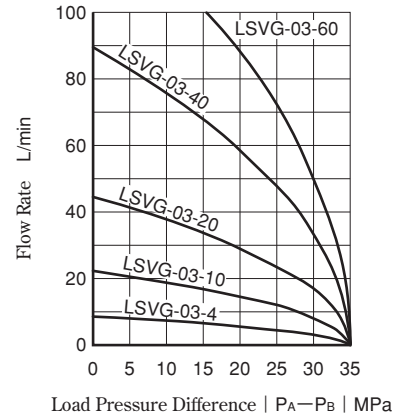


Load Flow Characteristics

<Conditions>

● Input Signal : 100 %

Note) Tolerance for Load Flow : ±10 %



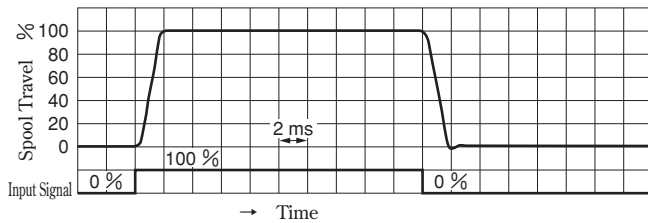
Step Response

<Conditions>

● Input Amplitude : 0 ⇔ 100 % ● Supply Pressure : 14 MPa

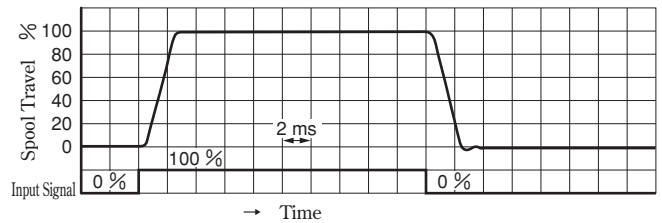
● LSVG-03-4/10/20/40-10

Amplifier : AMLS-A-D48- * -10 (Power Supply: 48 V DC)

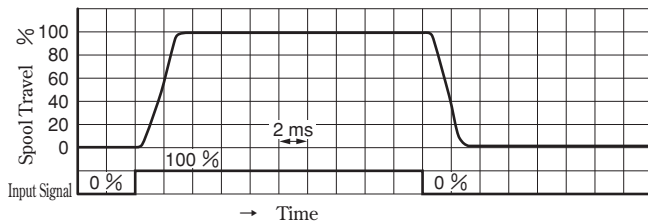


● LSVG-03-60-10

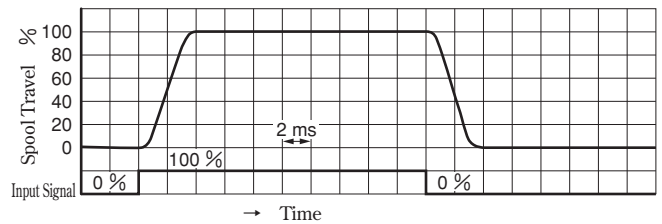
Amplifier : AMLS-B-D48- * -10 (Power Supply: 48 V DC)



Amplifier : AMLS-A-D24- * -10 (Power Supply: 24 V DC)



Amplifier : AMLS-B-D24- * -10 (Power Supply: 24 V DC)



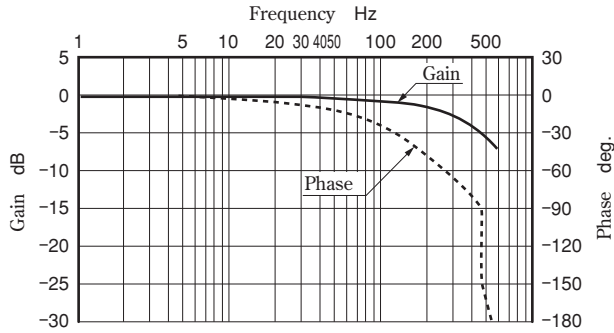
Frequency Response

< Conditions >

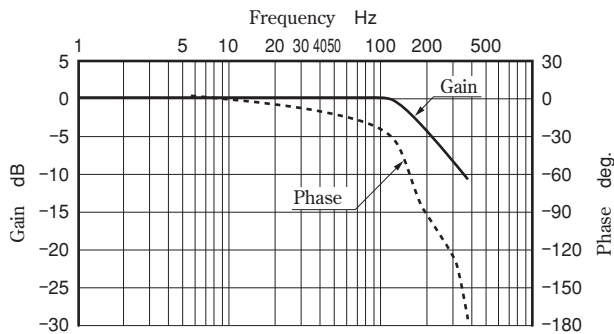
● Hydraulic Circuit: Port A/B Closed ● Supply Pressure : 14 MPa

● LSVG-03-4/10/20/40-10

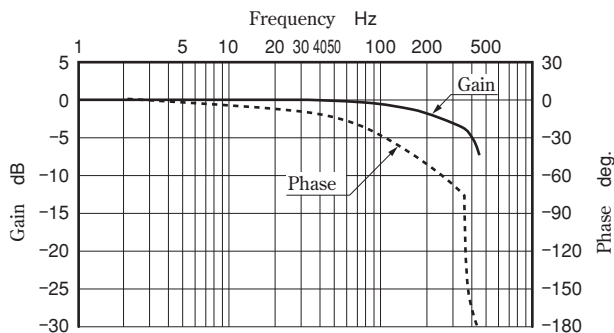
Amplifier : AMLS-A-D48- * -10 (Power Supply: 48 V DC)
Input Signal $\pm 25\%$



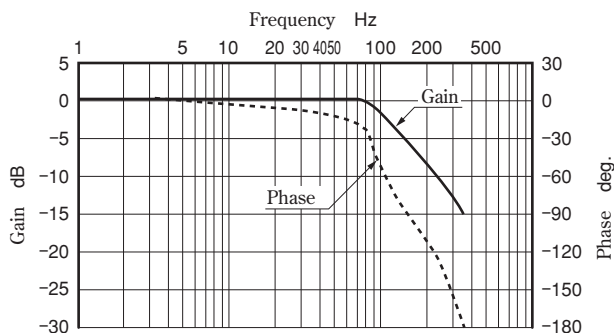
Input Signal $\pm 100\%$



Amplifier : AMLS-A-D24- * -10 (Power Supply: 24 V DC)
Input Signal $\pm 25\%$

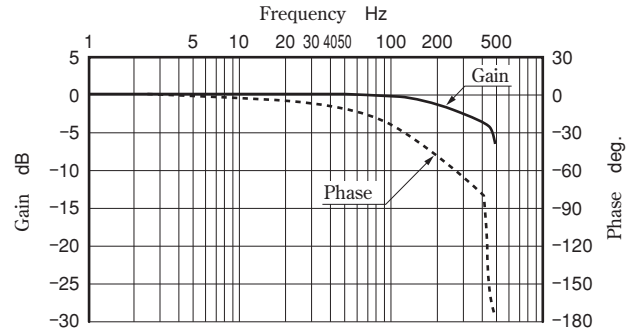


Input Signal $\pm 100\%$

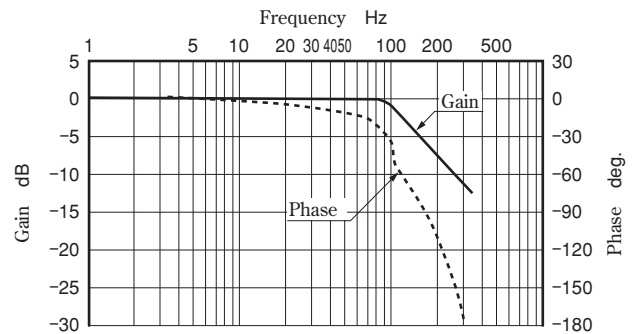


● LSVG-03-60-10

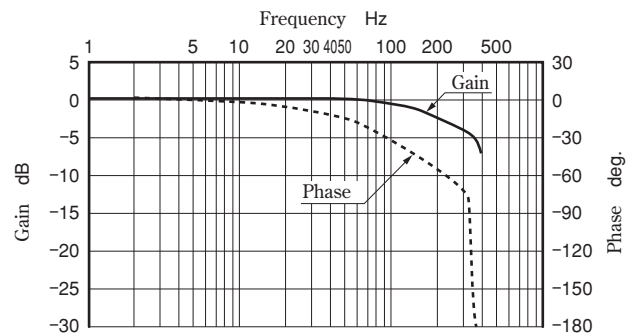
Amplifier : AMLS-B-D48- * -10 (Power Supply: 48 V DC)
Input Signal $\pm 25\%$



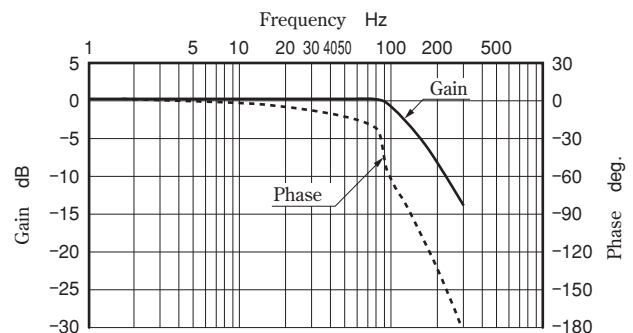
Input Signal $\pm 100\%$



Amplifier : AMLS-B-D24- * -10 (Power Supply: 24 V DC)
Input Signal $\pm 25\%$



Input Signal $\pm 100\%$



Tow Stage Type High-Speed Linear Servo Valves

Two stage type linear servo valves are a type of high-flow servo valve that has a direct type high speed linear servo valve in its pilot stage to drive the main spool. These valves control the positions of the pilot and main spools with electrical feedback, achieving high accuracy and response.

High flow

The valves consist of two stages to provide a high flow rate (Rated flow at $\Delta P = 7 \text{ MPa}$: 750 - 3800 L/min).

High accuracy

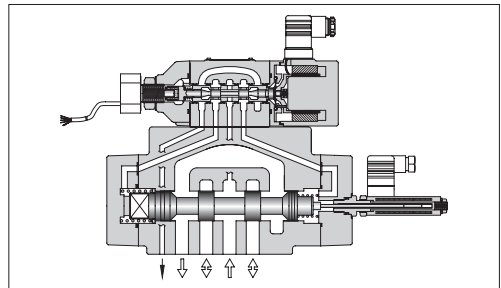
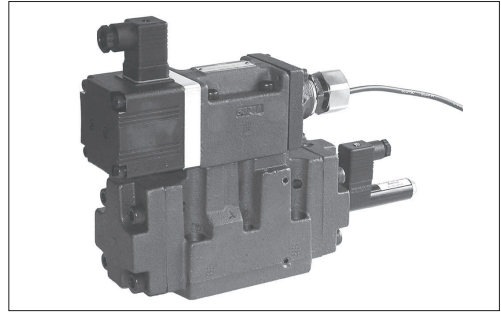
The valves have a low hysteresis of 0.1 % or less, achieving high accuracy. They allow the main unit to operate with much higher repeatability.

High response characteristics

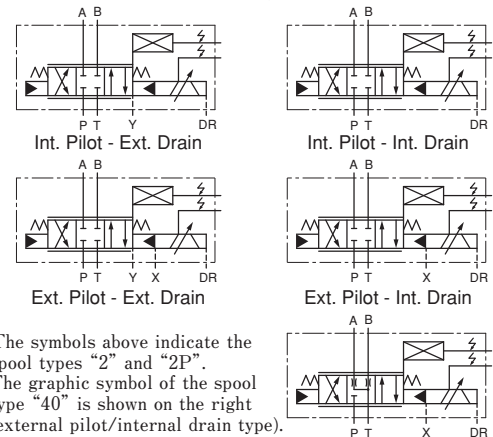
The valves provide significantly high levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 8 ms (0 $\leftrightarrow$ 100 %), and the frequency response is 105 Hz/ -90° (± 25 % amplitude) (Representative values for LSVHG-06-900). Thus, the valves ensure the achievement of unprecedented high response.

Excellent contamination resistance

As is the case with the direct type linear servo valves, the permissible level of fluid contamination for these valves is up to NAS 1638 class 10.



Graphic Symbols



Model Number Designation

F—	LSVHG	—06	—900	—2P	—E	T	—R	—A	—10
Fluid Type	Series Number	Valve Size	Rated Flow @ $\Delta P = 7 \text{ MPa}$	Spool Type	Pilot Connection	Drain Connection	Cable Departure Direction	Fail-safe Function	Design Number
F : Special Seals for Phosphate Ester Type Fluid (Omit if not required)	LSVHG : Two Stage Type High Speed Linear Servo Valves	04	750 : 750 L/min	2 : 10% Overlap 	None : Internal Pilot E : External Pilot	None : External Drain T : Internal Drain	(Viewed from the linear motor side) None : Upper (Standard) R : Right L : Left	None : P→B→A→T Position Valve Opening: Full	10
		06	900 : 900 L/min 1300 : 1300 L/min	40 : Open Center A, B & T 					
		10	3800 : 3800 L/min	2P : Zero Lap (Dual Flow Gain)				A : P→A→B→T Position Valve Opening: Full	20

Exclusive Amplifiers

To ensure stable performance, it is recommended to use Yuken's AMLS series linear servo amplifiers.

Valve Model Numbers	Amplifier Model
LSVHG-04-750	AMLS-C2-D * - * -10
LSVHG-06-900	AMLS-C-D * - * -10
LSVHG-06-1300 LSVHG-10-3800	AMLS-D-D * - * -10

Accessories

Model Numbers	Mounting Bolt	Qty.	Bolt Tightening Torque
LSVHG-04	Hex. Soc. Head Cap Screw:M 6 ×55L	2	12.9 - 15.9 Nm
	Hex. Soc. Head Cap Screw:M10×60L	4	60.6 - 74.1 Nm
LSVHG-06	Hex. Soc. Head Cap Screw:M12×85L	6	104 - 127 Nm
LSVHG-10	Hex. Soc. Head Cap Screw:M20×90L	6	494 - 603 Nm

Specifications

The specifications below are for use with a 48 V DC type exclusive amplifier; for use with a 24 V DC type amplifier, see the values in parentheses.

Model Numbers			LSVHG-04-750				LSVHG-06-900				LSVHG-06-1300				LSVHG-10-3800			
Descriptions																		
Rated Flow @ Δ P = 7 MPa (4-Way Valve) L/min			750				900				1300				3800			
Rated Flow @ Δ P' = 0.5 MPa (per Land) L/min			283				340				490				1440			
Max. Operating Pressure MPa			35				35				31.5				35			
Proof Pres. at Return Port	External Drain MPa		31.5				35				25				28			
	Internal Drain ⁽¹⁾ MPa		31.5				35				25				28			
DR Port Permissible Back Pressure ⁽²⁾ MPa			0.05															
Pilot Pressure ⁽³⁾ MPa			1.5 - 35												1.5 - 25			
Pilot Flow Rate ⁽⁴⁾ L/min			27 (22) or more				30 (24) or more				34 (27) or more				32 (27) or more			
Pilot Valve Max. Leakage	Ps=Pp=14 MPa 32 mm ² /s	L/min	1.7															
Main Valve Max. Leakage	Spool Type		-2-	-40-	-2P-	-2-	-40-	-2P-	-2-	-40-	-2P-	-2-	-40-	-2P-	-2-	-40-	-2P-	
	Ps=Pp=14 MPa 32 mm ² /s	L/min	0.8	1.6	6.8	0.9	1.8	7	1	2	8	3	6	10				
Hysteresis %			0.1 or less															
Step Response (0 <=> 100 %, Typical) ⁽⁵⁾ ms			8 (10)				8 (10)				10 (13)				15 (18)			
Frequency Response (±25 % Amplitude, Typical) ⁽⁵⁾	Gain: -3 dB	Hz	150 (140)				160 (130)				150 (110)				100 (60)			
	Phase: -90°	Hz	110 (100)				105 (100)				100 (100)				85 (75)			
Vibration Proof ⁽⁶⁾			Frequency: 10 - 60 Hz, Amplitude: 4 mm, Acceleration: 7.8 - 282 m/s ² Frequency: 61 - 2000 Hz, Amplitude: 4 - 0.0038 mm, Acceleration: 294 m/s ²															
Protection			IP 64															
Ambient Temperature °C			-15 - +60															
Spool Stroke to Stops mm			±5				±5				±7				±7			
Spool End Area cm ²			7.1				8				8				11.3			
Polarity			See the description about I/O signal characteristics on page I-19															
Linear Motor Specification	Current A		2 [Max. 6]															
	Coil Resistance Ω		4.5															
Approx. Mass kg			12				20				21				78			

Note) ⁽¹⁾ Pressure at the return port should be at actual supply pressure or less.

⁽²⁾ Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.

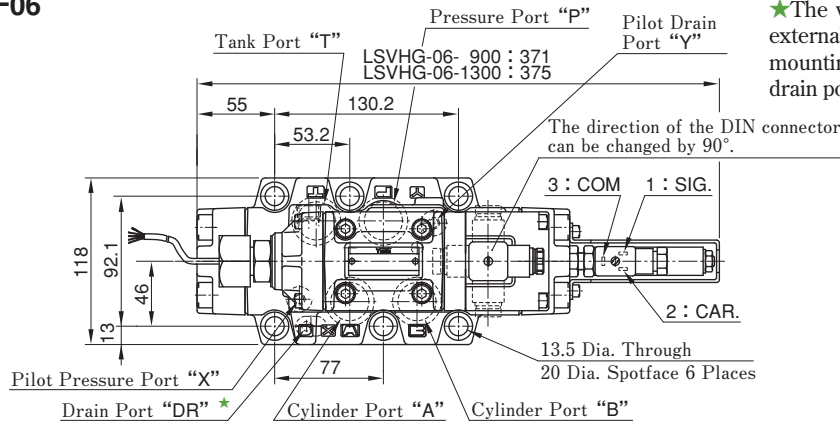
⁽³⁾ Supply pressure for the pilot valve should be 1.5 to 35 MPa (1.5 to 25 MPa for LSVHG-10) and should also be 60 % of actual supply pressure or more.

⁽⁴⁾ The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.

⁽⁵⁾ This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.

⁽⁶⁾ There are restrictions on the mounting position; refer to the instructions for details.

LSVHG-06

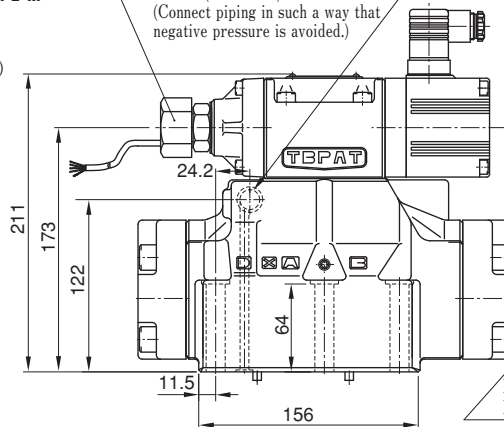


★The valve has two "DR" ports: one for external connection and the other on the mounting surface. Use either one of the drain ports.

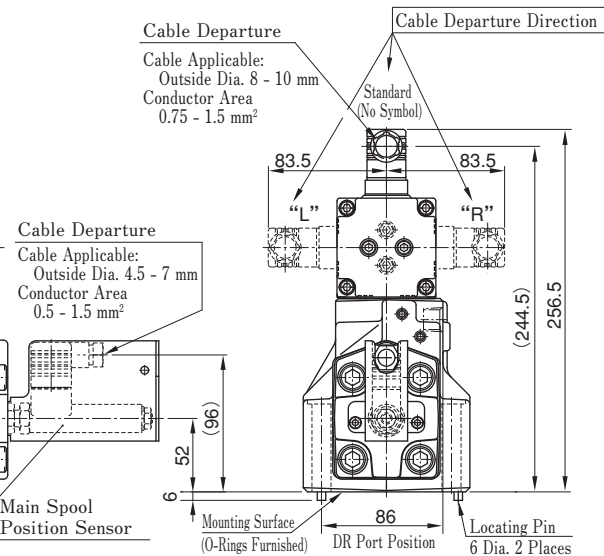
Pilot Spool Position Sensor

Lead Wire Length 2 m
 Red: DC +15 V
 Black: 0 V
 Yellow: Output (+)
 White: Output (-)

External Connection Drain Port "DR" ★
 Rc 3/8 (Back Side)
 (Connect piping in such a way that negative pressure is avoided.)



Cable Departure
 Cable Applicable:
 Outside Dia. 4.5 - 7 mm
 Conductor Area
 0.5 - 1.5 mm²



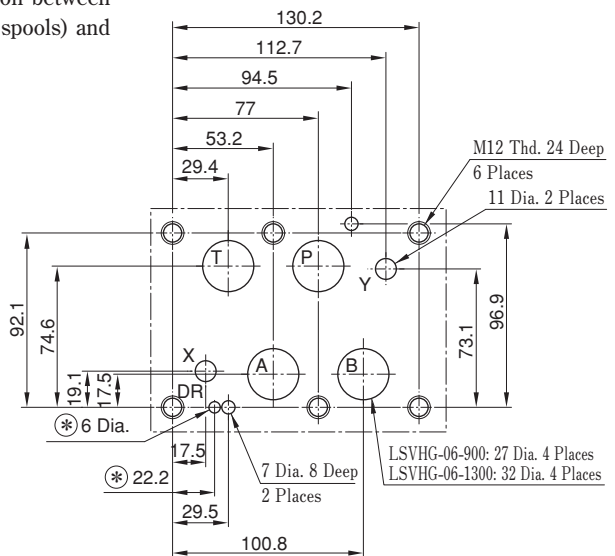
Note) Refer to the wiring diagram on page I-21 for detailed connection between the pilot valve DIN connector/position sensors (pilot and main spools) and the amplifier.

【Mounting Surface】

Prepare a mounting surface shown on the right. Basically, the dimensions of the mounting surface conform to the ISO standard, but the specifications for the ports P, A, B, and T are different as follows.

	ISO 4401-08-08-0-05	Mounting Surface for LSVHG-06-900	Mounting Surface for LSVHG-06-1300
Dia. of Port P, A, B, T	23.4 Dia.	27 Dia.	32 Dia.
Drain Port	None	Available (6 Dia.)	

The mounting surface should have a good machined finish. ($\sqrt{6}$)



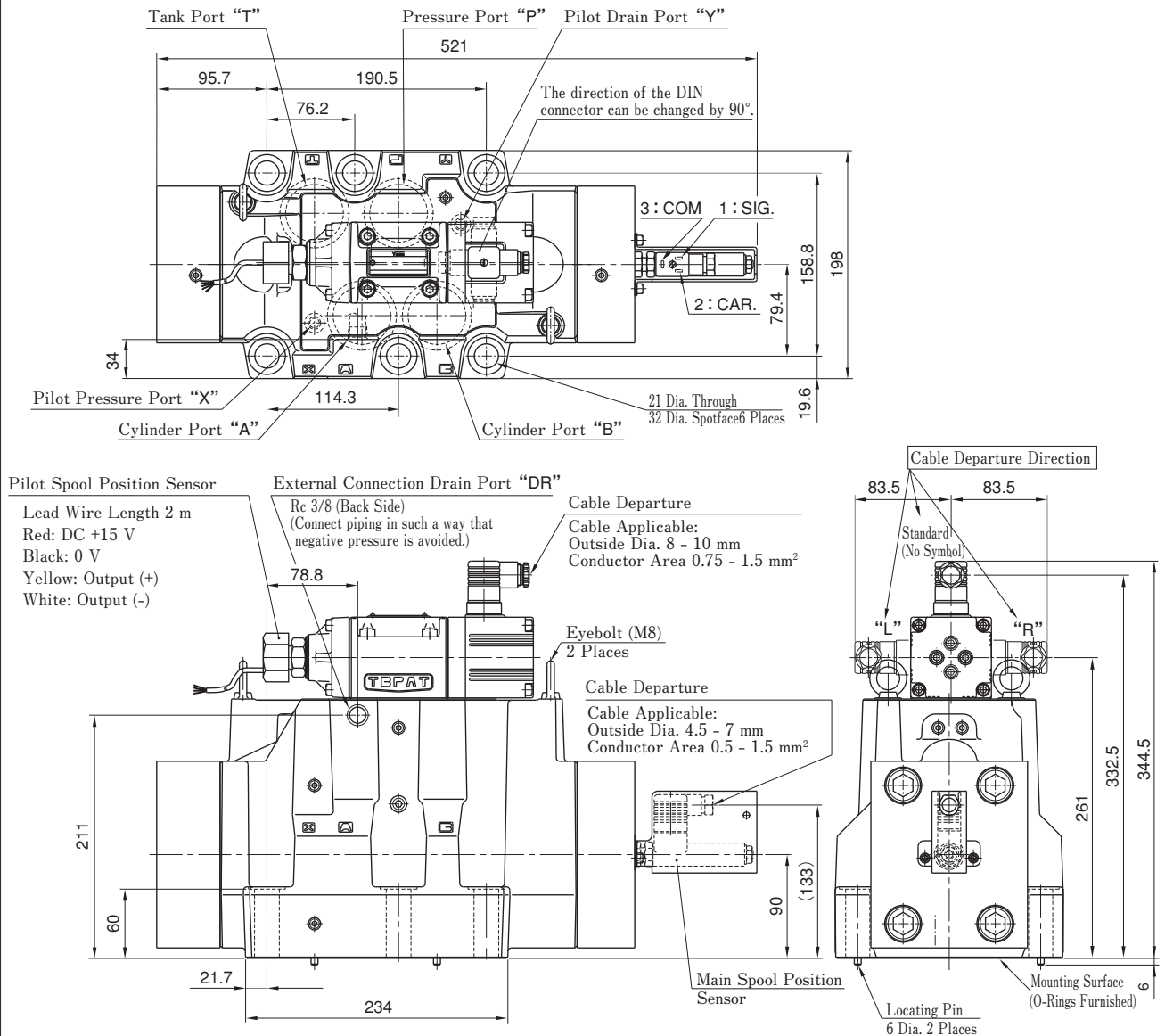
● O-Rings for the Ports

Port	O-Ring Size		Qty.
	LSVHG-06-900	LSVHG-06-1300	
P, A, B, T	AS568-123 (NBR-90)	AS568-126 (NBR-90)	4
X, Y	OR NBR-90 P14-N		2
DR	AS568-016 (NBR-90)		1

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

Note) ※: Not required if the external connection drain port is used.

LSVHG-10



Note) Refer to the wiring diagram on page I-21 for detailed connection between the pilot valve DIN connector/ position sensors (pilot and main spools) and the amplifier.

[Mounting Surface]

Prepare a mounting surface shown on the right. Basically, the dimensions of the mounting surface conform to the ISO standard, but the specifications for the ports P, A, B, and T are different as follows.

	ISO 4401-08-09-0-05	Mounting Surface for LSVHG-10
Dia. of Port P, A, B, T	36 Dia.	50 Dia.

The mounting surface should have a good machined finish. ($\frac{1}{16}$)

● O-Rings for the Ports

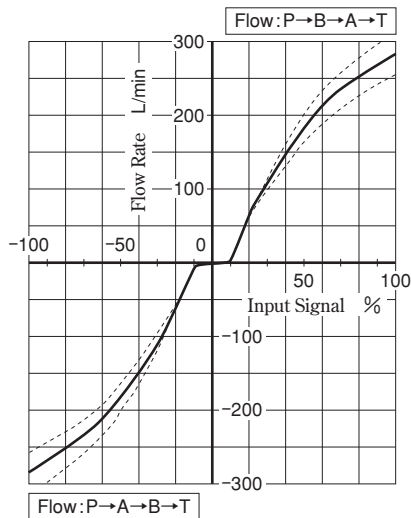
Port	O-Ring Size	Qty.
P, A, B, T	AS568-227 (NBR-90)	4
X, Y	AS568-015 (NBR-90)	2

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

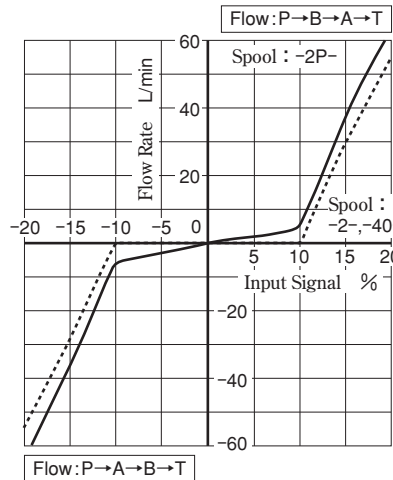
Characteristics of LSVHG-04-750 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

◁ Conditions ▷ ● Valve Pressure Difference : 1 MPa (Pressure Difference per Land : 0.5 MPa)



Around Null Position Input Signal -20 ⇔ +20 %

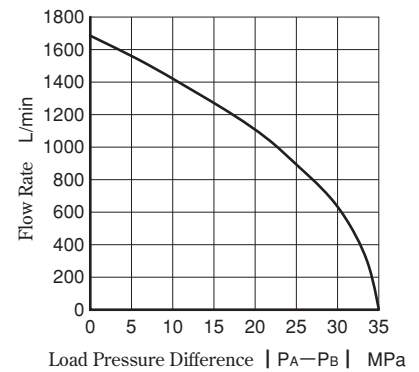


Load Flow Characteristics

◁ Conditions ▷

● Input Signal : 100 %

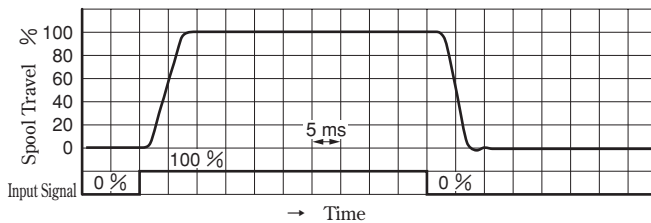
Note) Tolerance for Load Flow



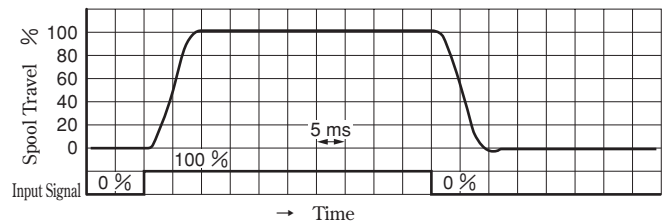
Step Response

◁ Conditions ▷ ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

Amplifier: AMLS-C2-D48- *-10 (Power Supply: 48 V DC)



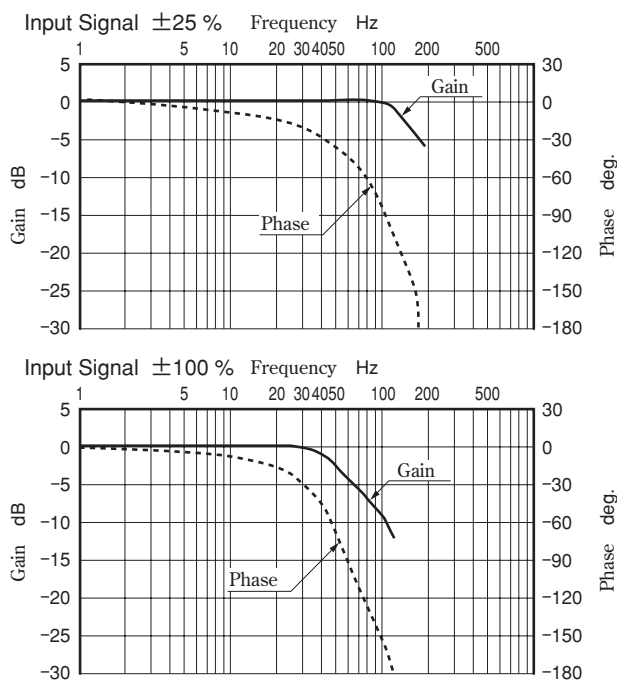
Amplifier: AMLS-C2-D24- *-10 (Power Supply: 24 V DC)



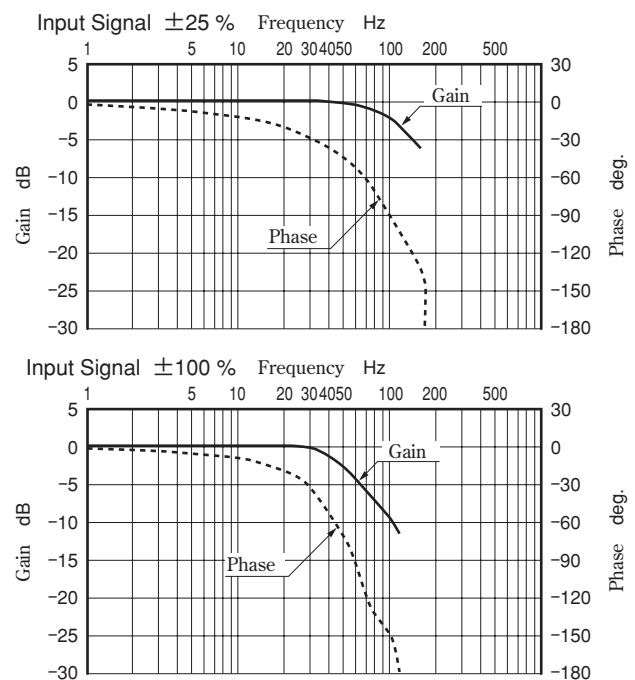
Frequency Response

◁ Conditions ▷ ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

Amplifier: AMLS-C2-D48- *-10 (Power Supply: 48 V DC)



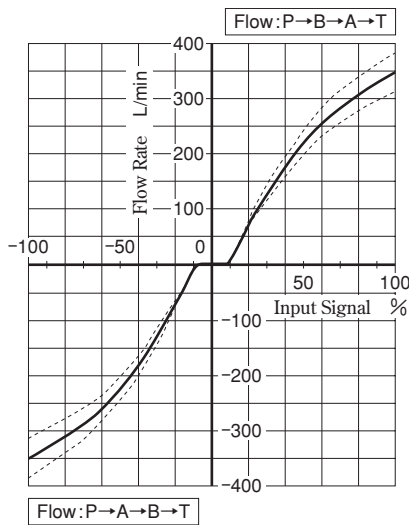
Amplifier: AMLS-C2-D24- *-10 (Power Supply: 24 V DC)



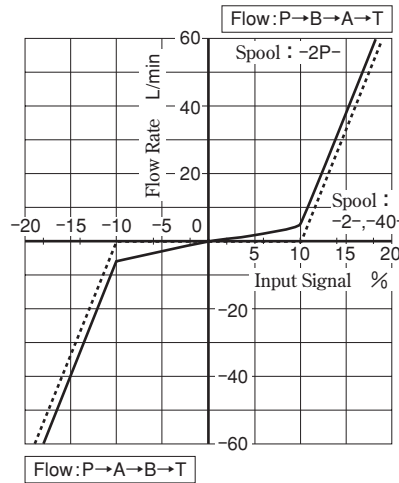
Characteristics of LSVHG-06-900 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

◁ Conditions ▷ ● Valve Pressure Difference : 1 MPa (Pressure Difference per Land : 0.5 MPa)



Around Null Position

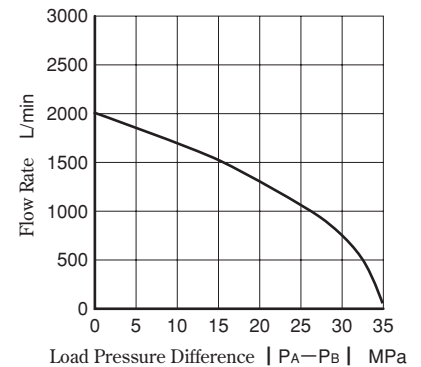


Load Flow Characteristics

◁ Conditions ▷

● Input Signal : 100 %

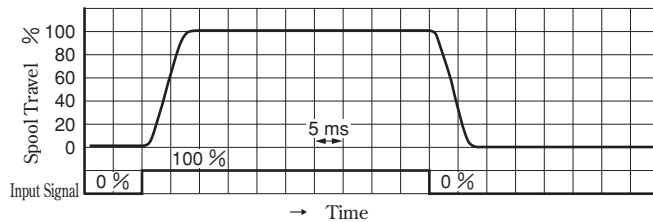
● Note) Tolerance for Load Flow : ±10 %



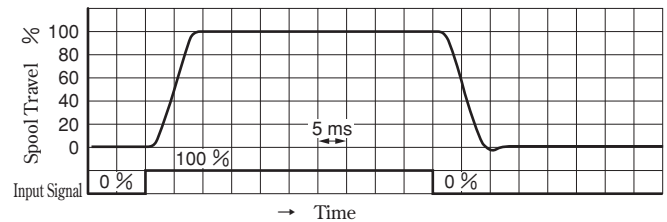
Step Response

◁ Conditions ▷ ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

Amplifier : AMLS-C-D48- *-10 (Power Supply: 48 V DC)



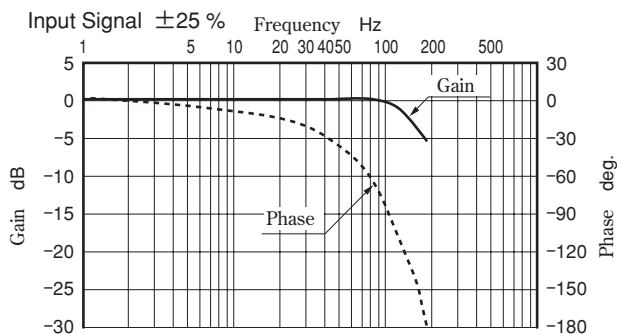
Amplifier: AMLS-C-D24- *-10 (Power Supply: 24 V DC)



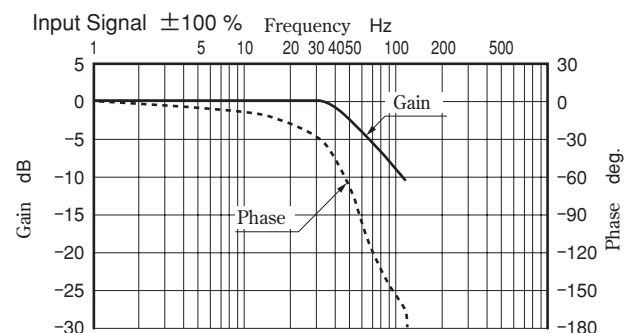
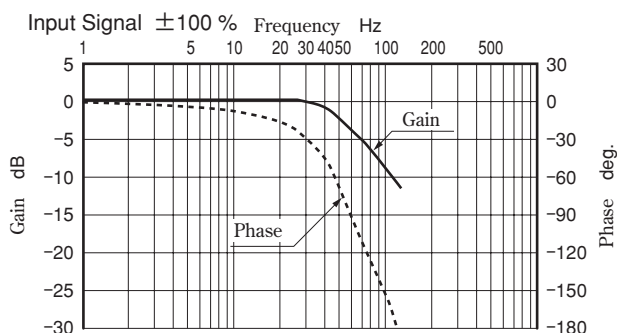
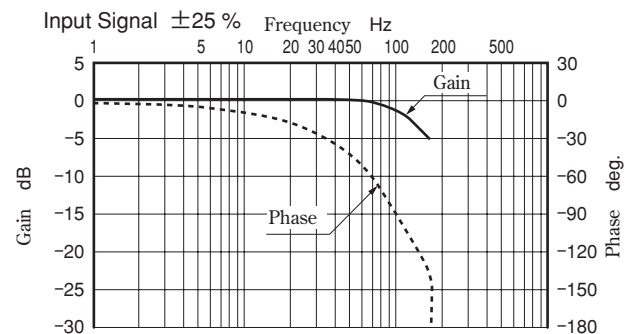
Frequency Response

◁ Conditions ▷ ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

Amplifier : AMLS-C-D48- *-10 (Power Supply: 48 V DC)



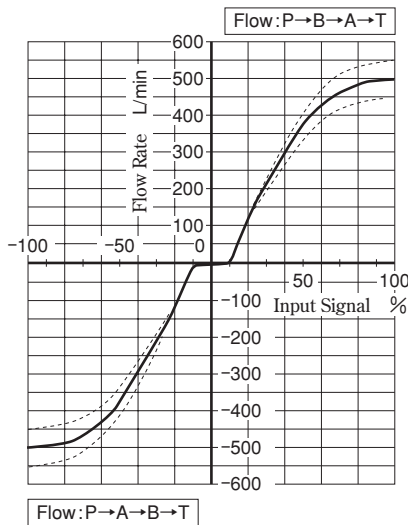
Amplifier : AMLS-C-D24- *-10 (Power Supply: 24 V DC)



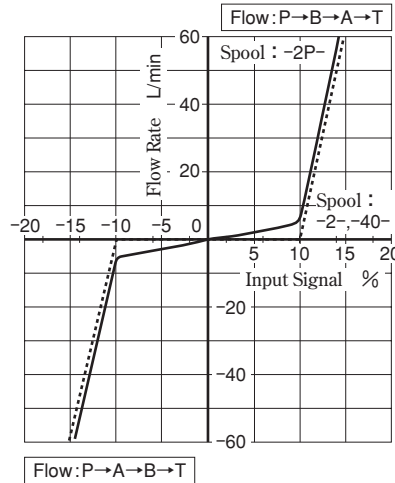
Characteristics of LSVHG-06-1300 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

<Conditions> ● Valve Pressure Difference: 1 MPa (Pressure Difference per Land : 0.5 MPa)



Around Null Position Input Signal -20 ⇔ +20 %

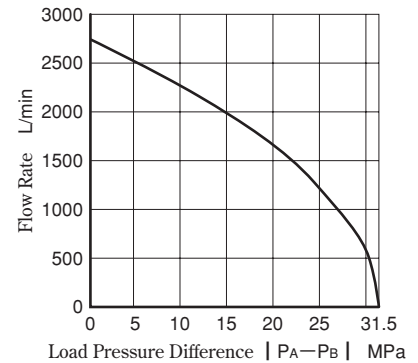


Load Flow Characteristics

<Conditions>

● Input Signal : 100 %

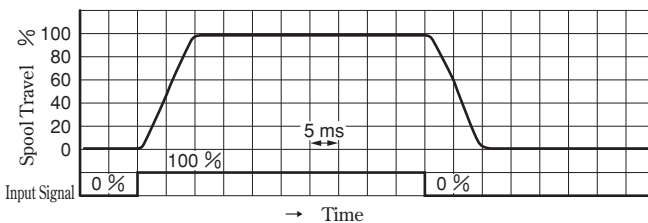
Note) Tolerance for Load Flow : ±10 %



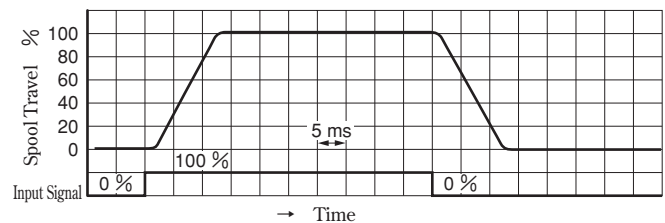
Step Response

<Conditions> ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

Amplifier : AMLS-D-D48-* -10 (Power Supply: 48 V DC)



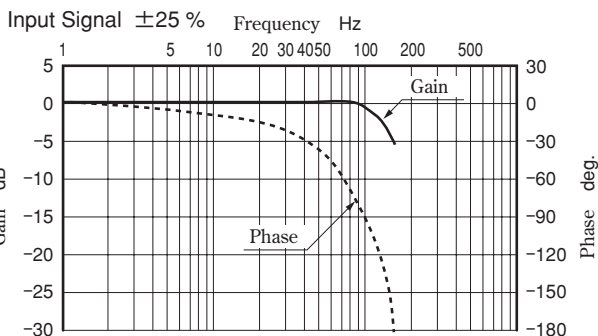
Amplifier : AMLS-D-D24-* -10 (Power Supply: 24 V DC)



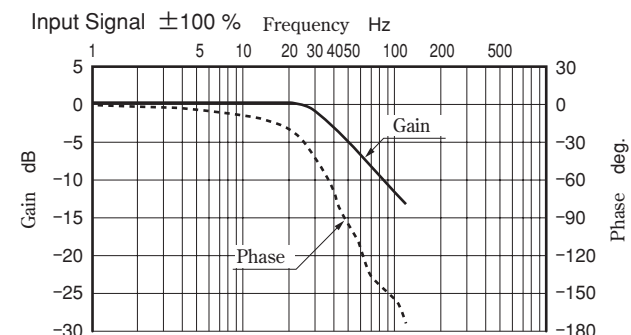
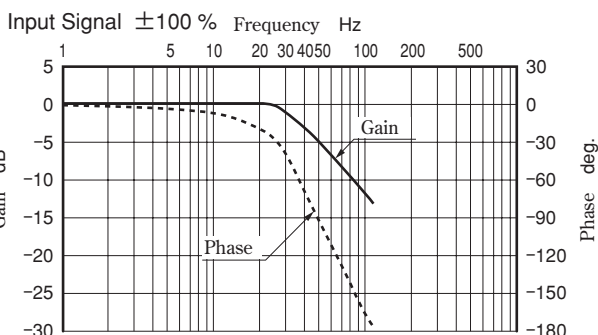
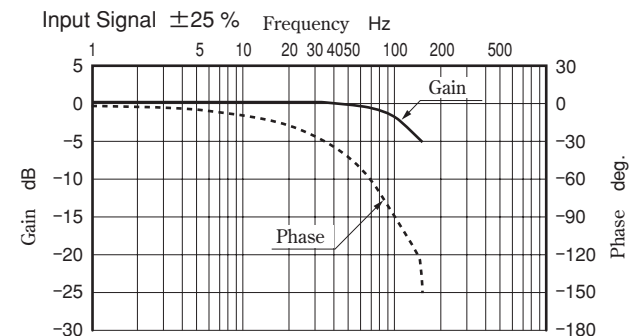
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

Amplifier : AMLS-D-D48-* -10 (Power Supply: 48 V DC)



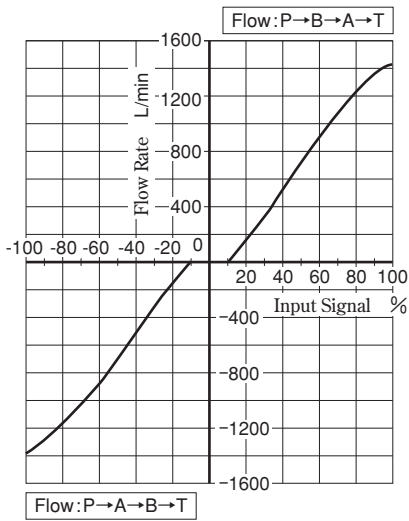
Amplifier : AMLS-D-D24-* -10 (Power Supply: 24 V DC)



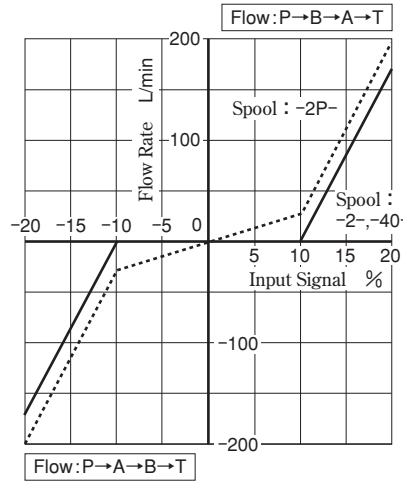
Characteristics of LSVHG-10-3800 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

◁ Conditions ▷ ● Valve Pressure Difference : 1 MPa (Pressure Difference per Land : 0.5 MPa)



Around Null Position Input Signal -20 ⇔ +20 %

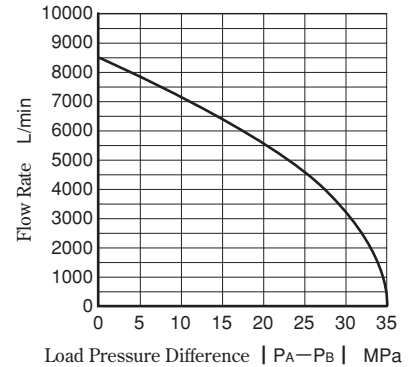


Load Flow Characteristics

◁ Conditions ▷

● Input Signal : 100 %

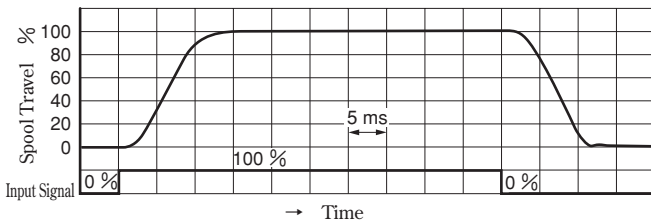
Note) Tolerance for Load Flow : ±10 %



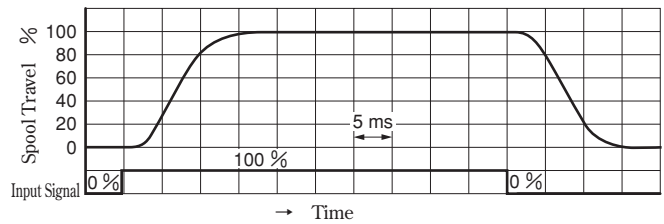
Step Response

◁ Conditions ▷ ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

Amplifier: AMLS-D-D48- *-10 (Power Supply: 48 V DC)



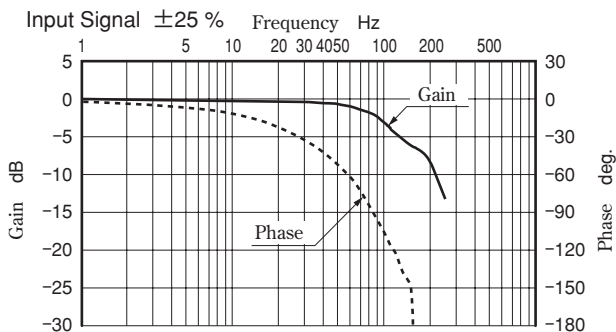
Amplifier: AMLS-D-D24- *-10 (Power Supply: 24 V DC)



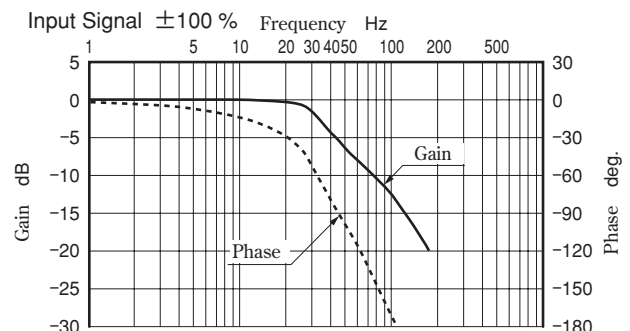
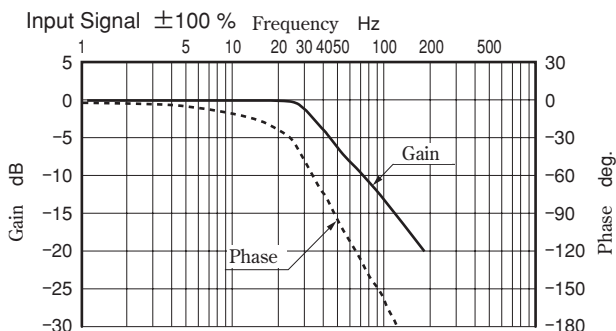
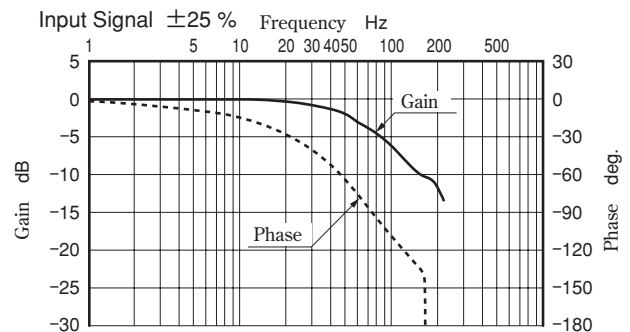
Frequency Response

◁ Conditions ▷ ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

Amplifier: AMLS-D-D48- *-10 (Power Supply: 48 V DC)

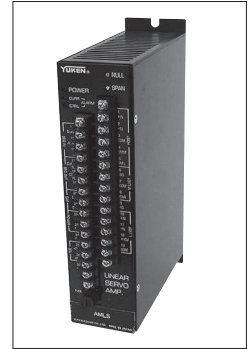


Amplifier: AMLS-D-D24- *-10 (Power Supply: 24 V DC)



Linear Servo Amplifier

This amplifier is used to drive LSVG/LSVHG series high speed linear servo valves. With an optimal design for the servo valves, the amplifier can maximize the valve performance.



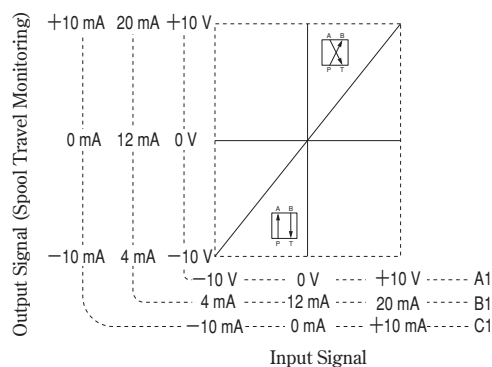
Specifications

Model Numbers	AMLS- *-D48- *-10	AMLS- *-D24- *-10
Descriptions		
Power Supply	48 V $\pm$ 2.4 V DC (200 VA or more)	24 V $\pm$ 1.2 V DC (100 VA or more)
Rated Output Current	Continuous $\pm$ 2 A (4 A Peak)	Continuous $\pm$ 2 A (3 A Peak)
Input/Output Signal	Output Signal = Spool Travel Monitoring A1 : Voltage Signal $\pm$ 10 V ($R_i = 100 \text{ k}\Omega$, $R_L \geq 10 \text{ k}\Omega$) B1 : Current Signal 4 - 20 mA ($R_i = 200 \Omega$, $R_L = 100 - 500 \Omega$) C1 : Current Signal $\pm$ 10 mA ($R_i = 200 \Omega$, $R_L = 100 - 500 \Omega$)	
Control Input /Output Signal	a) Servo "ON" Input/Alarm Reset Input: Photocoupler Input Voltage: +15 V DC to +28 V DC, Input Impedance: 2.2 k Ω b) Overcurrent Output (CURR.AL.)/Deviation Alarm Output (CTRL.AL.): Photocoupler Output Voltage: Max. 50 V DC, Current: Max. 30 mA	
Ambient Temperature $^{\circ}\text{C}$	0 - +50	
Ambient Humidity	20 - 90 %Rh (No Condensation)	
Mass kg	1.8	

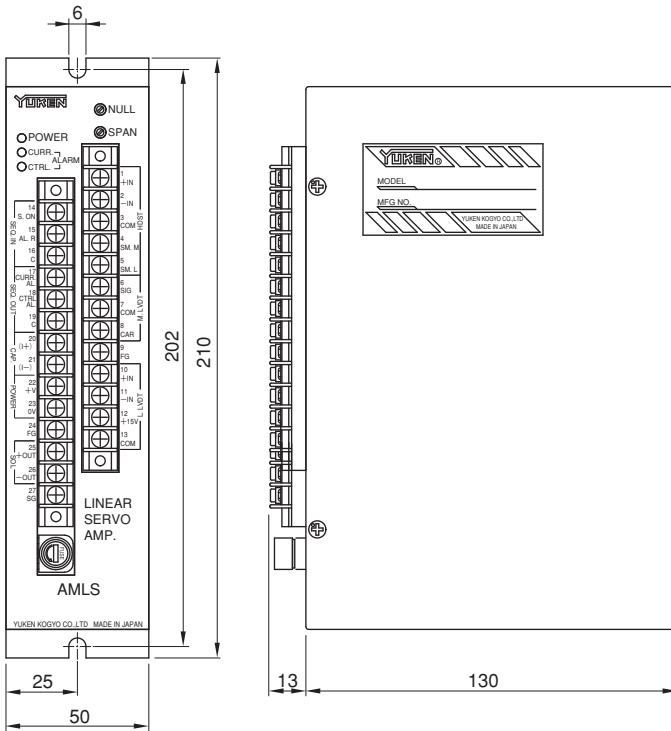
Model Number Designation

AMLS	-A	-D48	-A1	-10
Series Number	Applicable Valve Type	Supply Voltage	Input Signal/ Spool Travel Monitoring	Design Number
AMLS : Linear Servo Amplifier	A : LSVG-03-4/10/20/40 B : LSVG-03-60 C : LSVHG-06-900 C2 : LSVHG-04 D : LSVHG-06-1300 LSVHG-10-3800	D48 : DC 48 V D24 : DC 24 V	A1: Voltage Signal $\pm$ 10 V B1: Current Signal 4 - 20 mA C1: Current Signal $\pm$ 10 mA	10

I/O Signal Characteristics



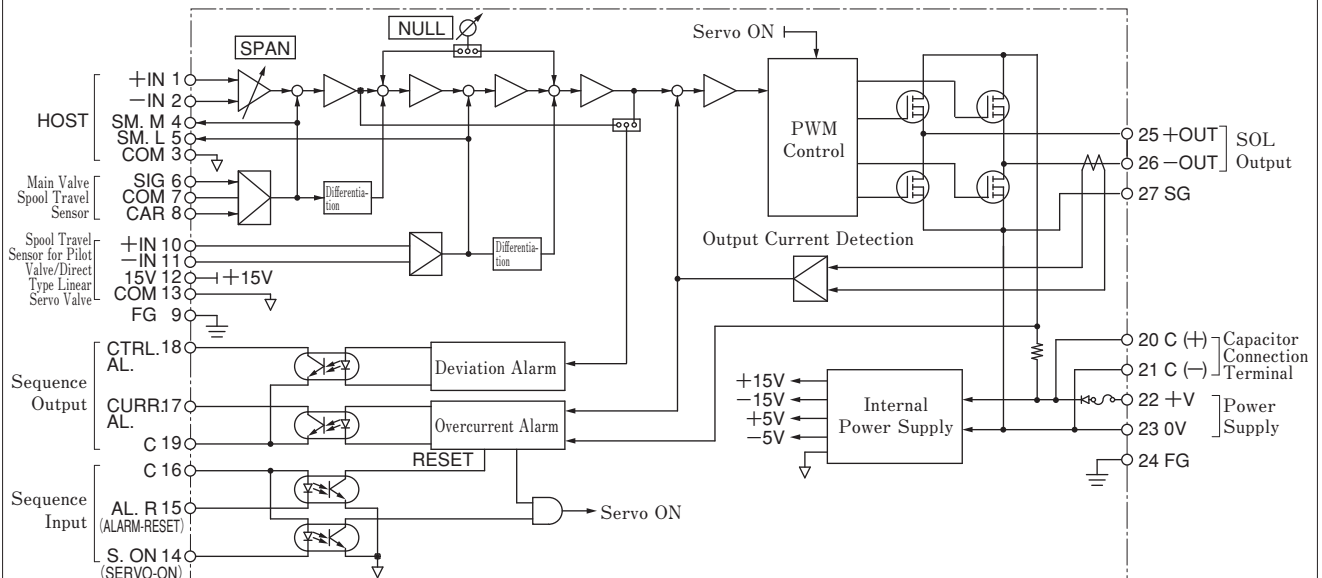
Appearance/Terminal Names



Terminal Name

No.	Terminal Name	
1	Input Signal	+IN
2		-IN
3	Common	
4	Sensor Monitoring	Main Valve Spool
5		Pilot Valve/Direct Type Linear Servo Valve
6	Main Valve Spool Travel Sensor	SIG
7		COM
8		
9	Frame Grounding	
10	Spool Travel Sensor for Pilot Valve/Direct Type Linear Servo Valve	+IN
11		-IN
12		+15V
13		COM
14	Sequence Input	Servo ON
15		Alarm Reset
16	Sequence Output	Input Common
17		Overcurrent Alarm
18		Deviation Alarm
19		
20	Capacitor Connection Terminal	Cap. (+)
21		Cap. (-)
22	Power Supply	+V
23		0V
24	Frame Grounding	
25	SOL Output	+OUT
26		-OUT
27	Signal Grounding	

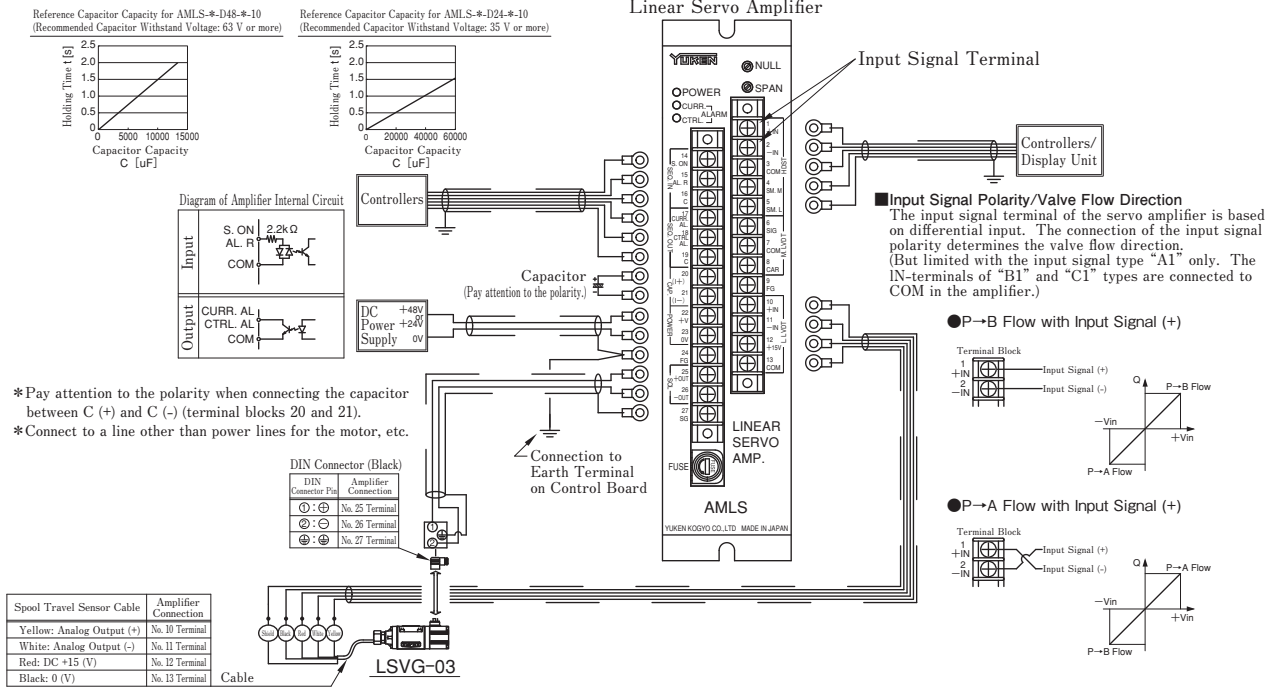
Block Diagram



Wire Connection Diagram

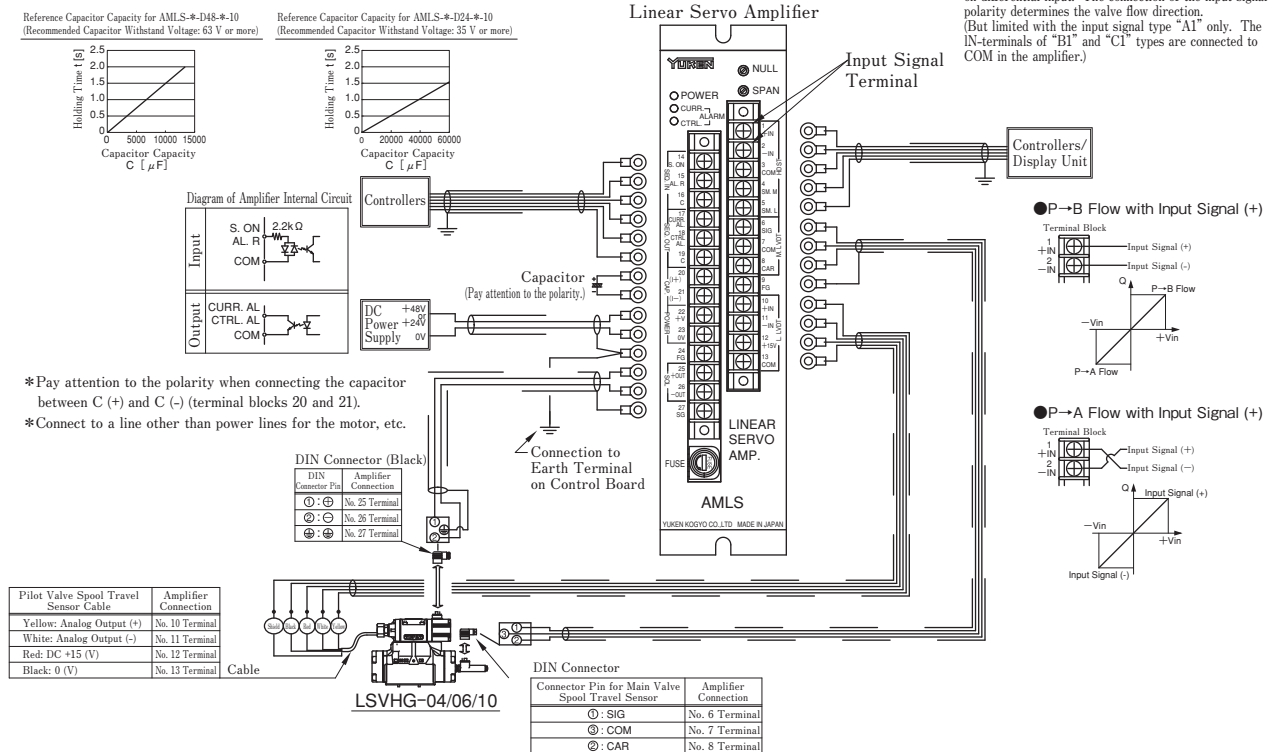
● AMLS-A, AMLS-B

*To hold the valve spool at the neutral position for a few seconds upon power failure or after power-off, connect the capacitor between C (+) and C (-) (terminal blocks 20 and 21).



● AMLS-C, AMLS-C2, AMLS-D

*To hold the valve spool at the neutral position for a few seconds upon power failure or after power-off, connect the capacitor between C (+) and C (-) (terminal blocks 20 and 21).



OBE type Direct Operated Linear Servo Valves

On-board electronics (OBE) type direct operated linear servo valves are based on high speed linear servo valves (LSVG) and OBE type linear servo valves (LSVHG-*EH), providing “high accuracy, easiness to use, and great usability” .

● High accuracy

As is the case with the high speed linear servo valves, all of the OBE type direct operated linear servo valves have a low hysteresis of 0.1 % or less, realizing high accuracy. These valves allow the main unit to operate with much higher repeatability.

● High response characteristics

Compared to other equivalent models, these valves provide higher levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 3 ms (0 <=> 100 %), and the frequency response is 260 Hz/-3 dB (± 25 % amplitude).

[★ : Representative values for LSVG-03EH with the Y port (dry type)]

● Easiness to use

These valves can offer high accuracy for hydraulic control systems just with 24 V DC power supply and command signal input.

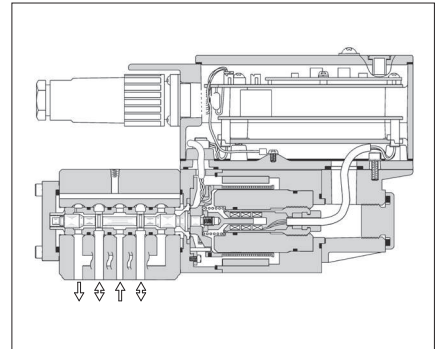
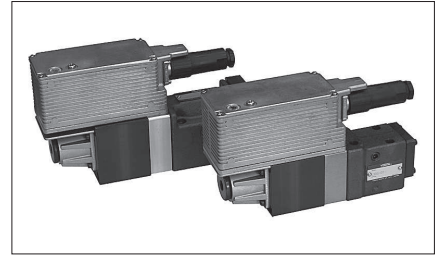
Six types of input signals in three input voltage/current ranges are available: 0 - ±10 V, 0 - ±10 mA, and 4 - 20 mA.

● Great usability

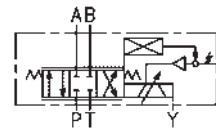
The small amplifier in the valves has a fault indicator lamp. This lamp indicates an error when valve failure causes any deviation between the spool position commanded by the signal and the actual spool position. It facilitates you to immediately troubleshoot the failure of the valves, if any.

● Excellent contamination resistance

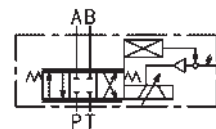
As is the case with the high speed linear servo valves, the OBE type direct operated linear servo valves have a simple pilot valve structure, exhibiting excellent contamination resistance. The permissible level of fluid contamination for these valves is up to NAS 1638 class 10.



Graphic Symbols



With Y Port (Dry Type)



Without Y Port (Wet Type)

Model Number Designation

F—	LSVG	—03	EH	—60	—W	A	—A	1	—10
Fluid Type	Series Number	Valve Size	Amp. Type	Rated Flow @ Δ P=7MPa	Drain Port and Permissible Back Pres.	Fail-safe Function	Input Signal/Spool Travel Monitoring	Connector Type	Design Number
F : Special Seals for Phosphate Ester Type Fluid (Omit if not required)	LSVG : Direct Operated Linear Servo Valves	01	EH : OBE Type	4: 4 L/min	None: With Y Port (Permissible Back Pres.: 0.05 MPa) (Dry Type)	A: P→A→B→T Position B: P→B→A→T Position C:Neutral	A: Voltage Signal ±10 V (P→B→A→T Flow with Input Signal (+))	1: 6 + PE Pole 2:11 + PE Pole - With “Enable” Function - With “Valve Ready” Function - With “Alarm Output” Function	10
				10: 10 L/min			B: Current Signal 4 - 20 mA (P→B→A→T Flow with Current Signal 12 - 20 mA)		
				20: 20 L/min			C: Current Signal ±10 mA (P→B→A→T Flow with Input Signal (+))		
				40: 40 L/min	D: Voltage Signal ±10 V (P→A→B→T Flow with Input Signal (+))				
		03		W:Without Y Port★1 (Wet Type)	E: Current Signal 4 - 20 mA (P→A→B→T Flow with Current Signal 12 - 20 mA)		10★2		
				60: 60 L/min			F: Current Signal ±10 mA (P→A→B→T Flow with Input Signal (+))		

★ 1. For the wet type, water-glycol fluids cannot be used.

★ 2. We prepare mounting bolt M6 specified application-designed product. Maximum pressure of this product is limited, for details please contact us.

Specifications The values in parentheses in the specification table below are applicable to the models “LSVG-*EH-*-W*-*” (wet type).

Model Numbers			LSVG-01EH-4-*	LSVG-01EH-10-*	LSVG-01EH-20-*	LSVG-03EH-40-*	LSVG-03EH-60-*	
Descriptions								
Rated Flow at Δ P = 7 MPa ⁽¹⁾ L/min			4	10	20	40	60	
Max. Operating Pressure MPa			35					
Proof Pres. at Return Port MPa			21 (7)			35 (7)		
Drain Port (Y Port) Permissible Back Pres. ⁽²⁾ MPa			0.05 (No Y Port for Wet Type)					
Internal Leakage $\left(\begin{matrix} P_s = 14 \text{ MPa} \\ \text{Max. Leakage} \\ \text{Viscosity: } 32 \text{ mm}^2/\text{s} \end{matrix} \right)$	L/min		0.4 or less	0.8 or less	1.2 or less	1.7 or less		
Hysteresis %			0.1 or less					
Step Response (Typical) ⁽³⁾ $\left[\begin{matrix} P_2 = 14 \text{ MPa} \\ (0 \Leftrightarrow 100 \%) \end{matrix} \right]$			ms		3 (3.5)			4 (4.5)
Frequency Response (± 25 % Amplitude) (Typical) ⁽³⁾	Gain: -3 dB	Hz	240 (230)			260 (240)	250 (220)	
	Phase: -90°	Hz	300 (270)			310 (310)	260 (220)	
Vibration Proof m/s ²			100					
Protection			IP 65					
Ambient Temperature °C			0 - + 50					
Spool Stroke to Stops mm			± 0.5				± 0.75	
Polarity			See the description about I/O signal characteristics on page I-24.					
Linear Motor Specification	Current	A	1.5 (Max. 3.2)					
	Coil Resistance	Ω	7 [at 20 °C]					
Approx. Mass kg			4.3			5.2		
Electric Connection			6 + PE/11 + PE Connector					

Note) ⁽¹⁾ Use the valves so that the relationship between the valve pressure difference and the flow rate, as specified below in “Range of Flow Control”, is met.

⁽²⁾ Back pressure at the drain port (Y) should be 0.05 MPa or less and not be a negative pressure.

⁽³⁾ This value is measured for each valve; it may vary depending on the actual circuit/operation conditions.

Accessories

Mounting Bolts

Model Numbers	Mounting Bolt	Qty.	Bolt Tightening Torque
LSVG-01EH	Hex. Soc. Head Cap Screw : M5 × 55 L	4	6.0 - 8.0 Nm
LSVG-03EH-*10	Hex. Soc. Head Cap Screw : M8 × 65 L	4	30.8 - 37.7 Nm

Connector

Model Numbers	Connector	Qty.	Remarks
LSVG-*EH-*1	6 + PE Electrical Plug	1	Compatible with EN 175201 PART 804
LSVG-*EH-*2	11 + PE Electrical Plug	1	

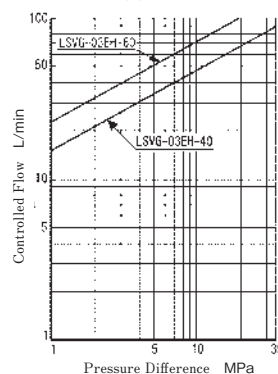
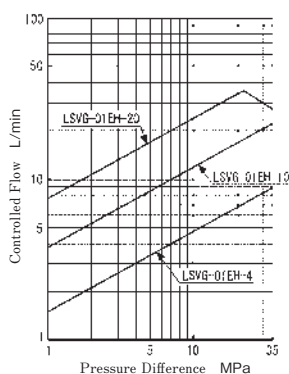
Cable with Connector (Separately Available)

Model Numbers	Connector	Cable Model Numbers	Remarks
LSVG-*EH-*1	6 + PE Electrical Plug	LSVC-6PE-*11	* Cable Length 03 : 3 m 05 : 5 m 10 : 10 m
LSVG-*EH-*2	11 + PE Electrical Plug	LSVC-11PE-*11	

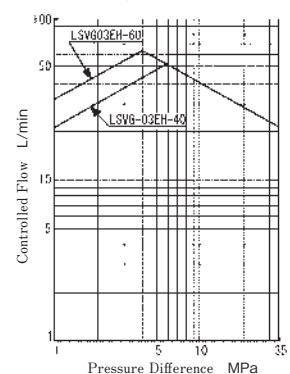
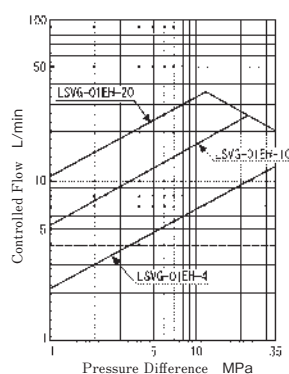
The cable with a connector is a cable assembly that includes the same connector as the one supplied with the valves.

Range of Flow Control

Control Method: 4-Way Valve



Control Method: 3-Way Valve



Electrical Specifications

6 + PE Connector



Valve Model		LSVG-*EH-*-A1 LSVG-*EH-*-D1	LSVG-*EH-*-B1 LSVG-*EH-*-E1	LSVG-*EH-*-C1 LSVG-*EH-*-F1
Pin				
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 100 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM(0 V)		
Pin D	Input (+) (Differential) ^{★1}	0 - ±10 V R _i =100 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	—		

11 + PE Connector



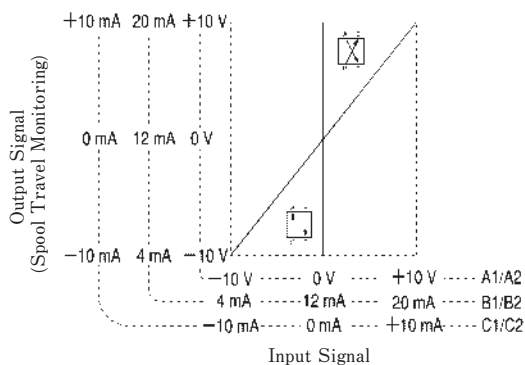
Valve Model		LSVG-*EH-*-A2 LSVG-*EH-*-D2	LSVG-*EH-*-B2 LSVG-*EH-*-E2	LSVG-*EH-*-C2 LSVG-*EH-*-F2
Pin				
Pin 1	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 100 VA or more		
Pin 2		0 V		
Pin 3	Enable (Servo ON) Input	Input Current = 3 - 5 mA at 4.8 - 28 V DC		
Pin 4	Input (+) (Differential) ^{★1}	0 - ±10 V R _i =100 kΩ	4 - 20 mA R _i =200 Ω	0 - ±10 mA R _i =200 Ω
Pin 5	Input (-) (Differential) ^{★1}			
Pin 6	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 7	Signal Common	COM (0 V)		
Pin 8	Valve Ready Output	Open Collector Output Voltage: Max. 30 V, Current: Max. 20 mA		
Pin 9	—	—		
Pin 10	—	—		
Pin 11	Alarm Output	Open Collector Output Voltage: Max. 30 V, Current: Max. 20 mA		
Pin	Protective Earth	—		

★1. Differential input signals can be used only for the valves with the voltage signal specifications of ±10 V (LSVG-*EH-*-A*/D*).

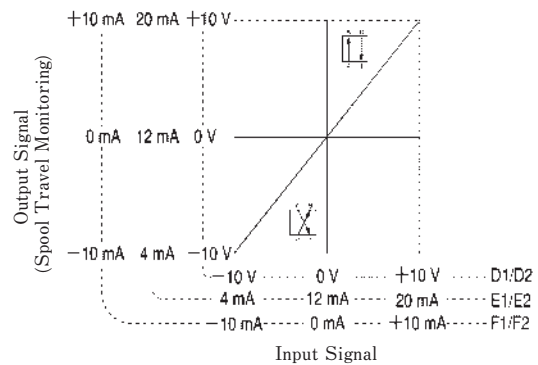
★2. The recommended load resistance is 200 Ω.

I/O Signal Characteristics

· LSVG-*EH-*-A*/B*/C*

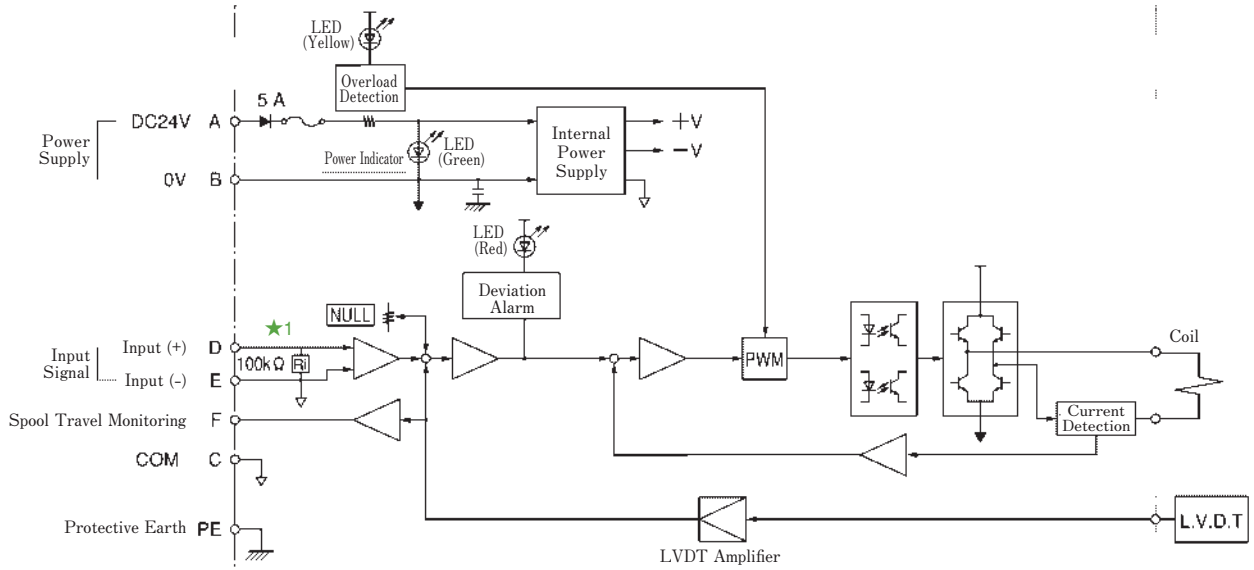


· LSVG-*EH-*-D*/E*/F*

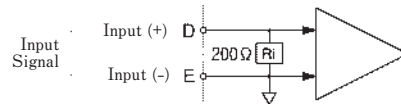


Block Diagram

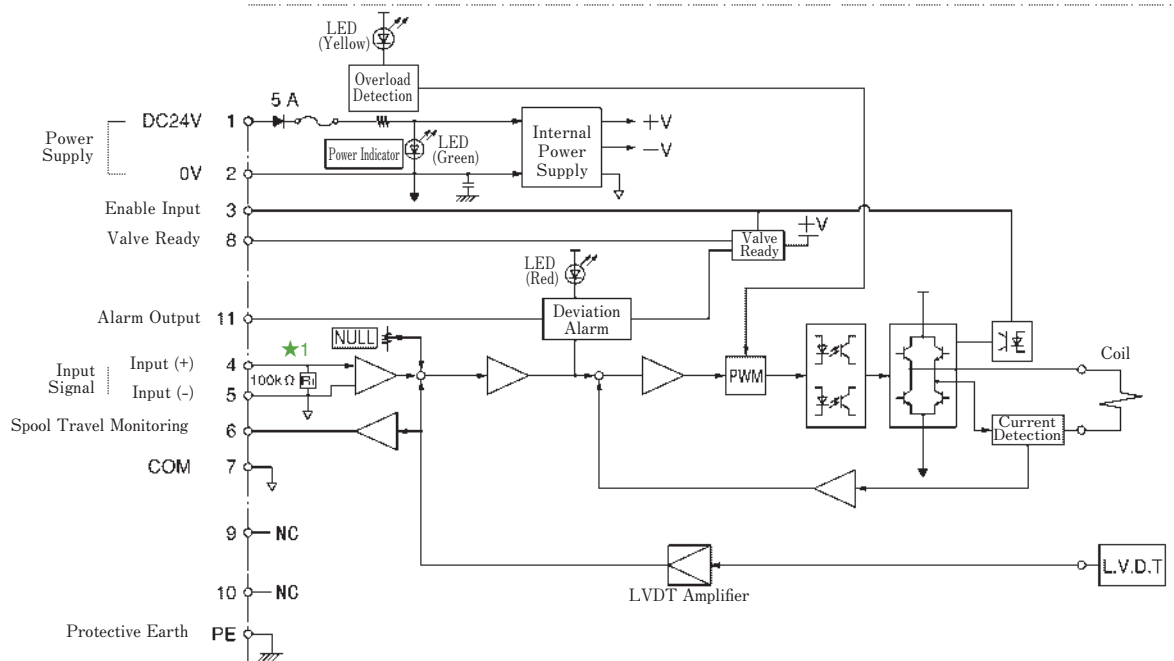
● LSVG-*EH-*-* -A1/B1/C1/D1/E1/F1 (6 + PE Connector)



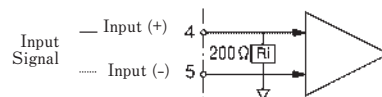
★1. The input stage for the models LSVG-*EH-*-* -B1/C1/E1/F1 (current signal) is as follows.



● LSVG-*EH-*-* -A2/B2/C2/D2/E2/F2 (11 + PE Connector)

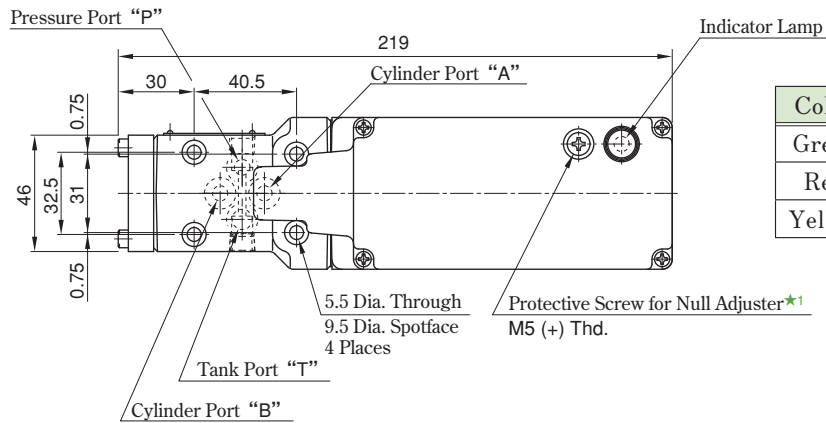


★1. The input stage for the models LSVG-*EH-*-* -B2/C2/E2/F2 (current signal) is as follows.

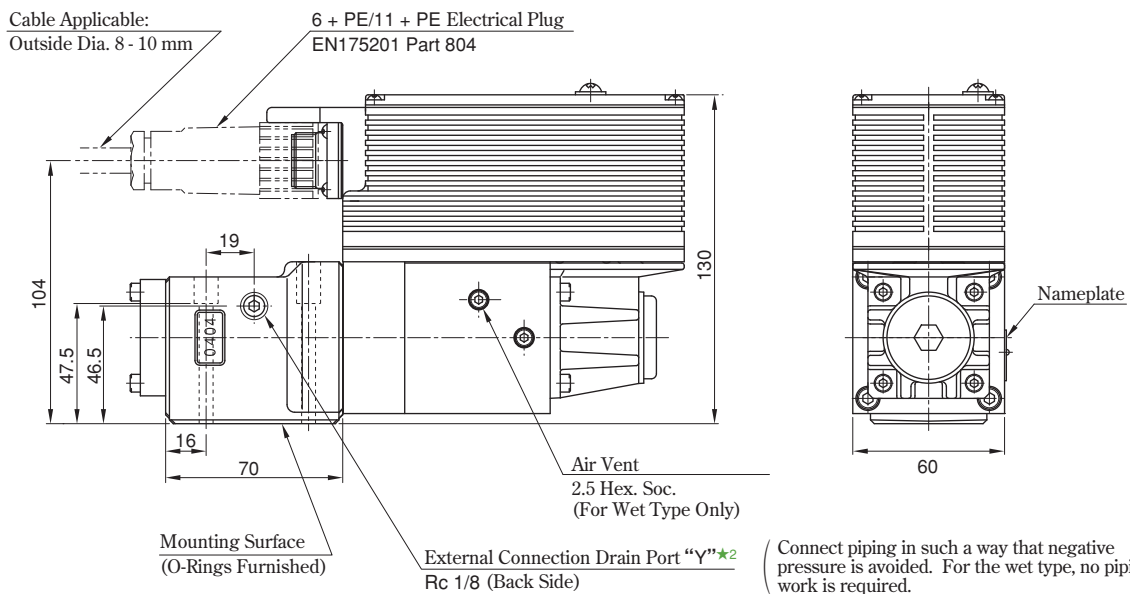


LSVG-01EH

Mounting Surface: Conforming to ISO 4401-03-02-0-05



Color	Indicator Lamp
Green	Power Supply
Red	Deviation Alarm
Yellow	Overload



(Connect piping in such a way that negative pressure is avoided. For the wet type, no piping work is required.)

- ★1. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.
- ★2. For the dry type, the external connection drain port "Y" on the tank port side is usually plugged. To use the port on the tank port side, remove the hexagon socket head plug (5 Hex.) from the drain port on the tank port side and plug the port on the pressure port side.

● O-Rings for the Ports

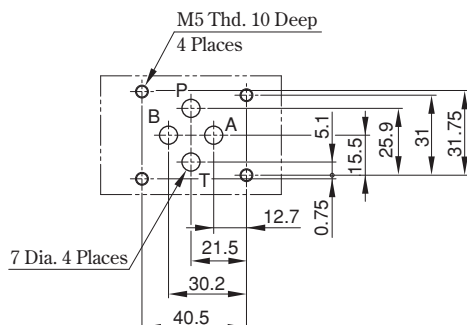
AS568-012 (NBR-90) : 4 pieces

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

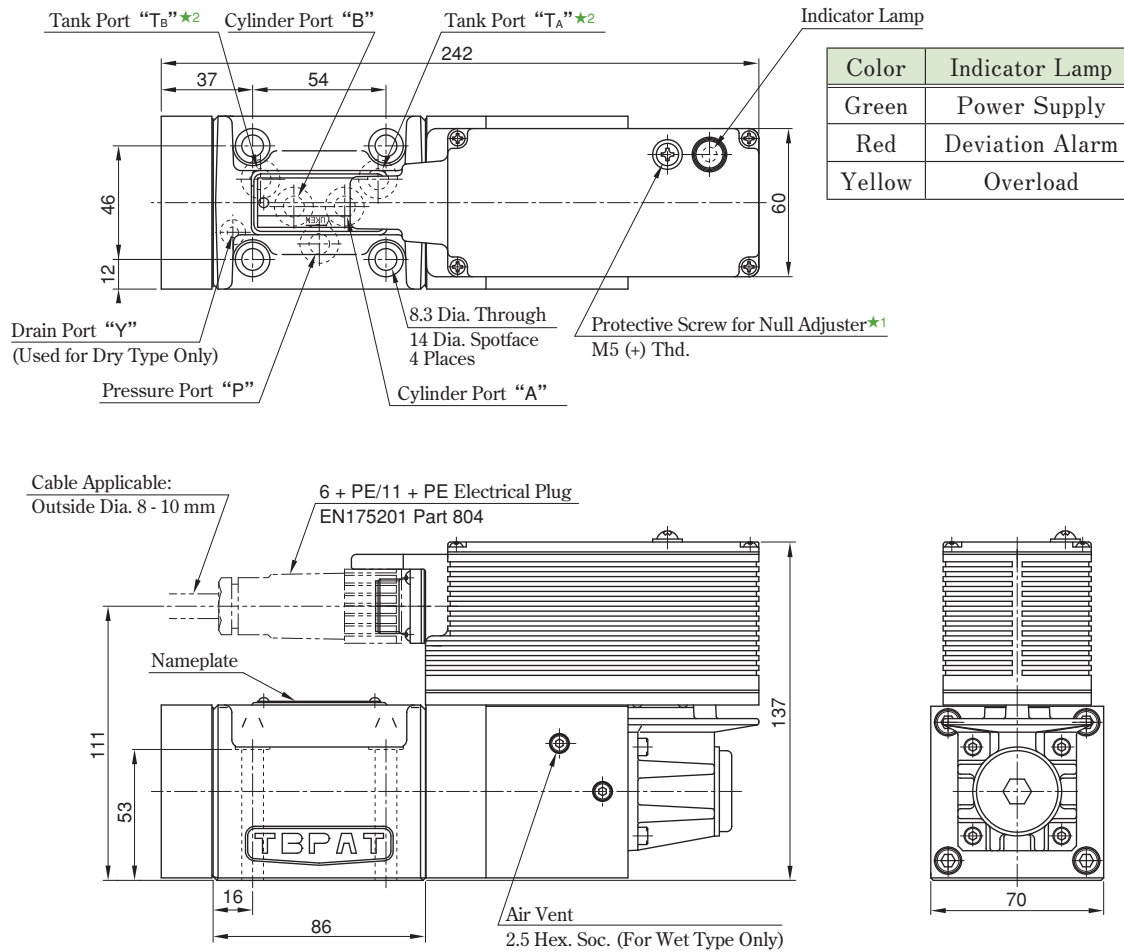
● Dimensions of Mounting Surface

Prepare a mounting surface shown below. Basically, the dimensions of the mounting surface conform to the ISO standard.

The mounting surface should have a good machined finish. $\sqrt{6}$



LSVG-03EH



★1. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

● O-Rings for the Ports

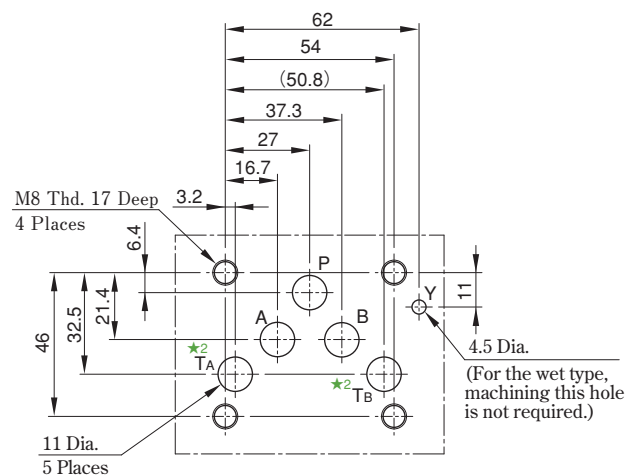
Port	O-Ring Size	Qty.
P, A, B, T	AS568-014 (NBR-90)	5
Y	OR NBR-90 P7-N	1

O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

● Dimensions of Mounting Surface

Prepare a mounting surface shown on the right. Basically, the dimensions of the mounting surface conform to the ISO standard, but the specifications for the valve mounting screws and the drain port "Y" (for the dry type) are different as follows.

	ISO 4401-05-04-0-05	Mounting Surface for LSVG-03EH- *-10
Valve Mounting Screw	M6	M8
Drain Port "Y" (For Dry Type)	Without "Y" Port	With "Y" Port



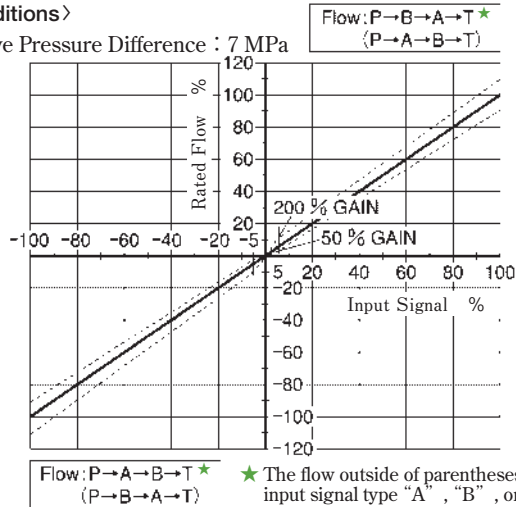
★2. There are two tank ports "T_A" and "T_B"; however, "T_A" may be used alone.

Characteristics of LSVG-01EH-4/10/20 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

<Conditions>

● Valve Pressure Difference : 7 MPa

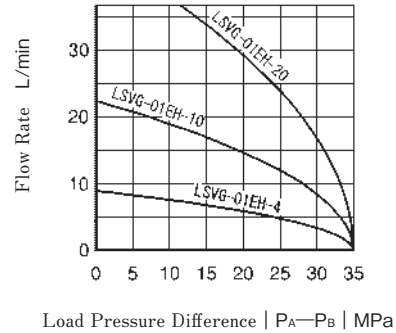


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Load Flow Characteristics

<Conditions> ● Input Signal : 100 %

Note) Tolerance for Load Flow : ±10 %

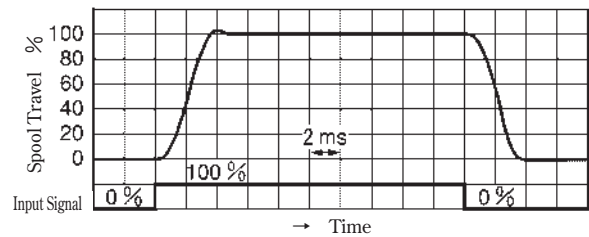
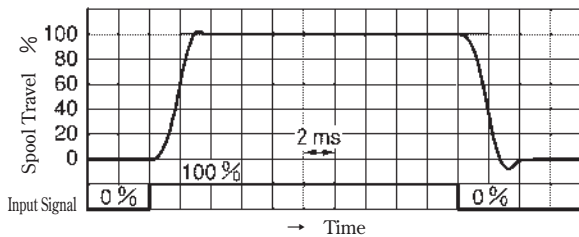


Step Response

<Conditions> ● Input Amplitude : 0 ⇔ 100 % ● Supply Pressure : 14 MPa

● LSVG-01EH-4/10/20-**-10 (Dry Type)

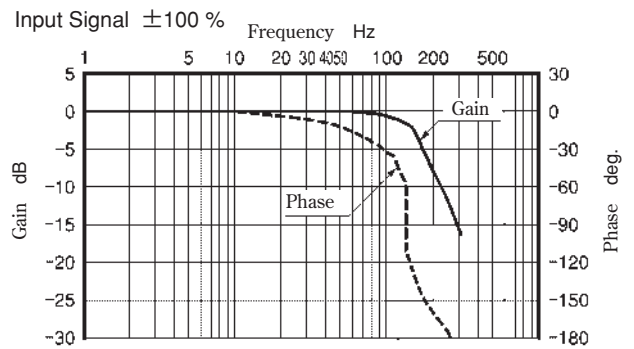
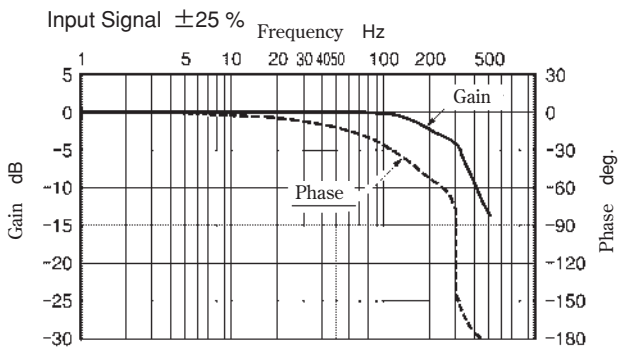
● LSVG-01EH-4/10/20-W**-10 (Wet Type)



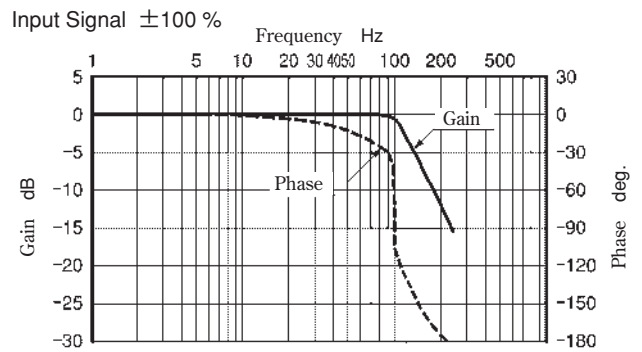
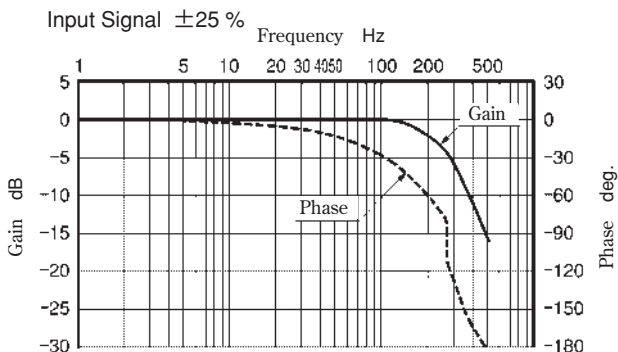
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply Pressure : 14 MPa

● LSVG-01EH-4/10/20-**-10 (Dry Type)



● LSVG-01EH-4/10/20-W**-10 (Wet Type)



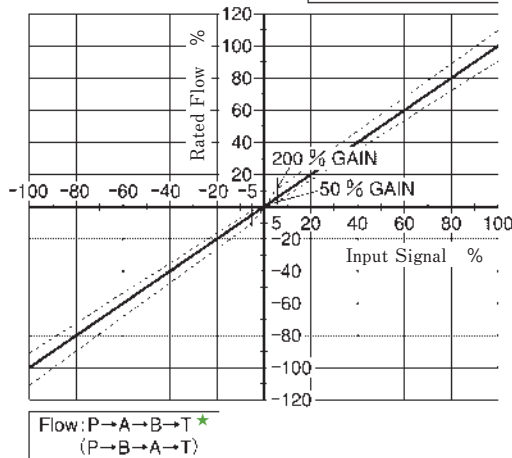
Characteristics of LSVG-03EH-40/60 (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

<Conditions>

● Valve Pressure Difference : 7 MPa

Flow: P→B→A→T ★
(P→A→B→T)

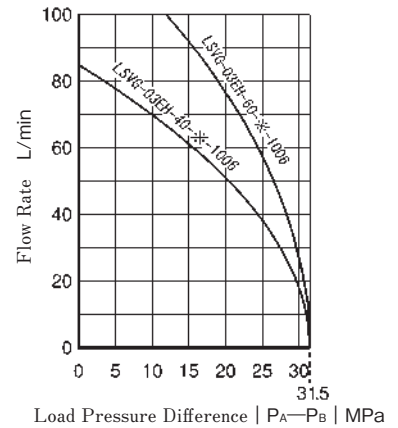
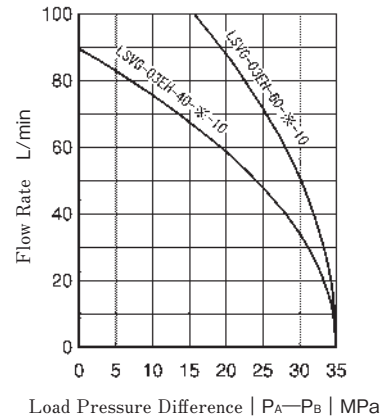


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Load Flow Characteristics

<Conditions> ● Input Signal : 100 %

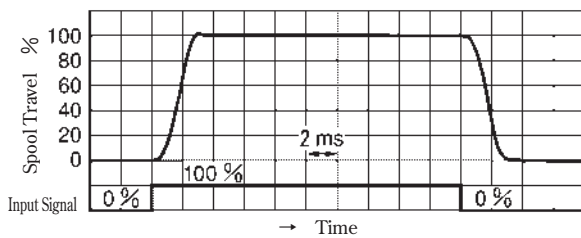
Note) Tolerance for Load Flow : ±10 %



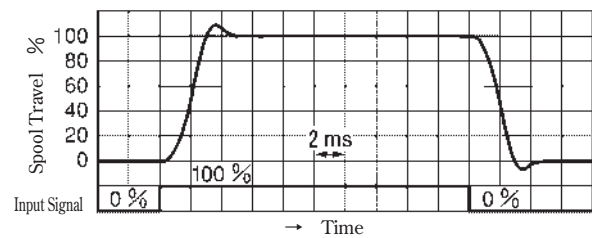
Step Response

<Conditions> ● Input Amplitude : 0 ⇔ 100 % ● Supply Pressure : 14 MPa

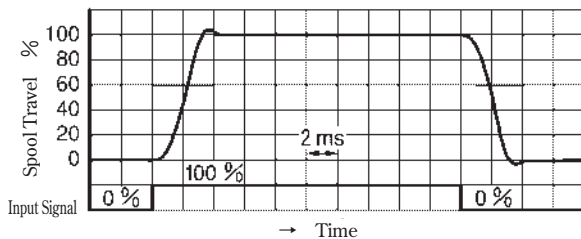
LSVG-03EH-40-W*-10 (Dry Type)



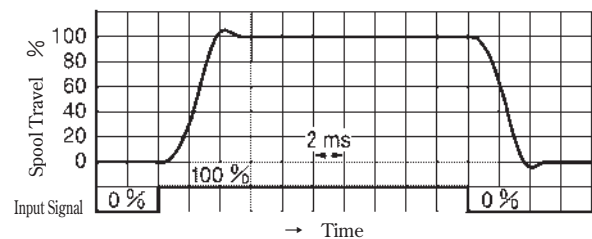
LSVG-03EH-40-W*-10 (Wet Type)



LSVG-03EH-60-W*-10 (Dry Type)



LSVG-03EH-60-W*-10 (Wet Type)

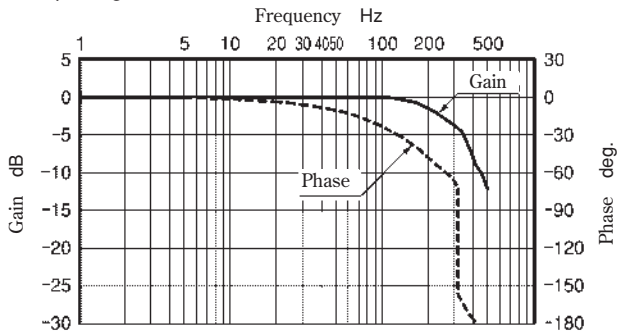


Frequency Response

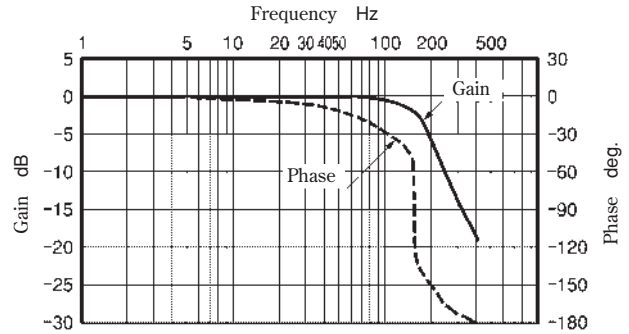
<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply Pressure : 14 MPa

● LSVG-03EH-40-*-10 (Dry Type)

Input Signal $\pm 25\%$

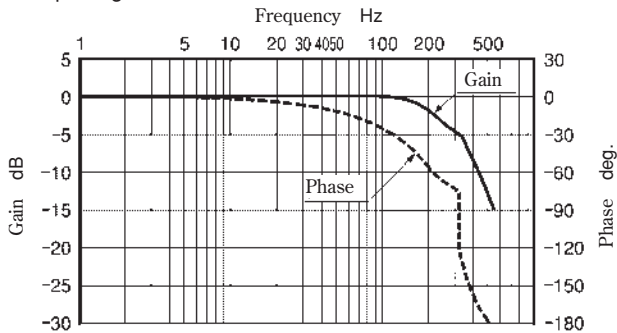


Input Signal $\pm 100\%$

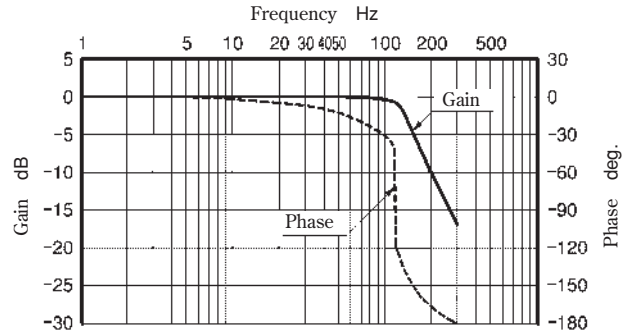


● LSVG-03EH-40-W-*-10 (Wet Type)

Input Signal $\pm 25\%$

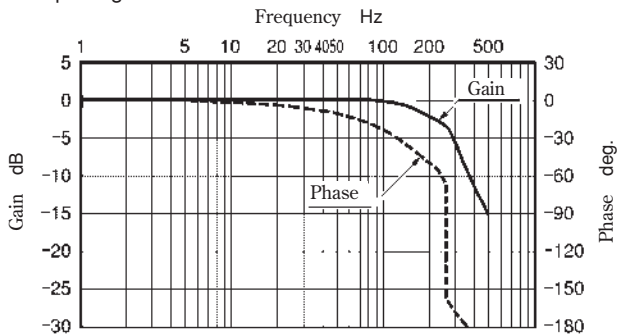


Input Signal $\pm 100\%$

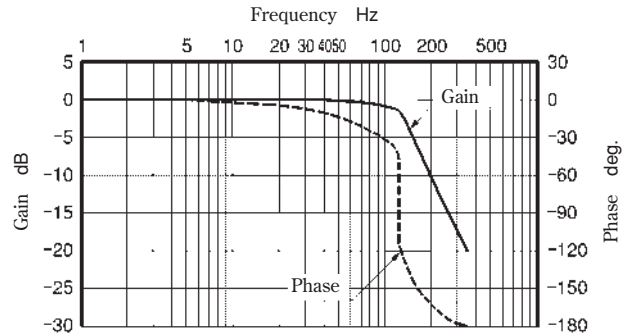


● LSVG-03EH-60-*-10 (Dry Type)

Input Signal $\pm 25\%$

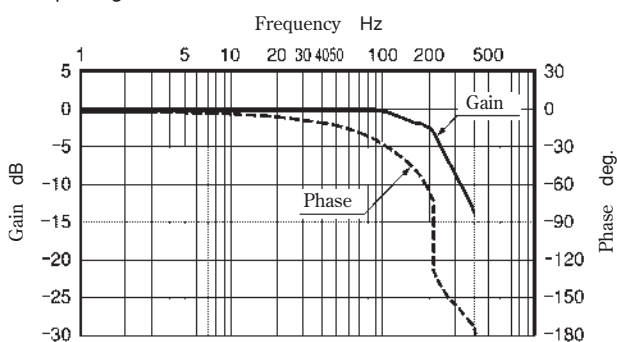


Input Signal $\pm 100\%$

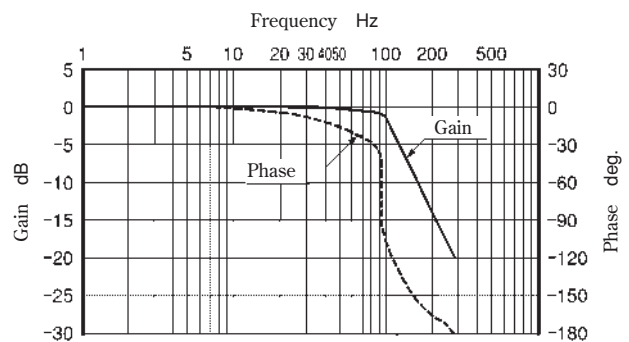


● LSVG-03EH-60-W-*-10 (Wet Type)

Input Signal $\pm 25\%$



Input Signal $\pm 100\%$



OBE(On-Board Electronics) Type Linear Servo Valves (Std. Type)

On-board electronics (OBE) type linear servo valves have been developed based on two stage type high speed linear servo valves, but with a focus on downsizing the pilot valve. The integration of the exclusive amplifier and the linear servo valve in a compact package provides “high accuracy, easiness to use, and great usability”.

● High accuracy

As is the case with the high speed linear servo valves, all of the OBE type linear servo valves have a low hysteresis of 0.1 % or less, realizing high accuracy. These valves allow the main unit to operate with much higher repeatability.

● High response characteristics

Compared to other equivalent models, these valves provide higher levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 7 ms (0 $\leftrightarrow$ 100 %)★, and the frequency response is 125 Hz/-3 dB ($\pm$ 25 % amplitude)★. (★ : Representative values for LSVHG-03EH)

● Easiness to use

These valves can offer high accuracy for hydraulic control systems just with 24 V DC power supply and command signal input.

Six types of input signals in three input voltage/current ranges are available: 0 - $\pm$ 10 V, 0 - $\pm$ 10 mA, and 4 - 20 mA.

● Great usability

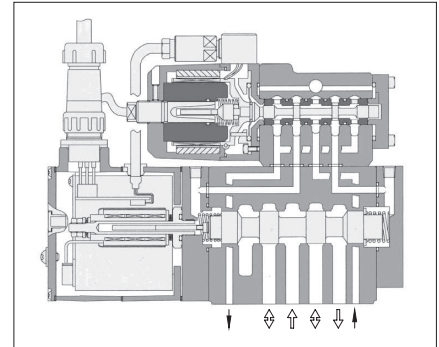
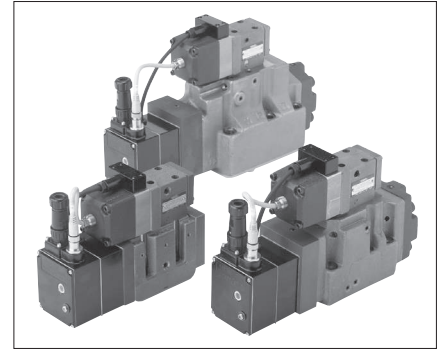
The small amplifier in the valves has a fault indicator lamp. This lamp indicates an error when valve failure causes any deviation between the spool position commanded by the signal and the actual spool position. It facilitates you to immediately troubleshoot the failure of the valves, if any.

● Two types of pilot valves available

There are two types of pilot valves available: a dry type good in response characteristics and a wet type that eliminates the drain (DR) port to improve usability. They can be selected according to users' purposes.

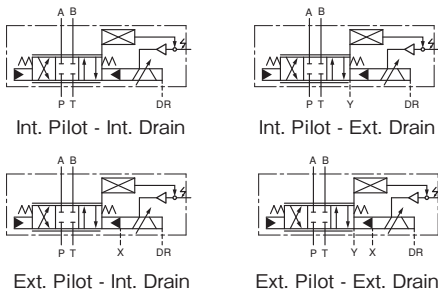
● Excellent contamination resistance

As is the case with the high speed linear servo valves, the OBE type linear servo valves have a simple pilot valve structure, exhibiting excellent contamination resistance. The permissible level of fluid contamination for these valves is up to NAS 1638 class 10.

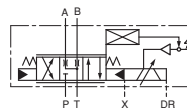


Graphic Symbols

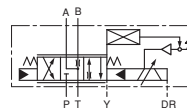
● Spool Types “2”, “2P”, and “2L”



● Spool Type “40”

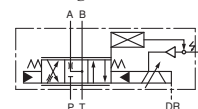


● Spool Type “4J”



The symbols above indicate the external pilot/internal drain type. The internal pilot/internal drain type is the same as that for the spool types “2”, “2P”, and “2L”.

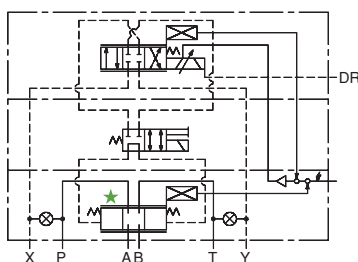
Input Signal/Spool Travel Monitoring “D”/“E”/“F”



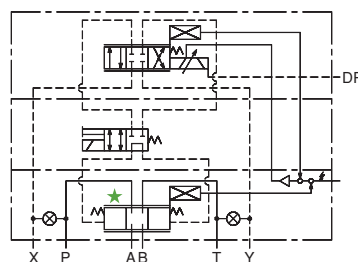
The pilot and drain types are the same as those for the input signal/spool travel monitoring “A”/“B”/“C”.

● Detailed Graphic Symbols (With Fail-safe Solenoid Operated Valve)

LSVHG-03/04EH-**-**EA/*EB/*EC



LSVHG-06/10EH-**-**EA/*EB/*EC



- ⊗ : Plugs for selecting the pilot and drain types
- ★ : Depending on the spool type.
(Same as the graphic symbols shown above)

Model Number Designation

F—	LSVHG	—06	EH	—900	—2P	—E	T	—W	A	—A	1	—20						
Fluid Type	Series Number	Valve Size	Amp. Type	Rated Flow @ΔP = 7 MPa	Spool Type ★1 ★5	Pilot Type	Drain Type	DR Port and Permissible Back Pres.	Fail-safe Function ★1	Input Signal/Spool Travel Monitoring ★1	Connector Type	Design Number						
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	LSVHG: Two Stage Type Linear Servo Valves	03	EH: OBE Type	230: 230 L/min	2L	None: Internal Pilot	None: External Drain	None: With DR Port (Permissible Back Pres.: 0.05 MPa) (Dry Type Pilot Valve)	None: P→B→A→T Position Valve Opening: Full	A: Voltage Signal ±10 V (P→B→A→T Flow with Input Signal (+)) B: Current Signal 4 - 20 mA (P→B→A→T Flow with Current Signal 12 - 20 mA) C: Current Signal ±10 mA (P→B→A→T Flow with Input Signal (+)) D: Voltage Signal ±10 V (P→A→B→T Flow with Input Signal (+)) E: Current Signal 4 - 20 mA (P→A→B→T Flow with Current Signal 12 - 20 mA) F: Current Signal ±10 mA (P→A→B→T Flow with Input Signal (+))	1: PE Pole 6+ Pole 2: ★3 PE Pole 11+ Pole	20						
				270: 270 L/min	2, 40, 2P				A: P→A→B→T Position Valve Opening: Full									
				210: ★4 210 L/min	4J:Open Center A, B & T				Applicable only when a fail-safe solenoid operated valve is mounted									
		04		750: 750 L/min	2, 40, 2P 2L: 2 % Overlap (Linear Flow Gain)				None: External Drain				T: Internal Drain	W: ★2 Without DR Port (Wet Type Pilot Valve)	EA: With Solenoid Operated Valve P→A→B→T Position Valve Opening: 10%	EC: With Solenoid Operated Valve Neutral Position		
				580: ★4 580 L/min	4J:Open Center A, B & T										EB: With Solenoid Operated Valve P→B→A→T Position Valve Opening: 10%			
				900: 900 L/min 1300: 1300 L/min	2, 40, 2P 2L: 2 % Overlap (Linear Flow Gain)										EC: With Solenoid Operated Valve Neutral Position			
		06		820: ★4 820 L/min 1300: 1300 L/min	4J:Open Center A, B & T										None: P→B→A→T Position Valve Opening: Full		A: P→A→B→T Position Valve Opening: Full	
				10	3800: 3800 L/min													2, 40, 2P 2L: 2 % Overlap (Linear Flow Gain)

- ★ 1. The available combinations of the spool type, fail-safe function, and input signal/spool travel monitoring are limited. For details, see the chart on the right.
- ★ 2. The valves with the model number “W” (without DR port) cannot use water-glycol fluids.
- ★ 3. For the valves with the fail-safe function “EC”, select “2” only for the connector type.
- ★ 4. For the spool type “4J”, the rated flow is a value obtained with +100% input and P → A flow (input signal/spool travel monitoring “A”, “B”, and “C”) or P → B flow (“D”, “E”, and “F”).
- ★ 5. For the spool function in the neutral position, see the chart below.

Spool Type	Fail-safe Function	Input Signal/Spool Travel Monitoring
2	With Solenoid Operated Valve: EC	All (A, B, C, D, E, F)
40	Without Solenoid Operated Valve: None/A	
2L	With Solenoid Operated Valve: EA/EB	
2P	Without Solenoid Operated Valve: None/A	
4J	With Solenoid Operated Valve: EC	D, E, F
	Without Solenoid Operated Valve: None	A, B, C
	Without Solenoid Operated Valve: A	

Spool Function in Neutral Position

Spool Type	Function
2, 2P, 2L	
40	
4J	

Fail-safe Function of the Valves

With reference to the information given below, select the option for the fail-safe function according to the use of applications. The valves have a fail-safe function, but a separate safety circuit should be provided if the hydraulic actuator must be reliably held or stopped to ensure safety in the event of electric failure (power failure, power cable disconnection, etc.) or upon startup.

- 1) Electric System: OFF and Hydraulic System: ON (Power Failure/Power Cable Disconnection)

No.	Model Numbers	Fail-safe Function [★]
1	(F-) LSVHG- * * EH- * -2/2P/2L (-E) (T) (-W)	P→B→A→T Position Valve Opening: Full
2	(F-) LSVHG- * * EH- * -2/2P/2L (-E) (T) (-W) A	P→A→B→T Position Valve Opening: Full
3	(F-) LSVHG- * * EH- * -4J (-E) (T) (-W)	P→B→A→T Position Valve Opening: Full
4	(F-) LSVHG- * * EH- * -4J (-E) (T) (-W) A	P→A→B→T Position Valve Opening: Full
5	(F-) LSVHG- * * EH- * -2/2P/2L (-E) (T) (-W) EA (With Fail-safe Solenoid Operated Valve)	P→A→B→T Position Valve Opening: 10 %
6	(F-) LSVHG- * * EH- * -2/2P/2L (-E) (T) (-W) EB (With Fail-safe Solenoid Operated Valve)	P→B→A→T Position Valve Opening: 10 %
7	(F-) LSVHG- * * EH- * -4J (-E) (T) (-W) EC-A * /B * /C * (With Fail-safe Solenoid Operated Valve)	A, B, T Connection (Neutral)
8	(F-) LSVHG- * * EH- * -4J (-E) (T) (-W) EC-D * /E * /F * (With Fail-safe Solenoid Operated Valve)	A, B, T Connection (Neutral)

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

- 2) Electric System: OFF and Hydraulic System: OFF (Startup)

For Models No. 1 and 2 in the table above, the fail-safe function holds the spool in the neutral position. For Models No. 5 and 6, the function is the same as that for “Electric System: OFF and Hydraulic System: ON”. For Models No. 3, 4, 7, and 8, the function is based on A, B, T connection (neutral).

Specifications

LSVHG-*EH-* -2/40/2P/2L

The values in parentheses in the specification table below are applicable to the models “LSVHG-*EH-*-*-*W*-” (without DR port).

Model Numbers			LSVHG— 03EH—230—*		LSVHG—03EH —270—*		LSVHG—04EH —750—*		LSVHG—06EH —900—*		LSVHG—06EH —1300—*		LSVHG—10EH —3800—*								
Descriptions																					
Spool Type			2 L		2	40	2P	2	40	2P	2 L	2	40	2P	2 L	2	40	2P	2 L		
Rated Flow at ΔP = 7 MPa (4-Way Valve) L/min			230		270		750		900		1300		3800								
Rated Flow at ΔP' = 0.5 MPa (per Land) L/min			87		102		283		340		490		1440								
Max. Operating Pressure MPa			31.5				35		35		31.5		35								
Proof Pres. at Return Port ⁽¹⁾	External Drain	T Port MPa	21 ⁽⁵⁾				31.5		35		25		28								
		Y Port MPa	21 (7) ⁽⁵⁾				21 (7)														
	Internal Drain	T & Y Ports MPa	21 (7) ⁽⁵⁾				21 (7)														
DR Port Permissible Back Pressure ⁽²⁾ MPa			0.05 (The valves with the model number “W” have no DR port.)																		
Pilot Pressure ⁽³⁾ MPa			1.5 - 21																		
Pilot Flow Rate ⁽⁴⁾ L/min			9 (8) or more				20 (17) or more		22 (19) or more		23 (19) or more		28 (24) or more								
Pilot Valve Max. Leakage		Pres.: P _S = P _P = 14 MPa Max. Leakage Viscosity: 32 mm ² /s L/min	0.8				1.2														
Main Valve Max. Leakage			1.6	0.5	1	5.6	0.8	1.6	6.8	2.5	0.9	1.8	7	2.5	1	2	8	2.5	3	6	10
Hysteresis %			0.1 or less																		
Step Response (0 <=> 100 %, Typical) ⁽⁶⁾ ms			8 (10)		7 (9)		11 (13)		11 (13)		15 (18)		18 (20)								
Frequency Response (±25 % Amplitude, Typical) ⁽⁶⁾		Gain: -3 dB Hz	120 (100)		125 (110)		100 (90)		100 (90)		75 (70)		60 (55)								
		Phase: -90° Hz	110 (90)		110 (100)		90 (90)		90 (90)		70 (75)		70 (60)								
Vibration Proof ⁽⁷⁾ m/s ²			100																		
Protection			IP 65																		
Ambient Temperature °C			0 - +50																		
Spool Stroke to Stops mm			±4		±3.5		±5		±5		±7		±7								
Spool End Area cm ²			3				7		8		8		11.3								
Polarity			See the description about I/O signal characteristics on page I-36.																		
Linear Motor Specification		Current A	Max. 2.1																		
		Coil Resistance Ω	9.6 [at 20 °C]																		
Approx. Mass ⁽⁸⁾ kg			8.5 [11]				14 [16]		20 [24]		20 [24]		77								
Electric Connection			6 + PE/11 + PE Connector 【EN175201 Part 804】																		

Note) ⁽¹⁾ Pressure at the return port should be at actual supply pressure or less.

⁽²⁾ Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.

⁽³⁾ Supply pressure for the pilot valve should be 1.5 - 21 MPa and should also be 60 % of actual supply pressure or more.

⁽⁴⁾ The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.

⁽⁵⁾ To use an external pilot type valve with a supply pressure of 21 MPa or more, pressures at the T and Y ports should be 7 MPa or less.

⁽⁶⁾ This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.

⁽⁷⁾ There are restrictions on the mounting position; refer to the instructions for details.

⁽⁸⁾ A value in brackets indicates the mass of each valve with a fail-safe solenoid operated valve.

⁽⁹⁾ For the effective range of the fail-safe function, see page I-60.

Specifications

LSVHG-*EH-* -4J-* -A*/B*/C*

The values in parentheses in the specification table below are applicable to the models “LSVHG-*EH-*-*-*EH-W*-*” (without DR port).

Model Numbers			LSVHG-03EH-210 -4J- *-A */B */C *	LSVHG-04EH-580 -4J- *-A */B */C *	LSVHG-06EH-820 -4J- *-A */B */C *	LSVHG-06EH-1300 -4J- *-A */B */C *
Descriptions						
Spool Type			4J: Open Center A, B & T P→B Flow: 10 % Overlap, A→T Flow: 50 % Underlap P→A Flow: 60 % Overlap, B→T Flow: 5 % Underlap			
Rated Flow (±10%)	Δ P = 3.5 MPa (per Land)	L/min	P→B Flow: 210 A→T Flow: 235 P→A Flow: 95 B→T Flow: 240	P→B Flow: 580 A→T Flow: 675 P→A Flow: 255 B→T Flow: 660	P→B Flow: 820 A→T Flow: 950 P→A Flow: 370 B→T Flow: 940	P→B Flow: 1300 A→T Flow: 1440 P→A Flow: 660 B→T Flow: 1375
	Δ P = 0.5 MPa (per Land)	L/min	P→B Flow: 79 A→T Flow: 89 P→A Flow: 36 B→T Flow: 91	P→B Flow: 219 A→T Flow: 255 P→A Flow: 96 B→T Flow: 249	P→B Flow: 310 A→T Flow: 359 P→A Flow: 140 B→T Flow: 355	P→B Flow: 491 A→T Flow: 544 P→A Flow: 249 B→T Flow: 520
Max. Operating Pressure		MPa	31.5	35	35	31.5
Proof Pres. at Return Port ⁽¹⁾	External Drain	T Port MPa	21	31.5	35	25
		Y Port MPa	21 (7)			
	Internal Drain	T & Y Ports MPa	21 (7)			
DR Port Permissible Back Pressure ⁽²⁾		MPa	0.05 or less (The valves with the model number “W” have no DR port.)			
Pilot Pressure ⁽³⁾		MPa	1.5 - 21			
Pilot Flow Rate ⁽⁴⁾		L/min	9 (8) or more	20 (17) or more	22 (19) or more	23 (19) or more
Pilot Valve Max. Leakage	Pres.: P _S = P _P = 14 MPa	L/min	0.8 or less	1.2 or less	1.2 or less	
Main Valve Max. Leakage	Max. Leakage Viscosity: 32 mm ² /s		0.7 or less	1.1 or less	1.2 or less	
Hysteresis		%	0.1 or less			
Step Response (0 ≤ 100 %) P _p = 14 MPa (Typical) ⁽⁵⁾		ms	7 (9)	11 (13)	11 (13)	15 (18)
Frequency Response (±25 % Amplitude) P _p = 14 MPa (Typical) ⁽⁵⁾		Hz	Gain = -3 dB: 125 (110) Phase = -90° : 110 (100)	Gain = -3 dB: 100 (90) Phase = -90° : 90 (90)	Gain = -3 dB: 100 (90) Phase = -90° : 90 (90)	Gain = -3 dB: 75 (70) Phase = -90° : 70 (75)
Vibration Proof		m/s ²	100			
Protection			IP 65			
Ambient Temperature		℃	0 - +50			
Spool Stroke to Stops		mm	±3.5	±5	±5	±7
Spool End Area		cm ²	3	7	8	8
Polarity			See the description about I/O signal characteristics on page I-36.			
Linear Motor	Current	A	Max. 2.1			
Specification	Coil Resistance	Ω	9.6 [at 20 ℃]			
Approx. Mass ⁽⁶⁾		kg	8.5 [11]	14 [16]	20 [24]	
Electric Connection			6 + PE/11 + PE Connector 【EN175201 Part 804】			

- Note) (1) Pressure at the return port should be at actual supply pressure or less (to use an external pilot type valve with the size “03” at 21 MPa or more, pressures at the T and Y ports should be 7 MPa or less).
- (2) Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.
- (3) Supply pressure for the pilot valve should be 1.5 - 21 MPa and should also be 60 % of actual supply pressure or more.
- (4) The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.
- (5) This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.
- (6) A value in brackets indicates the mass of each valve with a fail-safe solenoid operated valve.
- (7) For the effective range of the fail-safe function, see page I-60.

Specifications

● LSVHG-*EH-*-4J-*-D*/E*/F*

The values in parentheses in the specification table below are applicable to the models “LSVHG-*EH-*-**EH-W*-*” (without DR port).

Model Numbers			LSVHG-03EH-210 -4J-* -D*/E*/F*	LSVHG-04EH-580 -4J-* -D*/E*/F*	LSVHG-06EH-820 -4J-* -D*/E*/F*	LSVHG-06EH-1300 -4J-* -D*/E*/F*
Descriptions						
Spool Type			4J: Open Center A, B & T P→A Flow: 10 % Overlap, B→T Flow: 50 % Underlap P→B Flow: 60 % Overlap, A→T Flow: 5 % Underlap			
Rated Flow (±10%)	Δ P = 3.5 MPa (per Land)	L/min	P→A Flow: 210 B→T Flow: 235 P→B Flow: 95 A→T Flow: 240	P→A Flow: 580 B→T Flow: 675 P→B Flow: 255 A→T Flow: 660	P→A Flow: 820 B→T Flow: 950 P→B Flow: 370 A→T Flow: 940	P→A Flow: 1300 B→T Flow: 1440 P→B Flow: 660 A→T Flow: 1375
	Δ P = 0.5 MPa (per Land)	L/min	P→A Flow: 79 B→T Flow: 89 P→B Flow: 36 A→T Flow: 91	P→A Flow: 219 B→T Flow: 255 P→B Flow: 96 A→T Flow: 249	P→A Flow: 310 B→T Flow: 359 P→B Flow: 140 A→T Flow: 355	P→A Flow: 491 B→T Flow: 544 P→B Flow: 249 A→T Flow: 520
Max. Operating Pressure		MPa	31.5	35	35	31.5
Proof Pres. at Return Port ⁽¹⁾	External Drain	T Port MPa	21	31.5	35	25
	Internal Drain	Y Port MPa	21 (7)			
		T & Y Ports MPa	21 (7)			
DR Port Permissible Back Pressure ⁽²⁾		MPa	0.05 or less (The valves with the model number “W” have no DR port.)			
Pilot Pressure ⁽³⁾		MPa	1.5 - 21			
Pilot Flow Rate ⁽⁴⁾		L/min	9 (8) or more	20 (17) or more	22 (19) or more	23 (19) or more
Pilot Valve Max. Leakage	Pres.: PS = PP = 14 MPa	L/min	0.8 or less	1.2 or less	1.2 or less	
Main Valve Max. Leakage	Max. Leakage Viscosity: 32 mm ² /s		0.7 or less	1.1 or less	1.2 or less	
Hysteresis		%	0.1 or less			
Step Response (0 <=> 100 %) Pp = 14 MPa (Typical) ⁽⁵⁾		ms	7 (9)	11 (13)	11 (13)	15 (18)
Frequency Response (± 25 % Amplitude) Pp = 14 MPa (Typical) ⁽⁵⁾		Hz	Gain = -3 dB: 125 (110) Phase = -90° : 110 (100)	Gain = -3 dB: 100 (90) Phase = -90° : 90 (90)	Gain = -3 dB: 100 (90) Phase = -90° : 90 (90)	Gain = -3 dB: 75 (70) Phase = -90° : 70 (75)
Vibration Proof		m/s ²	100			
Protection			IP 65			
Ambient Temperature		℃	0 - +50			
Spool Stroke to Stops		mm	±3.5	±5	±5	±7
Spool End Area		cm ²	3	7	8	8
Polarity			See the description about I/O signal characteristics on page I-36.			
Linear Motor Specification	Current	A	Max. 2.1			
	Coil Resistance	Ω	9.6 [at 20 ℃]			
Approx. Mass ⁽⁶⁾		kg	8.5 [11]	14 [16]	20 [24]	
Electric Connection			6 + PE/11 + PE Connector 【EN175201 Part 804】			

- Note) (1) Pressure at the return port should be at actual supply pressure or less (to use an external pilot type valve with the size “03” at 21 MPa or more, pressures at the T and Y ports should be 7 MPa or less).
 (2) Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure.
 (3) Supply pressure for the pilot valve should be 1.5 - 21 MPa and should also be 60 % of actual supply pressure or more.
 (4) The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.
 (5) This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.
 (6) A value in brackets indicates the mass of each valve with a fail-safe solenoid operated valve.
 (7) For the effective range of the fail-safe function, see page I-60.

Accessories

● Mounting Bolts

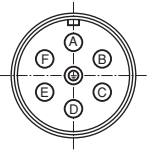
Model Numbers	Mounting Bolt	Qty.	Bolt Tightening Torque
LSVHG-03EH	Hex. Soc. Head Cap Screw : M6×35L	4	12.9 - 15.9 Nm
LSVHG-04EH	Hex. Soc. Head Cap Screw : M6×55L	2	12.9 - 15.9 Nm
	Hex. Soc. Head Cap Screw : M10×60L	4	60.6 - 74.1 Nm
LSVHG-06EH	Hex. Soc. Head Cap Screw : M12×85L	6	104 - 127 Nm
LSVHG-10EH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

● Connector

Model Numbers	Connector	Qty.	Remarks
LSVHG-*EH -*-*1	6 + PE Electrical Plug	1	Compatible with EN 175201 PART 804
LSVHG-*EH -*-*2	11 + PE Electrical Plug	1	

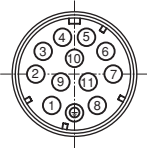
Electrical Specifications

6 + PE Connector



Valve Model		LSVHG- *EH- *-A1 LSVHG- *EH- *-D1	LSVHG- *EH- *-B1 LSVHG- *EH- *-E1	LSVHG- *EH- *-C1 LSVHG- *EH- *-F1
Pin				
Pin A	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 50 VA or more		
Pin B		0 V		
Pin C	Signal Common	COM (0 V)		
Pin D	Input (+) (Differential) ★ ¹	0 - ±10 V	4 - 20 mA	0 - ±10 mA
Pin E	Input (-) (Differential) ★ ¹	R _i = 100 kΩ	R _i = 200 Ω	R _i = 200 Ω
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	—		

11 + PE Connector



Valve Model		LSVHG- *EH- *-A2 LSVHG- *EH- *-D2	LSVHG- *EH- *-B2 LSVHG- *EH- *-E2	LSVHG- *EH- *-C2 LSVHG- *EH- *-F2
Pin				
Pin 1	Power Supply	24 V DC (21.6 - 26.4 V DC Included Ripple), 50 VA or more		
Pin 2		0 V		
Pin 3	Enable (Servo ON) Input	Input Current = 3 - 5 mA at 4.8 - 28 V DC		
Pin 4	Input (+) (Differential) ★ ¹	0 - ±10 V	4 - 20 mA	0 - ±10 mA
Pin 5	Input (-) (Differential) ★ ¹	R _i = 100 kΩ	R _i = 200 Ω	R _i = 200 Ω
Pin 6	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 7	Signal Common	COM (0 V)		
Pin 8	Valve Ready Output	Open Collector Output Voltage: Max. 30 V, Current: Max. 20 mA		
Pin 9 ★ ³	Power Supply (For Solenoid Operated Valve)	24 V DC (21.6 - 26.4 V DC Included Ripple), 14 VA (Holding Current: 0.6 A)		
Pin 10 ★ ³		0 V		
Pin 11	Alarm Output	Open Collector Output Voltage: Max. 30 V, Current: Max. 20 mA		
Pin	Protective Earth	—		

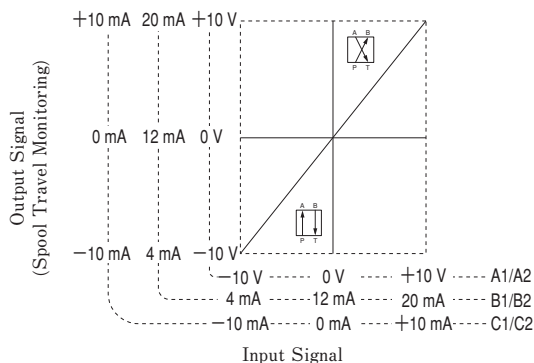
★¹. Differential input signals can be used only for the valves with the voltage signal specifications of ±10 V (LSVHG- *EH-A*/D*).

★². The recommended load resistance is 200 Ω.

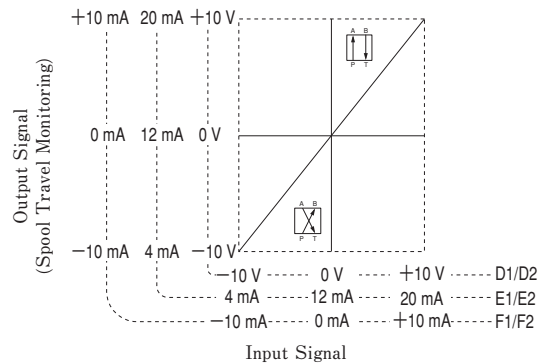
★³. Pins 9 and 10 are used only for the valves with a fail-safe solenoid operated valve. In this case, use a separate power source for the solenoid operated valve from the power source for the amplifier (Pins 1 and 2).

I/O Signal Characteristics

· LSVHG- *EH- *-A*/B*/C*

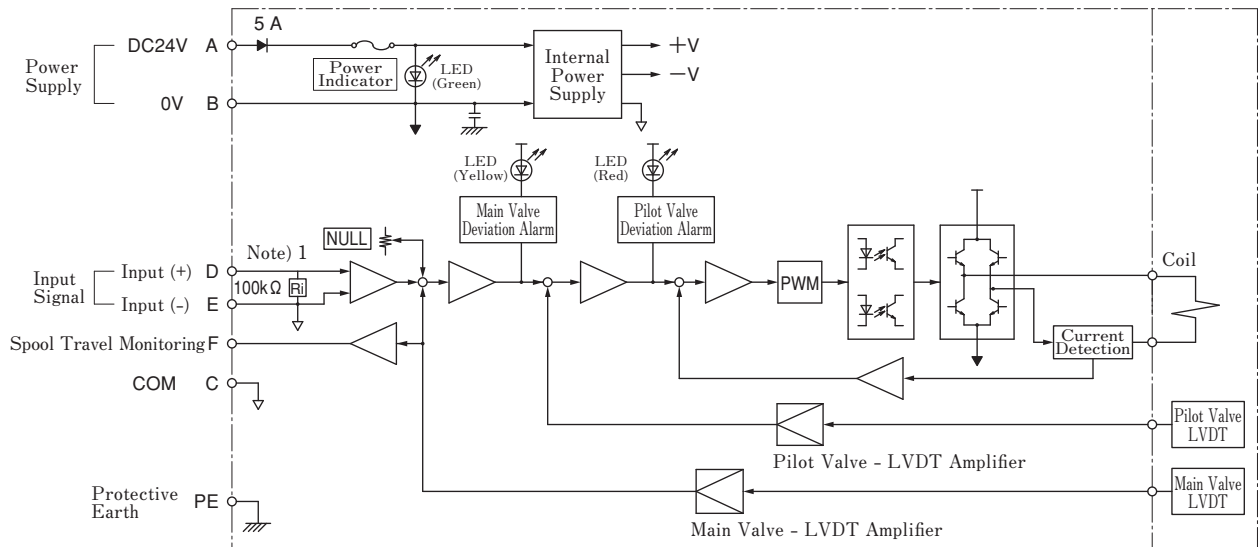


· LSVHG- *EH- *-D*/E*/F*

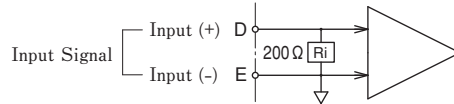


Block Diagram

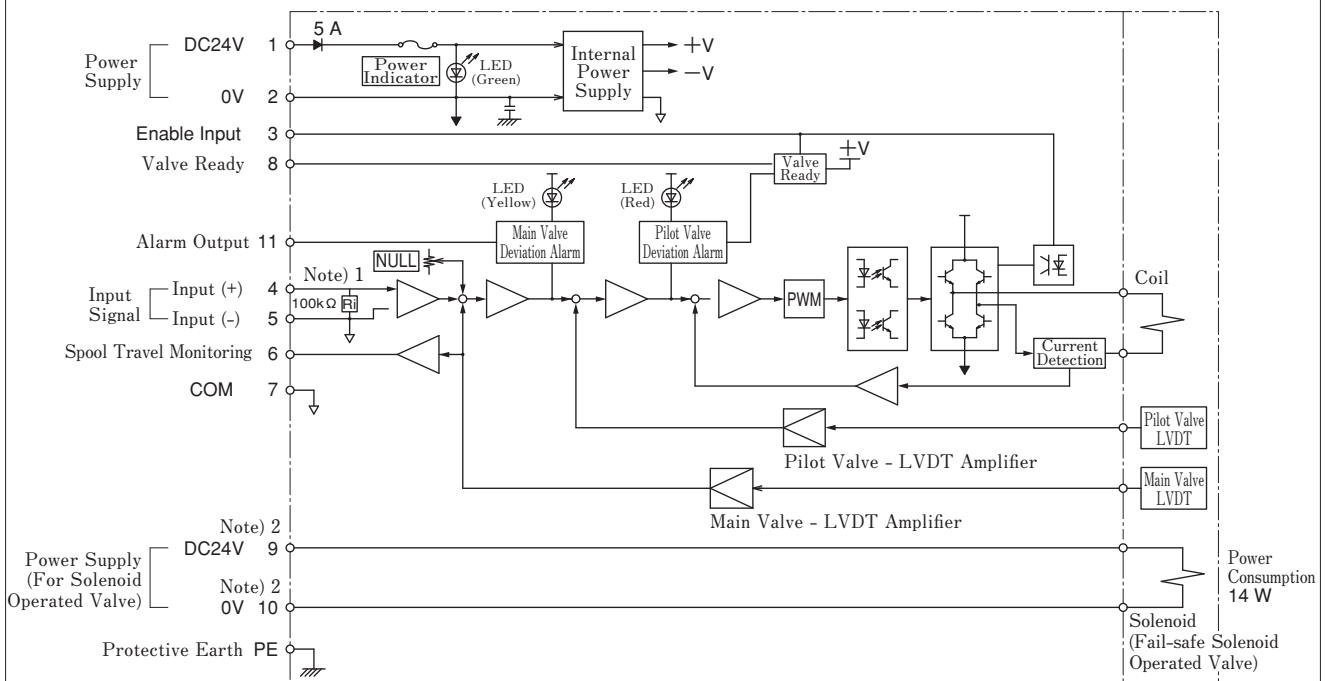
● LSVHG-*EH-*-*A1/D1 (6 + PE Connector)



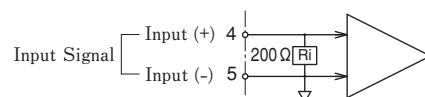
Note) 1. The input stage for the models LSVHS-*EH-*-*B1/C1/E1/F1 (current signal) is as follows.



● LSVHG-*EH-*-*A2/D2 (11 + PE Connector)



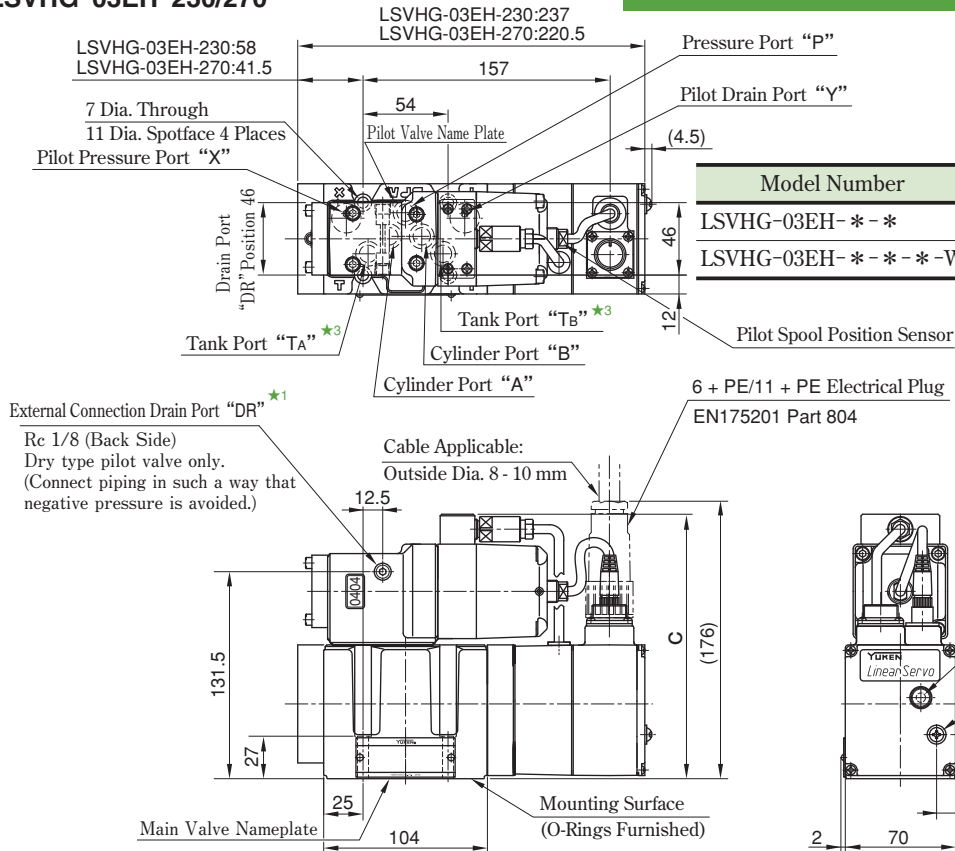
Note) 1. The input stage for the models LSVHG-*EH-*-*B2/C2/E2/F2 (current signal) is as follows.



2. Pins 9 and 10 are used only for the models LSVHG-*EH-*-*E* with a fail-safe solenoid operated valve.

LSVHG-03EH-230/270

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

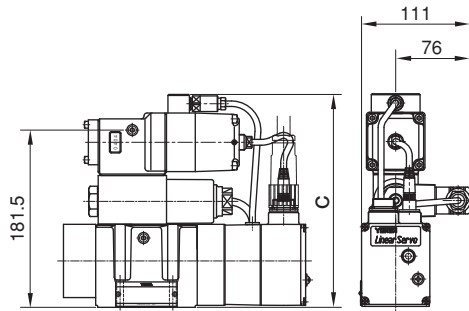


Model Number	C	Remarks
LSVHG-03EH- * - *	168	Pilot Valve: Dry Type
LSVHG-03EH- * - * - W	177	Pilot Valve: Wet Type

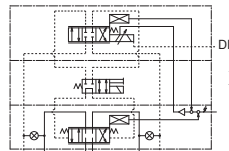
Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

- ★1. The external connection drain port "DR" on the front side is usually plugged. To use the port on the front side, remove the hexagon socket head plug (5 Hex.) and plug the port on the back side.
- ★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

**LSVHG-03EH-230/270- * - * EA/EB/EC
(With Fail-safe Solenoid Operated Valve)**



Detailed Graphic Symbol

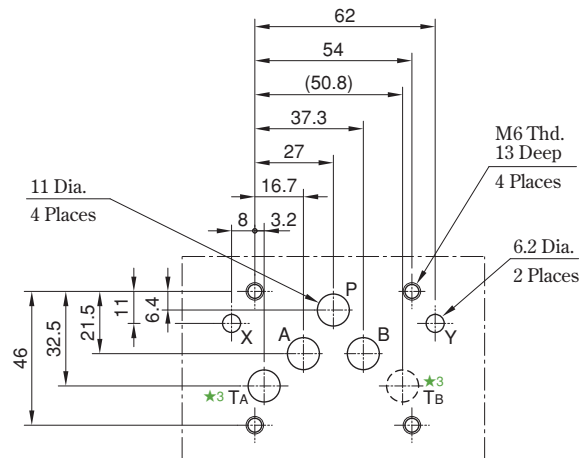


Note) The configuration in the shaded area varies with the selected spool type (corresponding to Graphic Symbols on page I-31).

⊗ : Plugs for selecting the pilot and drain types

[Dimensions of Mounting Surface]

Prepare a mounting surface shown below. Basically, the dimensions of the mounting surface conform to ISO 4401-05-05-0-05. The mounting surface should have a good machined finish. ($\sqrt{6}$)



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

Model Numbers	C	Remarks
LSVHG-03EH- * - * - E *	218	Pilot Valve: Dry Type
LSVHG-03EH- * - * - WE *	227	Pilot Valve: Wet Type

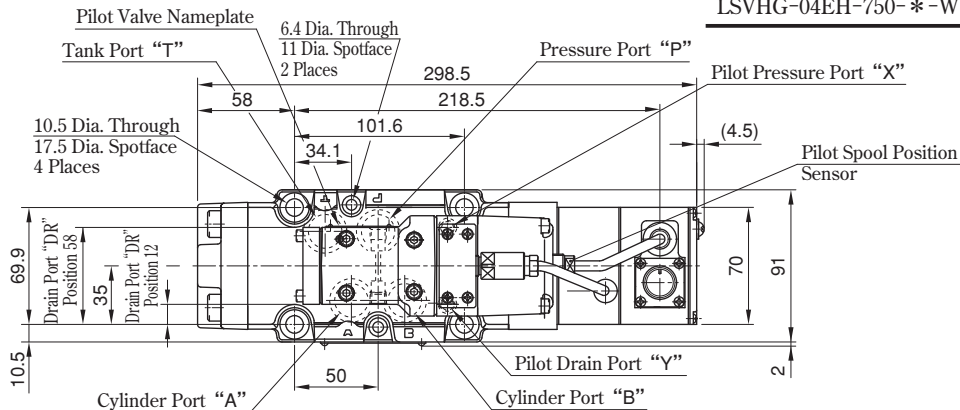
● For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

● O-Rings for the Ports

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

O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

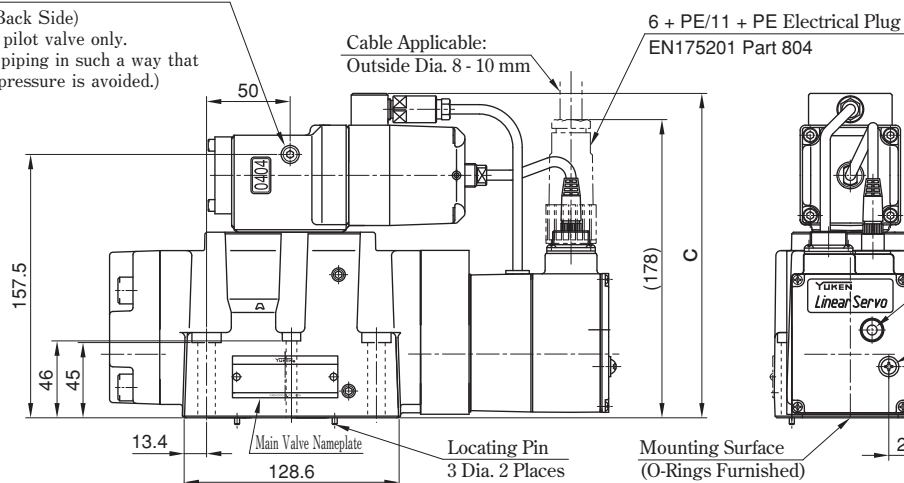
LSVHG-04EH-750



Model Numbers	C	Remarks
LSVHG-04EH-750-*	194	Pilot Valve: Dry Type
LSVHG-04EH-750-* -W	203	Pilot Valve: Wet Type

External Connection Drain Port "DR"

Rc 1/8 (Back Side)
Dry type pilot valve only.
(Connect piping in such a way that negative pressure is avoided.)

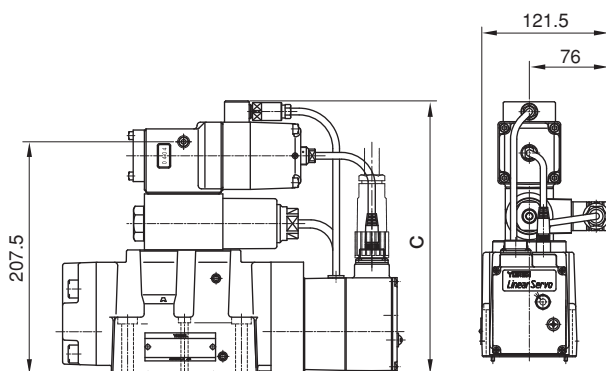


Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

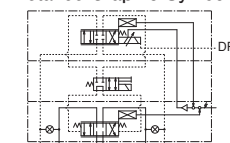
Indicator Lamp
Protective Screw for Null Adjuster
M5 (+) Thd.

- ★1. The external connection drain port "DR" on the front side is usually plugged. To use the port on the front side, remove the hexagon socket head plug (5 Hex.) and plug the port on the back side.
- ★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

LSVHG-04EH-750- * - * EA/EB/EC (With Fail-safe Solenoid Operated Valve)



Detailed Graphic Symbol



Note) The configuration in the shaded area varies with the selected spool type (corresponding to Graphic Symbols on page I-31).

⊗: Plugs for selecting the pilot and drain types

Model Numbers	C	Remarks
LSVHG-04EH-750- * -E *	244	Pilot Valve: Dry Type
LSVHG-04EH-750- * -WE *	253	Pilot Valve: Wet Type

● For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

● O-Rings for the Ports

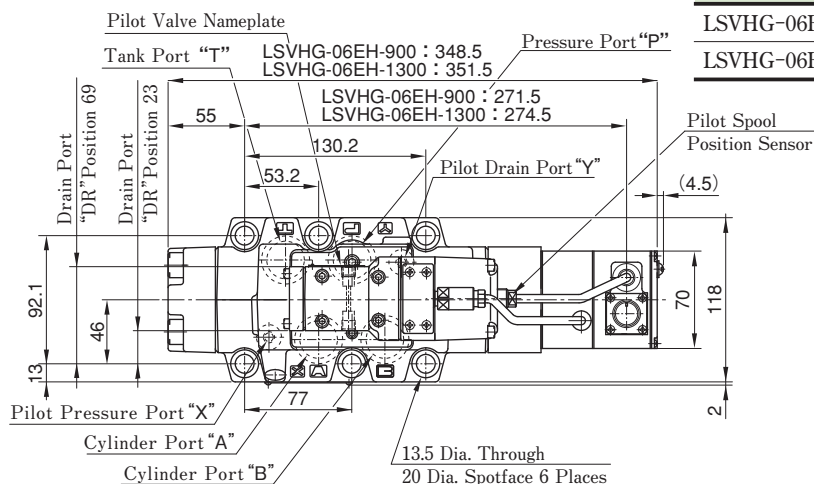
Port	O-Ring Size	Qty.
P, A, B, T	OR NBR-90 P22-N	4
X, Y	AS568-012 (NBR-90)	2

O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

[Dimensions of Mounting Surface]

The dimensions of the mounting surface are the same as those of the models LSVHG-04 (page I-12).

LSVHG-06EH-900/1300

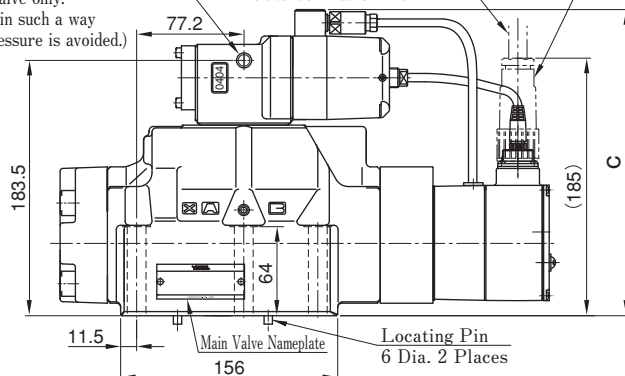


Model Numbers	C	Remarks
LSVHG-06EH- * - *	244	Pilot Valve: Dry Type
LSVHG-06EH- * - *-W	253	Pilot Valve: Wet Type

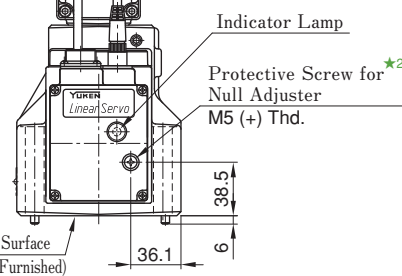
External Connection Drain Port "DR"★
Rc 1/8 (Both Sides)
Dry type pilot valve only.
(Connect piping in such a way
that negative pressure is avoided.)

Cable Applicable:
Outside Dia. 8 - 10 mm

6 + PE/11 + PE Electrical Plug
EN175201 Part 804

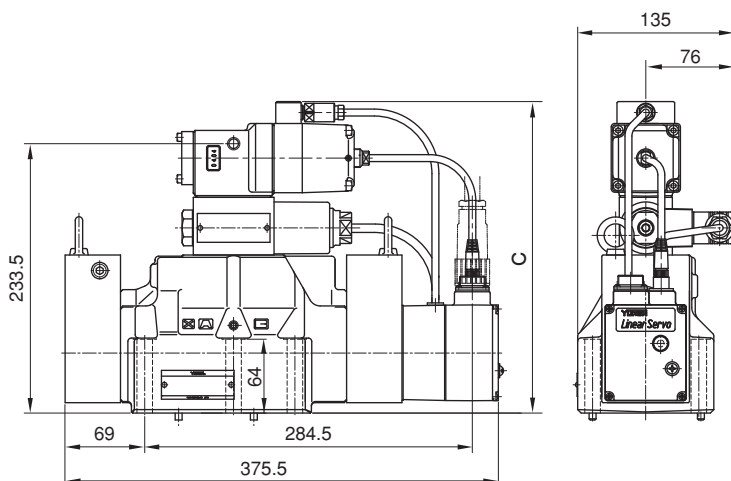


Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

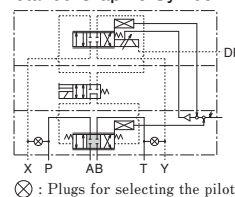


- ★1. The external connection drain port "DR" on the back side is usually plugged. To use the port on the back side, remove the hexagon socket head plug (Hex. 5) and plug the port on the front side.
- ★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

LSVHG-06EH-900/1300- * - * EA/EB/EC (With Fail-safe Solenoid Operated Valve)



Detailed Graphic Symbol



Note) The configuration in the shaded area varies with the selected spool type (corresponding to Graphic Symbols on page I-31).

Model Numbers	C	Remarks
LSVHG-06EH- * - *-E *	270	Pilot Valve: Dry Type
LSVHG-06EH- * - *-WE *	279	Pilot Valve: Wet Type

● For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

● O-Rings for the Ports

Port	O-Ring Size		Qty.
	LSVHG-06EH-900	LSVHG-06EH-1300	
P, A, B, T	AS568-123 (NBR-90)	AS568-126 (NBR-90)	4
X, Y	OR NBR-90 P14-N		2

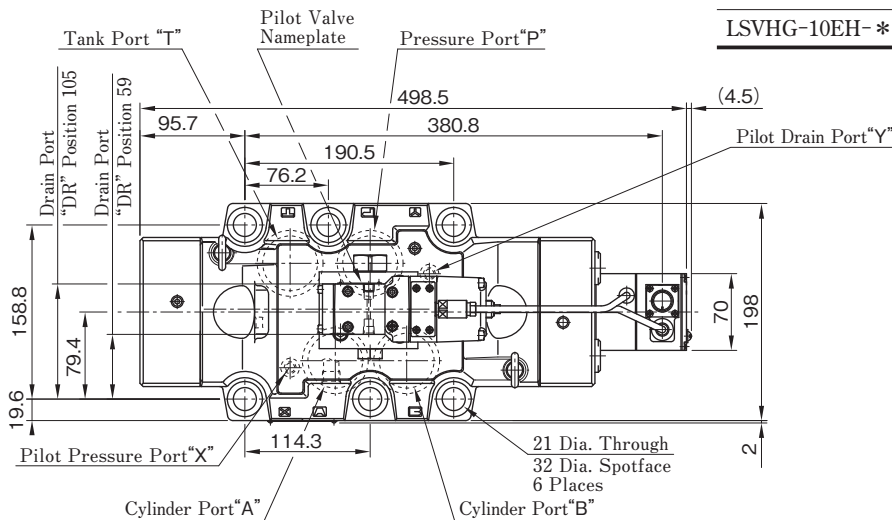
O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

[Dimensions of Mounting Surface]

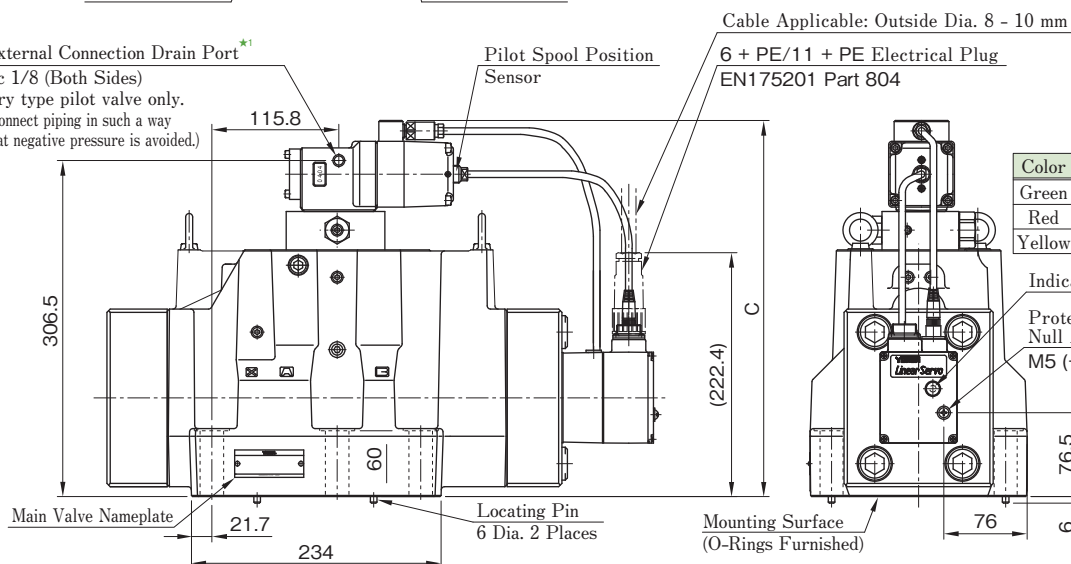
The dimensions of the mounting surface are the same as those of the models LSVHG-06 (page I-13).

LSVHG-10EH-3800

Model Numbers	C	Remarks
LSVHG-10EH-**-*	343	Pilot Valve: Dry Type
LSVHG-10EH-***-W	352	Pilot Valve: Wet Type



External Connection Drain Port^{★1}
Rc 1/8 (Both Sides)
Dry type pilot valve only.
(Connect piping in such a way
that negative pressure is avoided.)



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

- ★1. The external connection drain port "DR" on the back side is usually plugged. To use the port on the back side, remove the hexagon socket head plug (Hex. 5) and plug the port on the front side.
- ★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

[Dimensions of Mounting Surface]

The dimension of the mounting surface can be fitted with ISO standard.
However, the hole dia. of P,A,B,T are different with those.
Please see mounting surface as shown right.

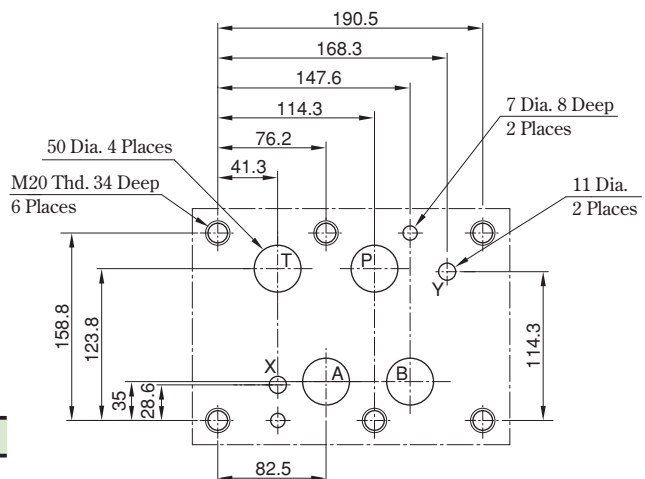
	ISO 4401-10-08-0-94	Mounting Surface for LSVHG-10EH
Hole dia. Of P,A,B,T port.	36 Dia.	50 Dia.

The mounting surface should have a good machined finish. ($\sqrt{16}$)

● O-Rings for the Ports

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

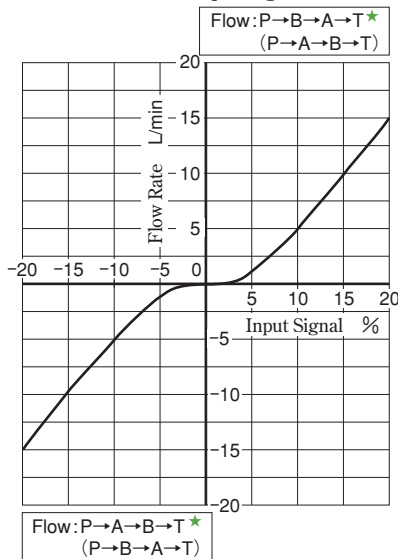
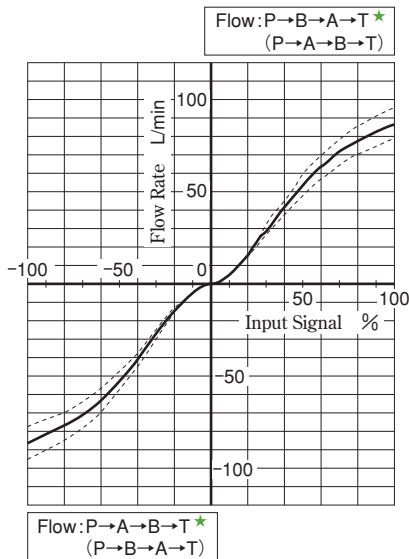
O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.



Characteristics of LSVHG-03EH-230 (Fluid Viscosity: 30 mm²/s)

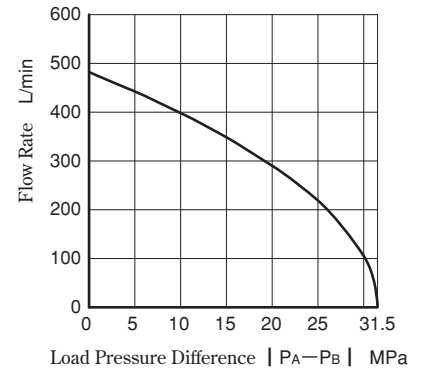
No-Load Flow Characteristics

<Conditions> ● Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)
Around Null Position Input Signal -20 ⇔ +20 %



Load Flow Characteristics

<Conditions> ● Input Signal : 100 %
Note) Tolerance for Load Flow : ±10 %

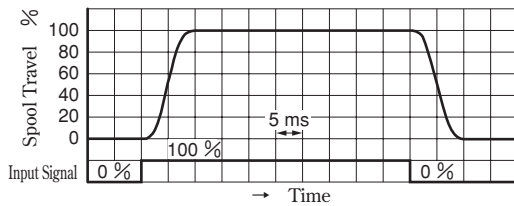


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

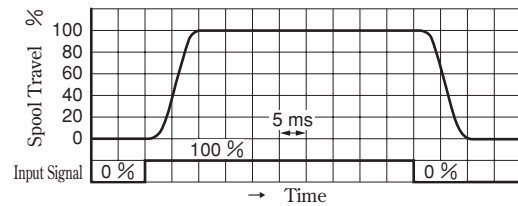
Step Response

<Conditions> ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

Pilot Valve: Dry Type



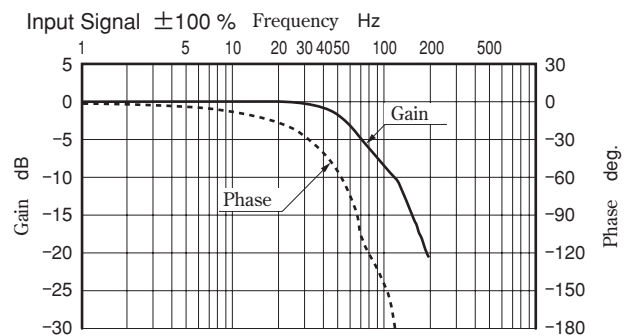
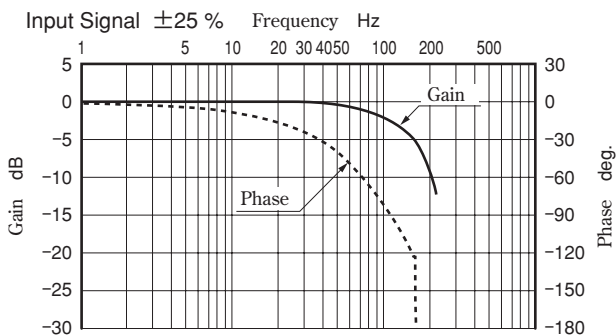
Pilot Valve: Wet Type



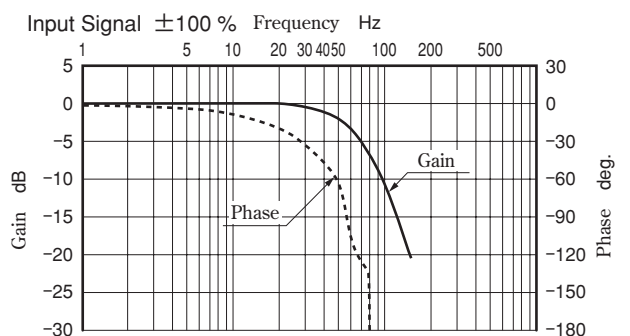
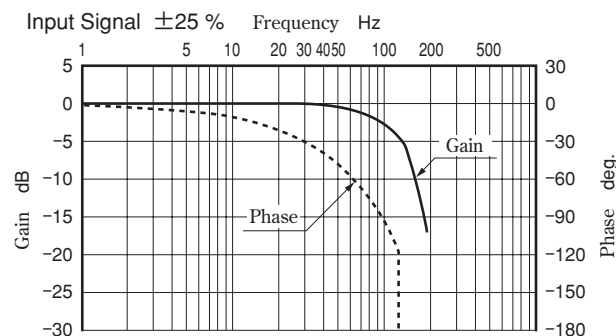
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

Pilot Valve: Dry Type



Pilot Valve: Wet Type

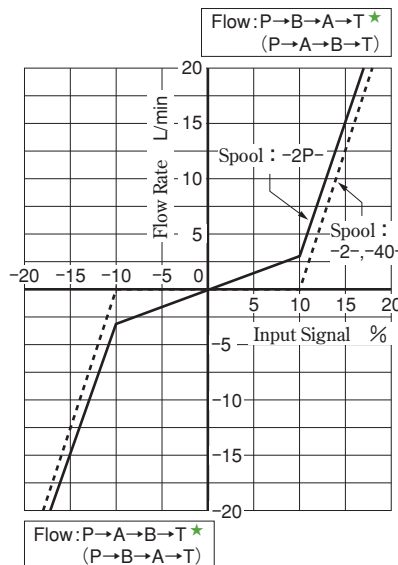
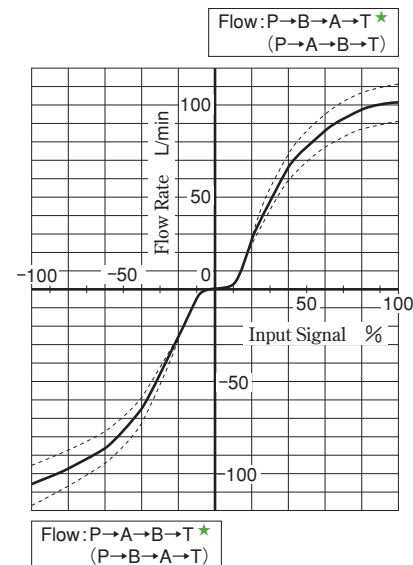


Characteristics of LSVHG-03EH-270-2/40/2P (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

<Conditions> ● Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)

Around Null Position Input Signal -20 ⇔ +20 %

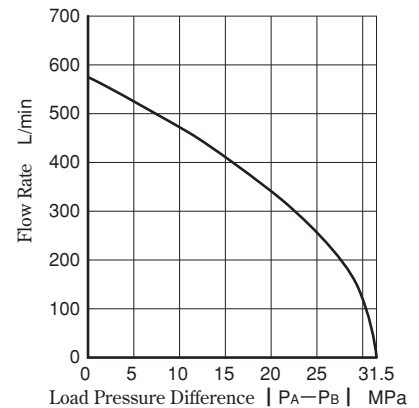


Load Flow Characteristics

<Conditions>

● Input Signal : 100 %

Note) Tolerance for Load Flow : ±10 %

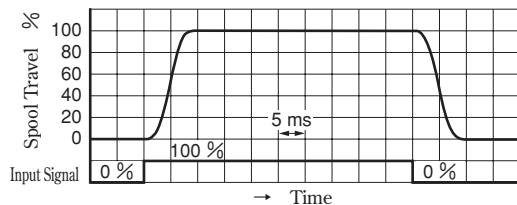


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

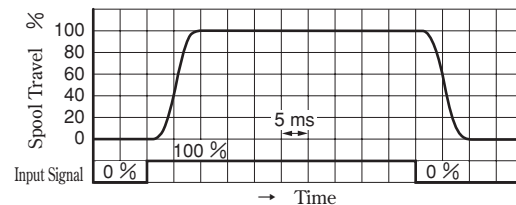
Step Response

<Conditions> ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



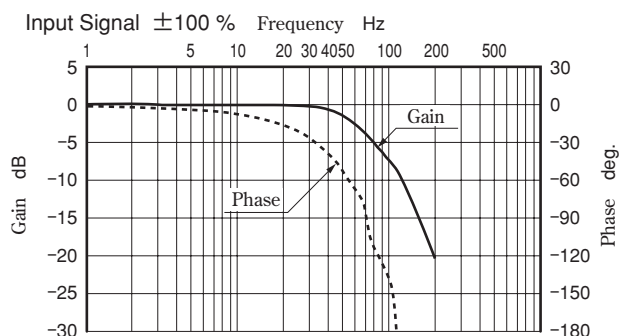
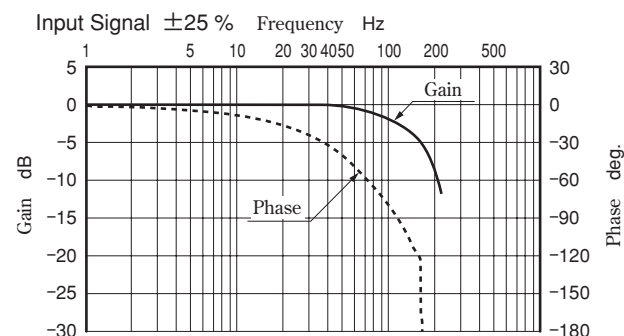
● Pilot Valve: Wet Type



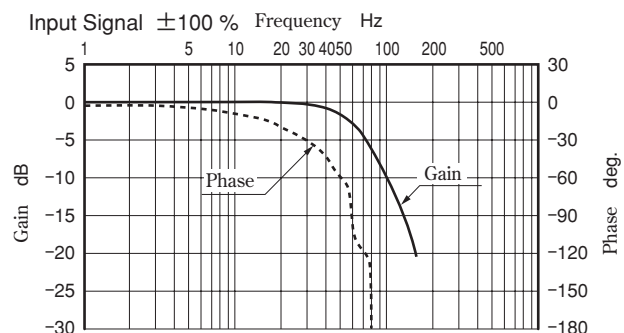
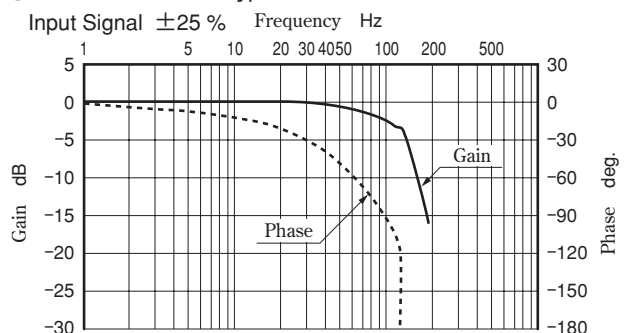
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



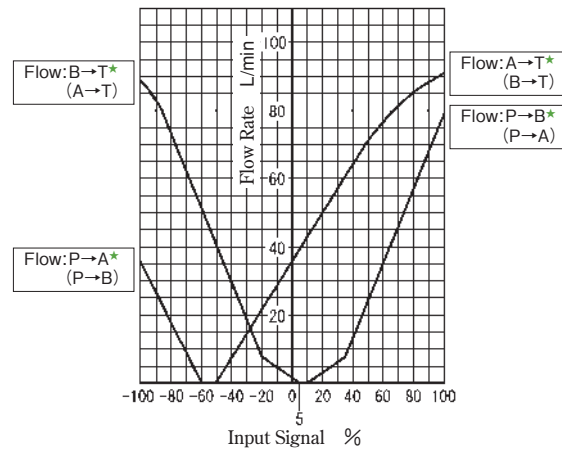
● Pilot Valve: Wet Type



Characteristics of LSVHG-03EH-210-4J (Fluid Viscosity: 30 mm²/s)

■ No-Load Flow Characteristics

〈Conditions〉 ● Valve Pressure Difference: $\Delta P = 0.5 \text{ MPa}$ (per Land)

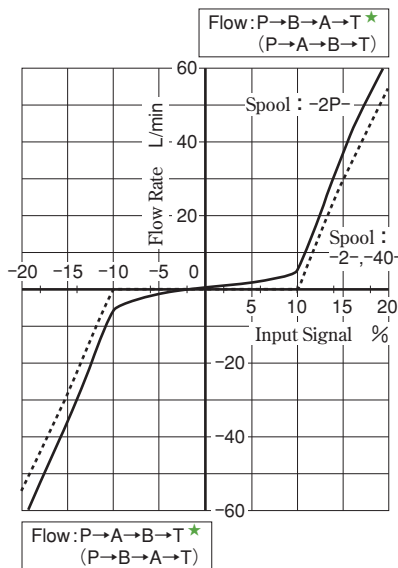
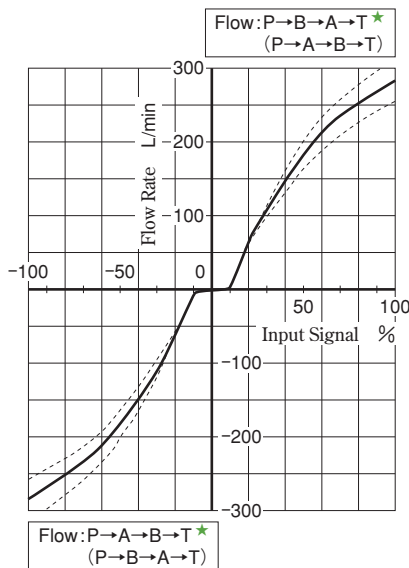


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-04EH-750-2/40/2P (Fluid Viscosity: 30 mm²/s)

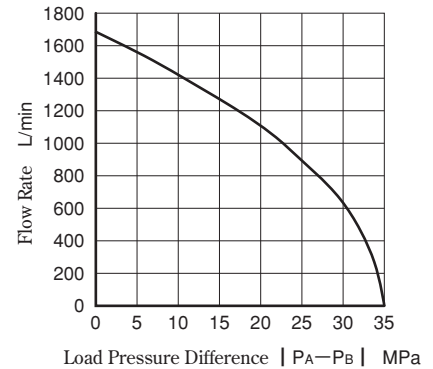
No-Load Flow Characteristics

<Conditions> ● Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)
Around Null Position Input Signal -20 ⇔ +20 %



Load Flow Characteristics

<Conditions> ● Input Signal : 100 %
Note) Tolerance for Load Flow : ±10 %

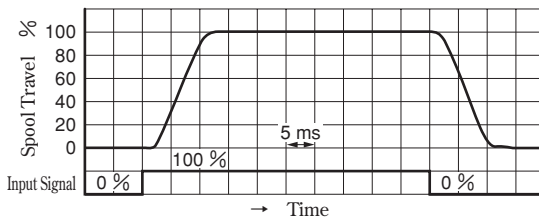


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

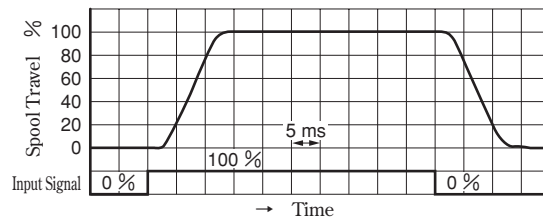
Step Response

<Conditions> ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

Pilot Valve: Dry Type



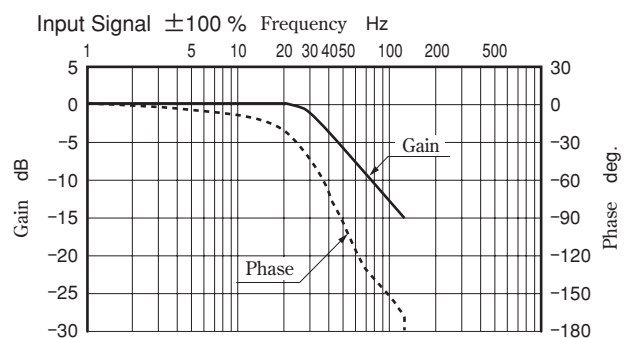
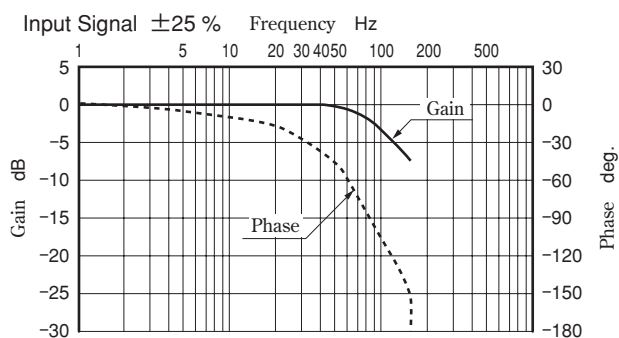
Pilot Valve: Wet Type



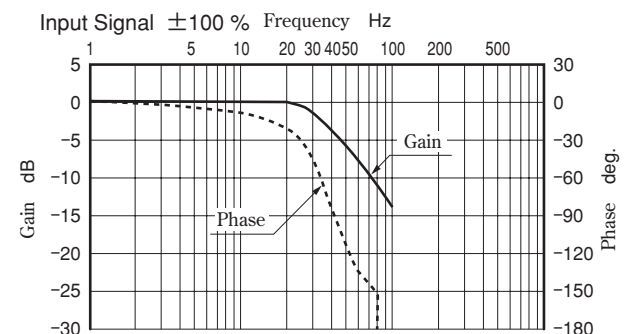
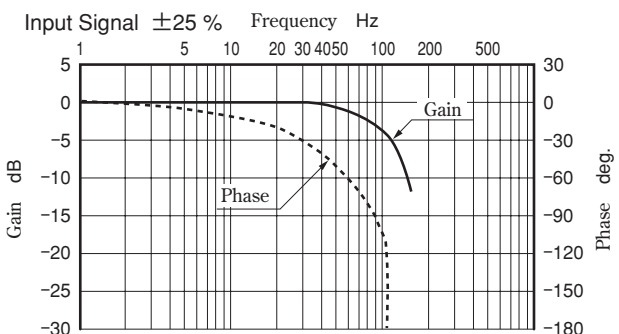
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

Pilot Valve: Dry Type



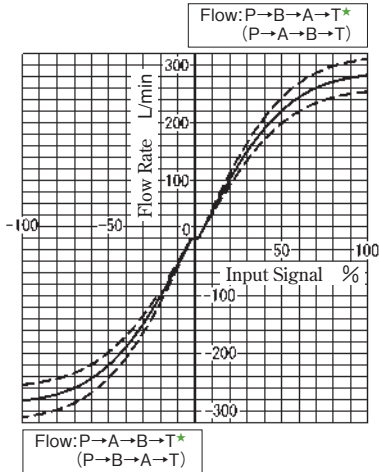
Pilot Valve: Wet Type



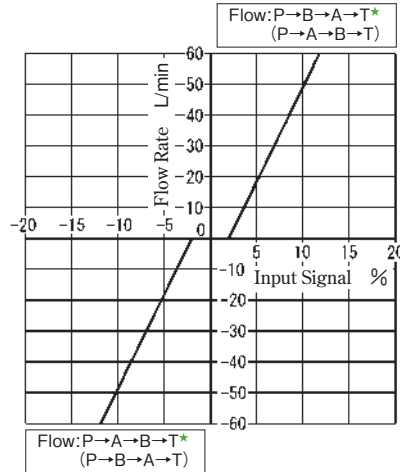
Characteristics of LSVHG-04EH-750-2L (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

〈Conditions〉 ● Valve Pressure Difference: $\Delta P = 1$ MPa (4-Way Valve) (Pressure Difference per Land: 0.5 MPa)



Around Null Position Input Signal -20 $\leftrightarrow$ +20 %



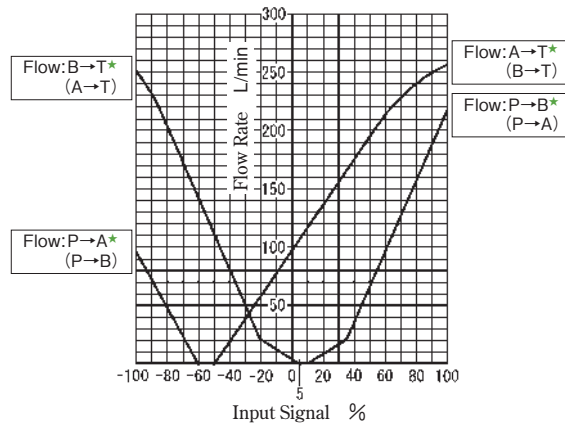
The load flow characteristics, step response, and frequency response are the same as those of the spool types "2", "40", and "2P".

★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-04EH-580-4J (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

〈Conditions〉 ● Valve Pressure Difference: $\Delta P = 0.5$ MPa (per Land)



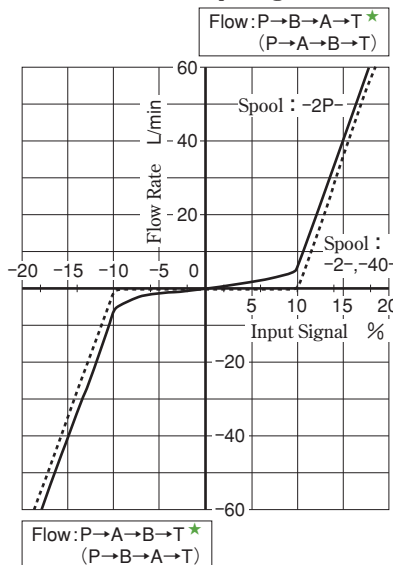
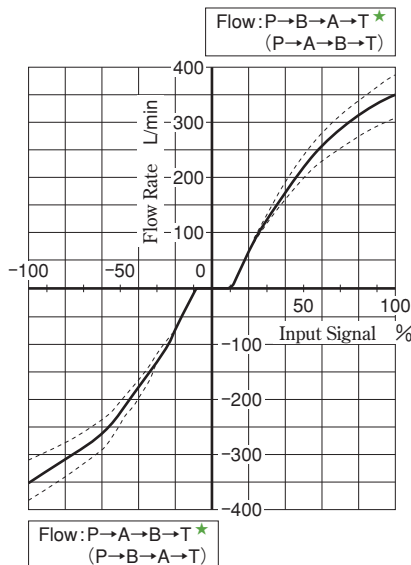
★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-06EH-900-2/40/2P (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

<Conditions> ● Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)

Around Null Position Input Signal -20 ⇔ +20 %

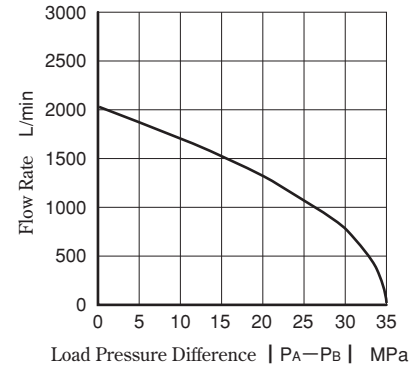


Load Flow Characteristics

<Conditions>

● Input Signal : 100 %

Note) Tolerance for Load Flow : ±10 %

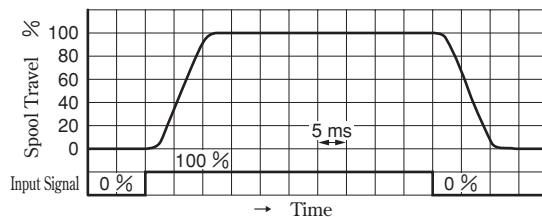


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

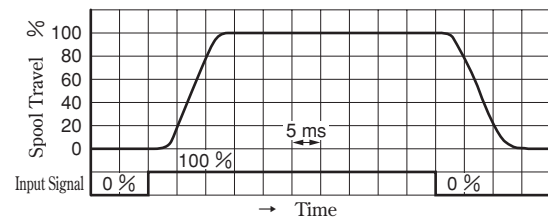
Step Response

<Conditions> ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



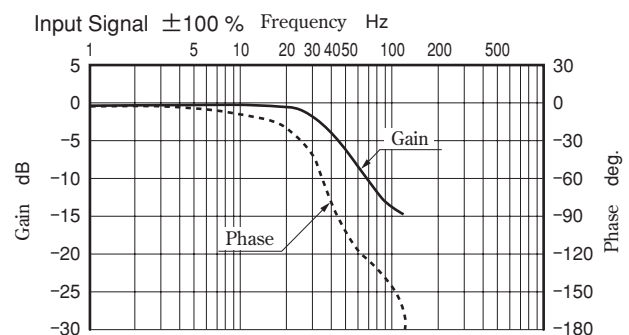
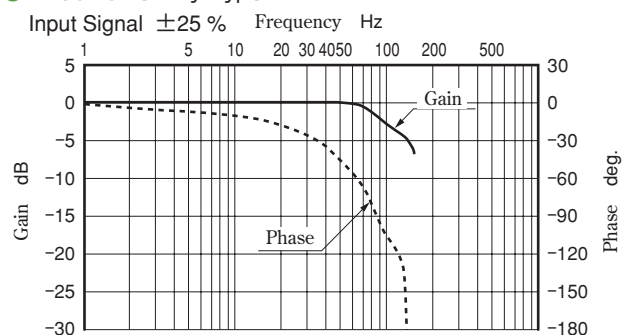
● Pilot Valve: Wet Type



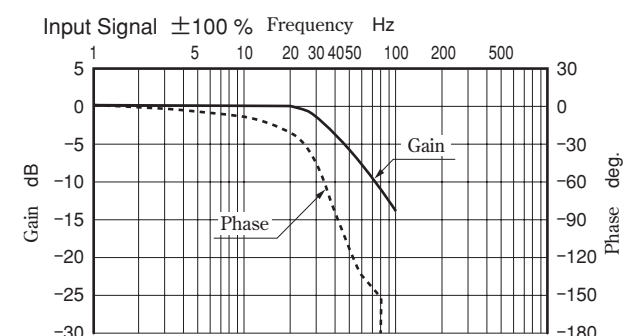
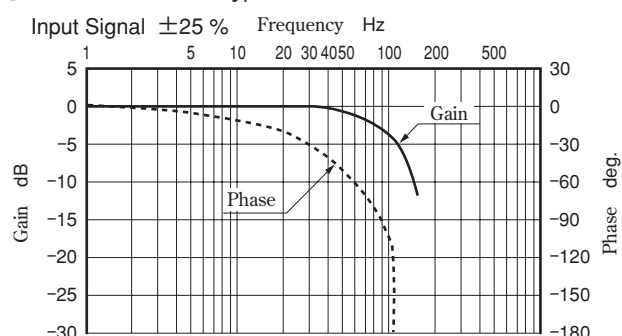
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type

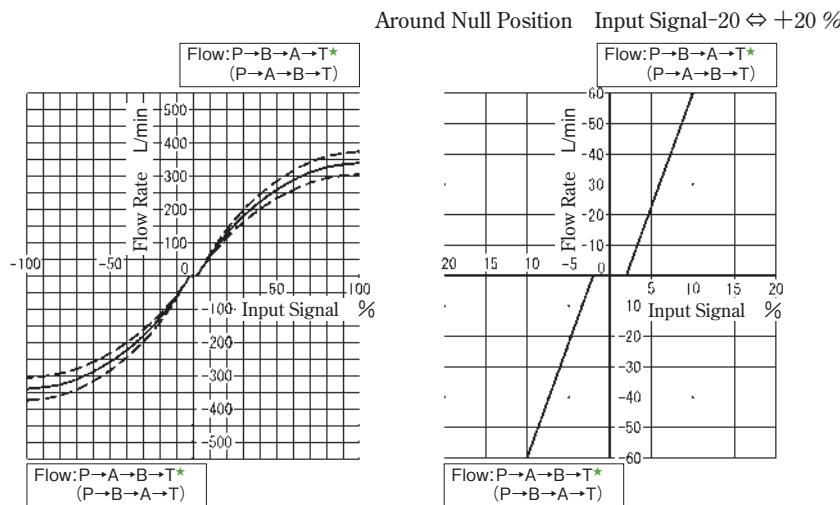


● Pilot Valve: Wet Type



Characteristics of LSVHG-06EH-900-2L (Fluid Viscosity: 30 mm²/s)

■ No-Load Flow Characteristics <Conditions> ● Valve Pressure Difference: $\Delta P = 1$ MPa (4-Way Valve) (Pressure Difference per Land: 0.5 MPa)

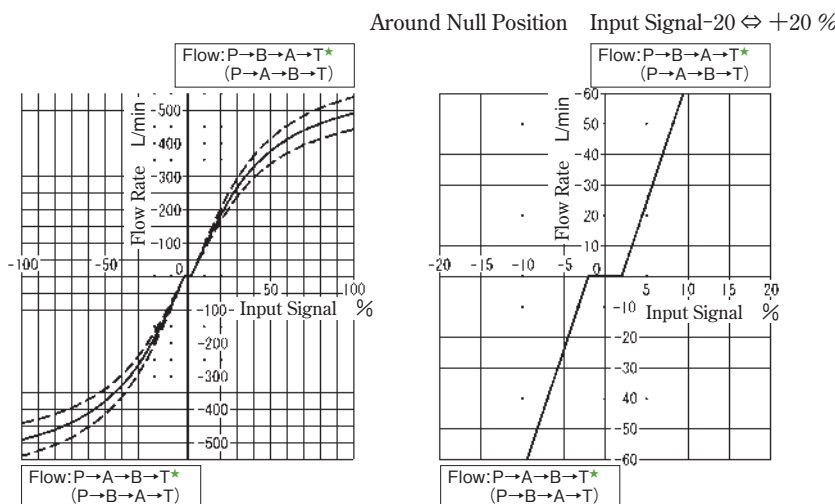


The load flow characteristics, step response, and frequency response are the same as those of the spool types "2", "40", and "2P".

★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-06EH-1300-2L (Fluid Viscosity: 30 mm²/s)

■ No-Load Flow Characteristics <Conditions> ● Valve Pressure Difference: $\Delta P = 1$ MPa (4-Way Valve) (Pressure Difference per Land: 0.5 MPa)

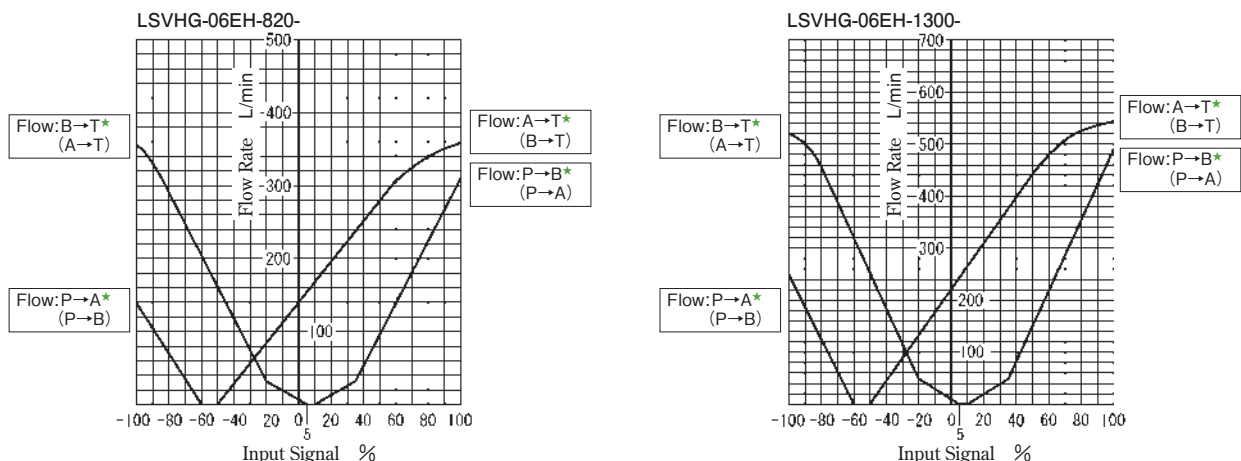


The load flow characteristics, step response, and frequency response are the same as those of the spool types "2", "40", and "2P".

★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-06EH-820/1300-4J (Fluid Viscosity: 30 mm²/s)

■ No-Load Flow Characteristics <Conditions> ● Valve Pressure Difference: $\Delta P = 0.5$ MPa (per Land)

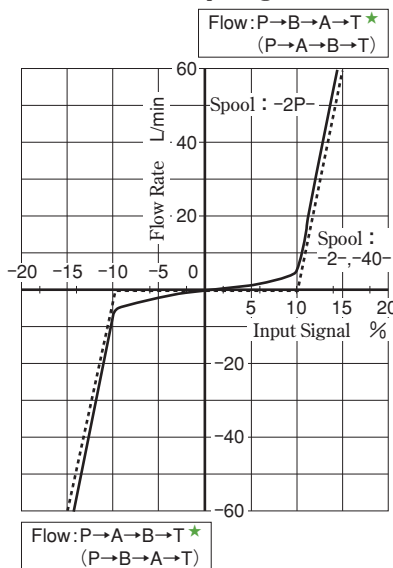
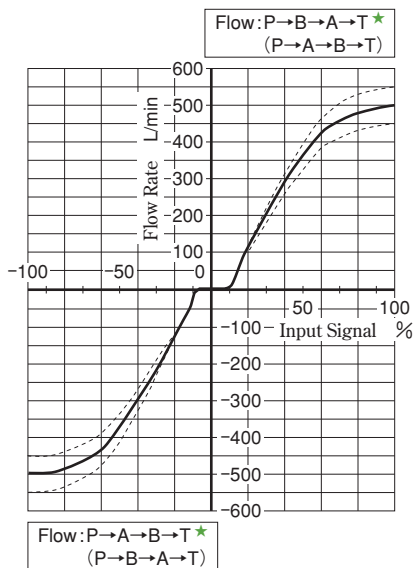


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

Characteristics of LSVHG-06EH-1300-2/40/2P (Fluid Viscosity: 30 mm²/s)

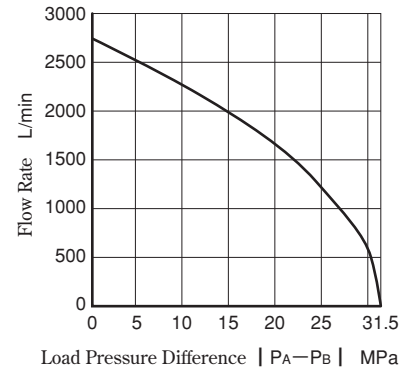
No-Load Flow Characteristics

<Conditions> ● Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)
Around Null Position Input Signal -20 ⇔ +20 %



Load Flow Characteristics

<Conditions> ● Input Signal : 100 %
Note) Tolerance for Load Flow : ±10 %

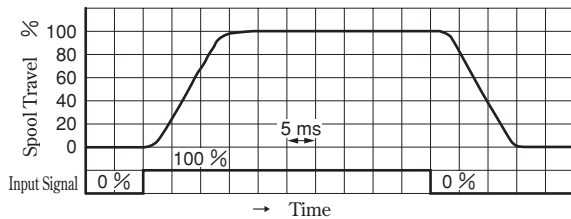


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

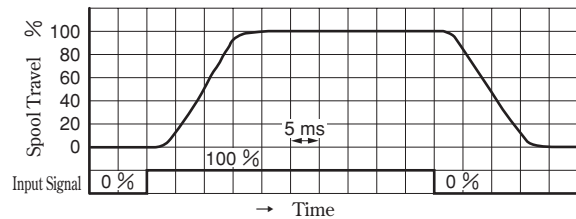
Step Response

<Conditions> ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



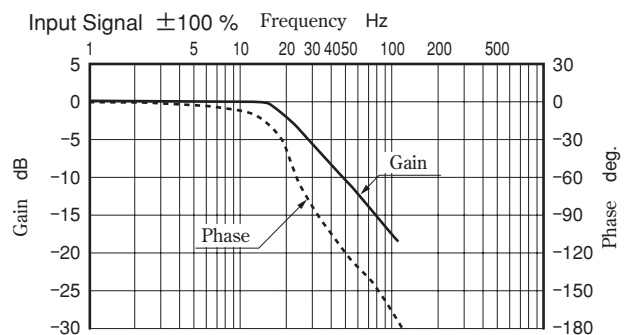
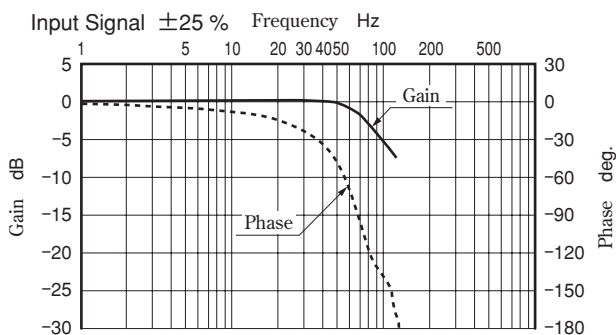
● Pilot Valve: Wet Type



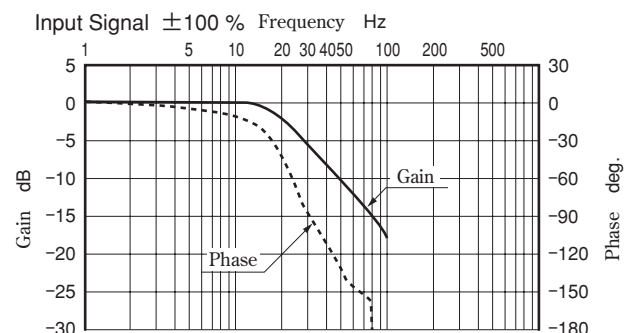
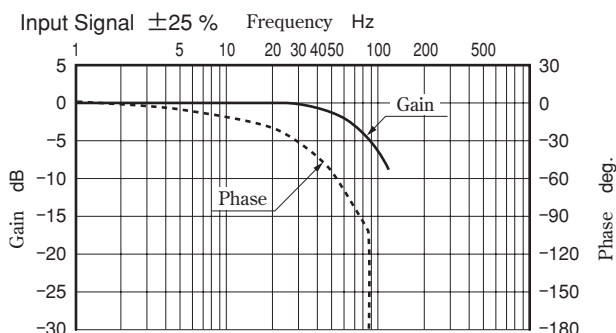
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



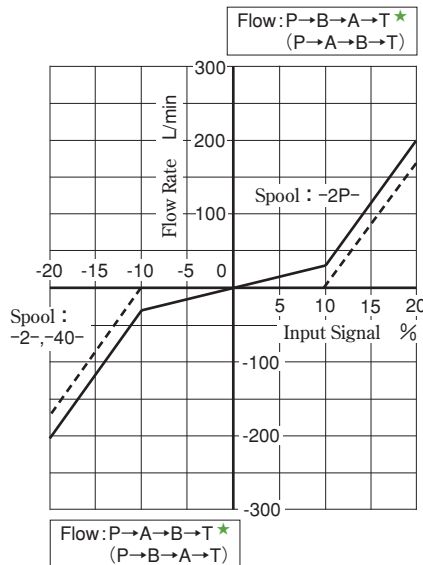
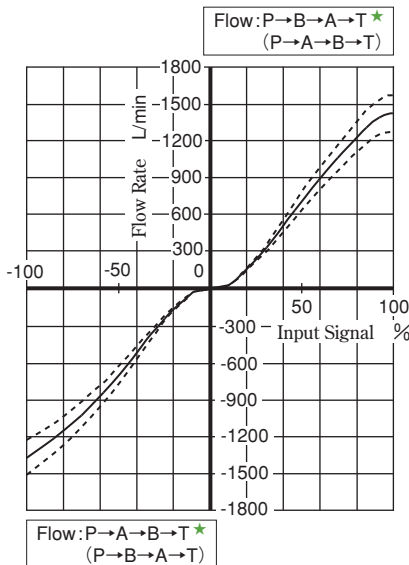
● Pilot Valve: Wet Type



Characteristics of LSVHG-10EH-3800-2/40/2P (Fluid Viscosity: 30 mm²/s)

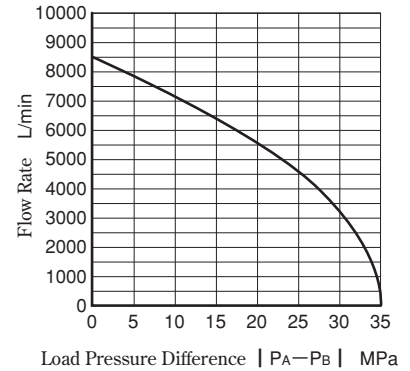
No-Load Flow Characteristics

◁ Conditions ▷ ● Valve Pressure Difference: 1 MPa (Pressure Difference per Land: 0.5 MPa)
 Around Null Position Input Signal -20 ⇔ +20 %



Load Flow Characteristics

◁ Conditions ▷ ● Input Signal : 100 %
 Note) Tolerance for Load Flow : ±10 %

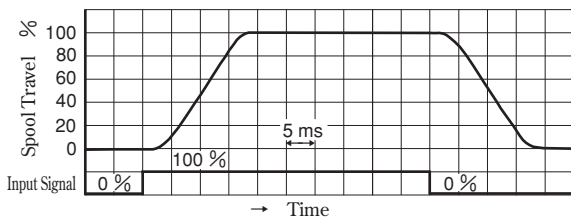


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

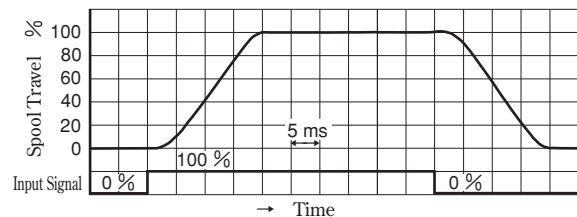
Step Response

◁ Conditions ▷ ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



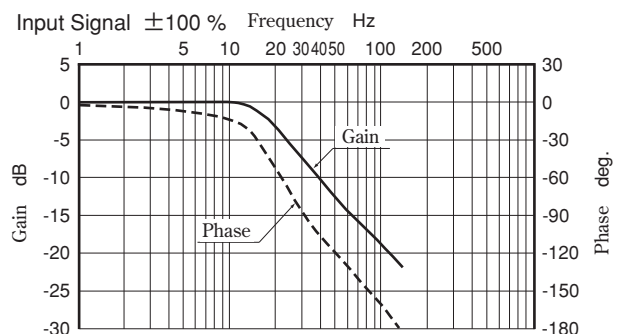
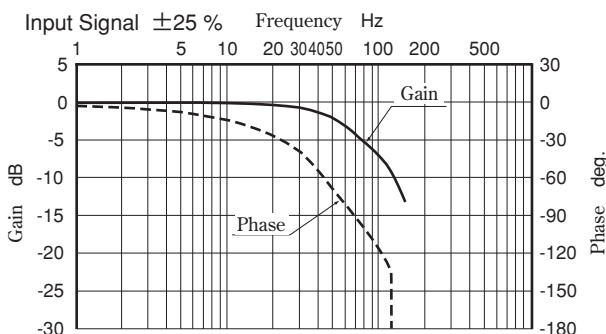
● Pilot Valve: Wet Type



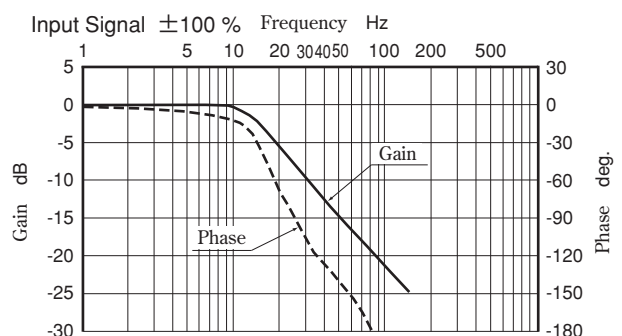
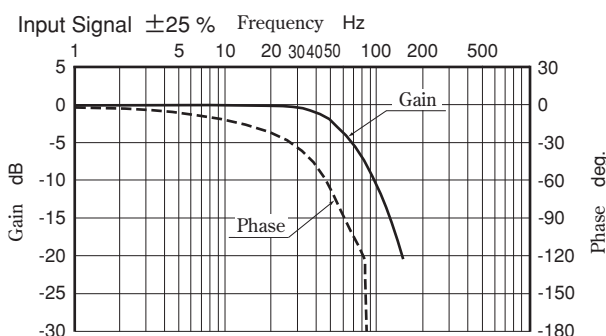
Frequency Response

◁ Conditions ▷ ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



● Pilot Valve: Wet Type

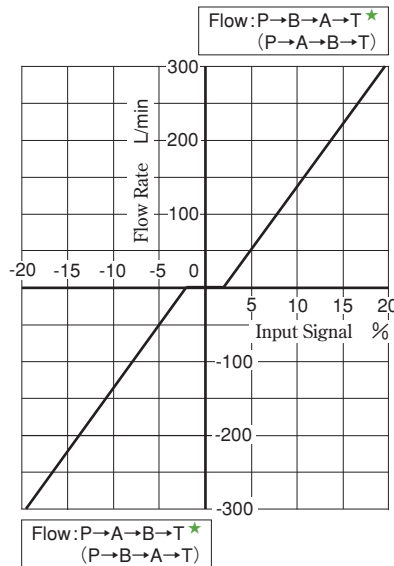
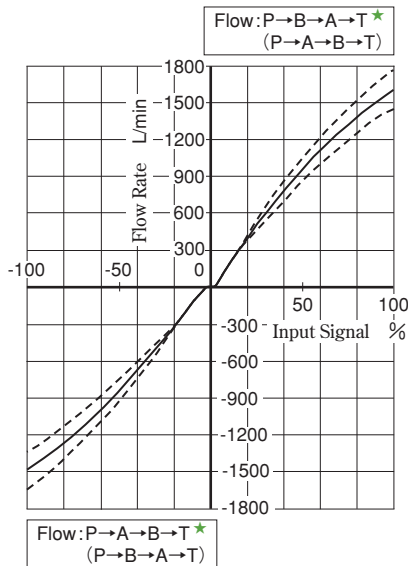


Characteristics of LSVHG-10EH-3800-2L (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

<Conditions> ● Valve Pressure Difference: $\Delta P = 1$ MPa (4-Way Valve) (Pressure Difference per Land: 0.5 MPa)

Around Null Position Input Signal -20 $\leftrightarrow$ +20 %



The load flow characteristics, step response, and frequency response are the same as those of the spool types "2", "40", and "2P".

★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

OBE (On-Board Electronics) type Linear Servo Valves (High Performance Type)

On-board electronics (OBE) type linear servo valves (high performance type) are produced for achieving higher accuracy and durability by incorporating a sleeve in the main stage of the OBE type linear servo valves (standard type), which have been well accepted for their "high accuracy, easiness to use, and great usability". Since the spool and the sleeve are processed to fit well and properly keep 1% overlap between one another, they are suited to be used for a system requiring high accuracy and durability.

● High accuracy

As is the case with the standard type valves, all of the OBE type linear servo valves (high performance type) have a low hysteresis of 0.1 % or less, realizing high accuracy. These valves allow the main unit to operate with much higher repeatability.

● High response characteristics

Compared to other equivalent models, these valves provide higher levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 7 ms (0 => 100 %)★, and the frequency response is 110 Hz/-3 dB (± 25 % amplitude)★. (★ : Representative values for LSVHG-03EH- * -S *)

● Easiness to use

These valves can offer high accuracy for hydraulic control systems just with 24 V DC power supply and command signal input.

Six types of input signals in three input voltage/current ranges are available:
0 - ±10 V, 0 - ±10 mA, and 4 - 20 mA.

● Great usability

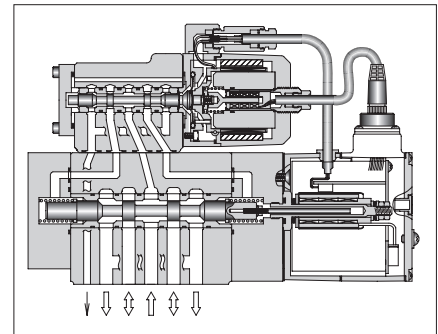
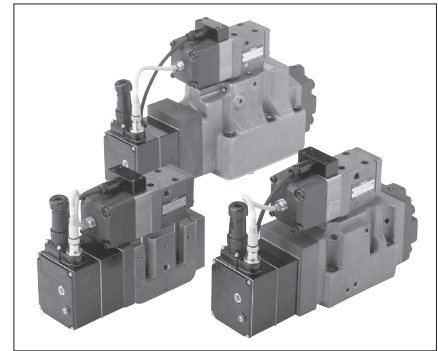
The small amplifier in the valves has a fault indicator lamp. This lamp indicates an error when valve failure causes any deviation between the spool position commanded by the signal and the actual spool position. It facilitates you to immediately troubleshoot the failure of the valves, if any.

● Excellent contamination resistance

As is the case with the high speed linear servo valves, the OBE type linear servo valves have a simple pilot valve structure, exhibiting excellent contamination resistance. The permissible level of fluid contamination for these valves is up to NAS 1638 class 10.

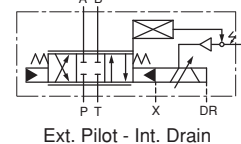
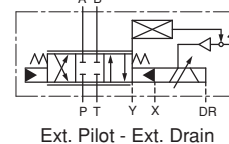
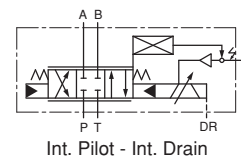
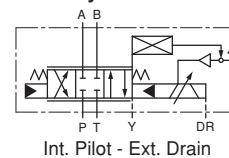
● Two types of pilot valves available

There are two types of pilot valves available: a dry type good in response characteristics and a wet type that eliminates the drain (DR) port to improve usability. They can be selected according to users' purposes.

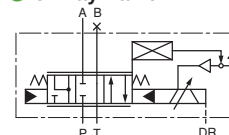


Graphic Symbols

● 4-Way Valve



● 3-Way Valve



Note) The pilot/drain types are the same as those for the "4-Way Valve" shown above.

■ Model Number Designation

F—	LSVHG	—06	EH	—900	—S	4	—E	T	—W	A	—A	1	—20
Fluid Type	Series Number	Valve Size	Amp. Type	Rated Flow @ ΔP = 7 MPa	Spool Type	Control Type	Pilot Type	Drain Type	DR Port and Permissible Back Pres.	Fail-safe Function	Input Signal/ Spool Travel Monitoring	Connector Type	Design Number
F : Special Seals for Phosphate Ester Type Fluid (Omit if not required)	LSVHG : Two Stage Type Linear Servo Valves	03	EH : OBE Type	60 : 60 L/min 100 : 100 L/min 160 : 160 L/min	S : 1 % Overlap 	3 : 3-Way Valve★1 (Port A is used.) 4 : 4-Way Valve	None: Internal Pilot E: External Pilot	None: External Drain T: Internal Drain	None: With DR Port (Permissible Back Pres.: 0.05 MPa) W: Without DR Port★2 (Wet Type Pilot Valve)	None: P→B→A→T Position Valve Opening: Full A: P→A→B→T Position Valve Opening: Full Applicable only when a fail-safe solenoid operated valve is mounted EA: With Solenoid Operated Valve P→A→B→T Position Valve Opening: 10 % EB: With Solenoid Operated Valve P→B→A→T Position Valve Opening: 10 %	A: Voltage Signal ± 10 V (P→B→A→T Flow with Input Signal +) B: Current Signal 4 - 20 mA (P→B→A→T Flow with Current Signal 12 - 20 mA) C: Current Signal ± 10 mA (P→B→A→T Flow with Input Signal +) D: Voltage Signal ± 10 V (P→A→B→T Flow with Input Signal +) E: Current Signal 4 - 20 mA (P→A→B→T Flow with Current Signal 12 - 20 mA) F: Current Signal ± 10 mA (P→A→B→T Flow with Input Signal +)	1: 6+ PE Pole 2: 11+ PE Pole 2: 11+ PE Pole	20
		04		100 : 100 L/min 200 : 200 L/min 280 : 280 L/min 450 : 450 L/min									
		06		500 : 500 L/min 900 : 900 L/min									

★1. For the valves with a 3-way valve and a fail-safe solenoid operated valve, select "EB" for the fail-safe function type and "D", "E", or "F" for the input signal/spool travel monitoring type.

★2. The valves with the model number "W" (without DR port) cannot use water-glycol fluids.

Specifications

The values in parentheses in the specification table below are applicable to the models "LSVHG-*EH-*S*-**W*-" (without DR port).

Model Numbers				LSVHG-03EH- *-S*				LSVHG-04EH- *-S*								LSVHG-06EH - *-S*						
Descriptions																						
Spool Type				S4			S3			S4				S3				S4		S3		
Rated Flow @ ΔP = 7 MPa (4-Way Valve) L/min				60	100	160	—	—	—	100	200	280	450	—	—	—	—	500	900	—	—	
Rated Flow @ ΔP = 3.5 MPa (3-Way Valve) L/min				—	—	—	60	100	160	—	—	—	—	100	200	280	450	—	—	500	900	
Max. Operating Pressure MPa				31.5						35								35				
Proof Pres. at Return Port ⁽¹⁾	External Drain	T Port MPa	21						31.5								35					
		Y Port MPa	21 ⁽⁷⁾ (7)						21 (7)								21 (7)					
	Internal Drain	T & Y Ports MPa	21 ⁽⁷⁾ (7)						21 (7)								21 (7)					
DR Port Permissible Back Pressure ⁽²⁾ MPa				0.05 (The valves with the model number “W” have no DR port.)																		
Pilot Pressure ⁽³⁾ MPa				1.5 - 21																		
Pilot Flow Rate ⁽⁴⁾ L/min				4 or more						6 or more								21 or more				
Pilot Valve Max. Leakage		Pres.: P _S = P _P = 14 MPa Fluid Viscosity: 32 mm ² /s L/min	0.4																1.2			
Main Valve Max. Leakage			0.6	1.1	2.1	0.3	0.6	1.1	0.9	1.7	2.5	5.0	0.5	0.9	1.3	2.5	1.9	4.8	1.0	2.4		
Hysteresis %				0.1 or less																		
Step Response (0 <=> 100 %, Typical) ⁽⁵⁾ ms				7 (8)						11 (12)								12 (13)				
Frequency Response (±25 % Amplitude Typical) ⁽⁶⁾		Gain: -3 dB Hz	110 (80)						100 (80)								100 (80)					
		Phase: -90° Hz	110 (90)						100 (90)								95 (90)					
Vibration Proof ⁽⁶⁾ m/s ²				100																		
Protection —				IP 65																		
Ambient Temperature °C				0 - +50																		
Spool Stroke to Stops mm				±3.5						±3.5								±5				
Spool End Area cm ²				1.3						3.1								8				
Linear Motor Specification	Current A	Max. 2.1																				
	Coil Resistance Ω	9.6 [at 20 °C]																				
Approx. Mass ⁽⁸⁾ kg				8.5 [11]						14 [16]								20 [24]				
Mounting Surface				ISO 4401-05-05-0-05						ISO 4401-07-06-0-05								ISO 4401-08-07-0-05				
Electric Connection				6 + PE/11 + PE Connector (EN175201 Part 804)																		

Note) ⁽¹⁾ Pressure at the return port should be at actual supply pressure or less.

⁽²⁾ Back pressure at the drain port should be 0.05 MPa or less and not be a negative pressure. For the valves with the model number "W", no drain port connection is required.

⁽³⁾ Supply pressure for the pilot valve should be 1.5 - 21 MPa and should also be 60% of actual supply pressure or more.

⁽⁴⁾ The pilot flow is calculated based on a pilot pressure of 14 MPa and the above step response.

⁽⁵⁾ This value is measured for each valve based on a pilot pressure of 14 MPa; it may vary depending on the actual circuit/operation conditions.

⁽⁶⁾ There are restrictions on the mounting position; refer to the instructions for details.

⁽⁷⁾ To use an external pilot type valve with a supply pressure of 21 MPa or more, pressures at the T and Y ports should be 7 MPa or less.

⁽⁸⁾ A value in brackets indicates the mass of each valve with a fail-safe solenoid operated valve.

⁽⁹⁾ For the effective range of the fail-safe function, see page I-60.

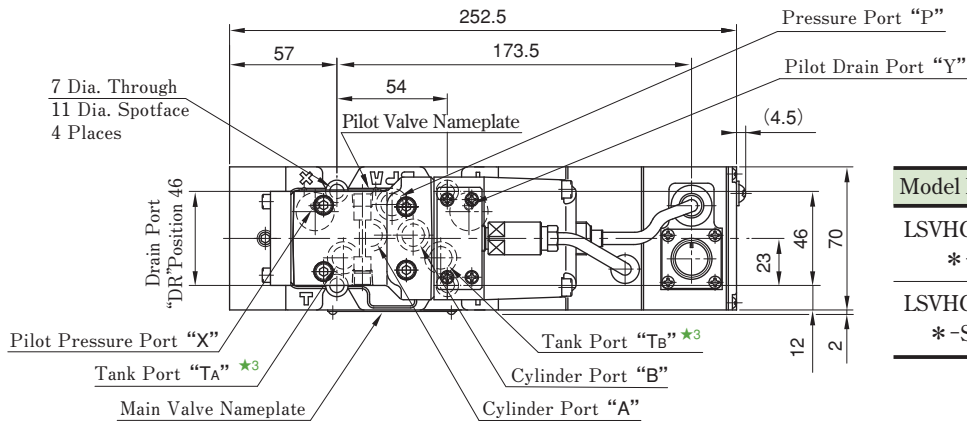
Accessories/Electrical Specifications/Block Diagram

These are the same as those of the standard type. See the relevant pages.

Item	Page for Reference
Accessories	I-35
Electrical Specifications	I-36
Block Diagram	I-37

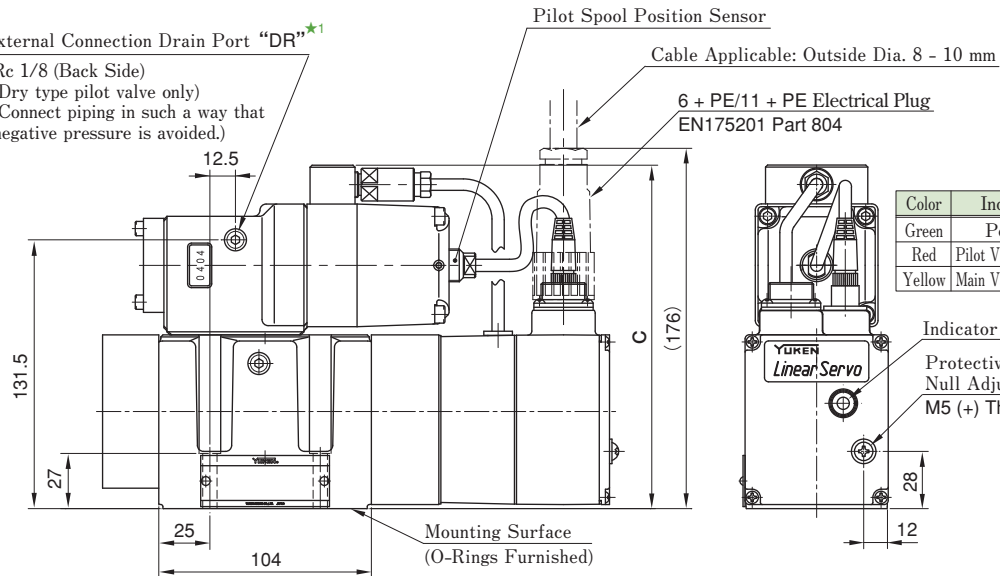
LSVHG-03EH-60/100/160-S *

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

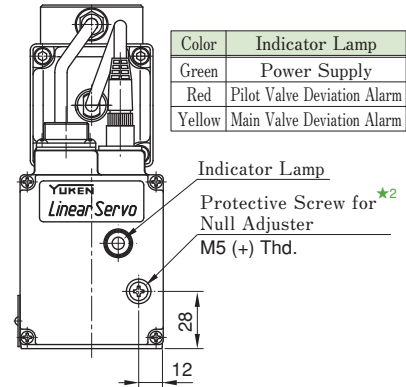


Model Numbers	C	Remarks
LSVHG-03EH- *-S*	168	Pilot Valve: Dry Type
LSVHG-03EH- *-S*-W	177	Pilot Valve: Wet Type

External Connection Drain Port "DR"^{★1}
Rc 1/8 (Back Side)
(Dry type pilot valve only)
(Connect piping in such a way that
negative pressure is avoided.)

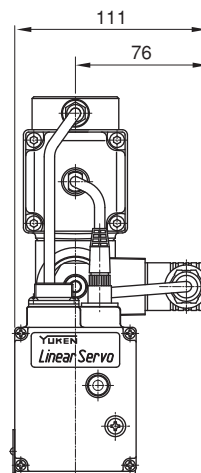
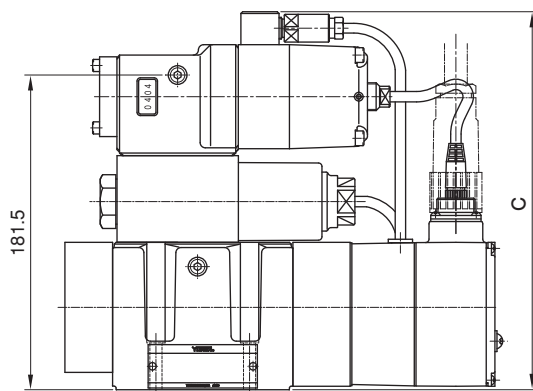


Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm



- ★1. The external connection drain port "DR" on the front side is usually plugged. To use the port on the front side, remove the hexagon socket head plug (5 Hex.) and plug the port on the back side.
- ★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.
- ★3. There are two tank ports "TA" and "TB" ; however, "TA" may be used alone.

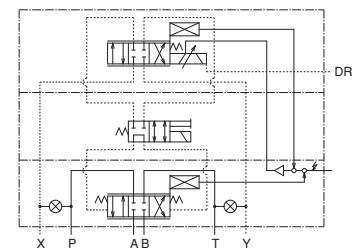
**LSVHG-03EH-60/100/160-S * - * EA/EB
(With Fail-safe Solenoid Operated Valve)**



【Dimensions of Mounting Surface】

The dimensions of the mounting surface are the same as those of the models LSVHG-03EH (page I-38).

Detailed Graphic Symbol



⊗ : Plugs for selecting the pilot and drain types

● O-Rings for the Ports

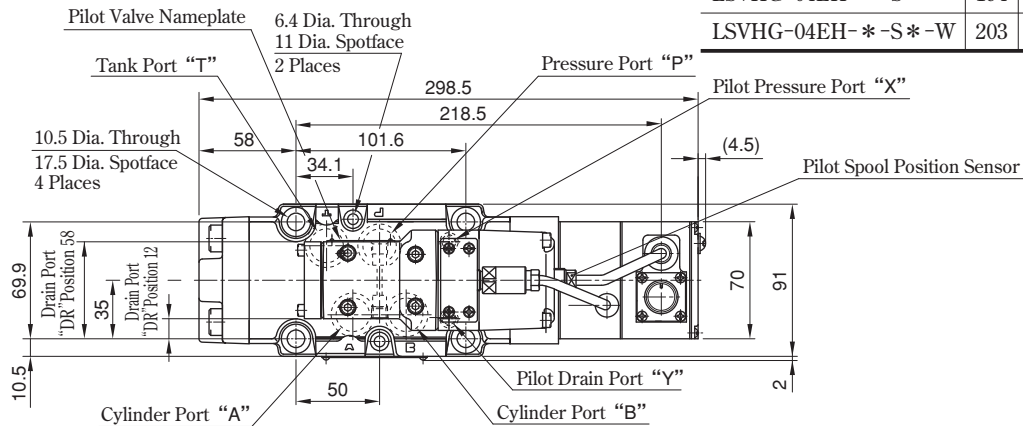
Port	O-Ring Size	Qty.
P, A, B, T	AS568-014 (NBR-90)	5
X, Y	AS568-016 (NBR-90)	2

O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

Model Numbers	C	Remarks
LSVHG-03EH- *-S*-E *	218	Pilot Valve: Dry Type
LSVHG-03EH- *-S*-WE *	227	Pilot Valve: Wet Type

● For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

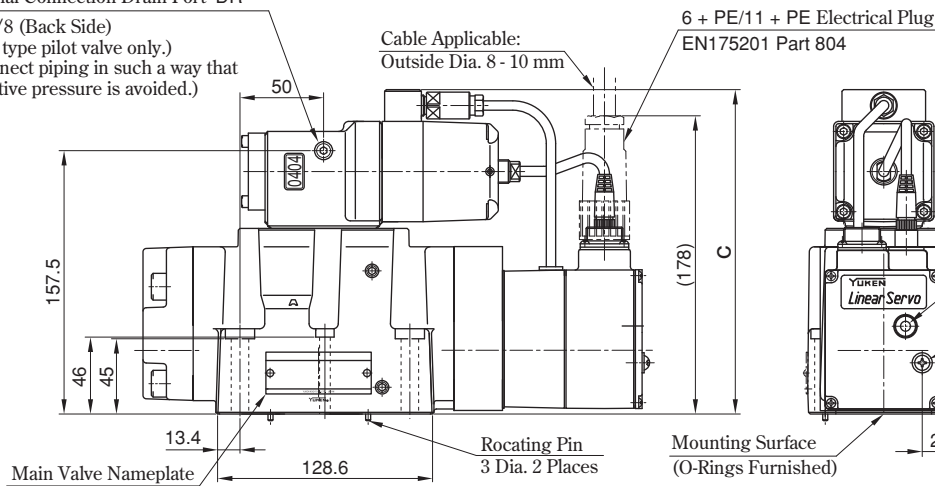
LSVHG-04EH-100/200/280/450-S *



Model Numbers	C	Remarks
LSVHG-04EH- *-S *	194	Pilot Valve: Dry Type
LSVHG-04EH- *-S *-W	203	Pilot Valve: Wet Type

External Connection Drain Port "DR" ^{★1}

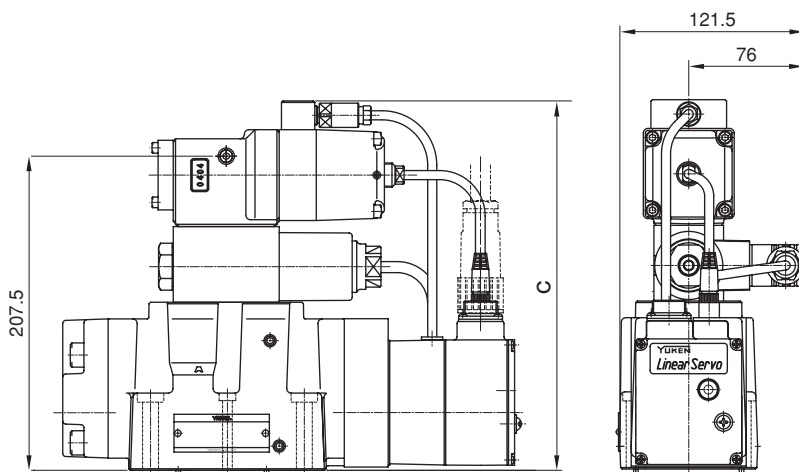
Rc 1/8 (Back Side)
(Dry type pilot valve only.)
(Connect piping in such a way that negative pressure is avoided.)



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

- ★1. The external connection drain port "DR" on the front side is usually plugged. To use the port on the front side, remove the hexagon socket head plug (5 Hex.) and plug the port on the back side.
- ★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

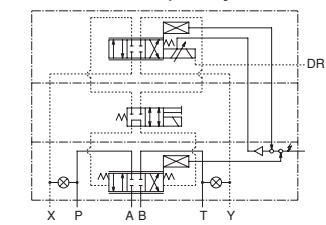
LSVHG-04EH-100/200/280/450- * S- * EA/EB (With Fail-safe Solenoid Operated Valve)



[Dimensions of Mounting Surface]

The dimensions of the mounting surface are the same as those of the models LSVHG-04 (page I-12).

Detailed Graphic Symbol



● O-Rings for the Ports

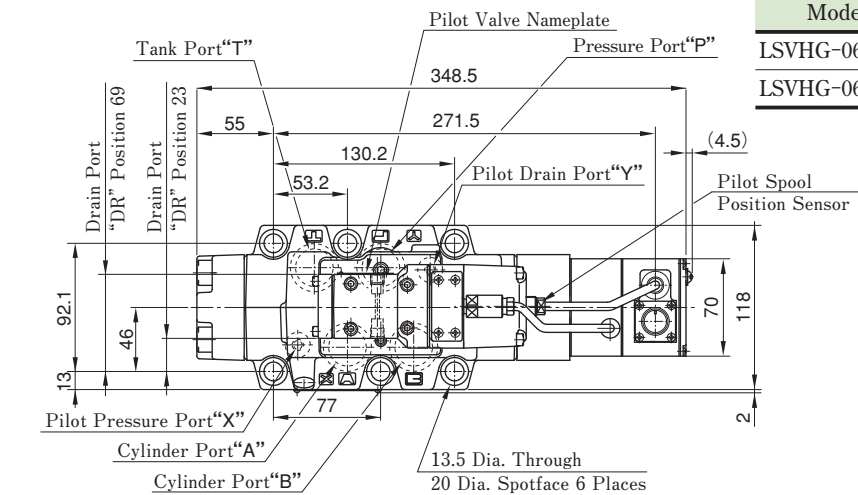
Port	O-Ring Size	Qty.
P, A, B, T	OR NBR-90 P22-N	4
X, Y	AS568-012 (NBR-90)	2

O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

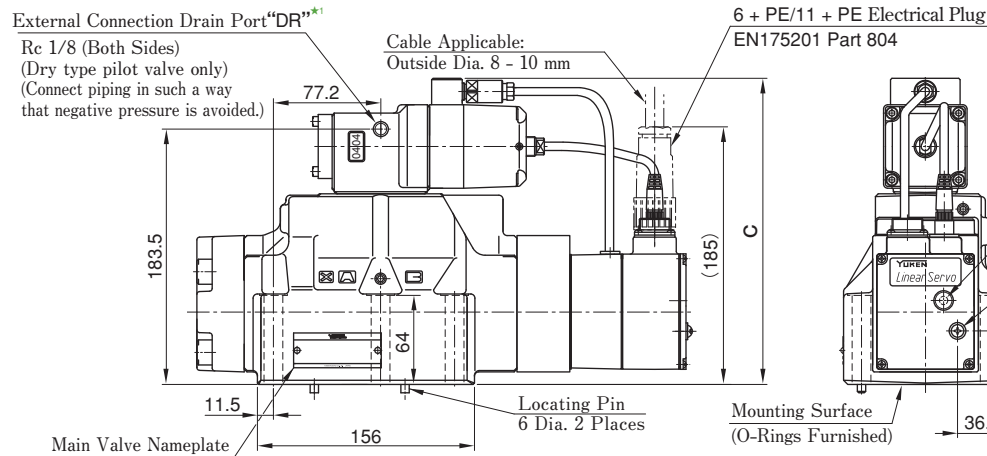
Model Numbers	C	Remarks
LSVHG-04EH- *-S *-E *	244	Pilot Valve: Dry Type
LSVHG-04EH- *-S *-WE *	253	Pilot Valve: Wet Type

● For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

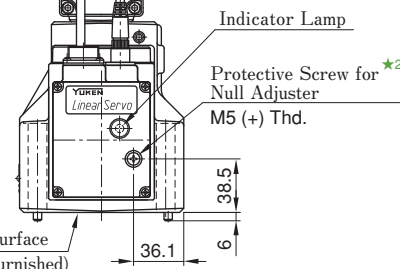
LSVHG-06EH-500/900-S *



Model Numbers	C	Remarks
LSVHG-06EH- *-S *	220	Pilot Valve: Dry Type
LSVHG-06EH- *-S *-W	229	Pilot Valve: Wet Type

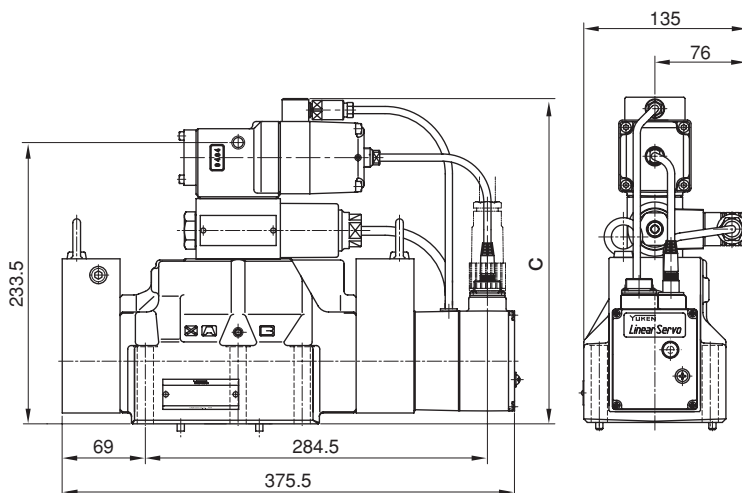


Color	Indicator Lamp
Green	Power Supply
Red	Pilot Valve Deviation Alarm
Yellow	Main Valve Deviation Alarm

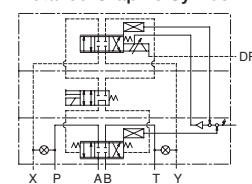


- ★1. The external connection drain port "DR" on the back side is usually plugged. To use the port on the back side, remove the hexagon socket head plug (5 Hex.) and plug the port on the front side.
- ★2. To adjust the null, remove the protective screw and turn the null trimmer. After adjustment, be sure to attach the protective screw.

LSVHG-06EH-500/900- * S- * EA/EB (With Fail-safe Solenoid Operated Valve)



Detailed Graphic Symbol



⊗: Plugs for selecting the pilot and drain types

Model Numbers	C	Remarks
LSVHG-06EH- *-S *-E *	270	Pilot Valve: Dry Type
LSVHG-06EH- *-S *-WE *	279	Pilot Valve: Wet Type

● For other dimensions, see the figures above (the models without a fail-safe solenoid operated valve).

● O-Rings for the Ports

Port	O-Ring Size	Qty.
P, A, B, T	AS568-123 (NBR-90)	4
X, Y	OR NBR-90 P14-N	2

O-Rings made of fluorinated rubber are required to use phosphate ester type fluids.

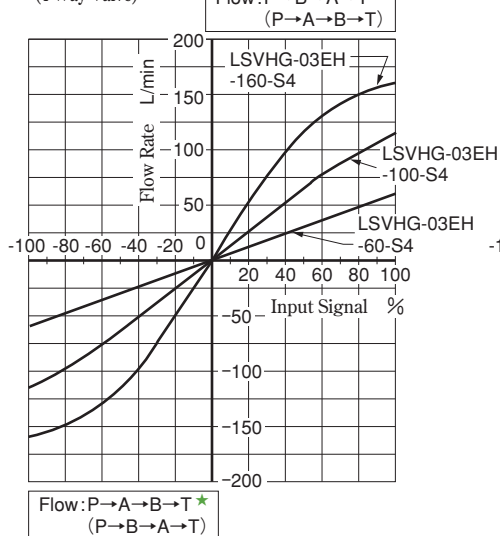
[Dimensions of Mounting Surface]

The dimensions of the mounting surface are the same as those of the models LSVHG-06-900 (page I-13).

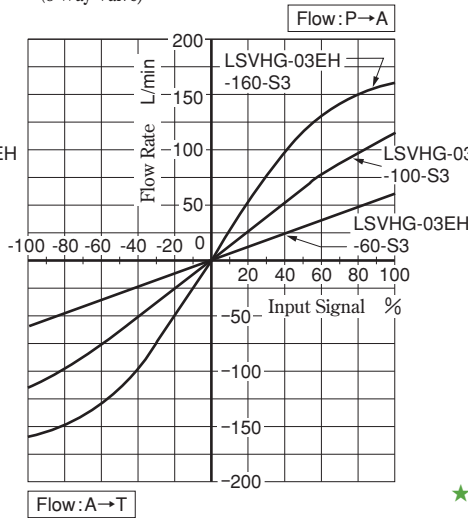
Characteristics of LSVHG-03EH-60/100/160-S * (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

Valve Pressure Difference: $\Delta P = 7 \text{ MPa}$ (Constant)
(4-Way Valve)



Valve Pressure Difference: $\Delta P = 3.5 \text{ MPa}$ (Constant)
(3-Way Valve)

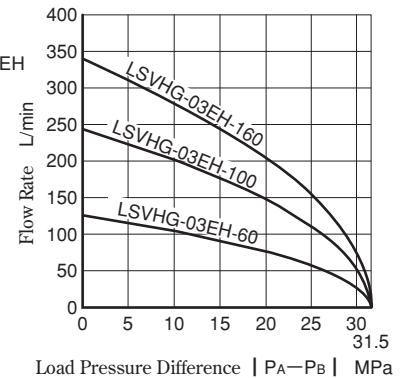


Load Flow Characteristics

<Conditions>

● Input Signal : 100 %

Note) Tolerance for Load Flow : $\pm 10 \%$

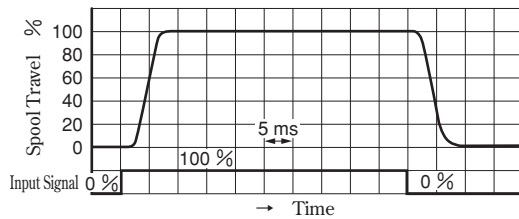


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

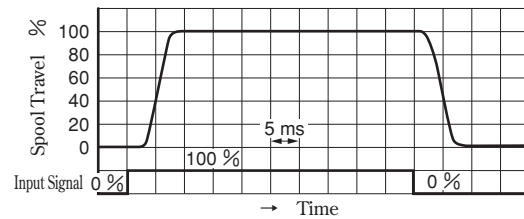
Step Response

<Conditions> ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

Pilot Valve: Dry Type



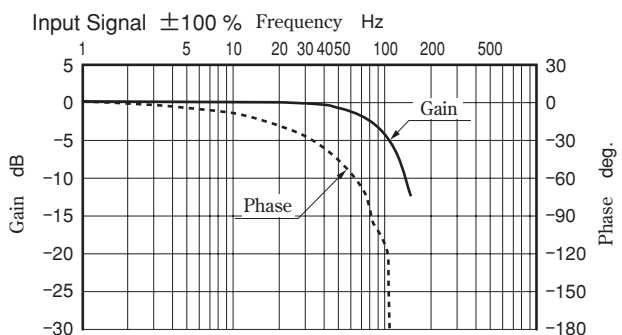
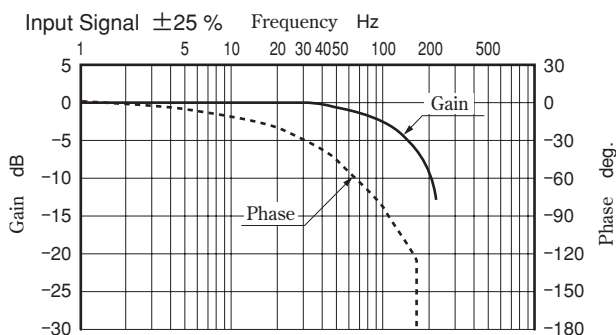
Pilot Valve: Wet Type



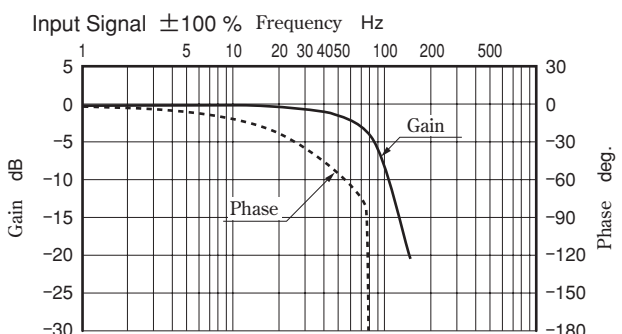
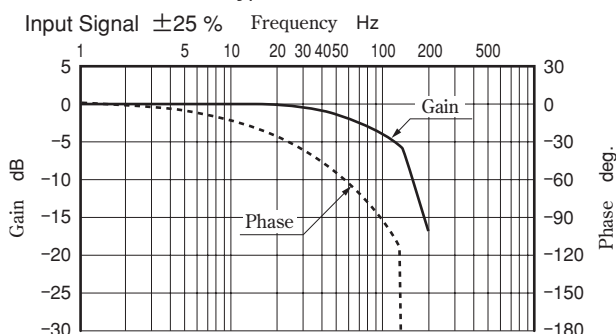
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

Pilot Valve: Dry Type



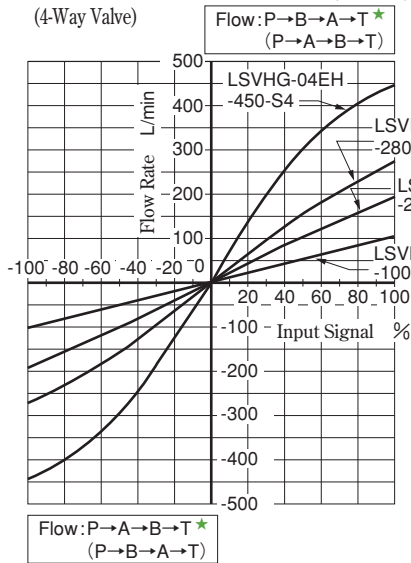
Pilot Valve: Wet Type



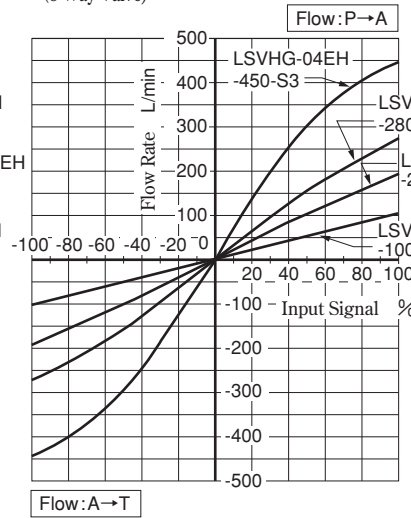
Characteristics of LSVHG-04EH-100/200/280/450-S * (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

Valve Pressure Difference: $\Delta P = 7 \text{ MPa}$ (Constant)
(4-Way Valve)



Valve Pressure Difference: $\Delta P = 3.5 \text{ MPa}$ (Constant)
(3-Way Valve)

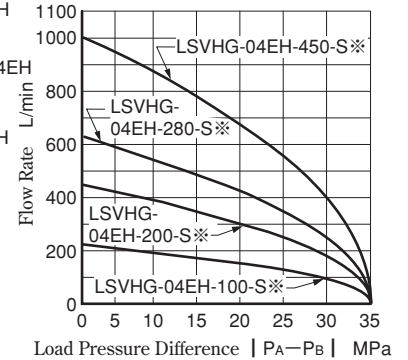


Load Flow Characteristics

<Conditions>

● Input Signal : 100 %

Note) Tolerance for Load Flow : $\pm 10 \%$

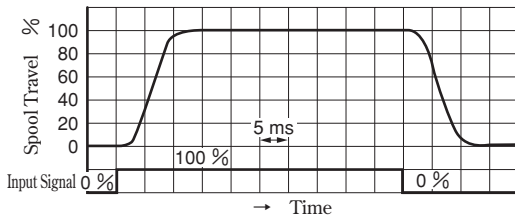


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

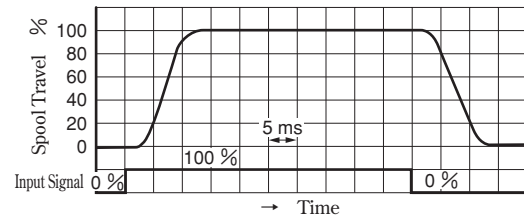
Step Response

<Conditions> ● Input Signal : 0 $\leftrightarrow$ 100 % ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



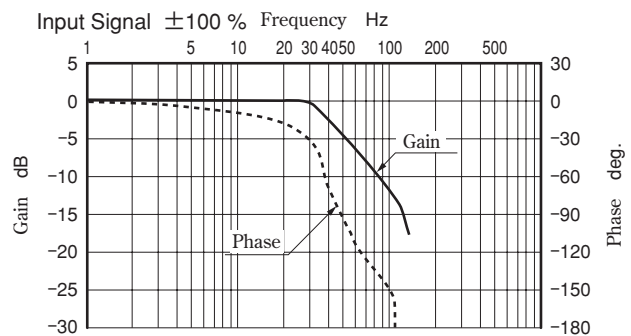
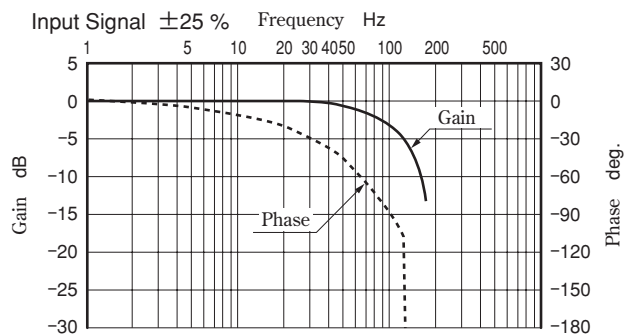
● Pilot Valve: Wet Type



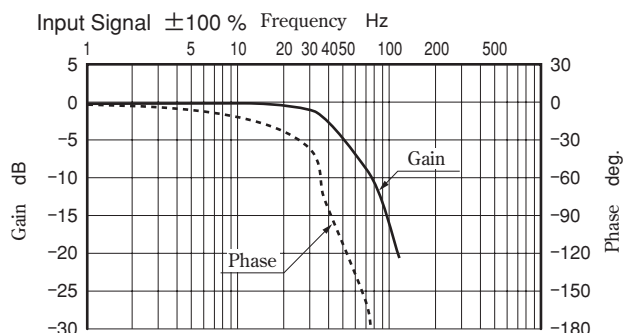
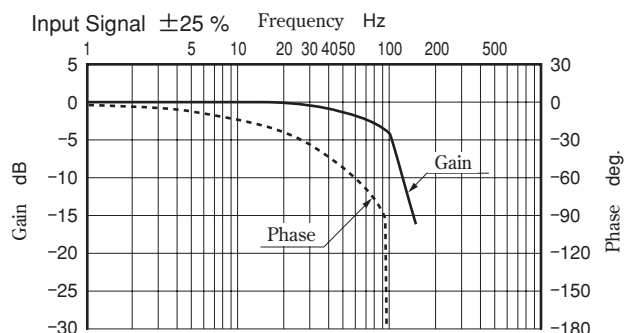
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

● Pilot Valve: Dry Type



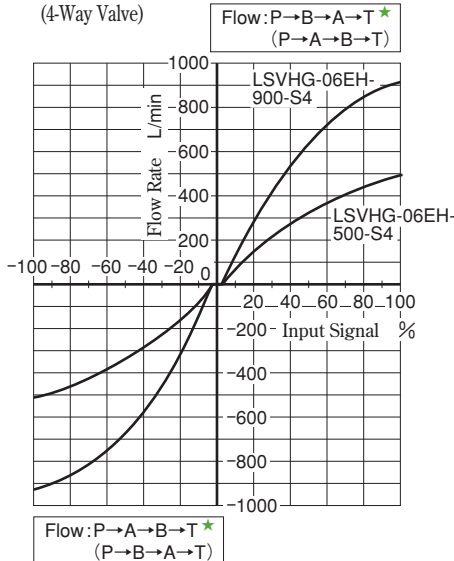
● Pilot Valve: Wet Type



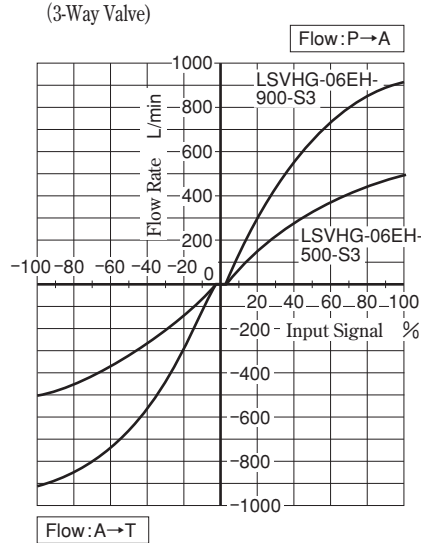
Characteristics of LSVHG-06EH-500/900-S * (Fluid Viscosity: 30 mm²/s)

No-Load Flow Characteristics

Valve Pressure Difference: $\Delta P = 7 \text{ MPa}$ (Constant)
(4-Way Valve)



Valve Pressure Difference: $\Delta P = 3.5 \text{ MPa}$ (Constant)
(3-Way Valve)

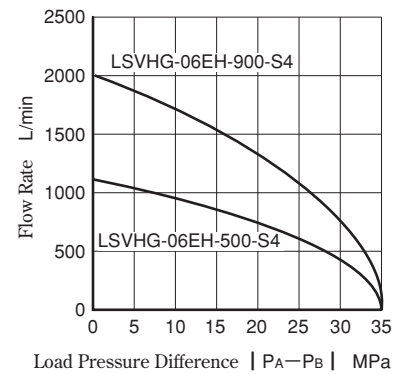


Load Flow Characteristics

<Conditions>

● Input Signal : 100 %

Note) Tolerance for Load Flow : $\pm 10 \%$

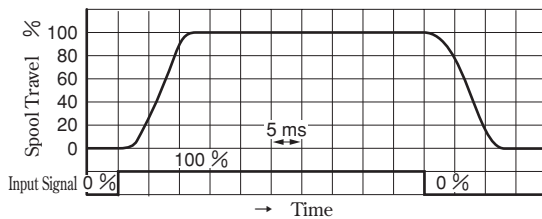


★ The flow outside of parentheses is achieved when the input signal type "A", "B", or "C" is selected. The flow in parentheses is achieved when "D", "E", or "F" is selected.

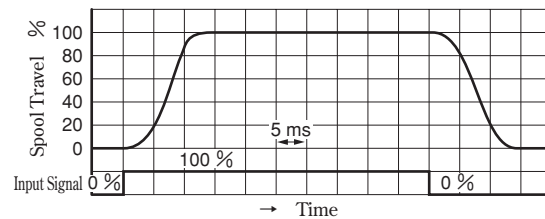
Step Response

<Conditions> ● Input Signal : 0 ⇔ 100 % ● Supply/Pilot Pressure : 14 MPa

Pilot Valve: Dry Type



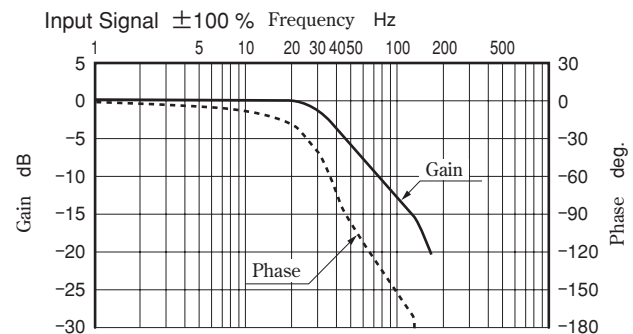
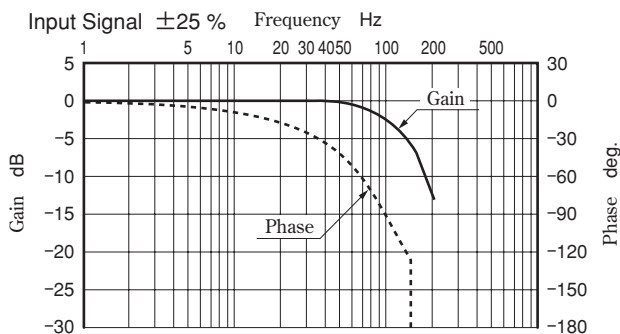
Pilot Valve: Wet Type



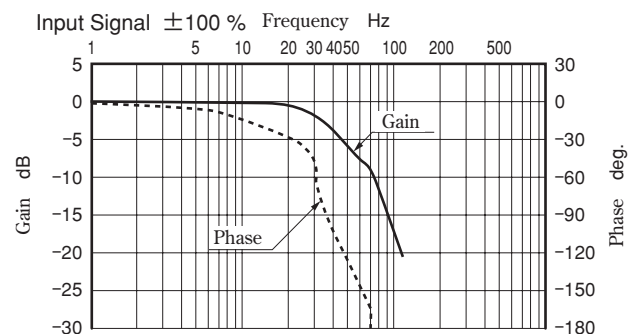
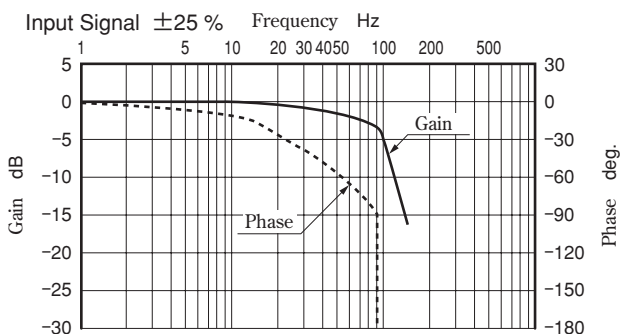
Frequency Response

<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply/Pilot Pressure : 14 MPa

Pilot Valve: Dry Type

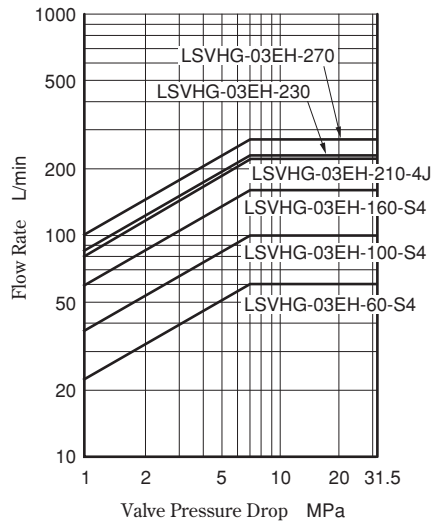


Pilot Valve: Wet Type

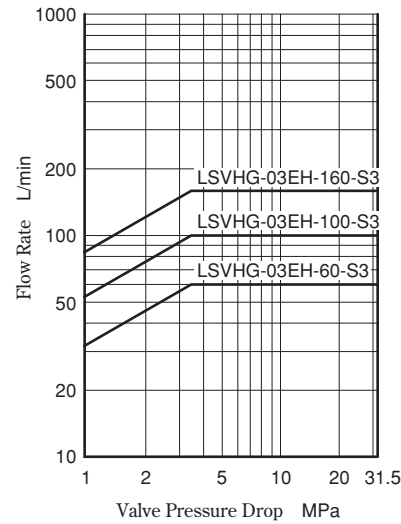


Effective Ranges of the Fail-safe Function for OBE (On-Board Electronics) Type Linear Servo Valves

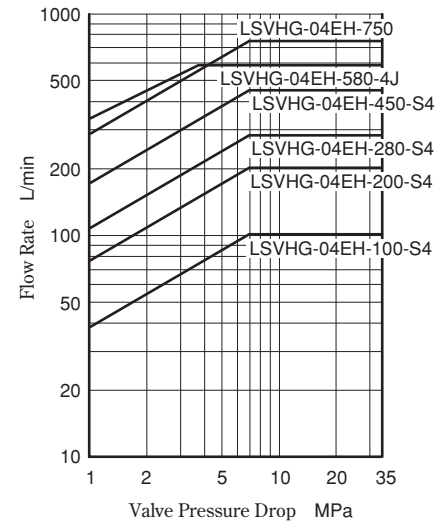
- LSVHG-03EH-230/270-
- LSVHG-03EH-210-4J-
- LSVHG-03EH-60/100/160-S4-



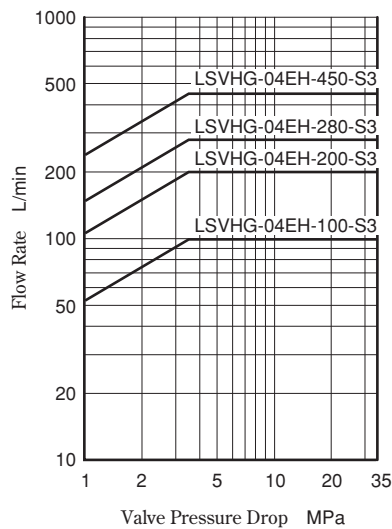
- LSVHG-03EH-60/100/160-S3-



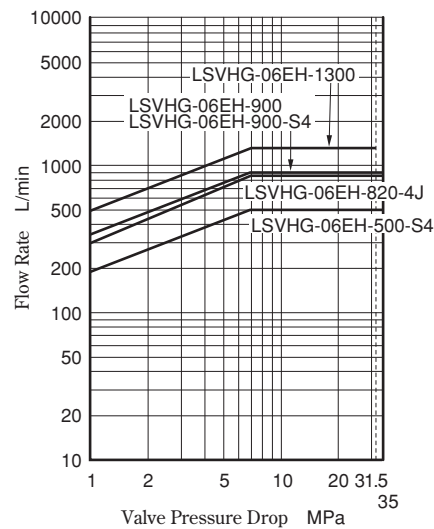
- LSVHG-04EH-750-
- LSVHG-04EH-580-4J-
- LSVHG-04EH-100/200/280/450-S4-



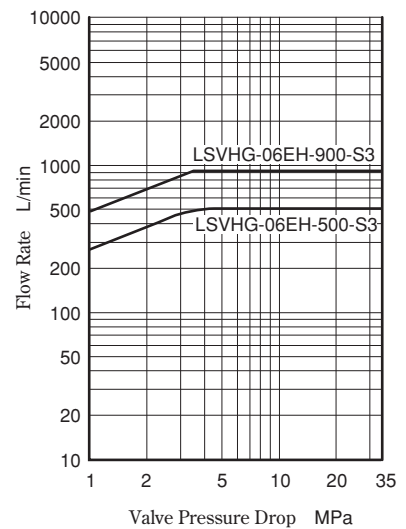
- LSVHG-04EH-100/200/280/450-S3-



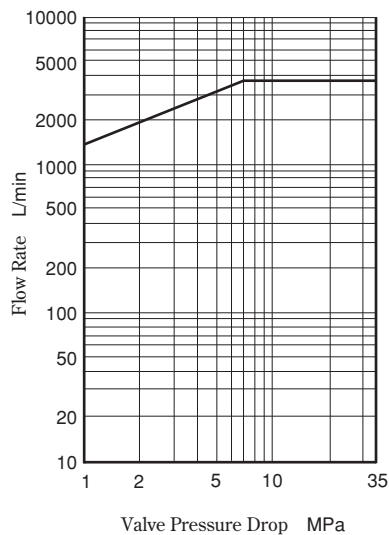
- LSVHG-06EH-900/1300
- LSVHG-06EH-820-4J-
- LSVHG-06EH-500/900-S4-



- LSVHG-06EH-500/900-S3-



- LSVHG-10EH-3800-



Servo Amplifiers & Controllers

Name / Model Numbers & Appearance	Functions / Merits
Servo Controller SK1056-**-**-20	The analog controller including all functions the servo amplifiers configure servo systems required. This controller is equipped with some functions to display feedback signals,to switch open/close by extreme signals,to output alarm signals,etc.
Servo Amplifier AMS-**-S-20	This amplifier is 2 input signal type(voltage input),also have auxiliary input(AUX) which can configure minor loop. Also can provide $\pm 12V$ rated voltage to the outside,so can connect with configurators or detectors(ex.potentiometer) easily.