NACHI

2017

Válvulas Hidráulicas

NACHI-FUJIKOSHI CORP.

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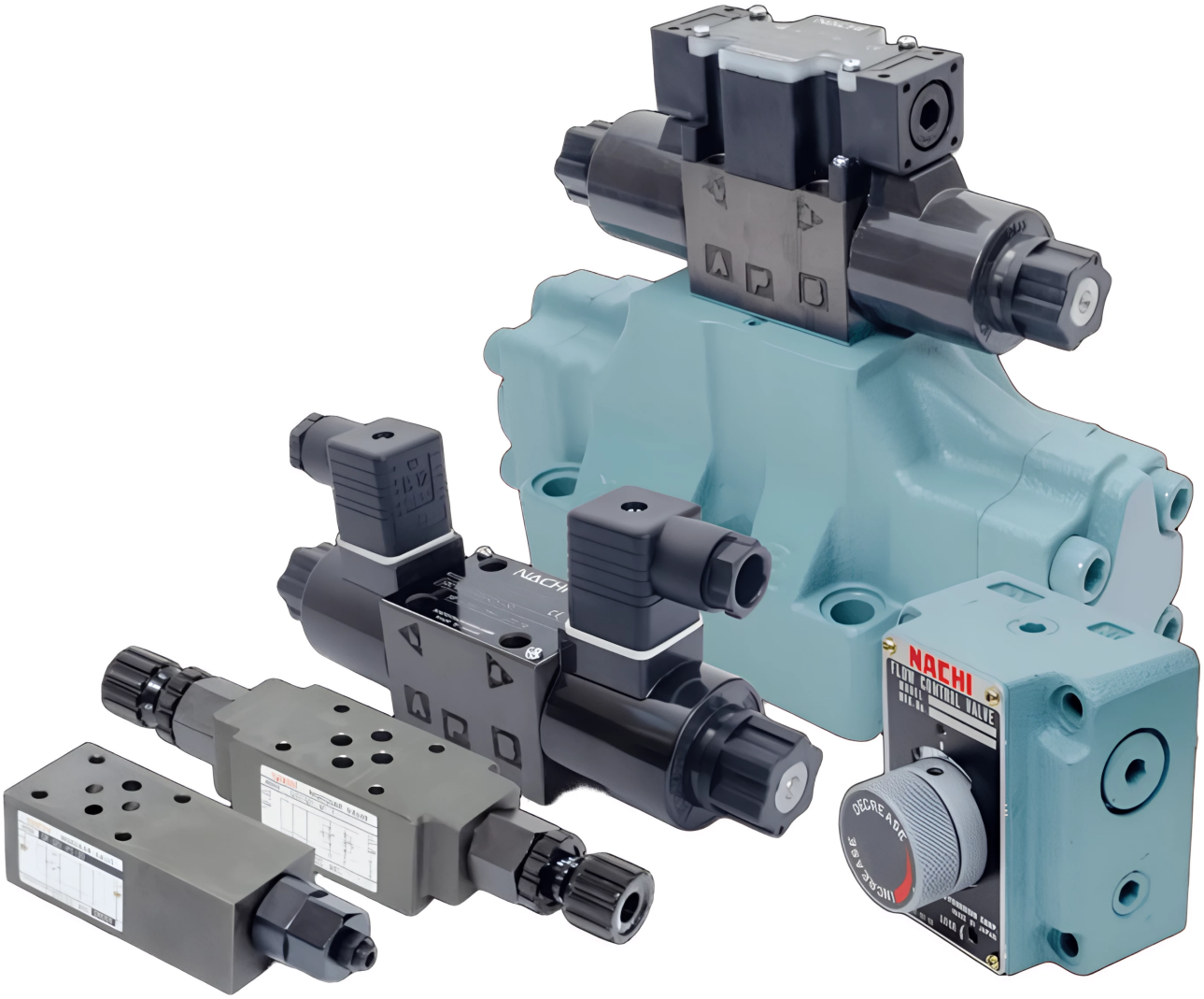


ISO 14001 JACO EC01J0025

ISO 9001 JQA-1383

NACHI Hydraulic Valves

Features

1 Maximum operating pressure of 3045 to 5000 psi provides smooth operation at high pressures. Low leakage for high efficiency.
2 Extremely stable performance across all pressure ranges.
3 Conformance with ISO recommended dimensions for most gasket installations enables a high degree of international compatibility.
4 A highly reliable and quiet wet type solenoid valve series is available when the noise and reliability issues of solenoid valves are a problem.
5 A comprehensive pipe-less series provides the ultimate in compact design and reliability.

Installation and Maintenance

1 Installation is possible in horizontal, vertical, and diagonal configurations. However, the spool must be oriented horizontally in the case of a solenoid valve or hydraulic switching solenoid valve no-spring type.
2 Precision finish the mounting surface to a surface roughness of 1.6a and degree of flatness of 0.0003 in.
3 Make sure that the return piping from the hydraulic valve to the tank is below the fluid level surface.
4 Be sure to use only specified bolts on hydraulic valves. Use grade 8 bolts or equivalent.
5 Installation bolts are not included with any modular valves, the SS, SA, SF, and SNG G01 size solenoid valves, the DMA-G01 manual valve, or with sub plates. Bolts are included with gasket type valves other than those mentioned above.
6 Use O-rings with a hardness of 90 durometer for valve gasket O-rings.

Management of Hydraulic Operating Fluid

1 Use mineral oil-based hydraulic operating fluid.
2 See pages N-1 and N-2 for information about the viscosity of the operating fluid you need to use.
3 When using water- or glycol-based hydraulic operating fluid, refer to pages N-4 through N-6 for details on applicable models. Contact your agent for information about other fire-resistant hydraulic fluids and special fluids.
4 Foreign matter in the hydraulic operating fluid can lead to frequent valve operation problems. Use a 10μm line filter to protect against contamination.

Terms Used in This Catalog

The following describes the meanings of the following terms used in this catalog:

- Rated Flow Rate :
  Specific guaranteed flow rate under certain fixed conditions
- Maximum Flow Rate :
  Maximum flow rate that satisfies valve function
- The following are the ratings that apply to the seal part list.
  JIS standard B2401 (O-ring)
  JIS standard B2407 (backup ring)
  SAE standard AS568 (O-ring)
- Pipe apertures mentioned in this catalog that are indicated as "G*/*" comply with BSPP O-ring seal systems.

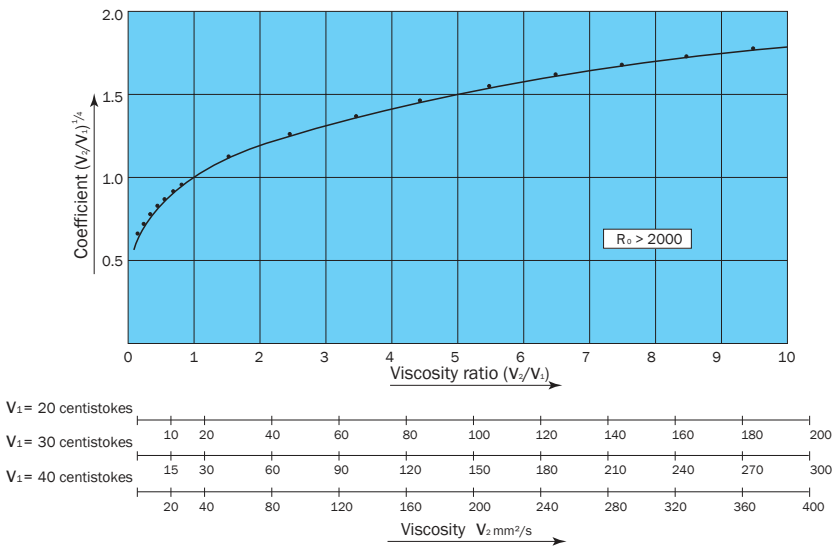
Calculation of Hydraulic Valve Pressure Loss

Use the following formula to convert pressure loss values for each hydraulic valve in accordance with changes in operating fluid viscosity.

$$\Delta P_2 = \left(\frac{V_1}{V_2}\right)^{1/4} \cdot \Delta P_1$$

ΔP_1 : Pressure loss psi at for viscosity V_1
ΔP_2 : Pressure loss psi at for viscosity V_2
V_1 : Viscosity centistokes
V_2 : Viscosity centistokes
The graph on the right shows coefficient values $(V_2/V_1)^{1/4}$ viscosity ratios (V_1/V_2).
<Example>
For a value whose pressure loss at the rated flow rate when V_1 = 30 centistokes is ΔP_1 = 43 psi, a change in viscosity to V_2 = 90 centistokes produces a pressure loss of (V_2/V_1) = 3.
According to the graph on the right, coefficient $(V_1/V_2)^{1/4}$ = 1.3.
Accordingly :

$\Delta P_2 = 1.3\Delta P_1 = 1.3 \times 43$ psi = 56 psi



Factory Default Handle Setting

The following are the factory default pressure and flow rate settings for handles (screws) on adjustable valves.
1 Pressure Control Valve: Near the minimum control pressure.
2 Flow Control Valve: Near the minimum control flow rate.

Note, however, that ER and ESR relief valves are set to rated pressures. For details, see the applicable pages for each type of valve.

Hydraulic Valve Selection Table

	Pump Type / Name	Type Classification	Maximum Working Pressure psi	Maximum Flow Rate gpm (.26 .52 1.3 2.6 5.2 13.2 26.4 52.8 132 264 528 1320)	Page
Modular Valves	Relief modular valve	OR	3600	01 03 04	F10
	Brake modular valve	ORO	3600	01 03	F16
	Direct relief modular valve	ORD	3600	01 03 04	F20
	Pressure reducing modular valve	OG	3600	01 03 04	F25
	01 Size balance type Pressure reducing modular valve	OGB	3600	01	F-32
	Reducing valve & modular valve	OG	3600	01 03 04	F-34
	2-pressure reducing modular valve	OGS	3600	01	F-41
	Sequence modular valve	OQ	3600	01 03	F-44
	Counter balance modular valve	OCQ	3600	01 03 04	F-47
	Pressure switching modular valve	OW	3600	01	F-52
	Flow regulator modular valve	O(C)Y	3600	01 03 04	F-55
	Flow control modular valve	O(C)F	3600	01 03 04	F-63
	Chceck modular valve	OC(V)	3600	01 03 04	F-69
	Pilot operated check modular valve	OCP	3600	01 03 04	F-76
Solenoid Valves	SS wet type solenoid valve	SS	5000	01 03	D-4
	SA wet type solenoid valve	SA	5000	01 03	D-16
	SE low power type solenoid valve	SE	3000	01 03	D-28
	SL wet type solenoid valve	SL	1000	01	D-34
	DSS(A) solenoid control valve	DSS DSA	5000	04 06	D-41
	Fine solenoid Valve	SF	3000	01	D-49
	Non-leak type solenoid valve	SNH	5000	01 03 04 06	D-53
	SAW solenoid with monitoring switch	SAW			D-62
	SCW poppet type with monitoring switch	SCW			D-71
	SK solenoid with Deutsch connector	SK			D-76
Pressure Control Valves	Relief valve	R	3000	03 06 10	I-1
	RI series relief valve	RI	5000	03 06	I-5
	Remote control valve	RC(D)	3000	RC-02 RCD-02	I-8
	Solenoid control relief valve	RSS(A)	3000	03 06 10	I-10
	RIS Series Solenoid control relief valve	RIS	5000	03 06	I-15
	Reducing (& check) valve	(C)G	3000	03 06 10	I-18
	Balancing valve	GR	3000	01 03	I-23
	Pressure control (& check) valve	(C)Q	3000	03 06 10	I-25

Maximum operating pressure for the modular valve series is 5000 psi.

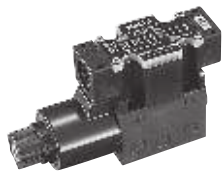
Hydraulic Valve Selection Table

Pump Type	Name	Type Classification	Maximum Working Pressure psi	Maximum Flow Rate gpm (.26 .52 1.3 2.6 5.2 13.2 26.4 52.8 132 264 528 1320)	Page
Flow Control Valves	Throttle (& check) valve	(C)FR	3000	03 06 10	J-1
	FT type low control valve	(C)FT	3000	02 03	J-4
	F type control valve	(C)F	3000	06 10	J-8
	TN type flow control valve	(C)TN	1500	02	J-11
	TS type flow control valve	(C)TS	1500	01	J-14
	TL type flow control valve	TL(T)	1000	03、04	J-16
Direction Control Valves	Right angle check valve	CA	3000	03 06 10	K-1
	In-line check valve	CN	3000	03 06 10	K-1
	Pilot check valve	CP	3000	03 06 10	K-4
	Gauge cock	K_2	6000	—	K-7
	Flange type check valve	CA	3625	06 10 16 24	K-8
	DMA type manual valve	DMA	5000	01 03	E-1
Electro-hydraulic Proportional Control Valves	Pilot relief valve	EPR	5000	01	G-2
	Relief valve	ER	5000	03 06	G-4
	Relief and reducing valve	EGB	3600	03 06	G-6
	Flow control valve	(C)ES	3000	02 03 06 10	G-8
	Load response control valve	ESR	3600	03 06 10	G-11
	Flow direction control valve	ESD	3600	01 03 04 06 10	G-14
	Modular type reducing valve	EOG	3600	01	G-22
	Modular type flow control valve	EOF	3000	01	G-24
	Driver power amplifier	EMA EMC	–	—	G-26
	Driver power compact amplifier	EBA EBC	–	—	G-30
	Compact multi-function power amplifier	EDA EDC	–	—	G-34
High-response Proportional Flow Control Valve	High-response proportional flow control valve	ESH	4600	01 03 04 06	G-38
	High-speed response proportional control valve amplifier	EHA	–	—	

WET TYPE SOLENOID OPERATED DIRECTIONAL CONTROL VALVE

SS Series (Wiring System: Central Terminal Box) Wet Type Solenoid Valve

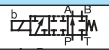
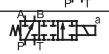
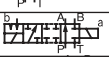
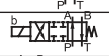
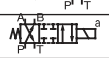
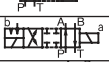
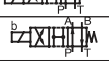
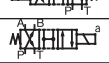
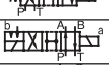
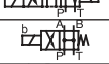
26.4 to 42 gpm
5075 psi



Features

Very long life
The movable iron core of the wet type solenoid is immersed in oil, which keeps it lubricated and cushions it from impact and vibration, ensuring very long life.
Low switching noise
The wet-type solenoid valve provides very low core switching noise, for quiet operation.
High pressure, large capacity, with minimal pressure loss
Comprehensive fluid reaction force compensation and low pressure compensation construction provide large capacity and low pressure loss.
G01 : 5075 psi (26.4 gpm)
G03 : 5075 psi (42 gpm)
Easy connections
A special wiring box provides a COM port and indicator light as standard for simple wiring and maintenance.
Easy coil replacement
A plug-in type coil enables one-touch coil replacement.
Wide-ranging backward compatibility makes it simple to replace previous valve models with this one. Combining this valve with a modular valve contributes to the compact configuration of the overall device.
Compliant with global and international safety regulations (G01 size CE, UL, CSA, and G03 size UL). Can be used safely around the world. Contact us for models and specifications of compliant products.

Specifications

Model No.		SS-G01 (D03)				SS-G03 (D05)					
		Standard Type		Shockless Type		Standard Type				Shockless Type	
						AC Solenoid Type		DC Solenoid Type (With built-in rectifier)			
JIS Symbol	Operation Symbol	Maximum Flow Rate gpm	Maximum Working Pressure psi	Maximum Flow Rate gpm	Maximum Working Pressure psi	Maximum Flow Rate gpm	Maximum Working Pressure psi	Maximum Flow Rate gpm	Maximum Working Pressure psi	Maximum Flow Rate gpm	Maximum Working Pressure psi
	-A2X-	7.9	5075	7.9	3625	10.5	5075	22.4	5075	22.4	3625
	-H2X-										
	-E2X-					22.4					
	-A3X-	21		13.2		34.3		42.2		34.3	
	-H3X-										
	-E3X-	26.4									
	-A3Z-	17.1									
	-H3Z-										
	-E3Z-										
	-A4-	13.2									
	-H4-										
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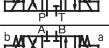
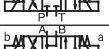
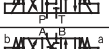
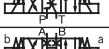
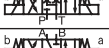
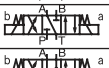
	-C5-										
	-C9-										
	-C1S-										
	-C6S-										
	-C1-	AC Solenoid 17.1 DC Solenoid 21.1									
	-C6-										
	-C4-	13.2									
	-C7Y-			10.5		18.5	3625	26.4	3625	22.4	
	-C8-										

Note: The maximum flow rate of each valve depends on the pressure. For details, see pages D-12 and D-13.

			SS-G01			SS-G03		
			AC Solenoid	DC Solenoid		AC Solenoid	DC Solenoid	
				Built-in Rectifier			Built-in Rectifier	
			C*	E*	D*	C*	E*	D*
Maximum Working Pressure	P, A, B ports		5075 psi					
Maximum Allowable Backpressure	T port		3045 psi			2320 psi		
Switching frequency (cycles/minute)		Standard Type	300	120	300	300	120	240
		Shockless Type	–		120	–		120
Standard	Indicator light		R			R		
Option	Shockless		–	F		–	F	
	Surgeless		G	–	G	G	–	G
	With manual push-button		N			N		
	Quick Return		–	Q	–	–	Q	–
Weight (kg)	Double Solenoid		1.8	2.0		4.2	5.5	
	Single Solenoid		1.4	1.5		3.5	4.1	
Operating Environment	Dust Resistance/Water Resistance Rank		IP64 (Dust-tight, Splash-proof)					
	Ambient Temperature		-4 to 122°F					
	Operating Fluid	Temperature Range	-4 to 158°F					
		Viscosity Range	15 to 300 centistokes					
		Filtration	10 microns or less					
Mounting bolt	Size × Length		10-24 x 1 3/4 LG (not included)			1/4-20 x 2 3/4		
	Tightening Torque		3.6 to 5 ft lbs			14.7 to 18.4 ft lbs		

Note: 1. Maximum operating pressure depends on the valve type. For details, see page D-1.
2. For mounting bolts, use 12T, grade 8 or equivalent.
3. Mounting bolts are not included with the 01 size. Bolts are included with the 03 size.

• Handling

1 In order to realize the full benefits of the wet type solenoid valve, configure piping so oil is constantly supplied to the T port. Never use a stopper plug in the T port.
2 Ensure that surge pressure in excess of the maximum allowable back pressure does not reach the T port.
3 Note that the maximum flow rate is limited when used as a four-way valve, or by blocking ports for use as a two-way valve or one-way valve.
4 Always keep the operating fluid clean. Allowable contamination is class NAS12 or less.
5 When using petroleum type operating fluid, use ISO VG 32, 46.
6 For details about using fire-resistant hydraulic fluid, contact your agent.
7 Use this valve only within the allowable voltage range.
8 Do not allow the AC solenoid to become charged until you install the coil into the valve.
9 In the case of operation symbols A2X, H2X, and E2X, run drain piping from the valve T port.
10 Maintaining a switching position under high pressure for a long period can cause abnormal operation due to hydraulic lockup. Contact your agent when you need to maintain a switching position for a long period.
11 When using a detent type (E2X, 3X, E3Z), use constant energization in order to securely maintain the switching position.
12 Note that manual pin operating pressure changes in accordance with tank line back pressure.
13 The series described in the table below are available for use as RSS and RIS Series solenoid control relief valves.

RSS-***-AR*-(H)-**-$^{15}_{23}$ RIS-***-AR*-(H)-**-21	SS-G01-AR-R-**-31
RSS-***-AQ*-(H)-**-$^{15}_{23}$ RIS-***-AQ*-(H)-**-21	SS-G01-A3X-R-**-31
RSS-***-*-F(H)-**-$^{15}_{23}$	SS-G01-A8X0-R-**-31
RIS-***-*-F-**-21	SS-G01-A3X-R-**-31

14 The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.
15 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs	Applicable Valve Type
MSA-01X-E10	1/4	3625	5.2	1.2	SS-G01-**-R-**-31
MSA-01Y-E10	3/8		10.4		
MS-03-E30	3/8		11.8	2.3	SS-G03-**-R-**-22
MS-03X-E30	1/2		21.1		

• Solenoid Assembly Specifications

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SS-G01					For SS-G03				
				Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)	Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)
AC	C1	AC100	50	EDC64-C1	2.2	0.52	25	80 to 110	ECB64-C1	5.4	0.92	36.0	80 to 110
			60		2.0	0.38	22	90 to 120		4.6	0.62	34.0	90 to 120
		AC110	60		2.2	0.46	28			5.0	0.78	42.0	
	C115	AC110	50	EDC64-C115	2.0	0.47	25	90 to 120	ECB64-C115	5.0	0.85	36.0	90 to 120
			60		1.8	0.35	22	100 to 130		4.2	0.57	34.0	100 to 130
		AC115	60		2.0	0.42	28			4.6	0.72	42.0	
	C2	AC200	50	EDC64-C2	1.1	0.26	25	160 to 220	ECB64-C2	2.7	0.46	36.0	160 to 220
			60		1.0	0.19	22	180 to 240		2.3	0.31	34.0	180 to 240
		AC220	60		1.1	0.23	28			2.5	0.39	42.0	
	C230	AC220	50	EDC64-C230	1.0	0.24	25	180 to 240	ECB64-C230	2.5	0.42	36.0	180 to 240
			60		0.91	0.17	22	200 to 260		2.1	0.29	34.0	200 to 260
		AC230	60		1.0	0.21	28			2.3	0.36	42.0	
DC with Built-in Rectifier	E1	AC100	50/60	EDC64-E1-1A	0.31		27	90 to 110	ECB64-E1	0.40		34.0	90 to 110
	E115	AC110	50/60	EDC64-E115-1A	0.26		25	100 to 125	ECB64-E115	0.33		31.0	100 to 125
		AC115			0.27		27			0.34		34.0	
	E2	AC200	50/60	EDC64-E2-1A	0.15		26	180 to 220	ECB64-E2	0.22		37.0	180 to 220
	E230	AC220	50/60	EDC64-E230-1A	0.12		24	200 to 250	ECB64-E230	0.16		30.0	200 to 250
		AC230			0.13		27			0.17		33.0	
DC	D1	DC12	☒	EDC64-D1-1A	2.2		26	10.8 to 13.2	ECB64-D1	2.6		31.0	10.8 to 13.2
	D2	DC24	☒	EDC64-D2-1A	1.1		26	21.6 to 26.4	ECB64-D2	1.5		36.0	21.6 to 26.4

Understanding Model Numbers

SS – G 03 – A 3 X – * R – C2 – E22

Design number
E31: 01 size; 10 - 24 mounting bolt
E22: 03 size; 1/4 - 20 mounting bolt

Power supply
C: AC (50/60Hz) C1=AC100V C115=AC110V C2=AC200V C230=AC220V
D: DC D1=DC12V D2=DC24V
E: AC (Built-in rectifier; 50/60Hz) E1=AC100V E115=AC115V E2=AC200V E230=AC230V

With indicator light

Auxiliary symbol (Can be combined in alphabetic sequence.)
F: Shockless type (Available with power supply D*, E)
G: Surgeless type (Available with power supply C*, D*)
N: With manual push-button
Q: Quick return type (Available with power supply E*)

Transition Flow Path (Specify for A2X, H2X, E2X, A3X, H3X, E3X, A3Z, H3Z, E3Z, C7Y only.)

X	Y	Z
Closed	Semi-open	Open

Center position

0	1	2	3	4	5
6	7	8	9	1S	6S

Note 1: P=Pressure port; A and B=Connection port to cylinder, etc.; T=Connection port to tank

Operation Method

A	H	C	E
Spring Offset		Spring Center	Detent

Nominal diameter
01 size (D03)
03 size (D05)

Mounting method
G: Cascade mounting

Wet type solenoid operated directional control valve

Options

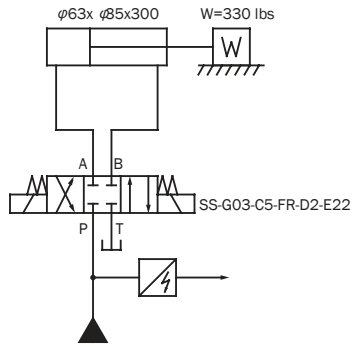
(Auxiliary Symbol Explanations)

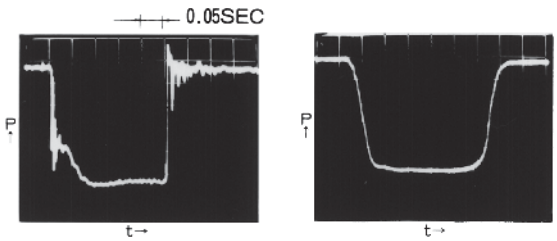
Shockless Type (Auxiliary Symbol: F)

Switching Response Characteristics

The pressure waveforms for each valve in the hydraulic circuit shown below are shown at the bottom of this block.

Opening and closing of a dry type valve generates shock (noise) and pipe vibration due to the sudden drop or rise in pressure. With a shockless solenoid valve, pressure fluctuation when the valve is opened or closed is smoothened, which eliminates shock (noise) and pipe vibration.

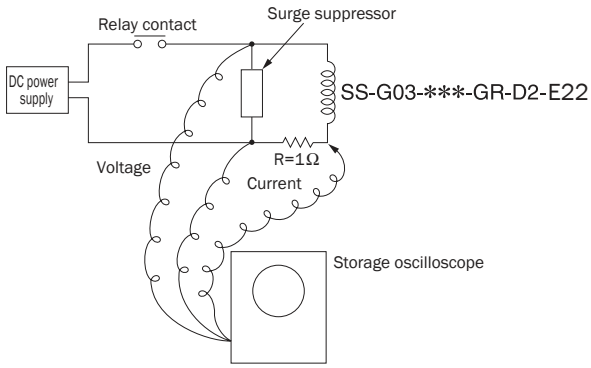


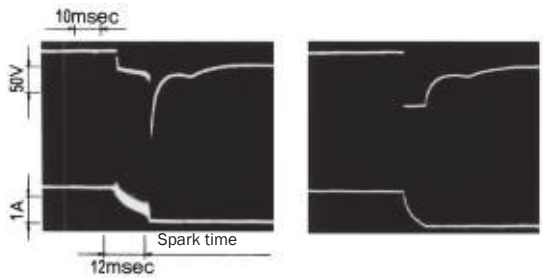


Dry type　　Shockless type

Surgeless Type (Auxiliary Symbol: G)

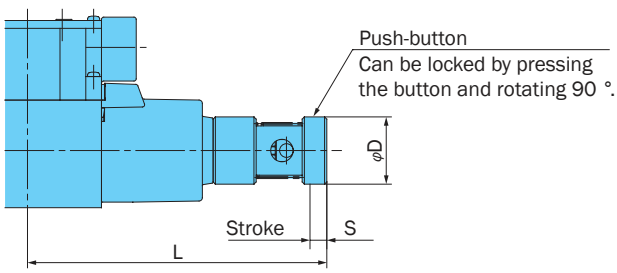
The surge pressure waveforms when the DC solenoid valve power supply is opened and closed by a relay are shown at the bottom of this block. A built-in surge absorber element eliminates sparking and surge pressure.





Normal form　　Surgeless time

Manual Button Type (Auxiliary Symbol: N)



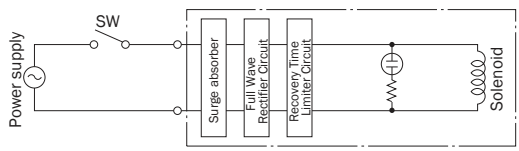
Part No.		L	S	D
EDB14-D-1A	AC Solenoid	133.5	7.5	30
EDB14-A	DC Solenoid	140.5		
ECB14-A	AC Solenoid	155.5	9.5	35
ECB14-D	DC Solenoid	173.5		

Quick Return (Auxiliary Symbol: Q)

• Handling

1. This type is used in the case of power supply type E* (with built-in rectifier) to shorten the spring return time. This also applies to D*.

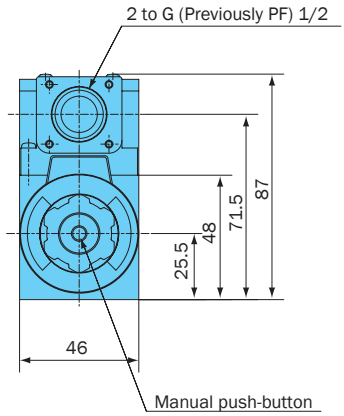
2. Quick return device is built-in to central terminal box.

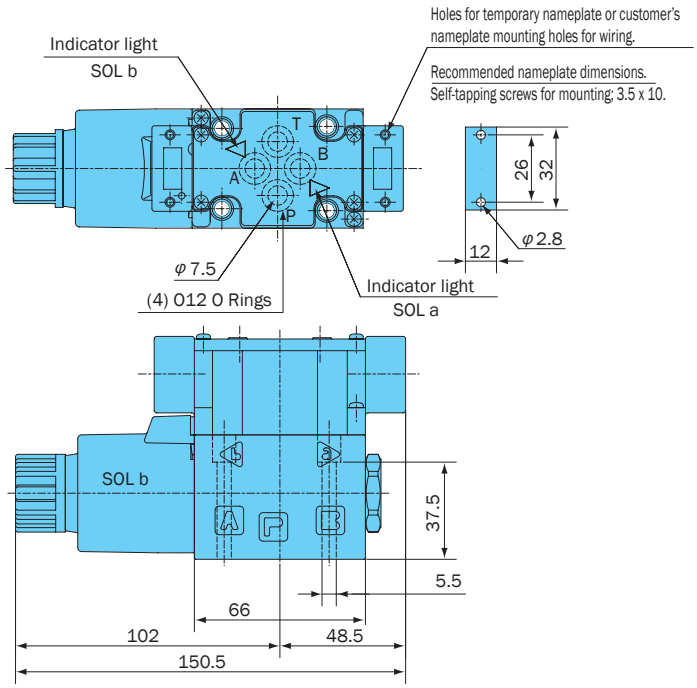


Installation Dimension Drawings

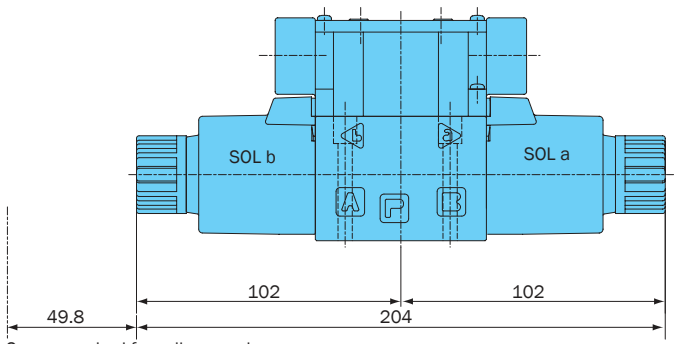
AC Solenoid
SS-G01-A**-R-C*-31
SS-G01-H**-R-C*-31

Note)
SS-G01-H**-R**-31
The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

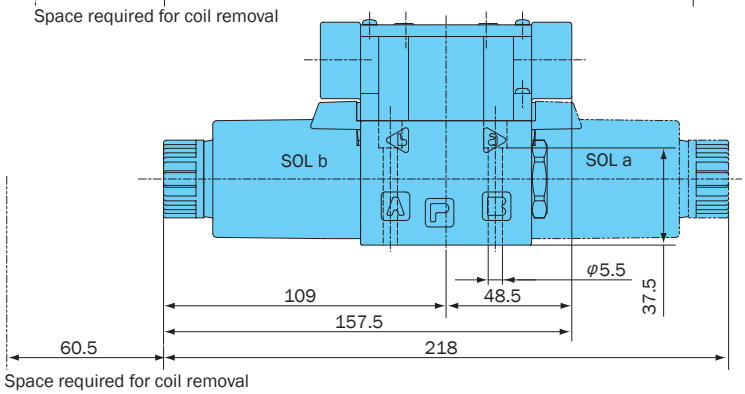




SS-G01-C **-R-C*-31
SS-G01-E **-R-C*-31



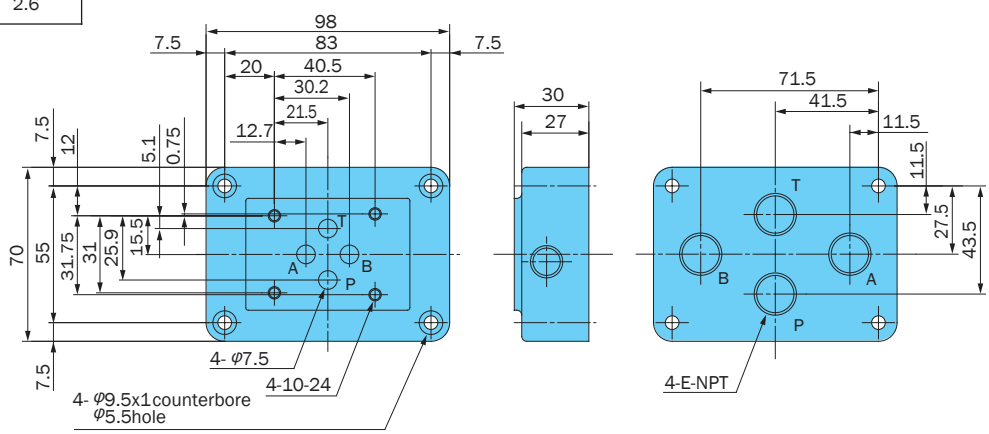
DDC Solenoid and Rectifier
SS-G01-A **-R-D/E*-31
SS-G01-H **-R-D/E*-31
SS-G01-C **-R-D/E*-31
SS-G01-E **-R-D/E*-31



For sub plate SS-G01

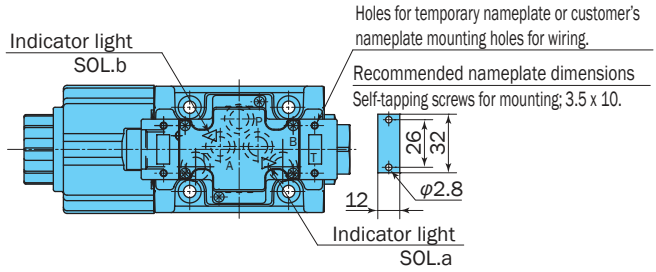
Model No.	E	Weight lbs
MSA-01X-E10	1/4	2.6
MSA-01Y-E10	3/8	2.6

Gasket Surface Dimensions
(ISO 4401-03-02-0-94
JIS B 8355 D-03-02-0-94)



Installation Dimension Drawings

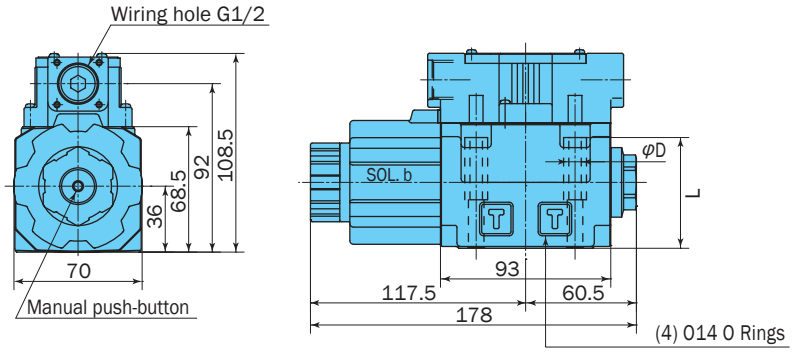
AC Solenoid
SS-G03-A**-R-C*-E22
SS-G03-H**-R-C*-E22



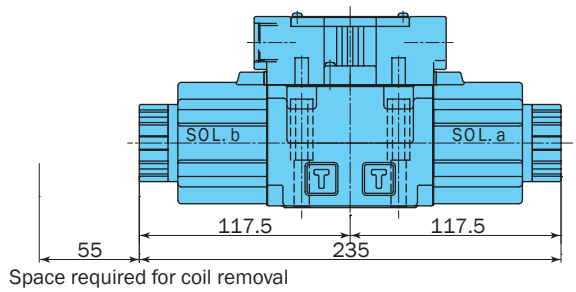
Note:
SS-G03-H**-R-**-E22
The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

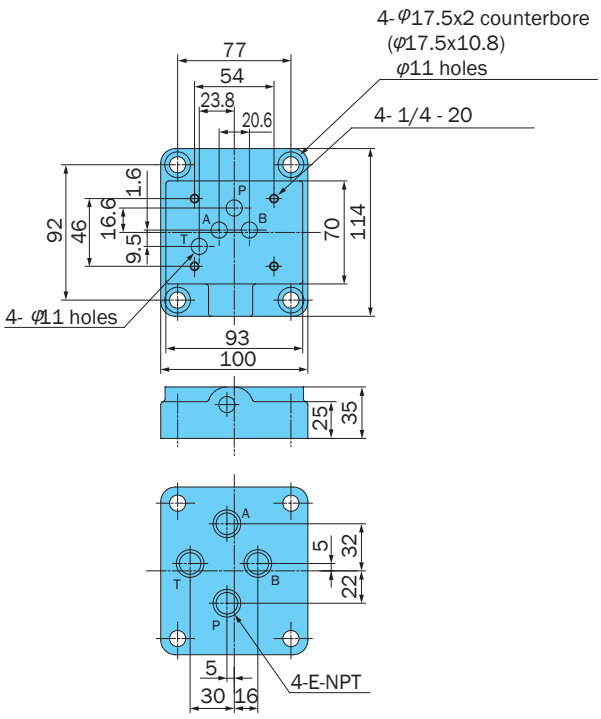
	SS-G03-**-*R-**-J22	SS-G03-**-*R-**-22
φD	φ6.8	φ8.5
L	60.5	58

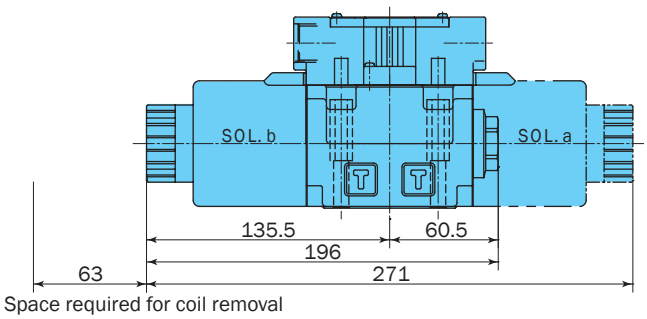
SS-G03-C**-R-C*-E22
SS-G03-E**-R-C*-E22



DC Solenoid and Rectifier
SS-G03-A **-R-D*/E*-E22
SS-G03-H **-R-D*/E*-E22
SS-G03-C **-R-D*/E*-E22
SS-G03-E **-R-D*/E*-E22





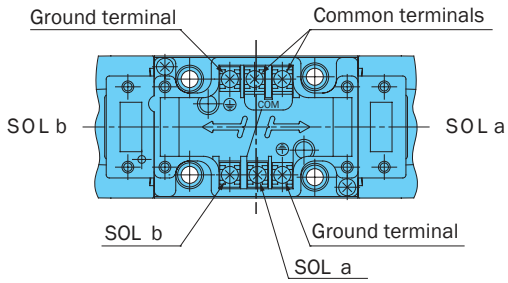


For sub plate SS-G03

Mounting bolt	Model No.	E	Weight lbs
1/4 - 20 x 2 3/4	MSA-03-E10	3/8	5.0
	MSA-03X-E10	1/2	

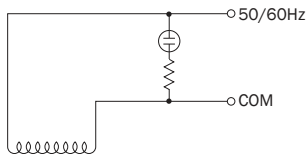
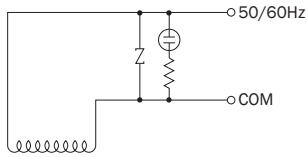
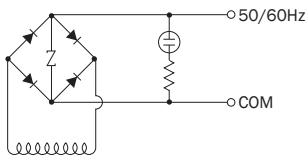
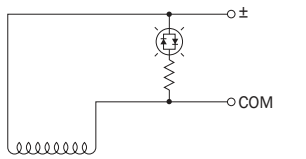
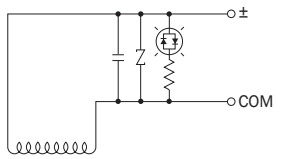
Gasket surface dimensions
(ISO 4401-05-04-0-94
JIS B 8355 D-05-04-0-94)

Wiring Diagram



Note:
1. In the case of a double solenoid valve, a common terminal is provided to simplify wiring. When the common terminal is not used, remove the terminal screws.
2. Use the ground terminal when grounding is required.
3. In the case of a solderless terminal, M3 screws.
4. Tighten terminal screws to a torque of 3.6 to 5 ft lbs.

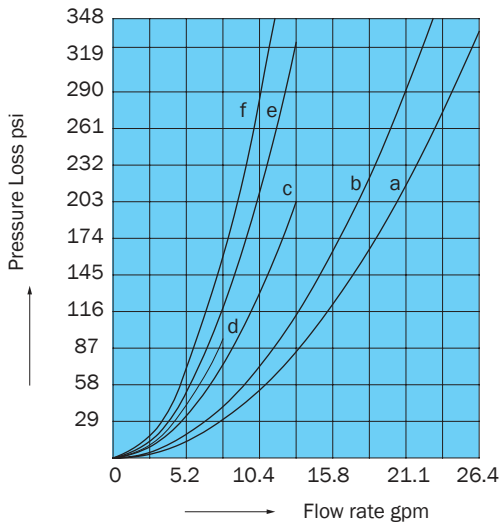
Electrical Circuit Diagram

Type	Model No.	Electrical Circuit
AC Solenoid	SS-$\frac{G01}{G03}$-***-R-C*-$\frac{31}{22}$	
AC Solenoid Surgeless Type	SS-$\frac{G01}{G03}$-***-GR-C*-$\frac{31}{22}$	
Built-in Rectifier	SS-$\frac{G01}{G03}$-***-R-E*-$\frac{31}{22}$	
DC Solenoid	SS-$\frac{G01}{G03}$-***-R-D*-$\frac{31}{22}$	
DC Solenoid Surgeless Type	SS-$\frac{G01}{G03}$-***-GR-D*-$\frac{31}{22}$	
Built-in Rectifier Quick Return Type	SS-$\frac{G01}{G03}$-***-QR-E*-$\frac{31}{22}$	See page D-7 for more information.

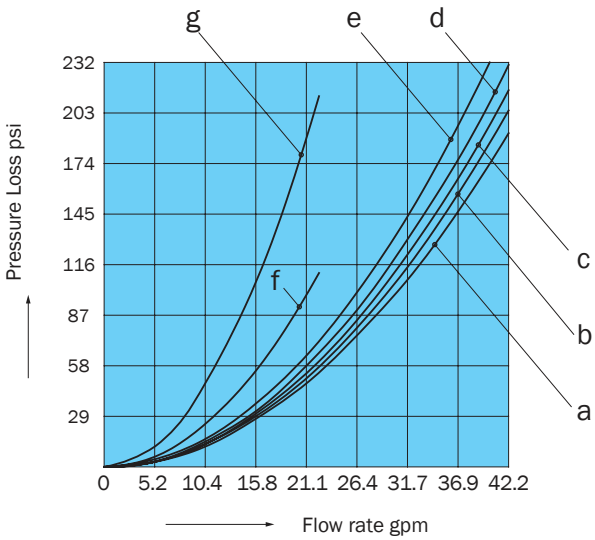
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics



Pump Type	Flow Path	P/ A	P/ B	A/ T	B/ T	P/ T
SS-G01	A2X, H2X, E2X	d	d	–	–	–
	A3X, H3X	b	b	b	b	–
	E3X	b	b	b	b	–
	A3Z, H3Z, E3Z	a	a	a	a	–
	A4, H4, C4	a	a	a	a	a
	A5, H5, C5, C6S	b	b	b	b	–
	C1, C1S	b	b	a	b	–
	C2	a	b	b	b	–
	C6	b	b	a	a	–
	C7Y	f	f	e	e	c
	C8	a	f	b	e	c
	C9	a	a	b	b	–



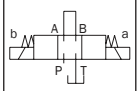
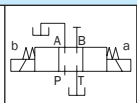
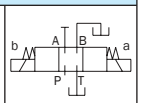
Pump Type	Flow Path	P/ A	P/ B	A/ T	B/ T	P/ T
SS-G03	A2X, H2X, E2X	e	e	–	–	–
	A5	–	c	c	–	–
	H5	c	–	–	c	–
	A3X, H3X, E3X	c	c	d	d	–
	A3Z, H3Z	a	a	d	d	–
	E3Z	b	b	a	a	–
	C1	c	c	a	c	–
	C2	a	c	c	c	–
	A4, H4, C4	a	a	a	a	a
	C5, C1S, C6S	c	c	c	c	–
	C6	c	c	a	a	–
	C7Y	g	g	g	g	f
	C8	a	g	a	g	f
	C9	a	a	c	c	–

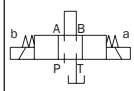
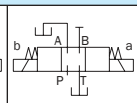
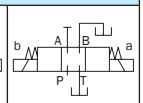
Switching Response Time

Model No.	Response Time (sec)		Measurement Conditions
	Solenoid ON	Spring Return	
SS-G01-**-R-C*-E31	0.02 to 0.03	0.02 to 0.03	2030 psi 7.9 gpm
SS-G01-**-(G)R-D*-E31	0.03 to 0.04	0.02 to 0.04	
SS-G01-**-R-E*-E31	0.03 to 0.04	0.07 to 0.10	
SS-G01-**-F(G)R-D*-E31	0.07 to 0.10	0.04 to 0.07	
SS-G01-**-FR-E*-E31	0.07 to 0.10	0.10 to 0.15	
SS-G03-**-R-C*-E22	0.02 to 0.03	0.02 to 0.03	2030 psi 18.4 gpm
SS-G03-**-(G)R-D*-E22	0.06 to 0.09	0.03 to 0.05	
SS-G03-**-R-E*-E22	0.07 to 0.10	0.10 to 0.15	
SS-G03-**-F(G)R-D*-E22	0.13 to 0.15	0.08 to 0.15	
SS-G03-**-FR-E*-E22	0.10 to 0.15	0.15 to 0.20	

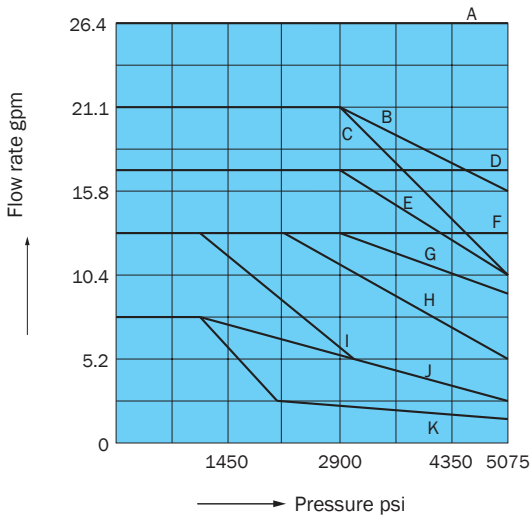
Note: 1.The switching response time changes slightly with operating conditions (pressure, flow rate, viscosity, etc.)
2. In the case of power supply type E* (with built-in rectifier), the spring return time using Quick Return (option symbol: Q) is the same as D*.

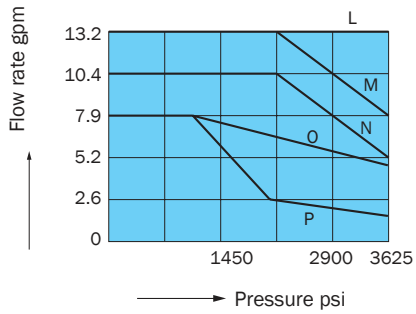
Pressure – Flow Volume Allowable Value

Size	Standard Form, with AC, DC solenoid SS-G01-**-R-**-31		
Operation Example / Operation Symbol			
A2X, H2X	–	K	K
E2X	–	J	J
A3X, H3X	B	K	K
E3X	A	J	J
A3Z, H3Z	D	D	D
E3Z	D	D	D
A5	A	–	I
H5	A	I	–
C1, C6	Note1) C(E)	I	I
C1S, C5, C6S	A	I	I
C2, C9	A	K	K
A4	F	F	F
H4	F	F	F
C4	F	F	F
C7Y, C8	Note2) G(H)	K	K

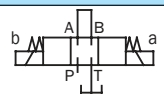
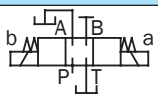
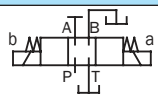
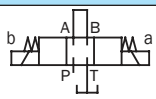
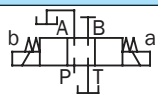
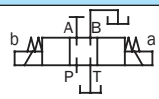
Size	Shockless Type, with DC solenoid SS-G01-**-FR-**-31		
Operation Example / Operation Symbol			
A2X, H2X	–	P	P
E2X	–	O	O
A3X, H3X	L	P	P
E3X	L	O	O
A3Z, H3Z	L	L	L
E3Z	L	L	L
A5	L	–	P
H5	L	P	–
C1, C6	M	P	P
C1S, C2, C5, C6S, C9	L	P	P
A4, H4	L	L	L
C4	L	L	L
C7Y, C8	N	P	P

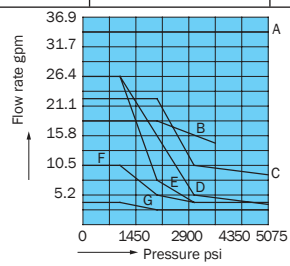
Note: 1.Letter in parentheses is for AC solenoid.
2.Letter in parentheses is for solenoid with built-in rectifier (E*), but without Quick Return, and for DC solenoid (D*) with surge voltage absorbing diode on the electrical circuit.

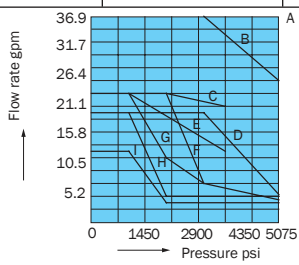


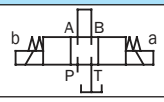
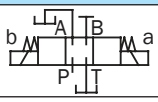
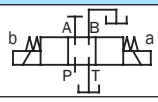


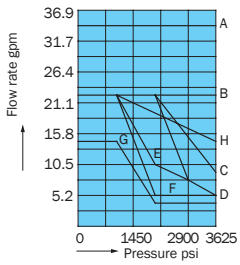
Pressure – Flow Volume Allowable Value

Model No.	Standard Form, with AC Solenoid			Standard Form, with DC Solenoid		
		SS-G03-**-R-C*-E22			SS-G03-**-R-**-E22	
Operation Example / Operation Symbol						
A2X	–	F	E	⊠	G	H
H2X	–	E	F	⊠	H	G
E2X	–	C	C	⊠	D	D
A3X	A	E	E	A	F	H
H3X	A	E	E	A	H	F
A3Z	A	A	C	A	D	D
H3Z	A	C	A	A	D	D
E3X, E3Z	A	C	C	A	D	D
A5	A	–	D	A	–	G
H5	A	D	–	A	G	–
C1S, C5, C6S	A	D	D	A	G	G
C1, C6	A	D	D	B	G	G
C2	A	G	D	A	I	G
A4, H4, C4	A	A	A	A	A	A
C9	A	G	G	A	I	I
C7Y, C8	B	B	B	Note1) C(E)	C(E)	C(E)





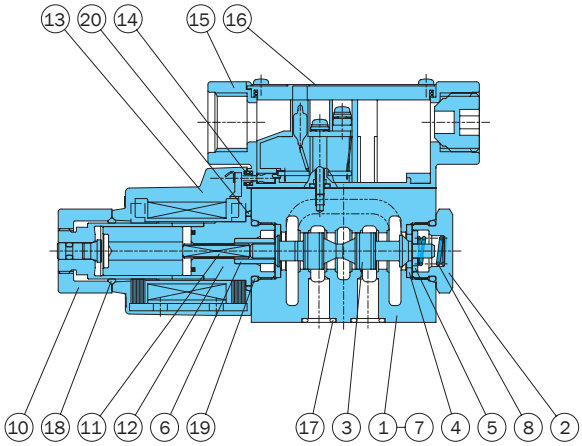
Model No.	Shockless Type, with DC solenoid		
	SS-G03-**-FR-**-E22		
Operation Example / Operation Symbol			
A2X	–	E	F
H2X	–	F	E
E2X	–	C	C
A3X	A	D	F
H3X	A	F	D
A3Z	A	C	C
H3Z	A	C	C
E3X, E3Z	A	C	C
A5	A	–	E
H5	A	E	–
C1, C1S, C5, C6, C6S	A	E	E
C2	A	G	E
A4, H4, C4	A	A	A
C9	A	G	G
C7Y, C8	Note1) B(H)	B(H)	B(H)



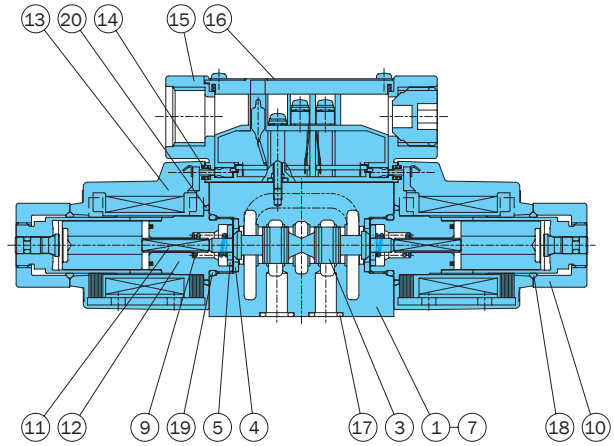
Note:
1.Letter in parentheses is for solenoid with built-in rectifier (E*), but without Quick Return, and for DC solenoid (D*) with surge voltage absorbing diode on the electrical circuit.
2.There is no shockless type for the AC solenoid (C*), so use a solenoid with built-in rectifier (E*) when shockless operation is required with an AC power supply.
3.The maximum flow rate is the allowable value of each port.

Cross-sectional Drawing

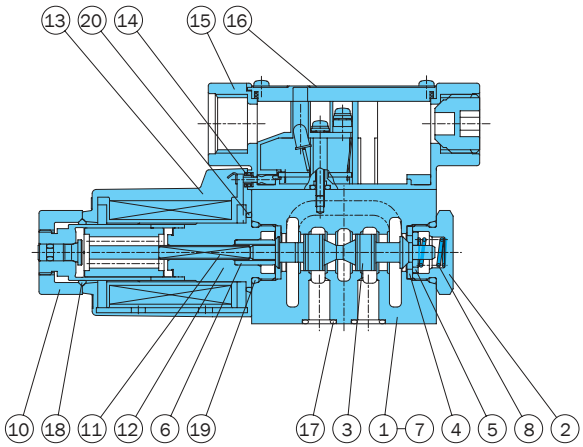
SS-G01-A**-R-C*-31



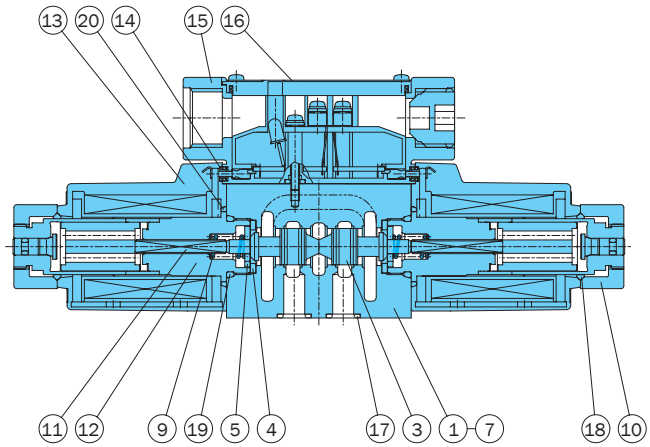
SS-G01-C**-R-C*-31



SS-G01-A**-R-D/E*-31



SS-G01-C**-R-D/E*-31



List of Sealing Parts

Part No.	Part Name	Part Number	Q'ty	
			Single Solenoid	Double Solenoid
17	O-ring	AS568-012(Hs90)	4	4
18	O-ring	1A-P20	1	2
19	O-ring	1B-P18	2	2
20	O-ring	S-25	1	2

Note: 1A and 1B are JIS Standard B 2401, while AS568 is SAE standard.

Seal Kit Number

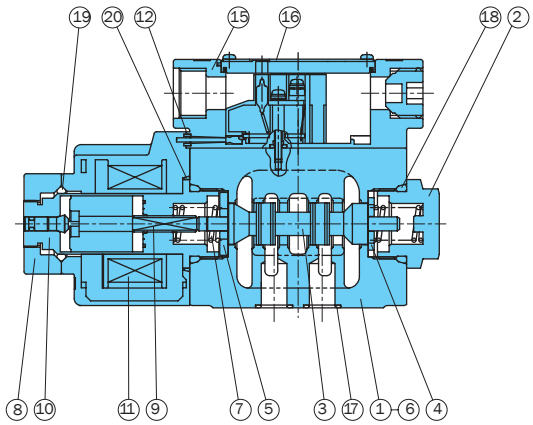
Single Solenoid	Double Solenoid
EDCS-A	EDCS-C

Part No.	Part Name
1	Body
2	Plug
3	Spool
4	Retainer A
5	Retainer B
6	Retainer C
7	Spacer
8	Spring A
9	Spring C
10	Nut

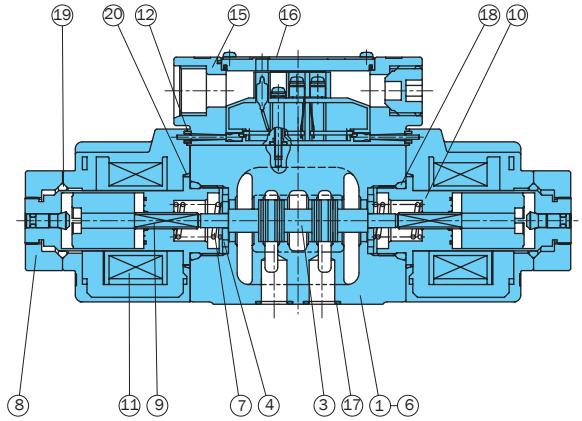
Part No.	Part Name
11	Rod
12	Solenoid guide
13	Solenoid coil
14	Packing
15	Terminal box kit
16	Nameplate
17	O-ring
18	O-ring
19	O-ring
20	O-ring

Cross-sectional Drawing

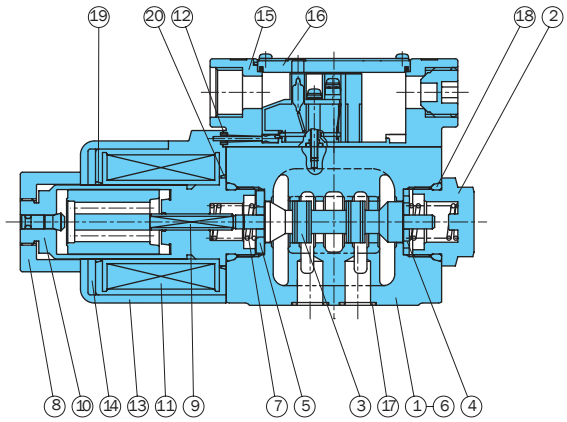
SS-G03-A**-R-C*-E22



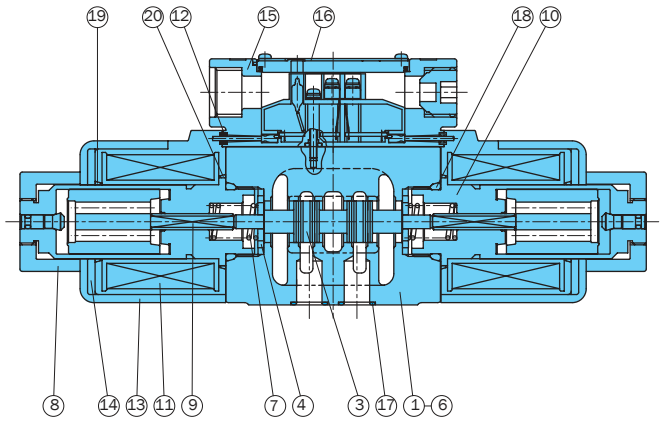
SS-G03-C**-R-C*-E22



SS-G03-A**-R-D/E*-E22



SS-G03-C**-R-D/E*-E22



List of Sealing Parts

Part No.	Part Name	Type/Part Number		Q'ty	
		AC SOL.	DC SOL.	Single Solenoid	Double Solenoid
17	O-ring	AS568-014(Hs90)		5	5
18	O-ring	1B-P28		2	2
19	O-ring	1A-P26	AS568-026	1	2
20	O-ring	AS568-029		2	2

Note: 1A and 1B** indicate JIS Standard B 2401-1A/1B-**.

Seal Kit Number

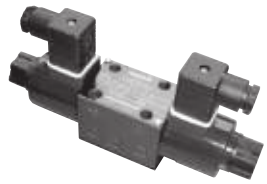
AC SOL.		DC SOL.	
Single Solenoid	Double Solenoid	Single Solenoid	Double Solenoid
ECBS-AA	ECBS-CA	ECBS-AD	ECBS-CD

Part No.	Part Name
1	Body
2	Plug
3	Spool
4	Retainer
5	Retainer B
6	Spacer
7	Spring
8	Nut
9	Rod
10	Solenoid guide
11	Solenoid coil
12	Packing B
13	Coil case

Part No.	Part Name
14	Coil yoke
15	Terminal box kit
16	Nameplate
17	O-ring
18	O-ring
19	O-ring
20	O-ring

SA Series (Wiring System: DIN Connector Type)
Wet Type Solenoid Valve

26.4 to 42 gpm
5075 psi



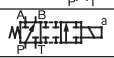
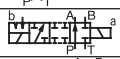
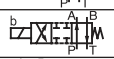
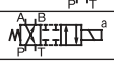
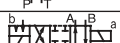
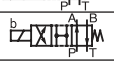
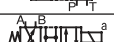
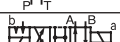
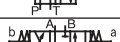
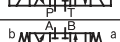
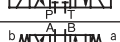
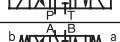
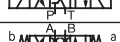
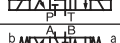
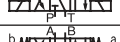
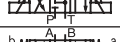
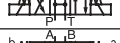
Features

Very long life
The movable iron core of the wet type solenoid is immersed in oil, which keeps it lubricated and cushions it from impact and vibration, ensuring very long life.
Low switching noise
The wet-type solenoid valve provides very low core switching noise, for quiet operation.

Shockless
A switching speed adjustment mechanism enables direct, shockless operation (Option F).
No surge voltage
Sparking and surge voltage during solenoid switching is canceled for stable switching (Option G).
Easy coil replacement
A DIN connector type coil enables one-touch coil replacement.

Wide-ranging backward compatibility makes it simple to replace previous valve models with this one. Combining this valve with a modular valve contributes to the compact configuration of the overall device.
Global support (G01 size)
Meets overseas safety standards (CE, UL, and CSA). It can be safely used anywhere in the world. Contact your agent for certified products.

Specifications

Model No.		SA-G01 (D03)				SA-G03 (D05)					
		Standard Type		Shockless Type		Standard Type				Shockless Type	
						AC Solenoid Type		DC Solenoid Type (With built-in rectifier)			
JIS Symbol	Operation Symbol	Maximum Flow Rate gpm	Maximum Working Pressure psi	Maximum Flow Rate gpm	Maximum Working Pressure psi	Maximum Flow Rate gpm	Maximum Working Pressure psi	Maximum Flow Rate gpm	Maximum Working Pressure psi	Maximum Flow Rate gpm	Maximum Working Pressure psi
	-A2X-	7.9	5075	7.9	3625	10.5	5075	22.4	5075	22.4	3625
	-H2X-										
	-E2X-					22.4					
	-A3X-	21.1		13.2		34.3		42.2		34.3	
	-H3X-										
	-E3X-	26.4									
	-A3Z-	17.1									
	-H3Z-										
	-E3Z-										
	--A4-	13.2									
	-H4-										
	-A5-	26.4									
	-H5-										
	-C2-										
	-C5-										
	-C9-										
	-C1S-										
	-C6S-										
	-C1-	AC Solenoid 17.1 DC Solenoid 21.1									
	-C6-										
	-C4-	13.2									
	-C7Y-			10.5		18.4	3625	26.4	3625	22.4	
	-C8-										

			SA-G01			SA-G03		
			AC Solenoid	DC Solenoid		AC Solenoid	DC Solenoid	
				Built-in Rectifier			Built-in Rectifier	
			C*	E*	D*	C*	E*	D*
Maximum Working Pressure	P, A, B ports		5075 psi (Note 1)					
Maximum Allowable Backpressure	T port		3045 psi			2320 psi		
Switching frequency (cycles/minute)		Standard Type	300	120	300	300	120	240
		Shockless Type	--		120	--		120
Option	Indicator light		R			R		
	Shockless		--	F		--	F	
	Surgeless		G	--	G	G	--	G
	G Screw Connector		J	--	J	J	--	J
	With manual push-button		N			N		
	Quick Return		--	Q	--	--	Q	--
Weight (kg)	Double Solenoid		1.8	2.0		4.2	5.5	
	Single Solenoid		1.4	1.5		3.5	4.1	
Operating Environment	Dust Resistance/Water Resistance Rank		IP65 (Dust-tight, Waterjet-proof) (Note 2)					
	Ambient Temperature		-4 to 122°F					
	Operating Fluid	Temperature Range	-4 to 158°F					
		Viscosity Range	15 to 300 centistokes					
		Filtration	10 microns or less					
Mounting bolt	Size × Length		10-24 x 1 3/4 LG (not included)			1/4-20 x 2 3/4		
	Tightening Torque		3.6 to 5 ft lbs			7.3 to 9.5 ft lbs		

Note: 1. Maximum operating pressure depends on the valve type. For details, see page D-16.
2. The power supply type for E* is IP64 (dust-tight, splash-proof).
3. For mounting bolts, use grade 8 or equivalent.
4. Mounting bolts are not included with the 01 size. Bolts are included with the 03 size.

• Handling

1 In order to realize the full benefits of the wet type solenoid valve, configure piping so oil is constantly supplied to the T port. Never use a stopper plug in the T port.
2 Ensure that surge pressure in excess of the maximum allowable back pressure does not reach the T port.
3 Note that the maximum flow rate is limited when used as a four-way valve, or by blocking ports for use as a two-way valve or one-way valve.
4 Always keep the operating fluid clean. Allowable contamination is class NAS12 or less.
5 When using petroleum type operating fluid, use ISO VG 32, 46.
6 For details about using fire-resistant hydraulic fluid, contact your agent.
7 Use this valve only within the allowable voltage range.
8 Do not allow the AC solenoid to become charged until you install the coil into the valve.
9 In the case of operation symbols A2X, H2X, and E2X, run drain piping from the valve T port.
10 Maintaining a switching position under high pressure for a long period can cause abnormal operation due to hydraulic lockup. Contact your agent when you need to maintain a switching position for a long period.
11 When using a detent type (E2X, 3X, E3Z), use constant energization in order to securely maintain the switching position.
12 Note that manual pin operating pressure changes in accordance with tank line back pressure.
13 The series described in the table below are available for use as RSS and RIS Series solenoid control relief valves.

RSA-***-AR*-(H)-**-$^{15}_{23}$	SA-G01-AR-**-31
RSA-***-AQ*-(H)-**-$^{15}_{23}$	SA-G01-A3X-**-31
RSA-***-*-F(H)-**-$^{15}_{23}$	SA-G01-A8X0-**-31

14 The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.
15 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs	Applicable Valve Type
MSA-01X-E10	1/4	3625	5.2	2.6	SA-G01-***-**-E31
MSA-01Y-E10	3/8		7.9		
MSA-03-E10	3/8		11.8	5.0	SA-G03-***-**-E21
MSA-03X-E10	1/2		21.1		

• Solenoid Assembly Specifications

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SA-G01					For SA-G03				
				Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)	Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)
AC	C1	AC100	50	EAC64-C1	2.2	0.52	25	80 to 110	EBB64-C1	5.4	0.92	36.0	80 to 110
			60		2.0	0.38	22	90 to 120		4.6	0.62	34.0	90 to 120
		AC110	60		2.2	0.46	28			5.0	0.78	42.0	
	C115	AC110	50	EAC64-C115	2.0	0.47	25	90 to 120	EBB64-C115	5.0	0.85	36.0	90 to 120
			60		1.8	0.35	22	100 to 130		4.2	0.57	34.0	100 to 130
		AC115	60		2.0	0.42	28			4.6	0.72	42.0	
	C2	AC200	50	EAC64-C2	1.1	0.26	25	160 to 220	EBB64-C2	2.7	0.46	36.0	160 to 220
			60		1.0	0.19	22	180 to 240		2.3	0.31	34.0	180 to 240
		AC220	60		1.1	0.23	28			2.5	0.39	42.0	
	C230	AC220	50	EAC64-C230	1.0	0.24	25	180 to 240	EBB64-C230	2.5	0.42	36.0	180 to 240
			60		0.91	0.17	22	200 to 260		2.1	0.29	34.0	200 to 260
		AC230	60		1.0	0.21	28			2.3	0.36	42.0	
DC with Built-in Rectifier	E1	AC100	50/60	EAC64-E1-1A	0.31		27	90 to 110	EBB64-E1	0.40		34.0	90 to 110
	E115	AC110	50/60	EAC64-E115-1A	0.26		25	100 to 125	EBB64-E115	0.33		31.0	100 to 125
		AC115			0.27		27			0.34		34.0	
	E2	AC200	50/60	EAC64-E2-1A	0.15		26	180 to 220	EBB64-E2	0.22		37.0	180 to 220
	E230	AC220	50/60	EAC64-E230-1A	0.12		24	200 to 250	EBB64-E230	0.16		30.0	200 to 250
		AC230			0.13		27			0.17		33.0	
DC	D1	DC12	☒	EAC64-D1-1A	2.2		26	10.8 to 13.2	EBB64-D1	2.6		31.0	10.8 to 13.2
	D2	DC24	☒	EAC64-D2-1A	1.1		26	21.6 to 26.4	EBB64-D2	1.5		36.0	21.6 to 26.4

Understanding Model Numbers

SA – G 01 – A 3 X – * * – C2 – 31

Design number
E31: 01 size; 10 - 24 mounting bolt
E21: 03 size; 1/4 - 20 mounting bolt

Power supply
C: AC (50/60Hz)
D: DC
E: AC (Built-in rectifier; 50/60Hz)

C1=AC100V C115=AC110V C2=AC200V C230=AC220V
D1=DC12V D2=DC24V
E1=AC100V E115=AC115V E2=AC200V E230=AC230V

With indicator light

Auxiliary symbol (Can be combined in alphabetic sequence.)
F: Shockless type (Available with power supply D*, E)
G: Surgeless type (Available with power supply C*, D*)
N: With manual push-button
Q: Quick return type (Available with power supply E*)

Transition Flow Path (Specify for A2X, H2X, E2X, A3X, H3X, E3X, A3Z, H3Z, E3Z, C7Y only.)

X	Y	Z
Closed	Semi-open	Open

Center position

0	1	2	3	4	5
6	7	8	9	1S	6S

Note 1: P=Pressure port; A and B=Connection port to cylinder, etc.; T=Connection port to tank

Operation Method

A	H	C	E
Spring Offset		Spring Center	Detent

Nominal diameter
01 size (D03)
03 size (D05)

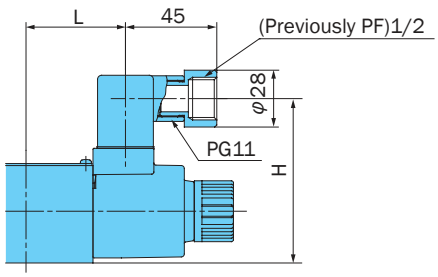
Mounting method
G: Cascade mounting

Wet type solenoid operated directional control valve

Options

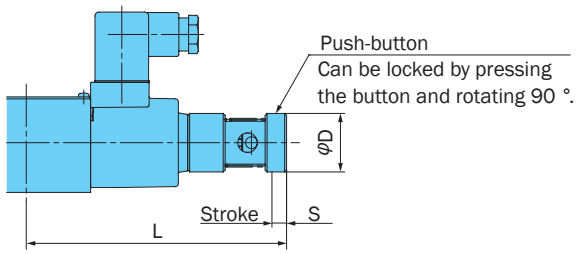
(Auxiliary Symbol Explanations)

G Screw Adapter (Auxiliary Symbol: J)



Model No.	L	H
SA-G01	49	81
SA-G03	60.5	100.5

With manual push-button (Auxiliary Symbol: N)



Part No.		L	S	D
EDB14-D-1A EDB14-A	AC Solenoid	133.5	7.5	30
	DC Solenoid	140.5		
ECB14-A ECB14-D	AC Solenoid	155.5	9.5	35
	DC Solenoid	173.5		

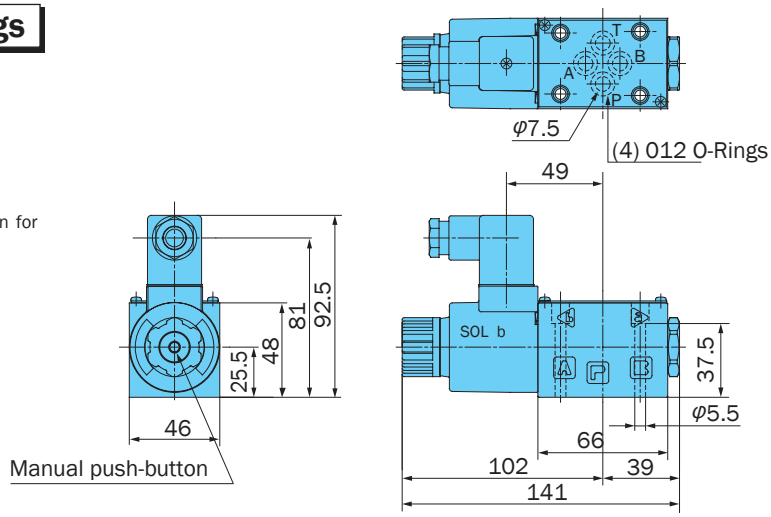
Other Options

Note: For information about the shockless and surgeless options, see page D-7.

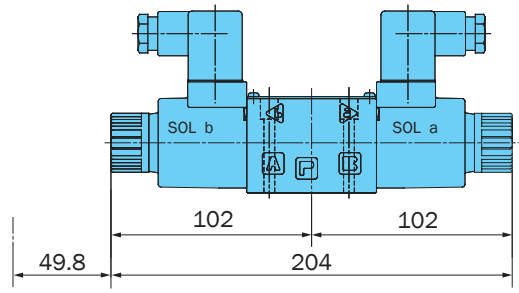
Installation Dimension Drawings

AC Solenoid
SA-G01-A**-*-C*-E31
SA-G01-H**-*-C*-E31

Note: SA-G01-H**-R-**-E31
The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

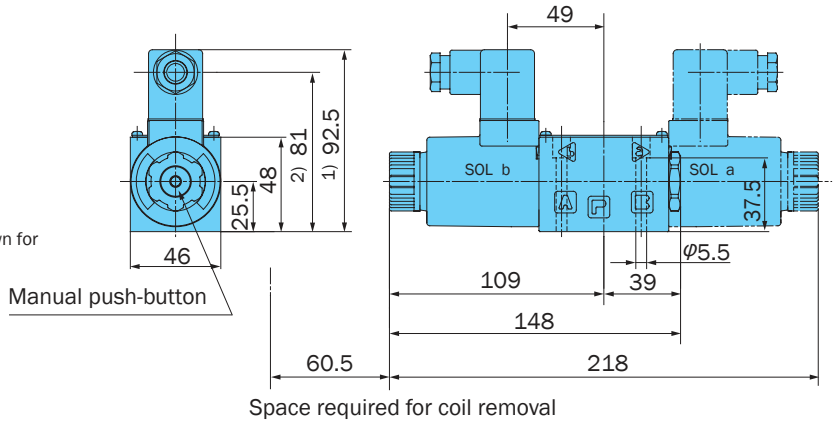


SA-G01-C**-R-C*-E31
SA-G01-E**-R-C*-E31



DC Solenoid and Rectifier
SA-G01-A**-D*/E*-E31
SA-G01-H**-D*/E*-E31
SA-G01-C**-D*/E*-E31
SA-G01-E**-D*/E*-E31

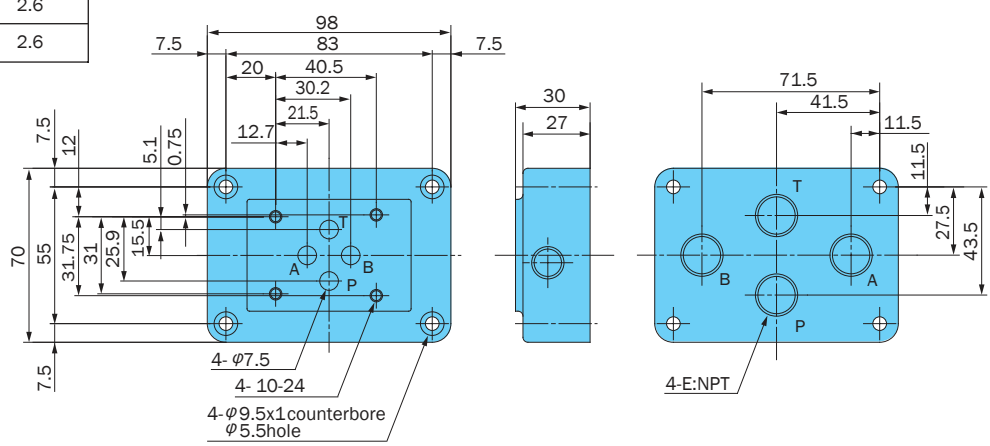
Note: 1.SA-G01-H**-*-D*/E*-E31
The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.
2.SA-G01-**-E*-E31
Dimension 1 is 96.
Dimension 2 is 73.



For sub plate SA-G01

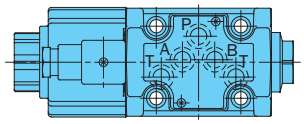
Model No.	E	Weight lbs
MSA-01X-E10	1/4	2.6
MSA-01Y-E10	3/8	2.6

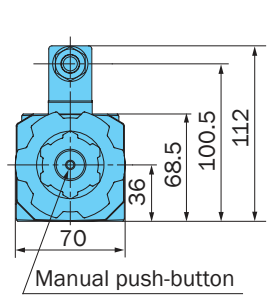
Gasket Surface Dimensions
(ISO 4401-03-02-0-94
JIS B 8355 D-03-02-0-94)

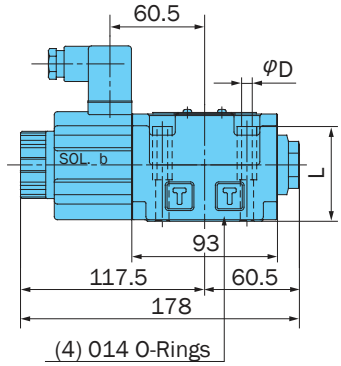


Installation Dimension Drawings

AC Solenoid
SA-G03-A**-*-C*-E21
SA-G03-H**-*-C*-E21



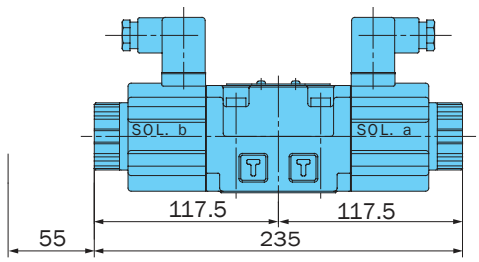




Note: SA-G03-H**-*-C*-E21
The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

	SA-G03-**-*-**-E21	SA-G03-**-*-**-21
φD	φ6.8	φ8.5
L	60.5	58

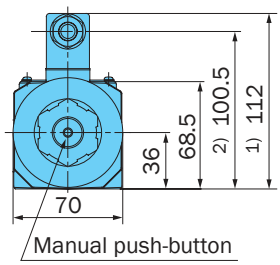
SA-G03-C**-*-C*-E21
SA-G03-E**-*-C*-E21

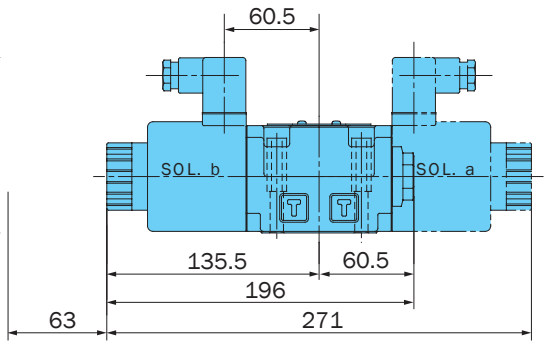


Space required for coil removal

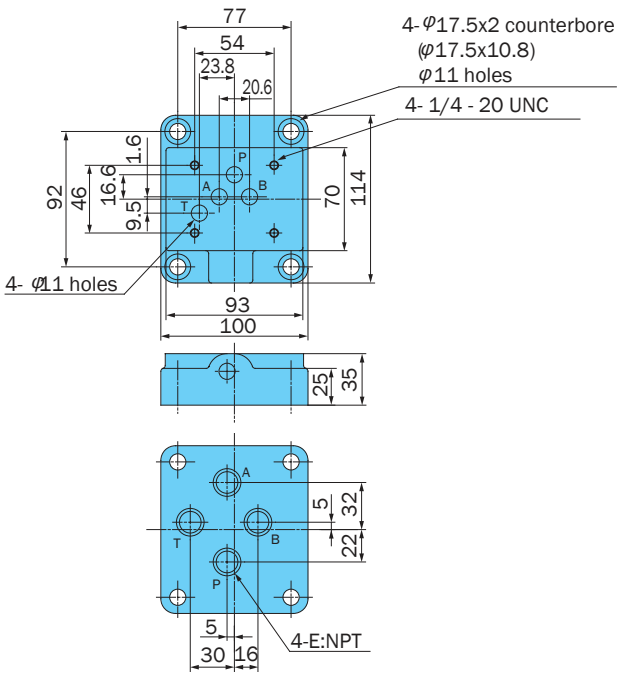
DC Solenoid and Rectifier
SA-G03-A**-*-D*/E*-E21
SA-G03-H**-*-D*/E*-E21
SA-G03-C**-*-D*/E*-E21
SA-G03-E**-*-D*/E*-E21

Note: 1.SA-G03-H**-*-D*/E21
The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.
2.SA-G03-**-E*-E21
Dimension 1 is 115.5.
Dimension 2 is 92.5.





Space required for coil removal

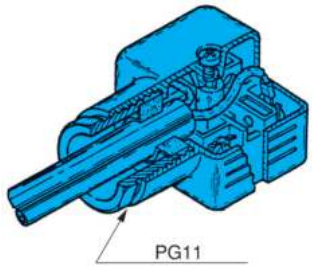
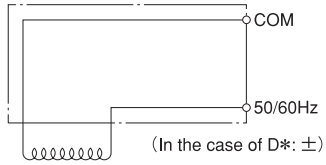
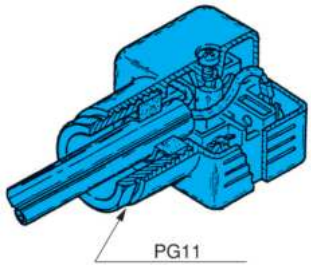
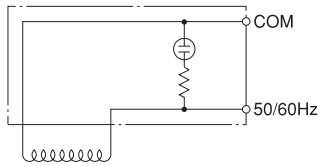
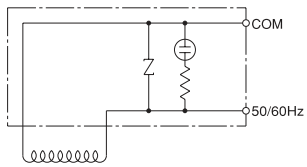
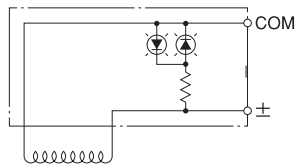
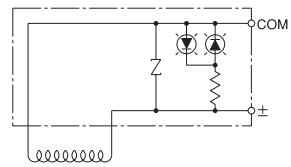
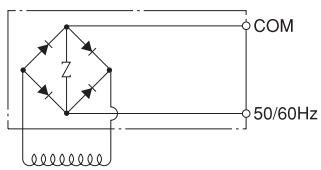
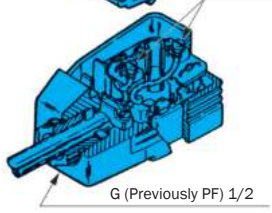
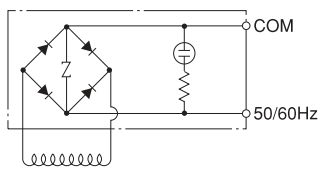


For sub plate SA-G03

Mounting bolt	Model No.	E	Weight lbs
1/4 - 20 x 2 3/4	MSA-03-E10	3/8	5.0
	MSA-03X-E10	1/2	

Gasket surface dimensions
(ISO 4401-05-04-0-94
JIS B 8355 D-05-04-0-94)

• **Connectors**

Model No.	Wiring	Electrical Circuit Diagram
SA-$\frac{G01}{G03}$-***C*-D*-$\frac{31}{E21}$ (EA41-1A)	 Connect the power supply to terminals No.1 and No. 2. The ⏚ terminal is ground. Use this terminal as required.	
SA-$\frac{G01}{G03}$-***-R-C*-$\frac{31}{E21}$ (EA41-R*-1C)	 Connect the power supply to terminals No.1 and No. 2. The ⏚ terminal is ground. Use this terminal as required.	
SA-$\frac{G01}{G03}$-***-GR-C*-$\frac{31}{E21}$ (EA41-GRC*-1C)		
SA-$\frac{G01}{G03}$-***-R-D*-$\frac{31}{E21}$ (EA41-DR*-1C)		
SA-$\frac{G01}{G03}$-***-GR-D*-$\frac{31}{E21}$ (EA41-GRD*-1C)		
SA-$\frac{G01}{G03}$-***-E*-$\frac{31}{E21}$ (EA42-1B)	 Connect the power supply to the terminals on the board. When ground connection is required, remove the board and use the ⏚ terminal. In this case, do not connect the power supply to the No. 1 and No. 2 terminals.	
SA-$\frac{G01}{G03}$-***-R-E*-$\frac{31}{E21}$ (EA42-R*-1B)		

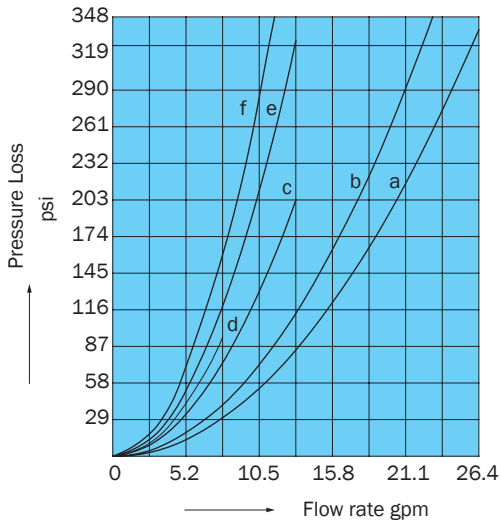
Symbols in parentheses indicate connector configuration.

Note: 1.Asterisks in the connector configuration and power supply symbols are fillers for the voltage symbol (1 or 2).
2.The connector cord diameter is φ8 to 10. Anything outside this range causes water tightness to be lost.
3.The orientation of the connectors can be changed in 90° increments by changing the terminal block.
4.The cover cannot be removed unless the installation screws are removed.
5.When J is specified for the auxiliary symbol, a G screw conversion adapter is attached to the connector, and the wiring port is a G (previously PF) 1/2 screw (standard: PG11). EA42 and EA42-R* also have a G (previously PF) wiring port.
6.Use M3 for round type and Y type solderless terminals.
7.Tighten the M3 screws that secure connectors and terminals to a torque of 42 to 70 in lbs.
8.An EA-41-1A or EA41-R*-1C connector is used in the case of power supply type E* with Quick Return type Q.

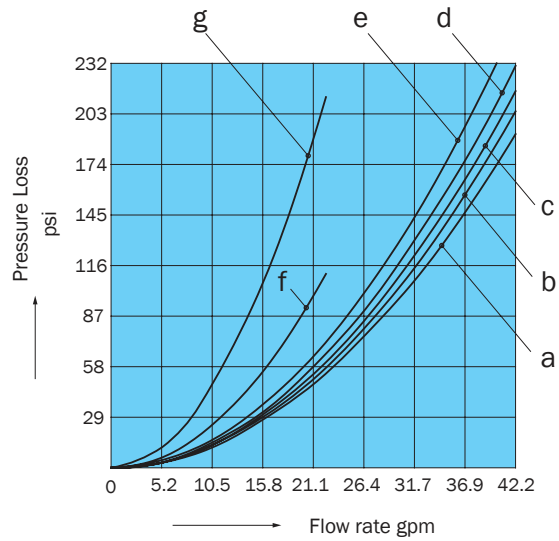
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics



Pump Type	Flow Path	P/ A	P/ B	A/ T	B/ T	P/ T
SA-G01	A2X, H2X, E2X	d	d	--	--	--
	A3X, H3X	b	b	b	b	--
	E3X	b	b	b	b	--
	A3Z, H3Z, E3Z	a	a	a	a	--
	A4, H4, C4	a	a	a	a	a
	A5, H5, C5, C6S	b	b	b	b	--
	C1, C1S	b	b	a	b	--
	C2	a	b	b	b	--
	C6	b	b	a	a	--
	C7Y	f	f	e	e	c
	C8	a	f	b	e	c
	C9	a	a	b	b	--



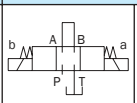
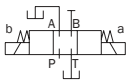
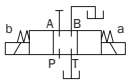
Pump Type	Flow Path	P/ A	P/ B	A/ T	B/ T	P/ T
SA-G03	A2X, H2X, E2X	e	e	--	--	--
	A5	--	c	c	--	--
	H5	c	--	--	c	--
	A3X, H3X, E3X	c	c	d	d	--
	A3Z, H3Z	a	a	d	d	--
	E3Z	b	b	a	a	--
	C1	c	c	a	c	--
	C2	a	c	c	c	--
	A4, H4, C4	a	a	a	a	a
	C5, C1S, C6S	c	c	c	c	--
	C6	c	c	a	a	--
	C7Y	g	g	g	g	f
	C8	a	g	a	g	f
	C9	a	a	c	c	--

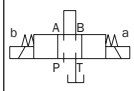
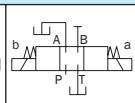
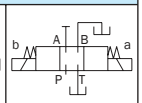
Switching Response Time

Model No.	Response Time (sec)		Measurement Conditions
	Solenoid ON	Spring Return	
SA-G01-**-(GR)-C*-E31	0.02 to 0.03	0.02 to 0.03	2030 psi 7.9 gpm
SA-G01-**-(GR)-D*-E31	0.03 to 0.04	0.02 to 0.04	
SA-G01-**-(R)-E*-E31	0.03 to 0.04	0.07 to 0.10	
SA-G01-**-F(GR)-D*-E31	0.07 to 0.10	0.04 to 0.07	
SA-G01-**-F(R)-E*-E31	0.07 to 0.10	0.10 to 0.15	
SA-G03-**-(GR)-C*-E21	0.02 to 0.03	0.02 to 0.03	2030 psi 18.4 gpm
SA-G03-**-(GR)-D*-E21	0.06 to 0.09	0.03 to 0.05	
SA-G03-**-(R)-E*-E21	0.07 to 0.10	0.10 to 0.15	
SA-G03-**-F(GR)-D*-E21	0.13 to 0.15	0.08 to 0.15	
SA-G03-**-F(R)-E*-E21	0.10 to 0.15	0.15 to 0.20	

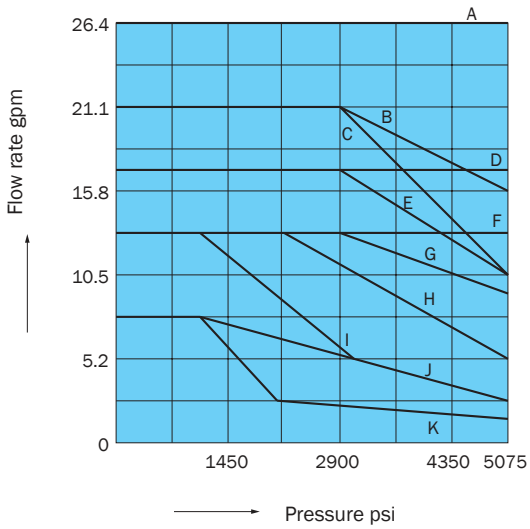
Note: 1. The switching response time changes slightly with operating conditions (pressure, flow rate, viscosity, etc.)

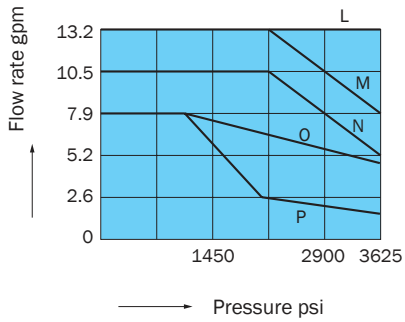
• Pressure - Flow Volume Allowable Value

Size	Standard Form, with AC, DC solenoid SA-G01-**-R-**-31		
Operation Example / Operation Symbol			
A2X, H2X	–	K	K
E2X	–	J	J
A3X, H3X	B	K	K
E3X	A	J	J
A3Z, H3Z	D	D	D
E3Z	D	D	D
A5	A	–	I
H5	A	I	–
C1, C6	Note1) C(E)	I	I
C1S, C5, C6S	A	I	I
C2, C9	A	K	K
A4	F	F	F
H4	F	F	F
C4	F	F	F
C7Y, C8	Note2) G(H)	K	K

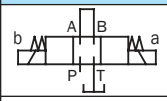
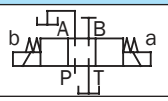
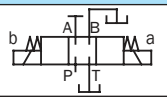
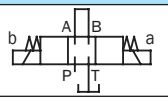
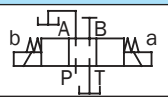
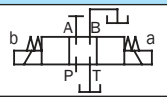
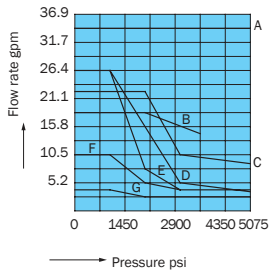
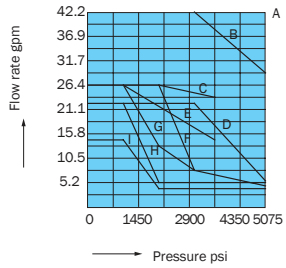
Size	Shockless Type, with DC solenoid SA-G01-**-FR-**-31		
Operation Example / Operation Symbol			
A2X, H2X	–	P	–
E2X	–	O	P
A3X, H3X	L	P	P
E3X	L	O	L
A3Z, H3Z	L	L	L
E3Z	L	L	P
A5	L	–	
H5	L	P	
C1, C6	M	P	
C1S, C2, C5, C6S, C9	L	P	
A4, H4	L	L	
C4	L	L	
C7Y, C8	N	P	

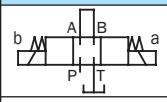
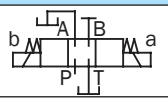
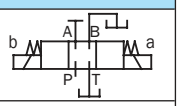
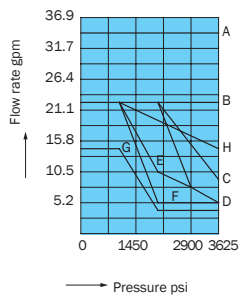
Note: 1.Letter in parentheses is for AC solenoid.
2.Letter in parentheses is for solenoid with built-in rectifier, but without Quick Return, and for DC solenoid with surge voltage absorbing diode on the electrical circuit.





• Pressure - Flow Volume Allowable Value

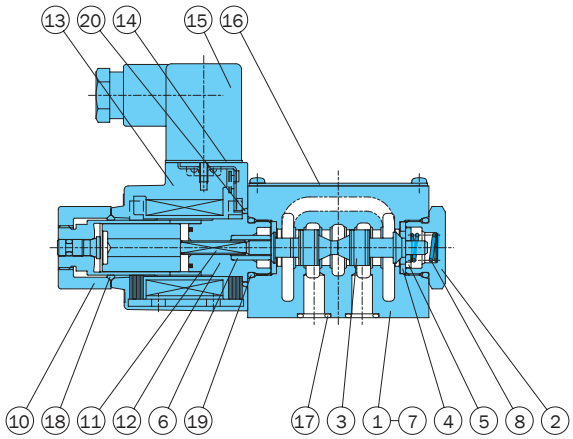
Model No.	Standard Form, with AC, DC solenoid			Standard Form, with DC solenoid		
	SA-G03-**-C*-E21			SA-G03-**-**-E21		
Operation Example / Operation Symbol						
A2X	--	F	E	--	G	H
H2X	--	E	F	--	H	G
E2X	--	C	C	--	D	D
A3X	A	E	E	A	F	H
H3X	A	E	E	A	H	F
A3Z	A	A	C	A	D	D
H3Z	A	C	A	A	D	D
E3X, E3Z	A	C	C	A	D	D
A5	A	--	D	A	--	G
H5	A	D	--	A	G	--
C1S, C5, C6S	A	D	D	A	G	G
C1, C6	A	D	D	B	G	G
C2	A	G	D	A	I	G
A4, H4, C4	A	A	A	A	A	A
C9	A	G	G	A	I	I
C7Y, C8	B	B	B	Note1) C(E)	C(E)	C(E)
						

Model No.	Shockless Type, with DC solenoid		
	SA-G03-**-F-**-E21		
Operation Example / Operation Symbol			
A2X	⊠	E	F
H2X	⊠	F	E
E2X	⊠	C	C
A3X	A	D	F
H3X	A	F	D
A3Z	A	C	C
H3Z	A	C	C
E3X, E3Z	A	C	C
A5	A	--	E
H5	A	E	--
C1, C1S, C5, C6, C6S	A	E	E
C2	A	G	E
A4, H4, C4	A	A	A
C9	A	G	G
C7Y, C8	Note 1: B(H)	B(H)	B(H)
			

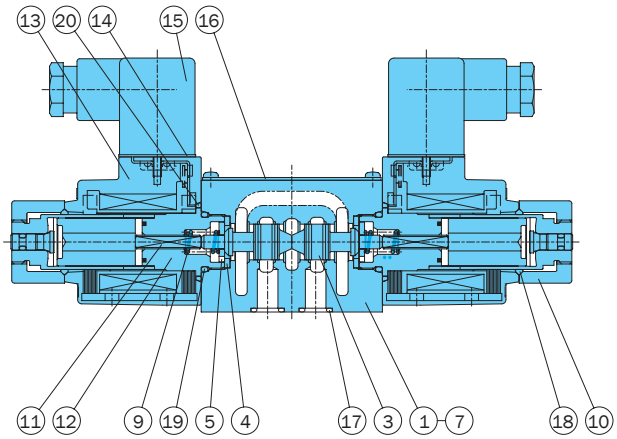
Note: 1. Letter in parentheses is for solenoid with built-in rectifier (E*), but without Quick Return, and for DC solenoid (D*) with surge voltage absorbing diode on the electrical circuit.
2. There is no shockless type for the AC solenoid (C*), so use a solenoid with built-in rectifier (E*) when shockless operation is required with an AC power supply.
3. The maximum flow rate is the allowable value of each port.

Cross-sectional Drawing

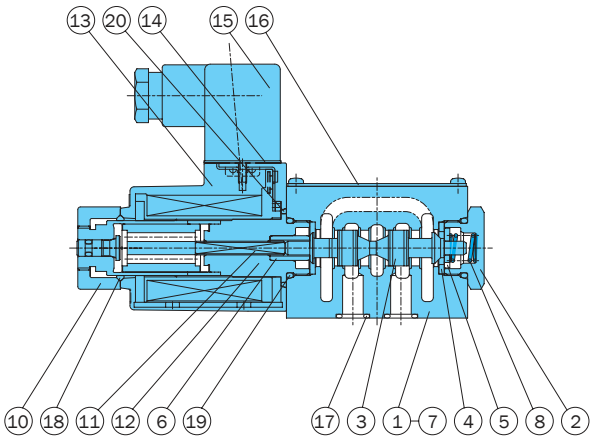
SA-G01-A**-C*-31



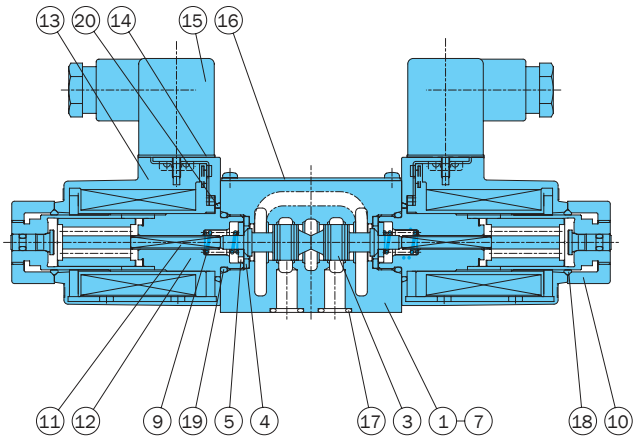
SA-G01-C**-C*-31



SA-G01-A**-D/E*-31



SA-G01-C**-D/E*-31



List of Sealing Parts

Part No.	Part Name	Part Number	Q'ty	
			Single Solenoid	Double Solenoid
17	O-ring	AS568-012(Hs90)	4	4
18	O-ring	1A-P20	1	2
19	O-ring	1B-P18	2	2
20	O-ring	S-25	1	2

Note: 1A and 1B are JIS Standard B 2401, while AS568 is SAE standard.

Seal Kit Number

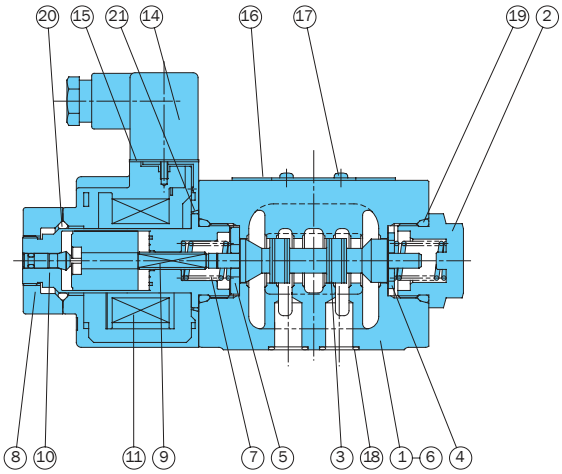
Single Solenoid	Double Solenoid
EDCS-A	EDCS-C

Part No.	Part Name
1	Body
2	Plug
3	Spool
4	Retainer A
5	Retainer B
6	Spring pin
7	Spacer
8	Spring A
9	Spring C
10	Nut

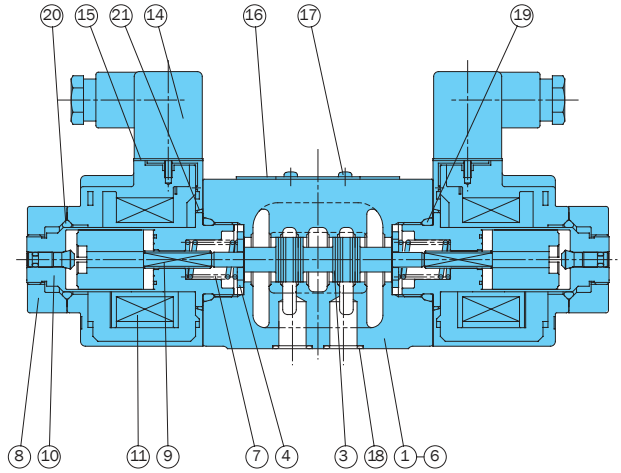
Part No.	Part Name
11	Rod
12	Solenoid guide
13	Solenoid coil
14	Packing
15	Connector
16	Nameplate
17	O-ring
18	O-ring
19	O-ring
20	O-ring

Cross-sectional Drawing

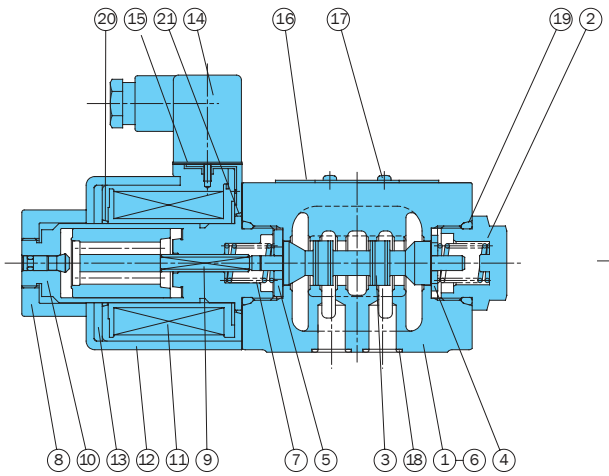
SA-G03-A**-C*-E21



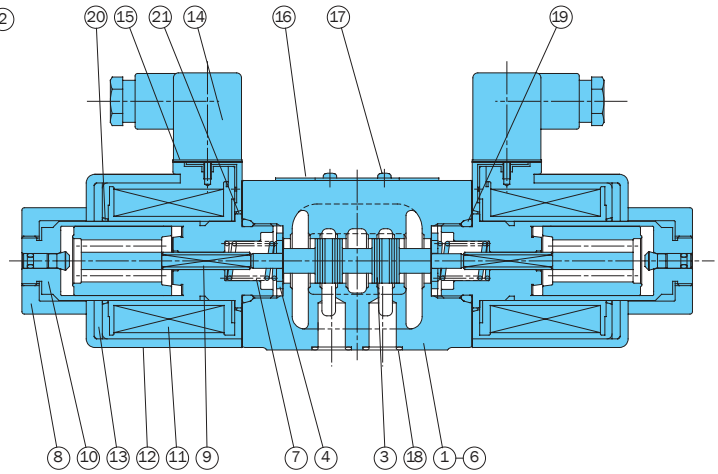
SA-G03-C**-C*-E21



SA-G03-A**-D/E*-E21



SA-G03-C**-D/E*-E21



List of Sealing Parts

Part No.	Part Name	Type/Part Number		Q'ty	
		AC SOL.	DC SOL.	Single Solenoid	Double Solenoid
18	O-ring	AS568-014(Hs90)		5	5
19	O-ring	1B-P28		2	2
20	O-ring	1A-P26	AS568-026	1	2
21	O-ring	AS568-029		1	2

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name
1	Body
2	Plug
3	Spool
4	Retainer
5	Retainer B
6	Spacer
7	Spring
8	Nut
9	Rod
10	Solenoid guide

Part No.	Part Name
11	Solenoid coil
12	Coil case
13	Coil yoke
14	Connector
15	Connector packing
16	Nameplate
17	Screw
18	O-ring
19	O-ring
20	O-ring
21	O-ring

Seal Kit Number

AC SOL.		DC SOL.	
Single Solenoid	Double Solenoid	Single Solenoid	Double Solenoid
ECBS-AA	ECBS-CA	ECBS-AD	ECBS-CD

SE Series
Lower Power Solenoid Valve

10.5 to 15.8 gpm
1450 to 2320 psi

Features

Low current, low power
The SE series magnetic switching valve's solenoid has significantly lower power consumption.

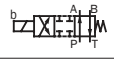
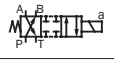
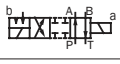
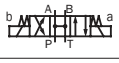
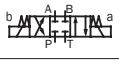
Directly drivable by a programmable controller
Low-current operation means not only allows direct drive by a programmable controller (PC) output circuit, it also enables the use of a compact and simple control circuit.

Little coil temperature rise
Low power operation means there is little heat generated from the coil, which minimizes the effects of heat on mechanisms. Even with the AC solenoid, there is little chance of coil burnout.

With M12-4 pin connector (option)
Makes it easier to interface with open networks like Device Net. This connector streamlines wiring work. The diode for preventing current back surge is built in to the terminal box to protect the slave unit connection. (With M12-4 pin connector)

Global compliance (G01 size)
Meets overseas safety standards TÜV (CE marking). Can be used safely around the world.

Specifications

Operation Symbol	JIS Symbol	SE-G01-**-(G)R-**-40		SE-G03-**-GR-**-(J) 30	
		Rated Flow Rate - Maximum Flow Rate gpm	Maximum Working Pressure psi	Rated Flow Rate - Maximum Flow Rate gpm	Maximum Working Pressure psi
A2X		7.9	2320	10.5	1450
A3X		10.5		13.2	
H3X				–	
E3X				13.2	
C4		7.9			
C5		10.5		15.8	
C6					

Note: The maximum flow rate of each valve depends on the pressure. For details, see page D-32.

• **Handling**

1 In order to realize the full benefits of the solenoid valve, configure piping so oil is constantly supplied to the T(DR) port.
2 Ensure that surge pressure in excess of the maximum allowable back pressure can be accidentally at the T port.
3 Note that the maximum flow rate is limited when used as a four-way valve, or by blocking ports for use as a two-way valve or one-way valve.
4 Always keep the operating fluid clean. Allowable contamination is class NAS12 or less.
5 When using petroleum type operating fluid, use ISO VG 32, 46.
6 Be sure to note the allowable pressure range of the coil being used.
7 Maintaining a switching position under high pressure for a long period can cause abnormal operation due to hydraulic lockup. Contact your agent when you need to maintain a switching position for a long period.
8 When using a detent type (E3X), provide constant energization when secure maintenance of the switching position is required.
9 Note that manual pin operating pressure changes in accordance with tank line back pressure.
10 If you do not select the option with the M12-4 pin connector, current back surge may occur because there is no solenoid in the central terminal box. Therefore, install solenoid valves to protect against current back surge on both ends of the coil in the output circuit of the programmable controller (PC) if directly operating the solenoid valves.

Solenoid Assembly Specifications

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SE-G01				For SE-G03			
				Solenoid Coil Type	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)	Solenoid Coil Type	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)
Built-in rectifier type AC	E1	AC100	50 / 60	EED64-E1	0.08	7.0	80 to 120	SLH1-03BR1-01	0.06	5.8	80 to 120
DC	D2	DC24	–	EED64-D2	0.2	4.8	21.6 to 26.4	SLH1-03BD2-01	0.2	4.8	21.6 to 26.4

Solenoid Type			SE-G01		SE-G03	
			DC Solenoid	Internal DC solenoid for rectifier	DC Solenoid	Internal DC solenoid for rectifier
			D2	E1	D2	E1
Maximum Working Pressure	P, A, B Ports		2320 psi		1450 psi	
Maximum Allowable Backpressure	T port		2320 psi		1450 psi (In the case of 290 psi operation symbol E3X)	
Changeover Frequency (per minute)			120		120	
Standard	Indicator light Surgeless		GR	R	GR	
Weight lbs	Double Solenoid		4.8		7.7	
	Single Solenoid		3.7		7.2	
Operating Environment	Dust Resistance/Water Resistance Rank		IP64 (Dust-tight, Splash proof)		IP65 (Dust-tight, Waterjet-proof)	
	Ambient Temperature		-4 to 122° F		14 to 122° F	
	Operating Fluid	Temperature Range	-4 to 158° F		32 to 149° F	
		Viscosity Range	15 to 300 centistokes			
		Filtration	10 microns or less			
Bundled Accessories	Mounting bolt		(4) 10-24 x 1 3/4 LG (not included)		1/4-20 UNC x 2 3/4	
	Tightening Torque		3.6 to 5 ft lbs		7.2 to 9.4 ft lbs	

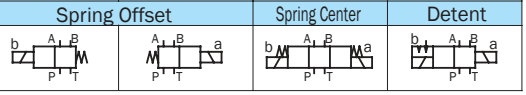
Note: For mounting bolts, use grade 8 or equivalent.

Understanding Model Numbers

SE – G 03 – A 3 X – GR – C2 – J30

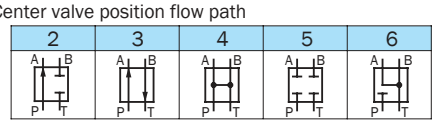
- **SE** – Low-power solenoid
- **G** – Mounting method: G: Gasket type
- **03** – Nominal pipe diameter: 01 size (D03), 03 size (D05)
- **A** – Operation Method

A	H	C	E
Spring Offset		Spring Center	Detent



- **3** – Center valve position flow path

2	3	4	5	6



- **X** – Transition Flow Path (Specify for A2X, A3X only.)

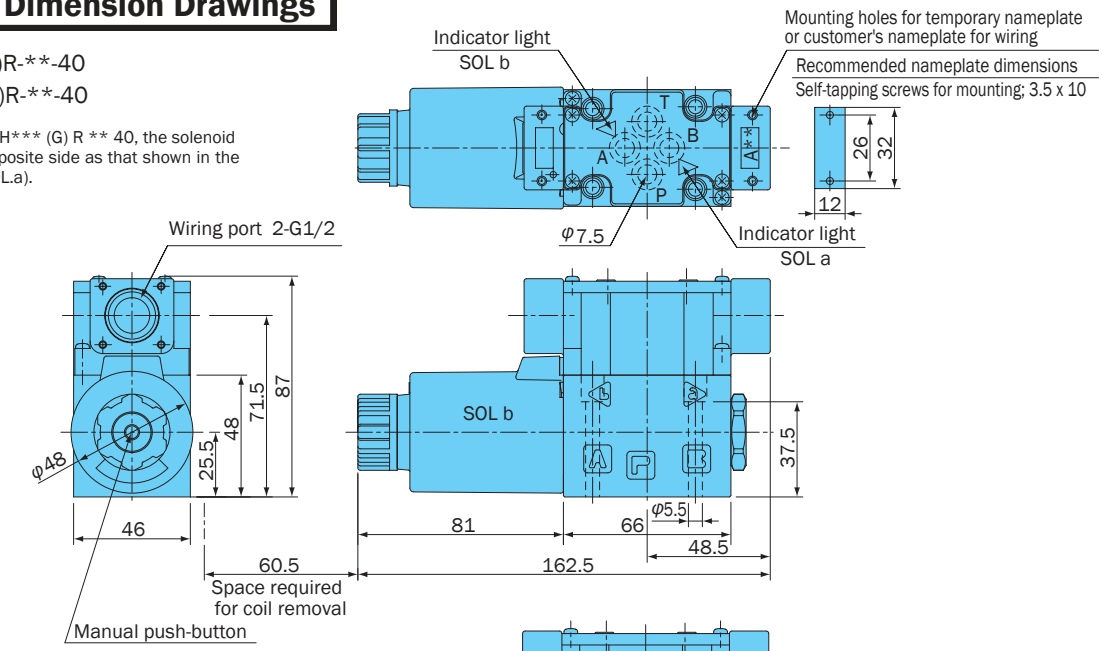
X
Closed

- **GR** – Auxiliary symbol
  - GR: Surgeless type with indicator (applicable for power supply D2 only)
  - R: With indicator light (applicable for power supply E1 only)
  - V: With M12-4 pin connector, load side - common (applicable for power supply D2 only)
  - W: With M12-4 pin connector, load side + common (applicable for power supply D2 only)
- **C2** – Power supply
  - D: DC — D2=DC 24V
  - E: For AC (joint 50/60 Hz inside rectifier) — E1=AC100V
- **J30** – Design number
  - 40: For 01 size
  - 30: 03

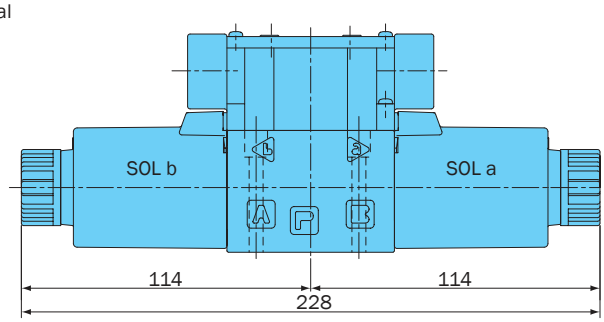
Installation Dimension Drawings

SE-G01-A***-(G)R-**-40
SE-G01-H***-(G)R-**-40

Note: For SE-G01-H*** (G) R ** 40, the solenoid is on the opposite side as that shown in the diagram (SOL.a).



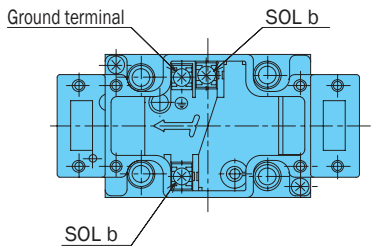
SE-G01-C**-(G)R-**-40
SE-G01-E3X-(G)R-**-40



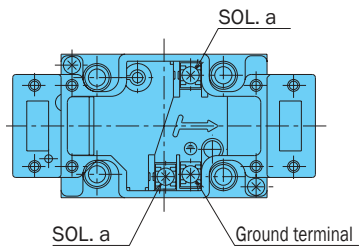
Note: Gasket surface dimensions and sub plate are the same as those for SS-G01. See page D-8 for more information.

Wiring diagram for central terminal box kit

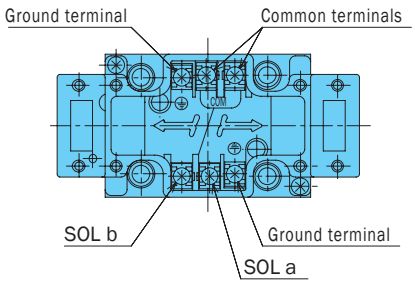
SE-G01-A**-*R*-**-40



SE-G01-H**-*R*-**-40



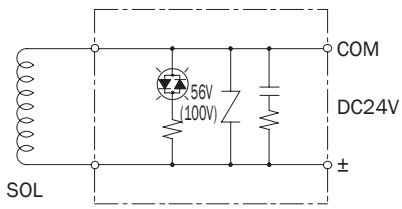
SE-G01- C** E3X -*R*-**-40



Note 1: Install D2 specification solenoid valves to protect against current back surge on both ends of the coil in the output circuit of the programmable controller (PC) if directly operating the solenoid valves.

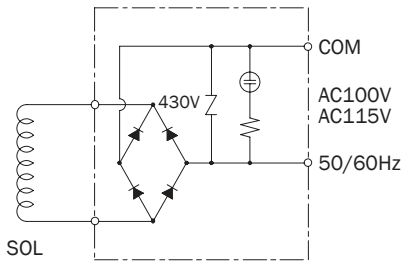
Electrical circuit diagram for central terminal box kit

D2 (DC24V) (Note 1)

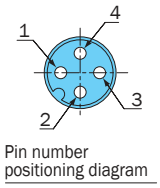


Varistor voltage values in (parenthesis) are for the SE-G03.

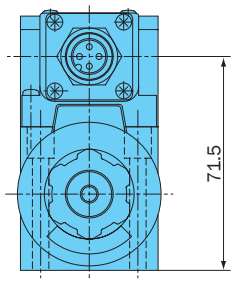
E1 (With built-in rectifier AC100V)

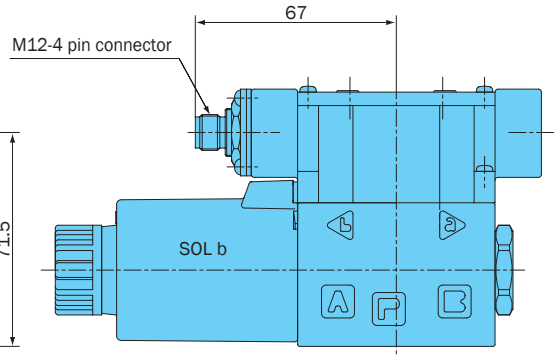


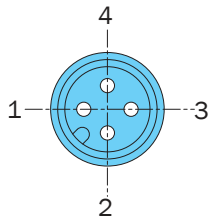
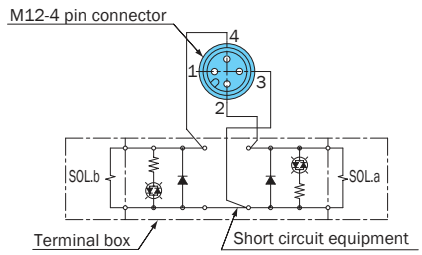
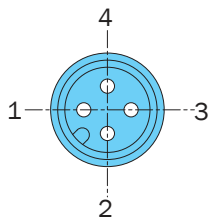
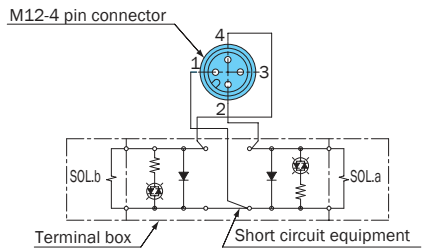
With M12-4 pin connector
SE-G01-**-GRV-D2-40
SE-G01-**-GRW-D2-40



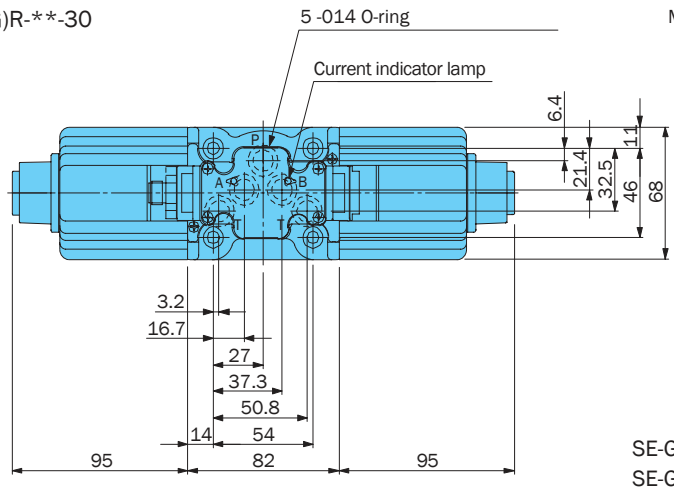
Pin number positioning diagram

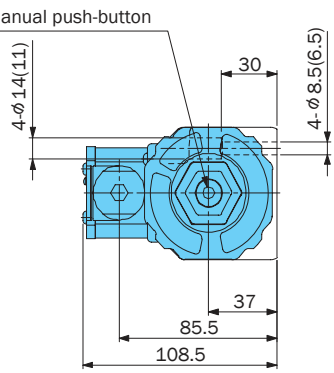




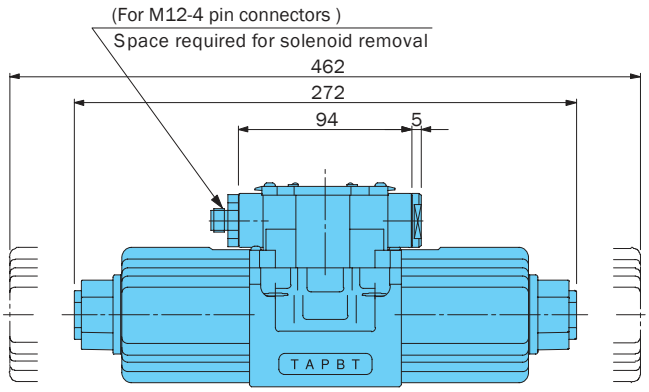
	M12-4 pin connector	Electrical Circuit Diagram
Type V	 1: Not used 2: SOL a 3: COM (-) 4: SOL b	
Type W	 1: COM (+) 2: SOL a 3: Not used 4: SOL b	

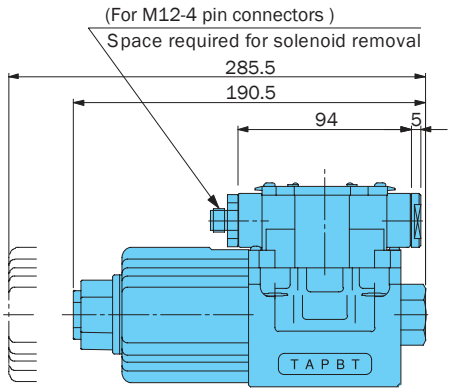
SE-G03-A***-(G)R-**-30





SE-G03-C*-(G)R-**-30
SE-G03-E3X-(G)R-**-30

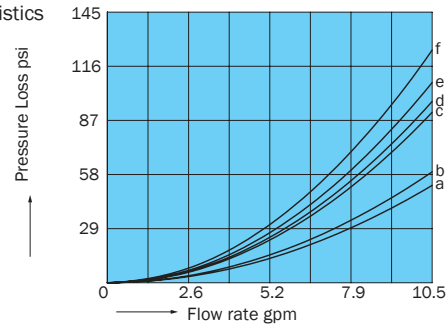




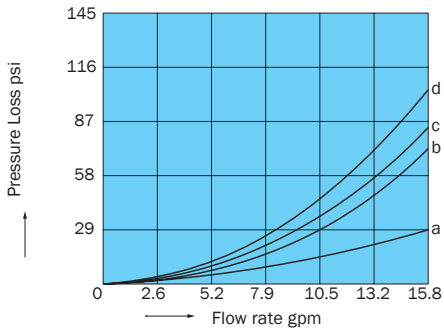
Performance Curves

Differential Hydraulic Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

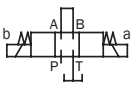
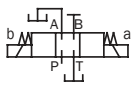
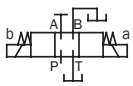
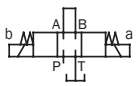
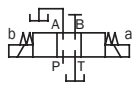
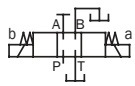


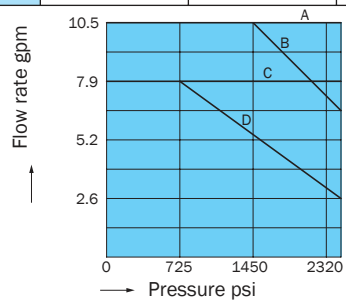
Pump Type	Flow Path	P/ A	P/ B	A/ T	B/ T	P/ T
SE-G01	A2X	d	f	–	–	–
	A3X	f	f	e	e	–
	H3X	f	f	e	e	–
	E3X	c	c	e	e	–
	C4	b	b	b	b	d
	C5	e	e	d	d	–
	C6	f	f	a	a	–

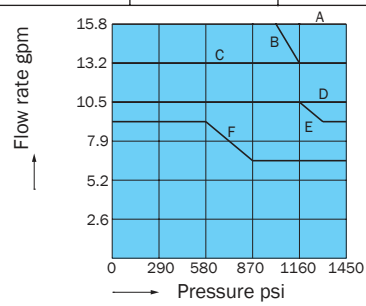


Pump Type	Flow Path	P/ A	P/ B	A/ T	B/ T	P/ T
SE-G03	A2X	d	d	–	–	–
	A3X	d	d	d	d	–
	E3X	d	d	c	c	–
	C4	c	c	a	a	b
	C5	d	d	d	d	–
	C6	d	d	b	b	–

Pressure - Flow Volume Allowable Value

Pump Type	SE-G01			SE-G03		
Operation Example / Operation symbol						
A2X	–	D	D	–	E	A
A3X	A	D	D	C	E	A
H3X	A	D	D	–	–	–
E3X	A	C	C	D	D	C
C4	C	C	C	C	F	C
C5	A	D	D	A	B	B
C6	B	D	D	A	B	B

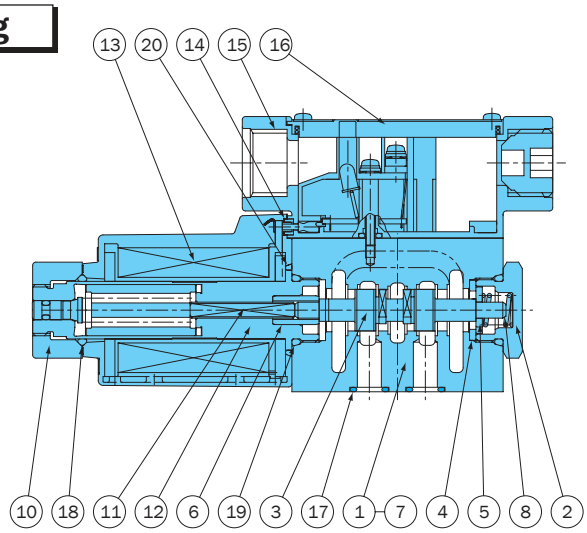




Note: 1.The maximum flow rate is the value when a rated 90%V is applied following solenoid temperature rise and saturation.
2.The maximum flow rate is the allowable value of each port.

Cross-sectional Drawing

SE-G01-A3X-(G)R-**-40



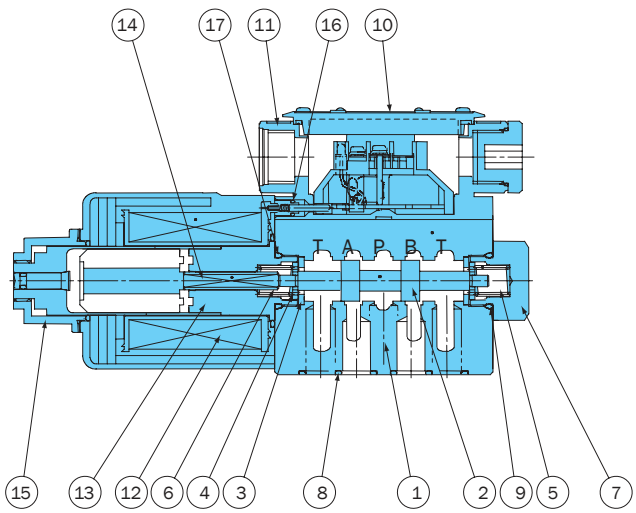
Part No.	Part Name
1	Body
2	Plug
3	Spool
4	Retainer A
5	Retainer B
6	Spring pin
7	Spacer
8	Spring A
9	Spring C
10	Nut
11	Rod
12	Solenoid guide
13	Solenoid coil
14	Packing
15	Terminal box kit
16	Nameplate
17	O-ring
18	O-ring
19	O-ring
20	O-ring

List of Sealing Parts

Part No.	Part Name	SE-G01		
		Part Number	Q'ty	
			Single Solenoid	Double Solenoid
17	O-ring	AS568-012(HS90)	4	4
18	O-ring	1A-P18	1	2
19	O-ring	1B-P18	2	2
20	O-ring	S-25	1	2

Note: O-ring 1A-** and 1-B** indicate JIS Standard B 2401-1A-** and 1B-**.

SE-G03-A3X-GR-**-(J)30



Part No.	Part Name
1	Body
2	Spool
3	Spacer
4	Holder
5	Spring
6	Spring
7	Plug
8	O-ring
9	O-ring
10	Nameplate
11	Terminal box kit
12	Solenoid coil
13	Solenoid guide
14	Rod
15	Nut
16	O-ring
17	O-ring

List of Sealing Parts

Part No.	Part Name	SE-G03		
		Part Number	Q'ty	
			Single Solenoid	Double Solenoid
8	O-ring	1B-P12	5	5
9, 17	O-ring	1B-P18	2	2
16	O-ring	1A-P3	2	4

Note: O-ring 1A-** and 1-B** indicate JIS Standard B 2401-1A-** and 1B-**.

Seal Kit Number

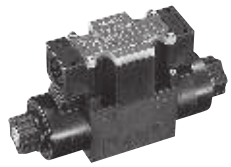
SE-G01		SE-G03	
Single Solenoid	Double Solenoid	Single Solenoid	Double Solenoid
EEDS-01A	EEDS-01C	EECS-03A	EECS-03C

NACHI

WET TYPE SOLENOID OPERATED DIRECTIONAL CONTROL VALVE

SL Series (Wiring System: Central Terminal Box) Lower Power Solenoid Valve

7.9 gpm
1015 psi



Features

Very long life
The movable iron core of the wet type solenoid is immersed in oil, which keeps it lubricated and cushions it from impact and vibration, ensuring very long life.

Low switching noise
The wet-type solenoid valve provides very low core switching noise, for quiet operation.

Low power consumption type.
The low power for the AC solenoid 9.6 W (60 Hz), DC solenoid 10 W contribute to energy conservation.

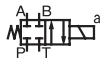
Easy connections
A special wiring box provides a COM port and indicator light as standard for simple wiring and maintenance.

Easy coil replacement
A plug-in type coil enables one-touch coil replacement.

Wide-ranging backward compatibility
makes it simple to replace previous valve models with this one. Combining this valve with a modular valve contributes to the compact configuration of the overall device.

Global support
Meets overseas safety standards (CE, UL, and CSA). It can be safely used anywhere in the world. Contact your agent for certified products.

Specifications

JIS Symbol	Operation symbol	Maximum flow rate gpm
	-A5-	7.9
	-H5-	
	-A3X-	
	-H3X-	
	-E3X-	
	-C1-	
	-C2-	

JIS Symbol	Operation symbol	Maximum flow rate gpm
	-C4-	7.9
	-C5-	
	-C6-	
	-C9-	
	-C6S-	
	-C7Y-	3.9

Solenoid Type		AC Solenoid		DC Solenoid	
				Built-in Rectifier	
		C1	C2	E1	D2
Maximum Working Pressure	P.A.B. Ports	1015 psi			
Maximum Allowable Backpressure	T Port	1015 psi			
Changeover Frequency (per minute)		240		120	240
Standard	Indicator light	R			
Options	Surgeless	G		–	G
	With manual push-button	N			
	Quick Return	–		Q	–
Mass lbs	Double Solenoid	3.3		4.4	
	Single Solenoid	2.6		3.3	
Recommended	Ambient Temperature	-4 to 158° F			
	Viscosity Range	15 to 300 centistokes			
	Viscosity Index	90 or greater			
	Filtration	10 microns or less			
Mounting bolt		Allen head - 10-24 x 1 3/4 LG			
Tightening Torque		3.6 to 5 ft lbs			

Note: Mounting bolts are not included.

• Handling

1 In order to realize the full benefits of the wet type solenoid valve, configure piping so oil is constantly supplied to the T port. Never use a stopper plug in the T port.
2 Ensure that surge pressure in excess of the maximum allowable back pressure does not reach the T port.
3 Note that the maximum flow rate is limited when used as a four-way valve, or by blocking ports for use as a two-way valve or one-way valve.
4 Always keep the operating fluid clean. (contamination level: 12 or lower)
5 When using petroleum type operating fluid, use ISO VG 32, 46.
6 Use the SS series solenoid valve when using fire resistant hydraulic operating fluid.
7 Use this valve only within the allowable voltage range.
8 Do not allow the AC solenoid to become charged until you install the coil into the valve.
9 Maintaining a switching position under high pressure for a long period can cause abnormal operation due to hydraulic lockup. Contact your agent when you need to maintain a switching position for a long period.
10 When using a detent type (3X), use constant energization in order to securely maintain the switching position.
11 Note that manual pin operating pressure changes in accordance with tank line back pressure.
12 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Maximum flow rate gpm	Weight lbs
MSA-01X-E10	1/4	5.2	2.6
MSA-01Y-E10	3/8	10.5	

• Solenoid Assembly Specifications

Solenoid Type		AC Solenoid						DC Solenoid	
								Built-in Rectifier	
Power Supply Type		C1			C2			E1	D2
Voltage (V)		AC100		AC110	AC200		AC220	AC100	DC24
Cycles (Hz)		50	60	60	50	60	60	50/60	–
For 01	Solenoid Coil Type	EL64-C1			EL64-C2			ELC64-E1-1A	ELC64-D2-1A
	Drive Current (A)	1.30	1.10	1.30	0.65	0.55	0.65	0.11	0.42
	Holding Current (A)	0.30	0.24	0.28	0.15	0.12	0.14		
	Holding Power (W)	12.0	9.6	12.2	12.0	9.6	12.2	10	10
	Allowable Voltage Range	80 to 110	90 to 120		160 to 220	180 to 240		90 to 110	21.6 to 26.4
	Allowable Pressure psi	1000							
	Insulator Resistance (M Ω)	100 or greater (500 V)							

Note: 1. A DC solenoid surge absorption circuit is effective in preventing misoperation in sensitive relays and IC circuits. (Applicable for power supply display D", option: G)
2. A DC solenoid RAC type (power supply E1) greatly increases the life of the contacts by eliminating contact arc without changing circuit sequence on an AC line, 50/60Hz can be used.

Understanding Model Numbers

SL – G 01 – A 3 X – ※ R – C2 – 31

- 31: Design Number
- C2: Power supply
  C: AC (50/60 Hz) C1 = AC100 V C2 = AC200 V
  D: For DC D2 = DC24V
  E: AC (Built-in rectifier; 50/60Hz) E1 = AC100V
- R: With indicator light
- ※: Auxiliary symbol (Can be combined in alphabetic sequence.)
  G: Surgeless type (Power supply C※D2 Applicable)
  N: With manual push-button (Available with power supply D2, E1)
  Q: Quick return type (Available with power supple E1)
- X: Transition flow path (A3X, H3X, E3X, C7Y only)

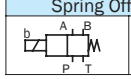
X	Y
Close	Semi-open
	

- 3: Center position

1	2	3	4	5
				
6	**7**	**9**	**6S**	
				

Note 1. P is pressure port, A and B are connection ports to cylinder. T (R) shows the connection port to the tank.

- A: Operation Method

A	H	C	E
Spring Offset type		Spring Center	Detent
			

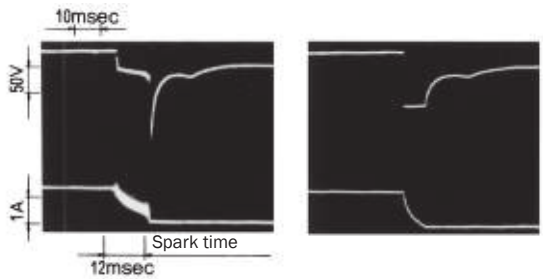
- 01: Nominal Diameter: 01 size (D03)
- G: Mounting method: Gasket type
- SL: Machine type: SL Series wet magnetic switching valve.

Options

(Auxiliary Symbol)

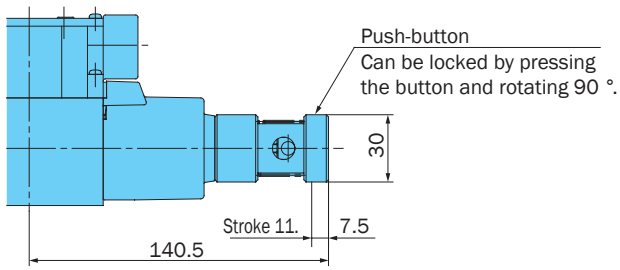
Surgeless Type (Auxiliary Symbol: G)

The surge pressure waveforms when the DC solenoid valve power supply is opened and closed by a relay are shown at the bottom of this block.
A built-in surge absorber element eliminates sparking and surge pressure.
Features ¡ Surge voltage is inhibited.
¡ Sparking at relay contact points is eliminated.

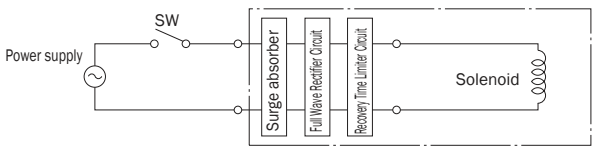


Standard Type Surgeless Type

Manual Push-button Type (Auxiliary symbol: N)



Quick Return Type (Auxiliary Symbol: Q)



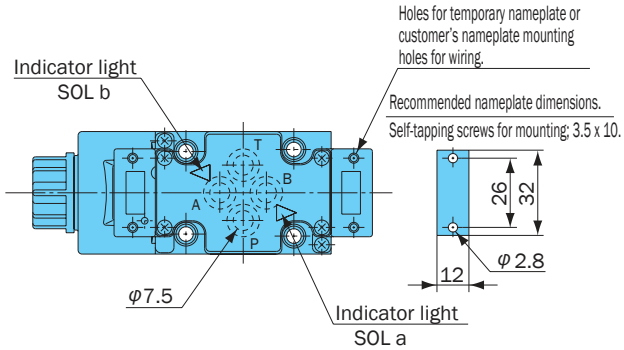
Handling

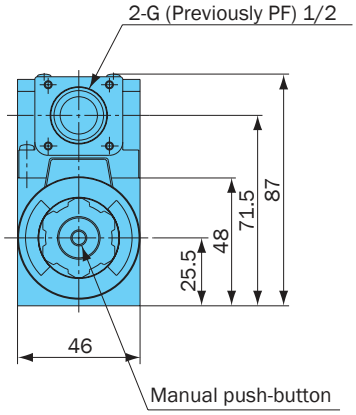
1. This type is used in the case of power supply type E1 (with built-in rectifier) to shorten the spring return time. This also applies to D2.
2. The quick return mechanism is built-in.

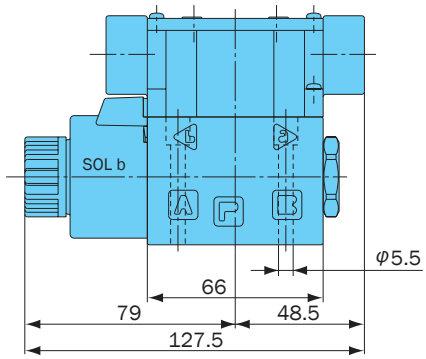
Installation Dimension Drawing

AC Solenoid
SL-G01-A**-R-C*-31
SL-G01-H**-R-C*-31

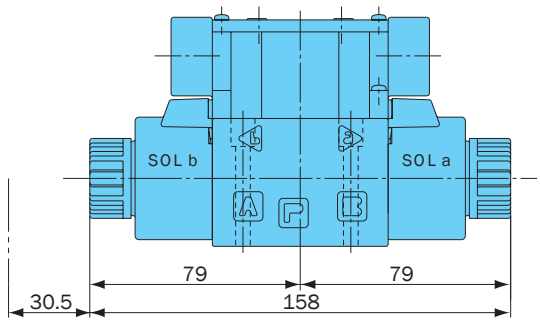
Note: The SL-G01-H**-R-**-31 solenoid, is attached to the opposite side (SOL a) as shown in the diagram.



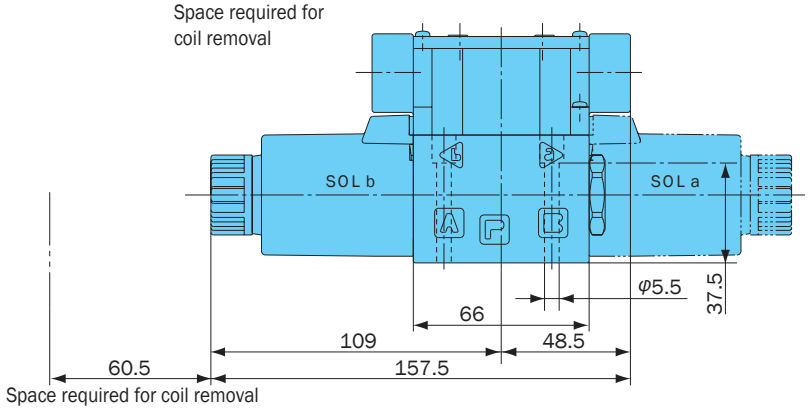




SL-G01-C**-R-C*-31
SL-G01-E**-R-C*-31



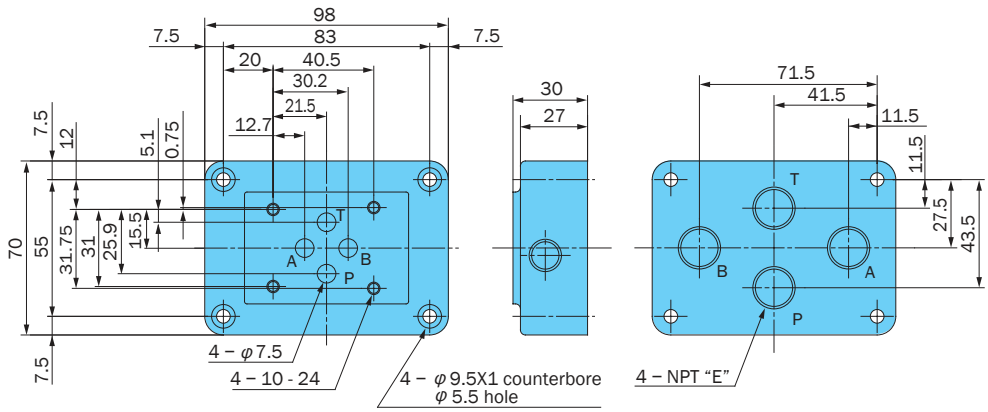
DC Solenoid and Rectifier
SL-G01-A**-R-D/E*-31
SL-G01-H**-R-D/E*-31
SL-G01-C**-R-D/E*-31
SL-G01-E**-R-D/E*-31



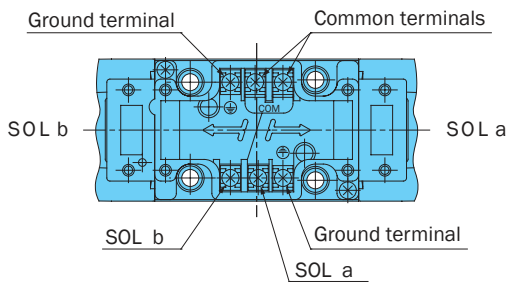
For sub plate SL-G01

Model No.	E	Mass
MSA-01X-E10	1/4	2.6
MSA-01Y-E10	3/8	2.6

Gasket Surface Dimensions
(ISO 4401-03-02-0-94
JIS B 8355 D-03-02-0-94)

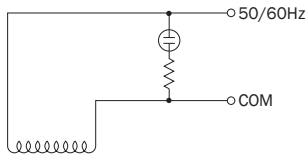
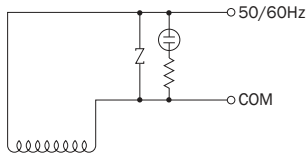
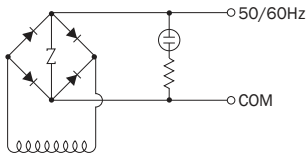
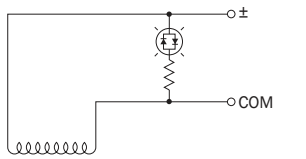
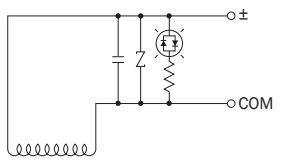


Wiring Diagram



Note: 1. In the case of a double solenoid valve, a common terminal is provided to simplify wiring.
When the common terminal is not used, remove the terminal screws.
2. Use the ground terminal when grounding is required.
3. Use an M3 type as a solderless terminal.
4. Tighten terminal screws to a torque of 4.4 to 6.1 in lbs

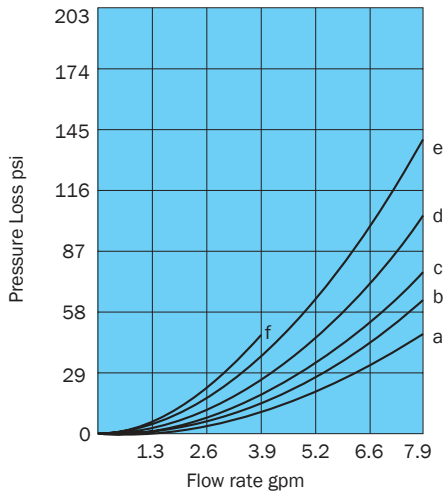
Electrical Circuit Diagram

Type	Model No.	Electrical Circuits
AC Solenoid	SL-G01-***-R-C*-31	
AC Solenoid Surgeless Type	SL-G01-***-GR-C*-31	
Built-in Rectifier	SL-G01-***-R-E*-31	
DC Solenoid	SL-G01-***-R-D*-31	
DC Solenoid Surgeless Type	SL-G01-***-GR-D*-31	
Built-in Rectifier Quick Return Type	SL-G01-***-QR-E*-31	See page D-7 for more information.

Performance Curves

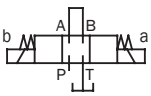
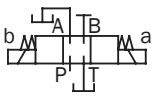
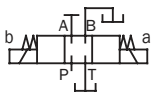
Hydraulic Operating Fluid Viscosity 20 centistokes

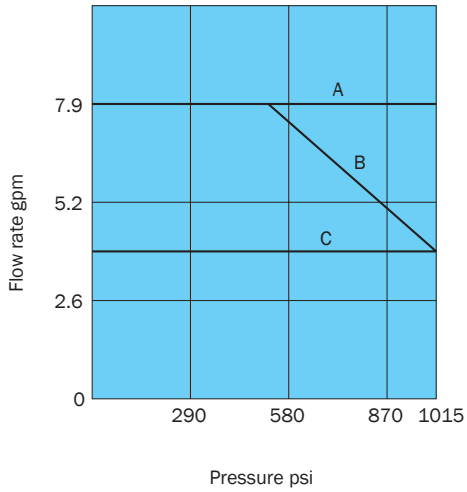
Pressure Loss Characteristics



Flow Path	P/ A	P/ B	A/ T	B/ T	P/ T
A5	–	c	c	–	–
H5	c	–	–	c	–
A3X, H3X, E3X	b	b	e	e	–
C1	c	c	a	c	–
C2	a	c	e	c	–
C4	a	a	c	c	d
C5, C6S	c	c	c	c	–
C6	c	c	a	a	–
C7Y	f	f	e	e	d
C9	a	a	e	e	–

Pressure – Flow Volume Allowable Value

Operation Example / Operation symbol			
A5	A	–	B
H5		B	–
A3X, H3X, E3X C1, C2, C4, C5 C6, C9, C6S		B	B
C7Y	C	C	C



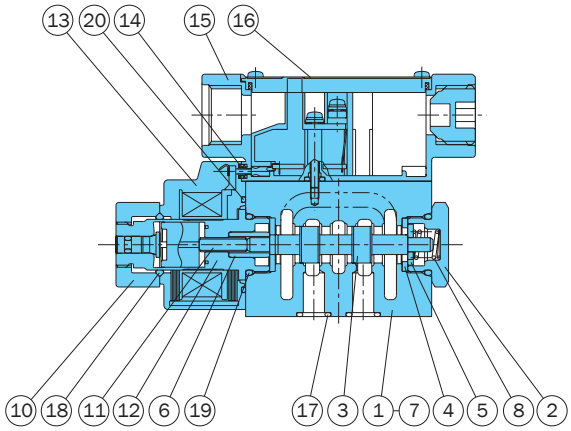
Switching Response Time

Model No.	Response Time (sec)		Measurement Conditions
	Solenoid ON	Spring Return	
SL-G01-**-R-C*-31	0.010 to 0.020	0.010 to 0.020	1015 psi
SL-G01-**-R-E1-31	0.055 to 0.080	0.150 to 0.185	5.2 gpm
SL-G01-**-(G)R-D2-31	0.055 to 0.080	0.025 to 0.035	40 centistokes

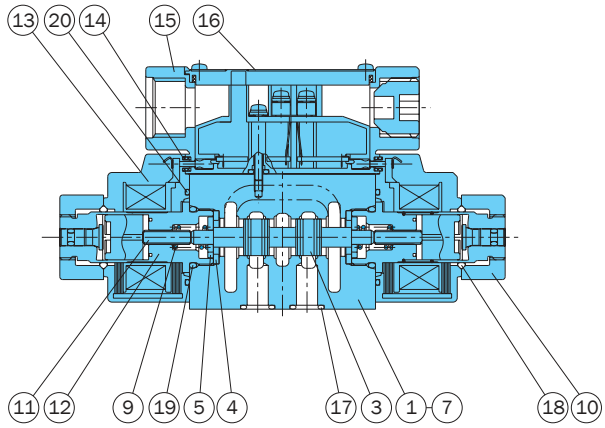
Note: 1.The switching response time changes slightly with operating conditions (pressure, flow rate, viscosity, etc.)
2. In the case of power supply type E1 (with built-in rectifier), the spring return time using Quick Return (option symbol: Q) is the same as D2.

Cross-sectional Drawing

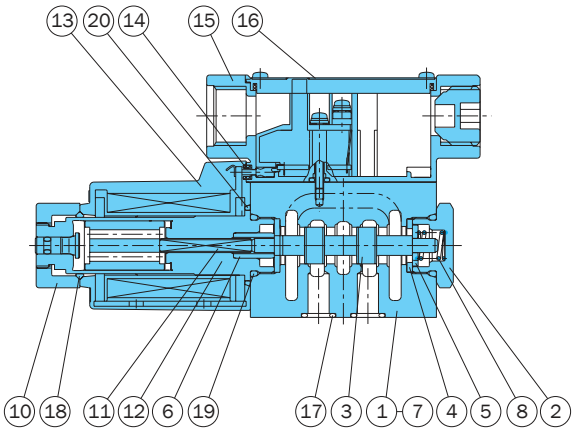
SL-G01-A**-R-C*-31



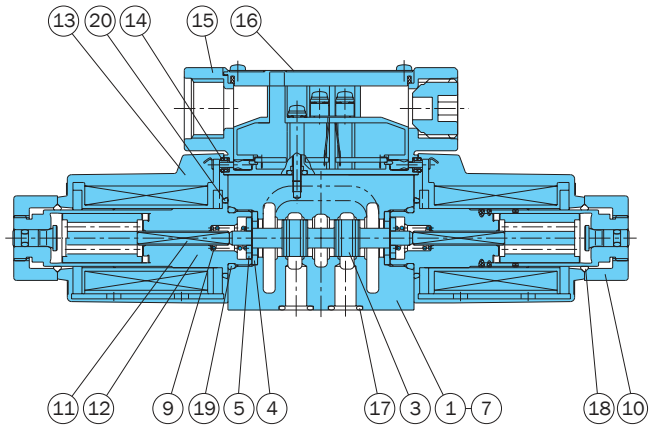
SL-G01-C**-R-C*-31



SL-G01-A**-R-D/E*-31



SL-G01-C**-R-D/E*-31



List of Sealing Parts

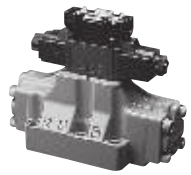
Part No.	Part Name	Type/ Part Number		Q'ty	
		DC SOL	AC SOL	Single Solenoid	Double Solenoid
17	O-ring	AS568-012(Hs90)		4	4
18	O-ring	1A-P20	1A-P18	1	2
19	O-ring	1B-P18		2	2
20	O-ring	S-25	AS568-025(Hs70)	1	2

Note: O-ring 1A/1B-** indicates JIS B2401-1A/1B**. AS568 is SAE standard.

Part No.	Part Name	Part No.	Part Name
1	Body	11	Rod
2	Plug	12	Solenoid guide
3	Spool	13	Solenoid coil
4	Retainer A	14	Packing
5	Retainer B	15	Terminal box kit
6	Retainer C	16	Nameplate
7	Spacer	17	O-ring
8	Spring A	18	O-ring
9	Spring C	19	O-ring
10	Nut	20	O-ring

DSS (DSA) 22 Design Series
Solenoid Control Valve

7.9 to 15.8 gpm
4640 to 5075 psi



Features

Long-life operation is ensured by use of the high-performance, renowned SS (SA)-G01 wet solenoid valve as the pilot valve.

High pressure, high capacity
The 04 size can provides up to 79 gpm, while the 06 size delivers up to 158 gpm.

Low pressure loss
An original flow path design provides wide-ranging low pressure loss and enhanced system circuit efficiency. Internal modification of the pilot and drain can be accomplished without removing the valve by simply connecting and disconnecting plugs.

Built-in pilot pressure check valve
When tandem center type valve is used for the internal pilot valve (option), pilot pressure required for switching is self-maintained.

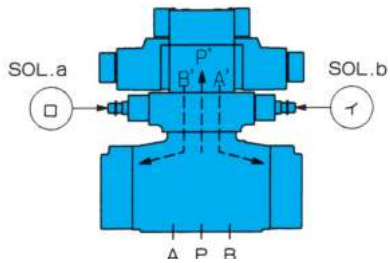
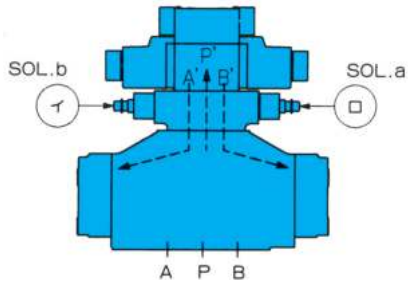
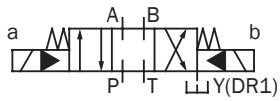
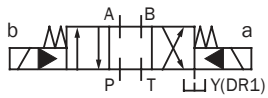
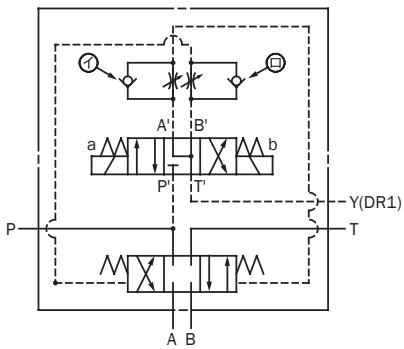
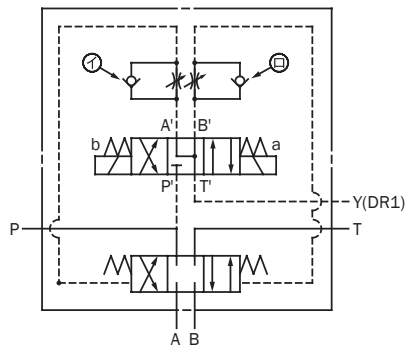
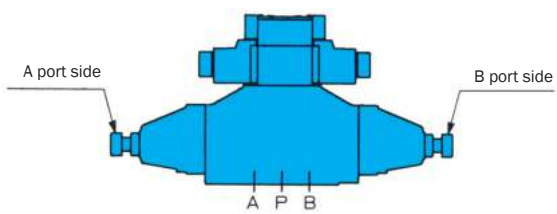
Specifications

Valve Size			04 Size (D07)	06 Size (D08)
Valve Model Number			DSS(DSA)-G04-***-R-**-22	DSS(DSA)-G06-***-R-**-22
Maximum Working Pressure psi	P.A.B. Ports		5075	4640
	T Port	Internal Drain Type	2320	2320
		External Drain Type	3045	3045
Maximum Flow Rate gpm			79	158
Rated Flow Rate gpm			39	79
Maximum Pilot Pressure psi			3625	3625
Minimum pilot pressure psi	A** (Spring Offset Type)		116	116
	E** (No-spring Detent Type)			
	C** (Spring Center Type)			
	D** (Pressure Center Type)		174	174
	Built-in Pilot Pressure Check Valve Type (For Internal Pilot)		65	
Maximum Changeover Frequency (cycles/minute)			120	120
Pilot Volume cu in	A** (Spring Offset Type)		.48	1.2
	C** (Spring Center Type)		.24	.6
Weight lbs	A** (Spring Offset Type)		19	31.9
	E** (No-spring Detent Type)		20.2	33
	C** (Spring Center Type)			
	D** (Pressure Center Type)		23	36.3
Operating Environment	Dust-resistance/Water-resistance Rank JIS C 0920		DSS: IP64 (Dust-tight, Splash-proof) DSA: IP65 (Dust-tight, Waterjet-proof)	
	Ambient Temperature		-4 to 122° F	
	Operating Fluid	Temperature Range	-4 to 158° F	
		Viscosity Range	15 to 300 centistokes	
		Filtration	10 microns or less	
Bundled Accessories	Mounting bolt		(2) 1/4-20 x 1 3/4 (4) 3/8-16 x 2	(6) 1/2-13 x 2 3/8
	Tightening Torque		1/4 - 7.3 to 9.5 ft lbs 3/8 - 33 to 40 ft lbs	44 to 51 ft lbs

Note: 1.The maximum flow rate of each valve depends on the pressure. For details, see pages D-46 and D-47.
2.Weight in parentheses is for stroke adjustment type.
3.Solenoid specifications are the same as those for SS (SA)-G01. For more information, see pages D-6 and D-18.

• Handling

1 Pilot pressure values show the differential pressure between the pilot port and tank port or drain port. In the case of the pressure center, they show differential pressure between the pilot and drain ports (DR1, DR2).
2 The standard configuration is internal pilot and external drain, but other configurations are possible when required. See page D-48 for more information.
3 The JIS number on the nameplate indicates the standard internal pilot and external drain.
Note therefore that the JIS numbers on page D-46 and D-47 are used even if the pilot is external and the drain is internal.
4 The maximum operating pressure for internal pilot is 3625 psi because it is limited by the pilot pressure.
5 For the PT mounting type DSS (DSA)-G**-C7*-**-22, open cross over with restrictor C7Y is standard.
6 When adjustable spool stroke is desired, specify L in the auxiliary symbol position of the model number. Note, however, that this is not available with the pressure center type.
7 When using a detent type (E3*), use constant energization in order to securely maintain the switching position.
8 Use of the pressure center type is recommended for large-volume flow control.
9 For the all ports open center type (A3Z, E3Z, C4, D4), PT mounting type (C7X, C7Y, D7X, D7Y), and PAT mounting type, use the type with built-in external pilot pressure check valve.
10 The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.

Valve Model Number	DSS(DSA)-G04	DSS(DSA)-G06
Front Position		
Simplified Symbols		
Detailed Symbols		
Flow Regulator Adjusting Screw Positions	A Port Restrictor: Right side A B Port Restrictor: Left side B	A Port Restrictor: Left side A B Port Restrictor: Right side B
Adjustable Stroke Adjusting Screw Positions	A Port Side: P / A, B / T flow rate adjustment (For C7Y, P / B, A / T) B Port Side: P / B, A / T flow rate adjustment (For C7Y, P / A, B / T) 	

Understanding Model Numbers

DSS – G 06 – C 7 Y C – **R* – C2 – E22

- **E22** — Design number
- **C2** — Power supply
  - C: AC (50/60Hz) C1=AC100V C115=AC110V C2=AC200V C230=AC220V
  - D: DC D1=DC12V D2=DC24V
  - E: AC (Built-in rectifier; 50/60Hz) E1=AC100V E115=AC115V E2=AC200V E230=AC230V
- ****R*** — Auxiliary symbol - For multiple specifications, use alphabetic sequence.
  - A: Internal drain
  - E: External pilot
  - L: Spool stroke limiter
  - P: Flow regulator valve to restrict P port
  - Y: With meter-out flow regulator valve
  - R: With indicator light (DSS type: Standard; DSA type: Optional)
  - N: With manual lock
  - Q: Quick return type
  - GR: Surgeless type with indicator
- **C** — Pilot pressure check valve
  - None: No check valve
  - C: Built-in check valve
- **Y** — Transition flow path (Specify for *3*, *7* only.)
  - X: Closed Y: Restrictor open Z: Open

X	Y	Z
Closed	Semi-open	Open

- **7** — Center valve position flow path
  1, 2, 3, 4, 4S, 5, 6, 6S, 7, 8

1	2	3	4	4S	5	6	6S	7	8

- **C** — Operation Method
  - A: Spring offset
  - E: No-spring detent
  - C: Spring center
  - D: Pressure center

A	E	C	D
Spring Offset	No-spring detent	Spring Center	Pressure center

- **06** — Nominal diameter 04 size, 06 size
- **G** — Mounting method G: Gasket type
- **DSS** — Pump Type DSS: Central terminal box solenoid control valve
  DSA: DIN connector type solenoid control valve

Pilot (PP), Drain (DR)

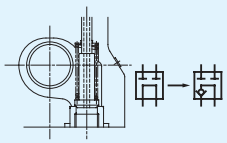
*High Pilot Pressure
Use at pressures that do not exceed 3625 psi
*Internal PP, external DR are Nachi-Fujikoshi standards.
For external PP: Built-in stopper plug (Option E)
For internal DR: Stopper plug modification (Option A)
* Internal DR Precautions
Make sure that the differential pressure between the pilot pressure and tank back pressure is greater than the minimum pilot pressure.
Do not connect any pipe that generates sudden surge pressure.

Built-in Pilot Solenoid Valve

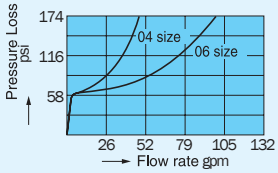
Valve Model Number	For G04	For G06
DSS(DSA)-G**-A**	SS(SA)-G01-A3X	SS(SA)-G01-H3X
DSS(DSA)-G**-E**	SS(SA)-G01-E3X	
DSS(DSA)-G**-C**	SS(SA)-G01-C6	
DSS(DSA)-G**-D**	SS(SA)-G01-C9	

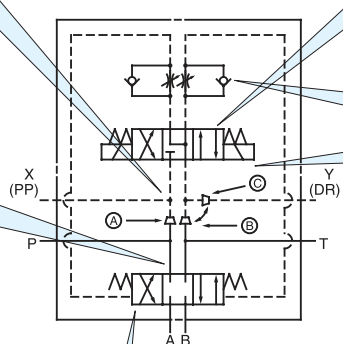
Built-in Pilot Pressure Check Valve

*Like the C7Y, this internal PP type is used in a flow path configuration where maintenance of pilot pressure is required.

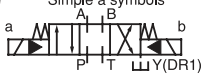


Check Valve Pressure Loss





Simple a symbols



Note: Above symbols are for DSS (DSA)-G06.

Flow Regulator Valve

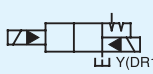
*Rotating the adjusting screw clockwise (rightward) slows the main spool switching speed.
P: Excitation of the solenoid (starting of the actuator) causes a restrictor effect.
Y: The restrictor effect can be obtained especially when the solenoid is de-excited (actuator stopped).

Pilot Valve Mounting Bolts

Standard	M5 x 45 (four)
Stage 1	M5 x 85 (four)
Stage 2	M5 x 125 (four)
Stage 3	M5 x 165 (four)

Tightening Torque: 3.6 to 5 ft lbs.)

Detent Type Installation



*Install the valve in a horizontal configuration.
*Provide constant energization for secure holding.

Adjustable Stroke Type

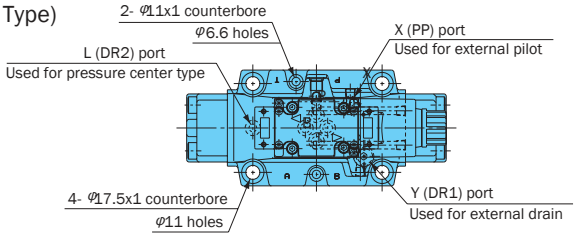
*Tightening the adjusting screw makes the main spool stroke smaller, which restricts flow.

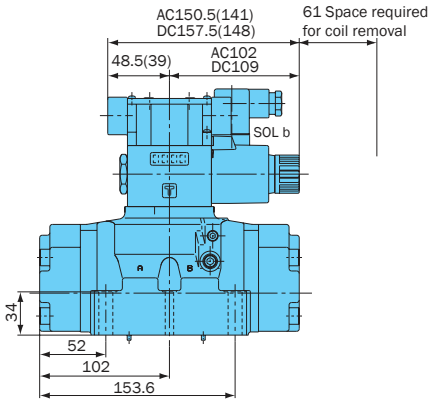
Pressure center

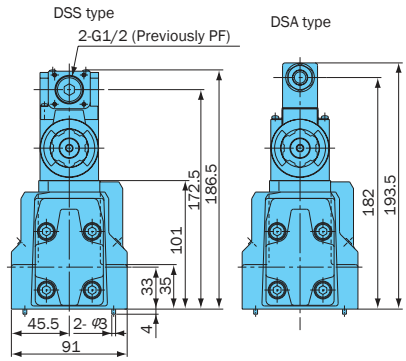
*Use this valve in a high-pressure, large-volume circuit to ensure reliable return of the main spool to the neutral position.

DSS(DSA)-G04-A**-R-**-22

(Spring Offset Type)



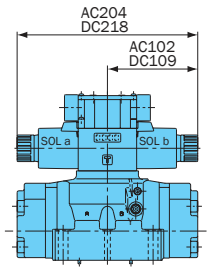




DSS(DSA)-G04-$\begin{matrix}E\\C\end{matrix}$**R-**22

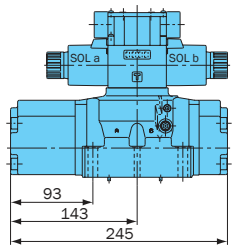
(No-spring Detent Type)

(Spring Center Type)



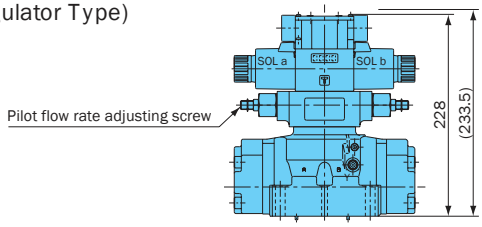
DSS(DSA)-G04-D**R-**22

(Pressure Center Type)



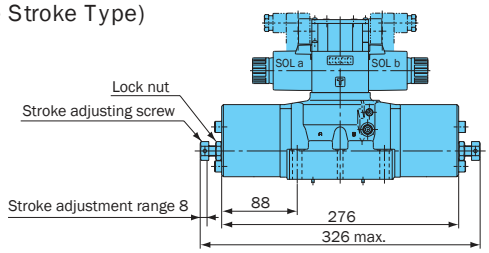
DSS(DSA)-G04-$\begin{matrix}A\\E\\C\\D\end{matrix}$**RY-**22

(Flow Regulator Type)



DSS(DSA)-G04-E$\begin{matrix}A\\C\end{matrix}$**LR-**22

(Adjustable Stroke Type)



Dimensions in the parentheses are for the DSA-G04-***-**-21.

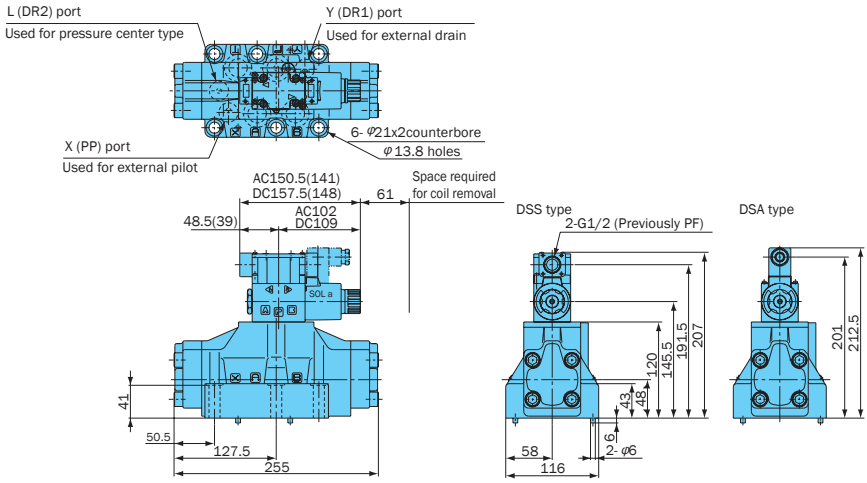
(ISO 4401-07-06-0-94
JIS B 8355 D-07-06-0-94)

For sub plate DSS (DSA) -G04

Model No.	E	Weight
MDS-04X-E10-D	SAE-12	4.1 lbs

DSS(DSA)-G06-A**-R-**-22

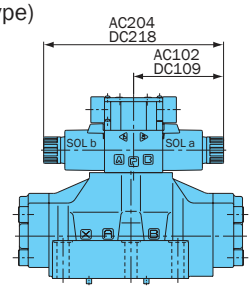
(Spring Offset Type)



DSS(DSA)-G06-$\begin{matrix}E\\C\end{matrix}$**R-**22

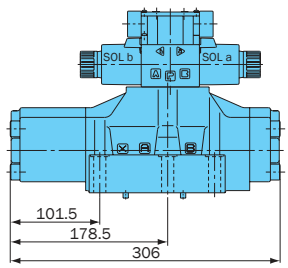
(No-spring Detent Type)

(Spring Center Type)



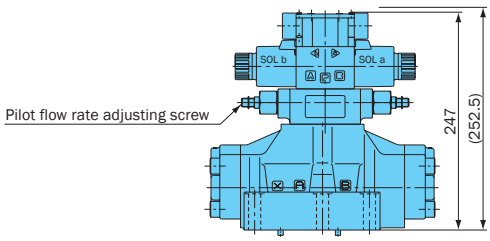
DSS(DSA)-G06-D**R-**22

(Pressure Center Type)



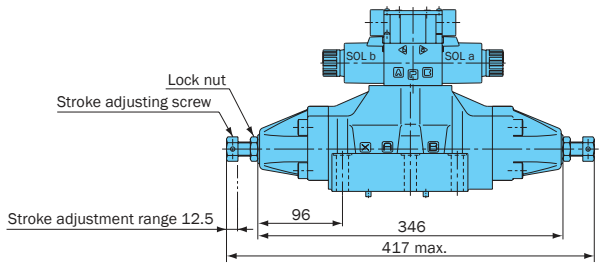
DSS(DSA)-G06-$\begin{matrix}A\\E\\C\\D\end{matrix}$**RY-**22

(Flow Regulator Type)



DSS(DSA)-G06-$\begin{matrix}A\\C\end{matrix}$**LR-**22

(Adjustable Stroke Type)



Dimensions in the parentheses are for the DSA-G06-***-RY-**-21.

(ISO 4401-08-07-0-94
JIS B 8355 D-08-07-0-94)

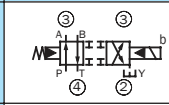
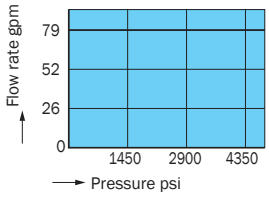
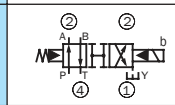
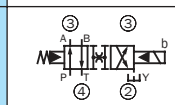
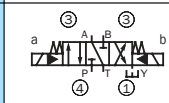
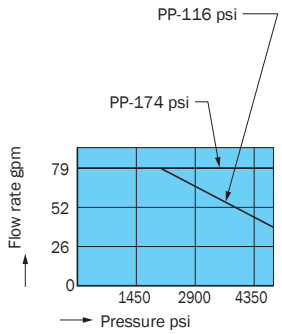
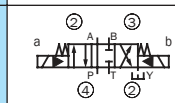
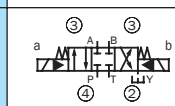
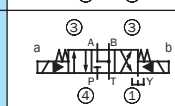
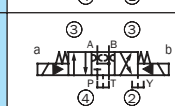
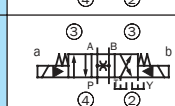
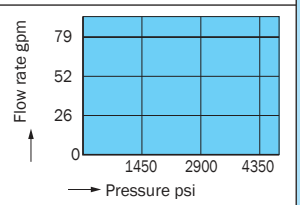
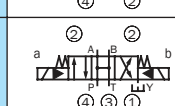
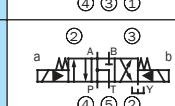
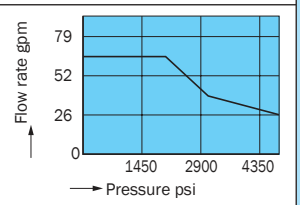
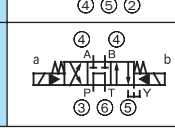
For sub plate DSS (DSA) -G06

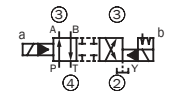
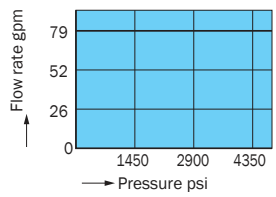
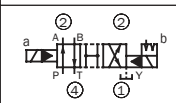
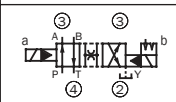
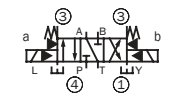
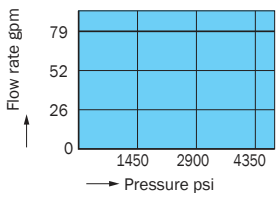
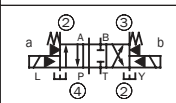
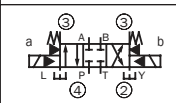
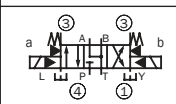
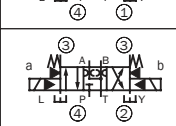
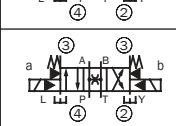
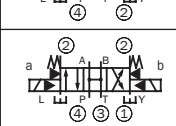
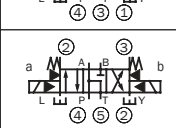
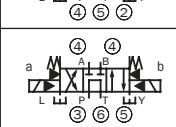
Model No.	E	Weight
MDS-06X-E30-D	SAE-16	5.3 lbs

Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

DSS(DSA)-G04

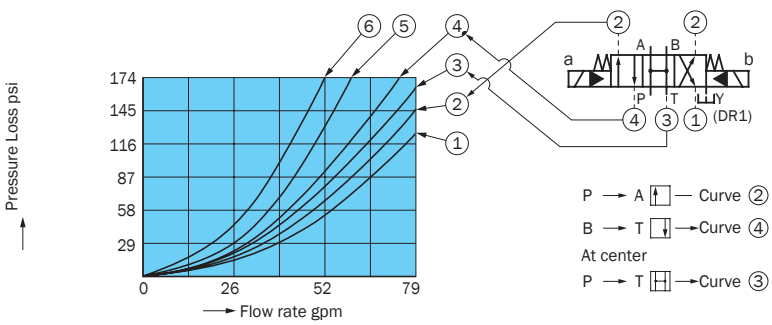
Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value
2-Position Spring Offset Type — DSS(DSA) -G04 -A3X-		
-A3Z-		
-A3Y-		
3-Position Spring Center Type — DSS(DSA) -G04 -C1-		
-C2-		
-C5-		
-C6-		
-C6S-		
-C4S-		
-C4-		
-C8-		
-C7X- -C7Y-		

Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value
2-Position Spring Offset Type — DSS(DSA) -G04 -E3X-		
-E3Z-		
-E3Y-		
3-Position Spring Center Type — DSS(DSA) -G04 -D1-		
-D2-		
-D5-		
-D6-		
-D6S-		
-D4S-		
-D4-		
-D8-		
-D7X- -D7Y-		

Note: The JIS number indicates the standard internal pilot and external drain.

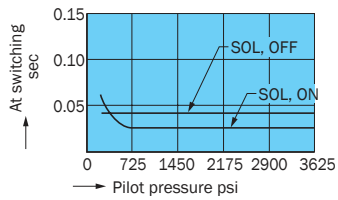
Pressure Loss Characteristics

Note:
Interpreting the Pressure Loss Value

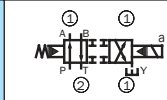
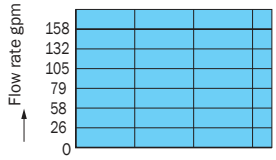
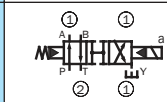
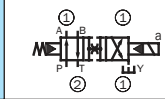
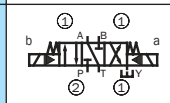
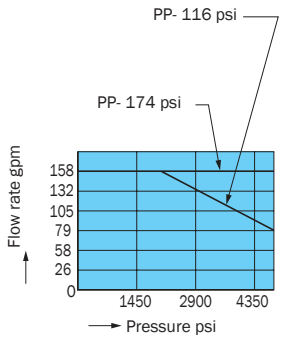
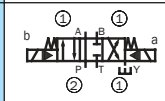
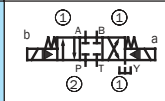
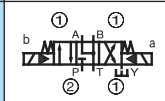
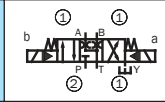
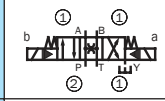
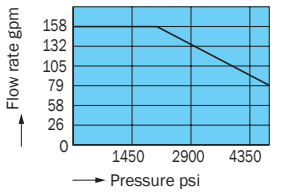
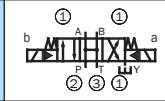
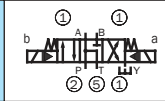
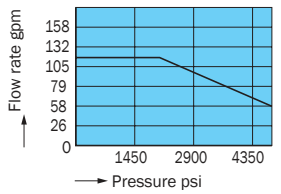
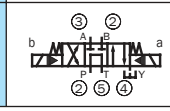


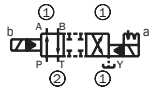
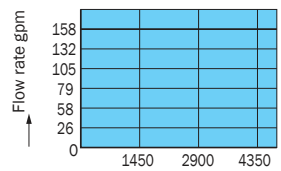
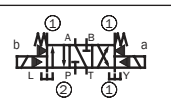
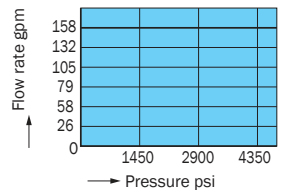
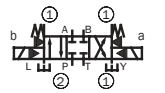
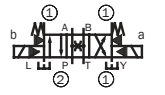
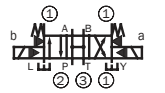
Switching Response Time

Model No. : DSS-G04-C5
Voltage Symbol : C1 (AC Solenoid)



DSS(DSA)-G06

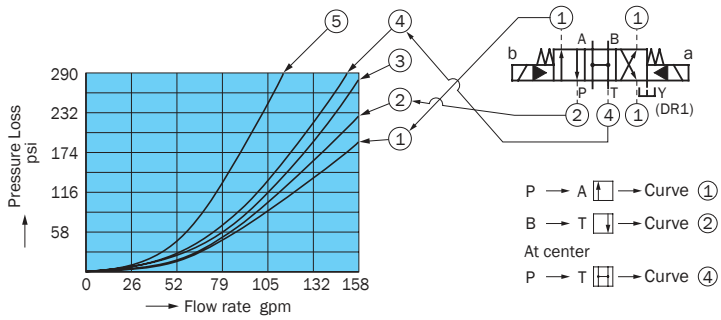
	Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value
2-Position Spring Offset Type	DSS(DSA) -G06 -A3X-		
	-A3Z-		
	-A3Y-		
3-Position Spring Center Type	DSS(DSA) -G06 -C1-		
	-C2-		
	-C5-		
	-C6-		
	-C6S-		
	-C4S-		
	-C4-		
	-C8-		
	-C7X- -C7Y-		

	Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value
2-Position Spring Offset Type	DSS(DSA) -G06 -E3X-		
	-E3Z-		
	-E3Y-		
3-Position Spring Center Type	DSS(DSA) -G06 -D1-		
	-D2-		
	-D5-		
	-D6-		
	-D6S-		
	-D4S-		
	-D4-		
	-D8-		
	-D7X- -D7Y-		

Note: The JIS number indicates the standard internal pilot and external drain.

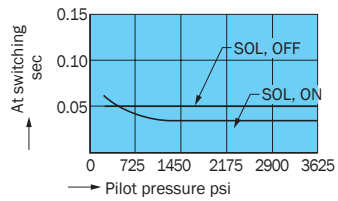
Pressure Loss Characteristics

Note:
Interpreting the Pressure Loss Value



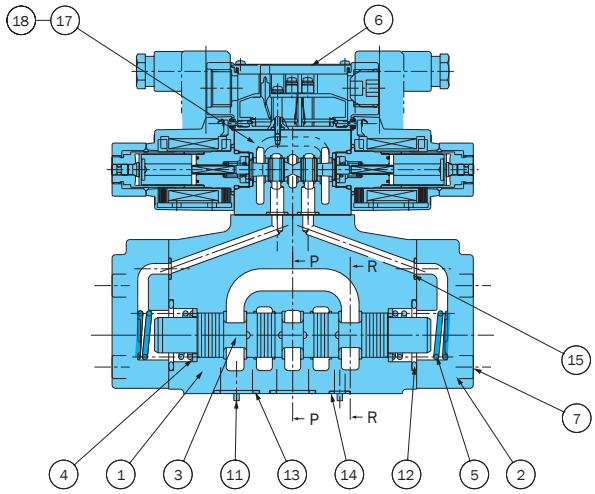
Switching Response Time

Model No. : DSS-G06-C5
Voltage Symbol: C1 (AC Solenoid)

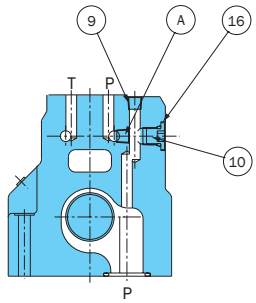


Cross-sectional Drawing

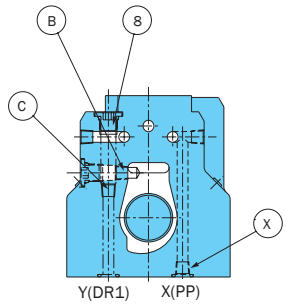
DSS(DSA)-G04-C**-R-C*-22



Pilot, Drain System Change

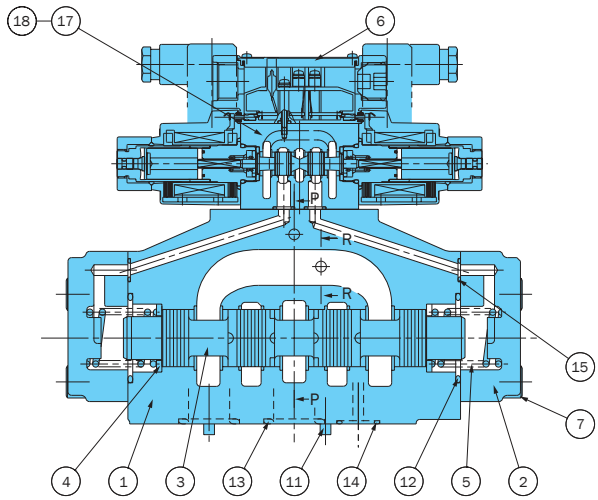


Cross-sectional P-P

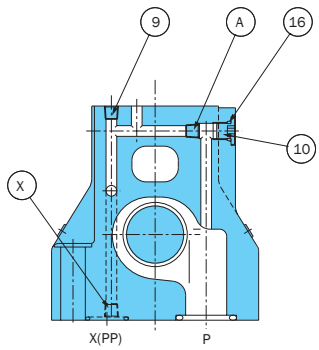


Cross-sectional R-R

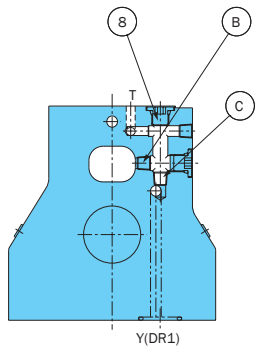
DSS(DSA)-G06-C**-R-C*-22



Pilot, Drain System Change



Cross-sectional P-P



Cross-sectional R-R

Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Ring
5	Spring
6	Nameplate
7	Screw

Part No.	Part Name
8	Plug
9	Plug
10	Plug
11	Pin
12	O-ring
13	O-ring

Part No.	Part Name
14	O-ring
15	O-ring
16	O-ring
17	Solenoid Valves
18	Screw

Changing the Pilot and Drain Connections

After Change		Hexagon Socket Head Plug
Pilot	Internal	Switch from A to x .
	External	Switch from x to A .
Drain	Internal	Switch from B to C .
	External	Switch from C to B .

List of Sealing Parts

Part No.	Part Name	Part Number		Q'ty
		04 size	06 Size	
12	O-ring	1B-P34	1B-G45	2
13	O-ring	1B-P22	1B-P28	4
14	O-ring	1B-P10A	1B-P20	2
15	O-ring	1B-P9	1B-P10	2
16	O-ring	1B-P8	1B-P8	3

Note: 1.O-ring 1A/1B/4D-** indicate JIS Standard B 2401-1A/1B/4D-**.
2.See SS/SA-G01-**-31for information about the seal part for the pilot solenoid valve.

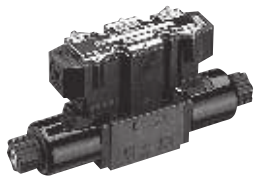
Seal Kit Number

04 size		06 Size	
Single Solenoid	Double Solenoid	Single Solenoid	Double Solenoid
EDBS-04AA-1A	EDBS-04CA-1A	EDBS-06AA-1A	EDBS-06CA-1A

Note: The seal kit includes a seal for the pilot solenoid valve.

Fine Solenoid Valve SF Series

2.6 to 10.5 gpm
3045 psi



Features

The function of two valves in one
A two-speed controller provides smooth speed adjustment from low speed to high, and from high-speed to low.
Quiet starts and stops
A low-speed startup and stop feature makes startups and stops smooth and soft.

Separate control of forward and back cylinder movement
There are five volume settings for highspeed flow rate and acceleration/-deceleration times that can be independently adjusted SOL.a and SOL.b (ON side, OFF side).

Specifications

Item \ Model No.			SF-G01 -C*10-D2-10	SF-G01 -C*20-D2-10	SF-G01 -C*40-D2-10
Valve Maximum Operating Pressure psi			3045		
Maximum Flow Rate ℓ (gpm)			10 (2.6)	20 (5.2)	40 (10.5)
High-speed Flow Rate gpm			1.3 to 2.6	2.6 to 5.2	5.2 to 10.5
Low-speed Flow Rate gpm			.13 to 1.0	.52 to 2.1	1.0 to 4.2
Maximum Allowable Back Pressure psi			1000		
Acceleration/Deceleration Time Adjustment Range SEC			0.1 to 2		
Hysteresis (Note 2)			7%		
Repeatability (Note 2)			3%		
Power Supply Voltage V Maximum Power Consumption W			D2: 24V DC regulated DC power supply 36W		
Operating Environment	Dust Resistance/Water Resistance Rank		IP63 (Dust-tight, Rain-proof)		
	Ambient Temperature		41 to 122° F		
	Operating Fluid	Temperature Range	41 to 140° F		
		Viscosity Range	15 to 300centistokes		
		Filtration	10 microns or less		
Mounting bolt	Size x Length		10-24 x 1 3/4		
	Tightening Torque		3.6 to 5 ft lbs		

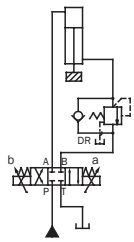
Note) 1.The above high-speed and low-speed flow rates are obtained with a differential pressure (PA, PB) of 145 psi. The flow rates depend on differential pressure.
2.Hysteresis and repeatability values are those at maximum flow rate.
3.For mounting bolts, use Grade 8 or equivalent.
4.Mounting bolts are not included.

Understanding Model Numbers

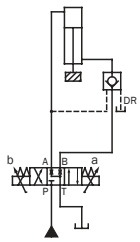
SF – G01 – C * * * – * R – D2 – E10

- E10: Design number E5153A-3 turn potentiometer
- D2: Power supply D2: 24V DC
- R: With indicator light
- *: Auxiliary symbol None: Sink A: Source
- * * *: Maximum flow rate: 10, 20, 40 ℓ/min
- C: Center position: 5,6S
- C: Operation Method: C (Spring center)
- G01: Mounting method G: Gasket type Nominal diameter: 01 (01 size) (D03)
- SF: Fine solenoid valve

• Handling
1 Valve differential pressure
Volume adjustment becomes sensitive when P→A (B) and B(A)→T differential pressure is large. Maintain the pressure differential so it is no greater than 500 psi.
2 Low-speed flow rate
The spool may not move if the low-speed flow rate is below the minimum. Use this valve only within the allowable minimum low-speed flow rate range.
3 Deceleration circuit
• Use a C5** spool for the deceleration circuit. Deceleration is difficult with the C6S** spool.
• When large deceleration is required or for a system that uses a vertical cylinder, equip an external drain type counter balance valve. See the illustration below.
4 Pilot check circuit
• For a circuit with a pilot check valve, knocking may occur in the pilot check valve due to large load inertia and circuit pressure loss. In cases like this, use an external drain type pilot check valve. See the illustration below.



When large brake pressure is required (Use an external drain type counter valve.)



When there is the possibility of pilot check valve knocking (Use an external drain type pilot check valve.)

Environmental conditions
5 The IC circuit board is located inside the central control box, so care must be exercised concerning water-resistance and ambient temperature.
• Water: Cover the box so there is no direct splashing with water.
• Ambient Temperature: Use in an area where the temperature is 41 to 122° F
6 Operating Fluid
• Always keep the operating fluid clean. Allowable contamination is class NAS11 or less.
• Use oil-based hydraulic operating fluid.
• Contact your agent when you want to use fire-resistant hydraulic fluid.

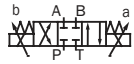
(Continued on following page)

7 Note the following points to optimize operation.

(1) Control fluid temperature when using this valve. Since the valve perform restrictor valve control on all processes, temperature differential changes flow volume and acceleration/deceleration time. The recommended temperature range is 86 to 140° F.

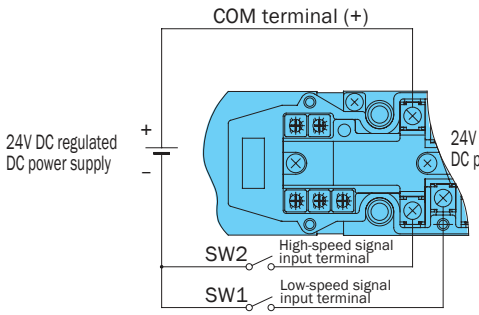
(2) During the positioning operation following deceleration, make sure that sufficient low-speed running is provided following deceleration before stopping operation. If low-speed operation time is too short can cause stopping during deceleration and shock problems due to fluctuation in load, etc.

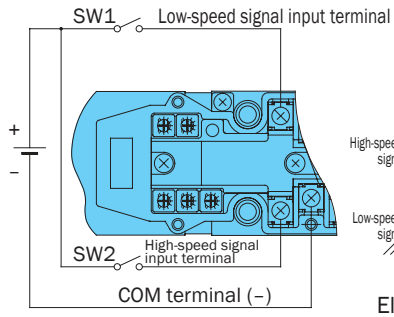
Spool Type and JIS Symbols

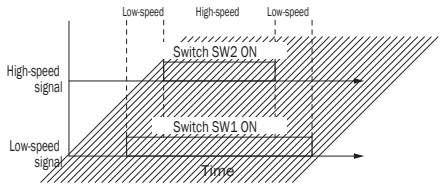
Spool Type	C5**	C6S**
JIS Symbol		

Cross-sectional Drawing

• Sink Type (Auxiliary Symbol: None)	• Source Type (Auxiliary Symbol: A)
Switches on load and power supply minus side	Switches on load and power supply plus side

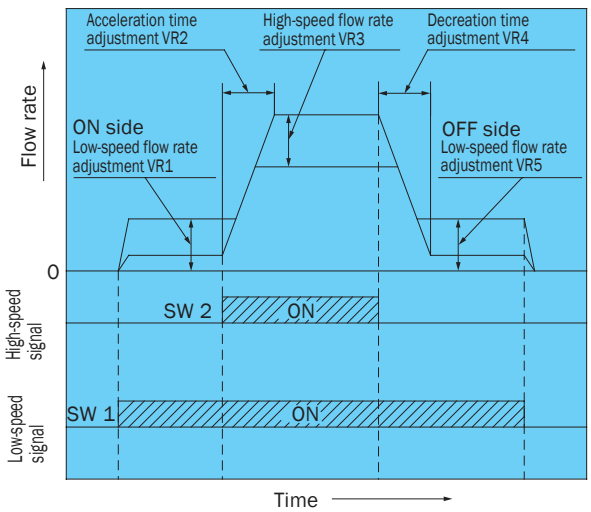


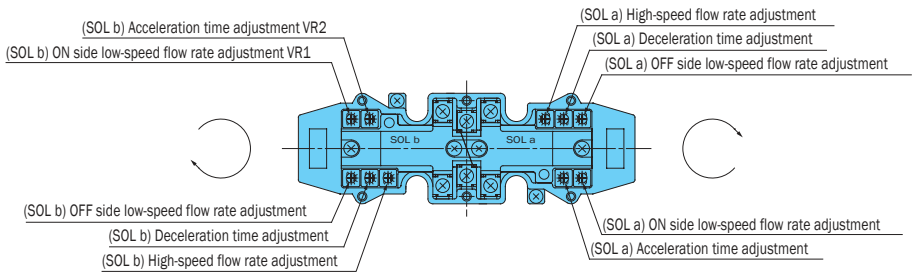




Adjustment Elements

Control Pattern



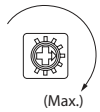


Electrical Control Precautions

- Do not introduce a high-speed signal prior to a low-speed signal. Make sure the two signals are introduced simultaneously or that the low-speed signal is introduced first.
  (1) Repeatedly introducing the high-speed signal first in a source type configuration can damage the IC board.
  (2) The valve will not operate on the high-speed signal only.
- The following adjustments in the range of VR1 through VR5 can be made independently for SOL.a and SOL.b. You can make adjustments for the best conditions for forward and back operations when considering the cylinder operations.
- Adjustment volume is arranged in from VR1 through VR5 in clockwise (rightward) rotation sequence when viewed from the coil side.
- The following are the factory default volume settings.

VR1 . 2 . 4 . 5
- - - Minimum setting
VR3 - - - Maximum setting

All Adjustment VRs

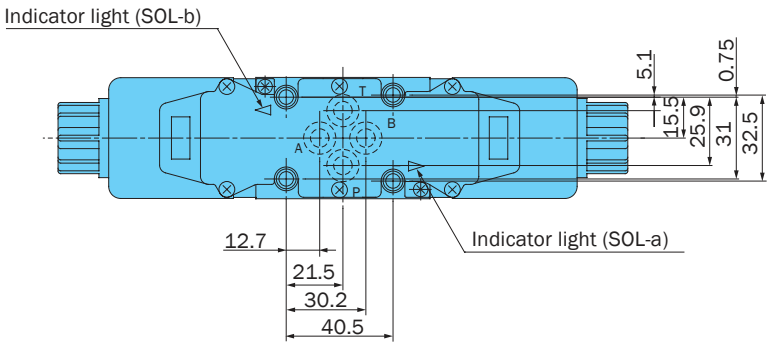


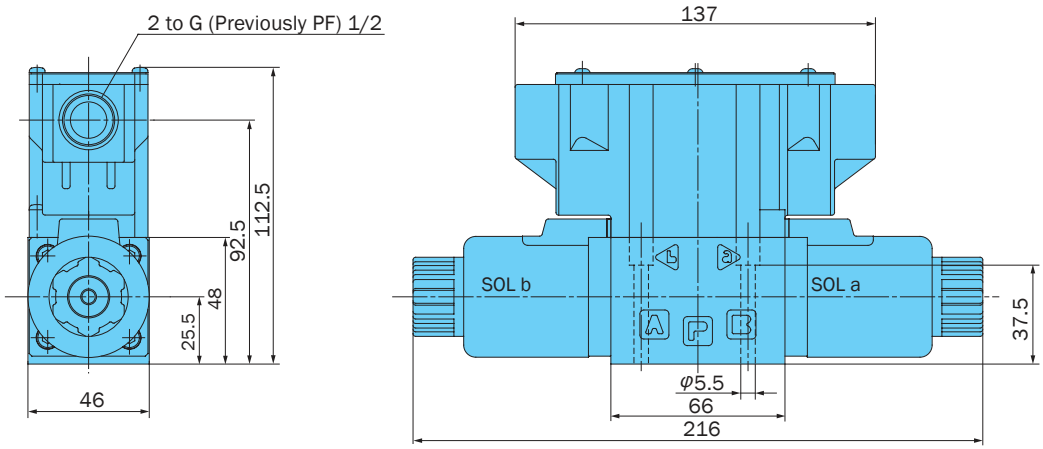
Maximum is clockwise (rightward) rotation.

- The volume rotation angle is 270°. Contact your agent about a three-rotation type adjustor for fine adjustment.

Installation Dimension Drawings

SF-G01-C***-(A)R-D2-E10

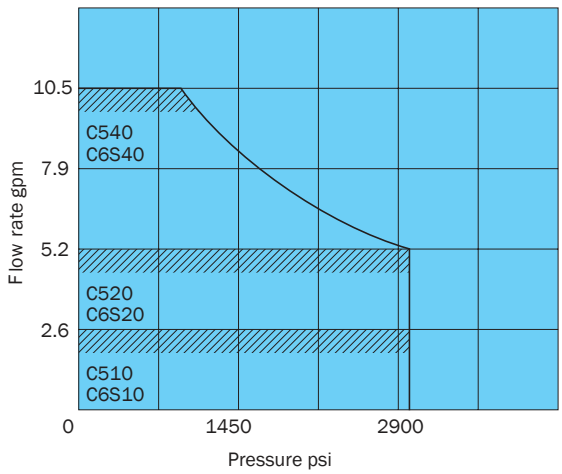




Performance Curves

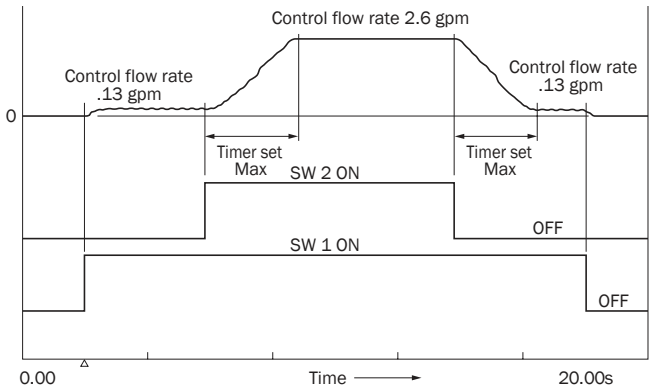
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure – Flow Rate Characteristics

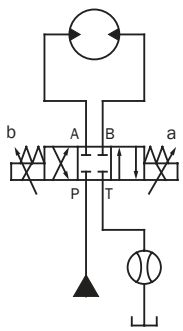


- Use the valve within the allowable flow rate range shown by the graph to the right.
- There are no operational problems within the allowable flow rate range, even when one-pass is used.

Control Waveform Example

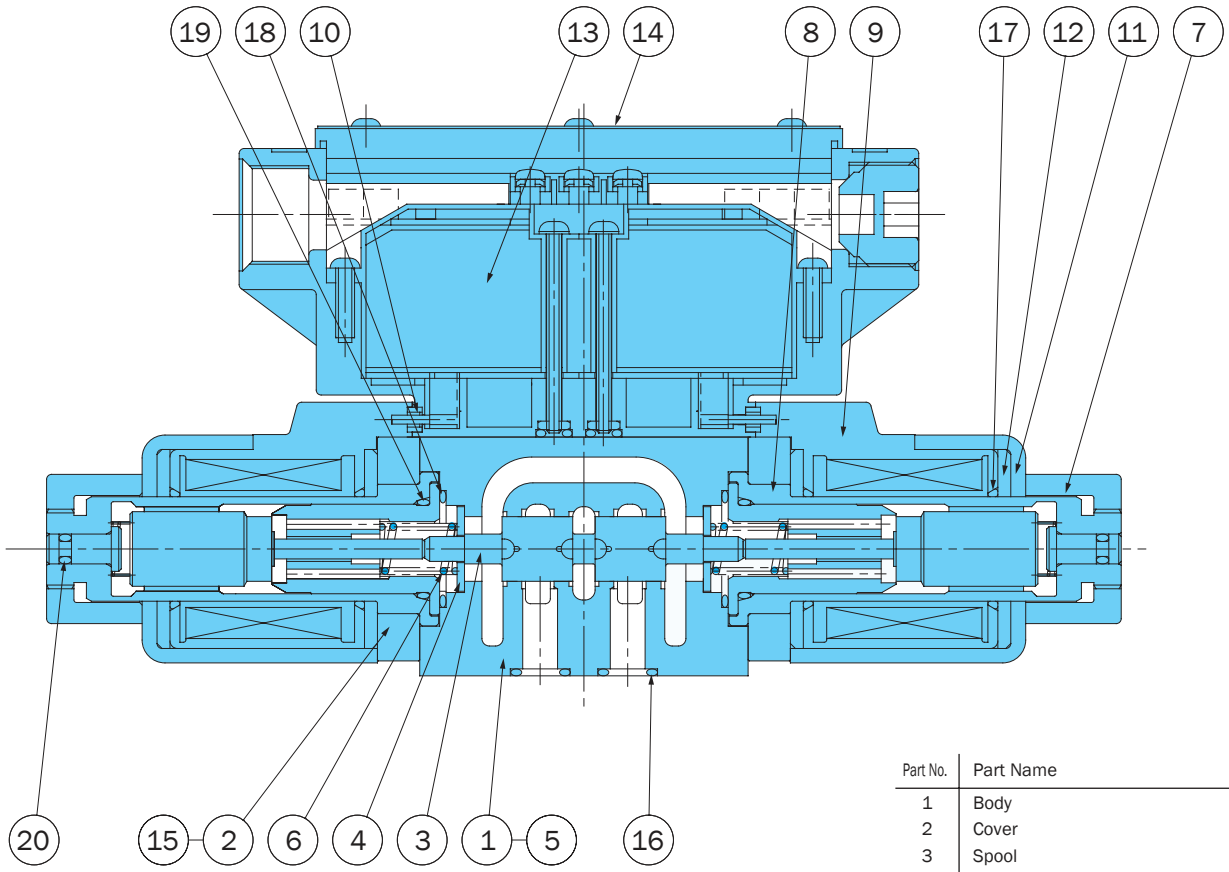


- Valve: SF-G01-C510-R-D2-E10
- Supply Pressure: 3000 psi
- Hydraulic Circuit



Cross-sectional Drawing

SF-G01-C***-(A)R-D2-E10



Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Retainer
5	Spacer
6	Spring
7	Nut
8	Solenoid guide
9	Solenoid coil
10	Packing B
11	Coil case
12	Coil yoke
13	Central terminal box kit
14	Nameplate
15	Hexagon Socket Head Bolt
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring

Seal Part List (Kit Model Number EFS)

Part No.	Part Name	Type/Part Number	Q'ty
16	O-ring	AS568-012(Hs90)	4
17	O-ring	AS568-019	4
18	O-ring	AS568-019(Hs90)	2
19	O-ring	AS568-017(Hs90)	2
20	O-ring	P3 Note2	2

Note: 1.O-ring 1B-** refers to JIS B 2401-1B-**.
2.Special flurorubber is used (Part Number: RO-P3-VS).

SNH Series Non-Leak Type Solenoid Valve

5.2 to 26.4 gpm
5075 psi

Features

Virtually no internal leakage
A poppet structure minimizes internal leaks from low pressures to as high as 5075 psi. Enhanced hydraulic circuit efficiency reduces energy needs.

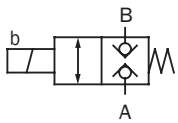
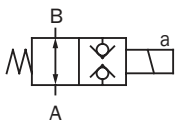
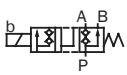
Virtually no pressure loss at high volumes
An original fluid reaction force suppression mechanism is provided for all sizes. Though compact, this valve provides the highest level switching capacity for its class.

High reliability
Since a wet type solenoid valve is used, the movable iron core remains immersed in oil as it moves, which minimizes switching noise and ensures reliable operation. A wet type valve also provides superior water resistance and longer life than a dry type valve.

ISO standard mounting service (01, 03 sizes)
This valve can be ganged together with a modular valve, enabling simple configuration of circuits and an overall compact device configuration.

EC connector for improved switching (06 size)
During switching, twice the current (starting current) flows to the coil than normal (holding current), which ensures reliable switching operations. The 06 size has compact configuration made possible by an original design that uses a small coil that provides high output, without the need for a large coil.

Specifications

Model No.			SNH-G01 (D03)	SNH-G03 (D05)	SNH-G04 (D07)	SNH-G06 (D08)
JIS Symbol	AR					
	HQ					
	A2K			----		
Maximum Working Pressure psi (P, A, B Ports)			5075			
Rated Flow Rate - Maximum Flow Rate gpm			AR,HQ; 2.6-5.2 A2K; 1.3-5.2	5.2 - 10.5	10.5 - 15.8	15.8 - 26.4
Maximum Changeover Frequency (per minute)			120			
Operating Environment	Dust Resistance/ Water Resistance Rank		JIS C 0920 IP65 (Dust-tight, Waterjet-proof) (Note 2)			IP64 (Dust-tight, Splash-proof)
	Ambient Temperature		-4 to 122° F			
	Operating Fluid	Temperature Range	-4 to 158° F			
		Viscosity Range	15 to 300 centistokes			
		Filtration	10 microns or less			
Weight AR/HQ (A2K) lbs			3.9	11.4	12.1	15.2
Mounting bolt	Size x Length		M5 × 45 (Four)	M8 × 70 (Four)	M8 × 70 (Four)	M10 × 75 (Four)
	Tightening Torque ft lbs		4.4 to 5.9	22 to 25	22 to 25	40 to 44

Note: 1.Internal leaking does not exceed 1 droplet/minute (.003 cu in)
2.The power supply type for E* is IP64 (dust-tight, splash-proof).
3.For mounting bolts, use grade 8 or equivalent.
4.Mounting bolts are not included with the 01 size. Bolts are included with the 03, 04, 06 sizes.

• Handling

1 Take care so the B port is not subjected to abnormal surge pressure that is in excess of the maximum operating pressure.
2 The manual switching (Options M, N) push pin receives B port pressure, so it cannot be pressed with a pressure in excess of about 725 psi. In the case of the HQ and A2K types, note that leaks are not completely stopped, even in the locked state.
3 Use this valve only within the allowable voltage range.
4 Use of water- or glycol-based hydraulic operating fluid is standard. Contact your agent about using other fire-resistant hydraulic fluid.
5 Always keep the operating fluid clean. Allowable contamination is class NAS12 or less.
6 In order to realize the full benefits of the wet type solenoid valve, configure piping so oil is constantly supplied to the B port.
7 The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.
8 Never try to take this valve apart. The cap seal cannot be reassembled without using special tools.

• Solenoid Assembly Specifications

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SNH-G01				For SNH-G03			
				Solenoid Coil Type	Current (A)	Power (W)	Allowable Voltage Range (V)	Solenoid Coil Type	Current (A)	Power (W)	Allowable Voltage Range (V)
DC with Built-in Rectifier	E1	AC100	50/60	EAC64-E1-1A	0.31	27	90 to 110	EBB64-E1	0.40	34	90 to 110
	E115	AC110	50/60	EAC64-E115-1A	0.26	25	100 to 125	EBB64-E115	0.33	31	100 to 125
		AC115			0.27	27			0.34	34	
	E2	AC200	50/60	EAC64-E2-1A	0.15	26	180 to 220	EBB64-E2	0.22	37	180 to 220
	E230	AC220	50/60	EAC64-E230-1A	0.12	24	200 to 250	EBB64-E230	0.16	30	200 to 250
		AC230			0.13	27			0.17	33	
DC	D1	DC12	⊠	EAC64-D1-1A	2.2	26	10.8 to 13.2	EBB64-D1	2.6	31	10.8 to 13.2
	D2	DC24	⊠	EAC64-D2-1A	1.1	26	21.6 to 26.4	EBB64-D2	1.5	36	21.6 to 26.4

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SNH-G04			
				Solenoid Coil Type	Current (A)	Power (W)	Allowable Voltage Range (V)
DC with Built-in Rectifier	E1	AC100	50/60	EBB64-E1	0.40	34	90 to 110
	E2	AC200	50/60	EBB64-E2	0.22	37	180 to 220
DC	D2	DC24	⊠	EBB64-D2	1.5	36	21.6 to 26.4

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SNH-G06				
				Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)
DC with Built-in Rectifier	E1	AC100	50/60	EBB64-D60	0.71	0.36	33.2	90 to 110
	E2	AC200	50/60	EBB64-D120	0.39	0.19	36.4	180 to 220
DC	D2	DC24	⊠	EBB64-D17	3.0	1.5	37.4	21.6 to 26.4

Understanding Model Numbers

SNH – G 01 – AR – ∗ – D2 – 11

- Design number
  - 11: 01 size
  - 10: 03, 04, 06 size
- Power supply
  - D: DC D1=DC12V D2=DC24V
  - E: AC (Built-in rectifier; 50/60Hz)
    - E1=AC100V E115=AC115V(01, 03 size)
    - E2=AC200V E230=AC230V(01, 03 size)
- Auxiliary symbol (Can be combined in alphabetic sequence.)
  - M: With manual switching pin
  - N: With manual switching push-button (with lock mechanism)
  - R: With indicator light (excluding 06 size)
  - GR: Surgeless type, with indicator (except for 06 size or 01, 03, 04 size power supply type E∗)
- Operation symbol
  - AR: 2-port normal close
  - HQ: 2-port normal open
  - A2K: 3-port (01 size)
- Nominal pipe diameter: 01, 03, 04, 06 size
- Mounting method: Gasket type
- Pump type
  - SNH: Non-leak type solenoid valve

Options

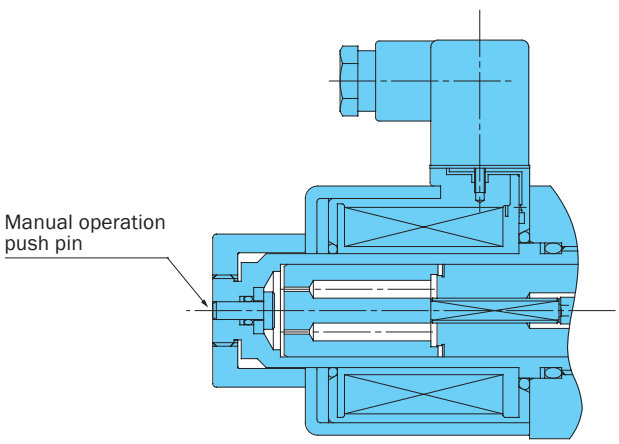
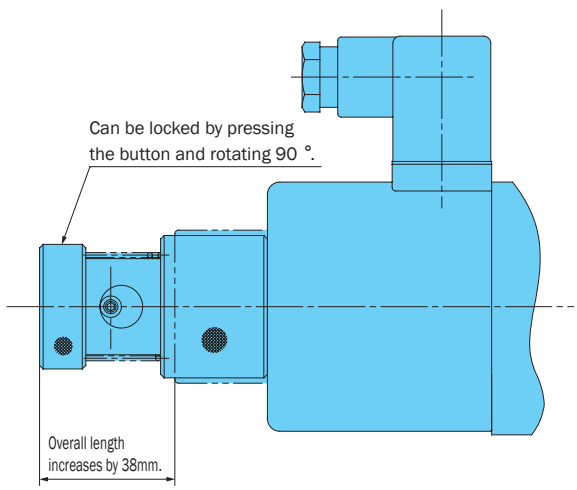
(Auxiliary Symbol)

• Select options in accordance with size, as shown in the table to the right.

(1) The 06 size has an EC connector and a built in surge killer as standard. However, an indicator light is not provided because of space considerations.

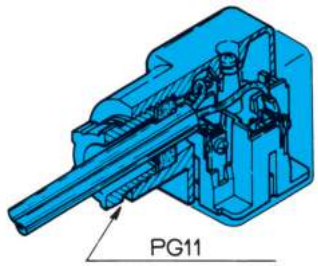
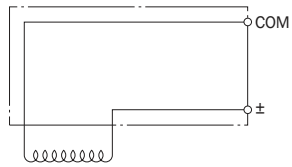
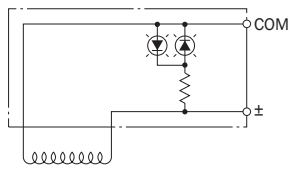
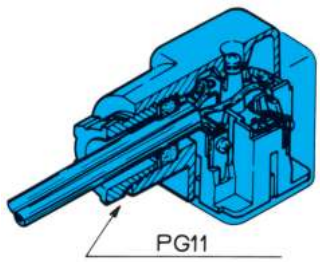
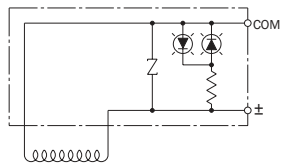
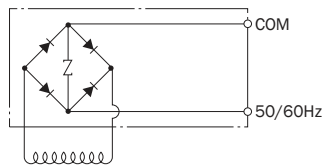
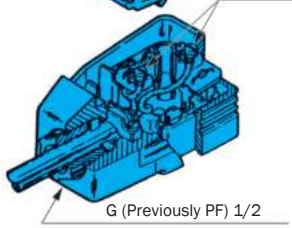
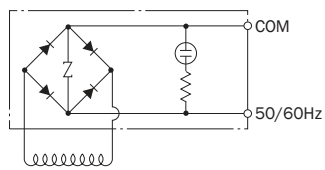
(2) Option N increases the measurement by the size of the pushbutton only.

Size \ Auxiliary symbol	M	N	R	GR
01	TM	TM	TM	TM
03	TM	TM	TM	TM
04	TM	TM	TM	TM
06	TM	TM	☒	☒

With manual push pin (Auxiliary Symbol "M")	With manual push-button (with lock mechanism) (Auxiliary Symbol "N")
 No change in overall length	

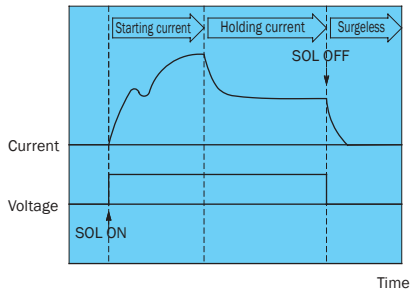
Electrical Circuits

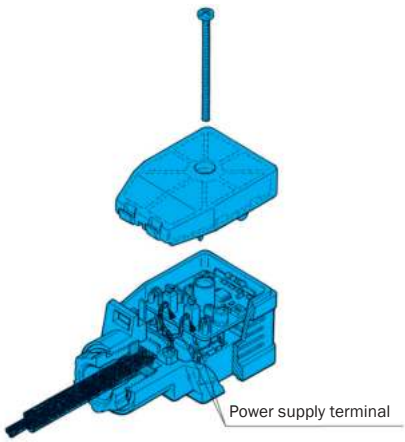
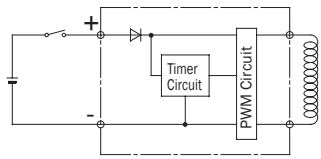
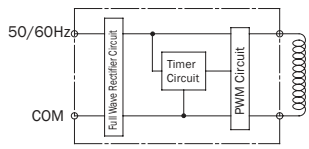
• These electrical circuits are for sizes 01, 03, 04. An EC connector is used for size 06. See the next page for more information .

Valve	Connector Type	Wiring	Electrical Circuit Diagram
G01 G03 G04 Size	EA41-1A (Standard for power supply type D*)	 Connect the power supply to terminals No.1 and No. 2. The ⏚ terminal is ground. Use this terminal as required.	
	EA41-DR1/2-1C (D* option: R)	Connect the power supply to terminals No.1 and No. 2. The ⏚ terminal is ground. Use this terminal as required.	
	EA41-GRD1/2-1C (D* option: GR)		
	EA42-1B (For power supply type E*)	 Connect the power supply to the terminals on the board. When ground connection is required, remove the board and use the ⏚ terminal. In this case, do not connect the power supply to the No. 1 and No. 2 terminals.	
	EA42-R1/2-1B (E* option: R)		

Note: 1.Connector types 1 and 2 indicate voltage. (1: 100V AC or 12V DC; 2: 200V AC or 24V DC)
2.Use a connector cord with a diameter that is in the range of φ8 to φ10.
3.The orientation of the connectors can be changed in 90° increments by modifying the terminal block.
4.The cover cannot be removed unless the installation screws are removed.
5.Use an M3 type as a solderless terminal.
6.Tighten the M3 screws that secure connectors and terminals to a torque of 2.6 to 4.4 in lbs.

• 06 Size EC Connector
SNH-G06 provides large switching power, so an EC connector is used. During switching, this EC connector supplies twice the current (starting current) that normally flows to the coil (holding current), and drops the current back to normal after switching is complete.

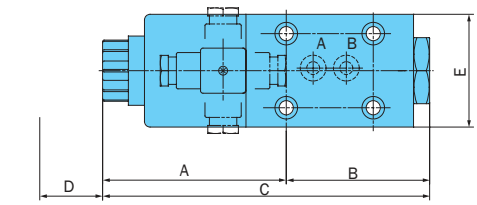


Valve	Connector Type	Wiring	Electrical Circuit Diagram
06 Size	Surgeless Type (24V DC) EC Connector EN41 – 06D2		 Note that correct polarity must be maintained with the power supply.
	Built-in Rectifier EC Connector EN41 – 06E1/E2	Connect the power supply to the terminals on the board. When ground connection is required, remove the board and use the ⏚ terminal. In this case, do not connect the power supply to the No. 1 and No. 2 terminals. Round type, Y type, and other solderless terminals cannot be used.	

Note: The orientation of the EN41-06** connector cannot be changed at 90° intervals by modifying the terminal block.

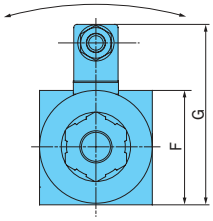
Installation Dimension Drawings

SNH-G**-AR-**-$\frac{11}{10}$

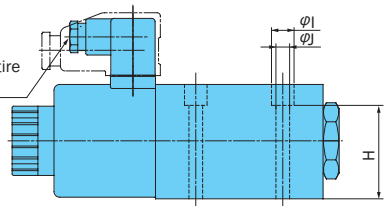


Space required for coil removal

Rotatable 360 ° (Note 2)



Wiring port (Allowable cabtire cord diameter: φ8 to 10)



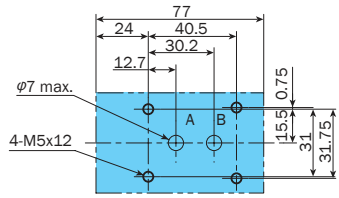
Dimension Table

Size	A	B	C	D	E	F	G (Note) 2	H	I	J
01	100	60.5	160.5	60.5	46	48	91 (94.5)	37.5	9	5.5
03	114	89	203	63	70	72	112 (115.5)	58	14	8.5
04	132	71	203	63	75	71	112 (115.5)	58	14	8.5
06	137	82	219	63	85	71	115.5	60	18	11

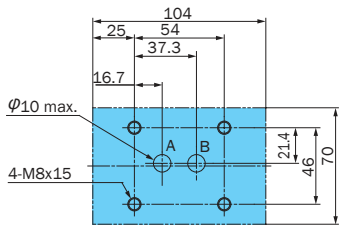
Note: 1. The 01, 03, 04 size power supply type E* allows rotation at 90° intervals, but the 06 size cannot be rotated.
2. Values in parentheses are for 01, 03, 04 size power supply type E*.
3. The P and T ports of the 01, 03 sizes do not have O-ring grooves, so if the manifold has P and T ports, use end plates to close off the valve P and T ports. Contact your agent for information about end plates.

Valve Mounding Surface Dimensions

01-AR/HQ (Conforms to ISO 4401-03-02-0-94)
MSA-01X-E10

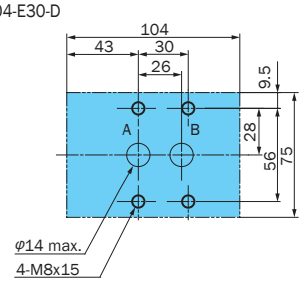


03-AR/HQ (Conforms to ISO 4401-05-04-0-94)
MS-03-E30

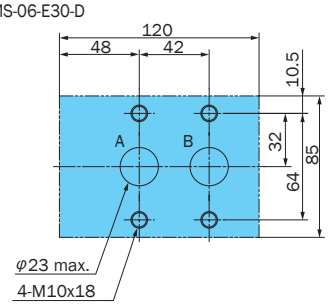


Note: An M6 mounting screw type is not yet available.

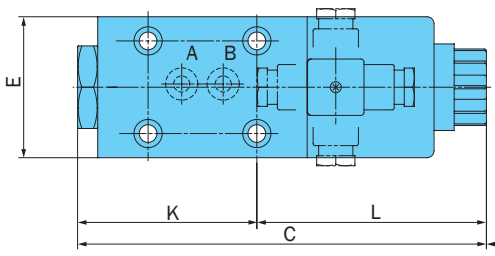
04-AR/HQ
MS-04-E30-D



06-AR/HQ
MS-06-E30-D

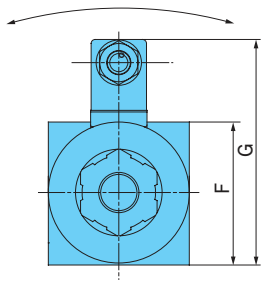


SNH-G**-HQ-**-$\frac{11}{10}$



Space required for coil removal

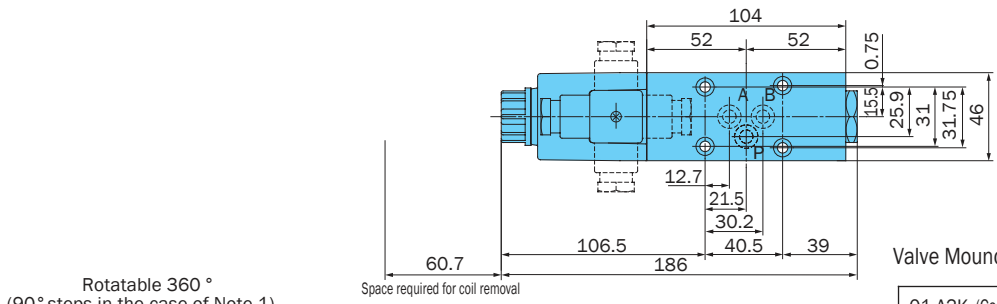
Rotatable 360 ° (Note 1)

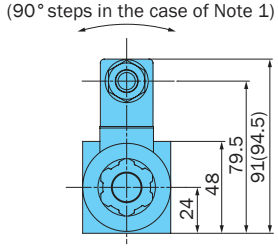


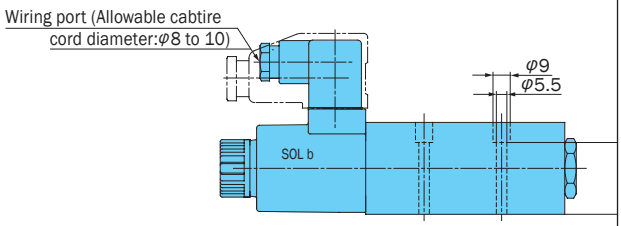
Dimension Table

Size	C	D	E	F	G (Note) 2	K	L
01	160.5	60.5	46	48	91 (94.5)	70.5	90
03	203	63	70	72	112 (115.5)	89	114
04	203	63	75	71	112 (115.5)	83	120
06	219	63	85	71	115.5	100	119

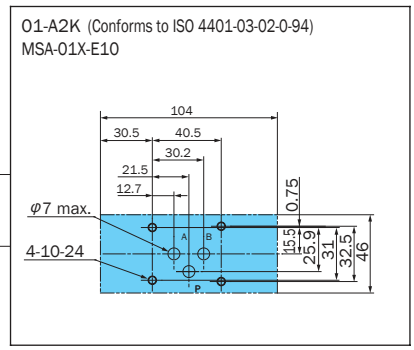
SNH-G01-A2K-*-D*/E*-11







Valve Mounding Surface Dimensions



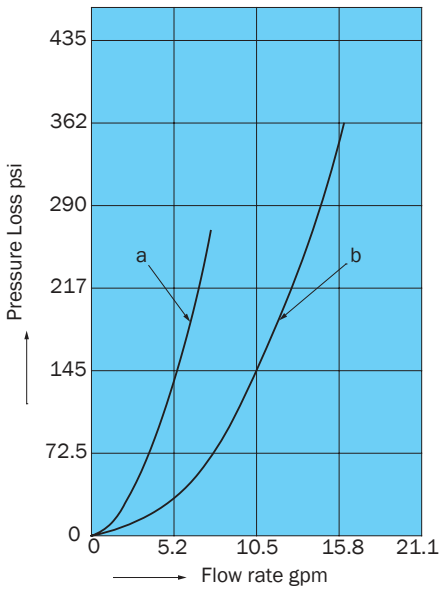
Note: 1. Power supply type E* allows rotation at 90° intervals.
2. Values in parentheses are for power supply type E*.

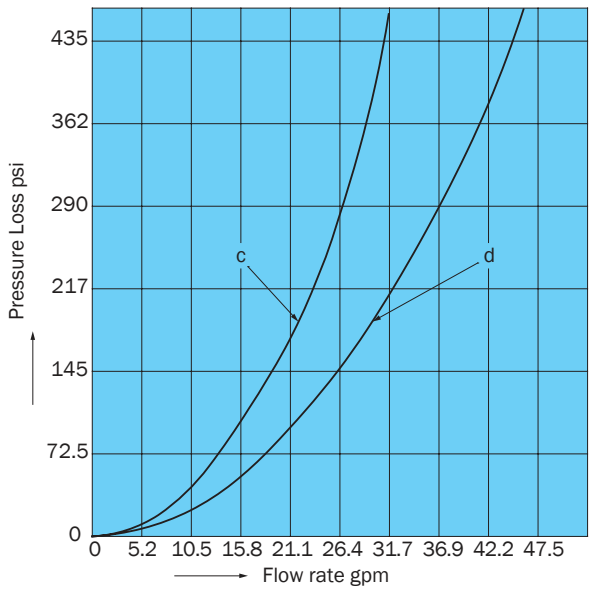
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

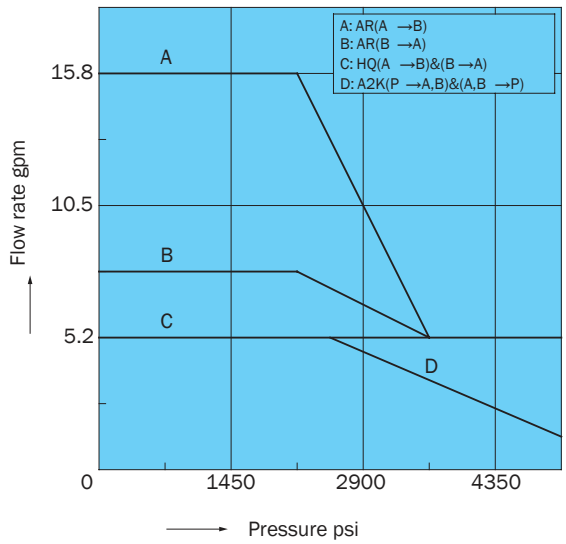
Flow Path \ Size	01	03	04	06
A↔B	a	b	c	d
P↔A, P↔B	a	--	--	--



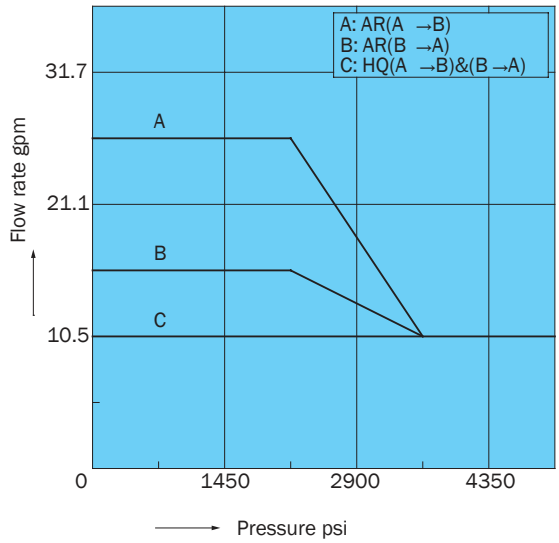


Pressure - Flow Volume Allowable Value

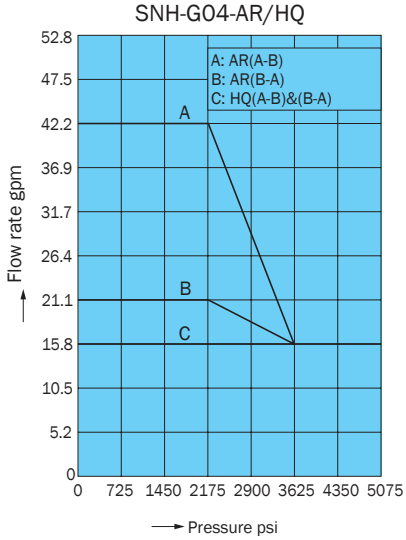
G01 Size



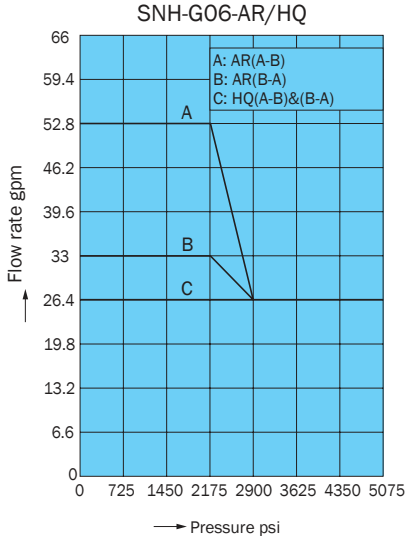
G03 Size



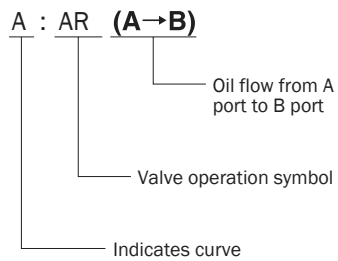
SNH-G04-AR/HQ



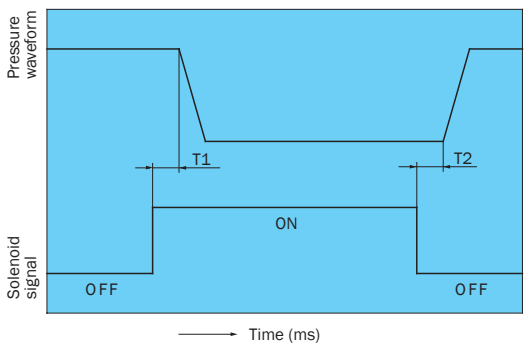
SNH-G06-AR/HQ



Note: Available flow rate values depend on pressure and fluid flow direction. The following shows how to read the data.



Switching Response Time



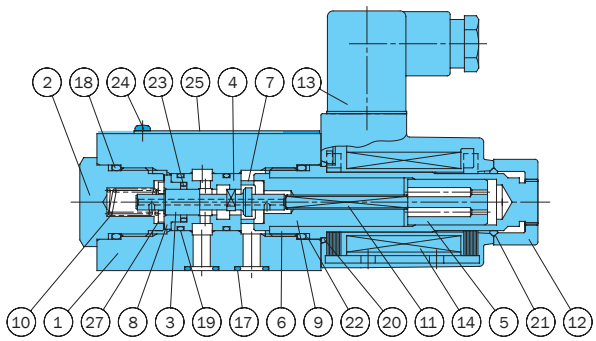
Pressure : 5075 psi
Flow Rate : 01 : 5.2 gpm
03 : 10.5 gpm
04 : 15.8 gpm
06 : 26.4 gpm
Operating Fluid : ISO VG68

Size	Power supply	Response Time (sec)	
		T1(ON)	T2(OFF)
01	D*	0.03 to 0.05	0.04 to 0.06
	E*	0.04 to 0.06	0.08 to 0.10
03	D*	0.06 to 0.08	0.04 to 0.06
	E*	0.07 to 0.09	0.08 to 0.10
04	D*	0.09 to 0.11	0.06 to 0.08
	E*	0.12 to 0.14	0.14 to 0.16
06	D*	0.04 to 0.06	0.06 to 0.08
	E*	0.09 to 0.11	0.14 to 0.16

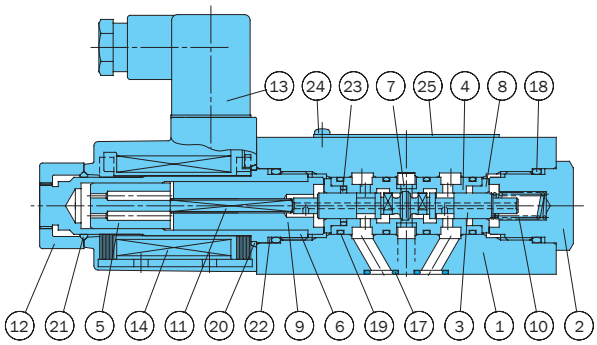
Note: The switching response time changes slightly with operating conditions (pressure, flow rate, viscosity, etc.)

Cross-sectional Drawing

SNH-G01-HQ-**11

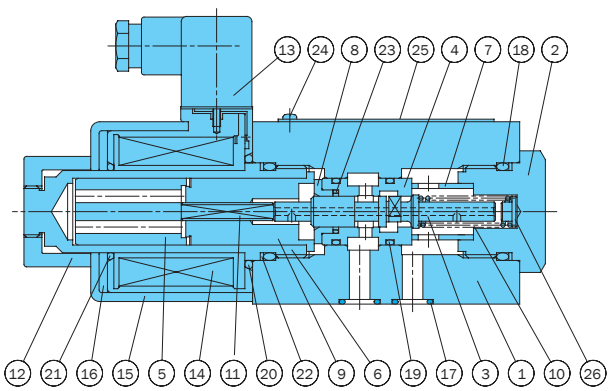


SNH-G01-A2K-**-11

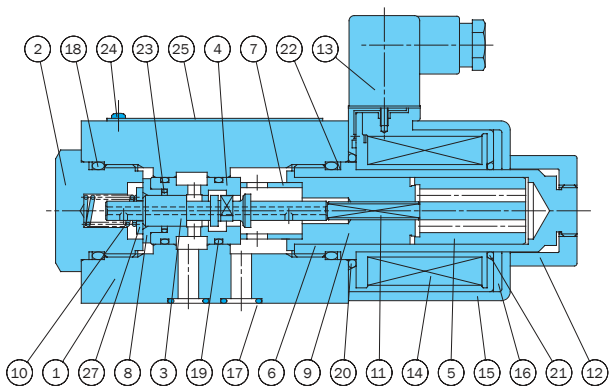


Part No.	Part Name	Part No.	Part Name
1	Body	15	Coil case
2	Plug	16	Coil yoke
3	Poppet	17	O-ring
4	Sleeve	18	O-ring
5	Plunger	19	O-ring
6	Solenoid guide	20	O-ring
7	Ring	21	O-ring
8	Collar	22	Backup ring
9	Solenoid stopper	23	Cap seal
10	Spring	24	Cross recessed head small screw
11	Rod	25	Nameplate
12	Nut	26	Stopper
13	Connector	27	Retainer
14	Solenoid coil		

03
SNH-G04-AR-**10
06



03
SNH-G04-HQ-**10
06



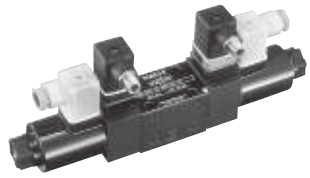
List of Sealing Parts

Part No.	Part Name	01	03	04	06	Q'ty	
						AR, HQ	A2K
17	O-ring	AS568-012 (HS90)	IB-P12	IB-P16	IB-P28	2	3
18	O-ring	IB-P22	IB-P32	IB-P32	IB-P32	2	2
19	O-ring	AS568-017(HS90)	IB-P22	AS568-120 (HS90)	IB-P26	2	4
20	O-ring	S-25	AS568-029	AS568-029	AS568-029	1	1
21	O-ring	1A-P20	AS568-026	AS568-026	AS568-026	1	1
22	Backup ring	T2-P22	T2-P32	T2-P32	T2-P32	2	2
23	Cap seal	*	*	*	*	1	1

Note: O-ring 1B-** refers to JIS B2401-1B. Backup ring T2 indicates JIS B 2407-T2.
Parts marked by an asterisk "" are not available on the market. Contact your agent for more information.

SAW Series
Directional Control Valve with Monitoring Switch

26.4 gpm
5075 psi

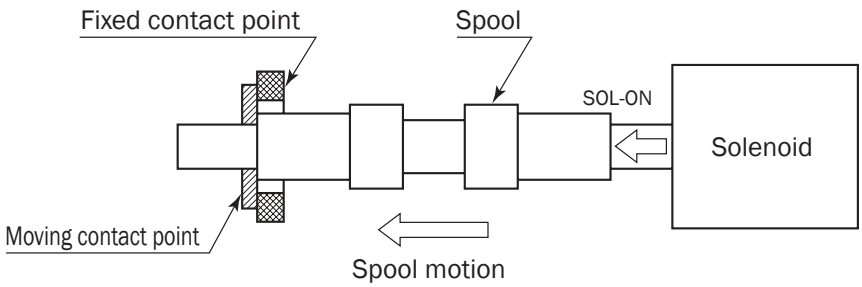


Features

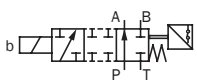
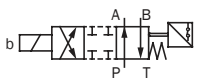
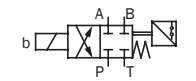
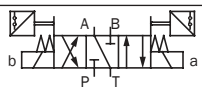
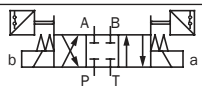
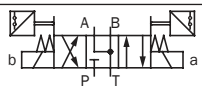
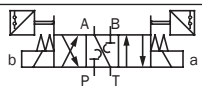
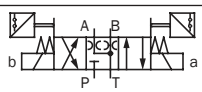
This valve is a spool activated directional control valve that uses mechanical detection to operate a switch to send an electric ON/OFF signal. This makes it possible, by monitoring the status of the spool operations, to use it as an information source for safety checks by using the ON/OFF signal as a basis for sequence control. In the future, they will be used in machinery that is compatible with international machine safety (ISO 12100) and JIS standards (JIS B 9700) standards.
The directional control valve with monitoring switch was developed as a valve to support this demand.
The switch contact has little dead zone and almost no temperature drift (variable motion caused by changes in temperature) or hysteresis because the reaction of the spool action is mechanical.
All valve functions, except for the monitoring function, are equivalent to the standard solenoid operated directional control valve (SA-G01).
DIN connectors are used for the switches and solenoid coil wiring so connections are easy when installing or replacing valves.

Operational Principle

When the spool is in the center position, the fixed and moving parts are in contact forming an electric circuit. Operating the solenoid moves the spool so the moving part moves breaking the electric connection between the fixed and moving parts.
PAT. PEND.



Specifications

Model No.		Standard Type		Shockless Type	
JIS Symbol	Operation Symbol	Maximum Working Pressure psi	Maximum Flow Rate gpm	Maximum Working Pressure psi	Maximum Flow Rate gpm
	-A2X-	5075	7.9	3625	7.9
	-A3X-		21.1		13.2
	-A5-		26.4		
	-C1-		21.1		
	-C5-		26.4		
	-C6-		21.1		
	-C1S-		26.4		
	-C6S-				

Note: The maximum flow rate of each valve depends on the pressure. For details, see page D-68.

• Valve Specifications

		AC Solenoid	DC Solenoid Built-in Rectifier
Maximum Working Pressure P, A, B ports	Standard Type	5075 psi	
	Shockless Type	3625 psi	
Maximum Allowable Backpressure T port		3045 psi	
Maximum Flow Rate		See pressure-flow characteristics on page D-68 for more information.	
Switching Frequency		120/minute	
Weight	Double Solenoid	6.1 lbs	6.6 lbs
	Single Solenoid	4.6 lbs	4.8 lbs
Operating Environment	Dust Resistance/Water Resistance Rank	JISC 0920 IP65	
	Operating Fluid	Oil-based operating fluid (Note 1)	
	Ambient Temperature Range	-4 to 122° F	
	Operating Fluid Temperature Range	-4 to 158° F	
	Operating Viscosity Range	15 to 300 centistokes	
	Filtration	10 µm or less	
Mounting bolt (Note2)	Size × Length	Socket hex head bolt (grade 8 equivalent) 10-24 x 1 3/4	
	Tightening Torque	3.6 to 5 ft lbs	

Note: 1. Use a petroleum based operating fluid because the ON/OFF mechanism of the valve's monitoring switch is immersed in oil and the oil must be a non-conducting fluid.
Use only petroleum based operating fluid (do not use fluids that are water, glycol, W/O emulsion, phosphate, or fatty ester based).
Petroleum based operating fluids must also have a water content that is less than 0.1% by volume.
2. Installation bolts are not provided with valves. Use the specified bolts.

• Monitoring Switch Specifications

Voltage Rating	24VDC
Allowable Voltage Range	± 20% of voltage rating
Maximum Current Load	100mA
Residual Voltage (Note 3)	Max. 1.2V
Wiring for Connector for Switch	Connect with wires or M12-4 pin connector

Note: 1. See page D-67 for the procedure to wire the connector for the switch.
2. The programmable controller input circuits are positive (+) common mode and negative (-) common mode.
The directional control valve with monitoring switch uses a source circuit [switch on the positive (+) side of the load and power source] for safety purposes.
Because of this, it is necessary to use a negative (-) common mode programmable controller to receive input from the monitoring switch output.
3. Set the voltage of the power supply to the monitoring switch within a range that satisfies the following conditions.
Load ON voltage + residual voltage ≦ switch supply voltage ≦ 28.8 V (+20% voltage rating)
4. The switch element (photocoupler) in the connector's internal circuit for the monitoring switch may malfunction in the ON state because of over voltage or over current.
Therefore, in addition to checking the ON output of the monitoring switch, monitor the current at the solenoid and the internal circuits of the connector and valve in conjunction with the switch output.

Condition of monitoring switch output and valve

		Current to Solenoid	
		ON	OFF
Monitoring Switch Output	ON	Abnormal Malfunction at internal circuit of connector or valve	Normal Spool returns to middle position
	OFF	Normal Spool is switching	Abnormal Valve malfunction or signal wire is cut

The monitoring switch outputs according to the motion of the spool, so the solenoid turns on and off according to the output signal which is delayed only as much as the spool operation is delayed.
Set a 0.3 second delay, including leeway, to monitor the output of the switch.

• Solenoid Specifications

Same specifications as the SA-G01 series (31 design).

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)
AC	C1	AC100	50	EAC64-C1	2.2	0.52	25	80 to 110
			60		2.0	0.38	22	90 to 120
		AC110	60		2.2	0.46	28	
	C115	AC110	50	EAC64-C115	2.0	0.47	25	90 to 120
			60		1.8	0.35	22	100 to 130
		AC115	60		2.0	0.42	28	
	C2	AC200	50	EAC64-C2	1.1	0.26	25	160 to 220
			60		1.0	0.19	22	180 to 240
		AC220	60		1.1	0.23	28	
	C230	AC220	50	EAC64-C230	1.0	0.24	25	180 to 240
			60		0.91	0.17	22	200 to 260
		AC230	60		1.0	0.21	28	
DC with Built-in Rectifier	E1	AC100	50/60	EAC64-E1-1A	0.31		27	90 to 110
	E115	AC110	50/60	EAC64-E115-1A	0.26		25	100 to 125
		AC115			0.27		27	
	E2	AC200	50/60	EAC64-E2-1A	0.15		26	180 to 220
	E230	AC220	50/60	EAC64-E230-1A	0.12		24	200 to 250
		AC230			0.13		27	
DC	D1	DC12	—	EAC64-D1-1A	2.2		26	10.8 to 13.2
	D2	DC24	—	EAC64-D2-1A	1.1		26	21.6 to 26.4

• Handling

1 In order to realize the full benefits of the wet type solenoid valve, configure piping so oil is constantly supplied to the T port. Never use a stopper plug in the T port.
2 Ensure that surge pressure in excess of the maximum allowable back pressure does not reach the T port.
3 Note that the maximum flow rate is limited when used as a four-way valve, or by blocking ports for use as a two-way valve or one-way valve.
4 Always keep the operating fluid clean. Allowable contamination is class NAS12 or less.
5 Use a ISO VG 32 petroleum-based operating fluid, or an equivalent, that has a water content that is less than 0.1% by volume.
6 Do not use fire-resistant operating fluid.
7 Use this valve only within the allowable voltage range.
8 Do not allow the AC solenoid to become charged until you install the coil into the valve.
9 In the case of operation symbol A2X, run drain piping from the valve T port.
10 Maintaining a switching position under high pressure for a long period can cause abnormal operation due to hydraulic lockup. Contact your agent when you need to maintain a switching position for a long period.
11 Note that manual pin operating pressure changes in accordance with tank line back pressure.
12 The solenoid has a pin for switching the spool manually. However, use the cap (option symbol: D) to prevent manual operation for jobs were manual operation would cause a safety problem.
13 The only way to prevent misoperation of the monitoring switch caused by noise generated by the solenoid turning on and off is to install the surgeless directional control valve with monitoring switch (option symbol: GR). (If the solenoid power source is C* and D*)
14 Use surgeless specification (with varistor diode) directional control valves with monitoring switches for all electric valves on the same machine to prevent mis-operation of the monitoring switch caused by noise when the solenoid turns on and off.
15 The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.
16 The connector for the solenoid is the same as for the SA series solenoid valve. See page D-22 for electrical circuit drawings and wiring procedures.
17 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs	Dimension Drawings Page
MSA-01X-E10	1/4	3625	5.2	2.6	D-20
MSA-01Y-E10	3/8		10.5		
MSA-01Y-T-E10	3/8		10.5	1.9	H-4

Understanding Model Numbers

SAW – G 01 – A3X – FGR V – D2 – 10

Design number

Solenoid power supply
- C1 : AC100V 50/60Hz, AC110V 60Hz
- C115: AC110V 50/60Hz, AC115V 60Hz
- C2 : AC200V 50/60Hz, AC220V 60Hz
- C230: AC220V 50/60Hz, AC230V 60Hz
- D1: DC12V
- D2 : DC24V
- E1: AC100V 50/60Hz
- E115: AC110/115V 50/60Hz
- E2: AC200V 50/60Hz
- E230: AC220/230V 50/60Hz

Wiring for connector for switch
- None: With 350mm wire
- V : With M12-4 pin connector
  (Example of connector with cable provided by customer: Omron XS2F-D421-D80-A)

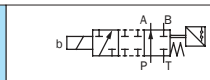
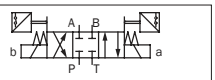
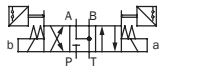
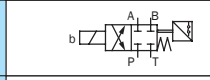
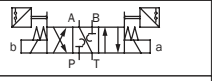
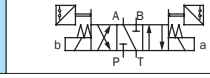
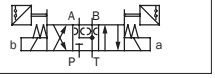
Option symbols
- None: No options (available with power supply E*)
- D : With cap to prevent operation of manual push pin
- F : Shockless type (available with power supply D* and E*)
- GR : Surgeless type, with indicator light (must be installed with power supply C* and D*)
- R : With indicator light (available with power supply E*)

Possible option symbol combinations

Power Supply	Option Symbols
C*	GR, DGR
D*	GR, DGR, FGR, DFGR
E*	None, D, F, DF, R, DR, FR, DFR

Note:
The only way to prevent misoperation of the monitoring switch caused by noise generated by the solenoid turning on and off is to install the surgeless directional control valve with monitoring switch.
(Power supply E is the standard surgeless type, option symbol G is not needed.)

Operation Symbol

A2X		C5	
A3X		C6	
A5		C1S	
C1		C6S	

Nominal diameter
01 size (D03)

Mounting method
G: Cascade mounting

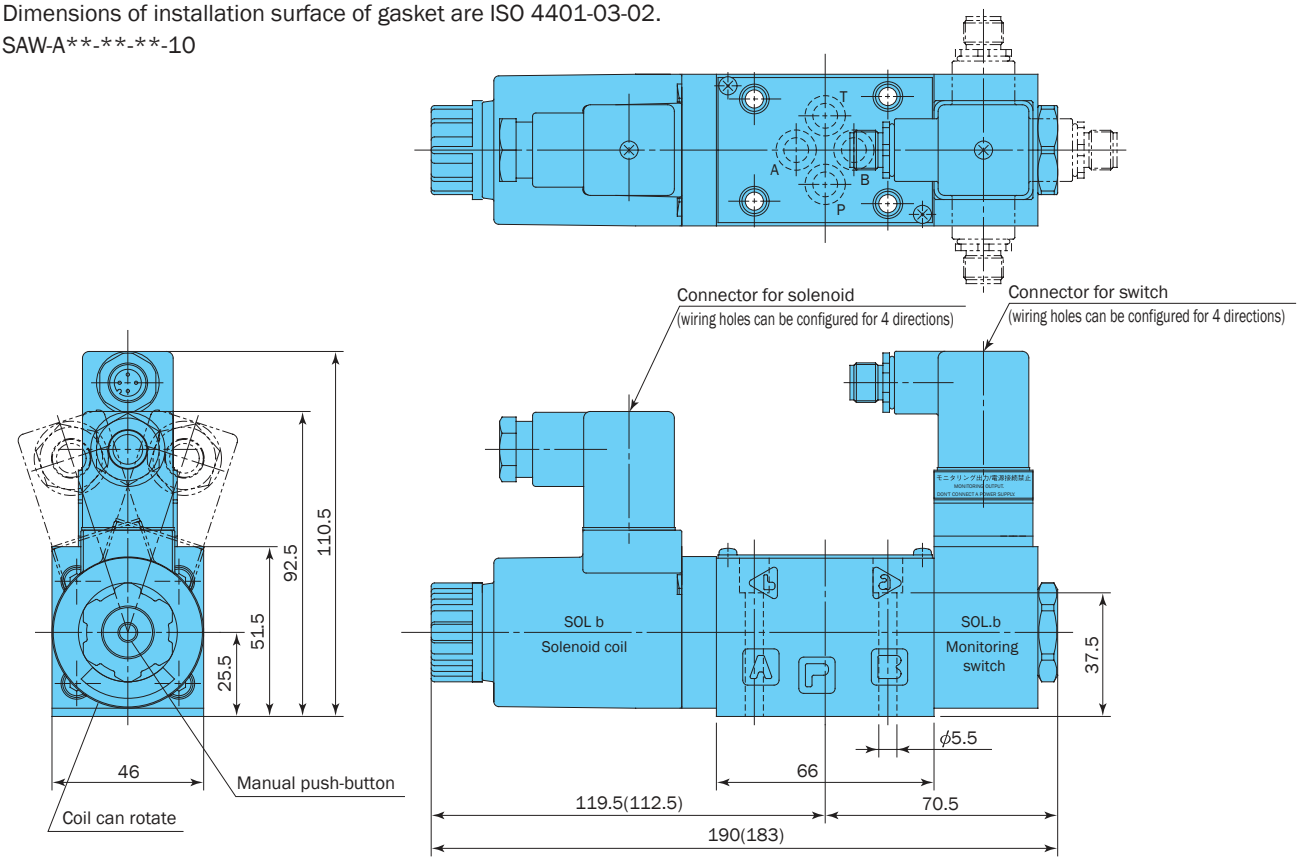
Directional control valve with monitoring switch (DIN connector type)

Note: See page D-7 for an explanation of the shockless type (option symbol F) and surgeless type (option symbol G).

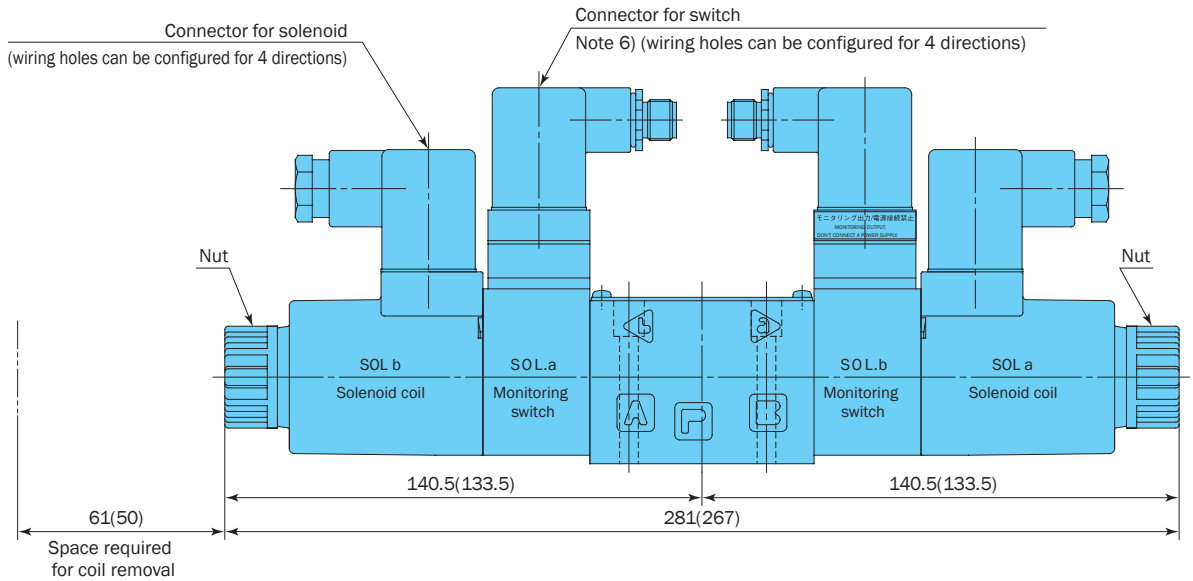
Installation Dimension Drawings

Dimensions of installation surface of gasket are ISO 4401-03-02.

SAW-A**-**-**-10



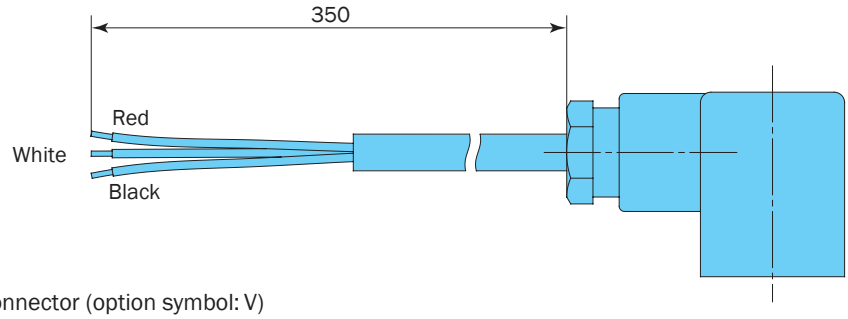
SAW-G01-C**-**-**-10



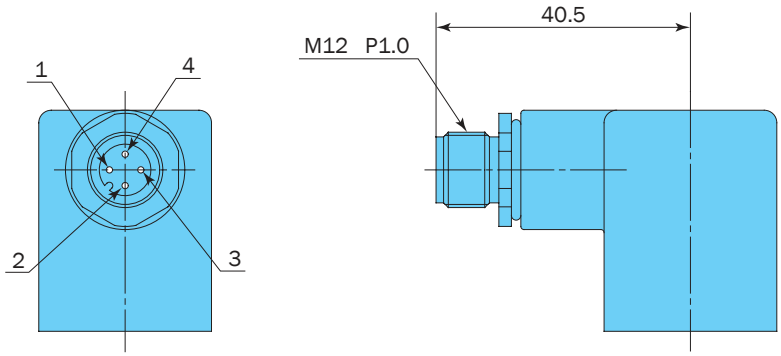
Note: 1. Dimensions in parentheses apply in the case of an AC solenoid.
2. For option symbol D (with cap to prevent manual operation), the nut for fixing coil is 5mm long. Include this length when calculating the total length of the valve.
3. The connector for the switch in the drawing above is the M12-4 pin connector. In addition there are wire connections also. See page D-67 for more detailed information.
4. The wiring hole for the connector is oriented as shown in the diagram for packaging purposes. The orientation can be changed according to the direction of the wiring.
5. Use surgeless directional control valves with monitoring switches for all electric valves on the same machine to prevent misoperation of the monitoring switch caused by noise when the solenoid turns on and off.
6. To orient the wiring hole for the connector for the switch towards the solenoid coil, loosen the nut and rotate the solenoid coil so the connector for the switch does not interfere with the connector for the solenoid.

• Details about the Connector for the Switch

(1) With wiring (option symbol: none)

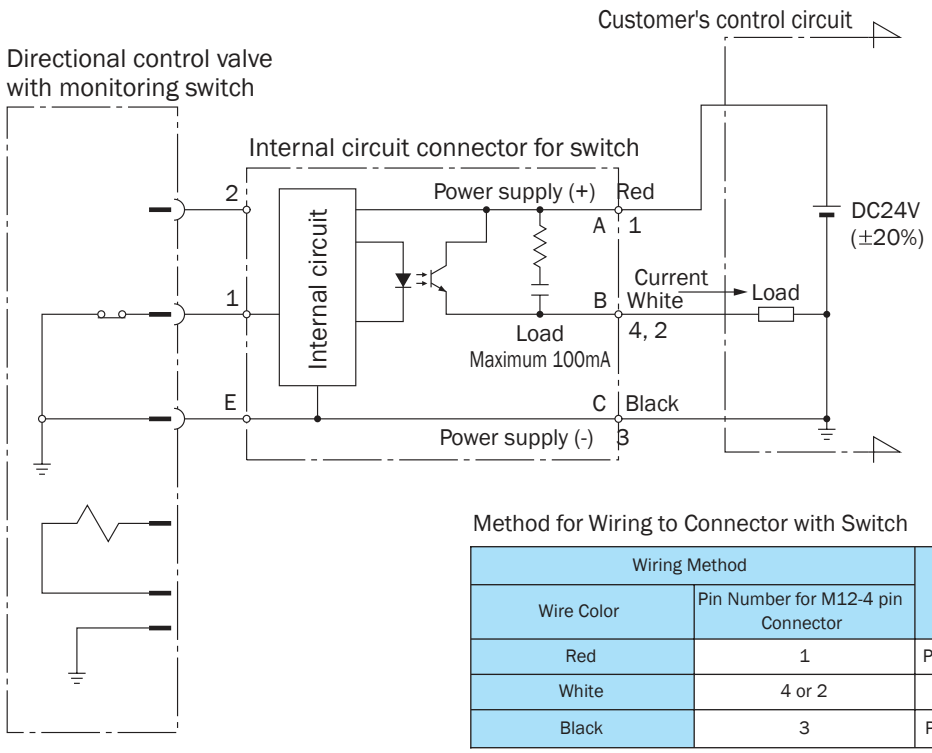


(2) With M12-4 pin connector (option symbol: V)



Note: 1. The pin connector is screwed to the housing so it is rotated a certain amount compared to the drawing.
Refer to the electrical circuit diagram below for how to connect it.
2. The connector that the M12-4 pin connector connects to is not provided.
(Example of connector with cable provided by customer: Omron XS2F-D421-D80-A)

(3) Electrical circuit diagram



Method for Wiring to Connector with Switch

Wiring Method		Connection
Wire Color	Pin Number for M12-4 pin Connector	
Red	1	Power supply (+)
White	4 or 2	Load
Black	3	Power supply (-)

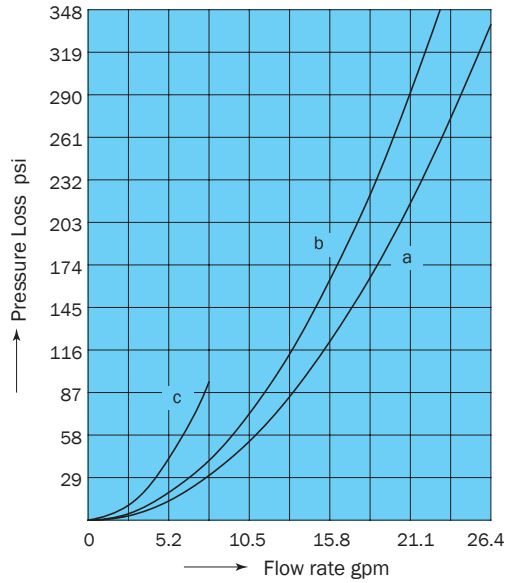
Note: 3. Always install a diode to prevent surges in the current when connecting an inductive load, such as a relay, to the monitoring switch.
4. Do not modify or replace the lead wires.
5. Connect the load for the M12-4 pin connector to either pin number 4 or 2.
6. When connecting monitoring switches in sequence, use the negative (-) common mode (type that current runs to sequence side).

Performance Curves

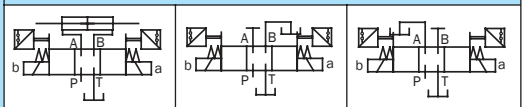
Hydraulic Operating Fluid Viscosity 32 centistokes

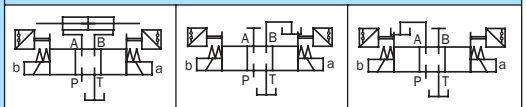
Pressure Loss Characteristics

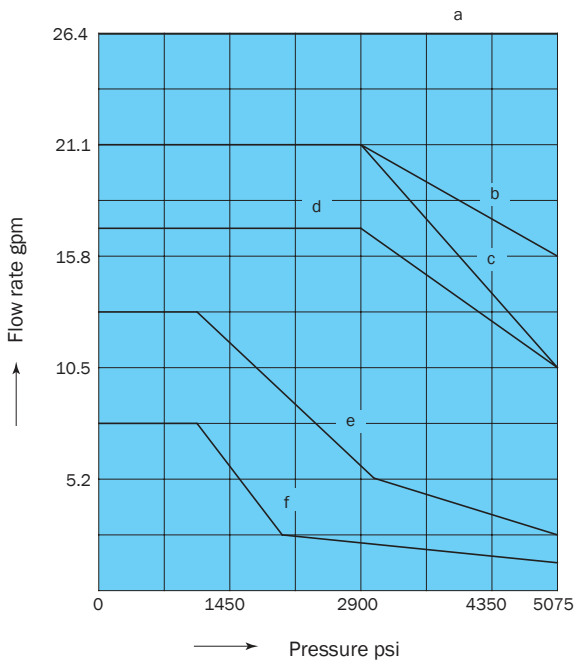
Operation Symbol	P → A	P → B	A → T	B → T
A2X	c	c	—	—
A3X	b	b	b	b
A5	—	b	b	—
C1	b	b	a	b
C5	b	b	b	b
C6	b	b	a	a
C1S	b	b	b	b
C6S	b	b	b	b

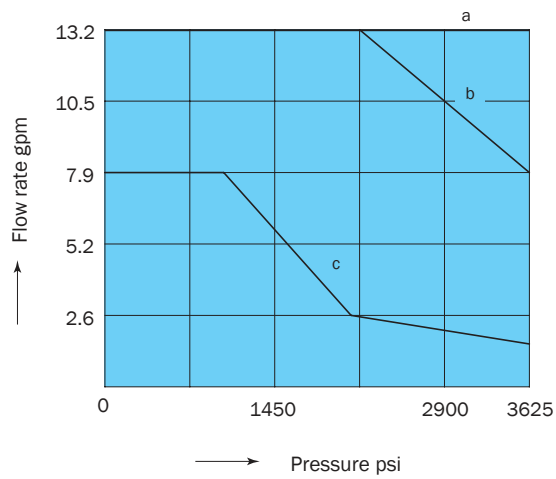


Pressure – Flow Volume Allowable Value

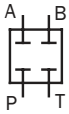
Operation Symbol	Standard Form, with AC, DC solenoid		
			
A2X	—	f	f
A3X	b	f	f
A5	a	—	e
C1	AC SOL. d DC SOL. c	e	e
C5	a	e	e
C6	AC SOL. d DC SOL. c	e	e
C1S	a	e	e
C6S	a	e	e

Operation Symbol	Shockless Type, with DC solenoid		
			
A2X	—	c	c
A3X	a	c	c
A5	a	—	c
C1	b	c	c
C5	a	c	c
C6	b	c	c
C1S	a	c	c
C6S	a	c	c



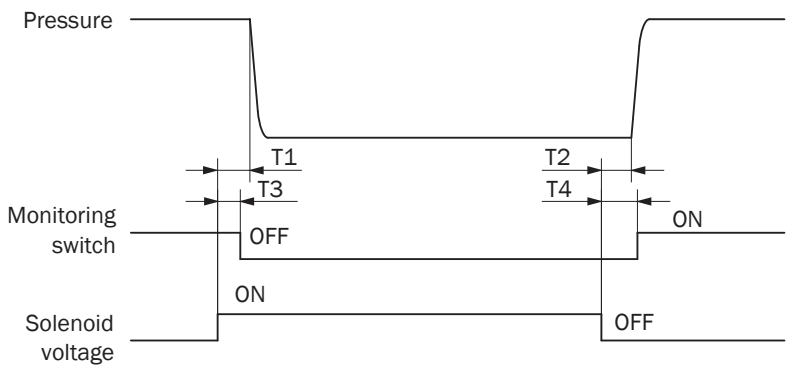


Range of Motion of Switch

Positions		Stroke of Spool		
		SOL.b ON	Center	SOL.a ON
Flow Path				
Motion of Switch	SOL.b Monitoring Switch	OFF	ON	
	SOL.a Monitoring Switch	ON		OFF

Note: 1. Flow path is C5 type (all-port-block), other flow paths also activate switch in middle position.
2. ON and OFF indicate the state of the output transistor on the circuit board in the connector.

Switching Responsiveness

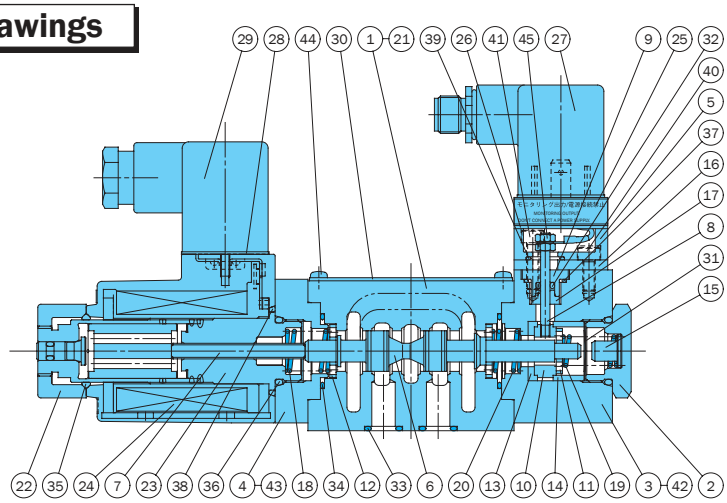


Type of Machine		Model	Response Time (s)			
			Pressure		Switch	
			T1	T2	T3	T4
AC Solenoid		SAW-G01-C5-GR-C1-10	0.02 to 0.03	0.02 to 0.03	0.01 to T1	T2 to 0.05
DC Solenoid	Standard Type	SAW-G01-C5-GR-D2-10	0.03 to 0.04	0.02 to 0.04	0.01 to T1	T2 to 0.06
	Built-in Rectifier	SAW-G01-E1-10	0.03 to 0.04	0.07 to 0.10	0.01 to T1	T2 to 0.15
	Shockless Type	SAW-G01-C5-FGR-D2-10	0.07 to 0.10	0.04 to 0.07	0.02 to T1	T2 to 0.10
	Built-in Rectifier Type Shockless Type	SAW-G01-C5-F-E1-10	0.07 to 0.10	0.10 to 0.15	0.02 to T1	T2 to 0.20

Note: May vary depending on switching response time and operating conditions (pressure, flow rate, and oil temperature).
[Measurement Conditions]
Pressure 2030 psi
Flow Rate 7.9 gpm
Operating fluid ISO VG32 104° F

Cross-sectional Drawings

SAW-G01-A**-**-**-10



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	16	Plate (connector)	31	Wave washer
2	Plug	17	Collar (insulated)	32	O-ring *
3	Cover (switch)	18	Spring (one SOL. guide side)	33	O-ring *
4	Cover (one SOL.)	19	Spring (one SOL. contact side)	34	O-ring *
5	Cover (connector)	20	Spring (main unit)	35	O-ring *
6	Spool	21	Spacer	36	O-ring *
7	Rod (guide)	22	Nut	37	O-ring *
8	Rod (conductor)	23	Solenoid guide	38	O-ring *
9	Bush (insulated)	24	Solenoid coil	39	O-ring *
10	Retainer (fixed contact)	25	Connector with lead wire	40	Hexagon socket head bolt
11	Retainer (movable contact)	26	Packing	41	Hexagon socket head bolt
12	Retainer (main unit)	27	Connector with built-in photo-coupler	42	Hexagon socket head bolt
13	Ring (insulation inside)	28	Connector packing	43	Hexagon socket head bolt
14	Ring (insulation outside)	29	Connector	44	Philips pan head screw
15	Stopper	30	Nameplate	45	Hexagon nut

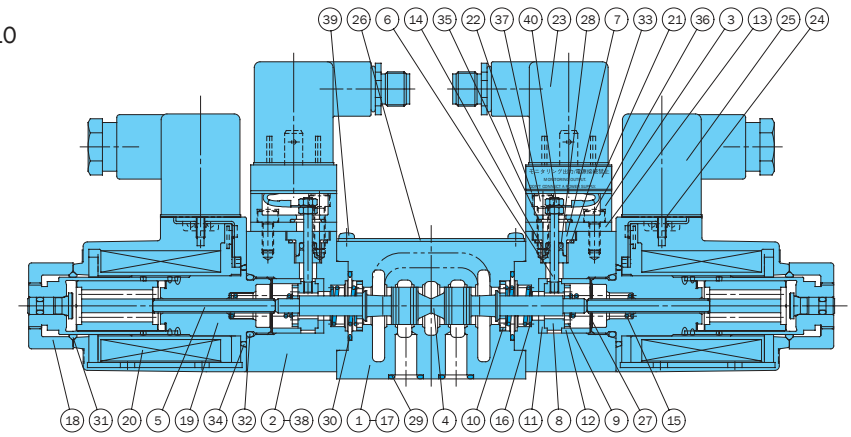
For details about parts marked with an asterisk "*", refer to the list of seals in the table on the right.

Seal Part List (Kit Model Number EQS-01A)

Part No.	Part Name	Part Number	Q'ty
32	O-ring	1B-P3	1
33	O-ring	AS568-012 (Hs90)	4
34	O-ring	AS568-019 (Hs90)	2
35	O-ring	1A-P20	1
36	O-ring	1B-P18	2
37	O-ring	S-11.2 (Hs90)	1
38	O-ring	S25 (Hs70)	1
39	O-ring	S-9 (Hs70)	1

Note: 1A and 1B are JIS Standard B 2401, while AS568 is SAE standard.

SAW-G01-C**-**-**-10



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	16	Spring (main unit)	31	O-ring *
2	Cover (sensor)	17	Spacer	32	O-ring *
3	Cover (connector)	18	Nut	33	O-ring *
4	Spool	19	Solenoid guide	34	O-ring *
5	Rod (DC guide)	20	Solenoid coil	35	O-ring *
6	Rod (conductor)	21	Connector with lead wire	36	Hexagon socket head bolt
7	Bush (insulated)	22	Packing	37	Hexagon socket head bolt
8	Retainer (fixed contact)	23	Connector with built-in photo-coupler	38	Hexagon socket head bolt
9	Retainer (movable contact)	24	Connector packing	39	Philips pan head screw
10	Retainer (main unit)	25	Connector	40	Hexagon nut
11	Ring (insulation inside)	26	Nameplate		
12	Ring (insulation outside)	27	Wave washer		
13	Plate (connector)	28	O-ring *		
14	Collar (insulated)	29	O-ring *		
15	Spring (one SOL. contact side)	30	O-ring *		

For details about parts marked with an asterisk "*", refer to the list of seals in the table on the right.

Seal Part List (Kit Model Number EQS-01C)

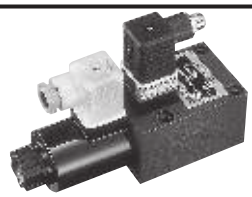
Part No.	Part Name	Part Number	Q'ty
28	O-ring	1B-P3	2
29	O-ring	AS568-012 (Hs90)	4
30	O-ring	AS568-019 (Hs90)	2
31	O-ring	1A-P20	2
32	O-ring	1B-P18	2
33	O-ring	S-11.2 (Hs90)	2
34	O-ring	S-25 (Hs70)	2
35	O-ring	S-9 (Hs70)	2

Note: 1A and 1B are JIS Standard B 2401, while AS568 is SAE standard.

POPPET TYPE SOLENOID VALVE WITH MONITORING SWITCH

SCW Series
Poppet Type Directional Control Valve with Monitoring Switch

13.2 gpm
3045 psi

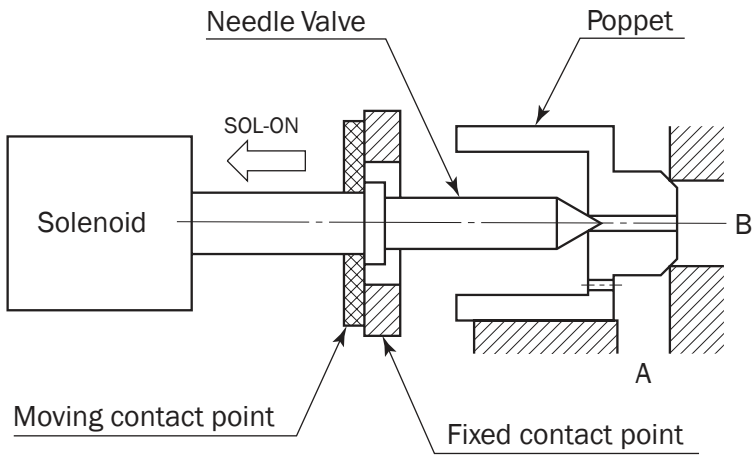


Features

This valve is a poppet activated directional control valve that uses mechanical detection to operate a switch to send an electric ON/OFF signal. This makes it possible, by monitoring the status of the spool operations, to use it as an information source for safety checks by using the ON/OFF signal as a basis for sequence control. In the future, they will be used in machinery that is compatible with international machine safety (ISO 12100) and JIS standards (JIS B 9700) standards.
The poppet type directional control valve with monitoring switch was developed as a valve to support this demand.
The switch contact has little dead zone and almost no temperature drift (variable motion caused by changes in temperature) or hysteresis because the reaction of the poppet action is mechanical.
All valve functions, except for the monitoring function, are equivalent to the standard poppet type directional control valve.
DIN connectors are used for the switches and solenoid coil wiring so connections are easy when installing or replacing valves.

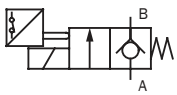
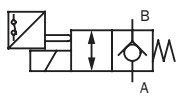
Operational Principle

When the needle valve is in the center position, the fixed and moving parts are in contact forming an electric circuit. The solenoid turns on, the needle valve operates so there is no circuit between the fixed and moving parts.



Specifications

• Valve Specifications

Operation Symbol		-AR-	-ARC-
JIS Symbol			
Maximum Working Pressure (A, B ports)		3045 psi	
Maximum Flow Rate	A → B	13.2 gpm	13.2 gpm
	B → A	——	
Cracking Pressure of Check Valve		29 psi	
Switching Frequency		120/minute	
Weight		5 lbs	
Operating Environment	Dust Resistance/Water Resistance Rank	JIS C 0920 IP65	
	Operating Fluid	Oil-based operating fluid (Note 1)	
	Ambient Temperature Range	-4 to 122° F	
	Operating Fluid Temperature Range	-4 to 158° F	
	Operating Viscosity Range	15 to 300 centistokes	
	Filtration	10µm or less	
Mounting bolt (Note2)	Size × Length	Socket hex head bolt (grade 8 equivalent) 10-24 x 1 3/4	
	Tightening Torque	7.3 to 9.5 ft lbs	

Note: 1. Use a pe troleum based operating fluid because the ON/OFF mechanism of the valve's monitoring switch is immersed in oil and the oil must be a non-conducting fluid.
Use only petroleum based operating fluid (do not use fluids that are water, glycol, W/O emulsion, phosphate, or fatty ester based).
Petroleum based operating fluids must also have a water content that is less than 0.1% by volume.
2. Installation bolts are provided with valves.

• Monitoring Switch Specifications

Voltage Rating	24VDC
Allowable Voltage Range	± 20% of voltage rating
Maximum Current Load	100mA
Residual Voltage (Note 3)	Max. 1.2V
Wiring for Connector for Switch	Connect with wires or M12-4 pin connector

Note: 1. See page D-74 for the procedure to wire the connector for the switch.
2. The programmable controller input circuits are positive (+) common mode and negative (-) common mode.
The directional control valve with monitoring switch uses a source circuit [switch on the positive (+) side of the load and power source] for safety purposes.
Because of this, it is necessary to use a negative (-) common mode programmable controller to receive input from the monitoring switch output.
3. Set the voltage of the power supply to the monitoring switch within a range that satisfies the following conditions.
Load ON voltage + residual voltage ≦ switch supply voltage ≦ 28.8 V (+20% voltage rating)
4. The switch element (photocoupler) in the connector's internal circuit for the monitoring switch may malfunction in the ON state because of over voltage or over current.
Therefore, in addition to checking the ON output of the monitoring switch, monitor the current at the solenoid and the internal circuits of the connector and valve in conjunction with the switch output.

Condition of monitoring switch output and valve

		Current to Solenoid		
		ON	OFF	
Monitoring Switch Output	ON	Abnormal Malfunction at internal circuit of connector or valve	Normal Needle valve returns to middle position	
	OFF	Normal Needle valve is switching	Pressure from A port (Closed)	Abnormal Valve malfunction or signal wire is cut
			Pressure from B port (Flows from B → A port)	Normal Poppet opens and needle valve operates

The monitoring switch outputs according to the motion of the spool, so the solenoid turns on and off according to the output signal which is delayed only as much as the spool operation is delayed.
Set a 0.3 second delay, including leeway, to monitor the output of the switch.

• Solenoid Specifications
Same specifications as the SA-G01 series (31 design).

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)
DC with Built-in Rectifier	E1	AC100	50/60	EAC64-E1-1A	0.31		27	90 to 110
	E115	AC110	50/60	EAC64-E115-1A	0.26		25	100 to 125
		AC115			0.27		27	
	E2	AC200	50/60	EAC64-E2-1A	0.15		26	180 to 220
	E230	AC220	50/60	EAC64-E230-1A	0.12		24	200 to 250
		AC230			0.13		27	
DC	D1	DC12	—	EAC64-D1-1A	2.2		26	10.8 to 13.2
	D2	DC24	—	EAC64-D2-1A	1.1		26	21.6 to 26.4

• Handling

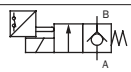
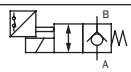
1 Do not allow abnormal surges greater than the maximum operating pressure to occur because pressure from the B port is used for the solenoid.
2 Always keep the operating fluid clean. Allowable contamination is class NAS12 or less.
3 Use a ISO VG 32 petroleum-based operating fluid, or an equivalent, that has a water content that is less than 0.1% by volume.
4 Do not use fire-resistant operating fluid.
5 Use this valve only within the allowable voltage range.
6 The only way to prevent misoperation of the monitoring switch caused by noise generated by the solenoid turning on and off is to install the surgeless directional control valve with monitoring switch (option symbol: GR). (If the solenoid power source is C* and D*)
7 Use surgeless specification (with varistor diode) directional control valves with monitoring switches for all electric valves on the same machine to prevent misoperation of the monitoring switch caused by noise when the solenoid turns on and off.
8 The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.
9 The connector for the solenoid is the same as for the SA series solenoid valve. See page D-22 for electrical circuit drawings and wiring procedures.
10 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs	Dimension Drawings Page
MSA-03-E10	3/8	3625	11.8	5	D-21
MSA-03X-E10	1/2		21.1		
MSA-03-T-E10	3/8		11.8	8.3	H-4
MSA-03X-T-E10	1/2		21.1		

Understanding Model Numbers

SCW – G 03 – ARC – GR V – D2 – J10

- Poppet type directional control valve with monitoring switch
- Mounting method
  G: Cascade mounting
- Nominal diameter
  03 size (D05)
- Operation Symbol

AR		When SOL. is ON does not flow from B →A.
ARC		When SOL. is ON flows both from A →B and B →A

- Option symbols
  None: No options (available with power supply E*)
  GR : Surgeless type, with indicator light (must be installed with power supply D*)
  R : With indicator light (available with power supply E*)

Possible option symbol combinations

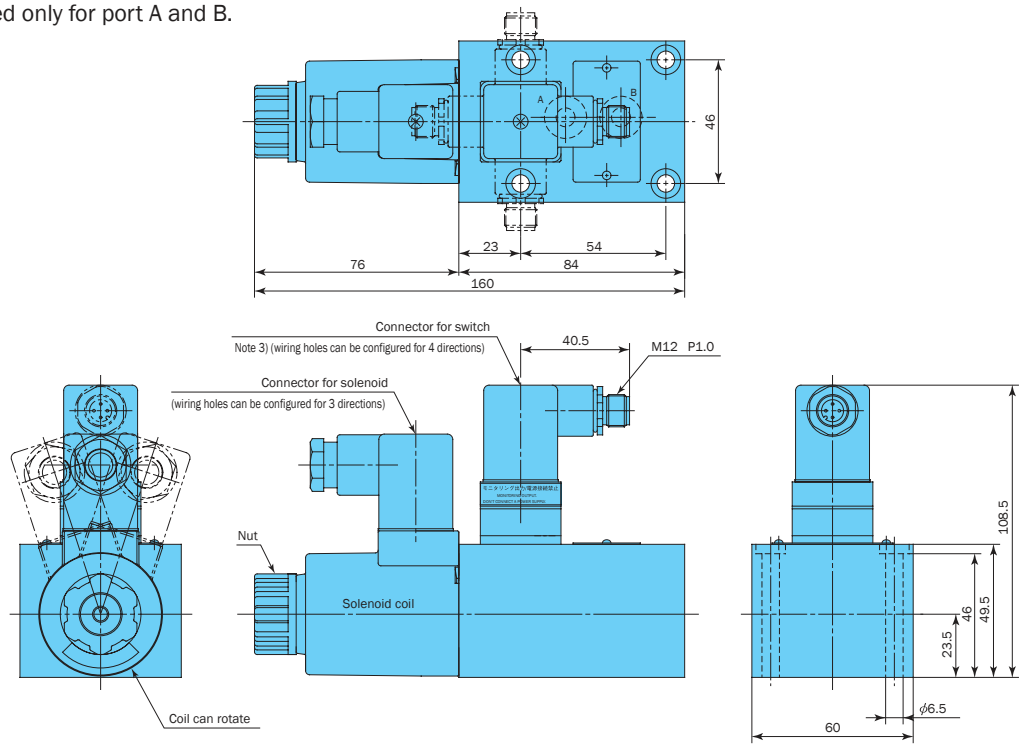
Power Supply	Option Symbols
D*	GR
E*	None, R

Note:
The only way to prevent misoperation of the monitoring switch caused by noise generated by the solenoid turning on and off is to install the surgeless directional control valve with monitoring switch.
(Power supply E is the standard surgeless type, option symbol G is not needed.)

- Wiring for connector for switch
  None: With 350mm wire
  V : With M12-4 pin connector
  (Example of connector with cable provided by customer: Omron XS2F-D421-D80-A)
- Solenoid power supply
  D1: DC12V D2 : DC24V
  E1: AC100V 50/60Hz E115: AC110/115V 50/60Hz
  E2: AC200V 50/60Hz E230: AC220/230V 50/60Hz
- Design number

Installation Dimension Drawings

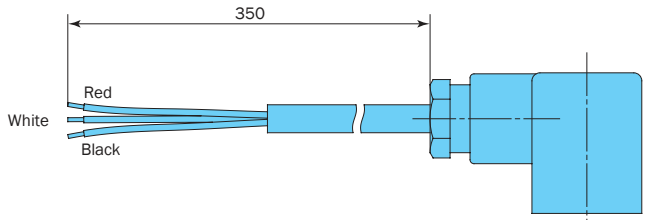
Dimensions of installation surface of gasket are ISO 4401-05-04.
However, used only for port A and B.



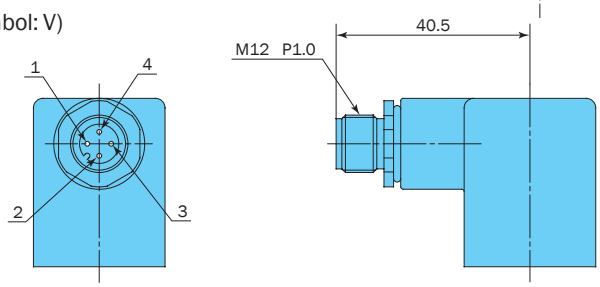
Note: 1. The connector for the switch in the drawing above is the M12-4 pin connector. In addition there are wire connections also.
See page D-74 for more detailed information.
2. Use surgeless directional control valves with monitoring switches for all electric valves on the same machine to prevent misoperation of the monitoring switch caused by noise when the solenoid turns on and off.
3. To orient the wiring hole for the connector for the switch towards the solenoid coil, loosen the nut and rotate the solenoid coil so the connector for the switch does not interfere with the connector for the solenoid.

• Details about the Connector for the Switch

(1) With wiring (option symbol: none)

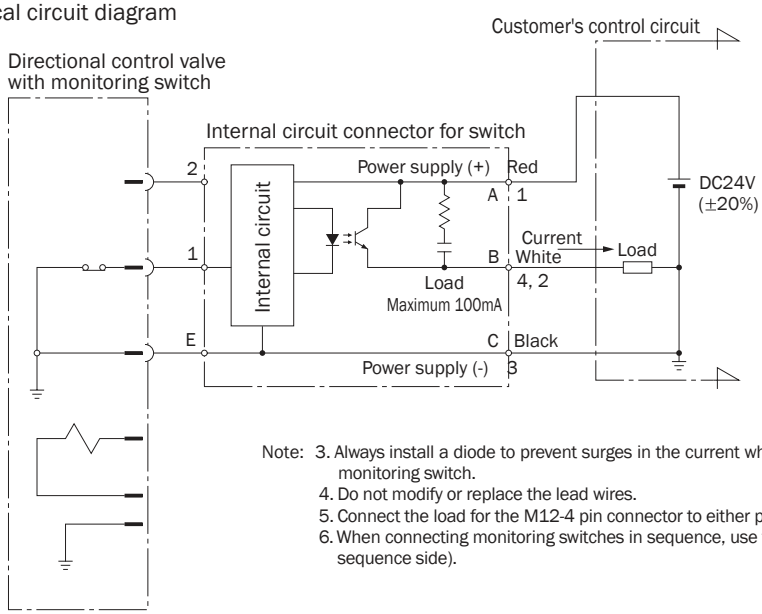


(2) With M12-4 pin connector (option symbol: V)



Note: 1. The pin connector is screwed to the housing so it is rotated a certain amount compared to the drawing. Refer to the electrical circuit diagram below for how to connect it.
2. The connector that the M12-4 pin connector connects to is not provided. (Example of connector with cable provided by customer: Omron XS2F-D421-D80-A)

(3) Electrical circuit diagram



Method for Wiring to Connector with Switch

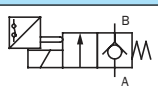
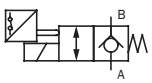
Wiring Method		Connection
Wire Color	Pin Number for M12-4 pin Connector	
Red	1	Power supply (+)
White	4 or 2	Load
Black	3	Power supply (-)

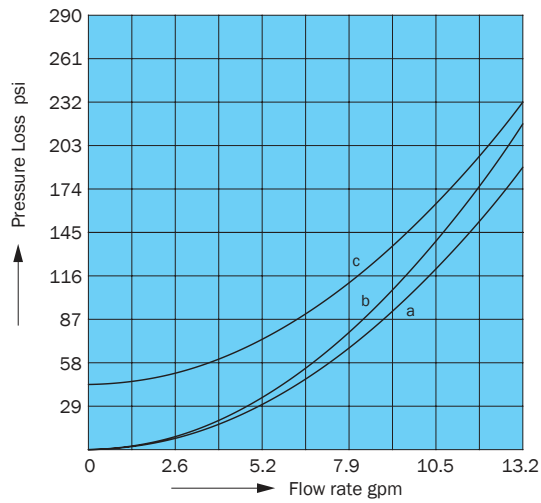
Note: 3. Always install a diode to prevent surges in the current when connecting an inductive load, such as a relay, to the monitoring switch.
4. Do not modify or replace the lead wires.
5. Connect the load for the M12-4 pin connector to either pin number 4 or 2.
6. When connecting monitoring switches in sequence, use the negative (-) common mode (type that current runs to sequence side).

Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

Operation Symbol	JIS Symbol	SOL OFF B → A	SOL ON A → B	SOL ON B → A
AR		c	a	—
ARC		c	a	b

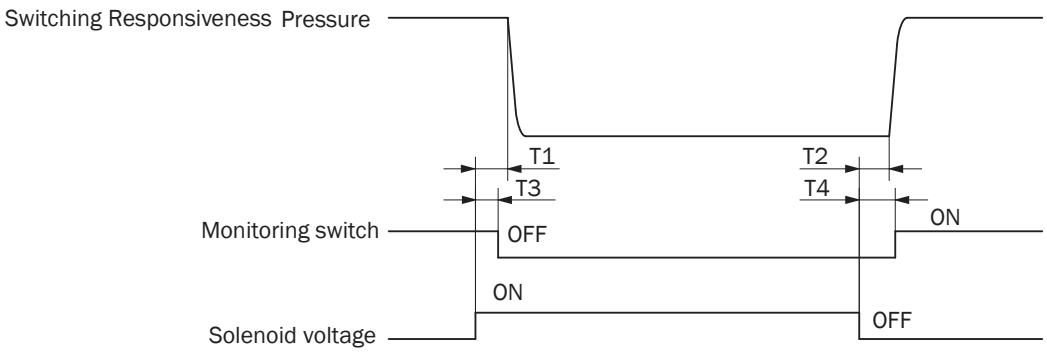


Range of Motion of Switch

Positions	Stroke of Poppet: SOL. ON	Switching Transition	Center
Flow Path			
Motion of Switch	OFF		ON

Note: 1. Internal leak exists at  of switching transition period.

2. ON and OFF indicate the state of the output transistor on the circuit board in the connector.

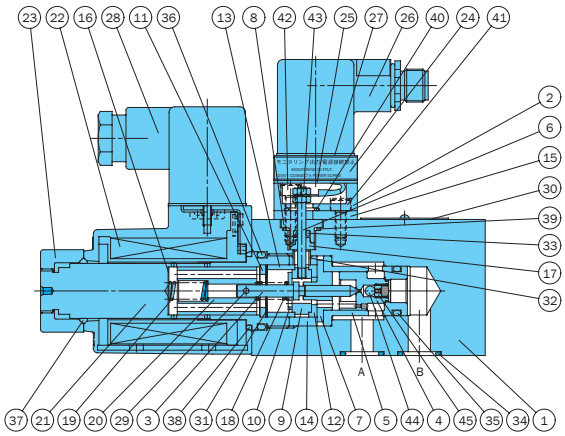


[Measurement Conditions]
Pressure 2030 psi
Flow Rate 7.9 gpm
Operating fluid ISO VG32 100° F

Type of Machine	Model	Response Time (s)			
		Pressure		Switch	
		T1	T2	T3	T4
DC Solenoid	SCW-G03-AR-GR-D2-J10	0.03 to 0.04	0.02 to 0.03	0.01 to T1	T2 to 0.05
DC Solenoid with Built-in Rectifier	SCW-G03-AR-E1-J10	0.03 to 0.04	0.08 to 0.11	0.01 to T1	T2 to 0.20

Note: May vary depending on switching response time and operating conditions (pressure, flow rate, and oil temperature).

Cross-sectional Drawing



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	16	Spacer (sealing prevention)	31	Wave washer
2	Cover (connector)	17	Collar (insulated)	32	Spacer (ring rotation prevention)
3	Needle Valve	18	Spring (contact side)	33	O-ring *
4	Poppet	19	Spring (guide side)	34	O-ring *
5	Sleeve	20	Solenoid plunger	35	O-ring *
6	Rod (conductor)	21	Solenoid guide	36	O-ring *
7	Bush (needle valve support)	22	Solenoid coil	37	O-ring *
8	Bush (insulated)	23	Nut	38	O-ring *
9	Retainer (fixed contact)	24	Connector with lead wire	39	O-ring *
10	Retainer (movable contact)	25	Packing	40	O-ring *
11	Retainer (flange side)	26	Connector with built-in photo-coupler	41	Hexagon socket head bolt
12	Ring (insulation inside)	27	Connector packing	42	Hexagon socket head bolt
13	Ring (insulation outside)	28	Connector	43	Hexagon nut
14	Ring (fixed by sleeve)	29	Parallel pin	44	Steel ball ★
15	Plate (connector)	30	Nameplate	45	Set screw ★

Seal Part List (Kit Model Number EQS-SC)

Part No.	Part Name	Part Number	Q'ty
33	O-ring	1B-P3	1
34	O-ring	AS568-014 (Hs90)	2
35	O-ring	1B-P14	2
36	O-ring	AS568-119 (Hs90)	1
37	O-ring	1A-P20	1
38	O-ring	S-25 (Hs70)	1
39	O-ring	S-11.2 (Hs9)	1
40	O-ring	S-9 (Hs70)	1

Note) 1A and 1B are JIS Standard B 2401, while AS568 is SAE standard.

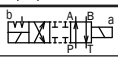
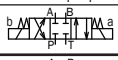
Note: 1. For details about parts marked with an asterisk "*", refer to the list of seals in the table on the right.
2. Products marked with a ★ use only SCW-G03-ARC-**-**-J10 and do not use SCW-G03-AR-**-**-J10.

SK-G01 Series
Wet Type Solenoid Valve

Features

- High pressure, large capacity with minimal pressure loss
- High dust and water resistance (JIS C 0920 IP67)
- High vibration proof (JIS D 1601 3 D Grade 90 Division 400)
- Shockless type available (Option: F)
- Diode built in coil available (Option: G)
- Low switching noise and very long life

Specifications

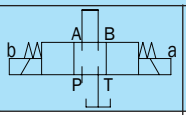
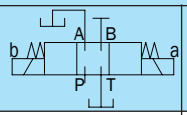
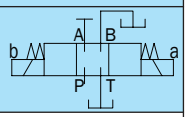
Model Number		SK-G01			
		Standard Type		Shockless Type	
JIS Symbol	Operation	Maximum Flow Rate L/min(gpm)	Maximum Working Pressure MPa(psi)	Maximum Flow Rate L/min(gpm)	Maximum Working Pressure MPa(psi)
	A3X	80 (21.1)	35 (5075)	50.0 (13.2)	25 (3625)
	H3X				
	E3X	100 (26.4)			
	C5				
	C6	80 (21.1)			
	C4	50.0 (13.2)			
	C7Y			40 (10.6)	

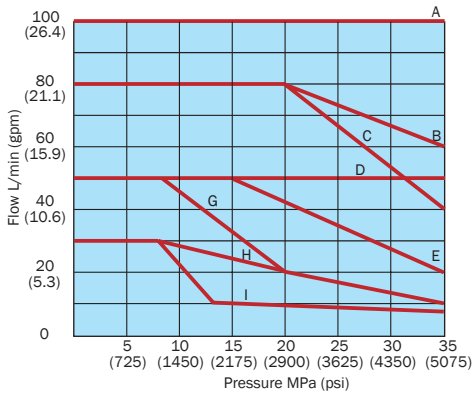
Maximum Working Pressure MPa(psi) P, A, B ports	Standard Type	35 (5075)
	Shockless Type	25 (3625)
Maximum Allowable Back Pressure MPa(psi) T port	Standard Type	21 (3045)
	Shockless Type	
Switches/min	Standard Type	120
	Shockless Type	
Option	Shockless	F
	Surgeless (Diode built in coil)	G
Weight kg (lbs)	Double solenoid	2.0 (4.41)
	Single solenoid	1.5 (3.31)
Operating Environment	Dust Resistance/Water Resistance Rank	JIS C 0920 IP67
	Vibration Proof	JIS D 1601 3 D Grade 90 Division 400
	Ambient Temperature	-30~+50°C (-22~+122°F)
Operating Fluid	Temperature Range	-25~+80°C (-13~+176°F)
	Viscosity Range	15~300mm²/s(cSt)
	Filtration	10 μm or less
Mounting Bolts	Size x Length	M5x45 or #10x1 3/4, four bolts Hexagon socket head bolts 10-24 x 1 3/4
	Tightening Torque	5~7N•m (3.69~5.16lbf•ft)

Note: 1. Maximum operating pressure depends on the valve type. For details, see "Permissible pressure-flow rate values."
2. A protective cover is recommended to avoid splashing the valve directly.
3. For mounting bolts, use grade 8.
4. Mounting bolts are not included.

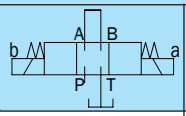
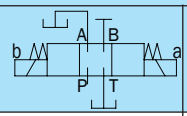
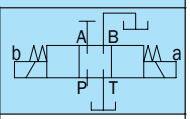
Permissible Pressure-Flow Rate Values

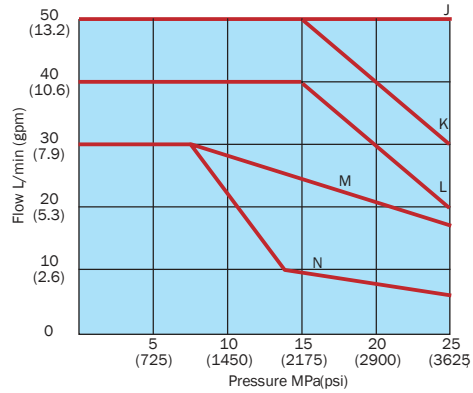
• Standard type

Type	Standard Type		
Operation Example / Operation Symbol			
A3X	B	I	I
H3X	B	I	I
E3X	A	H	H
C4	D	D	D
C5	A	G	G
C6	C	G	G
C7Y	E	I	I

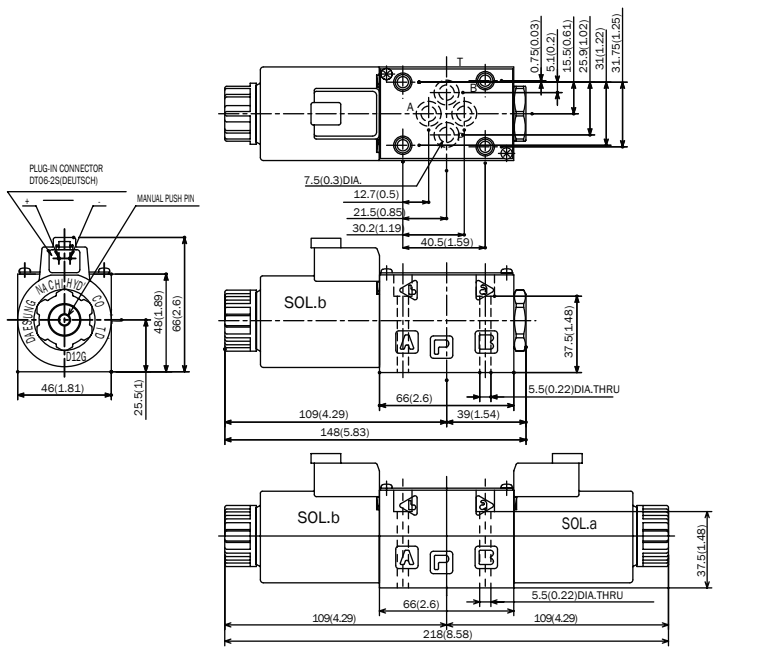


• Shockless type

Type	Shockless Type		
Operation Example / Operation Symbol			
A3X	J	N	N
H3X	J	N	N
E3X	J	M	M
C4	J	J	J
C5	J	N	N
C6	K	N	N
C7Y	L	N	N



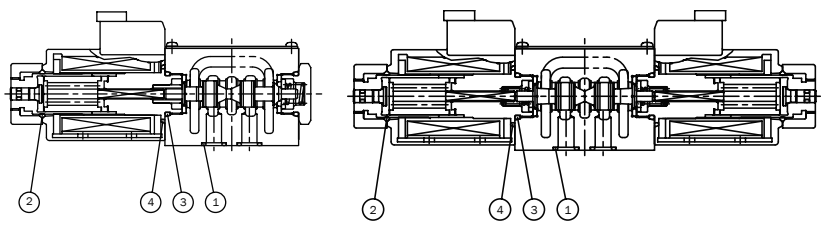
Dimensional Drawings



Sealing Parts

Part No.	Part Name	Part No.	Quantity	
			Single Solenoid	Double Solenoid
1	O-ring	AS568-012(Hs90)	4	4
2	O-ring	1A-P20	1	2
3	O-ring	1B-P18	2	2
4	O-ring	S-25	1	2

Note: 1A and 1B are JIS Standard B 2401, while AS568 is SAE Standard.



DMA Type Manual Valve

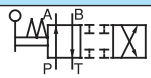
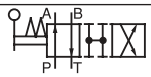
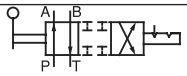
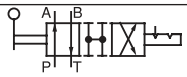
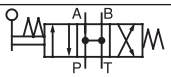
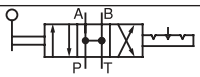
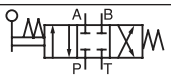
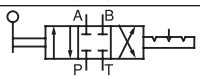
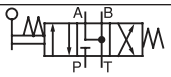
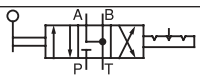
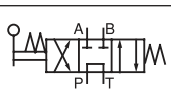
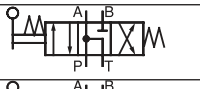
10.5 to 26.4 gpm
5075 psi

Features

The compact 01 and 03 sizes are perfect for small flow rate control.
Since a balanced type valve is used, there is no need for drain piping, and use with back pressures up to 2320 psi is possible.
Mounting methods are the same as SAG01/03, and the 01, 03 size modular the reaction of the poppet action is valve can be used, so circuit configuration is quick and easy.

Specifications

Model No.	Nominal Diameter (size)	Maximum Working Pressure psi	Tank Port Back Pressure psi	Maximum Flow Rate gpm	Spool Stroke (in)		Weight lbs
					2-position	3-position	
DMA-G01-***-20	1/8	5075	2320	10.5	.16	.16 × 2	2.8
DMA-G03-***-(J)20	3/8	3625		26.4	.24	.24 × 2	7.2

Positions	Type		JIS Symbol	Model No.	Maximum Working Pressure psi
2-position	Closed Cross			DMA- G01 G03 -A3X- 20 (J)20	5075
	Open Cross			DMA- G01 G03 -A3Z- 20 (J)20	
	Closed Cross			DMA- G01 G03 -E3X- 20 (J)20	
	Open Cross			DMA- G01 G03 -E3Z- 20 (J)20	
3-position	All Ports Open			DMA- G01 G03 -C4- 20 (J)20	
				DMA- G01 G03 -F4- 20 (J)20	
	All Parts Blocked			DMA- G01 G03 -C5- 20 (J)20	
				DMA- G01 G03 -F5- 20 (J)20	
	ABT Connection			DMA- G01 G03 -C6- 20 (J)20	
				DMA- G01 G03 -F6- 20 (J)20	
	PT Connection	Closed Cross		DMA- G01 G03 -C7X- 20 (J)20	3625
		Restricted Open Cross		DMA- G01 G03 -C7Y- 20 (J)20	
		Closed Cross		DMA- G01 G03 -F7X- 20 (J)20	
		Restricted Open Cross		DMA- G01 G03 -F7Y- 20 (J)20	
	PAT Connection			DMA- G01 G03 -C8- 20 (J)20	5075
				DMA- G01 G03 -F8- 20 (J)20	

• Handling

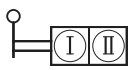
1 The following are the three types of lever operations.
- Spring Offset Type (Type A)
  The lever is normally kept in the end position by the spring. Raising the lever performs switching, and the lever returns to its original position when released.
- Spring Center Type (Type C)
  The spool is normally in the center of position 3. After switching to either end, the spring returns the lever to its center position when the lever is released.
- Detent Type (Type F, Type E)
  A notch at spool position 3 or as a stop.

2 Pressure loss is the same as that for the SAG01/G03, so see SA-G01/G03 for more information.

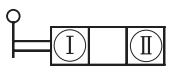
3 The lever mounting orientation can be positioned at 90° increments by changing the orientation of the lever side cover.

4 For PT connection type DMA-G01/G03 -*7*-(J)20, closed cross DMA-G01/G03-*7X-(J)20 is the standard type.

5 The relationship between the lever switching positions and JIS symbols is shown below. (See the installation dimension diagrams for symbols & I and & II .)



2-position



3-position

6 Mounting bolts are not included with the 01 size.

DMA-G01-***-20	10-24 x 1 3/4	4
DMA-G03-***-20	1/4-20 x 2 3/4	4

Note: For mounting bolts, use grade 8 or equivalent.

7 The following shows the sub plates.

Model No.	Pipe Diameter	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs	Applicable Valve Type
MSA-01Y-E10	3/8	3625	10.5	2.6	DMA-G01-***-20
MS-03-E30	3/8		10.5	5	DMA-G03-***-E10
MS-03X-E30	1/2		11.8		

These sub plates can also be used with SA (SS)-G01/G03, so see SA (SS)-G01/G03 for mounting methods.

Understanding Model Numbers

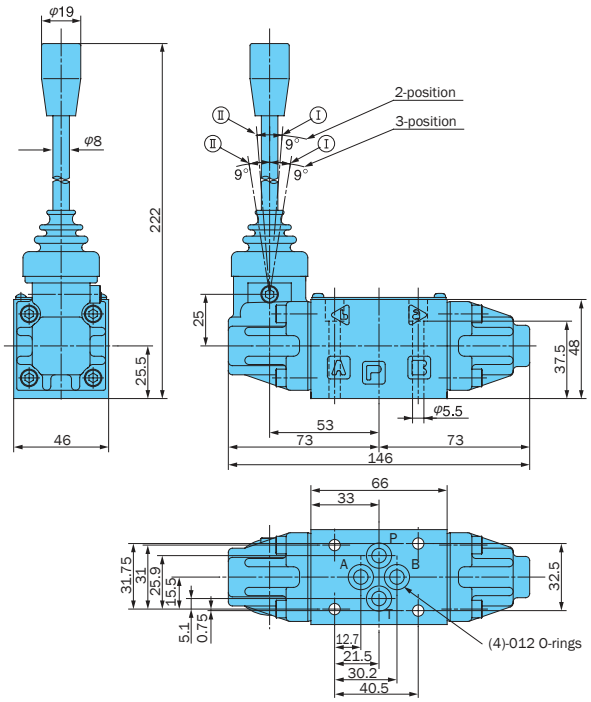
DMA – G 01 – A 3 X – 20

- Design number E20: G01, E10: G03
- Transition flow path (※3※, ※7※ only) X: Closed Y: Restrictor open Z: Open
- Center valve position flow path 3, 4, 5, 6, 7, 8
- Operation Method A: Spring offset type C: Spring center, E, F: Detent
- Nominal diameter 01, 03
- Mounting method G: Gasket type
- Manual valve (DMA type)

Installation Dimension Drawings

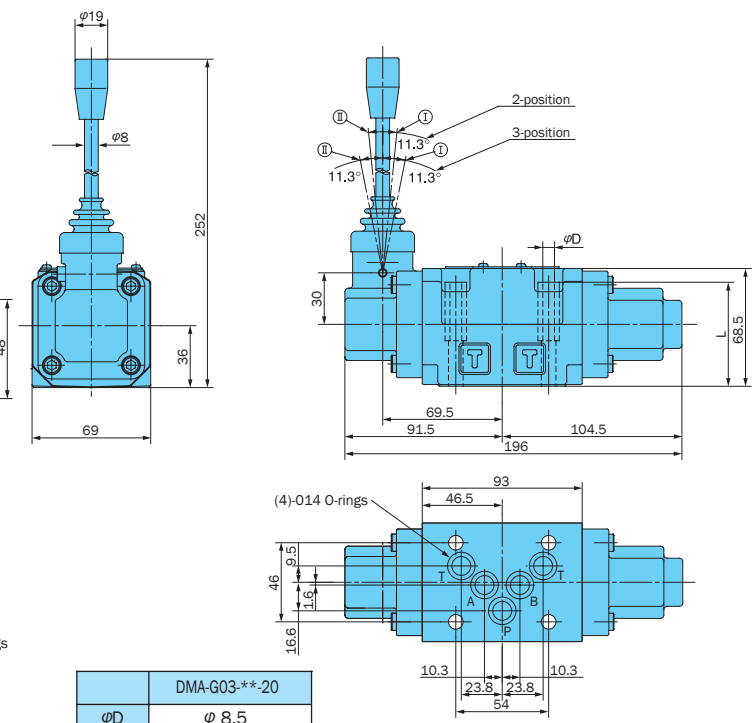
DMA-G01-*E-20 (D03)

Gasket Surface Dimensions (ISO 4401-03-02-0-94 JIS B8355 D-03-02-0-94)



DMA-G03-***-E-10 (D05)

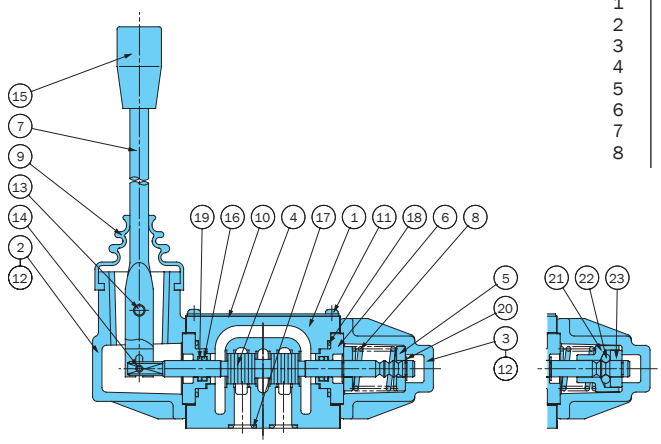
Gasket Surface Dimensions (ISO 4401-05-04-0-94 JIS B8355 D-05-04-0-94)



	DMA-G03-**-20
φD	φ 8.5
L	58

Cross-sectional Drawing

DMA-G01-***-20



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	9	Rod cover	17	O-ring
2	Cover A	10	Nameplate	18	O-ring
3	Cover B	11	Stopper screw	19	Backup ring
4	Spool	12	Screw	20	Snap ring
5	Ring	13	Screw	21	Guide
6	Bush	14	Pin	22	Ball
7	Lever	15	Knob	23	Retainer
8	Spring	16	O-ring		

Seal Part List

Part No.	Part Name	Model No.			
		DMA-G01	Q'ty	DMA-G03	Q'ty
16	O-ring	1A-P7	2	1A-P10	2
17	O-ring	AS568-012 (Hs90)	4	AS568-014(Hs90)	5
18	O-ring	AS568-019 (Hs90)	2	1B-P28	2
19	Backup ring	T2-P7	2	T2-P10	2

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Backup ring indicates JIS B2407-T2-**.

Modular Valve Series

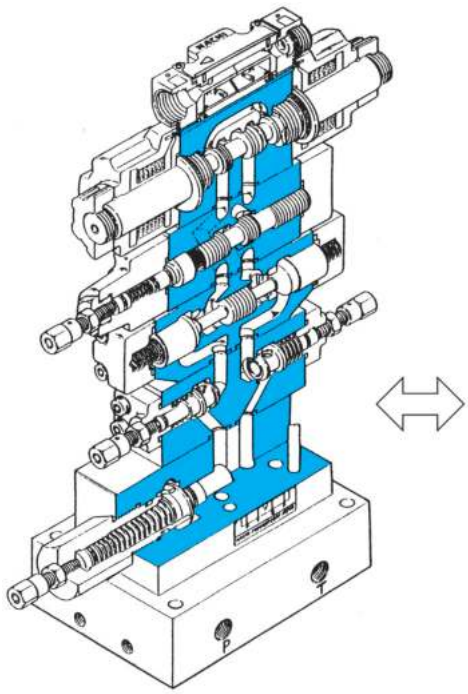
5.2 to 79 gpm
3000, 3600, 5000 psi

Overview

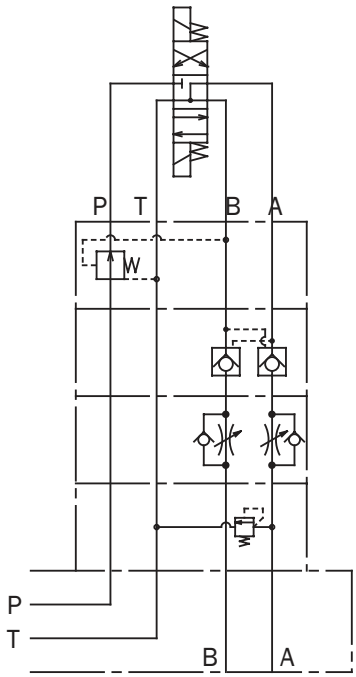
The modular valve is designed and engineered to integrate multiple hydraulic valve operations into a single unit, which eliminates the need for piping between valves and enables configuration of a circuit using a single modular valve. The result is an innovative valve system whose energy and materials efficiency provide advantages in terms of compact configuration, reliability, and more.
The illustrations below show one example of a circuit configuration using this system.

Features

1 High pressure and high volume.
Available maximum operating pressure operations are 3000, 3600, and 5000 psi, while maximum control flow rates are G01 13 gpm, G03 26 gpm, G04 79 gpm.
2 Ganging and bolting format allows for quick and easy circuit configuration as well as circuit changes and additions.
3 Compact module configurations greatly reduce space requirements.
4 Maintenance costs are also reduced because less piping and fewer couplings mean less need for acid rinsing and flushing of pipes.
5 Fewer fluid leak problems due to pipe resonance, noise, and loose couplings.
6 Circuit configuration is simple yet exact. Nameplates on the side of the valve show ISO codes that make it quick and easy to determine its performance.
7 A full lineup of models is available to meet a wide range of needs and circuit configurations: Model G01 (D03), G03 (D05), G04 (D07).



Integrated Structural Diagram



Integrated Circuit Diagram

Specifications

Name	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Gasket Surface Dimensions	Possible Number of Ganged Valves (Note 2)
01 Series	1/8	3600 (Note 1)	13	ISO 4401-03-02-0-94	1 to 4
03 Series	3/8	3600 (Note 1)	26	ISO 4401-05-04-0-94	1 to 4
04 Series	1/2	5000	79	ISO 4401-07-06-0-94	1 to 3 (Note 3)

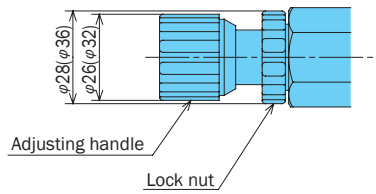
Note) 1. The M35 Series is available as a 5000 psi maximum operating pressure version of the 01 and 03 Series.
For details, see pages F92 and F93.
2. The number of ganged valves does not include solenoid valves.
3. Up to four valves can be ganged together if the maximum operating pressure is less than 3000 psi.

K Series Modular Valve

The valve shown in the photograph is available with nominal diameter 01 and 03 size adjusting bolts. Use the following format for specification.

Example: OCY–G01–W–Y–K–20

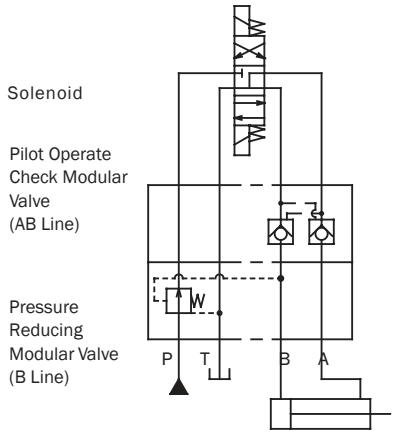
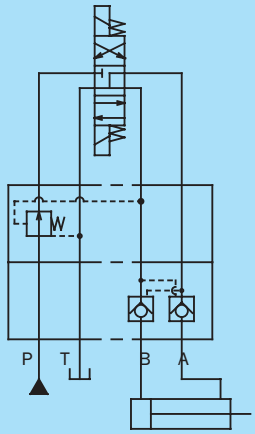
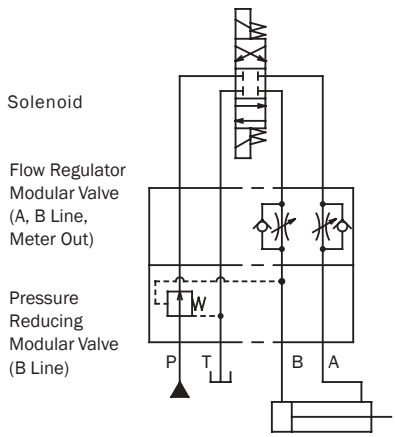
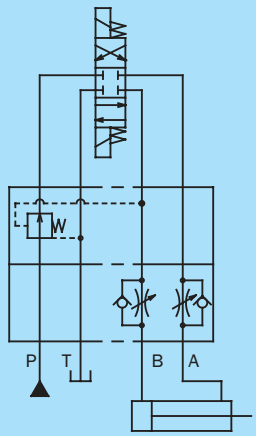
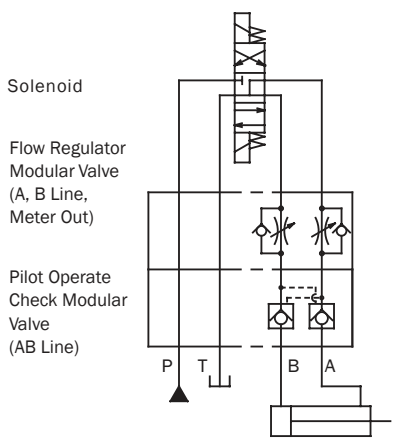
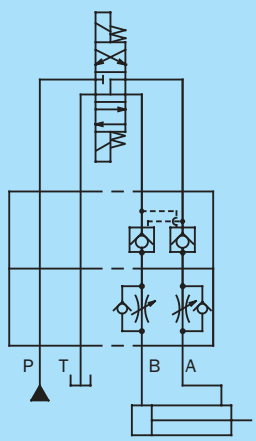
Auxiliary symbol
K: With handle



Dimensions in parentheses indicate nominal diameter 03.

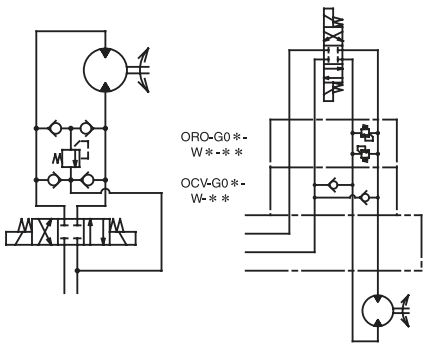
Precautions when Ganging Modular Valves

Note the following precautions when ganging modular valves together in the applicable example circuits.

Circuit Diagram	Description	Incorrect	Correct
Locking Circuit and Pressure Reducing Circuit	●Cylinder position not maintained ○Leaks occur because, during the pilot check, the line being maintained flows into the pilot line of the reducing valve.		
Pressure Reduction Circuit with Speed Control	●Insufficient cylinder output and drop in speed ○Pressure increases due to the restrictor effect of the flow regulator. Since the pilot runs from that line, pressure reduction makes smooth operation impossible.		
Locking Circuit and Speed Control Circuit	●Cylinder knocking ○Pressure is increased by the restrictor effect of the flow regulator. That pressure moves the pilot check in the closed direction, which causes the valve to repeatedly open and close.		

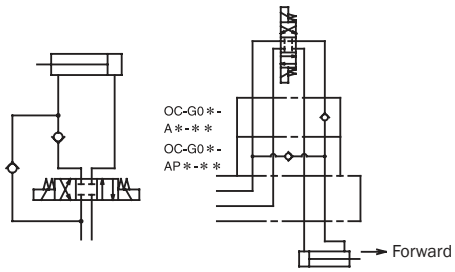
Valve Ganging Configuration Examples

Anti-cavitation Circuit G 01 03



- Surge pressure is prevented by the inertia of the actuator, and cavitation by fluid being sucked in through the opposite port, which is in negative pressure, is prevented.
- Example Valve Model Numbers (G03)
  Relief Valve ———— 0RO-G03-W*-J50
  Vacuum Check Valve —— 0CV-G03-W-J50

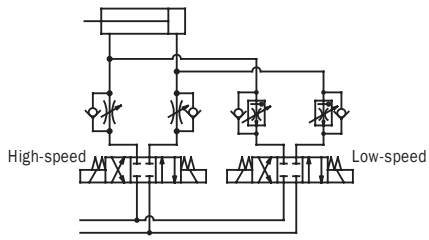
Differential Circuit G 01 03

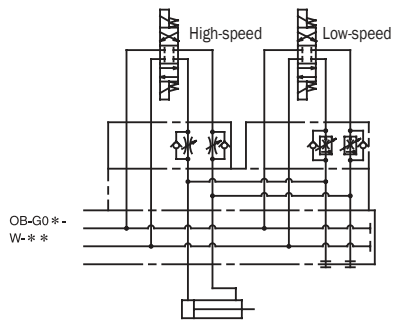


- When the cylinder advances, the rod side return fluid returns to the P port and the pump discharge rate and confluence are advanced at high speed (differential).
- Example Valve Model Numbers (G03)
  Check valve ———— 0C-G03-A*-J50
  Differential check valve —— 0C-G03-AP*-J50

  Important:
  Cylinder effective output is the rod surface area portion only.

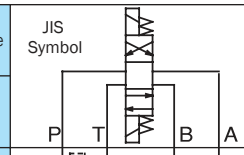
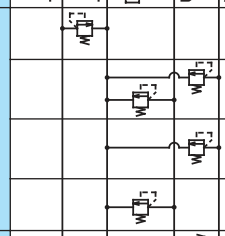
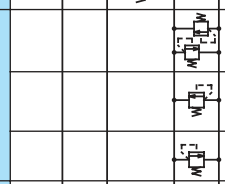
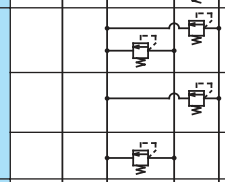
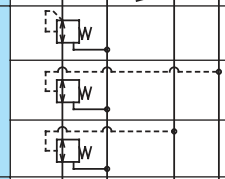
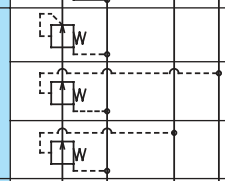
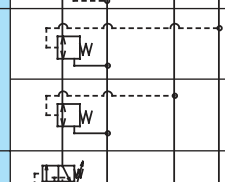
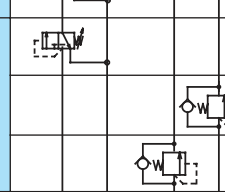
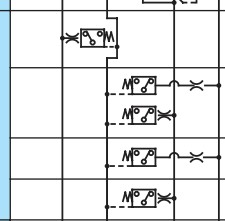
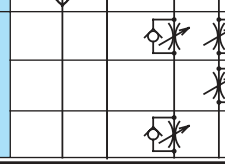
2-speed Circuit G 01 03



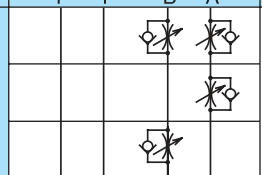
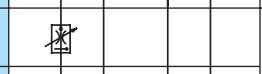
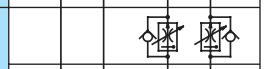
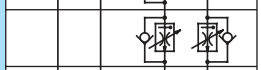
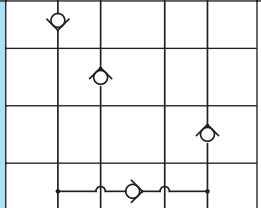
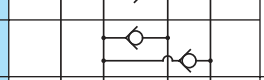
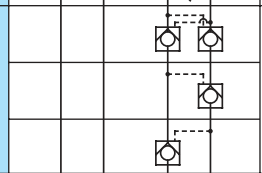
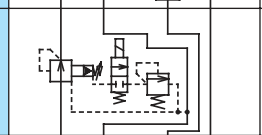
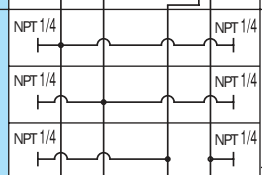
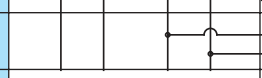
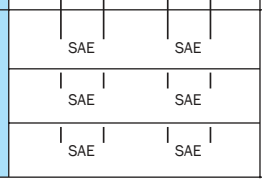


- This type of circuit allows variation between two actuator speeds. It prevents low-speed shock when the actuator starts up or stops, and it used when the intermediate stroke is operated at high speed.
- Example Valve Model Numbers (G03)
  2-speed Plate ———— 0B-G03-W-(H)-J30
  High-speed Flow Regulator Valve —— 0CY-G-03-W-Y-J51
  Low-speed Flow Control Valve ———— 0CF-G03-W60-Y-J50

G01 Modular Valve Series

Type	Name	Valve Model Number	Pressure Adjustment Range (Check Valve Cracking Pressure) psi	Maximum Flow Rate gpm	JIS Symbol	Height in	Weight lbs	Catalog Page
Solenoid Valves	Solenoid Valve	SS-G01-**-R-**-31 SA-G01-**-**-31		13				D-4 D-16
Pressure Control Valves	Relief Valves (Balance Type)	OR-G01-P $\frac{1}{3}$-20	1: 145 to 1000 3: 500 to 3600	13		1.57	3.3	F-10
		-W $\frac{1}{3}$-20					5.0	
		-A $\frac{1}{3}$-21					3.5	
		-B $\frac{1}{3}$-21						
	Brake Valves (Direct Type)	ORO-G01-W $\frac{1}{3}$-20	1: 115 to 1000 3: 500 to 3600	5.2		1.57	3.3	F-16
		-A $\frac{1}{3}$-20					3.0	
		-B $\frac{1}{3}$-20						
	Direct Relief Valves (Direct Type)	ORD-G01-W $\frac{1}{3}$-20	1: 115 to 1000 3: 500 to 3600	5.2		1.57	3.3	F-20
		-A $\frac{1}{3}$-20					3.0	
		-B $\frac{1}{3}$-20						
	Reducing Valves (Direct Type)	OG-G01-P $\frac{C}{2}$ 1-21	C: 20 to 500 1: 115 to 1000 2: 500 to 3000	13		1.57	2.8	F-25
		$\frac{C}{2}$ 1-21						
		$\frac{C}{2}$ 1-21						
	Balance Type Reducing Valves	OGB-G01-P $\frac{C}{3}$ 1-20	C: 20 to 500 1: 115 to 1000 3: 500 to 3000	10.5		1.57	4.1	F-32
		-A $\frac{C}{3}$ 1-20						
		-B $\frac{C}{3}$ 1-20						
	Reducing Valves (Direct Type)	OG-G01-A $\frac{C}{2}$ 1-E21	C: 20 to 500 1: 115 to 1000 2: 500 to 3000			1.57	2.8	F-34
		OG-G01-B $\frac{C}{2}$ 1-E21						
	Pressure Control Valves (Sequence Valves)	OQ-G01-P2 $\frac{1}{3}$-20	1: 115 to 1000 3: 500 to 3000	10.5		1.57	2.4	F-44
	Pressure Control Valves (Counter Balance Valves)	OCQ-G01-A1 $\frac{1}{2}$-20	1: 115 to 1000 2: 500 to 2000					F-47
		-B1 $\frac{1}{2}$-20						
	Pressure Switches	OW-G01-P $\frac{C}{3}$ 1-R-**-30	C: 72 to 500 1: 115 to 1000 3: 500 to 3000 Contact Capacitance AC 125V:5A DC 12V:2.2A DC 24V:1.1A	13		1.57	3.9	F-52
		-W $\frac{C}{3}$ 1-R-**-30					5.7	
		-A $\frac{C}{3}$ 1-R-**-30					3.9	
		-B $\frac{C}{3}$ 1-R-**-30						
Flow Control Valve	Flow Regulator Valve	OY-G01-T-20		13		1.57	2.2	F-55
	Flow Regulator Valves with Check	OCY-G01-P-20	5.8					
	Meter-Out Flow Regulator Valves	OCY-G01-W-Y-20	11.6	13		1.57	2.8	F-55
		-A-Y-20					2.6	F-63
		-B-Y-20						

G01 Modular Valve Series

Type	Name	Valve Model Number	Pressure Adjustment Range (Check Valve Cracking Pressure) psi	Maximum Flow Rate gpm	JIS Symbol	Height in	Weight lbs	Catalog Page
Flow Control Valves	Meter-in Flow Regulator Valve	OCY-G01-W-X-20	11.6	13		1.57	2.8	F-55
		-A-X-20					2.6	
		-B-X-20						
	Flow Control Valve (compensated)	OF-G01-P20-20	(Control Flow Rate) Differential Pressure 1000: 2.6 to 10.5 Differential Pressure 3000: .13 to 10.5				2.6	
	Meter-out Flow Control Valves (compensated)	OCF-G01-W40-Y-30	115	10.5			3.7	F-63
		-A40-Y-30					3.3	
		-B40-Y-30						
	Meter-in Flow Control Valves (compensated)	OCF-G01-W40-X-30	(Control Flow Rate) Differential Pressure 1000: 2.6 to 10.5 Differential Pressure 3600: .13 to 10.5				3.7	
		-A40-X-30					3.3	
		-B40-X-30						
Direction Control Valve	Check Valves	OC-G01-P $\begin{smallmatrix}1\\2\\3\end{smallmatrix}$-20	Cracking pressure 1: 5.8 2: 50 3: 72 *For differential circuit	13		1.57	2.2	F-69
		T $\begin{smallmatrix}1\\2\\3\end{smallmatrix}$-20					2.6	
		-A $\begin{smallmatrix}1\\2\\3\end{smallmatrix}$-21 *						
		-AP $\begin{smallmatrix}1\\2\\3\end{smallmatrix}$-20 *					2.2	
	Vacuum Check Valves	OCV-G01-W-20	2	13				
	Pilot Check Valves	OCP-G01-W $\frac{1}{2}$-(F)-21	Cracking pressure 1: 29 2: 72 (Auxiliary Symbol) Open Valve Ratio Standard: Parent Valve 37% F: Child Valve 6% : Parent Valve 51%	13		1.57	2.6	F-76
		-A $\frac{1}{2}$-(F)-21						
		-B $\frac{1}{2}$-(F)-21						
Composite Valves	2-pressure Reducing Valves	OGS-G01-P C $\frac{1}{1}$ C-K(R)-**-22 High pressure side Low pressure side Power supply : C1, C2, D1, D2	C: 29 to 500 1: 115 to 1000 2: 500 to 2000	10.5		3.5	10.5	F-41
Other	Gauge Modular Blocks	OK-G01-P-(H)-E20		13		1	1.3	F-81
		-T-(H)-E20						
		-W-(H)-E20						
	2-speed Plates	OB-G01-W-(H)-20		13				F-83
	End Plates	MOB-G01-(H)-10		–		20 1.41	0.3 0.6	F-85
	Free-flow plate	MOB-G01-A-10		13		1.41	0.6	
		-B-10						
	Base Blocks (Multi-block)	MOB -01X-B*-10	B: A, B ports * : Sequential number from 2 to 6 Single side outlet			–	–	F-90
		-01Y-W*-10	W: A, B ports Sequential number from 1 to 6 Dual side outlet					
	Sub Plate	MSA-01Y-10 MSA-01Y-T-10	None: Back side outlet T: Side outlet					H-4

G03 Modular Valve Series

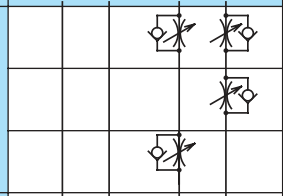
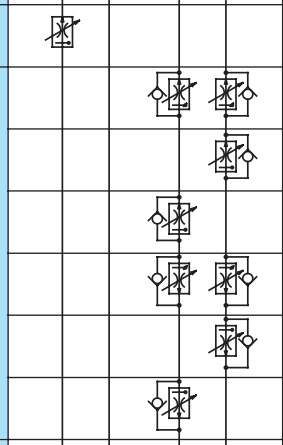
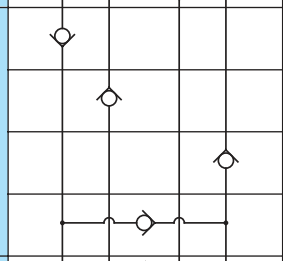
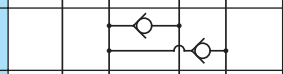
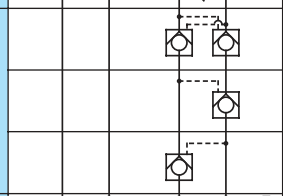
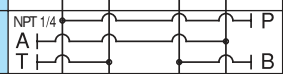
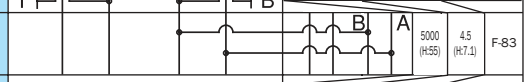
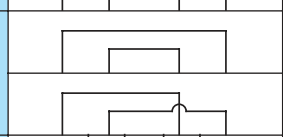
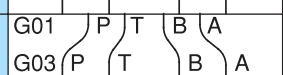
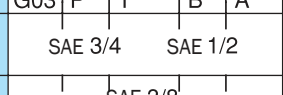
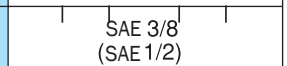
Type	Name	Valve Model Number	Pressure Adjustment Range (Check Valve Cracking Pressure) psi	Maximum Flow Rate gpm	JIS Symbol	Height in	Weight lbs	Catalog Page
Solenoid Valves	Solenoid Valves	SS-G03-**-R-**-E21-21 SA-G03-**-** -E21-21		26	P T B A			D-4 D-16
Pressure Control Valve	Relief Valves (Balance Type)	OR-G03-P $\frac{1}{3}$-E50	1: 1000 3: 500 to 3600 (Auxiliary Symbol) V: With vent port	21		2.1	6.8	F-10
		-W$\frac{1}{3}$-E50					8.5	
		-A$\frac{1}{3}$-E50					6.8	
		-B$\frac{1}{3}$-E50						
		OR-G03-P $\frac{1}{3}$-V-J50			V		6.8	
	Brake Valves (Direct Type)	ORO-G03-W $\frac{1}{3}$-J50	1: 115 to 1000 3: 500 to 3600	7.9		2.1	10.5	F-16
		-A$\frac{1}{3}$-J50					8.8	
		-B$\frac{1}{3}$-J50						
	Direct Relief Valves (Direct Type)	ORD-G03-W $\frac{1}{3}$-J50	1: 115 to 1000 3: 500 to 3600	7.9		2.1	8.5	F-20
		-A$\frac{1}{3}$-J50					6.8	
		-B$\frac{1}{3}$-J50						
	Reducing valve	OG-G03-P $\frac{C}{3}$1-(B)-E51	C: 36 to 500 1: 115 to 1000 3: 500 to 3000	21 However, C: 13	DR	2.1	7.9	F-25
		-A$\frac{C}{3}$1-(B)-E51			DR			F-34
		-B$\frac{C}{3}$1-(B)-E51			DR			
	Pressure Control Valves (Sequence Valves)	OQ-G03-P2 $\frac{A}{E}$C-J50	A: 36 to 125 C: 125 to 500 E: 500 to 2000	21		2.1	7.7	F-44
	Pressure Control Valves (Counter Balance Valves)	OCQ-G03-A1 $\frac{A}{E}$C-J50				2.1		F-47
		-B1 $\frac{A}{E}$C-J50						
Flow Control Valve	Flow Regulator Valve	OCY-G03 $\frac{-P}{-P-H}$ -J50	(Function) H: High differential pressure regulator 14.5	26		2.1	6.3	F-55
	Meter-Out Flow Regulator Valves	$\frac{-W-Y}{-W-HY}$ -J51					6.8	
		$\frac{-A-Y}{-A-HY}$ -J51					6.6	
		$\frac{-B-Y}{-B-HY}$ -J51						

*There is no problem with seals and other parts when mixing these valves with NACHI G03 modular valve design number (J) 30 valves.

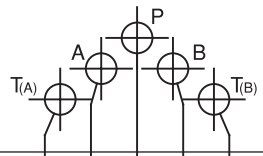
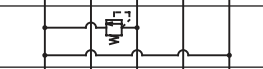
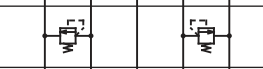
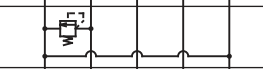
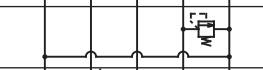
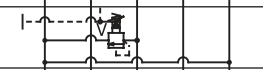
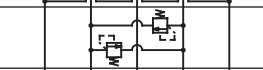
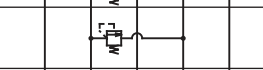
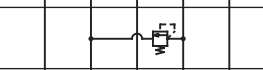
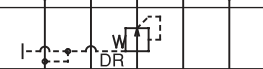
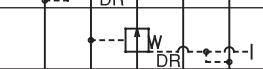
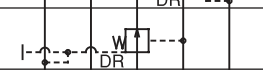
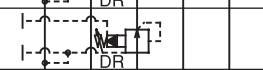
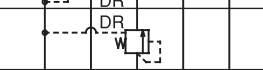
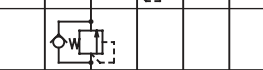
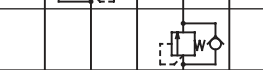
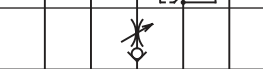
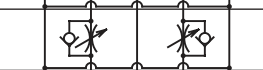
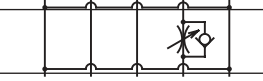
*G03 module valve installation bolts
For M6: Design number J50
For M8: Design number 50
For E: 1/4 - 20UNC
Unit has commonality. Also, two J-pins have been inserted diagonally for M6 applications.

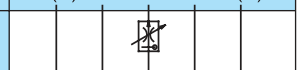
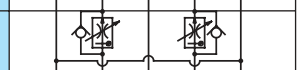
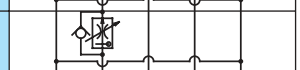
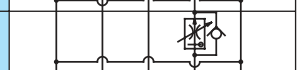
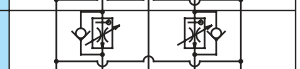
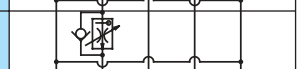
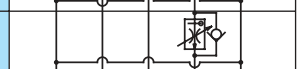
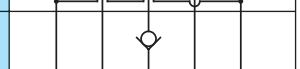
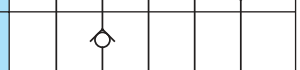
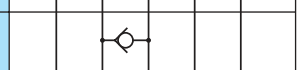
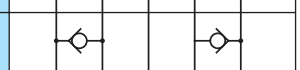
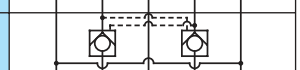
Note: G03 series modular valves have two T port locations: one on the A port side T (A) and one on the B port side T (B). The port that is used depends on the model number.

G03 Modular Valve Series

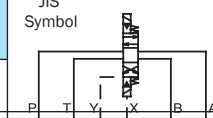
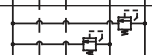
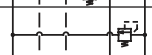
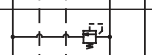
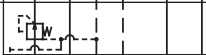
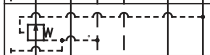
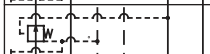
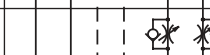
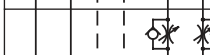
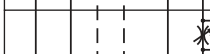
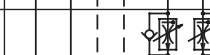
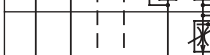
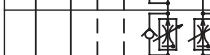
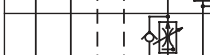
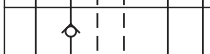
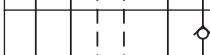
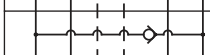
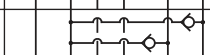
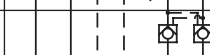
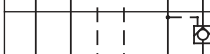
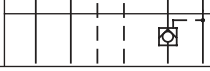
Type	Name	Valve Model Number	Pressure Adjustment Range (Check Valve Cracking Pressure) psi	Maximum Flow Rate gpm	ISO Symbol	Height in	Weight lbs	Catalog Page
Flow Control Valve	Meter-in Flow Regulator Valve	OCY-G03 -W-X -W-HX -J51	(Function) H: High differential pressure regulator 14.5	26		2.16	6.8	F-55
		-A-X -A-HX -J51					6.6	
		-B-X -B-HX -J51						
	Flow Control Valve (compensated)	OF-G03-P60-J50	(Control Flow Rate) Differential Pressure 1000: .07 to 15.8 Differential Pressure 3600: .13 to 15.8	15.8		2.16	6.8	F-63
	Meter-out Flow Control Valves (compensated)	OCF-G03-W60-Y-J50	(Volume control flow rate) Differential Pressure 1000: .13 to 15.8 Differential Pressure 3600: .02 to 15.8 (0.1{1})				11	
		-A60-Y-J50					10.1	
		-B60-Y-J50						
	Meter-in Flow Control Valves (compensated)	OCF-G03-W60-X-J50					11	
		-A60-X-J50					10.1	
		-B60-X-J50						
Direction Control Valve	Check Valves	OC-G03-P 1 2-J50 3	Cracking pressure 1: 5.8 2: 50 3: 72 *For differential circuit	26		2.16	5.9	F-69
		T 1 2-J50 3						
		-A 1 2-J50 3 *						
		-AP 1 2-J50 3 *						
	Vacuum Check Valves	OCV-G03-W-J50	2.1	26		2.16	7.7	F-69
	Pilot Check Valves	OCP-G03-W 1/2-(D)-J50	Cracking pressure 1: 29 2: 72 (Auxiliary Symbol) Open Valve Ratio Standard : Child Valve 7% : Parent Valve 49% D : Parent Valve 49%	26		2.16	7.9	F-76
		-A 1/2-(D)-J50						
		-B 1/2-(D)-J50						
Other	Gauge Block	OK-G03-E50		26		2.16	5.0	F-81
	2-speed Plates	OB-G03-W-(H)-J30		26				F-83
	End Plates	MOB-G03-J50: For M6 MOB-G03-(H)-50: For M8		–		1.25 (H:58)	1.4 (H:2.5)	F-85
	Free Flow	MOB-G03-A-J50: For M6 MOB-G03-A-(H)-50: For M8		26		1.25 (H:58)	1.3 (H:2.3)	
		MOB-G03-B-J50: For M6 MOB-G03-B-(H)-50: For M8						
	Conversion plate (For 03/01 conversion)	MOB-G03-AA-50 MOB-G03-AA-J50		13		1.77	5.0	
	Base Blocks	MOB-03-B*-J30	*:Sequential number from 2 to 5 A, B port dual side outlet			–	–	F-91
	Sub Plate	MSA-03-E10 MS-03(X)-E10 MSA-03(X)-T-E10 MS-03(X)-T-E10	Bottom Outlet Bottom Outlet Side outlet Side outlet					D-9 H-5

G03 Modular Valve Series Detailed ISO Symbols

Type	Valve Model Number	Detailed ISO Symbols
Solenoid Valves	For M6, M8 SS-G03-**-R-**-E21 -21 SA-G03-**-** -E21 -21	
Pressure Control Valve	OR-G03-P 1/3-E50	
	OR-G03-W 1/3-E50	
	OR-G03-A 1/3-E50	
	OR-G03-B 1/3-E50	
	OR-G03-P 1/3-V-J50	
	ORO-G03-W 1/3-E50	
	ORO-G03-A 1/3-J50	
	ORO-G03-B 1/3-J50	
	ORD-G03-W 1/3-J50	
	ORD-G03-A 1/3-J50	
	ORD-G03-B 1/3-J50	
	OG-G03-P C 1-(B)-E51 3	
	OG-G03-A C 1-(B)-E51 3	
	OG-G03-B C 1-(B)-E51 3	
	OG-G03-P C 1-(B)V-J51 3	
	OQ-G03-P2 A C-J50 E	
	OCQ-G03-A1 A C-J50 E	
	OCQ-G03-B1 A C-J50 E	
Flow Control Valve	OCY-G03-P-J50	
	OCY-G03-W-Y-J51	
	OCY-G03-A-Y-J51	
	OCY-G03-B-Y-J51	
	OCY-G03-W-X-J51	
	OCY-G03-A-X-J51	
	OCY-G03-B-X-J51	

Type	Valve Model Number	Detailed ISO Symbols
Flow Control Valve	OF-G03-P60-J50	
	OCF-G03-W60-Y-J50	
	OCF-G03-A60-Y-J50	
	OCF-G03-B60-Y-J50	
	OCF-G03-W60-X-J50	
	OCF-G03-A60-X-J50	
	OCF-G03-B60-X-J50	
Direction Control Valve	OC-G03-P 1 2-J50 3	
	OC-G03-T 1 2-J50 3	
	OC-G03-A 1 2-J50 3	
	OC-G03-AP 1 2-J50 3	
	OCV-G03-W-J50	
	OCP-G03-W 1/2-J50	
	OCP-G03-A 1/2-J50	
	OCP-G03-B 1/2-J50	
	OK-G03-J50	
Other	OB-G03-W-J30	
	MOB-G03-(H)-50 MOB-G03-J50	
	MOB-G03-A-(H)-50 MOB-G03-A-J50	
	MOB-G03-B-(H)-50 MOB-G03-B-J50	
	MOB-G03-AA-50 MOB-G03-AA-J50	
	MOB-03X-B*-50 MOB-03X-B*-J50	
	MS-03(X)-30 MSA-03(X)-10 MS-03(X)-T-10 MSA-03(X)-T-10	

G04 Modular Valve Series

Type	Name	Valve Model Number	Maximum Working psi	Maximum Flow Rate gpm	Pressure Adjustment Range (Check Valve Cracking Pressure) psi	JIS Symbol	Weight lbs	Catalog Page
Solenoid Valves	Solenoid Control Valves	DSS-G04-****-R-**-21	35MPa 5000	79			33	D-41
Pressure Control Valve	Relief valve	ORH-G04-P 1 3-10 5	35MPa 5000	79	1: 115 to 1000 3: 500 to 3600		15.4	F-10
	Direct Relief Valves	ORH-G04-DW- 1 3-10 5		13.2	1: 115 to 1000 3: 500 to 3600 5: 1000 to 5000		14.3	F-20
		ORH-G04-DA 1 3-10 5						
		ORH-G04-DB 1 3-10 5						
	Reducing valve	OGH-G04-P 1 3-(B)-10		79	1: 115 to 1000 3: 500 to 3600 (Auxiliary Symbol) B: External drain		17.6	F-25
		OGH-G04-A 1 3-(B)-10					17.6	F-32
		OGH-G04-B 1 3-(B)-10						
	Counter Balance Valves	OQH-G04-A1 A C-10 E		79	A: 36 to 125 C: 72 to 500 E: 290 to 2000		17.6	F-47
		OQH-G04-B1 A C-10 E					17.6	
Flow Control Valve	Flow Regulator Valves	OYH-G04-P-10		79	Check Valve Cracking Pressure 5.8		10.3	F-55
	Meter-in Flow Regulator Valve	OYH-G04-W-X-10		79	Check Valve Cracking Pressure 14.5		14.3	F-55
		OYH-G04-A-X-10					14.3	
		OYH-G04-B-X-10						
	Meter-Out Flow Regulator Valves	OYH-G04-W-Y-10					14.3	
		OYH-G04-A-Y-10					14.3	
		OYH-G04-B-Y-10						
	Meter-in Flow Control Valves	OFH-G04-W200-X-10		52.8	Check Valve Cracking Pressure 14.5		24.4	F-63
		OFH-G04-A200-X-10					22.5	
		OFH-G04-B200-X-10						
	Meter-out Flow Control Valves	OFH-G04-W200-Y-10					24.4	
		OFH-G04-A200-Y-10					22.5	
		OFH-G04-B200-Y-10						
Direction Control Valve	Check Valves	OCH-G04-P 1 2-10 3		79	1: 5.8 2: 50 3: 72		9.9	F-69
		OCH-G04-T 1 2-10 3					14.3	
		OCH-G04-A 1 2-10 3					9.9	
		OCH-G04-AP 1 2-10 3					9.9	
	Vacuum Check Valves	OVH-G04-W-10		79	14.5		14.3	F-69
	Pilot Check Valves	OPH-G04-W 1 2-(D)-10		79	1: 29 2: 72 (Auxiliary Symbol) Open Valve Ratio Standard : Child Valve 7% : Parent Valve 50% D : Parent Valve 50%		15	F-76
		OPH-G04-A 1 2-(D)-10						
		OPH-G04-B 1 2-(D)-10						

The G04 series modular valves do not have an L (DR_2) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

Relief Modular Valve

13 to 79 gpm
3600 to 5000 psi

Features

This modular relief valve provides maximum pressure control for a hydraulic circuit.

Wide ranging applicability Maximum Operating Pressure: 3600 to 5000 psi Pressure Adjustment Range: 115 to 3600, 5000.

Shockless unload, 2-pressure control, and other configurations are possible by switching the solenoid valve. Contact your agent for details.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
OR-G01-P1-20 P3	1/8	3600	13	* to 1000 500 - 3600	3.3	ISO 4401-03-02-0-94
OR-G01-W1-20 W3				* to 1000 500 - 3600	5	
OR-G01-A1-21 A3				* to 1000 500 - 3600	3.5	
OR-G01-B1-21 B3				* to 1000 500 - 3600	3.5	
OR-G03-P1-(V)-J50 P3	3/8	3600	21	* to 1000 500 - 3600	6.8	ISO 4401-05-04-0-94
OR-G03-W1-J50 W3				* to 1000 500 - 3600	8.6	
OR-G03-A1-J50 A3				* to 1000 500 - 3600	6.8	
OR-G03-B1-J50 B3				* to 1000 500 - 3600	6.8	
ORH-G04-P1-10 P3 P5	1/2	5000	79	* to 1000 500 - 3600 1000 - 5000	15.4	ISO 4401-07-06-0-94

Note: *See the Flow Rate - Low Pressure characteristics on page D-17 for information about items marked with an asterisk.

• Handling

1 When using a remote control valve in a vent circuit, certain vent circuit pipe capacities can cause vibration. Because of this, thick steel pipe with an inside diameter of .15 in that is no longer than three meters is recommended. Vent piping cannot be used with the 01 size. If a vent port is required for the 03 size, add the auxiliary code "V".

2 For use as a safety valve, use a pressure override that is higher than the required circuit pressure.

3 Make sure that tank port back pressure sure is no greater than 29 psi.

4 A small control flow rate can cause pressure instability. Use a control flow rate that is in accordance with the values shown below.

01 size: At least 1.3 gpm
03 size: At least 2.1 gpm
04 size: At least 2.1 gpm

For applications that require a flow rate that is less than the minimum flow rate, use an ORD-G** direct type relieve modular valve.

5 Note that a sub plate and installation bolts are not included. See pages H4 or F-87-89 if these items are required. 04

6 series modular valves do not have an L (DR drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

7 Connect OR-G03-W*- (J) 50 to the two T-ports on the tanks.

Understanding Model Numbers

01: 03 size

OR – G 03 – P 1 – (K) – J50

- Design number — Note: For 03 size, relationship between mounting bolts and design number is indicated as J50: M6, 50: M8 E50: 1/4 - 20 For 01 size 20 or 21
- Auxiliary symbol K: With handle (01, 03 size) V: With vent port (03 size only)
- Pressure adjustment range 1, 3
- Control port P: P port W: A, B ports A: A port B: B port
- Nominal diameter (size) 01, 03
- Mounting method G: Gasket type
- Relief modular valve

04 size

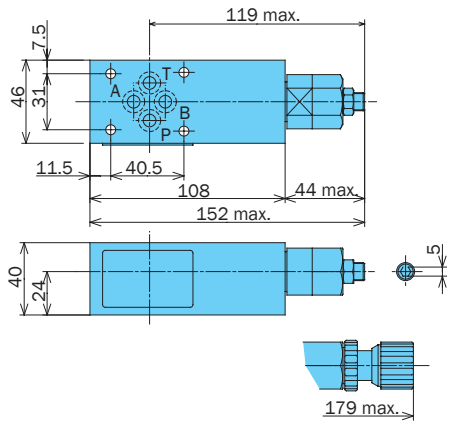
ORH – G 04 – P 5 – 10

- Design number
- Pressure adjustment range 1, 3, 5
- Control port P: P port
- Nominal diameter (size) 04
- Mounting method G: Gasket type
- M35 Series relief modular valve

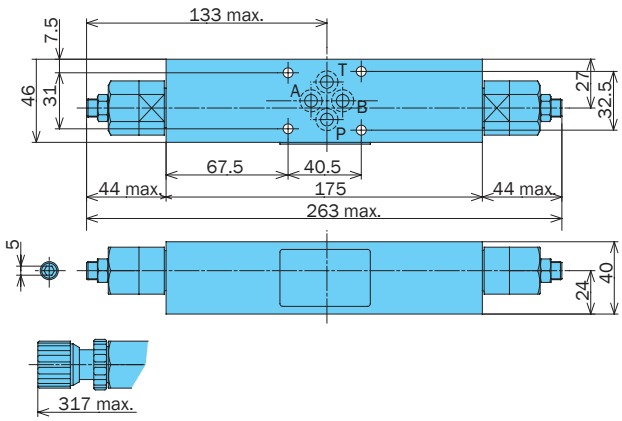
Installation Dimension Drawings

Note: Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

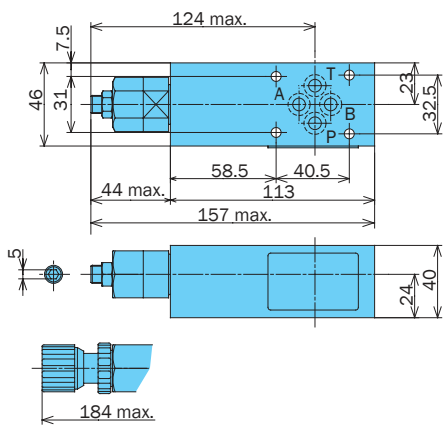
OR-G01-P-*-20



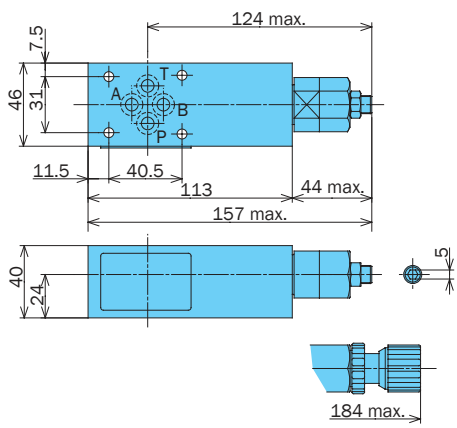
OR-G01-W*-20



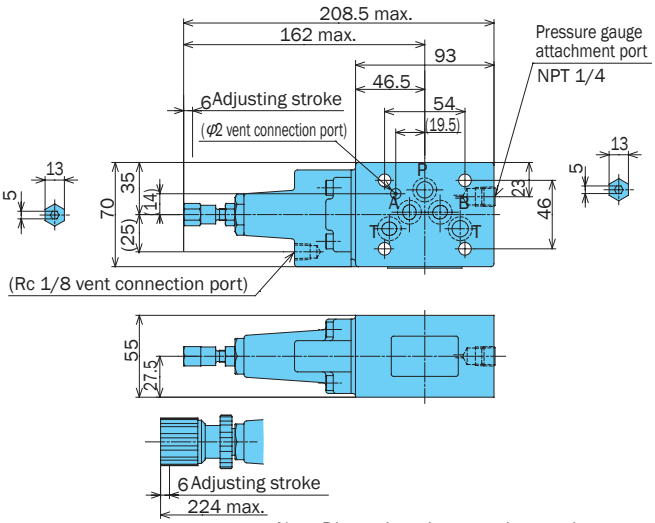
OR-G01-A*-21



OR-G01-B*-21

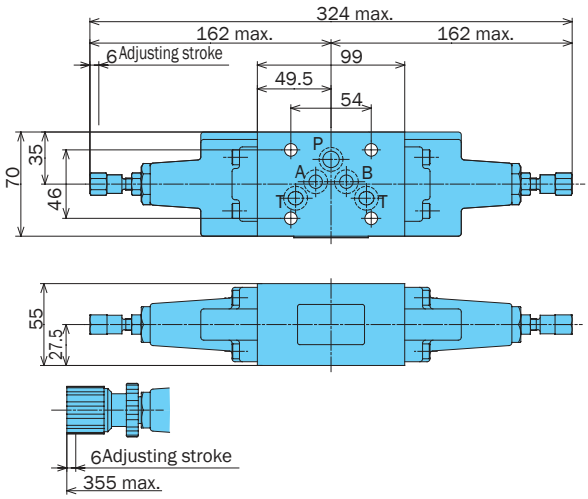


OR-G03-P*-(V)-J50

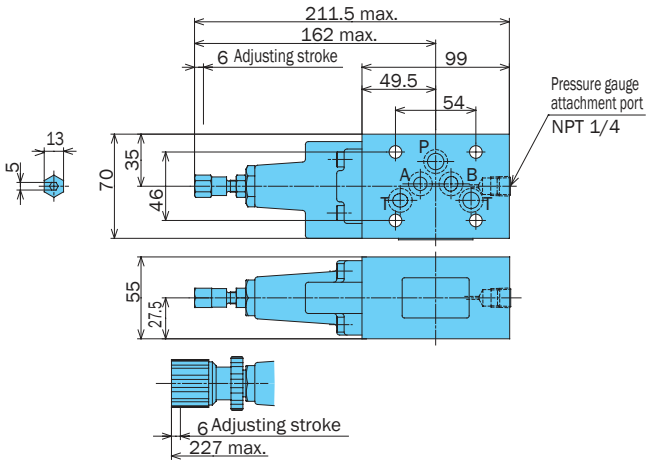


Note: Dimensions in parentheses show dimensions with vent port installed (V type)

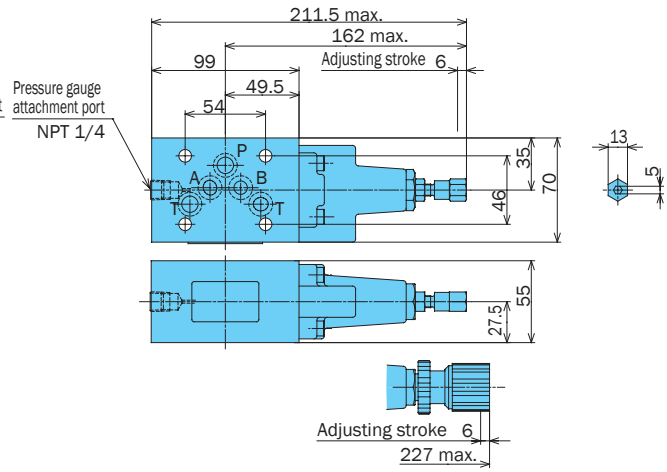
OR-G03-W*-J50



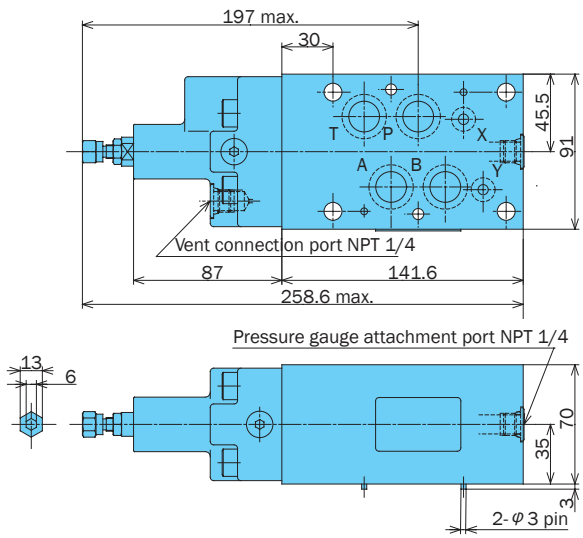
OR-G03-A*-J50



OR-G03-B*-J50



ORH-G04-P*-10

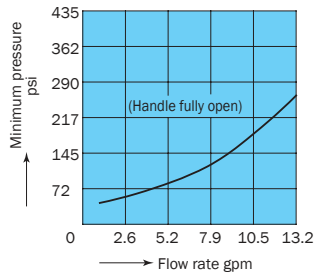


Performance Curves

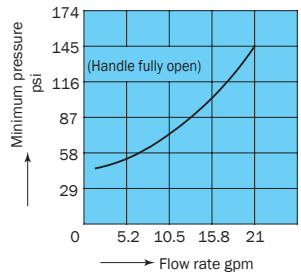
Differential Hydraulic Fluid Viscosity 32 centistokes

Flow Rate - Minimum Pressure Characteristics

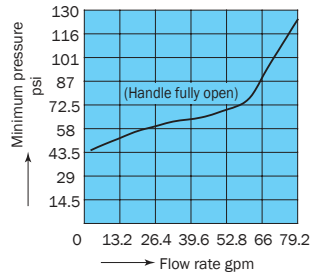
OR-G01-*1-20(21)



OR-G03-P1-J50

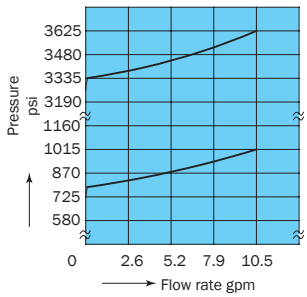


ORH-G04-P*-10

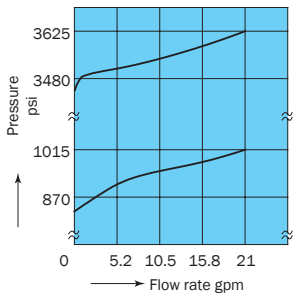


Pressure - Flow Rate Characteristics

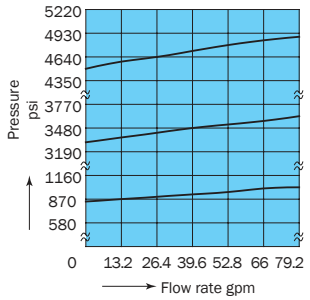
OR-G01--20(21)**



OR-G03-P*-J50

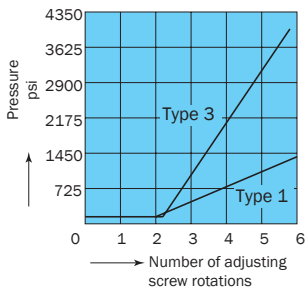


ORH-G04-P*-10

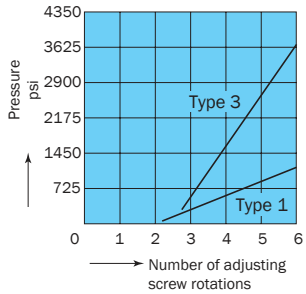


Number of Adjusting Screw Rotations - Pressure Characteristics

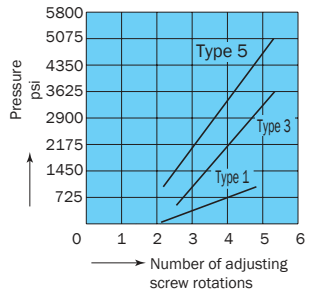
OR-G01-P*-20



OR-G03-P*-(J)50



ORH-G04-P*-10

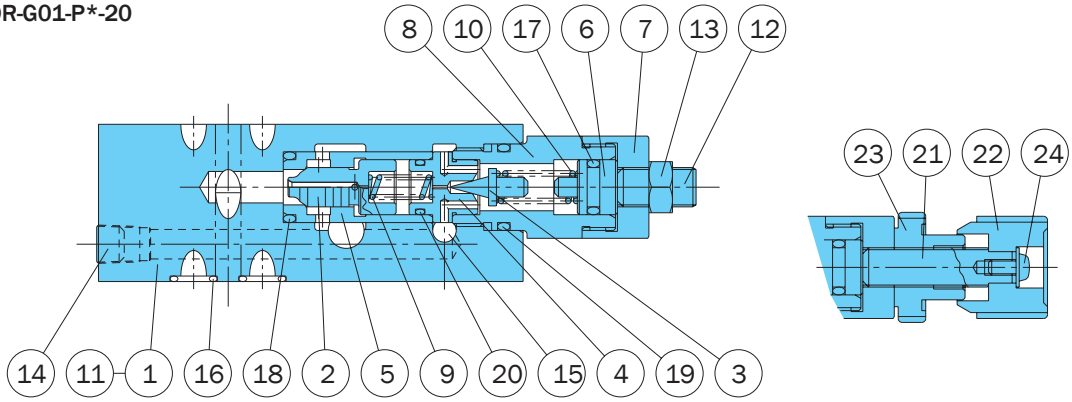


F

Modular Valves

Cross-sectional Drawing

OR-G01-P*-20



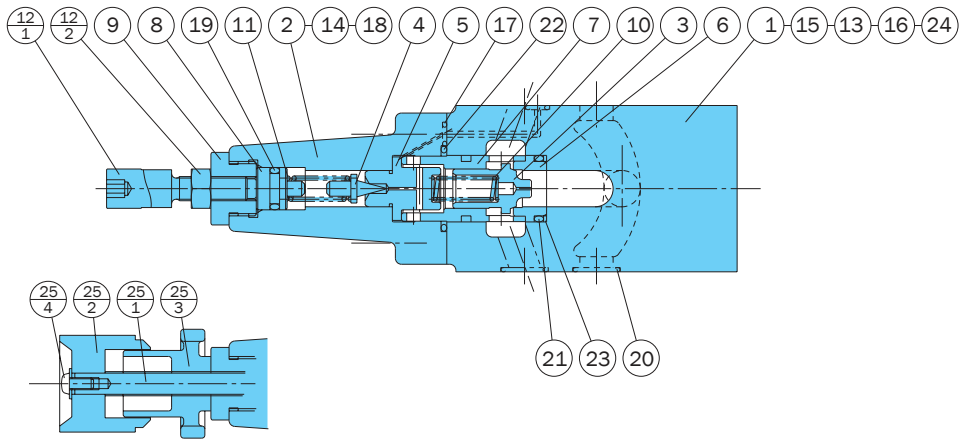
Part No.	Part Name
1	Body
2	Spool
3	Poppet
4	Seat
5	Sleeve
6	Plunger
7	Bushing
8	Retainer
9	Spring
10	Spring
11	Plate
12	Screw
13	Nut
14	Plug
15	Plug
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring
21	Screw
22	Knob
23	Nut
24	Screw

Seal Part List (Kit Model Number BRBS-01R*)

Part No.	Part Name	Part Number	Q'ty			
			P	W	A	B
16	O-ring	1B-P9	4	4	4	4
17	O-ring	1A-P10A	1	2	1	1
18	O-ring	1B-P14	1	2	1	1
19	O-ring	1B-P18	1	2	1	1
20	O-ring	AS568-013(Hs90)	1	2	1	1

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify P, W, A, or B for the asterisk (*) in the kit model number.

OR-G03-P*-V-J50



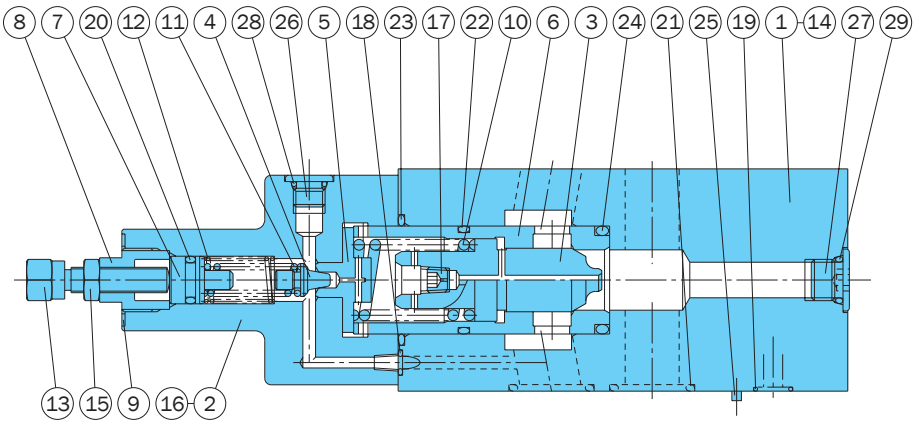
Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Poppet
5	Seat
6	Seat
7	Sleeve
8	Plunger
9	Retainer
10	Spring
11	Spring
12	Screw kit
12_1	Screw
12_2	Nut
13	Plate
14	Screw
15	Plug
16	Plug
17	O-ring
18	O-ring
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	Backup ring
24	Pin
25	Handle kit
25_1	Screw
25_2	Knob
25_3	Nut
25_4	Screw

Seal Part List (Kit Model Number BRES-03R*)

Part No.	Part Name	Part Number	Q'ty		
			P/A/B	W	PV
17	O-ring	1B-P5	–	–	2
18	O-ring	1B-P7	1	2	1
19	O-ring	1A-P10A	1	2	1
20	O-ring	AS568-014(Hs90)	5	5	5
21	O-ring	1B-P18	2	4	2
22	O-ring	AS568-119(Hs90)	1	2	1
23	Backup ring	T2-P18	1	2	1

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Backup ring indicates JIS B2407-T2-**.
3. Specify P, W, or PV for the asterisk (*) in the kit model number.

ORH-G04-P*-10



Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Poppet
5	Seat
6	Sleeve
7	Plunger
8	Retainer
9	Plate
10	Spring
11	Spring
12	Spring
13	Screw
14	Plate
15	Nut
16	Screw
17	Choke
18	O-ring
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	O-ring
24	O-ring
25	Pin
26	Plug
27	Plug
28	O-ring
29	O-ring

Seal Part List (Kit Model Number BRKS-04RP)

Part No.	Part Name	Part Number	Q'ty
18	O-ring	1B-P5	1
19	O-ring	AS568-012(Hs90)	2
20	O-ring	1A-P11	1
21	O-ring	AS568-118(Hs90)	4
22	O-ring	AS568-122(Hs90)	1
23	O-ring	AS568-127(Hs90)	1
24	O-ring	1B-P28	1
28	O-ring	1B-P8	3
29	O-ring	1B-P11	3

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Brake Modular Valve

5.2 to 7.9 gpm
115 to 3045, 3625 psi

Features

This modular pressure control valve prevents abnormal pressure when the actuator stops, enabling smooth stops.

Wide ranging applicability Maximum Operating Pressure: 3625 psi.

Pressure Adjustment Range: 115 to 3045, 3625 psi.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
ORO-G01-W1-20 W3	1/8	3625	5.2	115 to 1000 500 to 3045	3.3	ISO 4401-03-02-0-94
ORO-G01-A1-20 A3				115 to 1000 500 to 3045	3.0	
ORO-G01-B1-20 B3				115 to 1000 500 to 3045	3.0	
ORO-G03-W1-J50 W3	3/8	3625	7.9	115 to 1000 500 to 3045	10.5	ISO 4401-05-04-0-94
ORO-G03-A1-J50 A3				115 to 1000 500 to 3045	8.8	
ORO-G03-B1-J50 B3				115 to 1000 500 to 3045	8.8	

• Handling

1 The pressure adjustment range is expressed using cracking pressure.
2 For use as a safety valve, use a pressure override that is higher than the required circuit pressure.
3 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.

Understanding Model Numbers

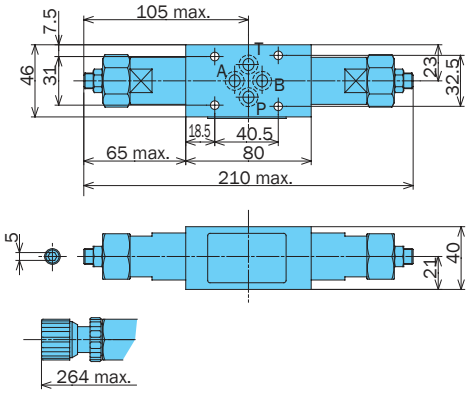
ORO – G 03 – A 3 – (K) – J50

- Design number — Note: For 01 size - 20; For 03 size, relationship between mounting bolts and design number is indicated as J50: M6, 50: M8.
- Auxiliary symbol K: With handle
- Pressure adjustment range 1, 3
- Control port W: A, B ports A: A port B: B port
- Nominal diameter (size) 01, 03
- Mounting method G: Gasket type
- Brake modulator valve

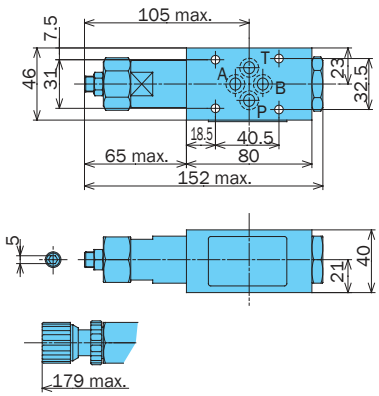
Specifications

Note: Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

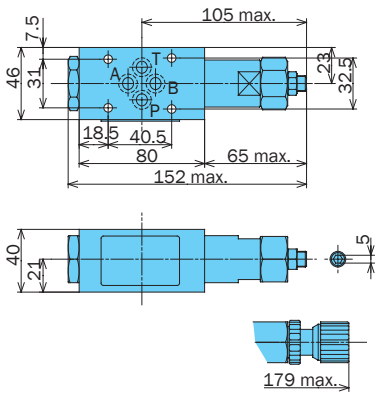
ORO-G01-W*-20



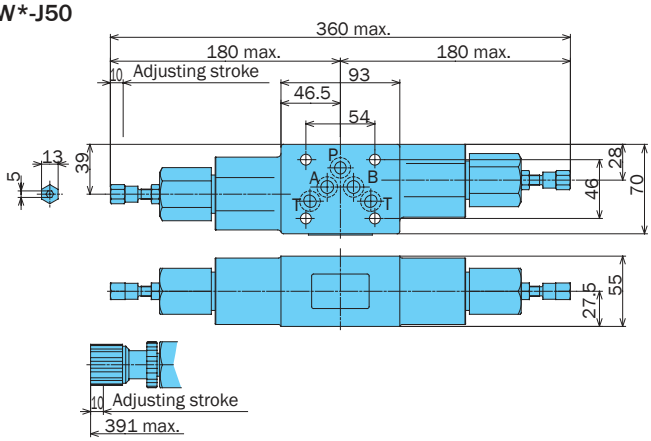
ORO-G01-A*-20



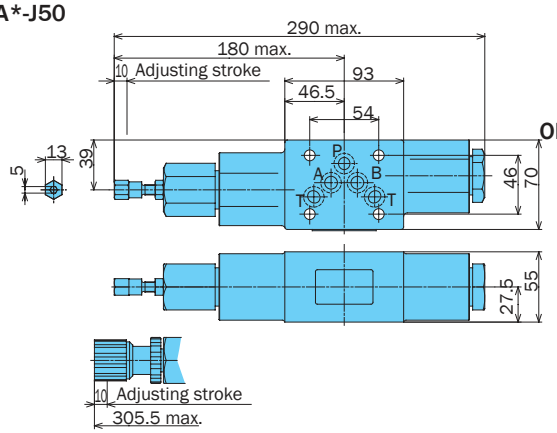
ORO-G01-B*-20



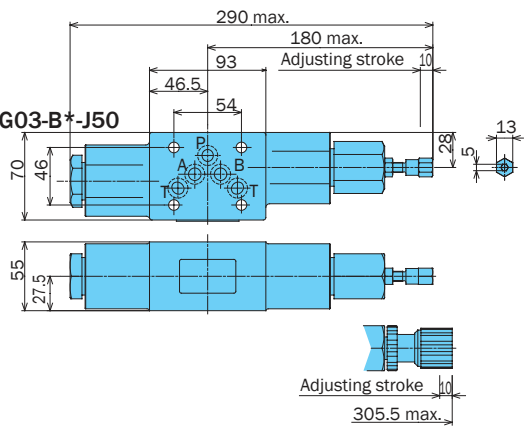
ORO-G03-W*-J50



ORO-G03-A*-J50



ORO-G03-B*-J50

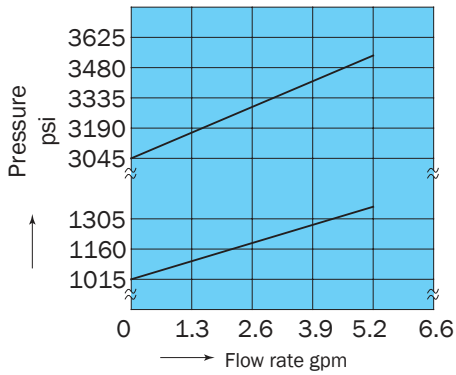


Performance Curves

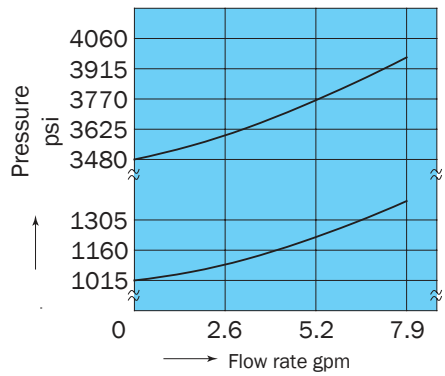
Differential Hydraulic Fluid Viscosity 32 centistokes

Pressure - Flow Rate Characteristics

ORO-G01--20**

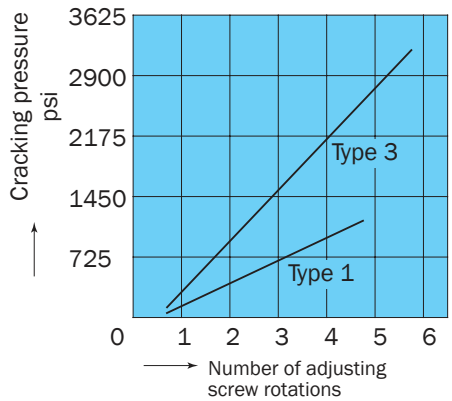


ORO-G03--J50**

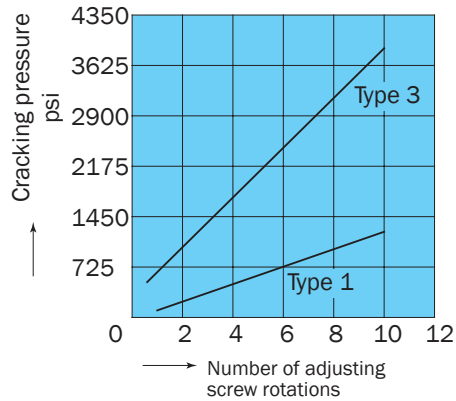


Number of Adjusting Screw Rotations - Pressure Characteristics

ORO-G01--20**

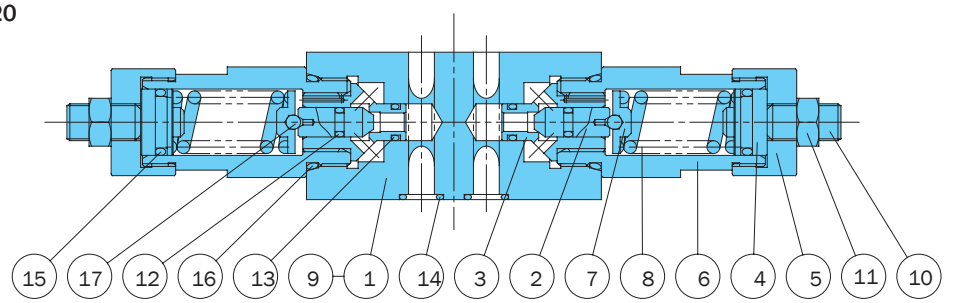


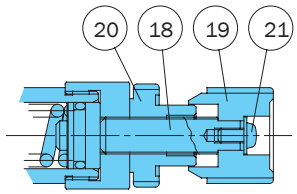
ORO-G03--J50**



Cross-sectional Drawing

ORO-G01-W*-20





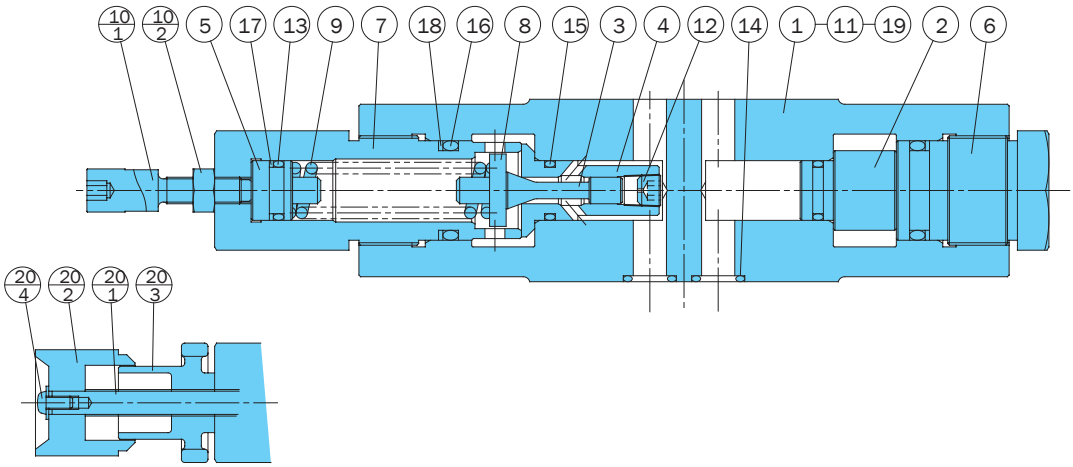
Part No.	Part Name
1	Body
2	Poppet
3	Seat
4	Plunger
5	Bushing
6	Retainer
7	Guide
8	Spring
9	Plate
10	Screw
11	Nut
12	O-ring
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Ball
18	Screw
19	Knob
20	Nut
21	Screw

Seal Part List (Kit Model Number BRBS-01R0*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
12	O-ring	1A-P5	2	1	1
13	O-ring	1B-P7	2	2	2
14	O-ring	1B-P9	4	4	4
15	O-ring	1B-P14	2	1	1
16	O-ring	1B-P22	2	2	2

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

ORO-G03-A*-J50



Part No.	Part Name
1	Body
2	Plug
3	Poppet
4	Seat
5	Plunger
6	Bushing
7	Retainer
8	Guide
9	Spring
10	Screw kit
10_{1}	Screw
10_{2}	Nut
11	Plate
12	Orifice
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Backup ring
18	Backup ring
19	Pin
20	Handle kit
20_{1}	Screw
20_{2}	Knob
20_{3}	Nut
20_{4}	Screw

Seal Part List (Kit Model Number BRES-03R0*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
13	O-ring	1A-P14	2	1	1
14	O-ring	AS568-014(Hs90)	5	5	5
15	O-ring	1B-P14	2	2	2
16	O-ring	1B-P24	2	2	2
17	Backup ring	T2-P14	2	1	1
18	Backup ring	T2-P24	2	2	2

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Backup ring indicates JIS B2407-T2-**.
3. Specify W, A, or B for the asterisk (*) in the kit model number.

Direct Relief Modular Valve

5.2 to 13.2 gpm
115 to 3045, 3625, 5075 psi

Features

1 This modular relief valve provides maximum pressure control for a hydraulic circuit.

2 Wide ranging applicability Maximum Working Pressure: 3625, 5075 psi.

3 Pressure Adjustment Range: 115 to 3045, 3625, 5075 psi.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
ORD-G01-W1-20 W3	1/8	3625	5.2	115 to 1000 500 to 3045	3.3	ISO 4401-03-02-0-94
ORD-G01-A1-20 A3				115 to 1000 500 to 3045	3.0	
ORD-G01-B1-20 B3				115 to 1000 500 to 3045	3.0	
ORD-G03-W1-J50 W3	3/8	3625	7.9	115 to 1000 500 to 3625	10.5	ISO 4401-05-04-0-94
ORD-G03-A1-J50 A3				115 to 1000 500 to 3625	8.8	
ORD-G03-B1-J50 B3				115 to 1000 500 to 3625	8.8	
ORH-G04-DW1-10 DW3 DW5	1/2	5075	13.2	115 to 1000 500 to 3625 1000 to 5075	14.3	ISO 4401-07-06-0-94
ORH-G04-DA1-10 DA3 DA5				115 to 1000 500 to 3625 1000 to 5075	14.3	
ORH-G04-DB1-10 DB3 DB5				115 to 1000 500 to 3625 1000 to 5075	14.3	

• Handling

1 The pressure adjustment range is expressed using cracking pressure.
2 For use as a safety valve, use a pressure override that is higher than the required circuit pressure.
3 Tank port back pressure changes cracking pressure by the corresponding amount.
4 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.
5 04 series modular valves do not have an L (DR2) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

Understanding Model Numbers

01, 03 size

ORD – G 03 – W 3 – (K) – J50

- Design number — Note: E - NPT; For 01 size, 20; For 03 size, relationship between mounting bolts and design number is indicated as J50: M6, 50: M8.
- Auxiliary symbol K: With handle
- Pressure adjustment range 1, 3
- Control port W: A, B ports A: A port B: B port
- Nominal diameter (size) 01, 03
- Mounting method G: Gasket type
- Direct relieve modular valve

Understanding Model Numbers

04 size

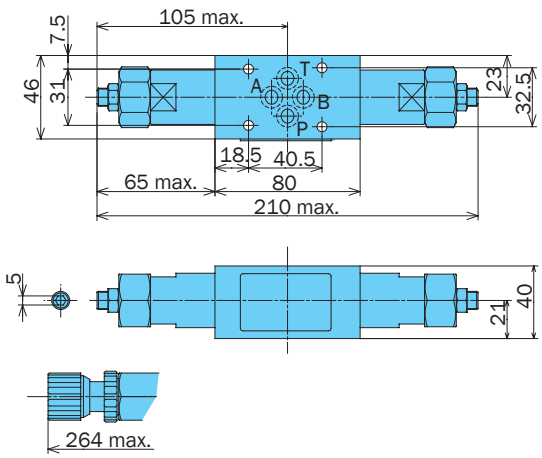
ORH – G 04 – D W 5 – 10

- 10: Design number
- 5: Pressure adjustment range 1, 3, 5
- W: Control port — W: A, B ports; A: A port; B: B port
- D: Function symbol — D: Direct type
- 04: Nominal diameter (size) 04
- G: Mounting method — G: Gasket type
- ORH: M35 Series relief modular valve

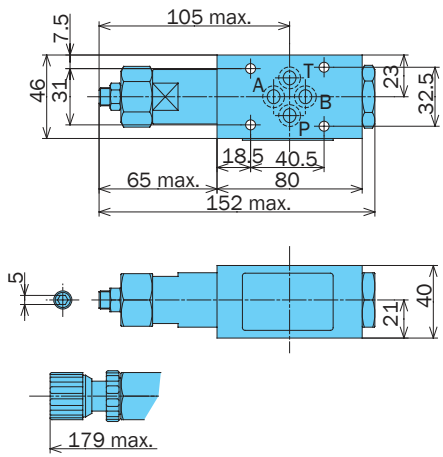
Understanding Model Numbers

Note: Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation

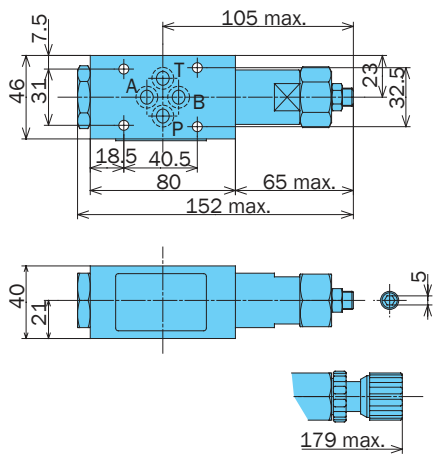
ORD-G01-W*-20



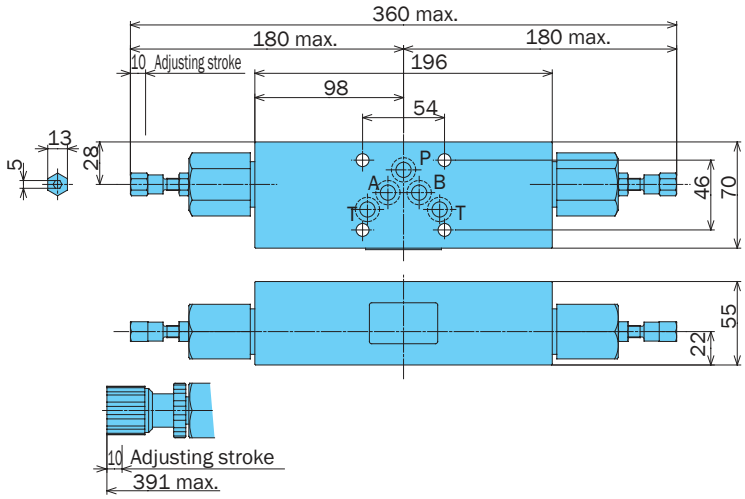
ORD-G01-A*-20



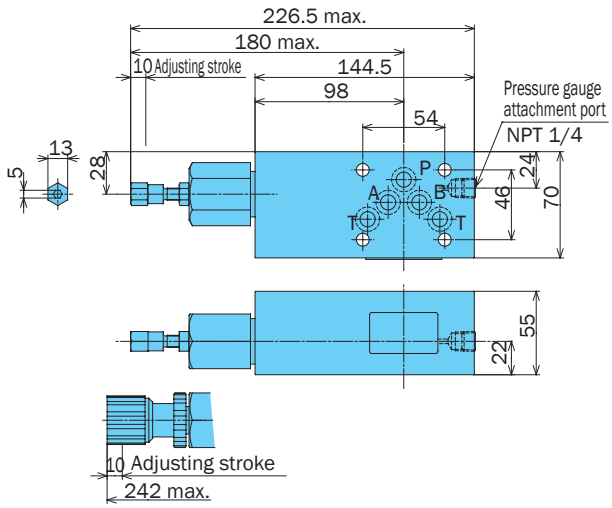
ORD-G01-B*-20



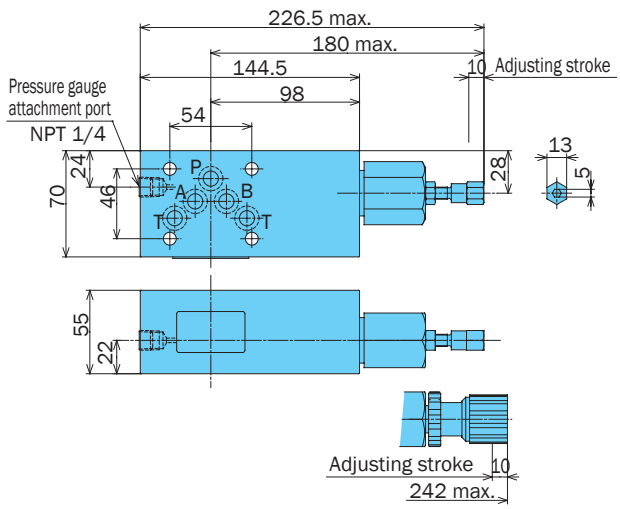
ORD-G03-W*-J50



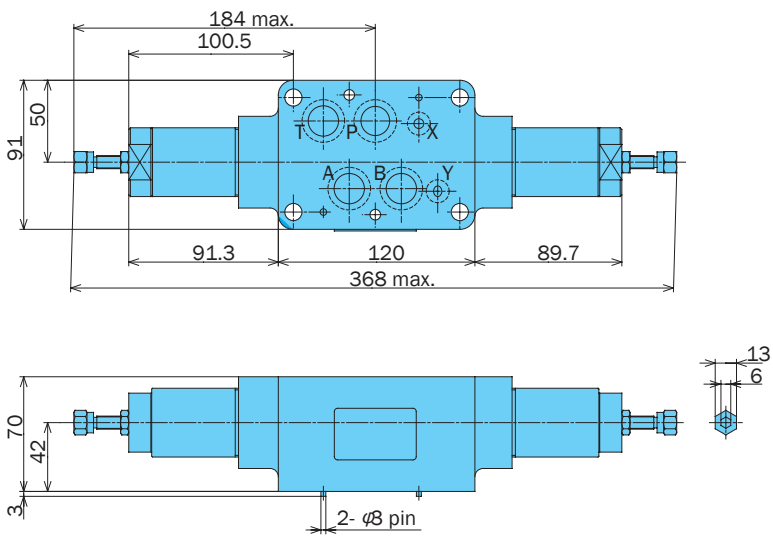
ORD-G03-A*-E50



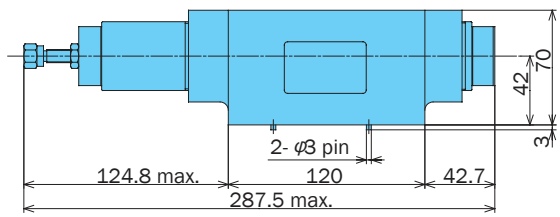
ORD-G03-B*-E50



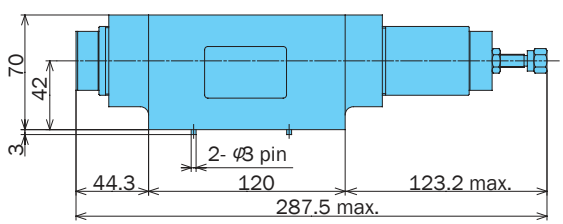
ORH-G04-DW*-10



ORH-G04-DA*-10



ORH-G04-DB*-10

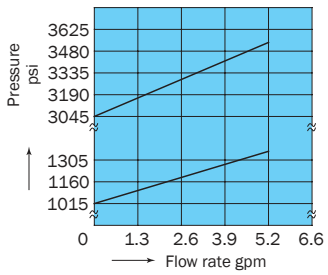


Performance Curves

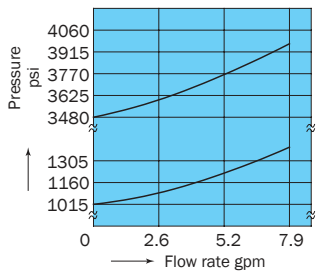
Differential Hydraulic Fluid Viscosity 32 centistokes

Pressure - Flow Rate Characteristics

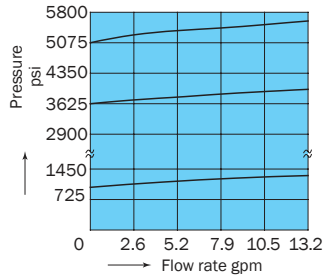
ORD-G01-**-20



ORD-G03-**-J50

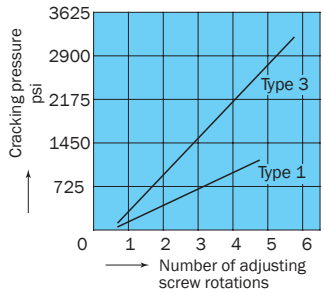


ORH-G04-DW*-10

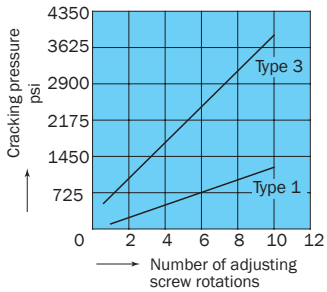


Number of Adjusting Screw Rotations - Pressure Characteristics

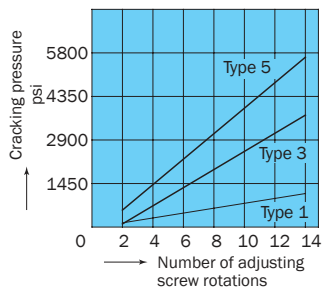
ORD-G01-**-20



ORD-G03-**-J50

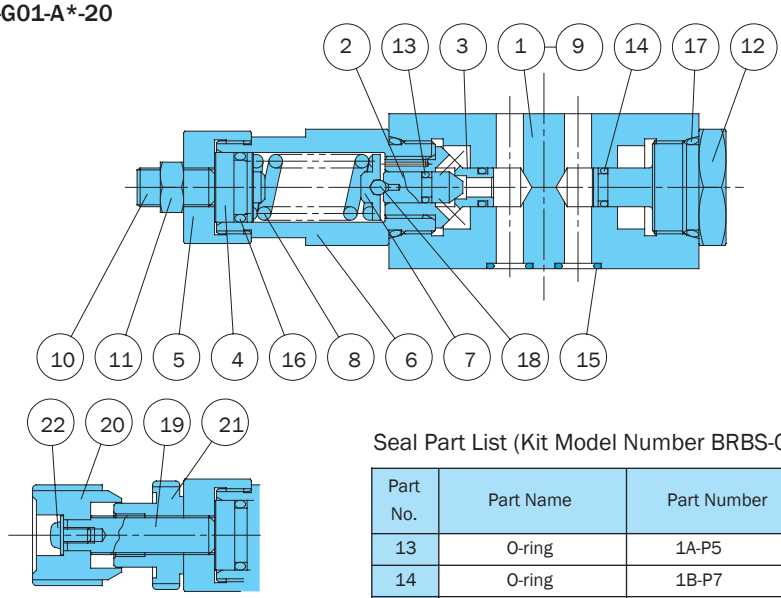


ORH-G04-DW*-10



Cross-sectional Drawing

ORD-G01-A*-20



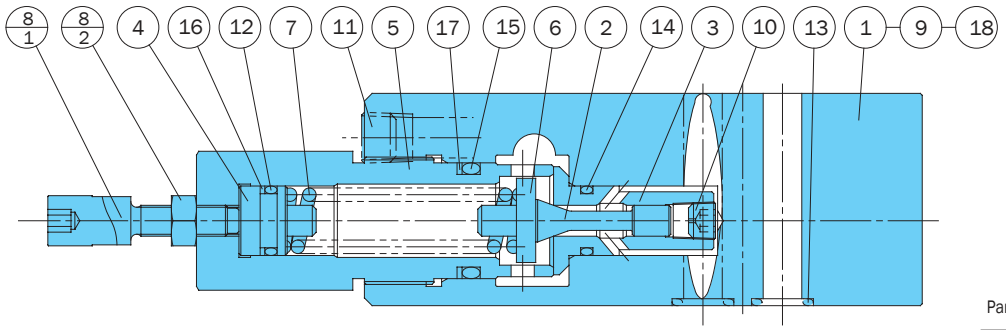
Seal Part List (Kit Model Number BRBS-01RD*)

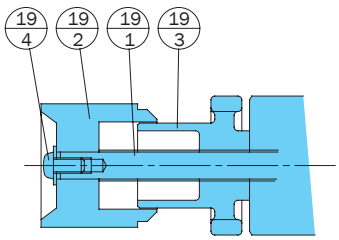
Part No.	Part Name	Part Number	Q'ty		
			W	A	B
13	O-ring	1A-P5	2	1	1
14	O-ring	1B-P7	2	2	2
15	O-ring	1B-P9	4	4	4
16	O-ring	1B-P14	2	1	1
17	O-ring	1B-P22	2	2	2

Note: 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Poppet
3	Seat
4	Plunger
5	Bushing
6	Retainer
7	Guide
8	Spring
9	Plate
10	Screw
11	Nut
12	Bushing
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	O-ring
18	Ball
19	Screw
20	Knob
21	Nut
22	Screw

ORD-G03-A*-J50





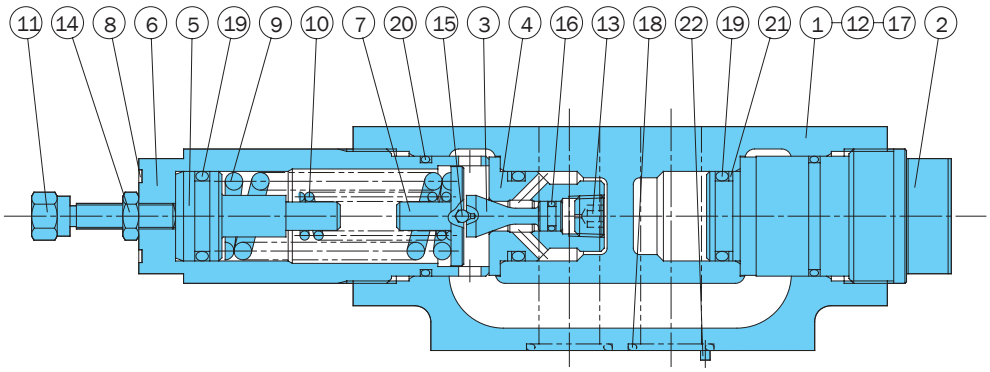
Seal Part List (Kit Model Number BRES-03RD*)

Part No.	Part Name	Part Number	Q'ty		
			A	B	W
12	O-ring	1A-P14	1	1	2
13	O-ring	AS568-014(Hs90)	5	5	5
14	O-ring	1B-P14	1	1	2
15	O-ring	1B-P24	1	1	2
16	Backup ring	T2-P14	1	1	2
17	Backup ring	T2-P24	1	1	2

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Backup ring indicates JIS B2407-T2-**.
3.Specify W, A, or B for the asterisk (*) in the kit model number

Part No.	Part Name
1	Body
2	Poppet
3	Seat
4	Plunger
5	Retainer
6	Guide
7	Spring
8	Screw kit
8_{-1}	Screw
8_{-2}	Nut
9	Plate
10	Orifice
11	Plug
12	O-ring
13	O-ring
14	O-ring
15	O-ring
16	Backup ring
17	Backup ring
18	Pin
19	Handle kit
19_{1}	Screw
19_{2}	Knob
19_{3}	Nut
19_{4}	Screw

ORH-G04-DA*-10



Seal Part List (Kit Model Number BRKS-04RD*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
16	O-ring	1A-P6	2	1	1
17	O-ring	AS568-012(Hs90)	2	2	2
18	O-ring	AS568-118(Hs90)	4	4	4
19	O-ring	1B-P22A	4	3	3
20	O-ring	AS568-125(Hs70)	2	2	2
21	Backup ring	T2-P22A	2	2	2

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Backup ring indicates JIS B2407-T2-**.
3.Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Plug
3	Poppet
4	Seat
5	Plunger
6	Retainer
7	Guide
8	Plate
9	Spring
10	Spring
11	Screw
12	Plate
13	Choke
14	Nut
15	Ball
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring
21	Backup ring
22	Pin

Pressure Reducing Modular Valve

10.5 to 79.2 gpm
3625, 5000 psi

Features

This modular valve makes the pressure in part of the circuit lower than that of the main circuit.

Even when pressure changes in the primary main circuit, the reduced secondary pressure is maintained at a constant level.

Maximum Operating Pressure: 3625, 5075 psi.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
OG-G01-PC-21 P1 P2	1/8	3625	13.2	21.7 to 500 115 to 1000 500 to 2320	2.8	ISO 4401-03-02-0-94
OG-G03-PC-(V)-J51 P1 P3	3/8	3625	21 but C : 13.2	36 to 500 115 to 1000 500 to 3045	8.3	ISO 4401-05-04-0-94
OGH-G04-P1-10 P3	1/2	5075	79.2	115 to 1000 500 to 3625	17.6	ISO 4401-07-06-0-94

• Handling

1 When using a remote control valve in a vent circuit, certain vent circuit pipe capacities can cause vibration. Because of this, thick steel pipe with an inside diameter of .15 in that is no longer than three meters is recommended. Vent piping cannot be used with the 01 size. If a vent port is required for the 03 size, add the auxiliary code "V".

2 For the 03 size, the drainage can be allowed to escape through the T port. In the case of a valve with the auxiliary symbol B, however, run a return pipe from the drain discharge port directly to the tank.

3 With the 04 sizes, piping is not required because drainage can be allowed to escape from the gasket side drain port. In the case of a valve with the auxiliary symbol B, however, run a return pipe from the drain discharge port directly to the tank.

4 Note that a change in drain back pressure causes a change in setting pressure.

5 With the 01, 03 sizes, the flow rate is limited at low pressures. See the Pressure-Flow Rate Characteristics on pages F-27 for more information.

6 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.

7 04 series modular valves do not have an L (DR2) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

8 With the 03, 04 sizes, the control port can be changed by altering the attachment orientation of the back cover. See the installation diagram for more information. After making this change, be sure also to make the other changes in accordance with the model number indicated on the nameplate.

Understanding Model Numbers

01, 03, size

OG – G 03 – P 1 – (B) – J51

- Design number — Note: For 01 size, 21; For 03 size, relationship between mounting bolts and design number is indicated as J51: M6, 51; M8. E: NPT piping (01, 03)
- Auxiliary symbol — B: See notes 2 and 3 under "Handling." K: With handle (01, 03 size) V: With vent port (03 size)
- Pressure adjustment range C, 1, 2, 3
- Control port P: P port
- Nominal diameter (size) 01, 03
- Mounting method G: Gasket type
- Pressure reducing modular valve

Understanding Model Numbers

04 size

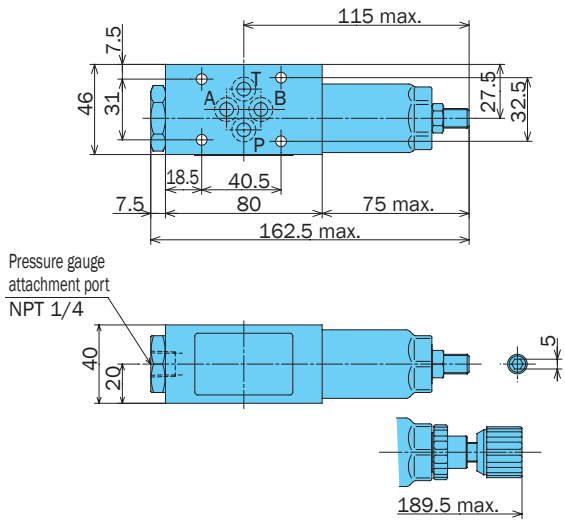
OGH – G 04 – P 1 – (B) – 10

- 10: Design number
- (B): Auxiliary symbol B: See note 3 under "Handling."
- 1: Pressure adjustment range 1, 3
- P: Control port P: P port
- 04: Nominal diameter (size) 04
- G: Mounting method G: Gasket type
- OGH: M35 Series reducing modular valve

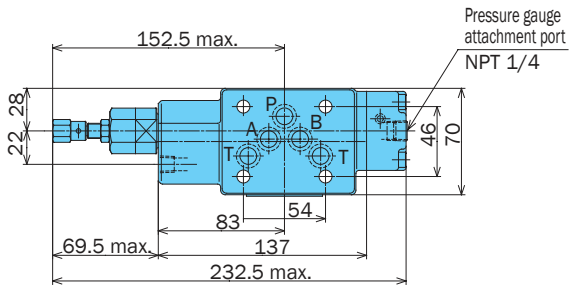
Installation Dimension Drawings

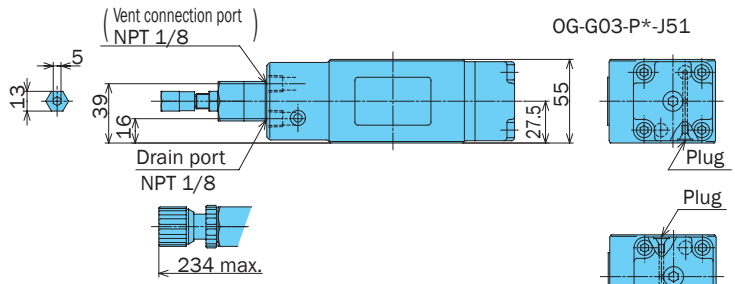
Note: Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

OG-G01-P*-E21



OG-G03-P*-(V)-E51



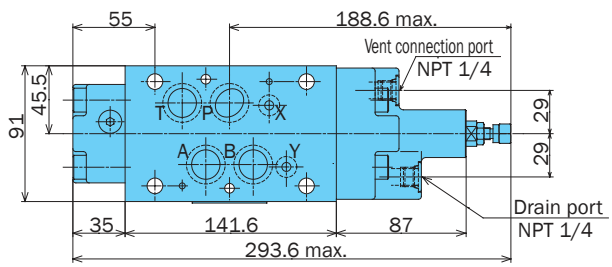


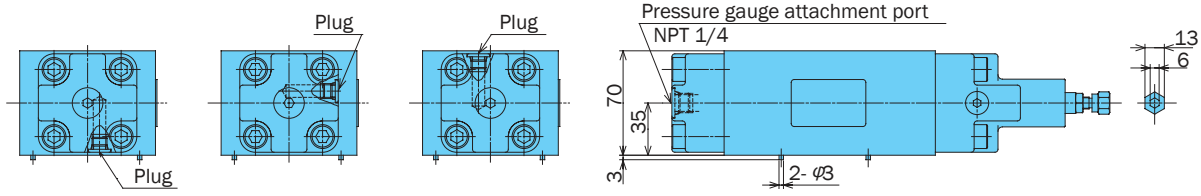
Note: 1. Conversion to B port control is possible by changing the back cover. Port control is determined by plug orientation.
2. When replacing the back cover, be sure also to change the nameplate to the applicable model type.
3. The tightening torque of the back cover bolts is: (M6) 7.3 to 9.5 ft lbs.

OG-G03-B*-J51

OGH-G04-P*-10

Note: 1. Conversion to A, B port control is possible by changing the back cover. Port control is determined by plug orientation.
2. When replacing the back cover, be sure also to change the nameplate to the applicable model type.
3. The tightening torque of the back cover bolts is: (M10) 33 to 40 ft lbs.





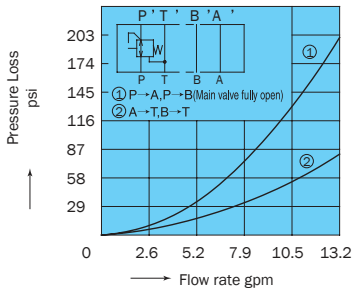
OGH-G04-B*-10 OGH-G04-A*-10 OGH-G04-P*-10

Performance Curves

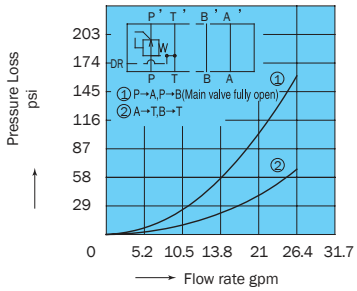
Differential Hydraulic Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

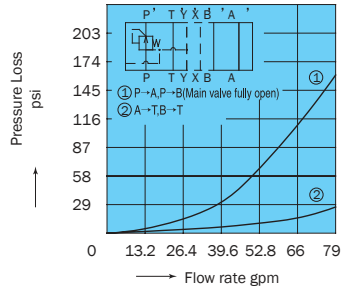
OG-G01-P*-21



OG-G03-P*-J51

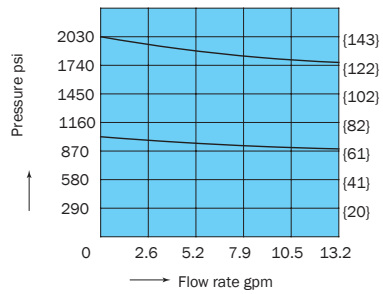


OGH-G04-**-10

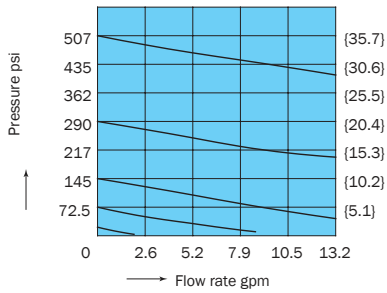


Pressure - Flow Rate Characteristics

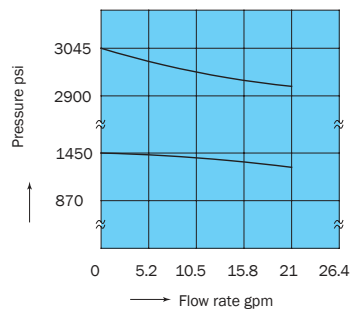
OG-G01-P $\frac{1}{2}$-21



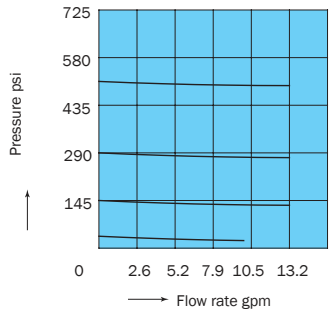
OG-G01-PC-21



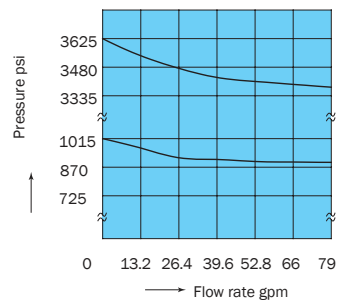
OG-G03-P $\frac{1}{3}$-J51



OG-G03-PC-J51



OGH-G04-**-10

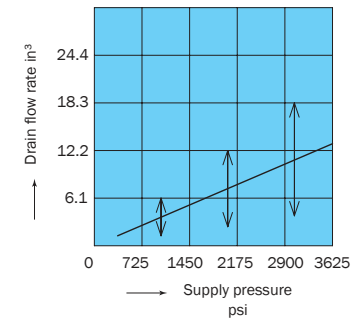


F

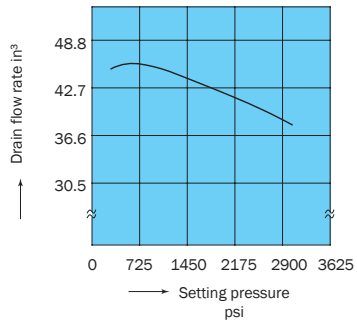
Modular Valves

Pressure - Drain Rate Characteristics

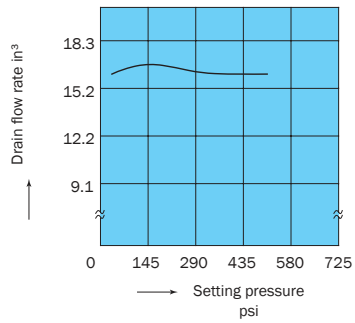
0G-G01-P*-21



0G-G03-P*-J51

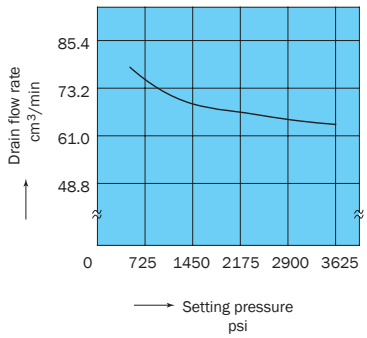


0G-G03-PC-J51



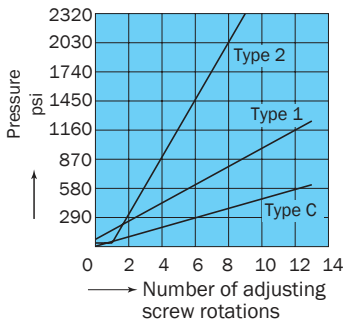
Determine it through the maximum value when designing the circuit.

0GH-G04-P3-10

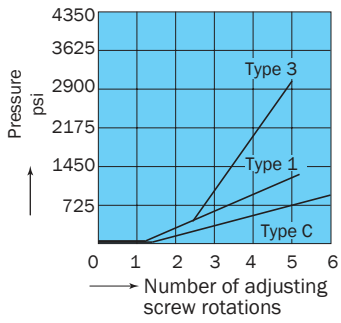


Number of Adjusting Screw Rotations - Pressure Characteristics

0G-G01-P*-21



0G-G03-P*-51



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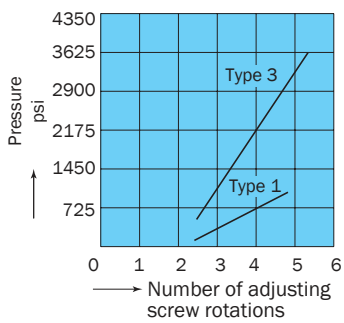
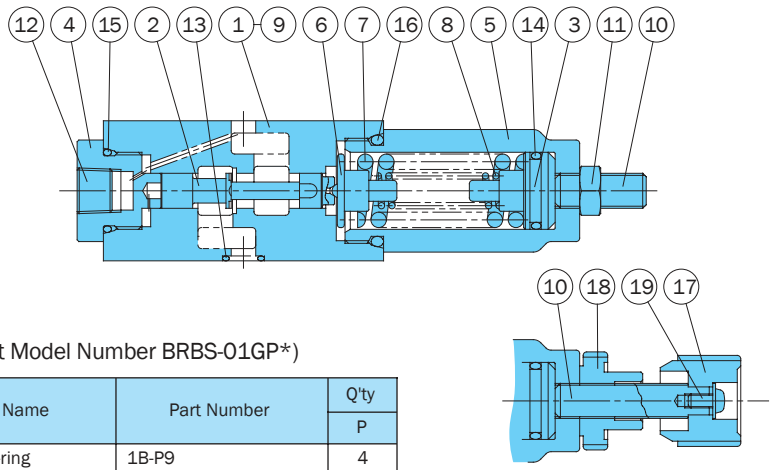


0G-G01-P2-21



Part No.	Part Name
1	Body
2	Spool
3	Push rod
4	Bushing
5	Retainer
6	Guide
7	Spring
8	Spring
9	Plate
10	Screw
11	Nut
12	Plug
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Knob
18	Nut
19	Screw

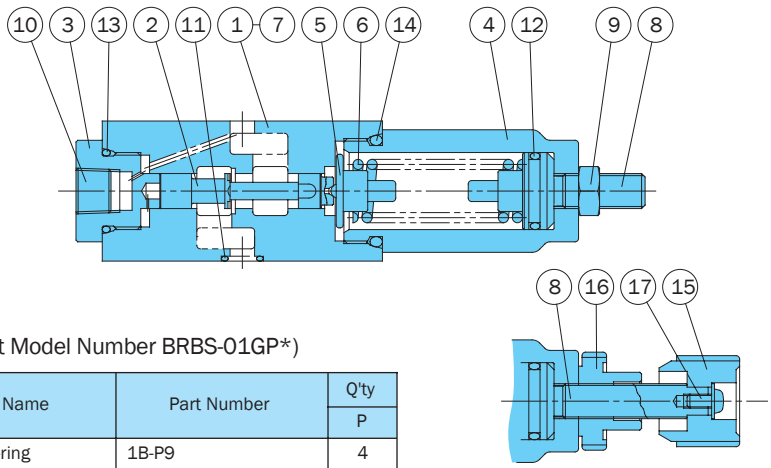
Seal Part List (Kit Model Number BRBS-01GP*)

Part No.	Part Name	Part Number	Q'ty P
13	O-ring	1B-P9	4
14	O-ring	1A-P18	1
15	O-ring	1B-P20	1
16	O-ring	1B-P26	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

Note:
Part number 8 is used in the case of pressure adjustment range type 2 only.

0G-G01-PC-21



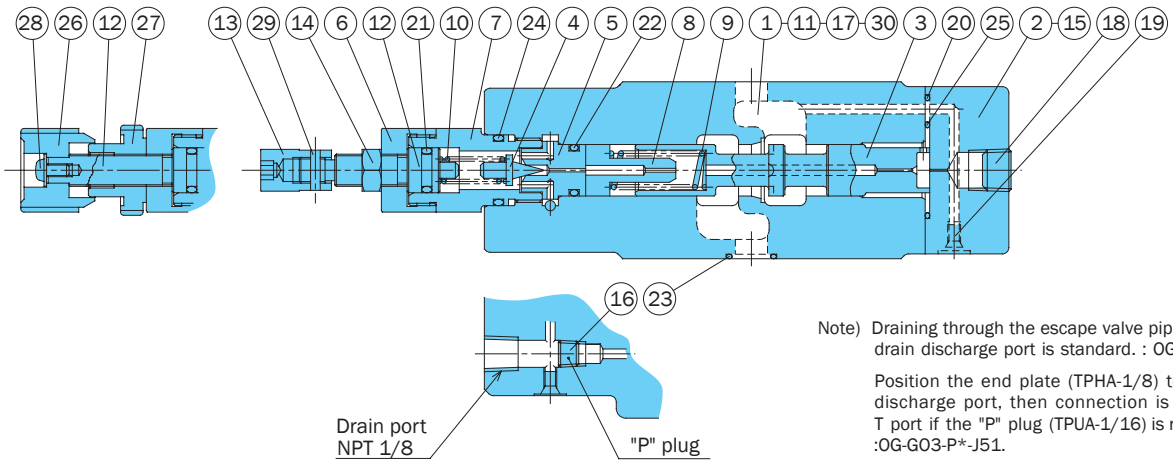
Part No.	Part Name
1	Body
2	Spool
3	Bushing
4	Retainer
5	Guide
6	Spring
7	Plate
8	Screw
9	Nut
10	Plug
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Knob
16	Nut
17	Screw

Seal Part List (Kit Model Number BRBS-01GP*)

Part No.	Part Name	Part Number	Q'ty P
11	O-ring	1B-P9	4
12	O-ring	1A-P18	1
13	O-ring	1B-P20	1
14	O-ring	1B-P26	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

0G-G03-P*-E51



Note) Draining through the escape valve piped to the drain discharge port is standard. : 0G-G03-P*-B-J51

Position the end plate (TPHA-1/8) to the drain discharge port, then connection is made to the T port if the "P" plug (TPUA-1/16) is removed. :0G-G03-P*-J51.

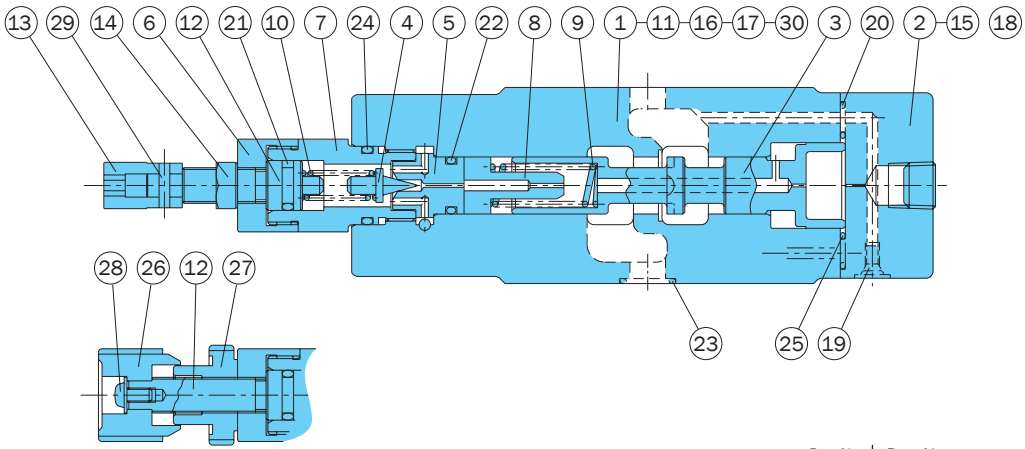
Seal Part List (Kit Model Number BRES-03GP-1A)

Part No.	Part Name	Part Number	Q'ty P
20	O-ring	1B-P6	2
21	O-ring	1A-P10A	1
22	O-ring	1B-P12	1
23	O-ring	AS568-014(Hs90)	5
24	O-ring	1B-P18	1
25	O-ring	AS568-023(Hs90)	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name	Part No.	Part Name
1	Body	14	Nut
2	Cover	15	Screw
3	Spool	16	Plug
4	Poppet	17	Plug
5	Seat	18	Plug
6	Bushing	19	Plug
7	Retainer	20	O-ring
8	Choke	21	O-ring
9	Spring	22	O-ring
10	Spring	23	O-ring
11	Plate	24	O-ring
12	Screw	25	O-ring
13	Nut	26	Knob
		27	Nut
		28	Screw
		29	Pin
		30	Pin

0G-G03-PC-E51



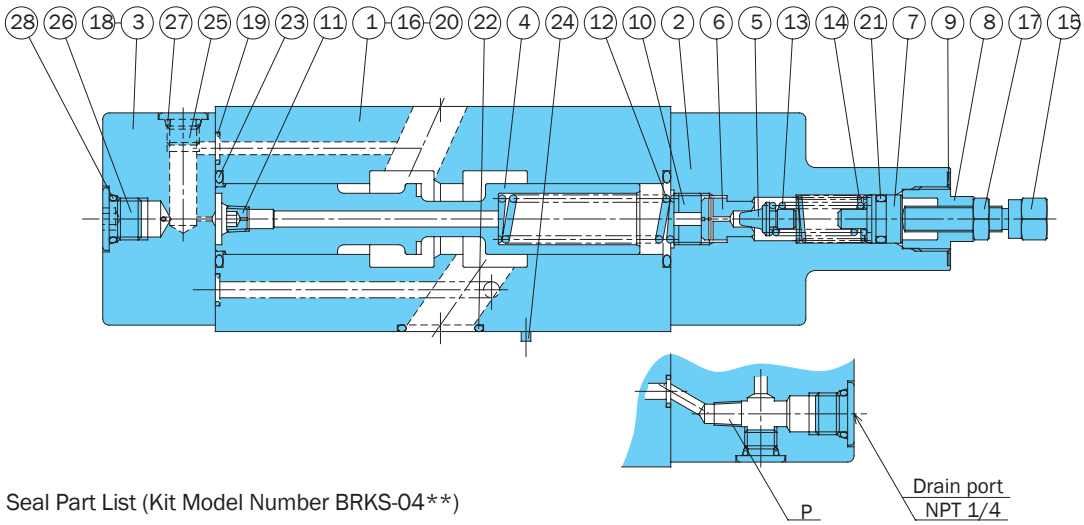
Seal Part List (Kit Model Number BRES-03GP*-1A)

Part No.	Part Name	Part Number	Q'ty P
20	O-ring	1B-P6	2
21	O-ring	1A-P10A	1
22	O-ring	1B-P12	1
23	O-ring	AS568-014(Hs90)	5
24	O-ring	1B-P18	1
25	O-ring	AS568-023(Hs90)	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name	Part No.	Part Name
1	Body	16	Plug
2	Cover	17	Plug
3	Spool	18	Plug
4	Poppet	19	Plug
5	Seat	20	O-ring
6	Bushing	21	O-ring
7	Retainer	22	O-ring
8	Choke	23	O-ring
9	Spring	24	O-ring
10	Spring	25	O-ring
11	Plate	26	Knob
12	Screw	27	Nut
13	Nut	28	Screw
14	Nut	29	Pin
15	Screw	30	Pin

OGH-G04-P*-E10



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Poppet
6	Seat
7	Plunger
8	Retainer
9	Plate
10	Collar
11	Choke
12	Spring
13	Spring
14	Spring
15	Screw
16	Plate
17	Nut
18	Screw
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	O-ring
24	Pin
25	Plug
26	Plug
27	O-ring
28	O-ring

Seal Part List (Kit Model Number BRKS-04**)

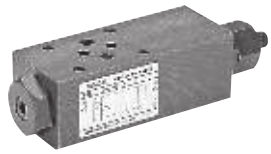
Part No.	Part Name	Part Number	Q'ty	
			G	GB
19	O-ring	1B-P7	4	4
20	O-ring	AS568-012(Hs90)	2	2
21	O-ring	1A-P11	1	1
22	O-ring	AS568-118(Hs90)	4	4
23	O-ring	1B-G25	2	2
27	O-ring	1B-P8	4	4
28	O-ring	1B-P11	3	2

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify G (internal drain) or GB (external drain) for the asterisk (*) in the kit model number.

Note:
In the standard configuration, OGH-G04-P*-10 does not require a P plug, while OGH-G04-P*-B-10 requires a P plug (TPUA-1/16) and drain pipe from the cover.

Balanced Piston Type Pressure Reducing Modular Valve

10.5 gpm
21 to 3625 psi



Features

This modular valve makes the pressure in part of the circuit lower than the main circuit.
Even when pressure changes in the primary main circuit, the reduced secondary pressure is maintained at a constant level.
Compared with the direct type, this type of valve has outstanding Pressure-Flow Rate Characteristics, and a superior flow rate in the low pressure control range.
Maximum operating pressure: 3625 psi.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
OGB-G01-PC-20 P1 P3	1/8	3625	10.5	21 to 500 115 to 1000 500 to 3000	4.1	ISO 4401-03-02-0-94
OGB-G01-AC-20 A1 A3				21 to 500 115 to 1000 500 to 3000	4.1	
OGB-G01-BC-20 B1 B3				21 to 500 115 to 1000 500 to 3000	4.1	

Understanding Model Numbers

OGB – G 01 – P 1 – (K) – 20

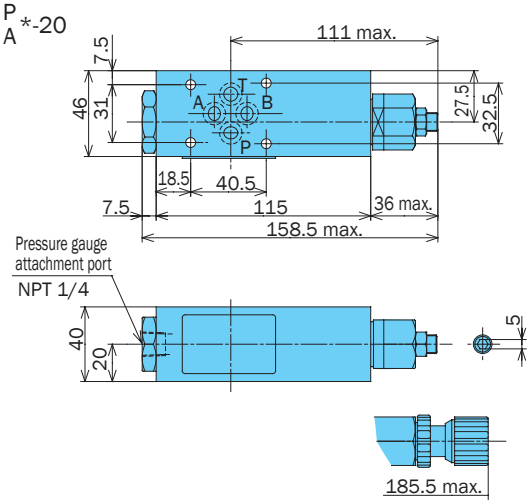
- Design number
- Auxiliary symbol K: With handle
- Pressure adjustment range C, 1, 3
- Control port P: P port A: A port B: B port
- Nominal diameter (size) 01
- Mounting method G: Gasket type
- Balanced piston type pressure reducing modular valve

• Handling
1 See the Pressure-Flow Rate Characteristics for information about how the flow rate is controlled at low pressures.
2 Note that a change in tank port back pressure causes a change in setting pressure.
3 Vent piping is not possible.
4 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.

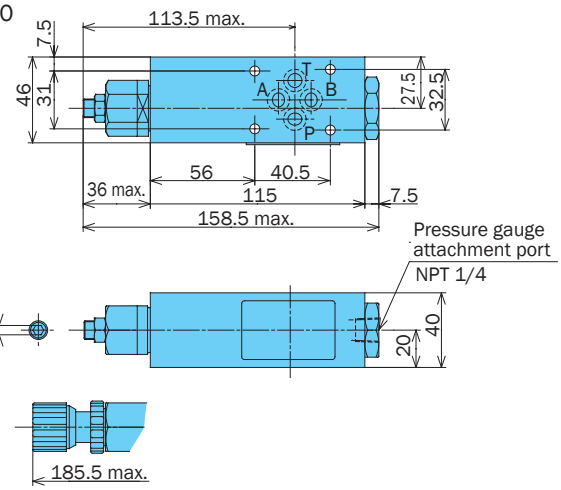
Installation Dimension Drawings

Note: Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

OGB-G01-$\frac{P}{A}$*-20



OGB-G01-B*-20

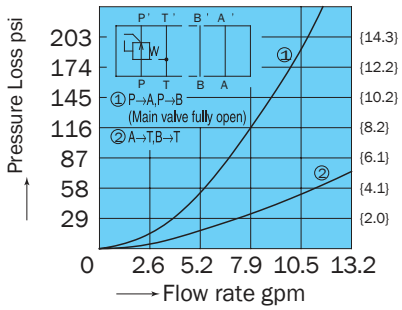


Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

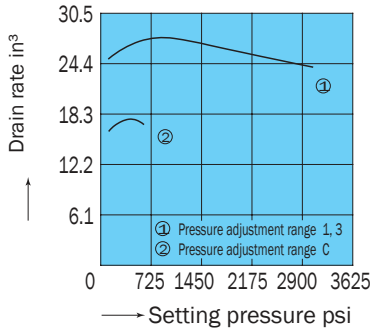
Pressure Loss Characteristics

OGB-G01-P*-20



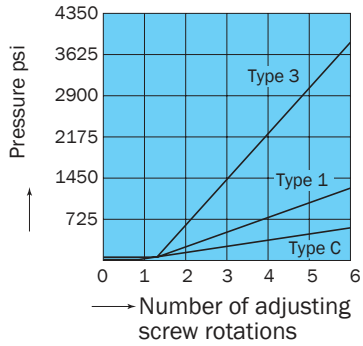
Pressure – Drain Rate Characteristics

OGB-G01-**-20



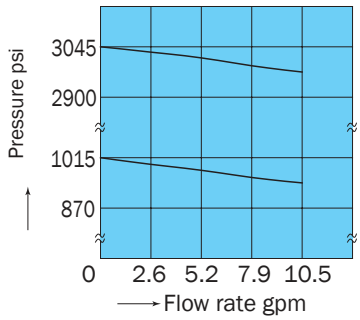
Number of Adjusting Screw Rotations – Pressure Characteristics

OGB-G01-P*-20

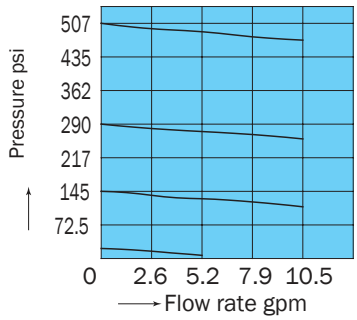


Pressure – Flow Rate Characteristics

OGB-G01-* $\frac{1}{3}$-20

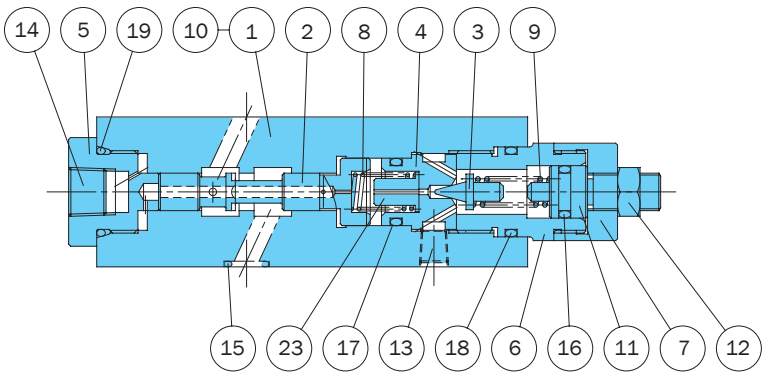


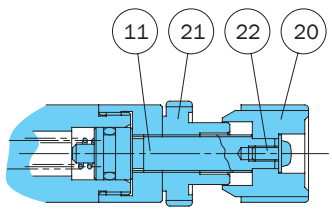
OGB-G01-*C-20



Cross-sectional Drawing

OGB-G01-P*-20





Part No.	Part Name
1	Body
2	Spool
3	Poppet
4	Seat
5	Bushing
6	Retainer
7	Bushing
8	Spring
9	Spring
10	Plate
11	Screw
12	Nut
13	Plug
14	Plug
15	O-ring
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	Knob
21	Nut
22	Screw
23	Choke

Seal Part List (Kit Model Number BRBS-01GB*)

Part No.	Part Name	Part Number	Q'ty		
			P	A	B
15	O-ring	1B-P9	4	4	4
16	O-ring	1A-P10A	1	1	1
17	O-ring	1B-P14	1	1	1
18	O-ring	1B-P20	1	1	1
19	O-ring	1B-P20	1	1	1

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify P, A, or B for the asterisk (*) in the kit model number.

Pressure Reducing Modular Valve

10.5 to 79 gpm
3625 to 5075 psi

Features

This modular valve makes the pressure in part of the circuit lower than the main circuit.

Even when pressure changes in the primary main circuit, the reduced secondary pressure is maintained at a constant level.

Maximum Operating Pressure: 3625 to 5075 psi.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
OG-G01-AC-21 A1 A2	1/8	3625	10.5	21 to 500 115 to 1000 500 to 2320	2.8	ISO 4401-03-02-0-94
OG-G01-BC-21 B1 B2				21 to 500 115 to 1000 500 to 2320	2.8	
OG-G03-AC-J51 A1 A3	3/8	3625	21.1 but C : 13.2	36 to 500 115 to 1000 500 to 3000	8.3	ISO 4401-05-04-0-94
OG-G03-BC-J51 B1 B3				36 to 500 115 to 1000 500 to 3000	8.3	
OGH-G04-A1-10 A3	1/2	5075	79.2	115 to 1000 500 to 3625	17.6	ISO 4401-07-06-0-94
OGH-G04-B1-10 B3				115 to 1000 500 to 3625	17.6	

• Handling

1 When using a remote control valve in a vent circuit, certain vent circuit pipe capacities can cause vibration. Because of this, thick steel pipe with an inside diameter of φ 4mm that is no longer than three meters is recommended. Vent piping cannot be used with the 01, 03 sizes.

2 With the 01, 03 sizes, the flow rate is limited at low pressures. See the Pressure-Flow Rate Characteristics on page F-37 and F-38 for more information.

3 For the 03 size, the drainage can be allowed to escape through the T port. In the case of a valve with the auxiliary symbol B, however, run a return pipe from the drain discharge port directly to the tank.

4 With the 04 sizes, piping is not required because drainage can be allowed to escape from the gasket side drain port. In the case of a valve with the auxiliary symbol B, however, run a return pipe from the drain discharge port directly to the tank.

5 Note that a change in drain back pressure causes a change in setting pressure.

6 Note that a sub plate and installation bolts are not included. See pages H4and F87-89 if these items are required.

7 04 series modular valves do not have an L (DR2) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

8 With the 03, 04 sizes, the control port can be changed by altering the attachment orientation of the back cover. See the installation diagram for more information.
After making this change, be sure also to make the other changes as in accordance with the model number indicated on the nameplate.

9 Use the P port control valve concurrently with the 01 size central all-port-block (C5) solenoid valve if when the valve is in the central position and external pressure may cause the pressure at the control port to exceed the set pressure.

Understanding Model Numbers

01, 03 size

OG – G 01 – P 1 – (K) – 20

- 20 — Design number E: NPT piping (01, 03)
- (K) — Auxiliary symbol K: With handle
- 1 — Pressure adjustment range C, 1, 3
- P — Control port A: A port B: B port
- 01 — Nominal diameter (size) 01, 03
- G — Mounting method G: Gasket type
- OG — Balanced piston type pressure reducing modular valve

Understanding Model Numbers

04 size

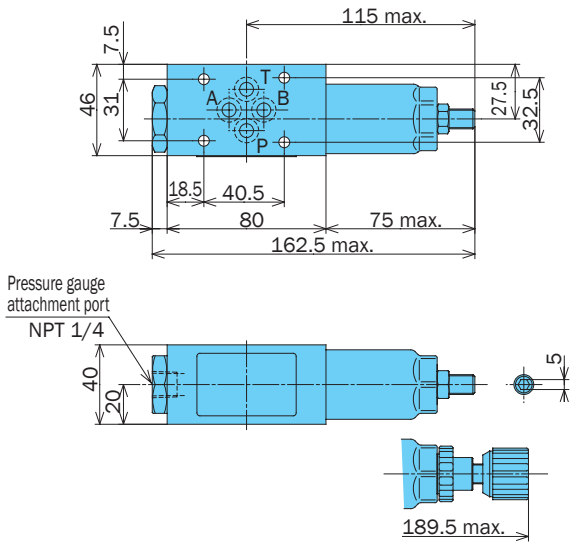
OGH – G 04 – A 1 – (B) – 10

- Design number
- Auxiliary symbol B: See note 4 under "Handling."
- Pressure adjustment range 1, 3
- Control port A: A port B: B port
- Nominal diameter (size) 04
- Mounting method G: Gasket type
- M35 Series pressure reducing modular valve

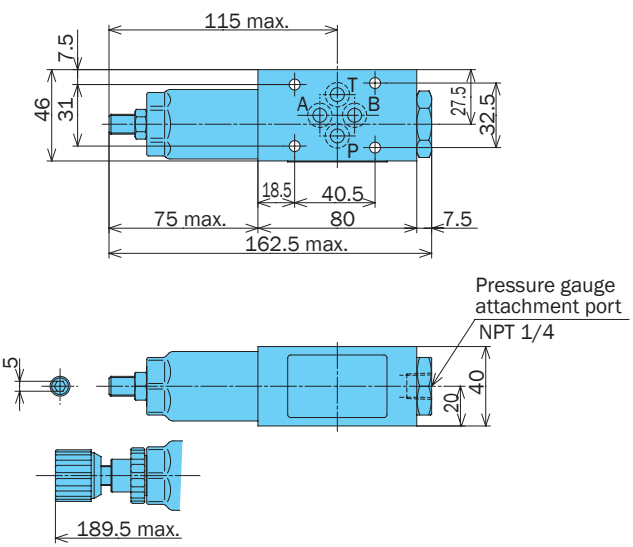
Installation Dimension Drawings

Note: Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

OG-G01-A*-E21



OG-G01-B*-E21



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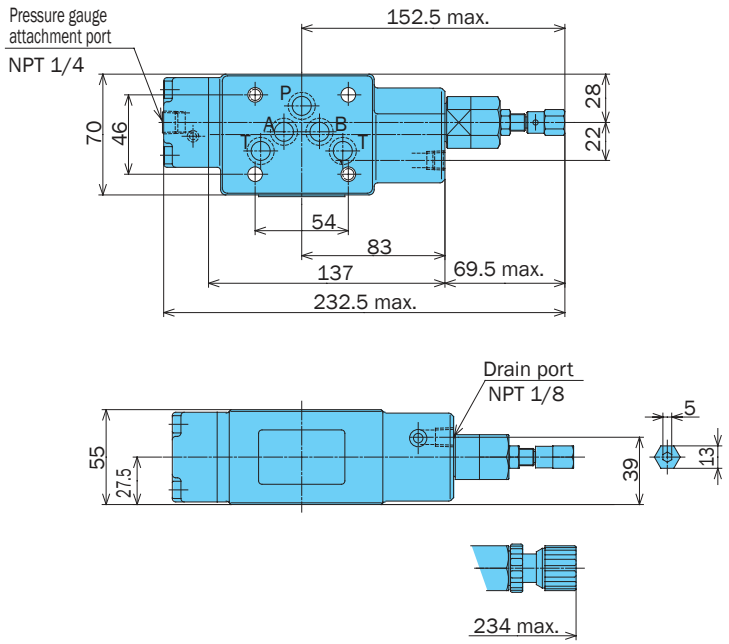
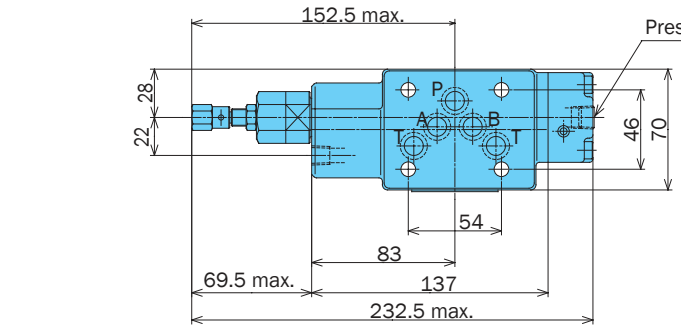
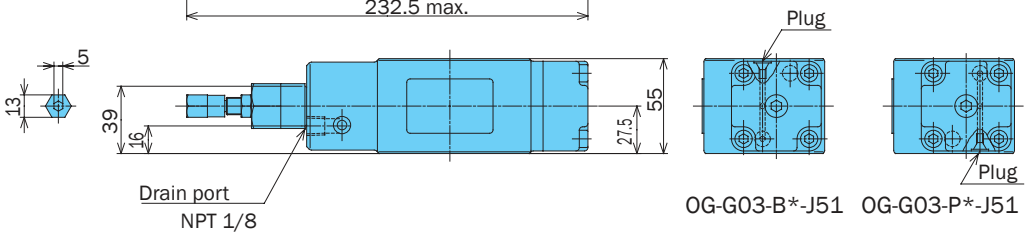


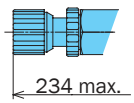
OG-G03-B*-E51



Note: 1. Conversion to P port control is possible by changing the back cover. Port control is determined by plug orientation.
2. When replacing the back cover, be sure also to change the nameplate to the applicable model type.
3. The tightening torque of the back cover bolts is: (M6) 7 - 9.5 ft lbs.

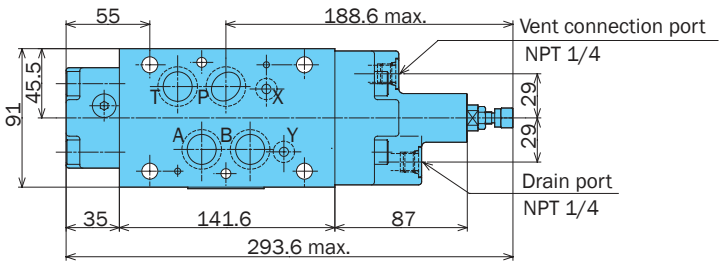


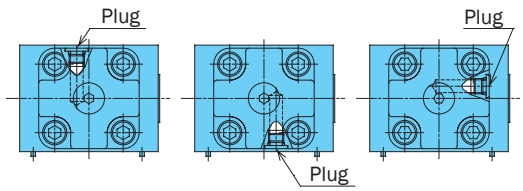
OG-G03-B*-J51 OG-G03-P*-J51

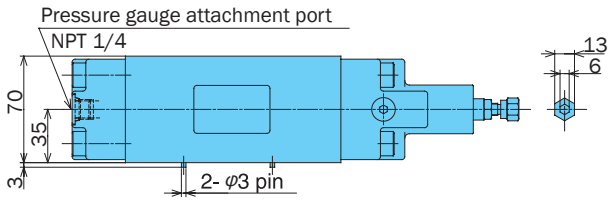


OGH-G04-A*-10

Note: 1. Conversion to P, B port control is possible by changing the back cover. Port control is determined by plug orientation.
2. When replacing the back cover, be sure also to change the nameplate to the applicable model type.
3. The tightening torque of the back cover bolts is: (M10) 33 - 40 ft lbs.







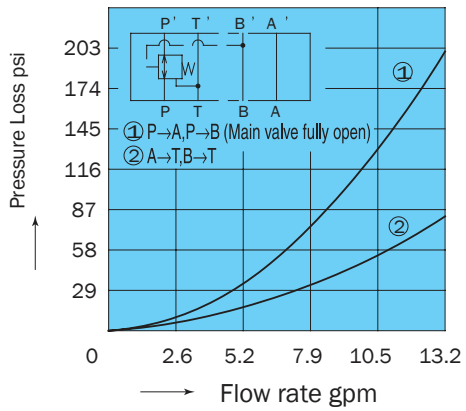
OGH-G04-P*-10 OGH-G04-B*-10 OGH-G04-A*-10

Performance Curves

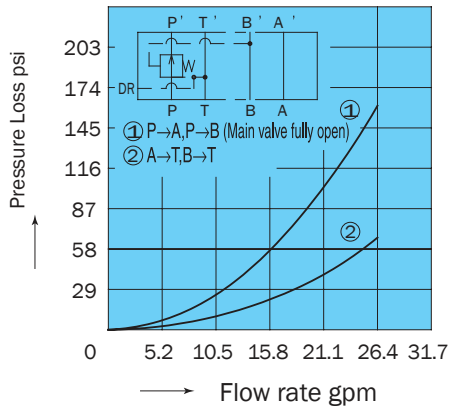
Hydraulic Operating Fluid Viscosity 32 centistokes.

Pressure Loss Curve

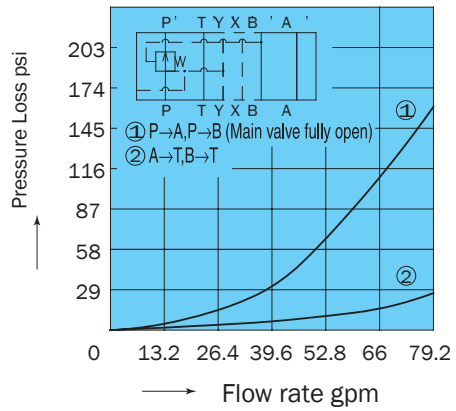
OG-G01-B*-21



OG-G03-B*-J51

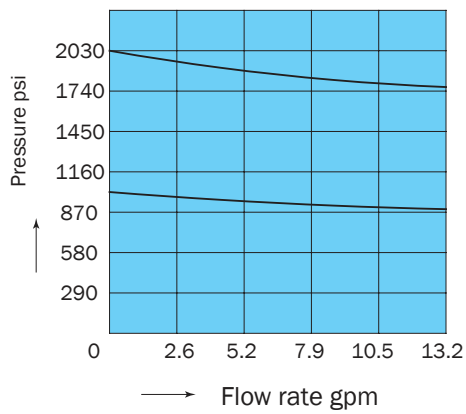


OGH-G04-**-10

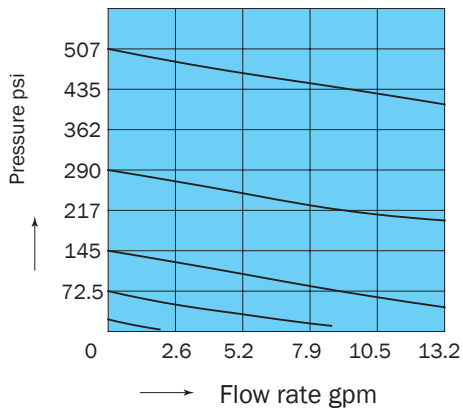


Pressure – Flow Rate Characteristics

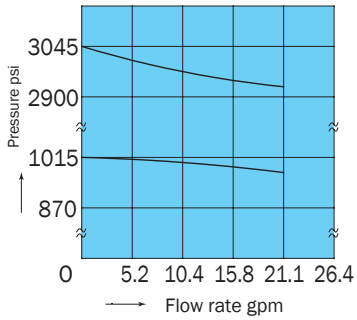
OG-G01-B $\frac{1}{2}$-21



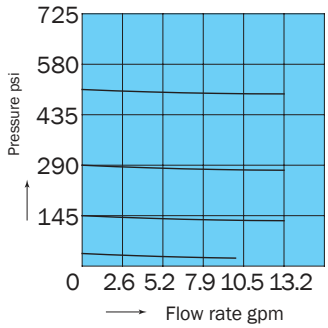
OG-G01-BC-21



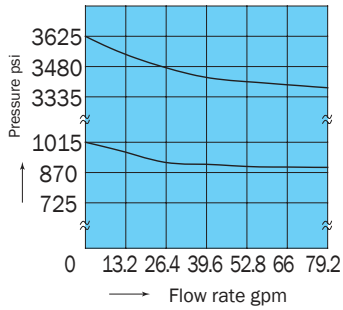
OG-G03-B $\frac{1}{3}$-J51



OG-G03-BC-J51

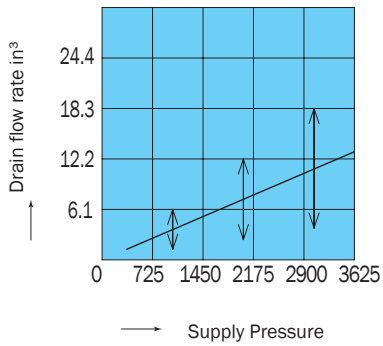


OGH-G04-**-10

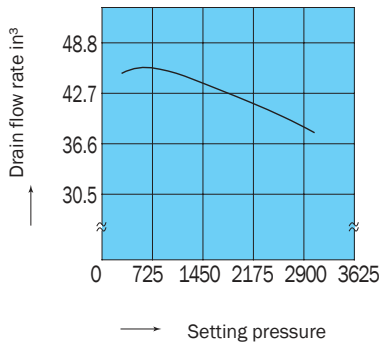


Pressure - Drain Rate Characteristics

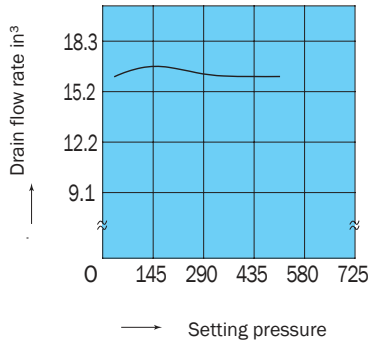
OG-G01-B*-21



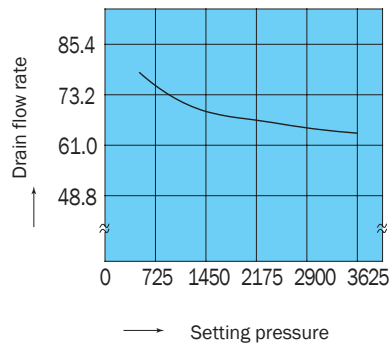
OG-G03-B*-J51



OG-G03-BC-J51

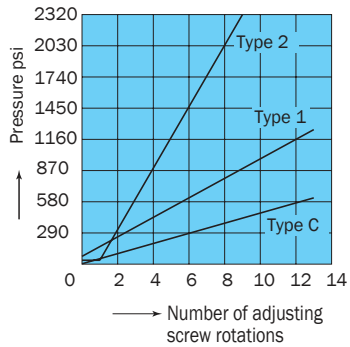


OGH-G04-*3-10

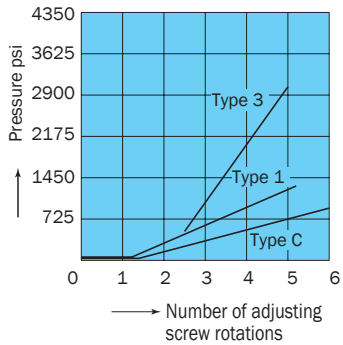


Number of Adjusting Screw Rotations - Pressure Characteristics

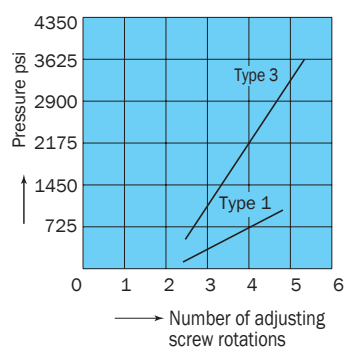
OG-G01-**-21



OG-G03-**-*-51

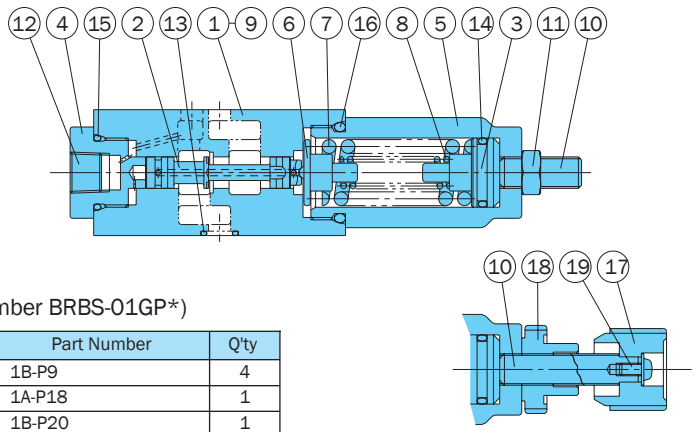


OGH-G04-**-10



Cross-sectional Drawing

OG-G01-A2-21



Part No.	Part Name
1	Body
2	Spoal
3	Push rod
4	Bushing
5	Retainer
6	Guide
7	Spring
8	Spring
9	Plate
10	Screw
11	Nut
12	Plug
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Knob
18	Nut
19	Screw

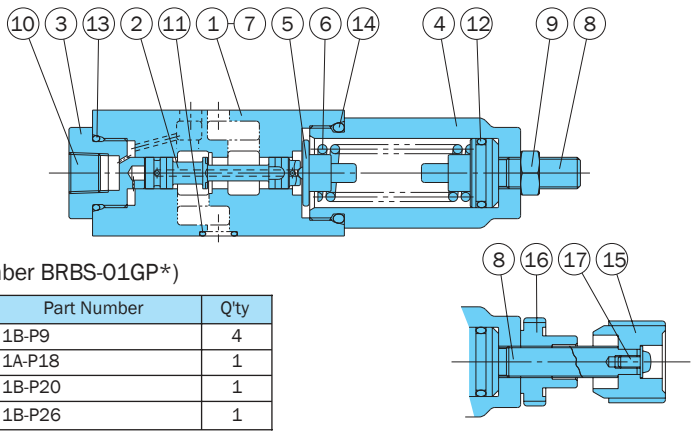
Seal Part List (Kit Model Number BRBS-01GP*)

Part No.	Part Name	Part Number	Q'ty
13	O-ring	1B-P9	4
14	O-ring	1A-P18	1
15	O-ring	1B-P20	1
16	O-ring	1B-P26	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

Note: Part number 8 is used in the case of pressure adjustment range type 2 only.

OG-G01-AC-21



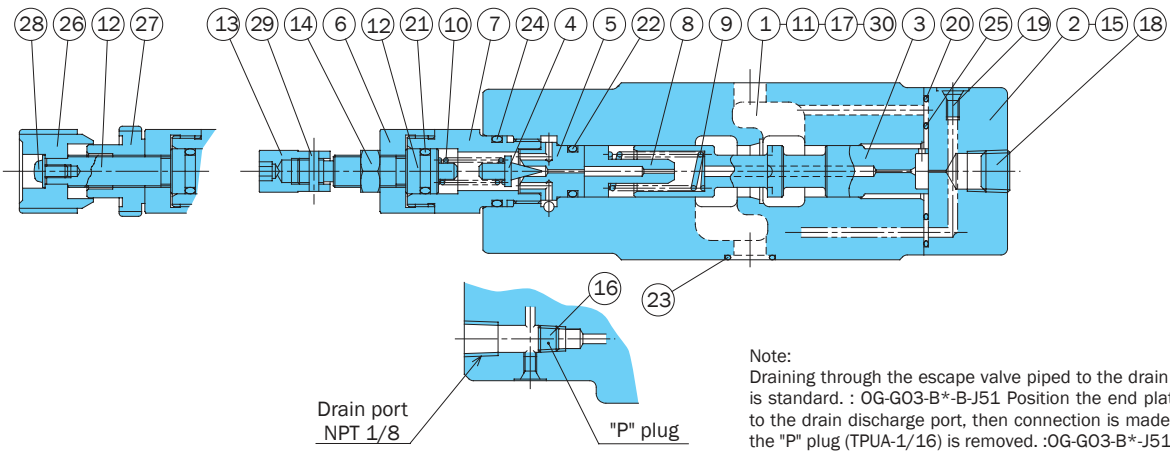
Part No.	Part Name
1	Body
2	Spool
3	Bushing
4	Retainer
5	Guide
6	Spring
7	Plate
8	Screw
9	Nut
10	Plug
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Knob
16	Nut
17	Screw

Seal Part List (Kit Model Number BRBS-01GP*)

Part No.	Part Name	Part Number	Q'ty
11	O-ring	1B-P9	4
12	O-ring	1A-P18	1
13	O-ring	1B-P20	1
14	O-ring	1B-P26	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

OG-G03-B*-J51



Note:
Draining through the escape valve piped to the drain discharge port is standard. : OG-G03-B*-B-J51 Position the end plate (TPHA-1/8) to the drain discharge port, then connection is made to the T port if the "P" plug (TPUA-1/16) is removed. :OG-G03-B*-J51.

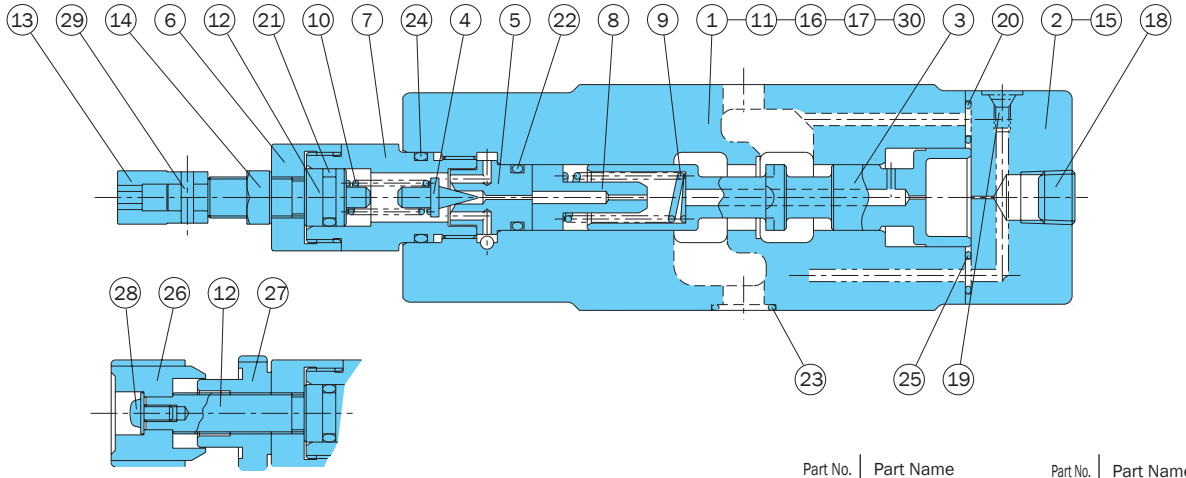
Seal Part List (Kit Model Number BRES-03G*-1A)

Part No.	Part Name	Part Number	Q'ty	
			A	B
20	O-ring	1B-P6	2	2
21	O-ring	1A-P10A	1	1
22	O-ring	1B-P12	1	1
23	O-ring	AS568-014(Hs90)	5	5
24	O-ring	1B-P18	1	1
25	O-ring	AS568-023(Hs90)	1	1

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify A or B for the asterisk (*) in the kit model number.

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	11	Plate	21	O-ring
2	Cover	12	Screw	22	O-ring
3	Spool	13	Nut	23	O-ring
4	Poppet	14	Nut	24	O-ring
5	Seat	15	Screw	25	O-ring
6	Bushing	16	Plug	26	Knob
7	Retainer	17	Plug	27	Nut
8	Choke	18	Plug	28	Screw
9	Spring	19	Plug	29	Pin
10	Spring	20	O-ring	30	Pin

OG-G03-BC-J51



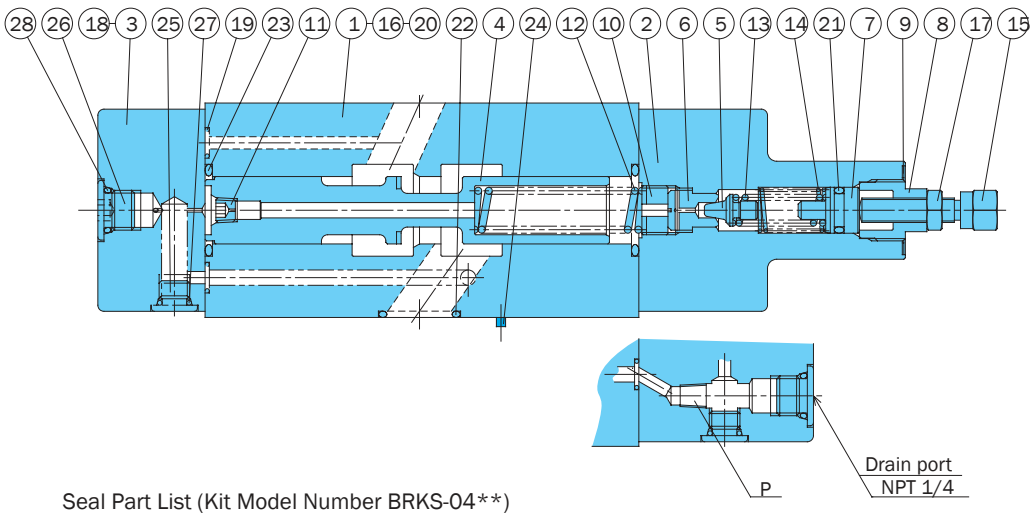
Seal Part List (Kit Model Number BRES-03GC*-1A)

Part No.	Part Name	Part Number	Q'ty	
			A	B
20	O-ring	1B-P6	2	2
21	O-ring	1A-P10A	1	1
22	O-ring	1B-P12	1	1
23	O-ring	AS568-014(Hs90)	5	5
24	O-ring	1B-P18	1	1
25	O-ring	AS568-023(Hs90)	1	1

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify A or B for the asterisk (*) in the kit model number.

Part No.	Part Name	Part No.	Part Name
1	Body	16	Plug
2	Cover	17	Plug
3	Spool	18	Plug
4	Poppet	19	Plug
5	Seat	20	O-ring
6	Bushing	21	O-ring
7	Retainer	22	O-ring
8	Choke	23	O-ring
9	Spring	24	O-ring
10	Spring	25	O-ring
11	Plate	26	Knob
12	Screw	27	Nut
13	Nut	28	Screw
14	Nut	29	Pin
15	Screw	30	Pin

OGH-G04-**-10



Seal Part List (Kit Model Number BRKS-04**)

Part No.	Part Name	Part Number	Q'ty	
			G	GB
19	O-ring	1B-P7	4	4
20	O-ring	AS568-012(Hs90)	2	2
21	O-ring	1A-P11	1	1
22	O-ring	AS568-118(Hs90)	4	4
23	O-ring	1B-G25	2	2
27	O-ring	1B-P8	4	4
28	O-ring	1B-P11	3	2

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify G (internal drain) or GB (external drain) for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Poppet
6	Seat
7	Plunger
8	Retainer
9	Plate
10	Collar
11	Choke
12	Spring
13	Spring
14	Spring
15	Screw
16	Plate
17	Nut
18	Screw
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	O-ring
24	Pin
25	Plug
26	Plug
27	O-ring
28	O-ring

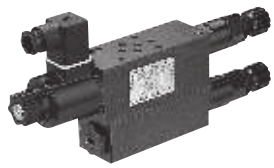
Note:
In the standard configu ration, OGH-G04-**-10 does not require a P plug, while OGH-G04-**-B-10 requires a P plug (TPUA-1/16) and drain pipe from the cover.

NACHI

Pressure Reducing Modular Valve for Two Press Setting

Two-Pressure Reducing Modular Valve

10.5 gpm
29 to 2030 psi



Features

When the pressure in part of the circuit is lower than the main circuit, this modular valve controls pressure by switching the low pressure to secondary pressure (high pressure, low pressure).
Even when pressure changes in the primary main circuit, the reduced secondary pressure is maintained at a constant level.
Maximum Operating Pressure: 1000, 3625 psi

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi		Weight lbs	Gasket Surface Dimensions
				Low pressure side	High pressure side		
OGS-G01-PCC-K-**-22 P1C	1/8	1000	10.5	29 to 500	29 to 5000	10.5	ISO 4401-03-02-0-94
					115 to 1000		
P21		3625		115 to 1000	500 to 2030		

Solenoid Specifications

Model No.	Rated Voltage	Starting Current	Holding Current	Holding Power
OGS-G01-P**-K- C1-22	AC100V 50/60HZ	2.2/2.0A	0.52/0.38A	25/22W
C2	AC200V 50/60HZ	1.1/1.0A	0.26/0.19A	25/22W
D1	DC12V	2.2A		26W
D2	DC24V	1.1A		26W

Understanding Model Numbers

OGS – G 01 – P 1 C – K(R) – C1 – 22

- 22 — Design number
- C1 — Power supply C1 : AC100V, C2 : AC200V, D1 : DC12V, D2 : DC24V
- K(R) — Auxiliary symbol K: With handle (standard), R: With indicator light (optional), GR: With surgeless type indicator light (Option)
- C — Low pressure side pressure adjustment range C, 1
- 1 — High pressure side pressure adjustment range C, 1, 2
  (There is no 11, 2C combination.)
- P — Control port P: P port
- 01 — Nominal diameter (size) 01
- G — Mounting method G: Gasket type
- OGS — Pressure reducing modular valve for two-press setting

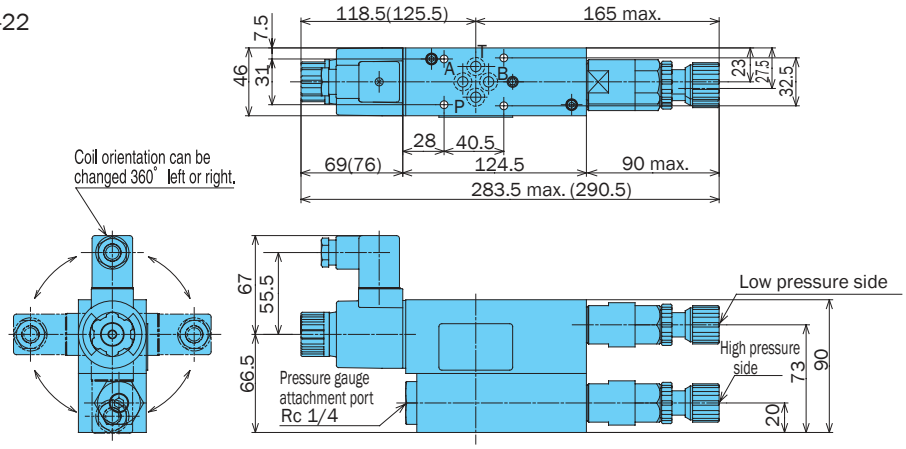
• Handling

1 See the Pressure-Flow Rate Characteristics for information about how the flow rate is controlled at low pressures.
2 Note that a change in tank port back pressure causes a change in setting pressure.
3 Instability occurs when there is a small setting pressure differential between the high pressure and low pressure, so be sure to maintain at least the minimum pressure differentials described below.
C Type:
At least 43 psi
1, 2 Type:
At least 72 psi
4 Vent piping is not possible.
5 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.
6 Low pressure is attained when the solenoid is on.
7 The coil surface temperature increases if this pump is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.
8 The wiring in the connector is the same as the SA series wet type solenoid valve. (See page D-22)

Installation Dimension Drawings

Note: 1. Dimensions in parentheses apply in the case of a DC solenoid
2. Pressure is increased by clockwise (rightward) rotation of the adjusting handle, and decreased by counterclockwise (leftward) rotation.

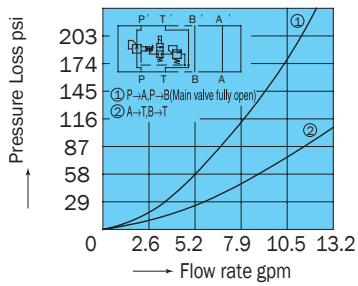
OGS-G01-P*C-K(R)-**-22



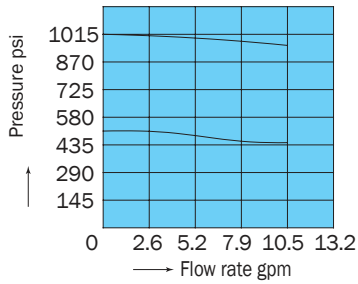
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

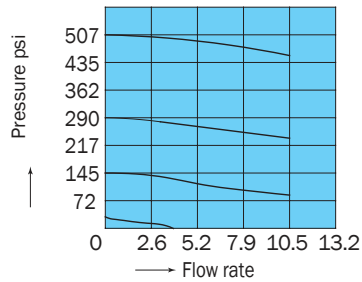
Pressure Loss Characteristics
OGS-G01-PIC-K-**-22



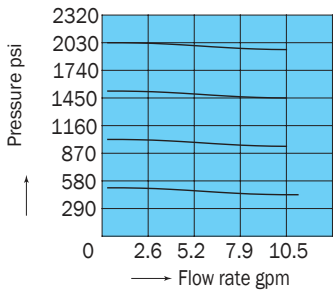
Pressure – Flow Rate Characteristics
OGS-G01-PIC-K-**-22
(Type 1)



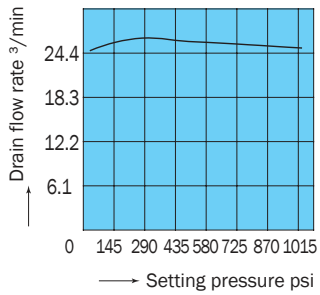
OGS-G01-P*C-K-**-22
(Type C))



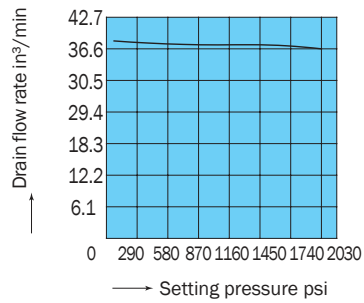
Pressure – Flow Rate Characteristics
OGS-G01-P21-K-**-22
(Type 2)



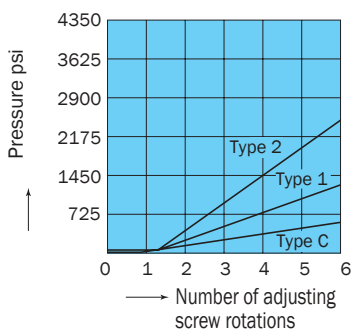
Pressure – Drain Rate Characteristics
OGS-G01-PIC-K-**-22



Pressure – Drain Rate Characteristics
OGS-G01-P21-K-**-22

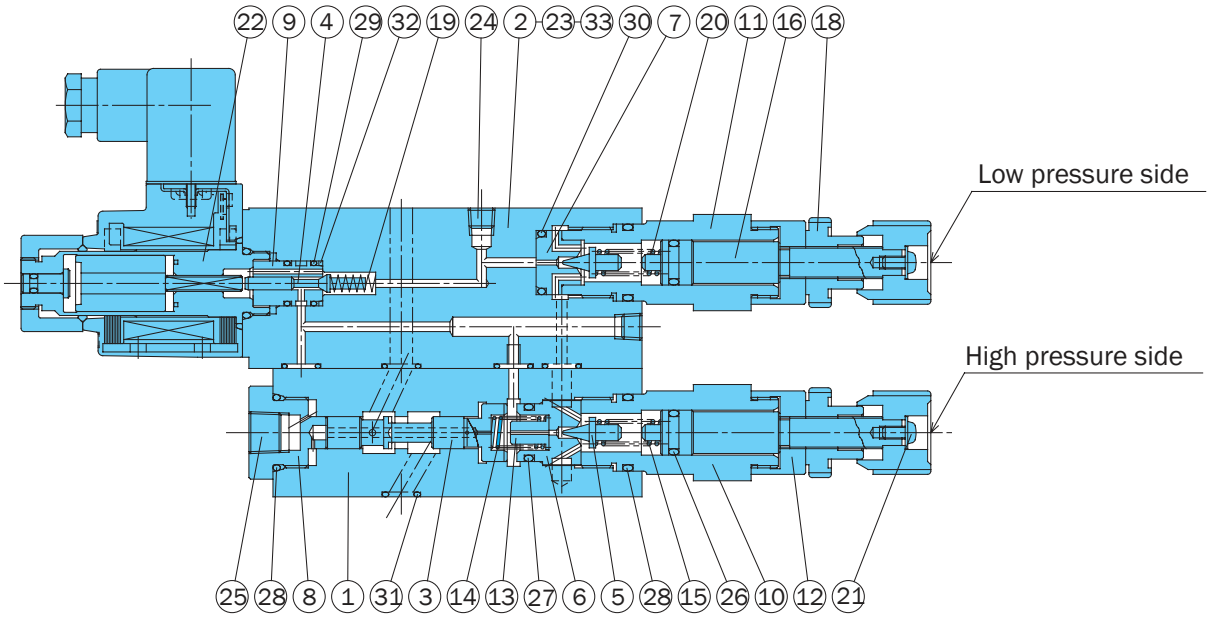


Number of Adjusting Screw Rotations Pressure Characteristics
OGS-G01-P**-22



Cross-sectional Drawing

OGS-G01-P*C-K(R)-**1-22



Seal Part List (Kit Model Number BRBS-01GSP-1A)

Part No.	Part Name	Part Number	Q'ty
26	O-ring	1A-P10A	2
27	O-ring	1B-P14	1
28	O-ring	1B-P20	3
29	O-ring	AS568-013(Hs90)	2
30	O-ring	1B-P16	1
31	O-ring	1B-P9	11
32	Backup ring	For AS568-013	1

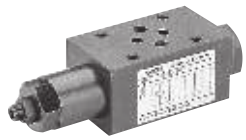
Note: 1.O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name
1	Body
2	Body
3	Spool
4	Spool
5	Poppet
6	Seat
7	Seat
8	Bushing
9	Sleeve
10	Retainer
11	Retainer
12	Bushing
13	Choke
14	Spring
15	Spring
16	Screw
17	Knob

Part No.	Part Name
18	Nut
19	Spring
20	Spring
21	Screw
22	Solenoid assy
23	Screw
24	Plug
25	Plug
26	O-ring
27	O-ring
28	O-ring
29	O-ring
30	O-ring
31	O-ring
32	Backup ring
33	Plate

Sequence Modular Valve

10.5 to 21 gpm
3625 psi



Features

This modular valve is a pressure control valve used for sequential actuator operations and for maintaining main circuit pressure.

Pressure adjustment is possible across a wide range, from 36 to 3045 psi.

Maximum Operating Pressure: 3625 psi.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
OQ-G01-P21-20 P23	1/8	3625	10.5	115 to 1000 500 to 3045	2.4	ISO 4401-03-02-0-94
OQ-G03-P2A-J50 P2C P2E	3/8	3625	21	36 to 123 123 to 500 500 to 2030	7.7	ISO 4401-05-04-0-94

Understanding Model Numbers

OQ – G 03 – P 2 A – (K) – J50

- Design number
  Note: For 01 size, 20
  For 03 size, relationship between mounting bolts and design number is indicated as J50: M6, 50: M8.
- Auxiliary symbol K: With handle (01, 03 size)
- Pressure adjustment range
- Type 2: Internal pilot External drain
- Control port P: P port
- Nominal diameter (size) 01, 03
- Mounting method G: Gasket type
- Sequence modular valve

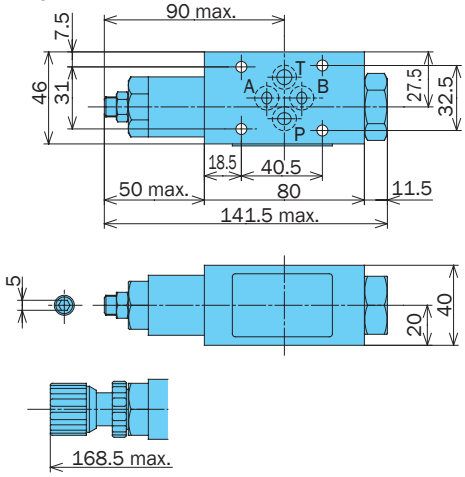
• Handling

1 The pressure adjustment range is expressed in terms of cracking pressure.
2 Install this valve directly above the sub plate or manifold.
3 When two or more of these valves are ganged in sequence, make sure the setting pressure differential between them is at least 145 psi.
4 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.

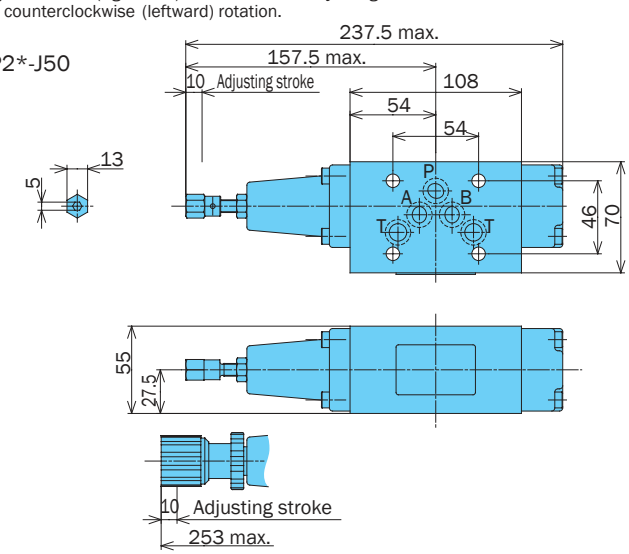
Installation Dimension Drawings

Note: Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

OQ-G01-P2*-20



OQ-G03-P2*-J50

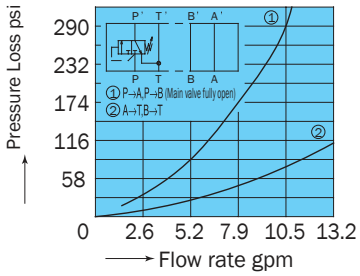


Performance Curves

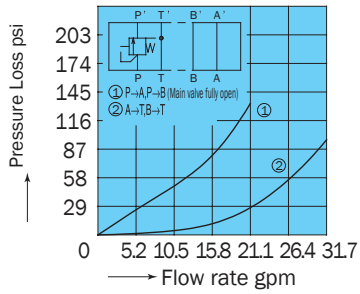
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

0Q-G01-P2*-20

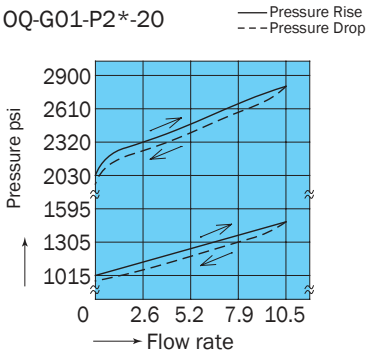


0Q-G03-P2A-J50

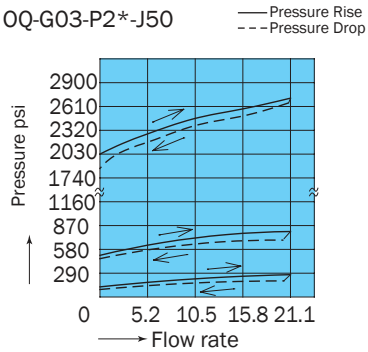


Pressure - Flow Rate Characteristics

0Q-G01-P2*-20

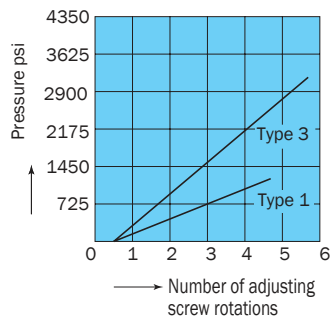


0Q-G03-P2*-J50

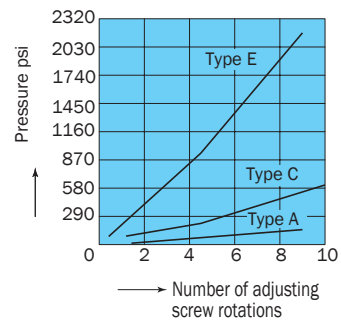


Number of Adjusting Screw Rotations - Pressure Characteristics

0Q-G01-P2*-20



0Q-G03-P2*-J50

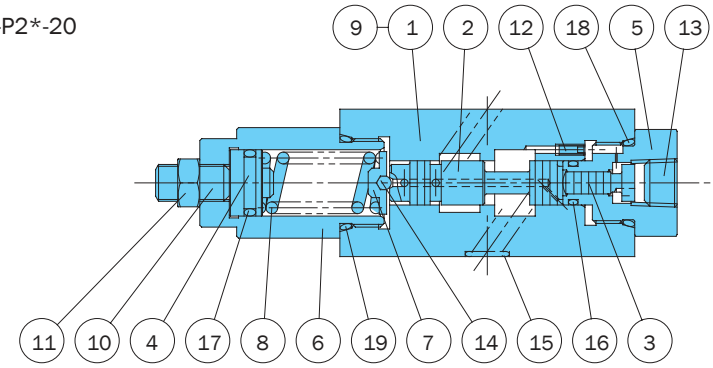


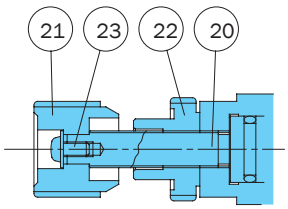
F

Modular Valves

Installation Dimension Drawings

0Q-G01-P2*-20





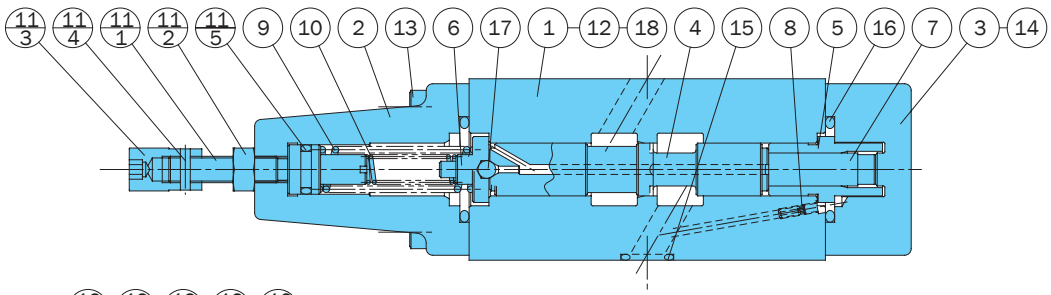
Part No.	Part Name
1	Body
2	Spool
3	Piston
4	Plunger
5	Bushing
6	Retainer
7	Guide
8	Spring
9	Plate
10	Screw
11	Nut
12	Choke
13	Plug
14	Ball
15	O-ring
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	Screw
21	Knob
22	Nut
23	Screw

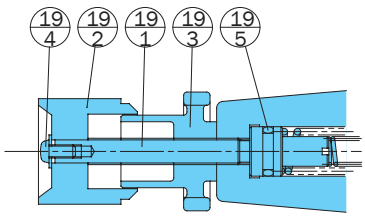
Seal Part List (Kit Model Number BRBS-01QP)

Part No.	Part Name	Part Number	Q'ty P
15	O-ring	1B-P9	4
16	O-ring	1B-P9	1
17	O-ring	1A-P14	1
18	O-ring	1B-P20	1
19	O-ring	1B-P22	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

0Q-G03-P2*-J50





Note: The 10 spring is not included with pressure adjustment Type A.

Seal Part List (Kit Model Number BRES-03QP)

Part No.	Part Name	Part Number	Q'ty P
11(19)$_5$	O-ring	1B-P11	1
15	O-ring	AS568-014(Hs90)	5
16	O-ring	1B-P26	2

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Sleeve
6	Guide
7	Plunger
8	Choke
9	Spring
10	Spring
11	Screw kit
11$_1$	Screw
11$_2$	Nut
11$_3$	Nut
11$_4$	Pin
11$_5$	O-ring
12	Plate
13	Screw
14	Screw
15	O-ring
16	O-ring
17	Ball
18	Pin
19	Handle kit
19$_1$	Screw
19$_2$	Knob
19$_3$	Nut
19$_4$	Screw
19$_5$	O-ring

Counter Balance Modular Valve

10.5 to 79 gpm
2030 psi

Features

This modular valve is used to control actuator back pressure and for other pressure control valve applications.

Pressure adjustment is possible across a wide range, from 36 to 2030 psi

Maximum Operating Pressure: 3625, 5075 psi

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
OCQ-G01-A11-20 A12	1/8	3625	10.5	115 to 1000 500 to 2030	2.4	ISO 4401-03-02-0-94
OCQ-G01-B11-20 B12				115 to 1000 500 to 2030	2.4	
OCQ-G03-A1A-J50 A1C A1E	3/8	3625	21	36 to 123 123 to 500 500 to 2030	7.7	ISO 4401-05-04-0-94
OCQ-G03-B1A-J50 B1C B1E				36 to 123 123 to 500 500 to 2030	7.7	
OQH-G04-A1A-10 A1C A1E	1/2	5075	79	36 to 123 72 to 500 290 to 2030	17.6	ISO 4401-07-06-0-94
OQH-G04-B1A-10 B1C B1E				36 to 123 72 to 500 290 to 2030	17.6	

• Handling

1 The pressure adjustment range is expressed in terms of cracking pressure.
2 Run tank port piping directly to the tank, and ensure that back pressure is as small as possible.
3 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.
4 04 series modular valves do not have an L (DR2) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

Understanding Model Numbers

01, 03 size

OCQ – G 03 – B 1 A – (K) – J50

- J50: Design number
  Note: For 01 size, 20
  For 03 size, relationship between mounting bolts and design number is indicated as J50: M6, 50 : M8.
- (K): Auxiliary symbol K: With handle (01, 03 size)
- A: Pressure adjustment range
- 1: Type 1 { Internal pilot / Internal drain
- B: Control port A: A port / B: B port
- 03: Nominal diameter (size) 01, 03
- G: Mounting method G: Gasket type
- OCQ: Counter balance modular valve

Understanding Model Numbers

04 size

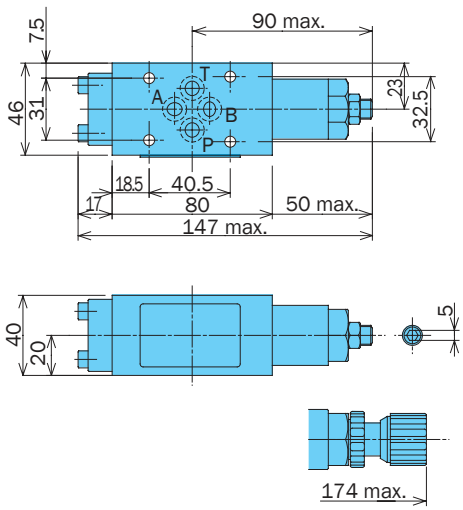
OQH – G 04 – B 1 A – 10

- Design number
- Pressure adjustment range A, C, E
- Type 1 { Internal pilot / Internal drain
- Control port A: A port / B: B port
- Nominal diameter (size) 04
- Mounting method G: Gasket type
- M35 Series counter balance modular valve

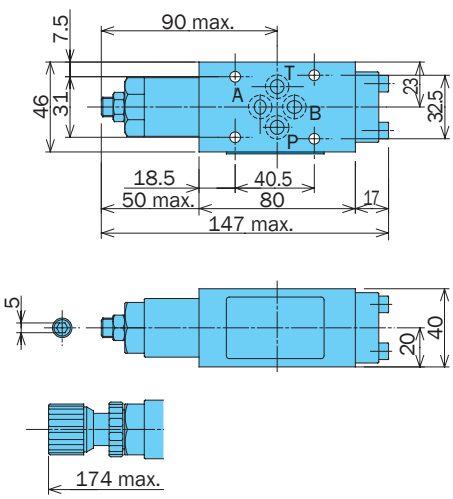
Installation Dimension Drawings

Note: Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

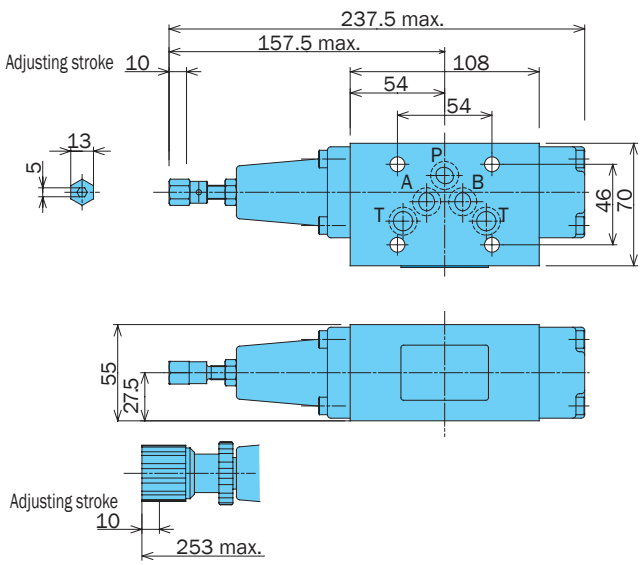
OCQ-G01-A1*-20



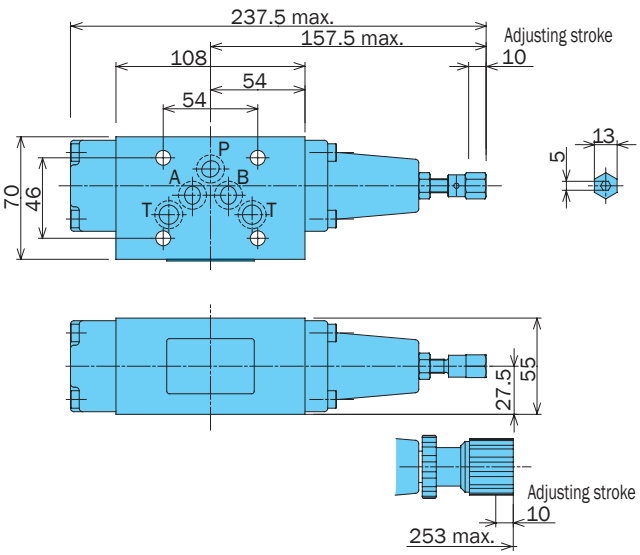
OCQ-G01-B1*-20



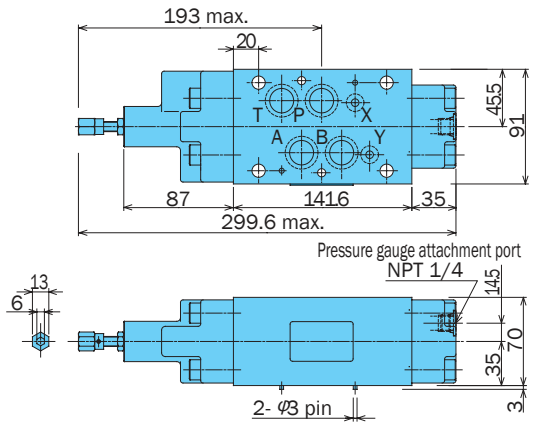
OCQ-G03-A1*-J50



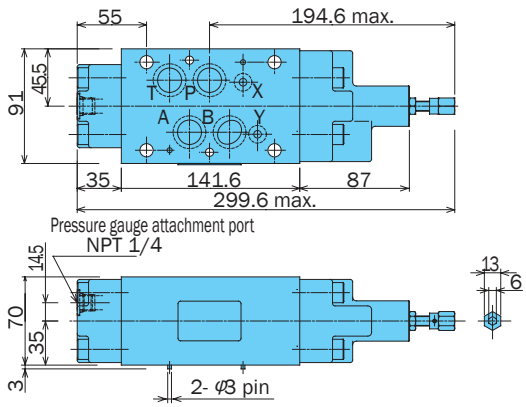
OCQ-G03-B1*-J50



OQH-G04-A1*-10



OQH-G04-B1*-10

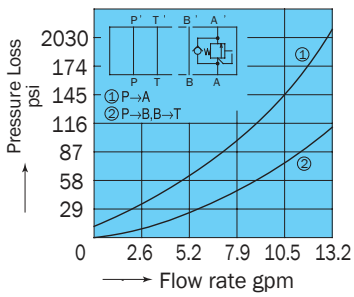


Performance Curves

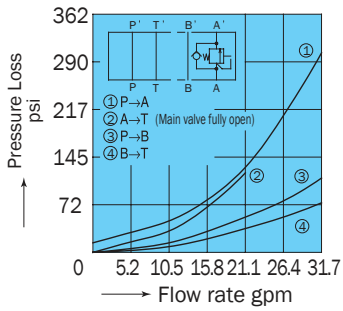
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

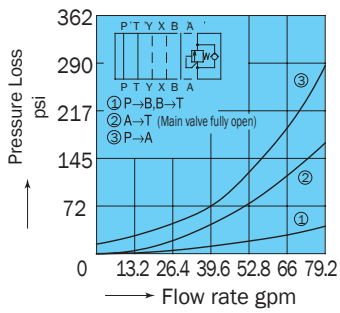
OCQ-G01-A1*-20



OCQ-G03-A1A-J50

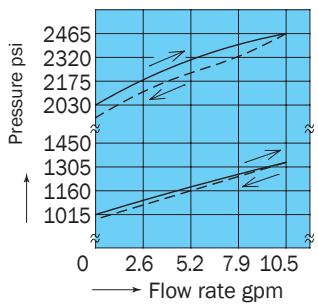


OQH-G04-B1A-10

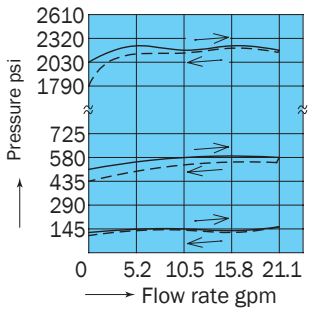


Pressure - Flow Rate Characteristics

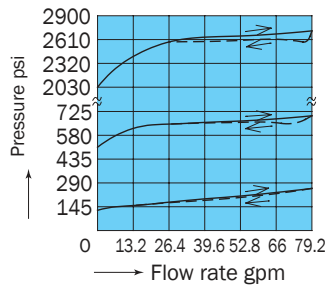
OCQ-G01- A1* / B1* -20 — Pressure Rise / Pressure Drop



OCQ-G03-A1*-J50 — Pressure Rise / Pressure Drop



OQH-G04- A1 / B1 *-10 — Pressure Rise / Pressure Drop

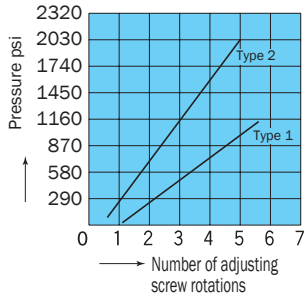


F

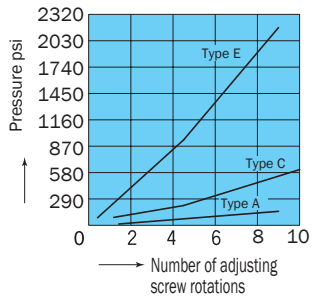
Modular Valves

Number of Adjusting Screw Rotations - Pressure Characteristics

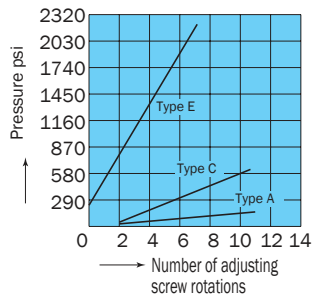
OCG-G01-A1*/B1*-20



OCG-G03-A1*/B1*-J50

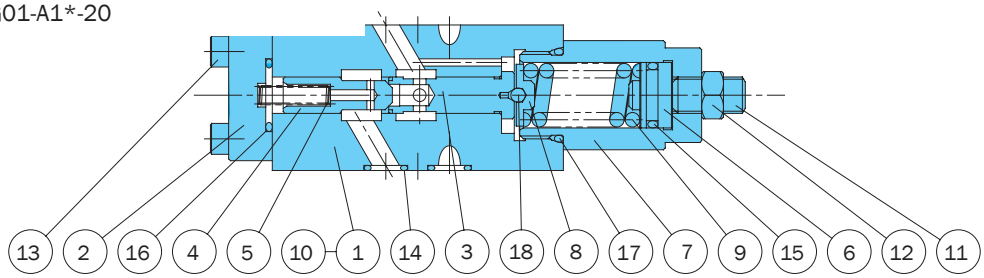


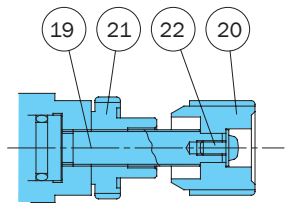
OQH-G04-A1*/B1*-10



Cross-sectional Drawing

OCQ-G01-A1*-20





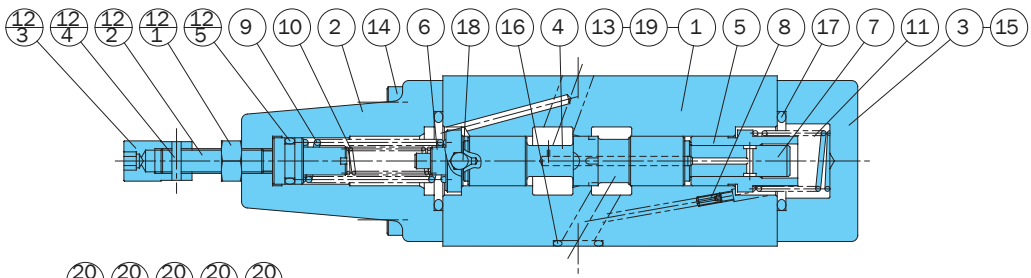
Seal Part List (Kit Model Number BRBS-01CQ*)

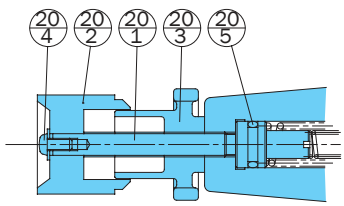
Part No.	Part Name	Part Number	Q'ty	
			A	B
14	O-ring	1B-P9	4	4
15	O-ring	1B-P14	1	1
16	O-ring	1B-P16	1	1
17	O-ring	1B-P22	1	1

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify A or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Poppet
5	Spring
6	Plunger
7	Retainer
8	Guide
9	Spring
10	Plate
11	Screw
12	Nut
13	Screw
14	O-ring
15	O-ring
16	O-ring
17	O-ring
18	Ball
19	Screw
20	Knob
21	Nut
22	Screw

OCQ-G03-A1*-J50





Seal Part List (Kit Model Number BRES-03CQ*)

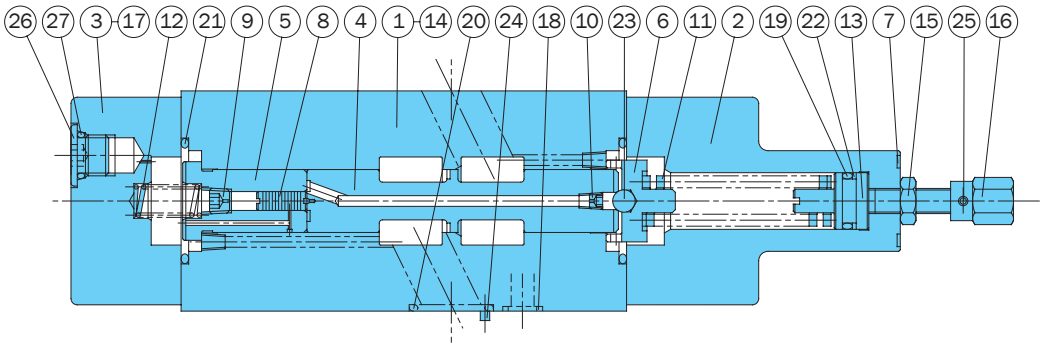
Part No.	Part Name	Part Number	Q'ty	
			A	B
12(20)$_5$	O-ring	1B-P11	1	1
16	O-ring	AS568-014(Hs90)	5	5
17	O-ring	1B-P26	2	2

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify A or B for the asterisk (*) in the kit model number.

Note:
The 10 spring is not included with pressure adjustment Type A.

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Sleeve
6	Guide
7	Plunger
8	Choke
9	Spring
10	Spring
11	Spring
12	Screw kit
12$_1$	Screw
12$_2$	Nut
12$_3$	Nut
12$_4$	Pin
12$_5$	O-ring
13	Plate
14	Screw
15	Screw
16	O-ring
17	O-ring
18	Ball
19	Pin
20	Handle kit
20$_1$	Screw
20$_2$	Knob
20$_3$	Nut
20$_4$	Screw
20$_5$	O-ring

OQH-G04-B1*-10



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Sleeve
6	Guide
7	Plate
8	Plunger
9	Choke
10	Choke
11	Spring
12	Spring
13	Screw
14	Plate
15	Nut
16	Nut
17	Screw
18	O-ring
19	O-ring
20	O-ring
21	O-ring
22	Backup ring
23	Ball
24	Pin
25	Pin
26	Plug
27	O-ring

Seal Part List (Kit Model Number BRKS-04CQ*)

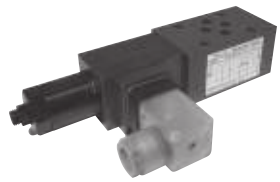
Part No.	Part Name	Part Number	Q'ty	
			A	B
18	O-ring	AS568-012(Hs90)	2	2
19	O-ring	1B-P14	1	1
20	O-ring	AS568-118(Hs90)	4	4
21	O-ring	1B-G35	2	2
22	Backup ring	T2-P14	1	1
27	O-ring	1B-P11	1	1

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Backup ring indicates JIS 2407-T2-**.
3. Specify A or B for the asterisk (*) in the kit model number.

Note: The illustration shows the configuration for pressure adjustment ranges Type C and Type E. For Type A, there is no #8 piston or #10 choke.

Pressure Switch Modular Valve

13.2 gpm
3625 psi



Features

This modular valve detects pressure changes inside the hydraulic circuit and opens and closes an electrical circuit accordingly.

High precision detection, high precision circuit control, outstanding reliability.
Maximum operating pressure: 3625 psi
Indicator light built into the DIN connector shows operational status at a glance.
A double type is also available for control of both port A and port B in a compact configuration.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
OW-G01-PC-R-**-30 P1 P3	1/8	3625	13.2	72 to 500 116 to 1000 500 to 3045	3.9	ISO 4401-03-02-0-94
OW-G01-AC-R-**-30 A1 A3				72 to 500 116 to 1000 500 to 3045	3.9	
OW-G01-BC-R-**-30 B1 B3				72 to 500 116 to 1000 500 to 3045	3.9	
OW-G01-WC-R-**-30 W1 W3				72 to 500 116 to 1000 500 to 3045	5.7	

Electrical Specifications Micro Switch Manufacturer: Omron Model No. SS-5	Contact Capacitance (Resistive Load)	AC	125V	5A
			250V	3A
		DC	12V	2.2A
			24V	1.1A
	Mechanical Life	At least 1 × 10^7		
	Electrical Life	At least 3 × 10^6(AC,0.1A,cos φ=1)		
	Contact Resistance	30MΩ maximum (initial value)		
	Insulation Resistance	At least 100MΩ		
	Allowable Operating Frequency	60 times/minute (electrical)		
Operating Environment	Dust Resistance/Water Resistance Rank	JIS C0920 IP64		
	Ambient Temperature	-4° F to 158° F (non-condensation)		
	Operating Fluid: Fluid Temperature	-4° F to 158°	Use a fluid that is within both ranges.	
	Operating Fluid: Allowable Viscosity Range	15 to 300		
	Operating Fluid: Filtration	10μm maximum		

- Handling

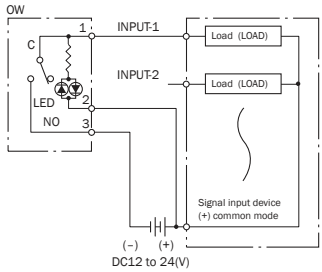
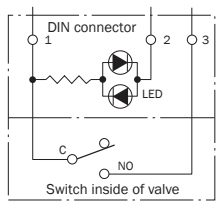
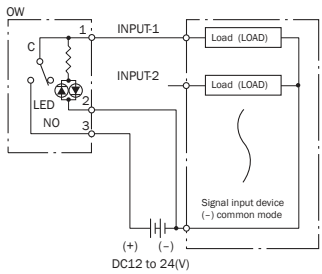
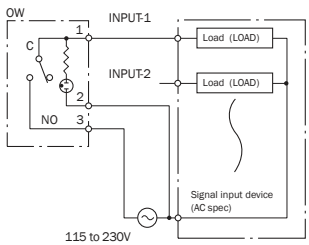
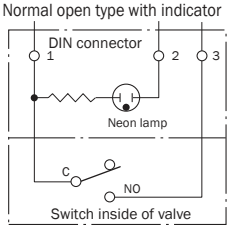
1 See the detailed explanation on the next page for information about wiring inside connectors.
2 Contacts are normally open type only, not normally closed type.
3 In addition to load wiring, power supply wiring is also required to illuminate the indicator light. See the wiring diagram for more information.
4 If the DIN connector interferes with other valves, remove the two switch installation bolts and change the installation orientation. If interference is caused in all orientations, install an interference blanker plate on top of the connector. Contact your agent if an interference blanker plate is required.
5 Note that a special type of DIN connector is required. The DIN connector is not interchangeable with the one for the SA type solenoid valve.
6 If you cannot remove the DIN connector when wiring, remove the switch installation bolts and then remove the DIN connector. The tightening torque for the installation bolts is 3.6 to 5.1 ft lbs.

Understanding Model Numbers

OW – G 01 – P 1 – (K)R – D2 – 30

- 30: Design number
- D2: Power supply specification C115: 115V; C2: 230V D1: 12V; D2: 24V
- (K)R: R: With indicator light (standard) K: With manual handle (optional)
- 1: Pressure adjustment range C: 72 to 500 psi; 1: 116 to 1000 psi ; 3: 500 to 3045 psi
- P: Control port P: P port; A: A port; B: B port; W: A, B ports
- 01: Nominal diameter (size) 01
- G: Mounting method G: Gasket type
- OW: Pressure switch modular valve

Connectors

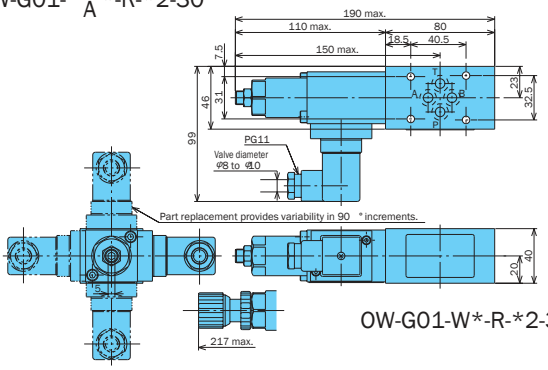
Model No.	Power supply specification	Wiring	Electrical Circuit Diagram
BRC41-01WD2	D2	◎When signal input device (load) remote common is plus OW Terminal 1 is connected to load, while Terminals 2 and 3 are connected to power (Terminal 2 to +). 	Normal open type with indicator  Pressure increase causes indicator to light. Circuit closed (ON) Pressure decrease causes indicator to go out. Circuit open (OFF)
		◎When signal input device (load) common is minus OW Terminal 1 is connected to load, while Terminals 2 and 3 are connected to power (Terminal 2 to –). 	
BRC41-01WC2	C2	◎When signal input device (load) is AC OW Terminal 1 is connected to load, while Terminals 2 and 3 are connected to power (Terminal 2 is nonpolar). 	Normal open type with indicator  Pressure increase causes indicator to light. Circuit closed (ON) Pressure decrease causes indicator to go out. Circuit open (OFF)

Note: 1. The DIN connector wiring connector port size is PG11.
2. The compatible cable diameter for the DIN connector is φ8 to φ10. Dust resistance and water resistance is lost for any cable outside this range.
3. The connector can be installed in different orientations are 90-degree increments by changing the orientation of the terminal block.
4. The connector is designed so the cover cannot be removed unless the installation screws are removed.
5. Use M3 for round type and Y type solderless terminals.
6. The tightening torque of M3 screws used for securing connectors and for terminals is 42 to 70 in lbs.

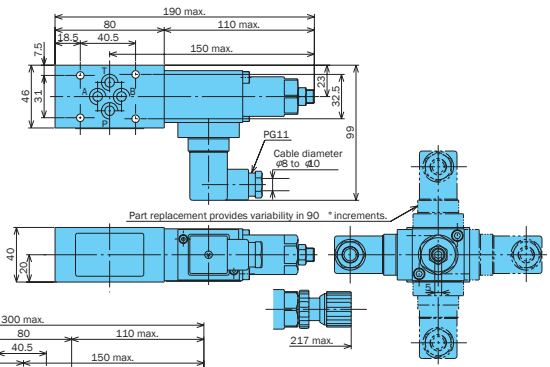
Installation Dimension Drawings

Note: Pressure is increased by clockwise (rightward) rotation of the adjusting screw, and decreased by counterclockwise (leftward) rotation.

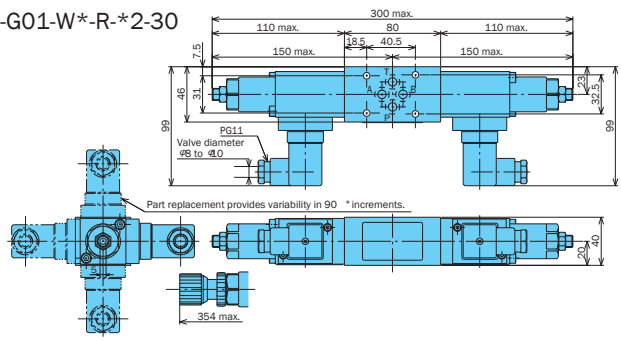
0W-G01- P/A *-R-*2-30



0W-G01-B*-R-*2-30



0W-G01-W*-R-*2-30

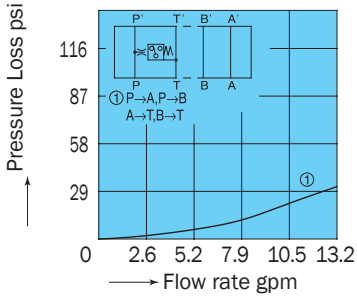


Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

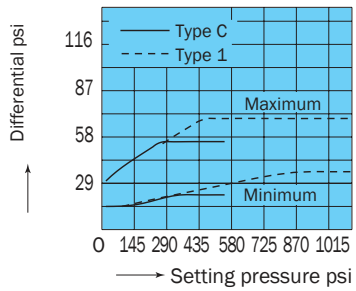
Pressure Loss Characteristics

OW-G01-**-R-**-30

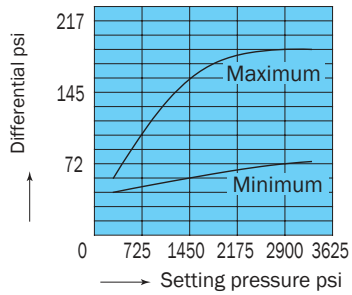


Setting Pressure - Differential Characteristics

OW-G01-* C/1 -R-**-30

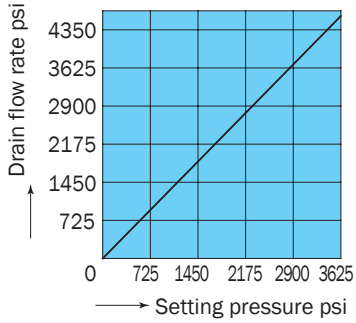


OW-G01-*3-R-**-30



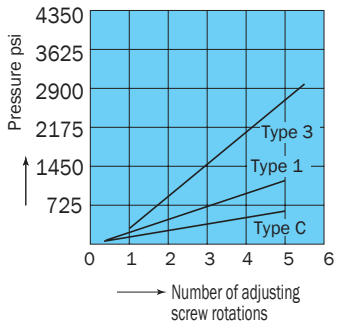
Drain Rate Characteristics

OW-G01-**-R-**-30



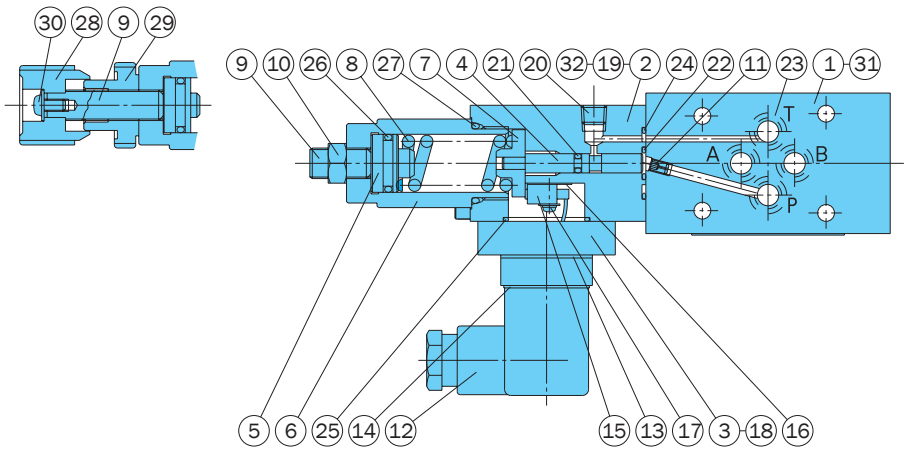
Number of Adjusting Screw Rotations Pressure Characteristics

OW-G01-**-R-**-30



Cross-sectional Drawing

OW-G01-P*-R-*2-30



Part No.	Part Name	Part No.	Part Name
1	Body	17	Screw
2	Cover	18	Screw
3	Cover	19	Screw
4	Piston	20	Plug
5	Push rod	21	O-ring
6	Retainer	22	O-ring
7	Guide	23	O-ring
8	Spring	24	O-ring
9	Screw	25	O-ring
10	Nut	26	O-ring
11	Choke	27	O-ring
12	Connector	28	Knob
13	Gasket	29	Nut
14	Gasket	30	Screw
15	Micro switch assy	31	Plate
16	Separator	32	Plate

Seal Part List (Kit Model Number BRCS-01W*)

Part No.	Part Name	Part Number	Q'ty			
			P	W	A	B
21	O-ring	1A-P3	1	2	1	1
22	O-ring	AS568-011(Hs90)	1	2	1	1
23	O-ring	1B-P9	4	4	4	4
24	O-ring	AS568-019(Hs70)	1	2	1	1
25	O-ring	AS568-022(Hs70)	1	2	1	1
26	O-ring	1A-P15	1	2	1	1
27	O-ring	1B-P22	1	2	1	1

Note: Specify P, W, A, or B for the asterisk (*) in the kit model number.

Flow Regulator Modular Valve

13.2 to 79 gpm
3625 to 5075 psi

Features

This modular valve is used to control actuator speed and for other flow control valve applications.

A wide range of models are available for A and B port control, A or B port control, and P or T port control.

Maximum Operating Pressure: 3625, 5075 psi

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure Adjustment Range psi	Weight lbs	Gasket Surface Dimensions
OY-G01-T-20	1/8	3625	50	–	2.2	ISO 4401-03-02-0-94
OCY-G01-P-20				5.7	2.2	
OCY-G01-W-X-20 A B				11.4	2.8 2.6	
OCY-G01-W-Y-20 A B				11.4	2.8 2.6	
OCY-G03-P-J50	3/8	3625	100	5.7	6.4	ISO 4401-05-04-0-94
OCY-G03-W-X-J51 A B				14.3	6.8 6.6	
OCY-G03-W-Y-J51 A B				14.3	6.8 6.6	
OYH-G04-P-10	1/2	5075	300	5.7	10.3	ISO 4401-07-06-0-94
OYH-G04-W-X-10 A B				14.3	14.3 14.3	
OYH-G04-W-Y-10 A B				14.3	14.3 14.3	

• Handling

1 In a 03 size application where control differential pressure is large, use of an H type makes adjustment easier.
2 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.
3 04 series modular valves do not have an L (DR2) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

Understanding Model Numbers

01, 03 size

OCY – G 03 – W – (H) Y – (K) – J51

- Design number
  Note: For 01 size, 20
  For 03 size, relationship between mounting bolts and design number is indicated as J50, J51: M6, 50, 51 : M8.
- Auxiliary symbol K: With handle (01, 03 size only)
- Control mechanism X: Meter-in Y: Meter-out
- Control function None: Standard
  H: High-differential pressure type (03 size only)
- Control port W: A, B ports
  A: A port P: P port
  B: B port T: T port (01 size only)
- Nominal diameter (size) 01, 03
- Mounting method G: Gasket type
- Flow regulator modular type
  OCY: With check valve
  OY : Without check valve (01 size T port control)

Understanding Model Numbers

04 size

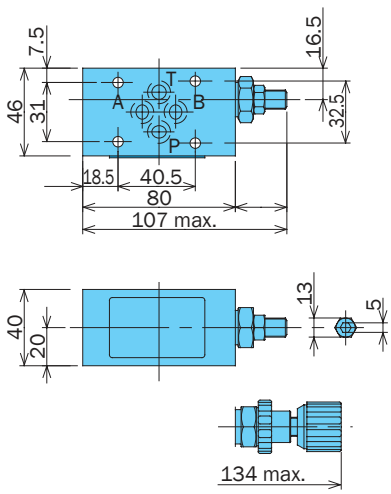
0YH – G 04 – W – Y – 10

- 10: Design number
- Y: Control mechanism X: Meter-in Y: Meter-out
- W: Control port P: P port, W: A, B ports, A: A port, B: B port
- 04: Nominal diameter (size) 04
- G: Mounting method G: Gasket type
- 0YH: M35 Series flow regulator modular valve

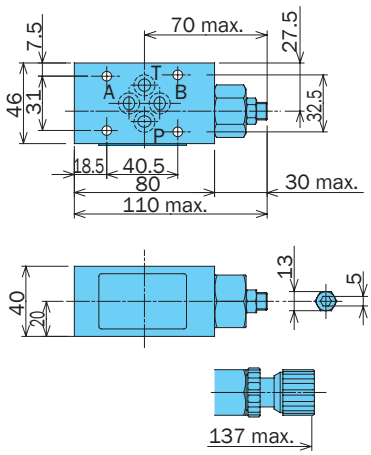
Installation Dimension Drawings

Note: The control flow rate is increased by counter clockwise (leftward) rotation of the adjusting screw.

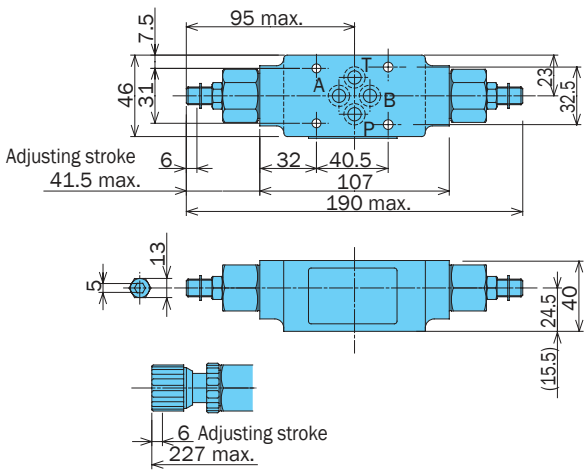
0Y-G01-T-20



0CY-G01-P-20

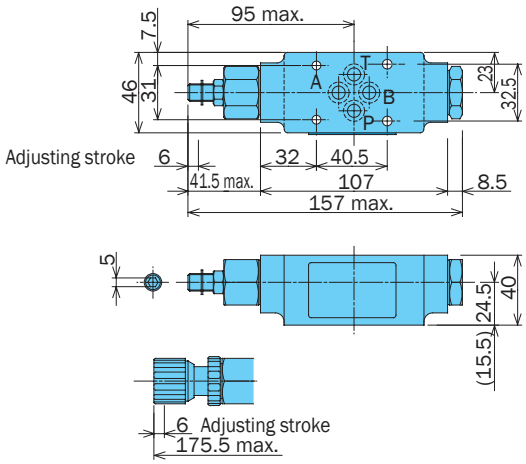


0CY-G01-W-$\frac{X}{Y}$-20



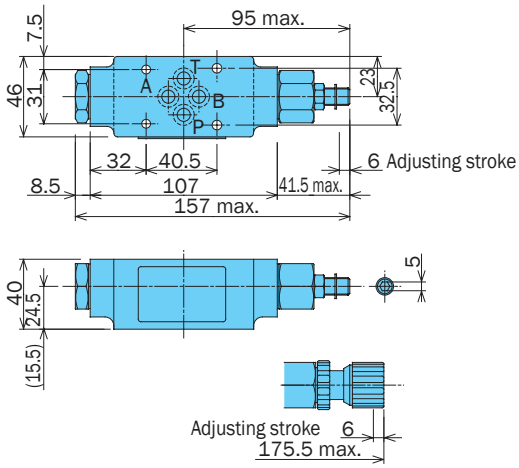
Note: Dimensions in the parentheses are for the 0CY-G01-W-X-20.

OCY-G01-A-$\frac{X}{Y}$-20



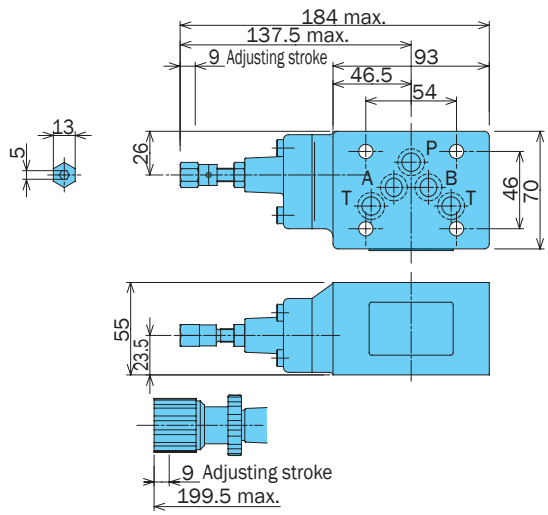
Note:
Dimensions in the parentheses are for the OCY-G01-A-X-20.

OCY-G01-B-$\frac{X}{Y}$-20

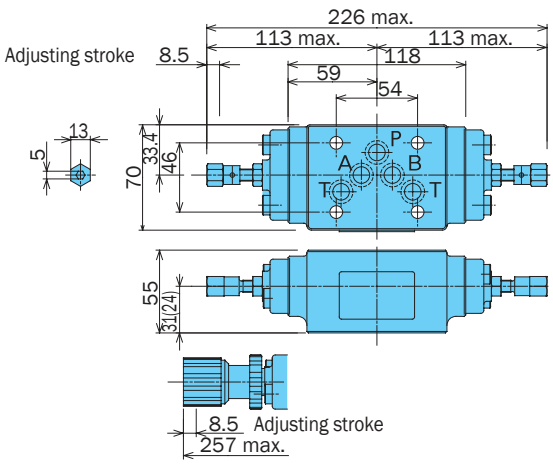


Note:
Dimensions in the parentheses are for the OCY-G01-B-X-20.

OCY-G03-P-J50

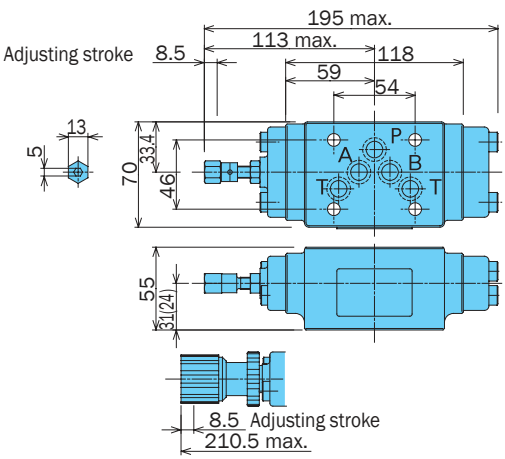


OCY-G03-W-$\frac{X}{Y}$-J51



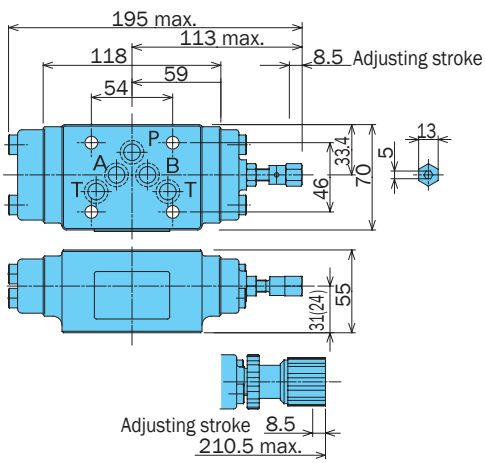
Note:
Dimensions in the parentheses are for the OCY-G03-W-X-J51.

OCY-G03-A-$\frac{X}{Y}$-J51



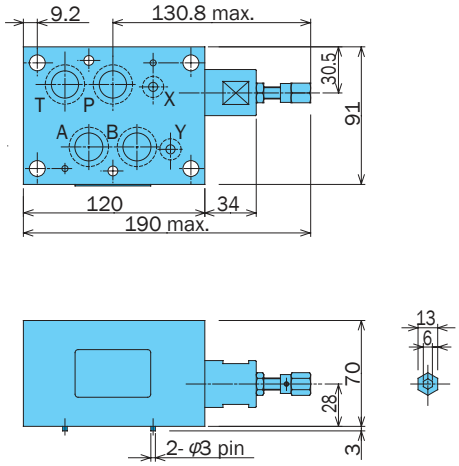
Note:
Dimensions in the parentheses are for the OCY-G03-A-X-J51.

OCY-G03-B-$\frac{X}{Y}$-J51

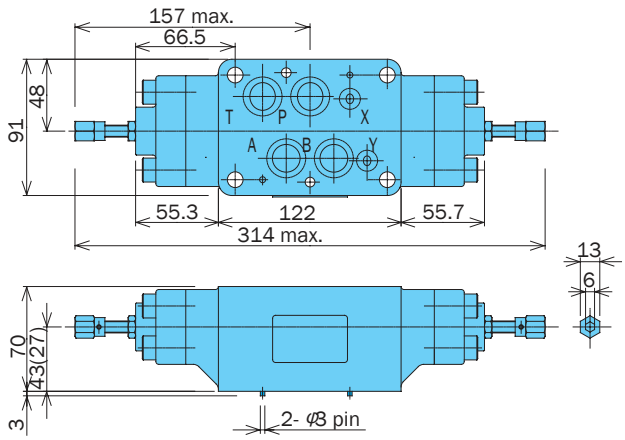


Note:
Dimensions in the parentheses are for the OCY-G03-B-X-J51.

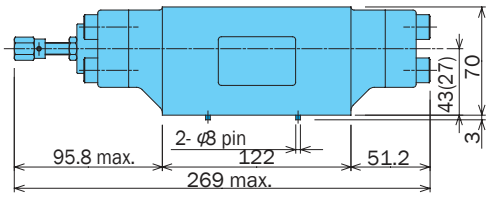
OYH-G04-P-10



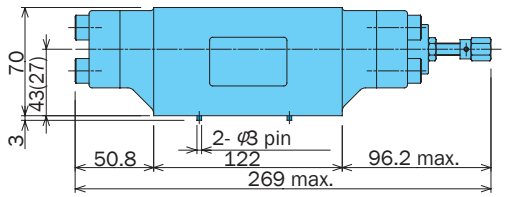
OYH-G04-W- X/Y -10



OYH-G04-A- X/Y -10



OYH-G04-B- X/Y -10



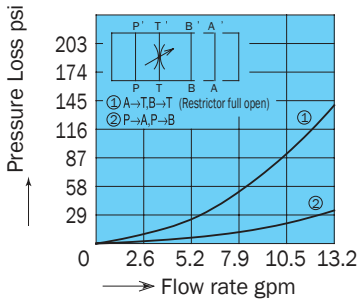
Note: Dimensions in the parentheses are for the OYH-G04-*-X-10.

Performance Curves

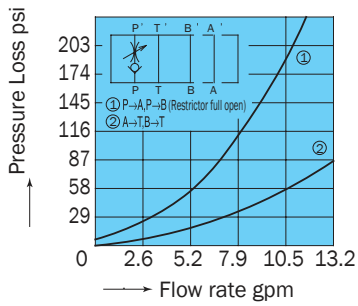
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

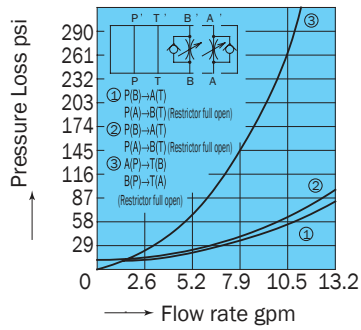
OY-G01-T-20



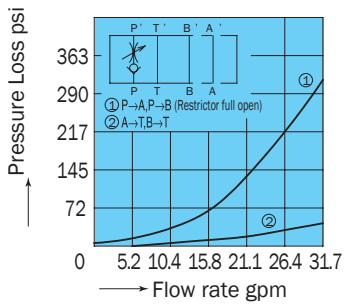
OCY-G01-P-20



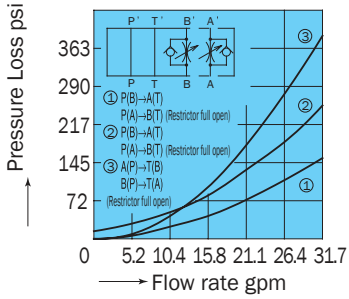
OCY-G01-W-Y-20
(OCY-G01-W-X-20)



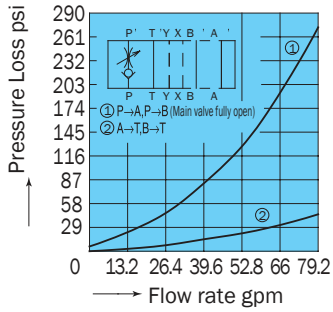
OCY-G03-P-J50



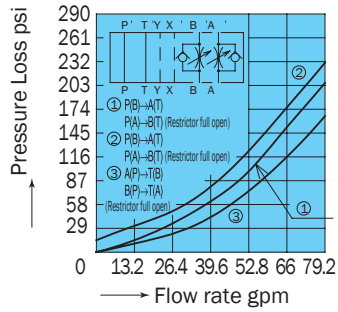
OCY-G03-W-Y-J51
(OCY-G03-W-X-J51)



OYH-G04-P-10

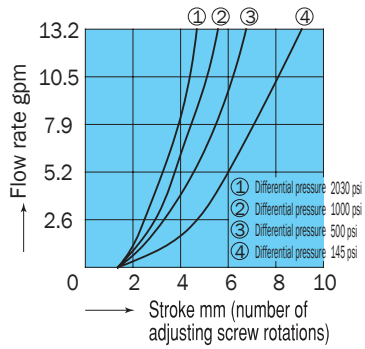


OYH-G04-W-Y-10
(OYH-G04-W-X-10)

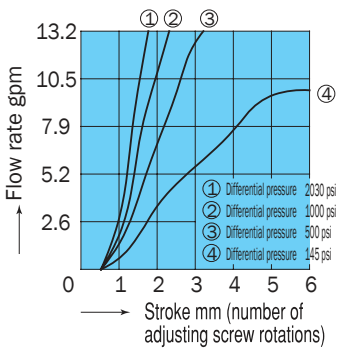


Stroke -- Flow Rate Characteristics

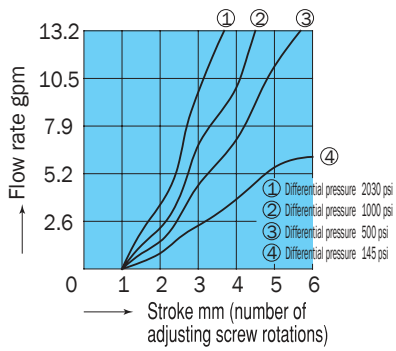
OY-G01-T-20



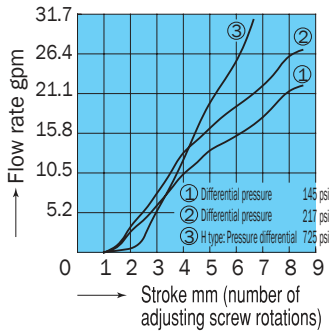
OCY-G01-P-20



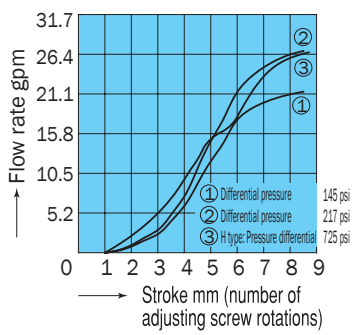
OCY-G01-*-*-20



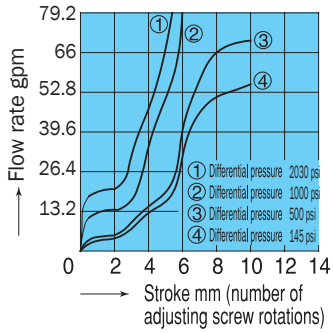
OCY-G03-P-(H)-J50



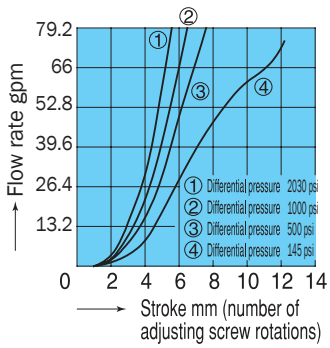
OCY-G03-W-(H)Y-J51



OYH-G04-P-10

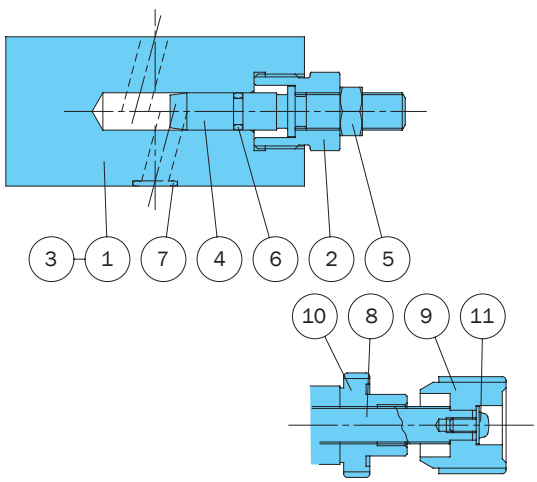


OYH-G04-W-Y-10



Cross-sectional Drawing

OY-G01-T-20



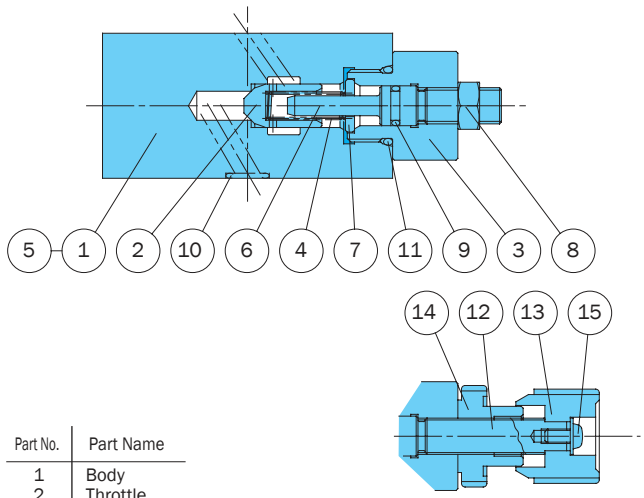
Part No.	Part Name
1	Body
2	Retainer
3	Plate
4	Screw
5	Nut
6	O-ring
7	O-ring
8	Screw
9	Knob
10	Nut
11	Screw

Seal Part List (Kit Model Number BFBS-01YT)

Part No.	Part Name	Part Number	Q'ty T
6	O-ring	1B-P7	1
7	O-ring	1B-P9	4

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

OCY-G01-P-20



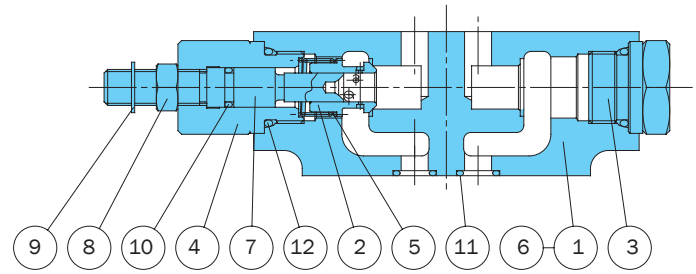
Part No.	Part Name
1	Body
2	Throttle
3	Retainer
4	Spring
5	Plate
6	Screw
7	Ring
8	Nut
9	O-ring
10	O-ring
11	O-ring
12	Screw
13	Knob
14	Nut
15	Screw

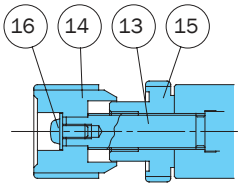
Seal Part List (Kit Model Number BFBS-01CYP)

Part No.	Part Name	Part Number	Q'ty T
9	O-ring	1B-P8	1
10	O-ring	1B-P9	4
11	O-ring	1B-P18	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

OCY-G01-A-Y-20





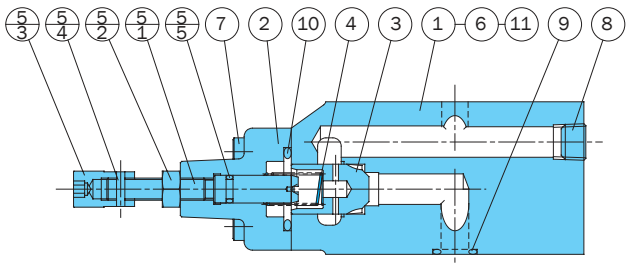
Seal Part List (Kit Model Number BFBS-01CY*)

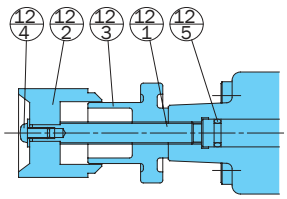
Part No.	Part Name	Part Number	Q'ty		
			W	A	B
10	O-ring	1B-P8	2	1	1
11	O-ring	1B-P9	4	4	4
12	O-ring	1B-P18	2	2	2

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Throttle
3	Bushing
4	Retainer
5	Spring
6	Plate
7	Screw
8	Nut
9	E-ring
10	O-ring
11	O-ring
12	O-ring
13	Screw
14	Knob
15	Nut
16	Screw

OCY-G03-P-J50





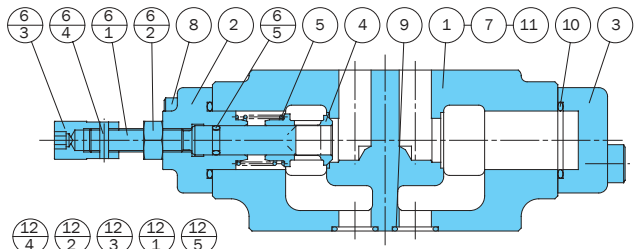
Seal Part List (Kit Model Number BFES-03CYP)

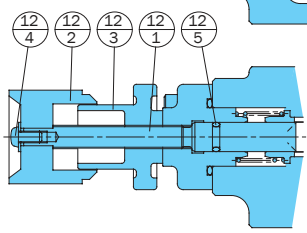
Part No.	Part Name	Part Number	Q'ty
			P
5(12)-5	O-ring	1B-P7	1
9	O-ring	AS568-014(Hs90)	5
10	O-ring	1B-P24	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name
1	Body
2	Cover
3	Throttle
4	Spring
5	Screw kit
5-1	Screw
5-2	Nut
5-3	Nut
5-4	Pin
5-5	O-ring
6	Plate
7	Screw
8	Plug
9	O-ring
10	O-ring
11	Pin
12	Handle kit
12-1	Screw
12-2	Knob
12-3	Nut
12-4	Screw
12-5	O-ring

OCY-G03-A-Y-J51





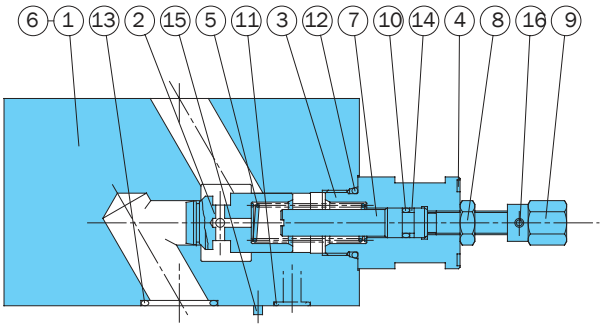
Seal Part List (Kit Model Number BFES-03CY*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
6(12)-5	O-ring	1B-P7	2	1	1
9	O-ring	AS568-014(Hs90)	5	5	5
10	O-ring	1B-P22	2	2	2

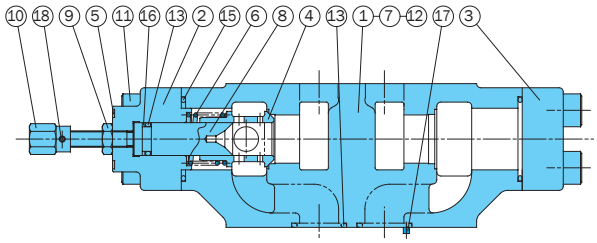
Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Throttle
5	Spring
6	Screw kit
6-1	Screw
6-2	Nut
6-3	Nut
6-4	Pin
6-5	O-ring
7	Plate
8	Screw
9	O-ring
10	O-ring
11	Pin
12	Handle kit
12-1	Screw
12-2	Knob
12-3	Nut
12-4	Screw
12-5	O-ring

OYH-G04-P-10



OYH-G04-A-Y-10



Seal Part List
(Kit Model Number BFKS-04CYP)

Part No.	Part Name	Part Number	Q'ty
			P
10	O-ring	1B-P7	1
11	O-ring	AS568-012(Hs90)	2
12	O-ring	1B-P20	1
13	O-ring	AS568-118(Hs90)	4
14	Backup ring	T2-P7	1

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Backup ring indicates JIS B 2407-T2-**.

Part No.	Part Name
1	Body
2	Throttle
3	Retainer
4	Plate
5	Spring
6	Plate
7	Screw
8	Nut
9	Nut
10	O-ring
11	O-ring
12	O-ring
13	O-ring
14	Backup ring
15	Pin
16	Pin

Seal Part List
(Kit Model Number BFKS-04CY*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
12	O-ring	AS568-012 (Hs90)	2	2	2
13	O-ring	1A-P12	2	1	1
14	O-ring	AS568-118 (Hs90)	4	4	4
15	O-ring	AS568-127 (Hs90)	2	2	2
16	Backup ring	T2-P12	2	1	1

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Backup ring indicates JIS B 2407-T2-**.
3. Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Throttle
5	Plate
6	Spring
7	Plate
8	Screw
9	Nut
10	Nut
11	Screw
12	O-ring
13	O-ring
14	O-ring
15	O-ring
16	Backup ring
17	Pin
18	Pin

Flow Control Modular Valve
(Pressure and temperature compensated)

5.2 to 52.8 gpm
3045, 3625, 5075 psi

Features

This modular valve is used to control actuator speed and for other flow control valve applications.
A wide range of models are available for A and B port control, A or B port control, and P port control.
A pressure compensation mechanism ensures that the control flow rate does not change, even when there is pressure fluctuation.
The control flow rate remains stable, even when fluid temperature changes.
Maximum Operating Pressure: 3045, 3625, 5075 psi

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Control Flow Rate gpm	Check Valve Cracking pressure psi	Weight lbs	Gasket Surface Dimensions
OF-G01-P20-20	1/8	3045	.02 to 5.2(differential pressure: 1000 psi) .07 to 5.2(differential pressure: 3045 psi)	--	2.6	ISO 4401-03-02-0-94
OCF-G01-W40-X-30 A40 B40		3625	.02 to 10.5(differential pressure: 1000 psi) .13 to 10.5(differential pressure: 3625 psi)	.02	3.7 3.3	
OCF-G01-W40-Y-30 A40 B40				11.6	3.7 3.3	
OF-G03-P60-J50	3/8	3625	.07 to 15.8(differential pressure: 1000 psi) .13 to 15.8(differential pressure: 3625 psi)	--	6.8	ISO 4401-05-04-0-94
OCF-G03-W60-X-J50 A60 B60			.13 to 15.8(differential pressure: 1000 psi) .26 to 15.8(differential pressure: 3625 psi)	14.5	11 10.1	
OCF-G03-W60-Y-J50 A60 B60				14.5	11 10.1	
OFH-G04-W200-X-10 A200 B200	1/2	5075	2.6 to 52.8(differential pressure: 3045 psi) 3.9 to 52.8(differential pressure: 3625 psi) 5.2 to 52.8(differential pressure: 5075 psi)	14.5	24.4 22.4	ISO 4401-07-06-0-94
OFH-G04-W200-Y-10 A200 B200				14.5	24.4 22.4	

• Handling

1 For flow rate control, make sure that the pressure differential between the input port and output port is at least 145 psi. See the Flow Rate - Minimum Differential Pressure Characteristics for information about the OCF-G01 and OFF-G04 maximum control flow rate.
2 The control flow rate is increased by counter clockwise (leftward) rotation of the flow rate control knob.
3 Pressure rate control knob rotation resistance will increase as the pressure increases. However, do not use a spanner or other tool that fits around the knob to turn it. Instead, insert a 5mm hex spanner into the hex hole in the center of the knob and rotate it that way.
4 After adjusting the flow rate, fix it in place by turning the lock screw on the end of the knob to the right.
5 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.
6 04 series modular valves do not have an L (DR2) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).
7 Flow rate fluctuation is ±5% within the temperature range of 68°F to 140°F.

Understanding Model Numbers

01, 03 size

OCF – G 03 – W 60 – Y – J50

- J50: Design number
  Note: For 01 size, 30, 20
  For 03 size, relationship between mounting bolts and design number is indicated as J50: M6, 50: M8
- Y: Control Mechanism X: Meter-in Y: Meter-out
- 60: Maximum control flow rate
- W: Control port W: A, B ports A: A port P: P port B: B port
- 03: Nominal diameter (size) 01, 03
- G: Mounting method G: gasket type
- OCF: Flow control modular valve
  OCF: with check valve
  OF: without check valve (P port control)

Understanding Model Numbers

04 size

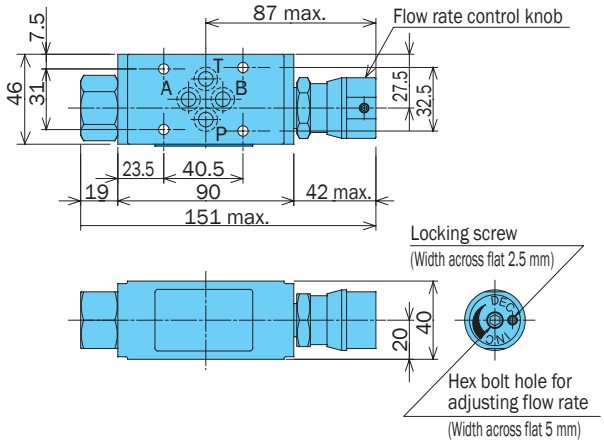
OFH – G 04 – W 200 – Y – 10

- Design number
- Control mechanism X: Meter-in Y: Meter-out
- Maximum control flow rate
- Control port W: A, B ports A: A port B: B port
- Nominal diameter (size) 04
- Mounting method G: Gasket type
- M35 Series flow control modular valve

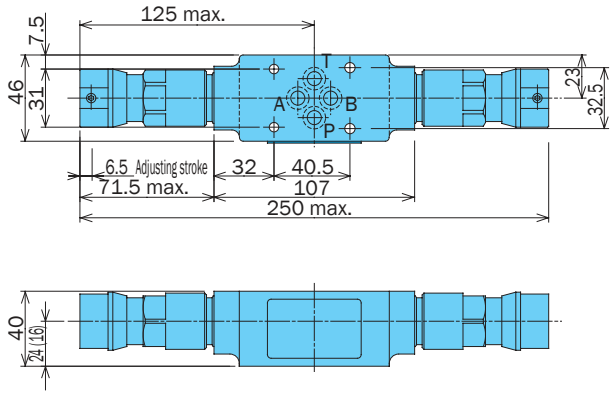
Installation Dimension Drawings

Note: The control flow rate is increased by counter clockwise (leftward) rotation of the flow rate control knob.

OF-G01-P20-20

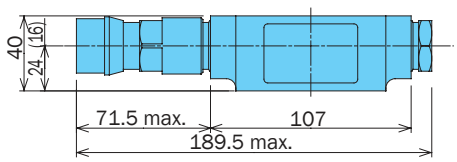


OCF-G01-W40-X/Y-30



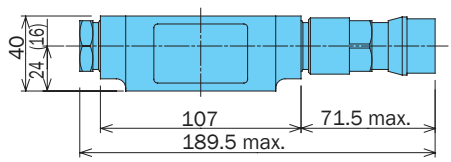
Note:
Dimensions in the parentheses are for the OCF-G01-W40-X-30.

OCF-G01-A40-X/Y-30



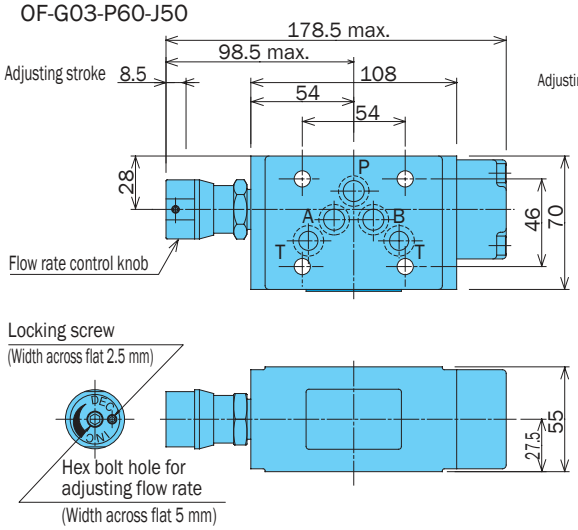
Note:
Dimensions in the parentheses are for the OCF-G01-A40-X-30.

OCF-G01-B40-X/Y-30

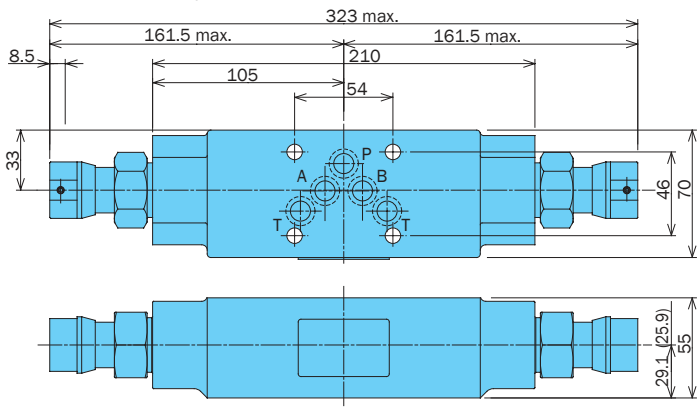


Note:
Dimensions in the parentheses are for the OCF-G01-B40-X-30.

OF-G03-P60-J50

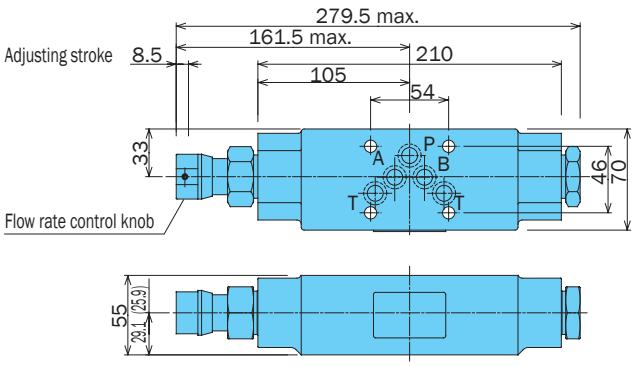


OCF-G03-W60-X/Y-J50



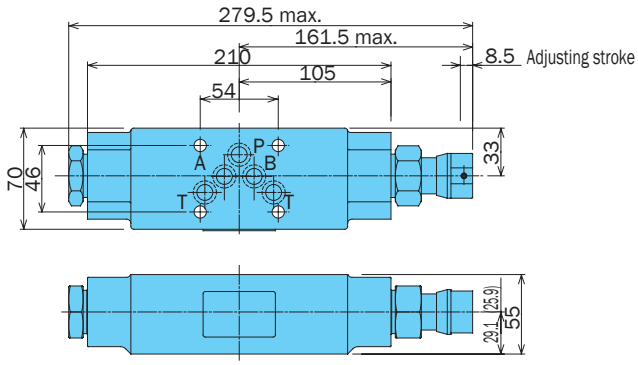
Note:
Dimensions in the parentheses are for the OCF-G03-W60-X-J50.

OCF-G03-A60-X/Y-J50



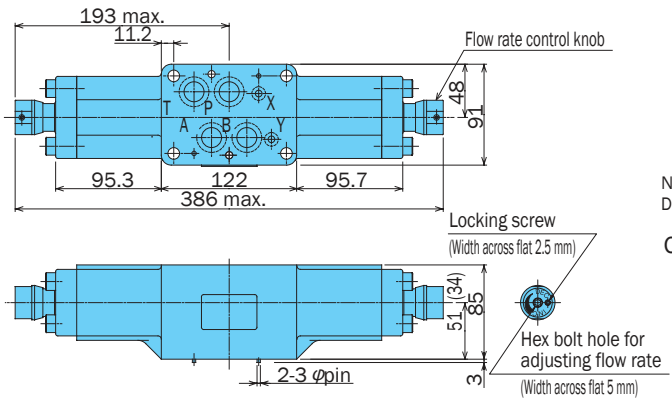
Note:
Dimensions in the parentheses are for the OCF-G03-A60-X-J50.

OCF-G03-B60-X/Y-J50



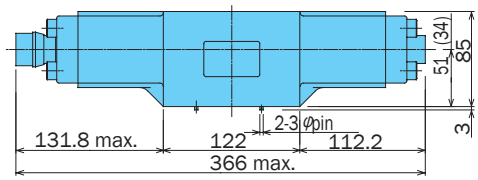
Note:
Dimensions in the parentheses are for the OCF-G03-B60-X-J50.

OFH-G04-W200-X/Y-10



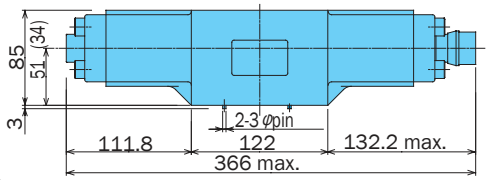
Note:
Dimensions in the parentheses are for the OFH-G04-W200-X-10.

OFH-G04-A200-X/Y-10



Note:
Dimensions in the parentheses are for the OCF-G04-A200-X-10

OFH-G04-B200-X/Y-10



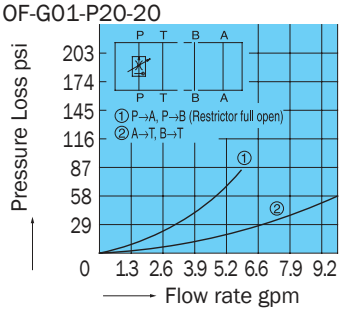
Note:
Dimensions in the parentheses are for the OFH-G04-B200-X-10.

Performance Curves

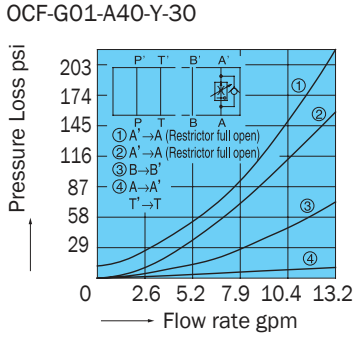
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

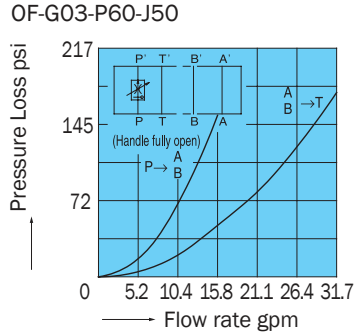
OF-G01-P20-20



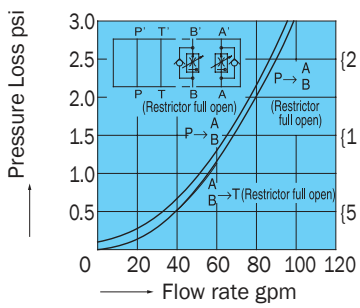
OCF-G01-A40-Y-30



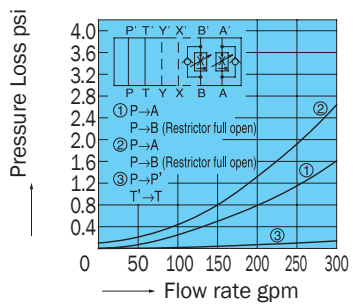
OF-G03-P60-J50



OCF-G03-W60-Y-J50

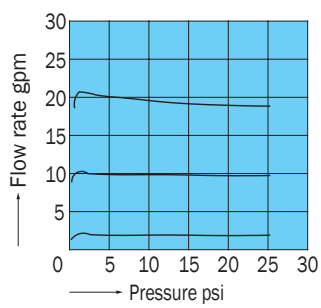


OFH-G04-W200-Y-10

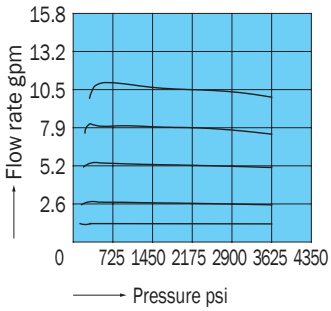


Pressure - Control Flow Rate Characteristics

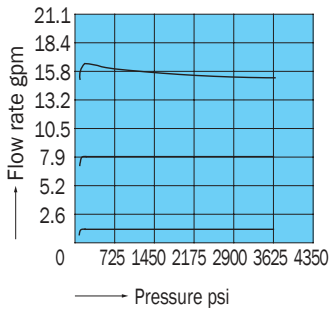
OF-G01-P20-20



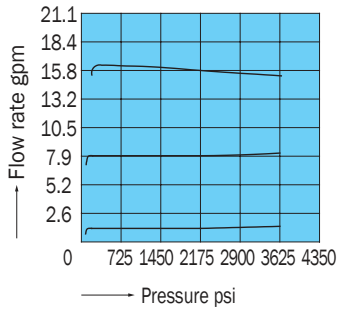
OCF-G01-*40-*-30



OF-G03-P60-J50

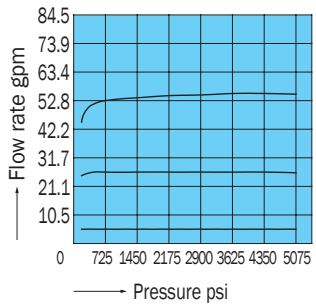


OCF-G03-W60-*-J50

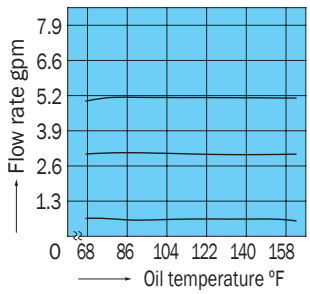


Fluid Temperature - Control Flow Rate Characteristics

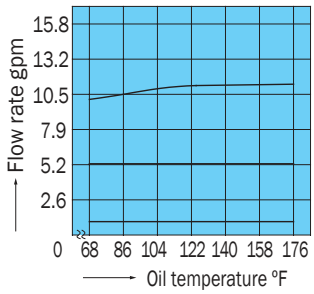
OFH-G04-W200-*-10



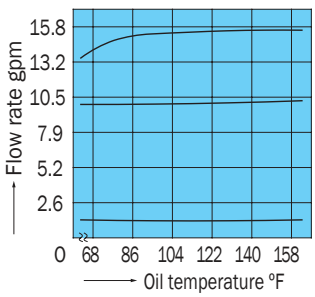
OF-G01-P20-20



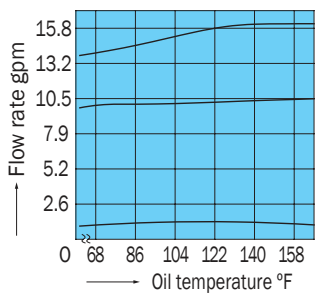
OCF-G01-*40-*-30



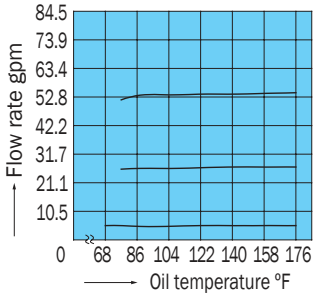
OF-G03-P60-J50



OCF-G03-W60-*-J50

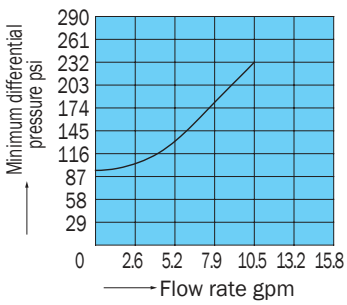


OFH-G04-W200-*-10

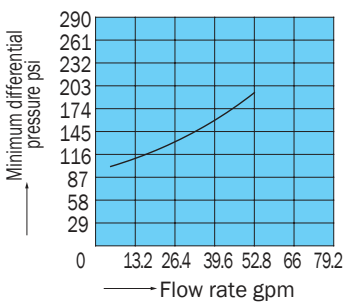


Flow Rate - Minimum Differential Pressure Characteristics

OCF-G01-*40-*-30

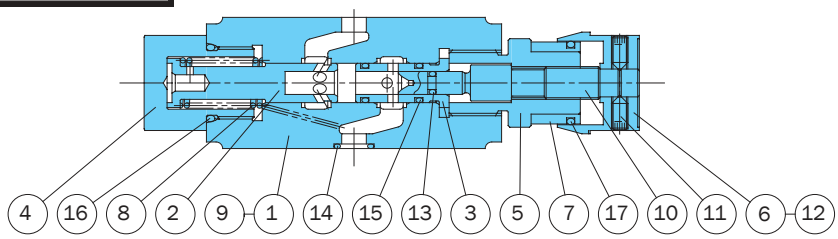


OFH-G04-W200-Y-10



Cross-sectional Drawing

0F-G01-P20-20



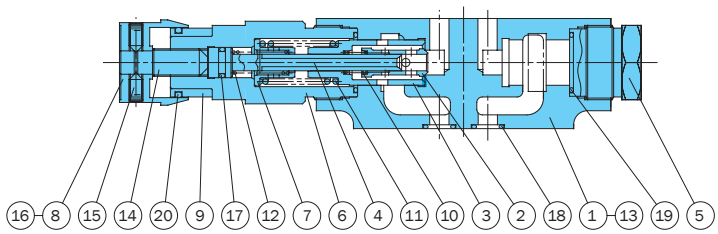
Part No.	Part Name
1	Body
2	Piston
3	Sleeve
4	Bushing
5	Retainer
6	Knob
7	Dial
8	Spring
9	Plate
10	Screw
11	Screw
12	Screw
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	O-ring

Seal Part List (Kit Model Number BFBS-01FP)

Part No.	Part Name	Part Number	Q'ty
			P
13	O-ring	1B-P4	1
14	O-ring	1B-P9	4
15	O-ring	1B-P9	2
16	O-ring	1B-P20	1
17	O-ring	1A-P21	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

0CF-G01-A40-Y-30



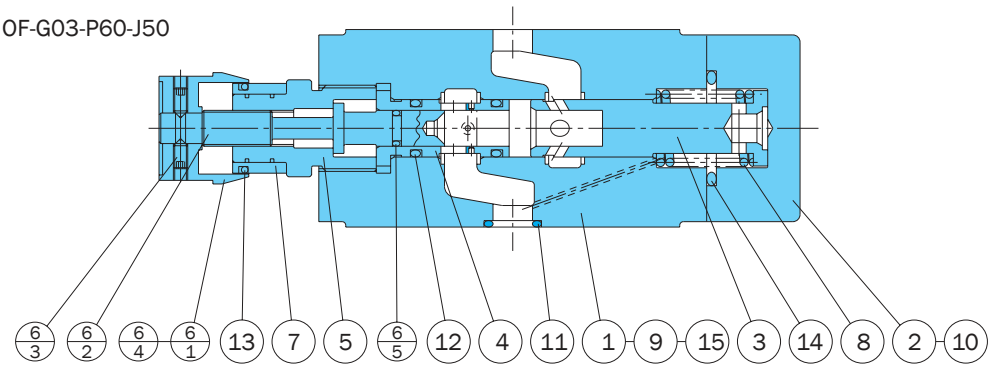
Part No.	Part Name
1	Body
2	Throttle
3	Piston
4	Rod
5	Bushing
6	Retainer
7	Guide
8	Knob
9	Dial
10	Spring
11	Spring
12	Spring
13	Plate
14	Screw
15	Screw
16	Screw
17	O-ring
18	O-ring
19	O-ring
20	O-ring

Seal Part List (Kit Model Number BFCS-01CF*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
17	O-ring	1A-P8	2	1	1
18	O-ring	1B-P9	4	4	4
19	O-ring	AS568-018(Hs90)	2	2	2
20	O-ring	1A-P21	1	1	1

Note:
1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

0F-G03-P60-J50



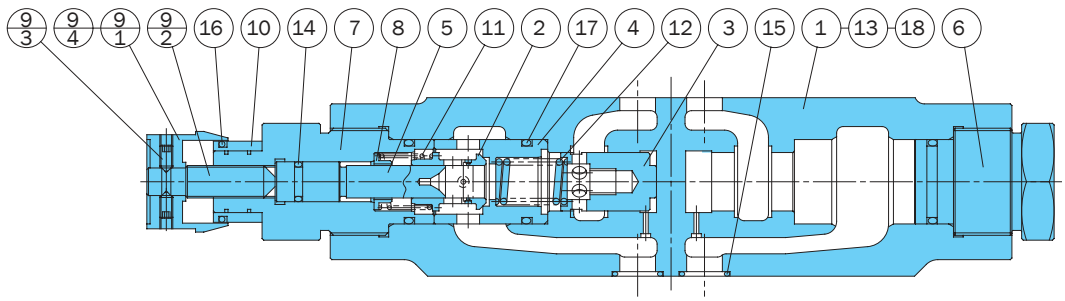
Part No.	Part Name
1	Body
2	Cover
3	Piston
4	Sleeve
5	Retainer
6	Screw kit
6-1	Knob
6-2	Screw
6-3	Screw
6-4	Screw
6-5	O-ring
7	Dial
8	Spring
9	Plate
10	Screw
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Pin

Seal Part List (Kit Model Number BFES-03FP)

Part No.	Part Name	Part Number	Q'ty
			PC
6-5	O-ring	1A-P7	1
11	O-ring	AS568-014(Hs90)	5
12	O-ring	1B-P12	2
13	O-ring	1A-P21	1
14	O-ring	1B-P26	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

0CF-G03-A60-Y-J50



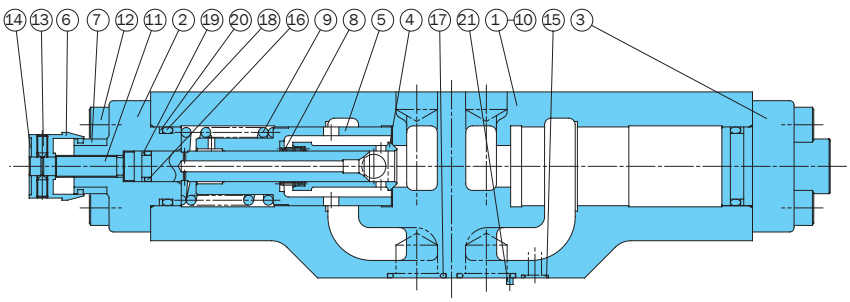
Part No.	Part Name
1	Body
2	Throttle
3	Piston
4	Sleeve
5	Rod
6	Bushing
7	Retainer
8	Guide
9	Screw kit
9_{-1}	Knob
9_{-2}	Screw
9_{-3}	Screw
9_{-4}	Screw
10	Dial
11	Spring
12	Spring
13	Plate
14	O-ring
15	O-ring
16	O-ring
17	O-ring
18	Pin

Seal Part List (Kit Model Number BFES-03CF*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
14	O-ring	1A-P10	2	1	1
15	O-ring	AS568-014(Hs90)	5	5	5
16	O-ring	1A-P21	2	1	1
17	O-ring	1B-P22	4	3	3

Note:
1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

0FH-G04-A200-Y-10



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Throttle
5	Piston
6	Knob
7	Dial
8	Spring
9	Spring
10	Plate
11	Screw
12	Screw
13	Screw
14	Screw
15	O-ring
16	O-ring
17	O-ring
18	O-ring
19	Backup ring
20	Backup ring
21	Pin

Seal Part List (Kit Model Number BFKS-04CF*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
15	O-ring	AS568-012(Hs90)	2	2	2
16	O-ring	1B-P10A	2	1	1
17	O-ring	AS568-118(Hs90)	4	4	4
18	O-ring	1B-P30	2	2	2
19	Backup ring	T2-P10A	2	1	1
20	Backup ring	T2-P30	2	2	2

Note:
1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Backup ring indicates JIS B 2407-T2-**.
3. Specify W, A, or B for the asterisk (*) in the kit model number.

Check Modular Valve

13.2 to 79.2 gpm
3625, 5075 psi

Features

This modular valve is a check valve that prevents reverse-flow.

The 01, 03, 04 sizes include types that can also be used as suction and differential circuits.

Maximum Operating Pressure: 3625, 5075 psi

Specifications

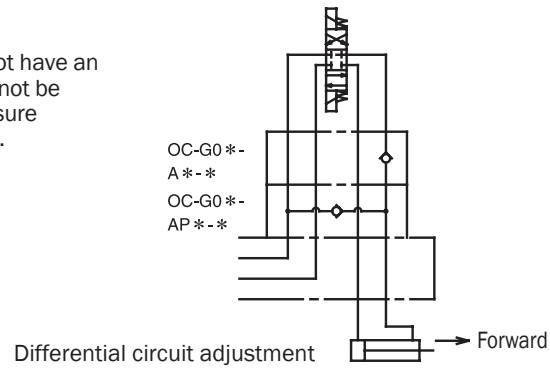
Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Cracking pressure psi	Weight lbs	Gasket Surface Dimensions
OC-G01-P1-20 P2 P3	1/8	3625	13.2	5.8 50.7 72.5	2.2	ISO 4401-03-02-0-94
OC-G01-T1-20 T2 T3				5.8 50.7 72.5	2.2	
OC-G01-A1-21 A2 A3				5.8 50.7 72.5	2.6	
OC-G01-AP1-20 AP2 AP3				5.8 50.7 72.5	2.2	
OCV-G01-W-20				2.1	2.2	
OC-G03-P1-J50 P2 P3	3/8	3625	26.4	5.8 50.7 72.5	5.9	ISO 4401-05-04-0-94
OC-G03-T1-J50 T2 T3				5.8 50.7 72.5	5.9	
OC-G03-A1-J50 A2 A3				5.8 50.7 72.5	5.9	
OC-G03-AP1-J50 AP2 AP3				5.8 50.7 72.5	5.9	
OCV-G03-W-J50				2.1	7.7	
OCH-G04-P1-10 P2 P3	1/2	5075	79.2	5.8 50.7 72.5	9.9	ISO 4401-07-06-0-94
OCH-G04-T1-10 T2 T3				5.8 50.7 72.5	14.3	
OCH-G04-A1-10 A2 A3				5.8 50.7 72.5	9.9	
OCH-G04-AP1-10 AP2 AP3				5.8 50.7 72.5	9.9	
OVH-G04-W-10				1.4	14.3	

• Handling

1 Differential circuit can be easily configured at P → B by attaching OC-G**-A* above the OC-G**-AP* on the subplate. (See the figure to the right.)

2 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.

3 04 series modular valves do not have an L (DR2) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).



Understanding Model Numbers

01, 03 size

OC (OCV) – G 03 – P 1 – J50

- Design number
  Note: For 01 size, 20,21
  For 03 size, relationship between mounting bolts and design number is indicated as J50: M6, 50: M8
- Cracking pressure 1, 2, 3
- Control port P: P port T: T port W: A, B ports (01, 03 vacuum check)
  A: A port
  AP: A, P ports } Differential circuit at set
- Nominal diameter (size) 01, 03
- Mounting method G: gasket type
- Vacuum check modular valve (01, 03 size)
- Check modular valve (01, 03 size)

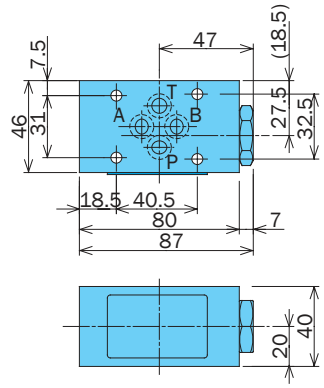
04 size

OCH (OVH) – G 04 – P 1 – 10

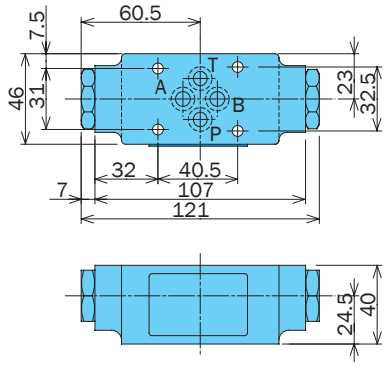
- Design number
- Cracking pressure 1, 2, 3
- Control port P: P port T: T port W: A, B ports (01, 03 vacuum check)
  A: A port
  AP: A, P ports } Differential circuit at set
- Nominal diameter (size) 04
- Mounting method G: gasket type
- M35 Series vacuum check modular valve
- M35 Series check modular valve

Installation Dimension Drawing

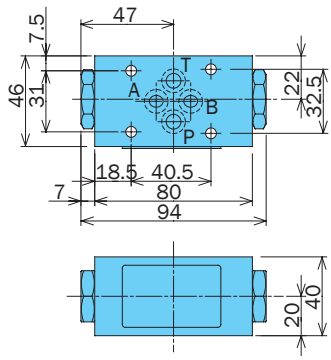
P
OC-G01-T*-20
AP



OC-G01-A*-21

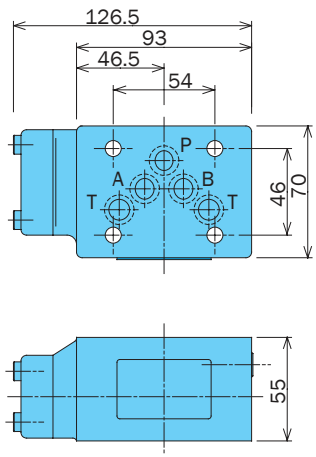


OCV-G01-W-20

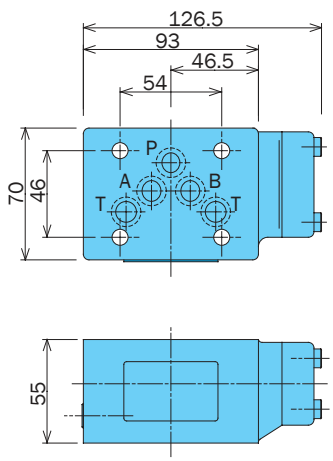


Note: Dimensions in the parentheses are for the OC-G01-T*-20.

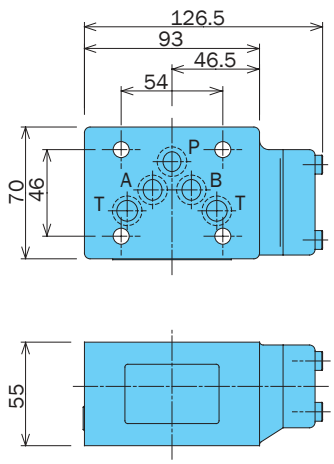
OC-G03- P/AP *-J50



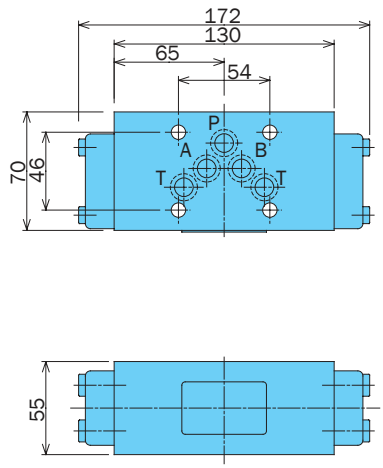
OC-G03-A*-J50



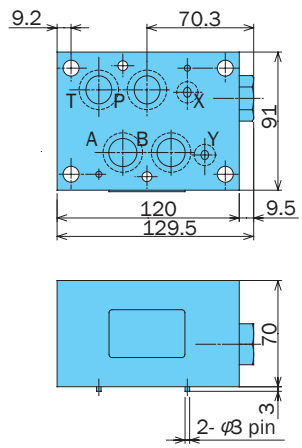
OC-G03-T*-J50



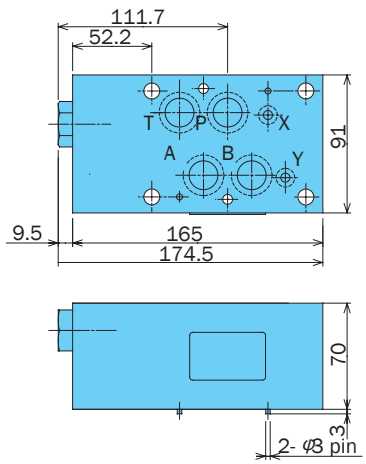
OCV-G03-W-J50



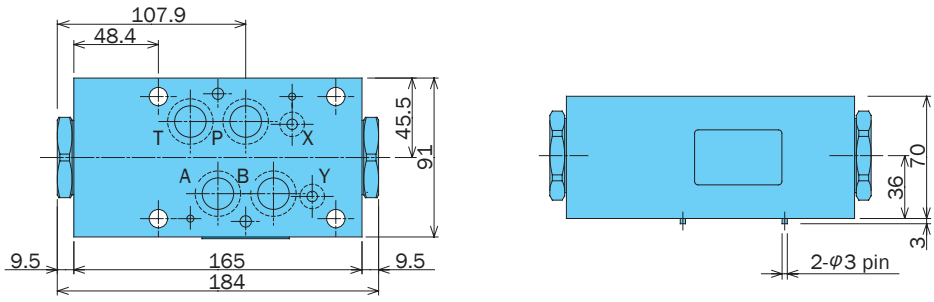
P
OCH-G04-A*-10
AP



OCH-G04-T*-10



OVH-G04-W-10

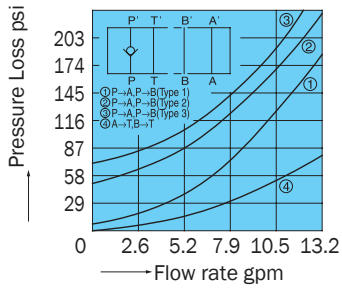


Performance Curves

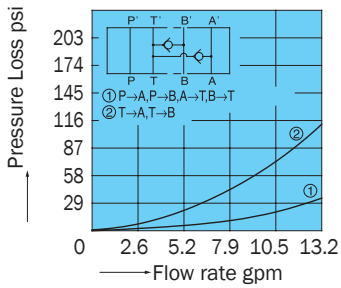
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

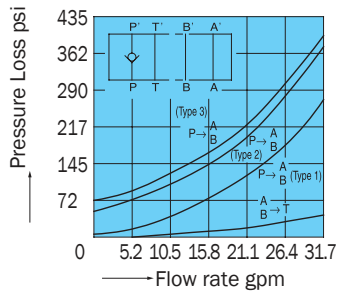
OC-G01-P*-20



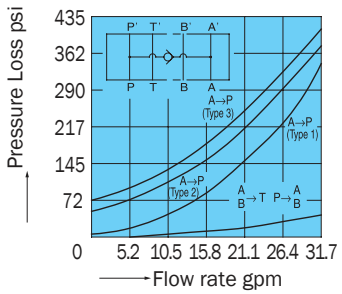
OCV-G01-W-20



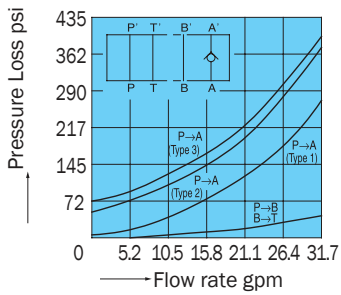
OC-G03-P*-J50



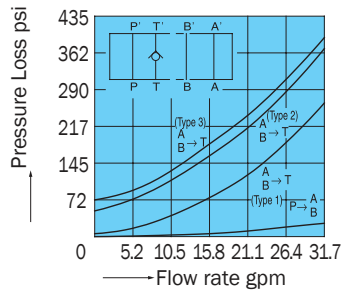
OC-G03-AP*-J50



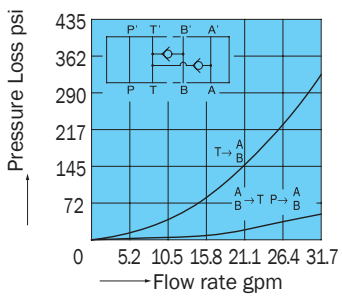
OC-G03-A*-J50



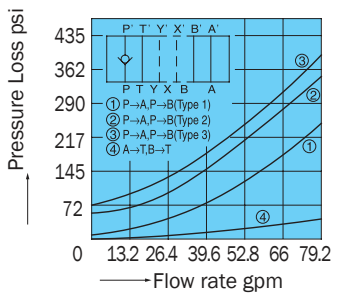
OC-G03-T*-J50



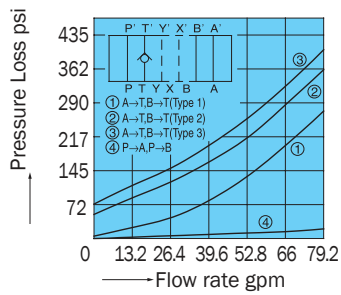
OCV-G03-W-J50



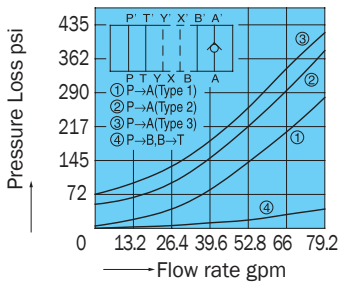
OCH-G04-P*-10



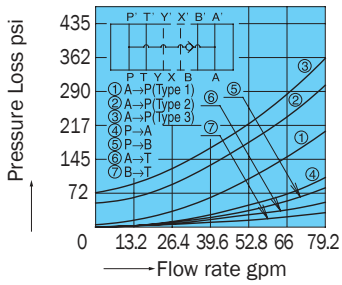
OCH-G04-T*-10



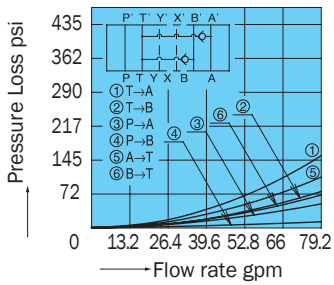
OCH-G04-A*-10



OCH-G04-AP*-10

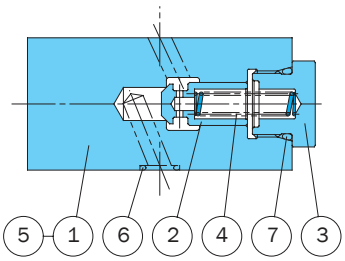


OVH-G04-W-10



Cross-sectional Drawing

P
OC-G01-T*-20
AP



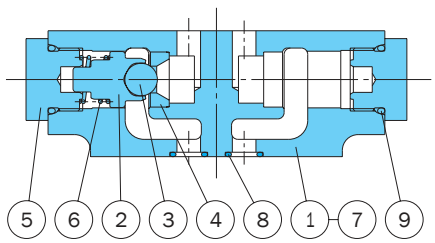
Part No.	Part Name
1	Body
2	Poppet
3	Spring seat
4	Spring
5	Plate
6	O-ring
7	O-ring

Seal Part List (Kit Model Number BRBS-01C*)

Part No.	Part Name	Part Number	Q'ty		
			P	T	AP
6	O-ring	1B-P9	4	4	4
7	O-ring	1B-P18	1	1	1

Note:
1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify P, T, or AP for the asterisk (*) in the kit model number.

OC-G01-A*-21



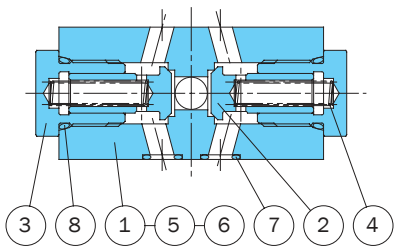
Part No.	Part Name
1	Body
2	Poppet
3	Ball
4	Seat
5	Spring seat
6	Spring
7	Plate
8	O-ring
9	O-ring

Seal Part List (Kit Model Number BDBS-01CA)

Part No.	Part Name	Part Number	Q'ty
			A
8	O-ring	1B-P9	4
9	O-ring	1B-P18	2

Note:
O-ring 1A/B-** refers to JIS B2401-1A/B.

OCV-G01-W-20



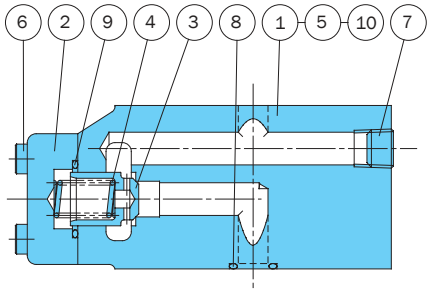
Part No.	Part Name
1	Body
2	Poppet
3	Guide
4	Spring
5	Plate
6	Plug
7	O-ring
8	O-ring

Seal Part List (Kit Model Number BDBS-01CVW)

Part No.	Part Name	Part Number	Q'ty
			W
7	O-ring	1B-P9	4
8	O-ring	1B-P18	2

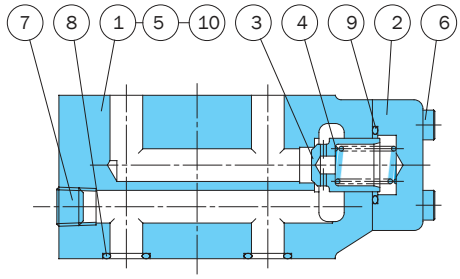
Note:
1. O-ring 1A/B-** refers to JIS B2401-1A/B.

OC-G03-P*-J50



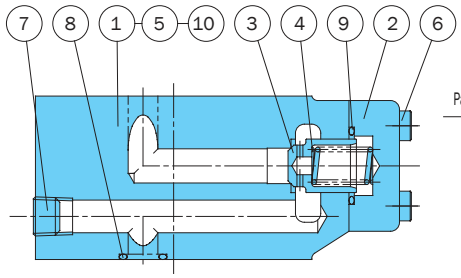
Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Spring
5	Plate
6	Screw
7	Plug
8	O-ring
9	O-ring
10	Pin

OC-G03-T*-J50



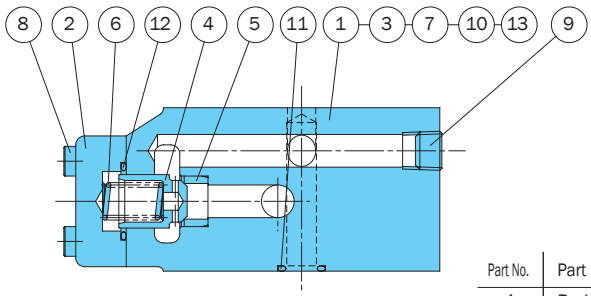
Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Spring
5	Plate
6	Screw
7	Plug
8	O-ring
9	O-ring
10	Pin

OC-G03-A*-J50



Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Spring
5	Plate
6	Screw
7	Plug
8	O-ring
9	O-ring
10	Pin

OC-G03-AP*-J50



Part No.	Part Name
1	Body
2	Cover
3	Plug
4	Poppet
5	Seat
6	Spring
7	Plate
8	Screw
9	Plug
10	O-ring
11	O-ring
12	O-ring
13	Pin

Seal Part List (Kit Model Number BDES-03C*)

Part No.	Part Name	Part Number	Q'ty		
			P	T	A
8	O-ring	AS568-014(Hs90)	5	5	5
9	O-ring	1B-P22	1	1	1

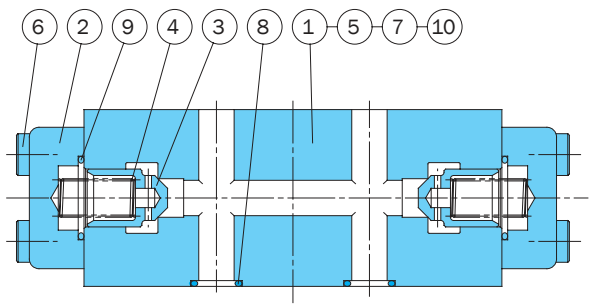
Note:
1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify P, T, or A for the asterisk (*) in the kit model number.

Seal Part List (Kit Model Number BDES-03CAP)

Part No.	Part Name	Part Number	Q'ty
			AP
10	O-ring	1B-P11	1
11	O-ring	AS568-014(Hs90)	5
12	O-ring	1B-P22	1

Note:
O-ring 1A/B-** refers to JIS B2401-1A/B.

OCV-G03-W-J50

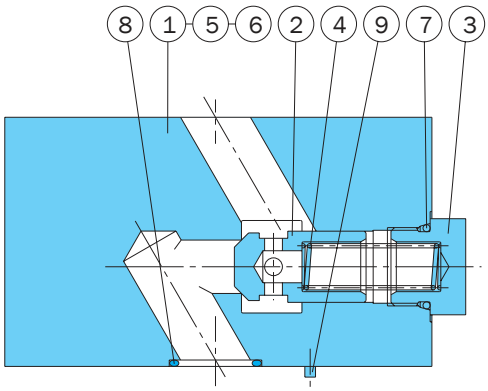


Seal Part List (Kit Model Number BDES-03CVW)

Part No.	Part Name	Part Number	Q'ty
			W
7	O-ring	1B-P10A	2
8	O-ring	AS568-014(Hs90)	5
9	O-ring	1B-P22	2

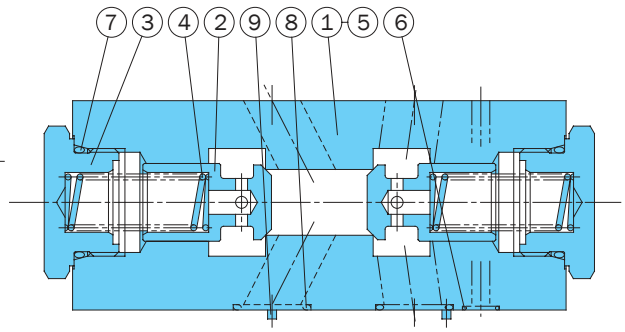
Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	5	Plate	9	O-ring
2	Cover	6	Screw	10	Pin
3	Poppet	7	O-ring		
4	Spring	8	O-ring		

OCH-G04-P*-10



Part No.	Part Name
1	Body
2	Poppet
3	Spring seat
4	Spring
5	Plate
6	O-ring
7	O-ring
8	O-ring
9	Pin

OVH-G04-W-10



Part No.	Part Name
1	Body
2	Poppet
3	Spring seat
4	Spring
5	Plate
6	O-ring
7	O-ring
8	O-ring
9	Pin

Seal Part List (Kit Model Number BDKS-04C*)

Part No.	Part Name	Body	Q'ty			
			P	T	A	AP
6	O-ring	AS568-012(Hs90)	2	2	2	2
7	O-ring	1B-P20	1	1	1	1
8	O-ring	AS568-118(Hs90)	4	4	4	4

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify P, T, A, or AP for the asterisk (*) in the kit model number.

Seal Part List (Kit Model Number BDKS-04CVW)

Part No.	Part Name	Part Number	Q'ty
6	O-ring	AS568-012(Hs90)	2
7	O-ring	1B-P32	2
8	O-ring	AS568-118(Hs90)	4

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

Pilot Operated Check Modular Valve

13.2 to 79.2 gpm
3625 to 5075 psi

Features

This modular valve is used to prevent actuator self-running and to maintain actuator position.

Maximum Operating Pressure: 3625, 5075 psi

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Cracking pressure psi	Area Ratio			Weight lbs	Gasket Surface Dimensions
					Pilot Piston	Check Valve Seat	Needle Valve Seat		
OCP-G01-W1-21 W2	1/8	3625	13.2	29 72	1	0.37	--	2.6	ISO 4401-03-02-0-94
OCP-G01-A1-21 A2				29 72					
OCP-G01-B1-21 B2				29 72					
OCP-G01-W1-F-21 W2				29 72	1	0.51	0.06	2.6	
OCP-G01-A1-F-21 A2				29 72					
OCP-G01-B1-F-21 B2				29 72					
OCP-G03-W1-J50 W2	3/8	3625	26.4	29 72	1	0.49	0.07	7.9	ISO 4401-05-04-0-94
OCP-G03-A1-J50 A2				29 72					
OCP-G03-B1-J50 B2				29 72					
OCP-G03-W1-D-J50 W2				29 72	1	0.49	--		
OCP-G03-A1-D-J50 A2				29 72					
OCP-G03-B1-D-J50 B2				29 72					
OPH-G04-W1-10 W2	1/2	5075	79.2	29 72	1	0.50	0.07	14.9	ISO 4401-07-06-0-94
OPH-G04-A1-10 A2				29 72					
OPH-G04-B1-10 B2				29 72					
OPH-G04-W1-D-10 W2				29 72	1	0.50	--		
OPH-G04-A1-D-10 A2				29 72					
OPH-G04-B1-D-10 B2				29 72					

• Handling

1 Note that when the 01 size has the auxiliary symbol "F," tank port back pressure can cause the small valve to open, making it impossible to maintain pressure.

2 If tank port back pressure causes the small valve to open and make it impossible to maintain pressure with the 03, 04 size, use a direct type with auxiliary symbol "D."

3 Minimum pilot pressure fluctuates with the input side pressure during reverse flow. Operate the valve so pressure is at least twice as high as the required pressure obtained using the minimum pilot pressure characteristics graph.

4 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.

5 04 series modular valves do not have an L (DR2) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

Understanding Model Numbers

OCP – G 03 – W 1 – (D) – J50 01, 03 size

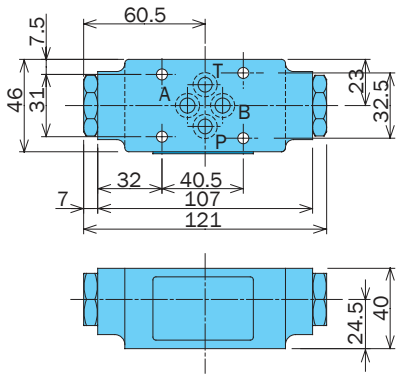
- Design number
  Note: For 01 size, 21
  For 03 size, relationship between mounting bolts and design number is indicated as J50: M6, 50 : M8.
- Auxiliary symbol F: With shock-resistant mechanism (01 size only)
  D: No small valve poppet (03 size only)
- Cracking pressure 1: 29 psi 2: 72 psi
- Control port W: A, B ports A: A port B: B port
- Nominal diameter (size) 01, 03
- Mounting method G: Gasket type
- Pilot operated check modular valve

OPH – G 04 – W 1 – (D) – 10 04 size

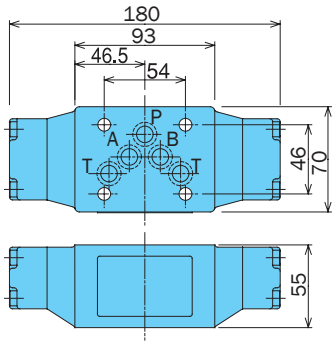
- Design number
- Auxiliary symbol D: No small valve poppet
- Cracking pressure 1: 29 psi
  2: 72 psi
- Control port W: A, B ports A: A port B: B port
- Nominal diameter (size) 04
- Mounting method G: Gasket type
- M35 Series pilot operated check modular valve

Installation Dimension Drawings

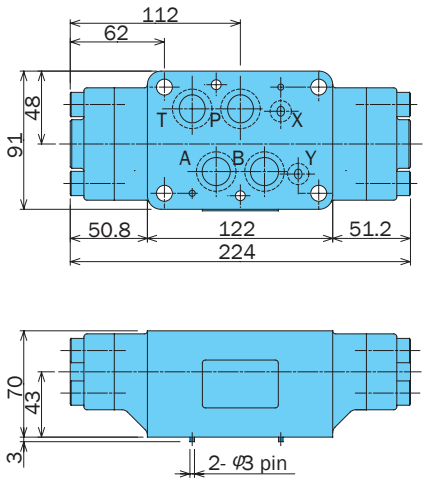
OCP-G01-**-(F)-21



OCP-G03-**-(D)-J50



OPH-G04-**-(D)-10

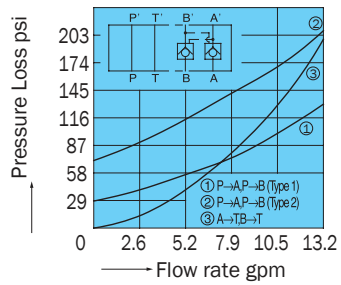


Specifications

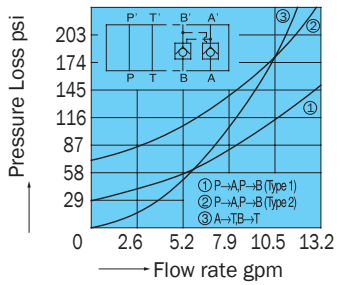
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

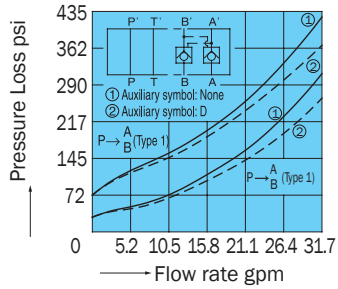
OCP-G01-W*-21



OCP-G01-W*-F-21

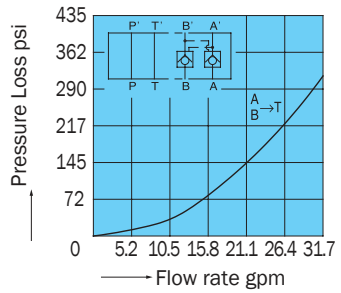


OCP-G03-W*-(D)-J50

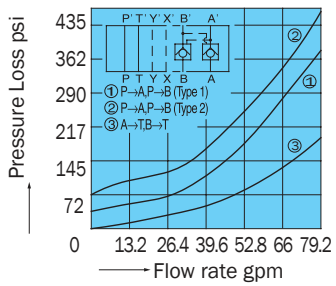


Pressure Loss Characteristics (Reverse Free Flow)

OCP-G03-W*-J50

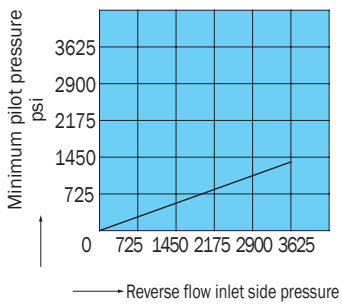


OPH-G04-W*-10

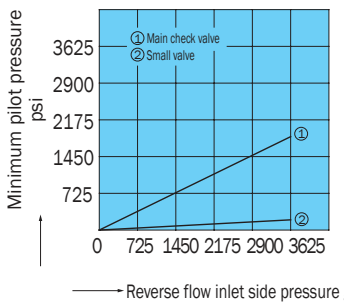


Minimum Pilot Pressure Characteristics

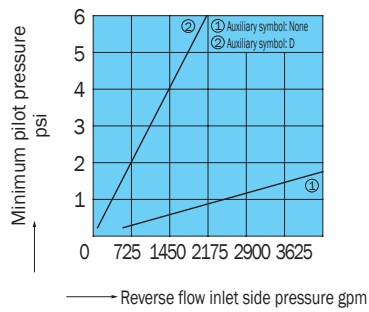
OCP-G01-**-21



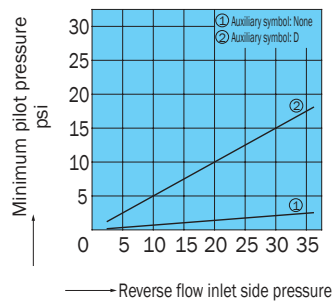
OCP-G01-**-F-21



OCP-G03-W*-(D)-J50

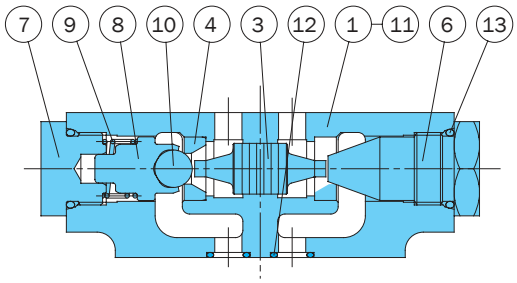


OPH-G04-W*-(D)-10

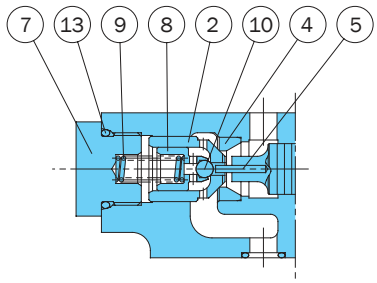


Cross-sectional Drawing

OCP-G01-A*-21



OCP-G01-A*-F-21



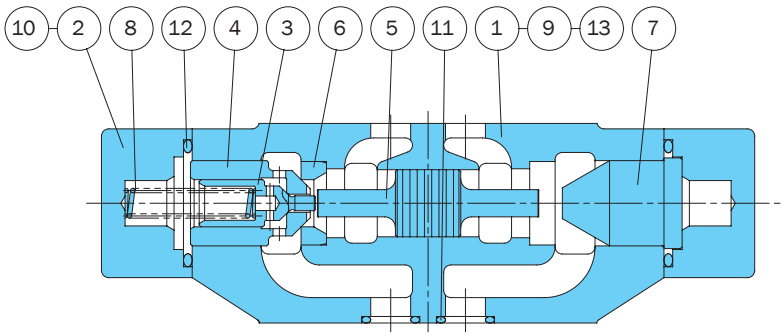
Part No.	Part Name
1	Body
2	Poppet
3	Piston
4	Seat
5	Rod
6	Bushing
7	Spring seat
8	Guide
9	Spring
10	Ball
11	Plate
12	O-ring
13	O-ring

Seal Part List (Kit Model Number BDBS-01CP)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
12	O-ring	1B-P9	4	4	4
13	O-ring	1B-P18	2	2	2

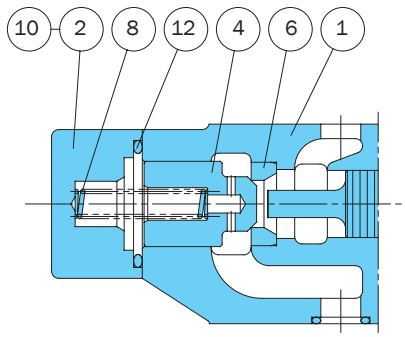
Note: 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Specify W, A, or B for the asterisk (*) in the kit model number.

OCP-G03-A*-J50



Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Poppet
5	Piston
6	Seat
7	Bushing
8	Spring
9	Plate
10	Screw
11	O-ring
12	O-ring
13	Pin

OCP-G03-**-D-J50

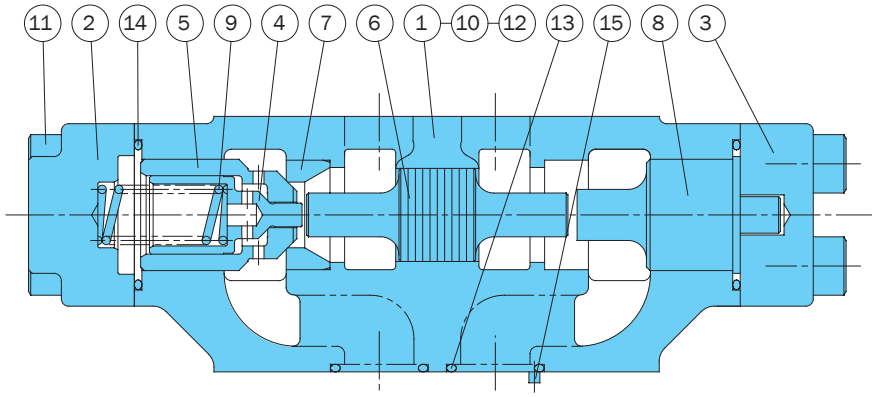


Seal Part List (Kit Model Number BDES-03CP*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
11	O-ring	AS568-014(Hs90)	5	5	5
12	O-ring	1B-P29	2	2	2

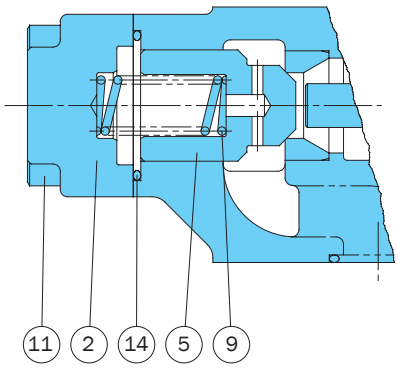
Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

OPH-G04-A*-10



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Poppet
5	Poppet
6	Piston
7	Seat
8	Bushing
9	Spring
10	Plate
11	Screw
12	O-ring
13	O-ring
14	O-ring
15	Pin

OPH-G04-**-D-10



Seal Part List (Kit Model Number BDKS-04CP*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
12	O-ring	AS568-012(Hs90)	2	2	2
13	O-ring	AS568-118(Hs90)	4	4	4
14	O-ring	AS568-127(Hs90)	2	2	2

Note: 1.Specify W, A, or B for the asterisk (*) in the kit model number.

Gauge Modular Block

13.2 to 26.4 gpm
3625 psi

Features

This modular block makes it possible to attach a pressure gauge to the P and T ports or the A and B ports.

Connection to the ports is extremely simple.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Weight lbs	Gasket Surface Dimensions
OK-G01-P-E20 OK-G01-T-E20	1/8	3625	13.2	1.3	ISO 4401-03-02-0-94
OK-G01-W-E20				1.3	
OK-G01-P-H-E20 OK-G01-T-H-E20				2.2	
OK-G01-W-H-E20				2.2	
OK-G03-E50	3/8	3625	26.4	5.0	ISO 4401-05-04-0-94

Understanding Model Numbers

OK – G 01 – P – (H) – 20

- 20 — Design number
  Note: For 03 size, relationship between mounting bolts and design number is indicated as J50: M6, 50 : M8.
  E: NPT piping 01, 03
- (H) — Auxiliary symbol H: 40 mm thick (01 size only)
- P — Pressure output port P: P port T: T port W: A, B ports
- 01 — Nominal diameter (size) 01, 03
- G — Mounting method G: Gasket type
- OK — Gauge modular block

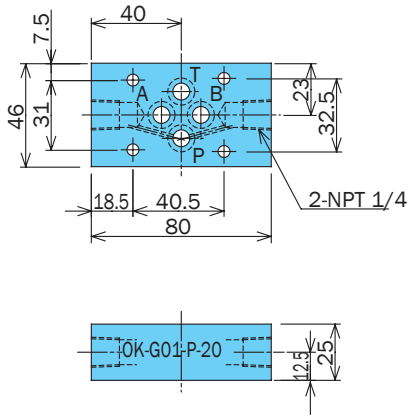
• Handling

1 When installing the OK-G01-P- (H)-E20, OK-G01-T-(H)-E20, or OK-G01-W-(H)-E20, make sure the model number printing is oriented so it can be read correctly from the P port side.

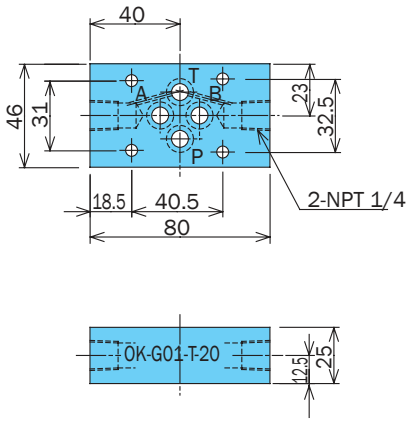
2 Note that a sub plate and installation bolts are not included. See pages H4 and F87-89 if these items are required.

Installation Dimension Drawings

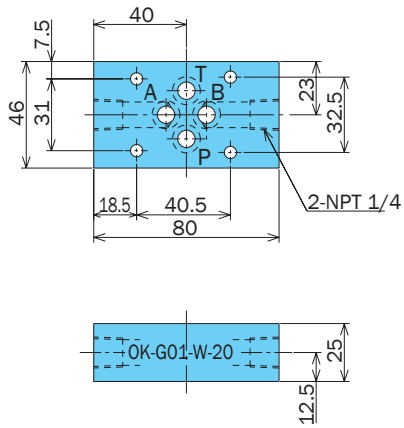
OK-G01-P-E20



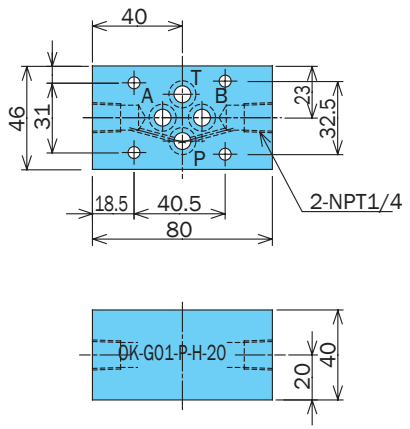
OK-G01-T-E20



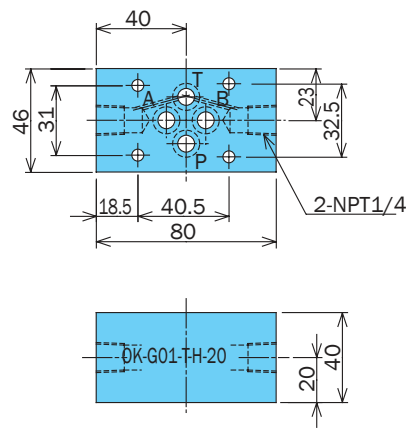
OK-G01-W-E20



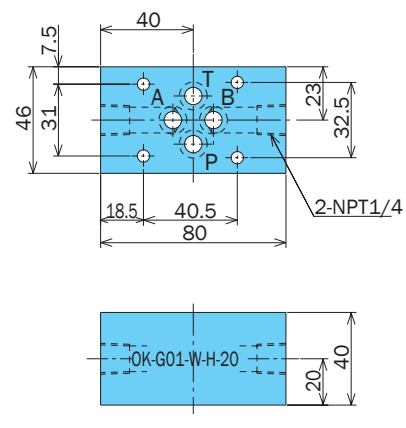
OK-G01-P-H-E20



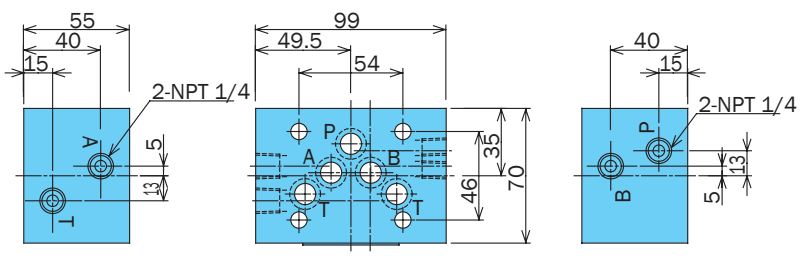
OK-G01-T-H-E20



OK-G01-W-H-E20



OK-G03-E50



High-Low System Block

13.2 to 26.4 gpm
3625 psi

Features

Simple high-low 2-speed control can be attained by stacking this block on top of a high-low base block and manifold, which configures a speed control circuit.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Weight lbs
OB-G01-W-20	1/8	3625	13.2	3.3
OB-G01-W-H-20				5.5
OB-G03-W-J30	3/8	3625	26.4	9.9
OB-G03-W-H-J30				15.6

• Handling

1 If a base block is required, use MOB-01Y-W*-10 for the 01 size and MOB-03X-B*-J30 for the 03 size, because their valve pitches match. MOB-01X-B*-10 has a different valve pitch, and so cannot be used.

2 When installing this block, make sure the nameplate is oriented so it can be read correctly from the A port side.

3 Both of the cylinder ports on this block's manifold side (bottom) are open. Because of this, close one of the base block cylinder ports (A1, B1 or A2, B2 on the next page), or modify the manifold so it has a single cylinder port only.

4 Note that installation bolts are not included. See pages H4 and F87-89 if these items are required.

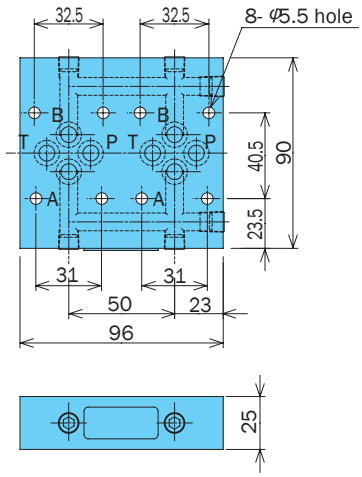
Understanding Model Numbers

OB – G 01 – W – (H) – 20

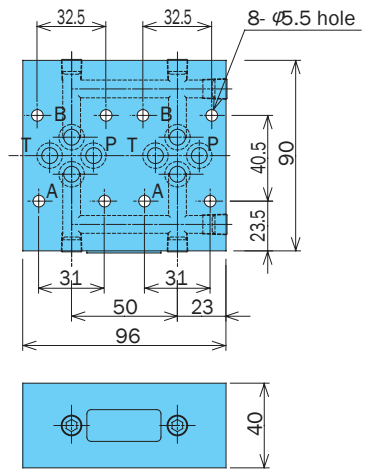
- 20: Design number
  Note: For 03 size, relationship between mounting bolts and design number is indicated as J30: M6, 30 : M8.
- (H): Auxiliary symbol H: 40 mm thick (01 size), 55 mm thick (03 size)
- W: High-low system
- 01: Nominal diameter (size) 01, 03
- G: Mounting method G: Gasket type
- OB: High-low system block

Installation Dimension Drawings

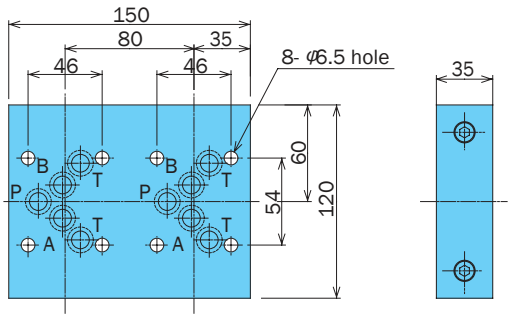
OB-G01-W-20



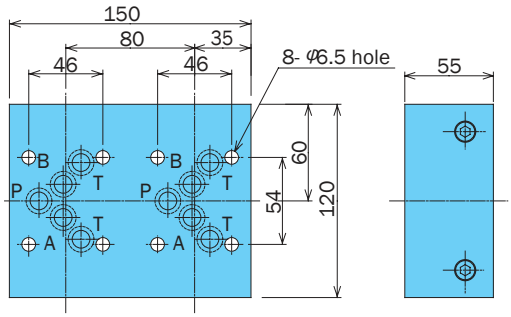
OB-G01-W-H-20

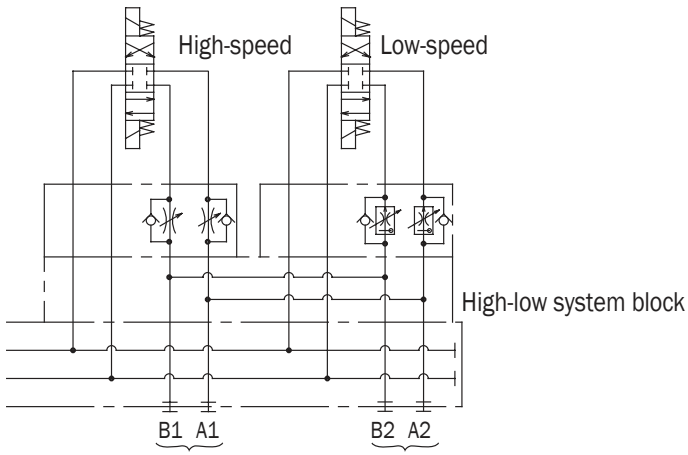


OB-G03-W-J30



OB-G03-W-H-J30





Use either one.

End Plate, Free Flow Plate, 03/01 Change Plate

13.2 to 26.4 gpm
3625 psi

Features

The end plate is a modular valve plate used to close off a circuit that is not required, and when using a relief modular valve in a standalone configuration.
The free flow plate is a modular valve plate is used in a one-way circuit that does not require a solenoid valve.
The 03/01 change plate makes it possible to use an 01 size modular valve with an 03 size sub-plate and base block.
The 06/04 change plate makes it possible to use an 04 size modular valve with an 06 size sub-plate and base block.

Specifications

Model No.	Nominal Diameter(Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Weight lbs
MOB-G01-10	1/8	3625	–	.6
MOB-G01-H-10				1.3
MOB-G01-A-10 MOB-G01-B-10			13.2	1.3
MOB-G03-J50	3/8	3625	–	3.0
MOB-G03-H-50				5.5
MOB-G03-A-J50 MOB-G03-B-J50			26.4	2.8
MOB-G03-A-H-50 MOB-G03-B-H-50				5.0
MOB-G03-AA-J50			13.2	5.0
MOB-G06-AA-5411A	3/4	3045	52.8	17.6

Understanding Model Numbers

MOB – G 03 – A – (H) – J50

- MOB: Modular valve plate
- G: Mounting method G: Gasket type
- 03: Nominal diameter (size) 01, 03
- A: Port connection status
  - None: All ports blocked (stop plate)
  - A : P←→A, B←→T } (Free-flow plate)
  - B : P←→B, A←→T }
  - AA : G03→G01, G06→G04
    - P→P, T→T: 03/01 Switching plate
    - A→A, B→B: 06/04 Conversion plate
- (H): Auxiliary symbol H: Tightening height 36mm (01 size), 58mm (03 size)
- J50: Design number

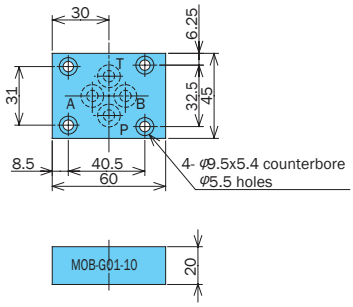
Note: Auxiliary symbol (tightening height) and design number (G03 size)
J50: M6 type 26.5mm
50: M8 type 23.4mm
H-50: M8 type 58mm (stop plate and relief low plate only)
5411A: 06/04 conversion plate (special item)

• Handling
1 Installation bolts are not included. Use the table to the right to specify bolts for stand-alone use.

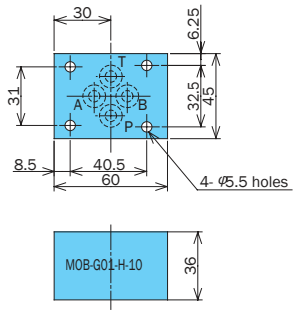
Model No.	Bolt Dimensions	Q'ty
MOB-G01-10	M5 × 25	4
MOB-G01-*-10	M5 × 45	4
MOB-G03-J50 MOB-G03-$\frac{A}{B}$J50 MOB-G03-AA-J50	M6 × 35	4
MOB-G03-50 MOB-G03-$\frac{A}{B}$50 MOB-G03-AA-50	M8 × 35	4
MOB-G03-H-50 MOB-G03-$\frac{A}{B}$H-50	M8 × 70	4
MOB-G06-AA-5411A	M12 × 70	6

Installation Dimension Drawings

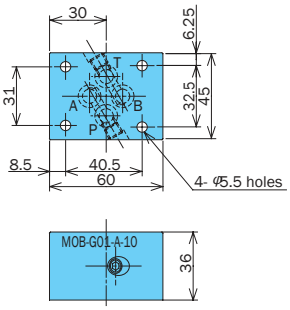
MOB-G01-10



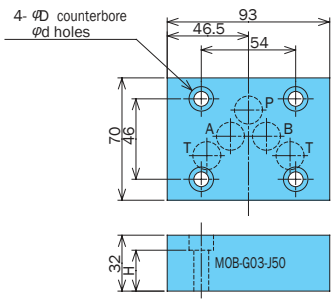
MOB-G01-H-10



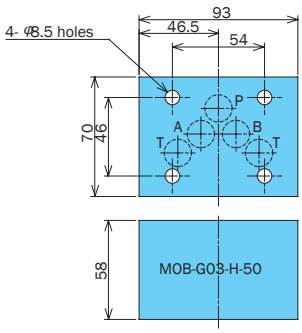
MOB-G01- A (B) -10



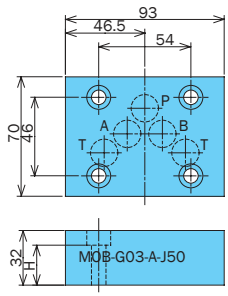
MOB-G03-J50



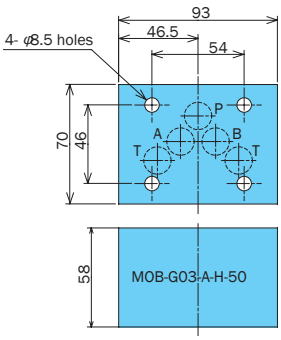
MOB-G03-H-50



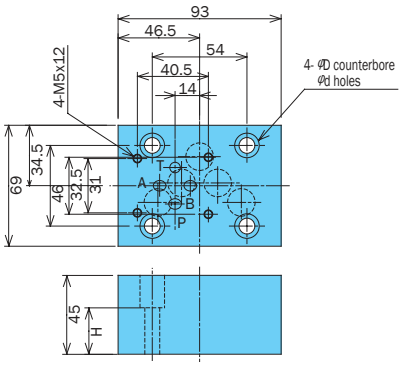
MOB-G03- A B -J50



MOB-G03- A B -H-50

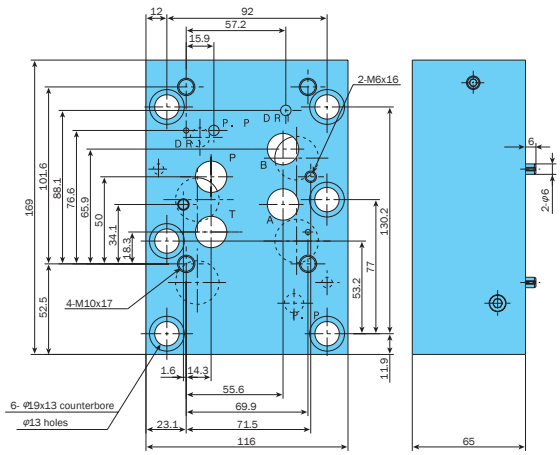


MOB-G03-AA-J50



Model No.	D	H	d
MOB-G03-*-50	14	23.4	8.5
MOB-G03-*-J50	11	26.5	6.5

MOB-G06-AA-5411A

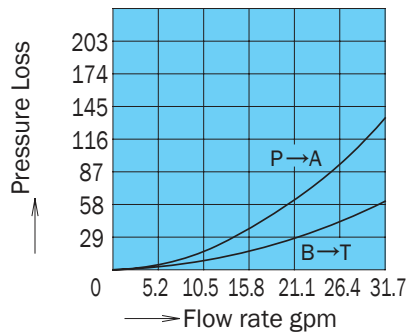


Performance Curves

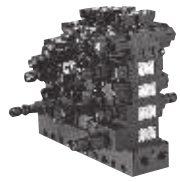
Hydraulic Operating Fluid
Viscosity 32 centistokes

Pressure Loss Characteristics

MOB-G03-A-J50

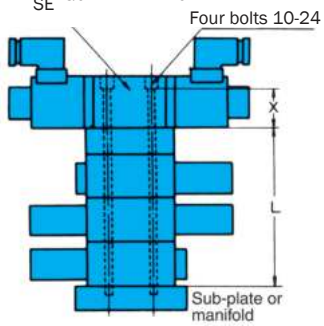


Valve Installation Bolt List



E: UNC Thread
01 (nominal diameter)

SS -G01-***-**-E31
SA
SL -G01-***-**-40
SE

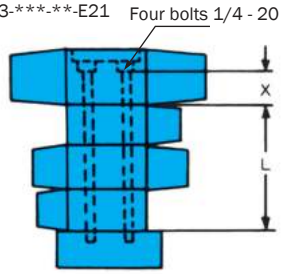


Model Number	X
SA-G01-***-**-E31	37.5
SS-G01-***-R-**-E31	
SL-G01- ***-R- **-E31	
SE-G01- ***-GR- **-40	

Type	Model Number	Dimension L	Bolt length
Hexagon Socket Head Bolt	0TH-01-70-10	25	70
	85	40	85
	110	65	110
	125	80	125
	150	105	150
	165	120	165
	190	145	190
	205	160	205
Stat Bolt	0TD-01-80-10	25	80
	95	40	95
	120	65	120
	135	80	135
	145	90	145
	160	105	160
	175	120	175
	185	130	185
	200	145	200
	210	155	210
	215	160	215
	225	170	225
	240	185	240
	250	195	250
	265	210	265
	275	220	275

E: UNC Thread
03 (nominal diameter)

SS-G03-***-**-E22
SA-G03-***-**-E21

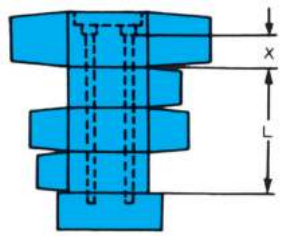


Model Number	X
SS-G03- ***-R- **-E22 SA-G03- ***-R- **-E21	60.5

Type	Model Number	Dimension L	Bolt length
Hexagon Socket Head Bolt	0TH-03-125-J30	55	M6 × 125
	-180-	110	M6 × 180
Stat Bolt	0TD-03-135-J30	55	M6 × 135
	-190-	110	M6 × 190
	-245-	165	M6 × 245
	-300-	220	M6 × 300

E: UNC Thread

SS-G03-***-**-22
SA-G03-***-**-21

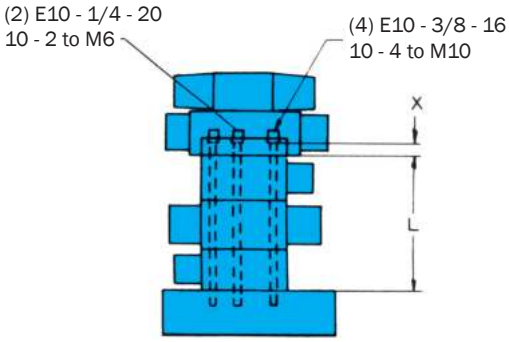


Model Number	X
SS-G03- ***-R- **-22 SA-G03- ***-R- **-21	58

Type	Model Number	Dimension L	Bolt length
Hexagon Socket Head Bolt	0TH-03-125-30	55	M8 × 125
	-180-	110	M8 × 180
Stat Bolt	0TD-03-135-30	55	M8 × 135
	-190-	110	M8 × 190
	-245-	165	M8 × 245
	-300-	220	M8 × 300

Note:
1 Model numbers indicate bolt kits for one solenoid valve.
2 Up to four modular valves can be ganged together.
3 01 Size Modular valves at a height of 40 + 25 = 65 mm are ganged to one level.
4 2-pressure reducing valves at a height of 90 mm are ganged to two levels.

04 (nominal diameter)

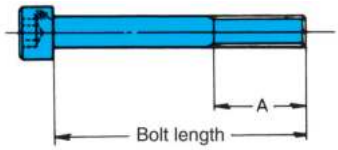


Model Number	X
DSS-G04-***-R-**-22 DSA-G04-***-**-22	34

Type	Model Number	Dimension L	Bolt Size	Bolt length
Hexagon Socket Head Bolt	0TH-04-120-10	70	M6	115
			M10	120
	-135-	85	M6	130
			M10	135
	-190-	140	M6	185
			M10	190
	-205-	155	M6	200
			M10	205
Stat Bolt	0TD-04-135-10	70	M6	123
			M10	135
	-150-	85	M6	138
			M10	150
	-205-	140	M6	193
			M10	205
	-220-	155	M6	210
			M10	220
	-275-	210	M6	265
			M10	275
	-290-	225	M6	278
			M10	290

Note: 1. The above model numbers indicate bolt kits for one solenoid valve.
2. Up to three modular valves can be ganged together.
3. There is a bolt for ganging four valves, but the maximum operating pressure is limited to 3045 psi. For details, consult your agent. (See page D-4)

Hexagon socket head bolt

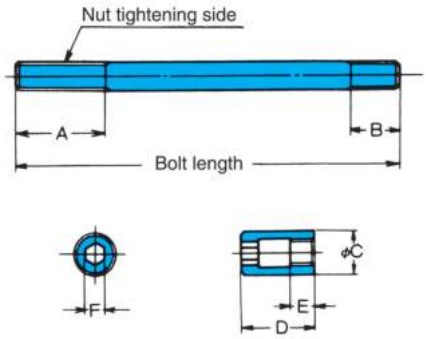


Nominal Diameter	A	Bolt Size
01	15	10 - 24
03	18	1/4 - 20

Tightening Torque

Nominal Diameter	Bolt Size	Tightening Torque N ft lbs
01	10 - 24 UNC	3.6 to 5.1
03	1/4 - 20 UNC	7.3 to 9.5

Stat Bolts and Nuts



Model No.	A	B	C	D	E	F	Bolt Size
OTD-01-***-10	12	9	8.5	16	11	4	M5
OTD-03-***-J30	20	10	10	18	11.5	5	M6
OTD-03-***-30	25	12.5	13	22	15	6	M8
OTD-04-***-10	20	10	10	18	11.5	5	M6
	25	18	16	23	15	8	M10

Stat bolts and nuts are included. The E dimension is the effective screw depth.

01, 03 Base Block

Features

This block, which allows piping from both sides, is designed for use with combinations of two or more solenoid valves and modular valves.

Understanding Model Numbers

MOB - 01 X - B3 - 10

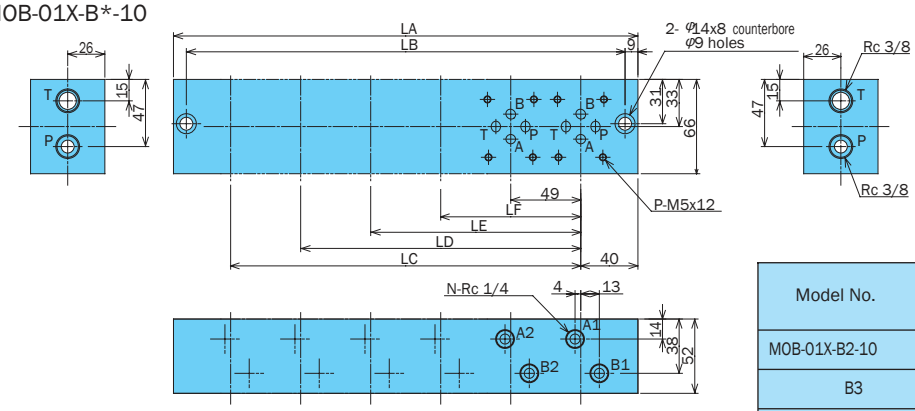
- Design number
- Sequential number
- A, B port piping diameter X: One size larger than nominal diameter Y: Two size larger than nominal diameter
- Nominal diameter (size) 01, 03
- Base block for modular valve

Note: Another series of multi-pump blocks is available for the MBS and MBW Series NACHI PACK. For details, see page L-24.

Installation Dimension Drawings

01 (nominal diameter) base block

MOB-01X-B*-10



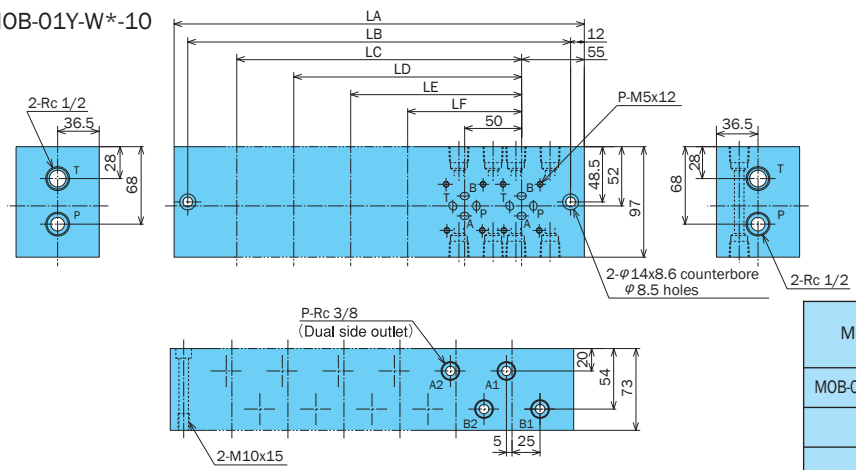
Model No	Pipe Outlet Size (A, B)	Maximum Working Pressure psi	Recommended Flow Rate gpm
MOB-01X-B*-10	1/4	3625	5.2

Plug Tightening Torque

Plug Configuration	Tightening Torque N ft lbs
TPHA-1/4	13.4 to 22
TPHA-3/8	29.5 to 35

Model No.	LA	LB	LC	LD	LE	LF	N	P	Weight lbs
MOB-01X-B2-10	129	111	–	–	–	–	4	8	6.1
B3	178	160				98	6	12	8.3
B4	227	209			147		8	16	10.8
B5	276	258		196			10	20	13.0
B6	325	307	245				12	24	15.2

MOB-01Y-W*-10



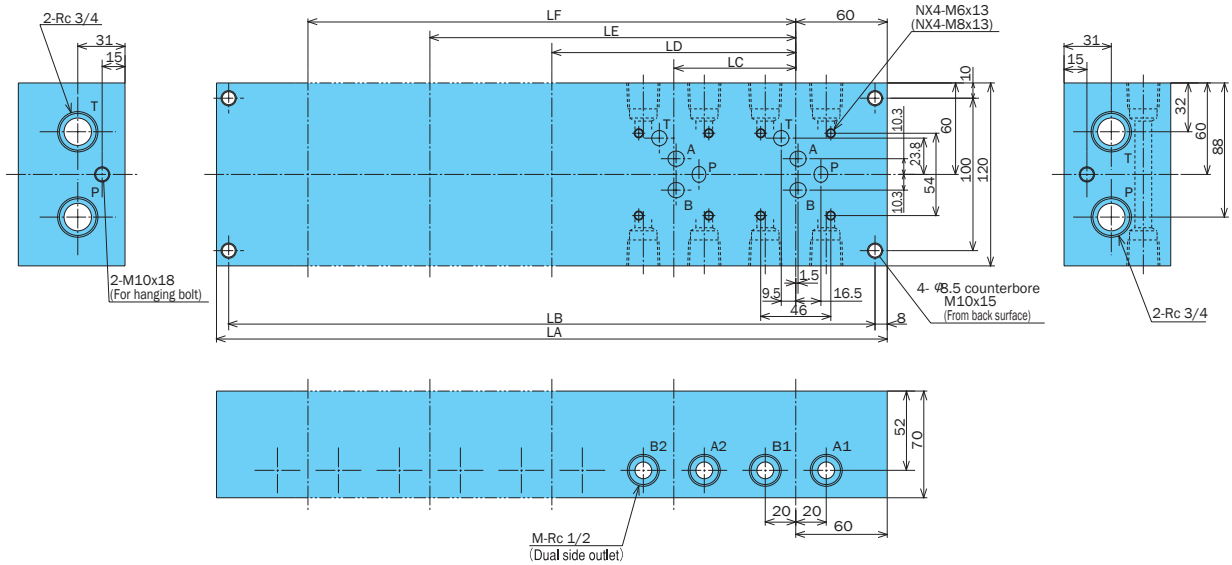
Model No	Pipe Outlet Size (A, B)	Maximum Working Pressure psi	Recommended Flow Rate gpm
MOB-01Y-W*-10	3/8	3625	10.5

Plug Tightening Torque

Plug Configuration	Tightening Torque N ft lbs
TPHA-3/8	29.5 to 35
TPHA-1/2	40.5 to 48

Model No.	LA	LB	LC	LD	LE	LF	P	Weight lbs
MOB-01Y-W1-10	110	86	–	–	–	–	4	11.2
W2	160	136					8	16.0
W3	210	186				100	12	21.1
W4	260	236			150		16	26.0
W5	310	286		200			20	30.8
W6	360	336	250				24	35.7

03 (nominal diameter) base block
M0B-03X-B*-(J)30



Plug Tightening Torque

Plug Configuration	Tightening Torque N ft lbs
TPHA-1/2	40.5 to 48
TPHA-3/4	66 to 73.7

Model No	Pipe Outlet Size (A, B)	Maximum Working Pressure psi	Recommended Flow Rate gpm
M0B-03X-B*-(J) 30	1/2	3625	21.1

Model No.	Dimensions								Weight lbs
	LA	LB	LC	LD	LE	LF	M	N	
M0B-03X-B2 -(J) 30	200	184	80	–	–	–	8	2	22.7
B3	280	264	80	160			12	3	31.5
B4	360	344	80	160	240		16	4	40.5
B5	440	424	80	160	240	320	20	5	49.3

Note: Dimensions in parentheses are for model number M0B-03X-B*-30, which is the model number when using M8 valve mounting bolts.

High-pressure M35 Series

13 to 80 gpm
5075 psi

Overview

The High-Pressure M35 Series responds to the needs of high density in a variety of fields by enabling higher density hydraulic systems.
This valve incorporates NACHI original flow control technology and heat treatment, plus precision machining to createhigh-performance valves with the following features:

- High-pressure 35MPa
- High reliability and compact design

- Press Machinery
  Press brakes, punching presses
- Underground Machinery
  Shield tunneling machinery, removal systems, etc.
- Construction Machinery
  From mini vehicles to 6 to 10-ton vehicles, shovels, etc.
- Environmental Related
  Granulators, filter presses, scrap presses
- Testing Equipment
  Impulse, durability, performance testers, etc.

(For details see catalog number 9265-3.)

- M35 Series Modular Valve (O * H)

By integrating multiple hydraulic devices, this valve can be used when configuring hydraulic circuits even in the high-pressure range. See page F9 for information about the 04 size.
This series consists of pressure, flow rate, and flow direction control valves.
Maximum Working Pressure: 5075 psi
Maximum Flow Rate: to 80 gpm

- M35 Series Non-leak Solenoid Valve (SNH)

A NACHI original structure is used to configure this wettype shutoff valve that isolates internal leaks. Installation conforms to ISO4401 standards, so it can be used in a wide range of applications in combination with modular valves. For more information, see page D-53.
Maximum Working Pressure: 5075 psi
Maximum Flow Rate: to 25 gpm

- M35 Series Related Components
  - Pump (See page A-42.)
    Rated Pressure: 5075 psi
    Capacity: 1.7 to 2.4 cu in/rev
  - High-response proportional flow control valve
    Maximum Working Pressure: 5075 psi
    Maximum Flow Rate: to 90 gpm
- M35 Series Industry Specific Components
  - Jack Valve
    Maximum Working Pressure: 5075 psi
    Maximum Flow Rate: to 25 gpm
  - Logic Cartridge Mono Block
    Maximum Working Pressure: 5075 psi
    Maximum Flow Rate: to 1850 gpm
- M35 Series Industry Specific Components
  - Hydraulic accessories (stop valves, filters, accumulators, hoses, etc.); NACHI-MOOG servo level

Specifications

M35 Series Modular Valve

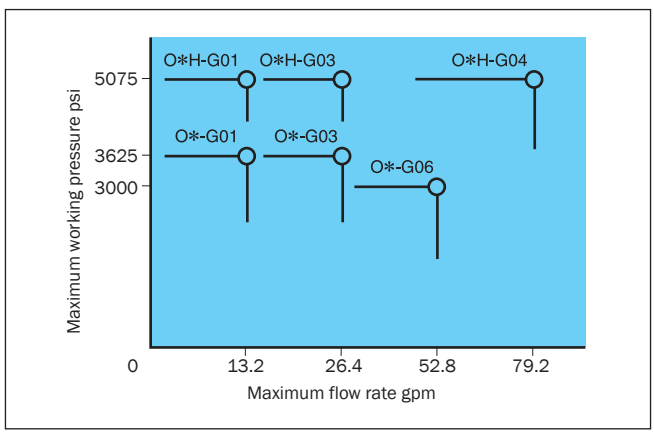
Size	Maximum Working Pressure psi	Maximum Flow Rate gpm	Number of Integration Levels
01	5075	13.2	to 3
03		26.4	
04		79.2	

Dimensions

Size	Height (mm)	Width (mm)	Remarks
01	40	46	Same dimensions as the M25 Series
03	55	70	
04	70	91	

Note: M8 installation bolts only are used for the 03 size.

Modular Valve Product Series



01, 03 Size Specifications

		Valve Model Number	Maximum Operating Power psi	Maximum Flow Rate gpm	Pressure Adjustment Range (Cracking Pressure) psi	ISO Symbol
Solenoid Valves	Solenoid Valves	SA-G**-**-**-31(21) SS-G**-**-**-31(22)				P T B A
Pressure Control Valves	Relief Valves (Balance Type)	ORH-G01-P*-10 -W*- ORH-G03-P*-10 -W*-		G01 10.5 1000 - 5075 G03 21.1	500 - 3625 P: P (→T) port W: AB (→T) port	
	Relief Valves (Direct Type)	ORH-G01-DW*-10 -DA*- -DB*- ORH-G03-DW*-10 -DA*- -DB*-		G01 5.2 1000 - 5075 G03 7.9	500 - 3625 DW: AB (→T) port DA: A (→T) port DB: B (→T) port	
	Reducing Valve	OGH-G01-P*-10 -B*- OGH-G03-P*-(B)-10 -B*-		G01 10.5 G03 21.1	500 - 3625 P: P port B: B port	
Flow Control Valves	Flow Regulator Valves	OYH-G01-W-Y-10 -A-Y- -B-Y- -W-X- -A-X- -B-X- OYH-G03-W-Y-10 -A-Y- -B-Y- -W-X- -A-X- -B-X-	5075	G01 13.2 G03 26.4	Y: Meter out X: Meter in W: AB port A: A port B: B port	
Direction Control Valves	Check Valves	OCH-G01-P*-10 -T*- OCH-G03-P*-10 -T*-		G01 13.2 G03 26.4	1: 5.8 2: 50.7 3: 72.5 P: P port T: T port	
	Pilot Check Valves	OPH-G01-W*-(F)-10 -A*- -B*- OPH-G03-W*-(D)-10 -A*- -B*-		G01 13.2 G03 26.4	1: 29 2: 72.5 W: AB port A: A port B: B port D: Direct type (no small valve, G03 only) F: Decomp type (with small valve, G01 only)	

ORH : Relief valve

OGH : Reducing valve

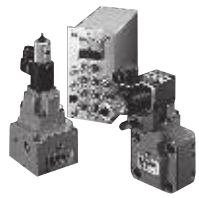
OPH : Pilot check valve

NACHI

Electro-Hydraulic Proportional Valve

Electro-Hydraulic Proportional Valve Series

.5 to 132 gpm
3000, 3600, 4000, 5000 psi



Overview

Today's hydraulic systems demand high levels of automation, power efficiency, and energy efficiency, which is why the use of electro-hydraulic proportional valves is on the rise. Built-in electronic components deliver outstanding response and fluid pressure that allows high output, as well as superior operation, and control. The NACHI Electrohydraulic Proportional Valve Series includes the pressure control valves, flow control valves, and direction control valves that make it easy to meet these needs.

Features

1 **Pressure Control Valve Series**

EPR Series: Small-volume direct driver type pilot relief valve
ER Series: Large-volume balanced piston type relief valve
EGB Series: Large-volume balanced piston type pressure reducing valve with relief function

The pressure control section uses a poppet structure, which is virtually impervious to the effects of dirt in the operating fluid for outstanding pressure stability.

2 **Flow Control Valve Series**

ES Series: This 3-directional valve provides proportional flow control in accordance with ***input current***.
ESR Series: With a built-in load sensing function, this 3-way valve is for use in low-energy circuits.

A force feedback mechanism is used for main spool positioning, and amplification is performed by the pilot spool. The result is superior response with small hysteresis and outstanding flow rate reproduction.

3 **Direction Flow Control Valve Series**

ESD Series: This electro-hydraulic proportional valve provides both direction control and flow control functions. Mounting methods are the same as those for standard directional valves, which allows simple structuring and maintenance.

4 **Modular Type Control Valve Series**

EOG-G01: This reduction valve with relief function can be used in ganged configurations.
EOF-G01: This flow control valve combines a restrictor valve with a pressure compensation valve.

This dual configuration provides easy installation along with dramatically reduced space requirements.

5 **Power Amplifiers**

EMA Series: Amplifier type
EMC Series: Controller type

A ***current-feedback*** amplifier system is used to virtually eliminate ***output current*** fluctuation. The same power supply specifications apply to all types.

6 **Compact Power Amplifiers**

EBA Series: Amplifier type

The highly efficient PWM control system of this new series ensures high reliability in a compact configuration.

7 **Compact, Multi-function Power Amplifiers**

EDA Series: Amplifier type

This compact amplifier can drive two solenoids with a single DC input.

EDC Series: Amplifier controller type

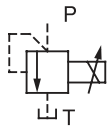
A choice of inputs: 6-contact or DC 2 input/4-contact compensation valve.

Series List

Name		Maximum Working Pressure psi	Rated Flow Rate gpm .26 .5 2.6 13.2 26.4 52.8 79.2 105 132
Electro-hydraulic Proportional Valve	(EPR)	5000	01 — Size
Electro-hydraulic Proportional Relief Valve	(ER)	5000	03, 06
Electro-hydraulic Proportional Relief and Reducing Valve	(EGB)	3600	03, 06
Electro-hydraulic Proportional Flow Control Valve	(ES)	3000	02, 03, 06, 10
Load Sensitive Electro-hydraulic Proportional Relief and Flow Control Valve	(ESR)	3600	03, 06, 10
Electro-hydraulic Proportional Flow Control Valve	(ESD)	3600	01, 03, 04, 06
Modular Type Electro-hydraulic Proportional Reducing Valve	(EOG)	3600	01
Modular Type Electro-hydraulic Flow Control Valve	(EOF)	3000	01
Power Amplifier	(EMA) (EMC)		—
Compact Power Amplifier	(EBA)		—
Compact, Multi-function Power Amplifier	(EDA) (EDC)		—

Electro-Hydraulic Proportional Pilot Relief Valve

0.3 gpm
43 to 4000 psi



Features

This DC solenoid relief valve matches the attraction force of a DC solenoid with fluid pressure. When connected to a small-volume hydraulic system or the poppet of a balanced piston type pressure control valve, this valve provides continual pressure control in proportion to ***input current***.

Specifications

Item \ Model No.	EPR-G01-*-****-12
Rated Flow Rate gpm	0.3
Pressure Control Range psi	B: 43 to 360 1: 100 to 1000 2: 145 to 2000 3: 215 to 3000 4: 215 to 4000 5: 290 to 5000
Rated Current mA	800
Coil Resistance Ω	20 (68° F)
Hysteresis %	3 max. (Note)
Weight lbs	3.5

Note: Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Series List

EPR – G 01 – 2 – 00 12 S * 12

- 12 — Design number
- * — E: Unified Thread
- S — Plunger orifice symbol: None: No orifice; S: With orifice
- 12 — Tank port orifice symbol (Table 1)
- 00 — Pressure port orifice symbol (Table 1)
- 2 — Pressure control range B, 1, 2, 3, 4, 5
- 01 — Nominal diameter 01
- G — Mounting method G: Gasket type
- EPR — Electro-hydraulic proportional pilot relief valve

Table 1 Pressure Port and Tank Port Orifice Symbols

Orifice Symbol	00	08	09	10	11	12	13
Orifice Diameter	None	φ0.8	φ0.9	φ1.0	φ1.1	φ1.2	φ1.3

Note: The following are the standards for the orifice auxiliary symbols.

Pressure Control Range	Orifice Auxiliary Symbol
Type B, Type 1	0013S
Type 2, Type 3	0012S
Type 4	1212S
Type 5	1111S

• Handling

1 Air Bleeding
To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid. The position of the air vent can change by loosening the M4 screw and rotating the cover.

2 Mounting Method
Mounting on a vertical surface causes minimum pressure to increase by 14 psi.

3 Manual Pressure Adjusting Screw
For the initial adjustment or when there is no ***input current*** to the valve due to an electrical problem or some other reason, valve pressure can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, the manual adjusting screw should be rotated back fully to the left (counter-clockwise) and secured with the lock nut.

4 Minimum Relief Flow Rate
A small flow rate can cause setting pressure to become unstable. Use a flow rate of at least .18 in^3/min.

5 Load Capacity
When using this valve to control direct circuit pressure, make sure the load volume (valve P port side volume) is at least 2.4 in^3.

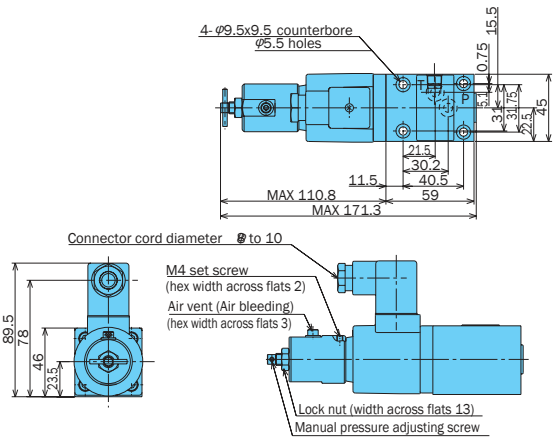
6 Bundled Accessories (Valve Mounting Bolts)
10-24 x 1 3/4"(four) Tightening torque: 3.6-7 ft lbs.

7 Sub Plate
When a sub plate is required, order using the following model number.
MSA-01Y-E10 (See the next page for dimensions.)

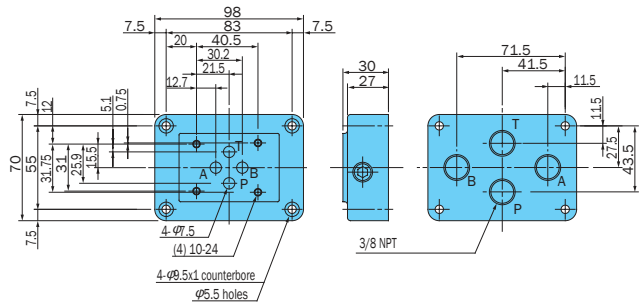
8 Use an operating fluid that conforms to the both of the following.
Fluid Temperature: 4°F to 140°F
Viscosity: 12 to 400 centistokes. The recommended viscosity range is 15 to 60 centistokes.

Installation Dimension Drawings

EPR-G01



Sub Plate
MSA-01Y-E10

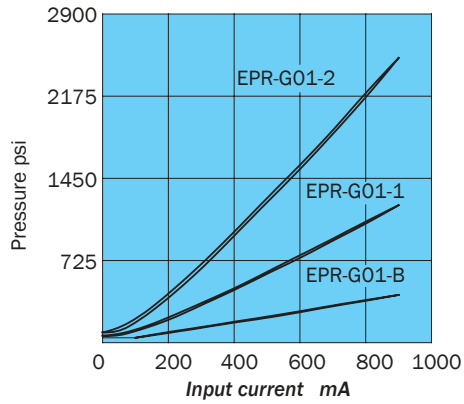


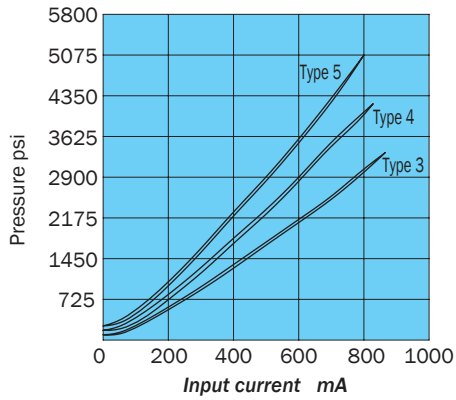
Note: Install the sub plate so the valve's P port is aligned with the sub plate's B port.
The gasket surface dimensions comply with the ISO standard shown below.
ISO 4401-03-02-0-94

Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

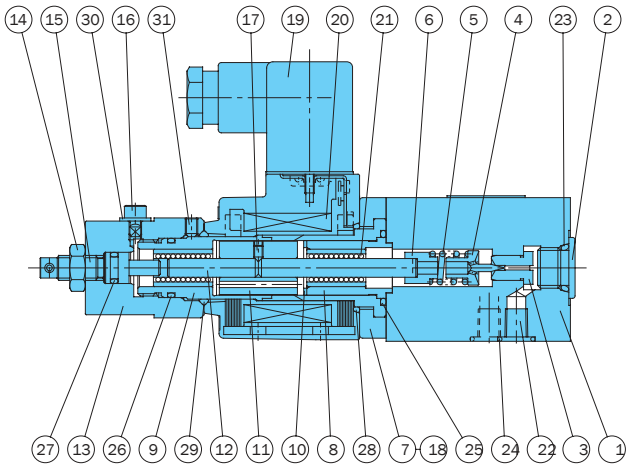
Input Current – Pressure Characteristics





Cross-sectional Drawing

EPR-G01-*-****-12



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	12	Rod	22	Choke
2	Plug	13	Cover	23	O-ring
3	Seat	14	Nut	24	O-ring
4	Poppet	15	Screw	25	O-ring
5	Spring	16	Screw	26	O-ring
6	Retainer	17	Screw	27	O-ring
7	Cover	18	Screw	28	O-ring
8	Stopper	19	Connector	29	O-ring
9	Guide	20	Coil	30	Seal
10	Shim	21	Ball bush	31	Screw
11	Plunger				

Note: Coil model number JD64-D2

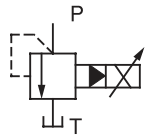
Seal Part List (Kit Model Number JPS-G01-1A)

Part No.	Part Name	Part Number	Q'ty
23	O-ring	1B-P11	1
24	O-ring	1B-P9	2
25	O-ring	1B-P22	1
26	O-ring	AS 568-016(Hs90)	1
27	O-ring	1B-P7	1
28	O-ring	S-25	1
29	O-ring	1A-P20	1
30	Seal	CW1000F0	1

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

Electro-Hydraulic Proportional Relief Valve

39 to 84.5 gpm
43 to 5075 psi



Features

This valve combines a compact, high-performance electro-hydraulic proportional pilot relief valve and balanced piston type relief valve to provide pressure control in proportion to ***input current.***

Throughput volume and fluid temperature fluctuation has little effect on control pressure, so this valve provides open loop control of even complex pressures (forces).

Specifications

Item \ Model No.	ER-G03-*-21	ER-G06-*-21
Rated Flow Rate gpm	39	84
Pressure Control Range psi	B: 43 to 357 1: 100 to 1000 2: 143 to 2000 3: 214 to 3000 4: 214 to 3571 5: 286 to 5000	
Rated Current mA	800	
Coil Resistance Ω	20 (68° F)	
Hysteresis %	3 max. (Note 2)	
Minimum Relief Flow Rate gpm	1.3	2.1
Weight lbs	13.2	15.7

Note: 1. G03 type only Flow rate: 10.5 gpm
2. Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Understanding Model Numbers

ER – G 03 – 3 * 21

- 21: Design number
- *: E: Unified Thread
- 3: Pressure control range B, 1, 2, 3, 4, 5
- 03: Nominal diameter 03, 06
- G: Mounting method G: Gasket type
- ER: Electro-hydraulic proportional relief valve

• Handling

1 To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid.

2 Manual Pressure Adjusting Screw
For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, valve pressure can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, the manual adjusting screw should be rotated back fully to the left (counter-clockwise) and secured with the lock nut.

3 Tank Port Back Pressure
Make sure that tank port back pressure is as small as possible; no greater than 29 psi.

4 Safety Valve Setting Pressure
The safety valve is set to maximum adjustment pressure plus 217 to 290 psi. When actually using the valve, adjust in accordance with actual pressure.

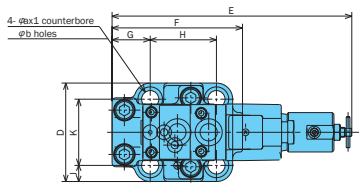
5 Bundled Accessories (Valve Mounting Bolts)

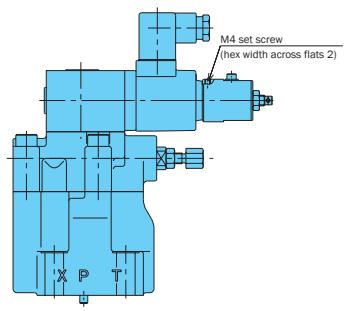
Model No.	Bolt Size	Q'ty	Tightening Torque ft lbs
ER-G03	1/2-13 x 2”	4	55 to 70
ER-G06	5/8-11 x 2 3/8”	4	140 to 170

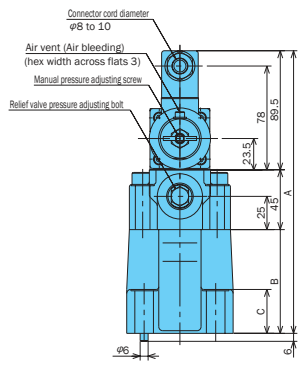
6 Use an operating fluid that conforms to the both of the following.
Fluid Temperature: 4°F to 140°F
Viscosity: 12 to 400 centistokes. The recommended viscosity range is 15 to 60 centistokes.

Installation Dimension Drawings

ER-G**-*-21





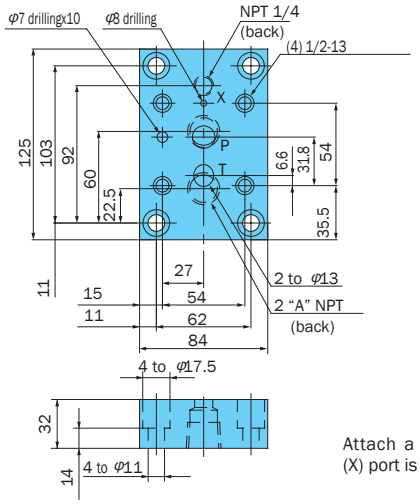


The gasket surface dimensions comply with the ISO standard shown below.
G03–ISO 6264-AR-06-2-A
G06–ISO 6264-AS-08-2-A

Model No.	A	B	C	D	E	F	G	H	J	K	a	b
ER-G03	212.5	78	33	80	194.8	106	31	53.8	13.1	53.8	20	14
ER-G06	217.5	83	37	100	203.8	119	37	66.7	15	70	26	17.5

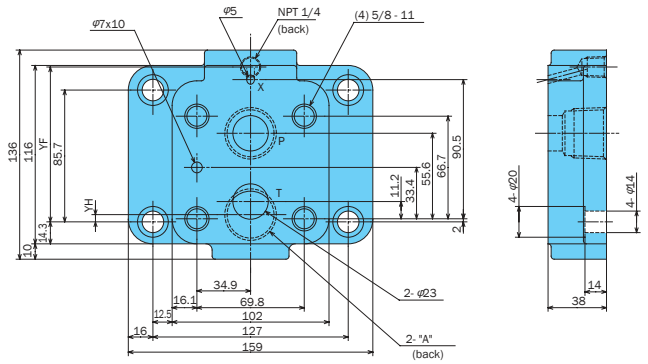
Sub Plate (Maximum Operating Pressure: 3625 psi

MRI-03*-E10 MRI-03X-E10



Attach a plug when the vent (X) port is not used.

MRI-06*-E10



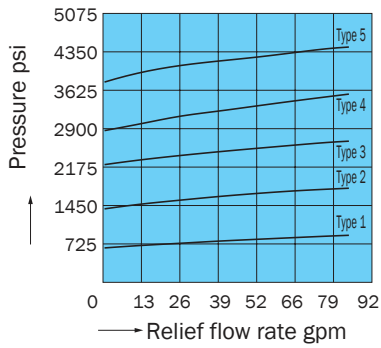
Model No.	A NPT
MRI-03-E10	3/8
MRI-03X-E10	1/2
MRI-06-E10	3/4
MRI-06X-E10	1

Model No.	YF	YH
MRI-06-E10	92.5	13.2
MRI-06X-E10	100.7	4.7

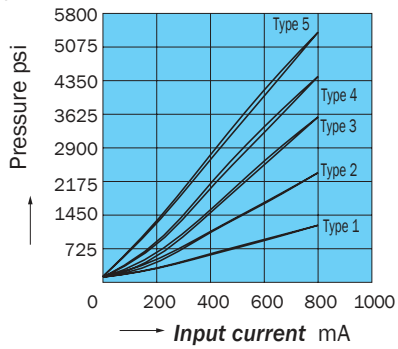
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

Flow Rate – Pressure Characteristics ER-G06-*-E21

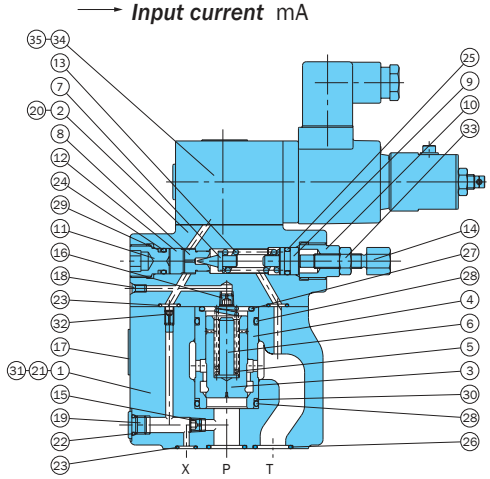


Input Current – Pressure Characteristics ER-G06-*-E21



Cross-sectional Drawing

ER-G**-*-21



ER Valve Built-in Pilot Relief Valve List

Model No.	Built-in Pilot Relief Valve
ER-G03-B-21	EPR-G01-B-0011S-12
1	1-0011S-12
2	2-1313S-12
3	3-1212S-12
4	4-1111S-12
5	5-1010S-12
ER-G06-1-21	EPR-G01-1-0011S-12
2	2-1313S-12
3	3-1212S-12
4	4-1111S-12
5	5-1010S-12

Seal Part List (Kit Model Number JPS-G01-1A)

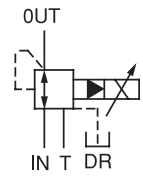
Part No.	Part Name	Nominal Diameter/Part Number		Q'ty
		G03	G06	
22	O-ring	1B-P8	1B-P8	1
23	O-ring	1B-P9	1B-P9	3
24	O-ring	1B-P10A	1B-P10A	1
25	O-ring	1A-P11	1A-P11	1
26	O-ring	1B-P18	1B-P28	2
27	O-ring	1B-G25	1B-P28	1
28	O-ring	1B-G30	1B-P32	2
29	Backup ring	T2-P10A	T2-P10A	1
30	Backup ring	T2-G30	T2-P32	1

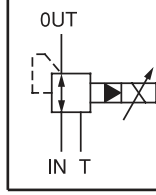
Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. For the ** part of the kit number, specify the valve size (G03, G06).
3. EPR-G01 pilot valve seal is available separately. See page G-3 for more information.

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	17	Plate	33	Nut
2	Cover	18	Plug	34	Pilot relief valve
3	Poppet	19	Plug	35	Screw
4	Sleeve	20	Screw		
5	Spring	21	Pin		
6	Spacer	22	O-ring		
7	Poppet	23	O-ring		
8	Seat	24	O-ring		
9	Plunger	25	O-ring		
10	Retainer	26	O-ring		
11	Plug	27	O-ring		
12	Collar	28	O-ring		
13	Spring	29	Backup ring		
14	Handle	30	Backup ring		
15	Orifice	31	Screw		
16	Orifice	32	Choke		

Electro-Hydraulic Proportional Reducing and Relief Valve

13.2 to 26.4 gpm
43.5 to 3625 psi





Features

This valve combines a compact, high-performance electro-hydraulic pilot relief valve, and a reducing and relief valve for low-pressure control of pressure within a hydraulic system in proportion to ***input current.***

Since this valve includes a relief function, OUT side pressure can be maintained at a virtually fixed level, even when the valve's OUT side is used as reaction force. This valve also provides outstanding response as pressure drops.

Specifications

Item \ Model No.	EGB-G03-*-11	EGB-G06-*-11
Maximum Operating Pressure psi	3625	
Maximum Flow Rate gpm	13.2	26.4
Pressure Control Range psi	B: 43 to 357 1: 100 to 1000 2: 129 to 2000 3: 214 to 3000	
Rated Current mA	800	
Coil Resistance Ω	20 (68° F)	
Hysteresis %	3 max. (Note 2)	
Weight lbs	12	17

Note: 1.G03 type only Rated flow rate: 5.2 gpm
2.Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

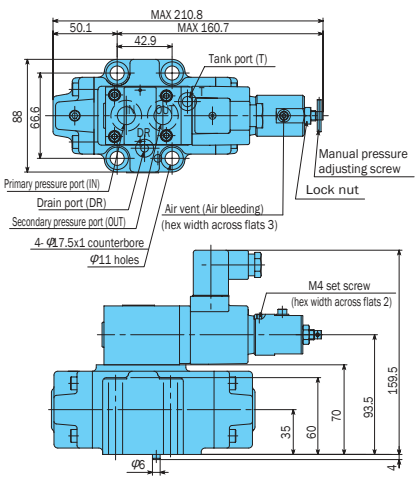
Understanding Model Numbers

EGB – G 03 – 2 * 11

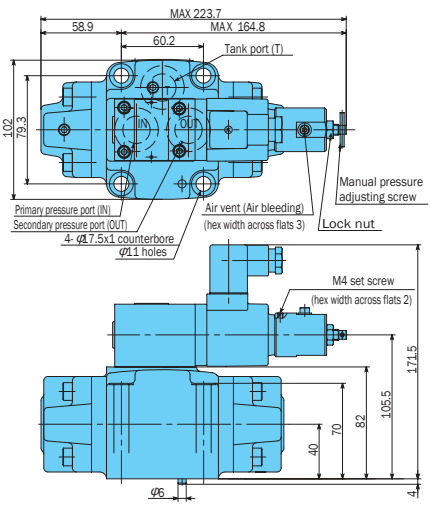
- 11: Design number
- *: E: Unified thread
- 2: Pressure control range B, 1, 2, 3
- 03: Nominal diameter 03, 06
- G: Mounting method G: Gasket type
- EGB: Electro-hydraulic proportional relief and reducing valve

Installation Dimension Drawings

EGB-G03-*-11



EGB-G06-*-11



• Handling

1 Air Bleeding
To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid.

2 DR Port Piping
When configuring piping, ensure that the DR port (T port for the G06 size) is filled with operating fluid.

3 Manual Pressure Adjusting Screw
For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, valve pressure can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, the manual adjusting screw should be rotated back fully to the left (counter-clockwise) and secured with the lock nut.

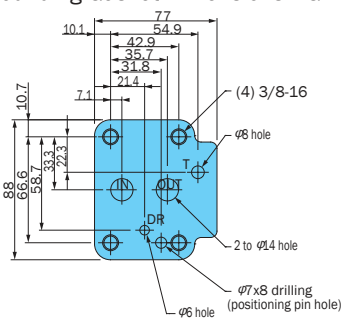
4 Load Capacity
The G03 load capacity (valve OUT side volume) is at least .5 gpm, while the G06 load capacity is at least 1.3 gpm.

5 Bundled Accessories (Valve Mounting Bolts)

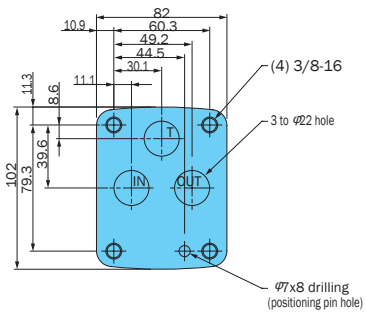
Model No.	Bolt Size	Q'ty	Tightening Torque ft lbs
EGB-G03	3/8-16 x 3”	4	33 to 40
EGB-G06	3/8-16 x 3 3/8”	4	33 to 40

6 Use an operating fluid that conforms to the both of the following.
Oil temperature: 4 to 140° F
Viscosity: 12 to 400 centistokes. The recommended viscosity range is 15 to 60 centistokes.

Mounding Gasket Dimensions EGB-G03-*-11



Mounding Gasket Dimensions EGB-G06-*-11

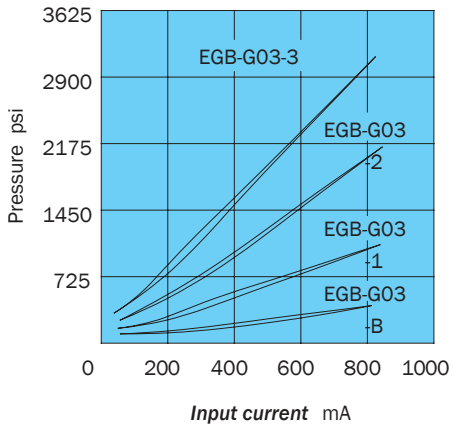


Performance Curves

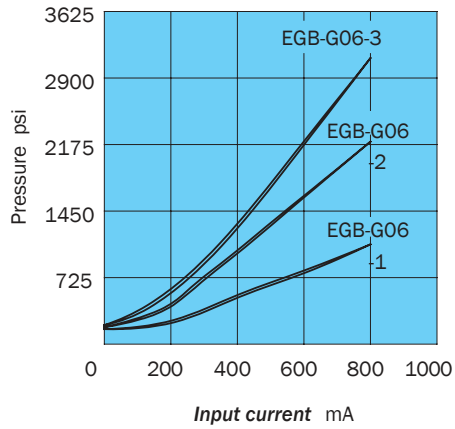
Hydraulic Operating Fluid Viscosity 32 centistokes

Input Current – Pressure Characteristics

EGB-G03

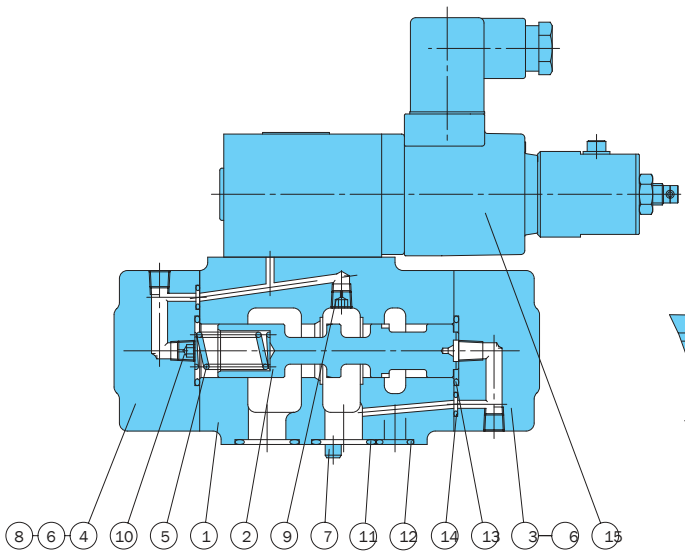


EGB-G06

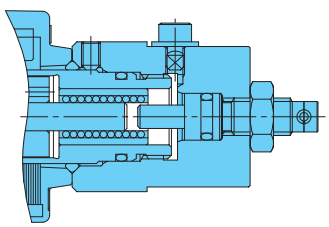


Cross-sectional Drawing

EGB-G**-*-11



Manual adjustment section



EGB Valve Built-in Pilot Relief Valve List

Model No.	Built-in Pilot Relief Valve
EGB-G03-B-11	EPR-G01-B-0000-12
EGB-G03-1-11	1-0013-12
EGB-G03-2-11	2-0012-12
EGB-G03-3-11	3-0011-12
EGB-G06-1-11	EPR-G01-1-0013-12
EGB-G06-2-11	2-0012-12
EGB-G06-3-11	3-0012-12

Part No.	Part Name
1	Body
2	Piston
3	Cover
4	Cover
5	Spring
6	Screw
7	Pin
8	Pin
9	Choke
10	Choke
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Pilot relief valve

Note:
Coil model number JD64-D2

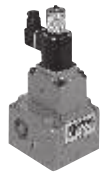
Seal Part List (Kit Model Number JGS-***)

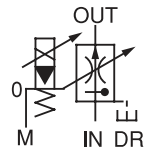
Part No.	Part Name	EGB-G03-*-11		EGB-G06-*-11	
		Part Number	Q'ty	Part Number	Q'ty
11	O-ring	1B-P20	2	1B-P26	3
12	O-ring	1B-P10A	2	–	–
13	O-ring	1B-P22	2	1B-G30	2
14	O-ring	1B-P6	2	1B-P6	2

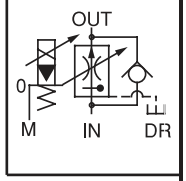
Note: 1.O-ring 1B-** refers to JIS B2401-1B-**.
2.For the ** part of the kit number, specify the valve size (G03, G06).
3.EPR-G01 pilot valve seal is available separately. See page G-3 for more information.

Electro-Hydraulic Proportional Flow Control Valve

.5 to 132 gpm
3045 psi







Features

This valve controls actuator speed in response to the size of ***input current***. Pressure and control fluid temperature fluctuation has little effect on setting pressure which enables high-precision speed control. This valve is the perfect choice for actuator acceleration and deceleration control, and remote control.

Specifications

Item \ Model No.	ES-G03-60 125 -(F)-12	(C)ES-G06-250-11	ES-G10-500-(F)-11
Maximum Operating Pressure psi	3045	3045	3045
Flow Rate Control Range gpm	.5 to 15.8	1.3 to 66	3.9 to 132
Minimum Allowable Valve Pressure Differential psi	145 (Note1)	217(Note1)	(Note1)
Reverse Flow Rate gpm (With check valve only)	33 (Note3)	52	–
Hysteresis %	3 max. (Note 2)	3 max. (Note 2)	3 max. (Note 2)
Rated Current mA	800	800	800
Coil Resistance Ω	20 (68°F)	20 (68°F)	20 (68°F)
Weight lbs	28.6	55	121

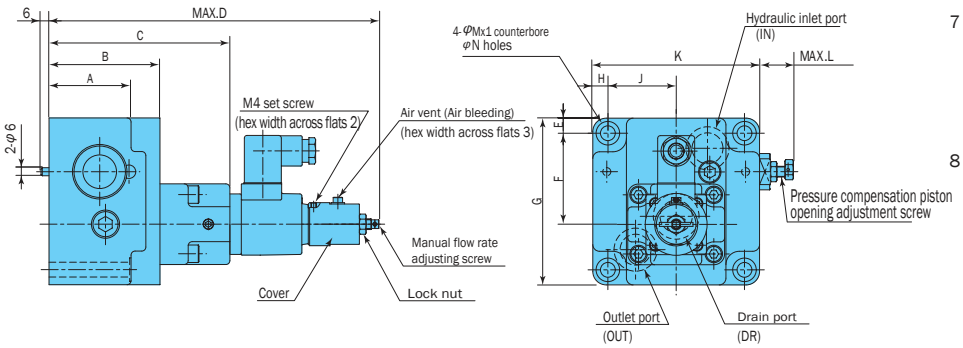
Note: 1.Control valve inlet and outlet pressure differential required to obtain favorable pressure compensation.
2.Value when a Nachi-Fujikoshi special amplifier is used (with dithering).
3.ES-G03 does not have a built-in check valve, but a sub plate with check valve (Model No. MCF-03-D-22) is available for it.

Understanding Model Numbers

(C)ES – G 03 – 30 – (F) * 12

- 12 — Design number
- * — E: Unified thread
- (F) — Auxiliary symbol F: With pressure compensation piston opening adjustment screw
  Note: Nominal diameters 02, 03, 10 only available
- 30 — Rated flow rate
- 03 — Nominal diameter: 03, 06, 10
- G — Mounting method G: Gasket type
- (C)ES — Pump type CES: Electro-hydraulic proportional flow control valve with check valve 02, 06 only
  ES: Electro-hydraulic proportional flow control valve

Installation Dimension Drawings



Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N
ES-G03	61	82.5	134.5	245.3	11.2	67.8	124	11.2	50.8	124	26	17.5	11
(C)ES-G06	115	130	182	292.8	16.8	104.8	167	17	73	180	-	26	18
ES-G10	137	160	215	326.3	25	148	228	23.5	98.5	244	18	32	22

- The gasket surface dimensions comply with the ISO standard shown below.
  (C) ES-G03 ...ISO 6263-07-09-97
  (C) ES-G06 ...ISO 6263-08-13-97

• Handling

1 Air Bleeding
To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid. The position of the air vent can change by loosening the M4 screw and rotating the cover.

2 Manual Flow Rate Adjusting Screw
For the initial adjustment or when there is no ***input current*** to the valve due to an electrical problem or some other reason, the flow rate can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, this adjusting screw should be returned completely to its original position and secured with the lock nut.

3 Drain Port
Make sure that back pressure is no greater than 29 psi, and that his port is connected directly to the fluid tank at a point that is below the oil surface.

4 Bundled Accessories (Valve Mounting Bolts)

Model No.	Bolt Size	Q'ty	Tightening Torque ft lbs
ES-G03	3/8-16 x 3"	4	33 to 40
(C)ES-G06	5/8-11 x 5 1/2"	4	140 to 170
ES-G10	3/4-10 x 6 1/4"	4	270 to 339

5 The loss coefficient and control valve can cause resonance when there is a great distance between the flow control valve and actuator (when the pipe internal volume is large). Be sure to keep the distance between the flow control valve and actuator as small as possible, and to avoid the use of flexible hose as much as possible.

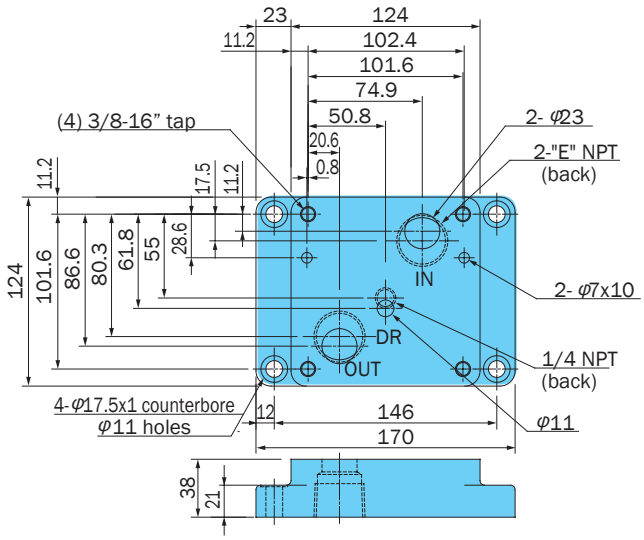
6 Sub Plate
See the next page for more information about sub plates.

7 Use an operating fluid that conforms to the both of the following.
Oil temperature: 4 to 140°F
Viscosity: –12 to 400 centistokes.
The recommended viscosity range is 15 to 60 centistokes.

8 Since this valve has a built-in pressure compensation valve, changing of the inertial load (using a high inertial oil motor, etc.) can create the risk of hunching under certain conditions. Contact your sales agent before changing the inertial load.
Note: Use a hex wrench that has a width across flats of 8 to adjust the aperture adjustment screw of nominal diameter 10.

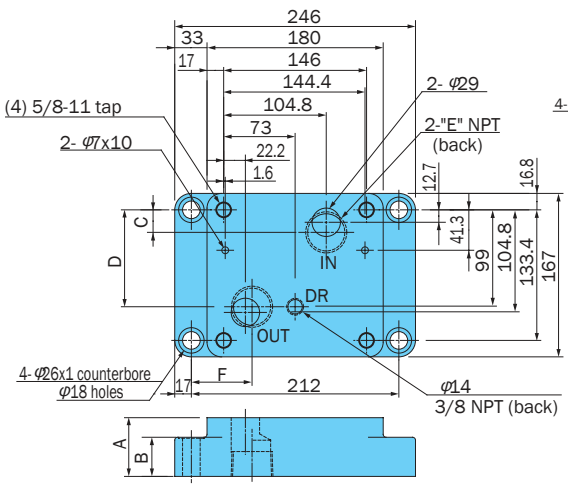
Sub Plate

MES-03*-E10



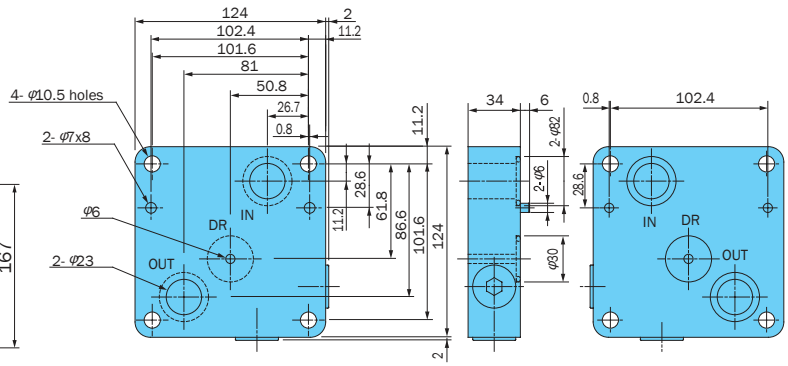
Model No.	E NPT
MES-03Y-E10	3/4
MES-03Z-E10	1

MES-06*-E10



Auxiliary Plate with Check Valve

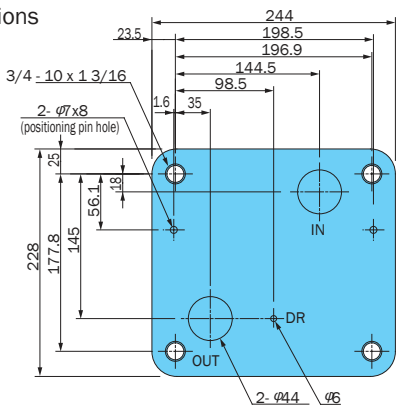
MCF-03-D-22



Bundled Items (Mounting Bolts) (4) 3/8-16 x 4 3/8"

Model No.	A	B	C	D	E	F
MES-06X-E10	45	25	16	104.8	1	55.2
MES-06Y-E10	60	40	23	99	1¼	62

ES-G10*-E10 Mounting Gasket Surface Dimensions

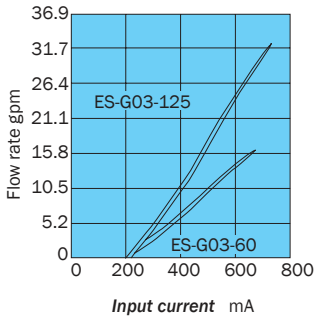


Performance Curves

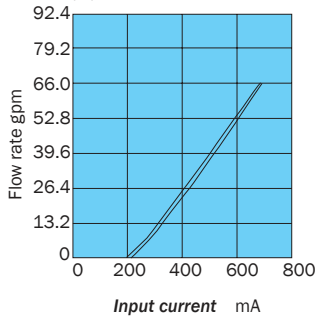
Hydraulic Operating Fluid Viscosity Centistokes

Input Current – Flow Rate Characteristics

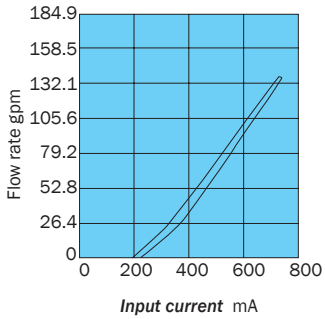
ES-G03



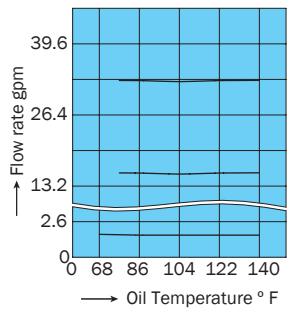
(C)ES-G06



ES-G10



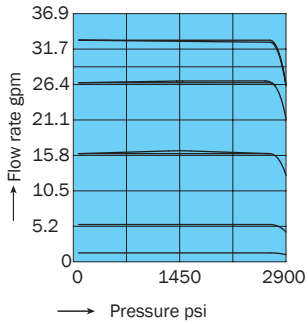
Fluid Temperature – Control Flow Rate Characteristics



Supply Pressure 2000 psi
Load Pressure 1450 psi
Operating Fluid VG32

Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Pressure – Control Flow Rate Characteristics

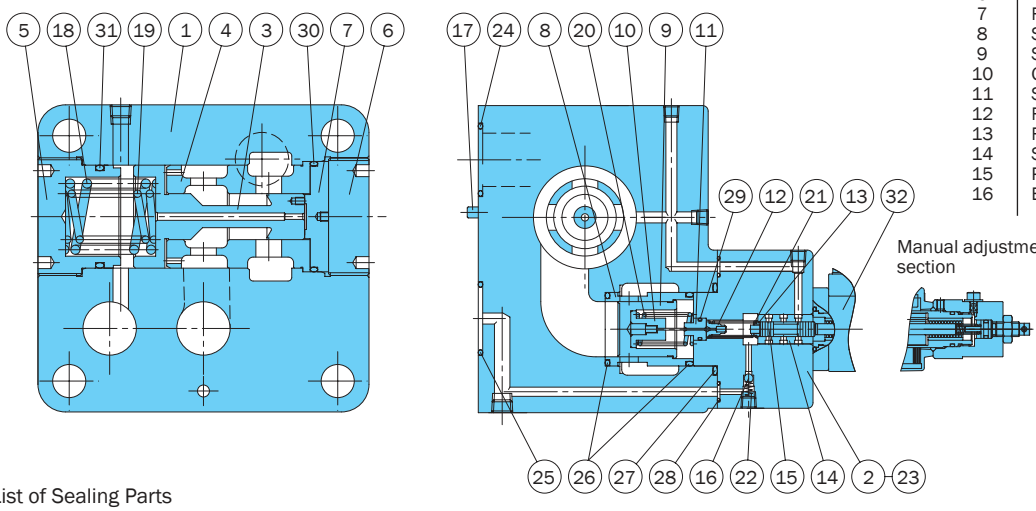


Supply Pressure 3000 psi
Operating Fluid VG32
Fluid Temperature 104° F

Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Cross-sectional Drawing

ES-G**-*-11(12)



Part No.	Part Name	Part No.	Part Name
1	Body	17	Pin
2	Cover	18	Spring
3	Piston	19	Spring
4	Sleeve	20	Spring
5	Plug	21	Spring
6	Plug	22	Spring
7	Retainer	23	Spring
8	Sleeve	24	O-ring
9	Spool	25	O-ring
10	Guide	26	O-ring
11	Sleeve	27	O-ring
12	Retainer	28	O-ring
13	Retainer	29	O-ring
14	Sleeve	30	O-ring
15	Piston	31	O-ring
16	Ball	32	Proportional solenoid

List of Sealing Parts

Part No.	Part Name	ES-G03		(C)ES-G06		ES-G10	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
24	O-ring	1B-P26	2	1B-G35	2	1B-P48	2
25	O-ring	1B-P28	1	1B-G35	1	1B-P48	1
26	O-ring	–	–	1B-G35	2	1B-G50	2
27	O-ring	1B-P29	1	1B-G45	1	1B-G60	1
28	O-ring	1B-P5	4	1B-P8	3	1B-P9	3
29	O-ring	1B-P9	1	1B-P9	1	1B-P9	1
30	O-ring	1B-P20	1	1B-G55	1	1B-G75	2
31	O-ring	1B-P38	1	1B-P50	1	1B-G75	1
Seal Kit Number		JFS-G03		JFS-G06		JFS-G10	

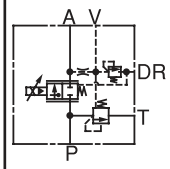
Note: O-ring 1B-** refers to JIS B2401-1B-**.

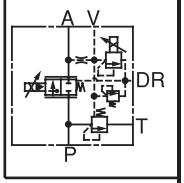
NACHI

Electro-Hydraulic Proportional
Relief and Flow Control Valve

Load Response Electro-Hydraulic Proportional Relief and Flow Control Valve

.26 to 132 gpm
3625 psi





Features

The load sensing function of this meter in flow control valve makes it possible to control pump discharge pressure automatically in accordance with the size of the load pressure.
Using this valve suppresses wasteful pump pressure rises and makes it possible to configure an energy-efficient circuit.

Specifications

Item \ Model No.		ESR-G03-125 (R*)-12	ESR-G06-250 (R*)-12	ESR-G10-500 R*-11
Maximum Operating Pressure psi		3625	3625	3625
Rated Flow Rate ℓ/min (gpm)		125 (33)	250 (66)	500 (132)
Flow Rate Control System	Flow Rate Control Range gpm	.5 to 33	1.3 to 66	3.9 to 132
	Valve Differential Pressure psi	72 (Note1)	101 (Note1)	130 (Note1)
	Hysteresis %	3 max. (Note 2)	3 max. (Note 2)	3 max. (Note 2)
	Repeatability %	1	1	1
	Rated Current mA	800	800	800
	Coil Resistance Ω	20 (68℉)	20 (68℉)	20 (68℉)
Pressure Control System (Note 3)	Pressure Control Range psi	R1 174 to 1000 R2 203 to 2000 R3 232 to 3000 R4 232 to 3625	R1 174 to 1000 R2 203 to 2000 R3 232 to 3000 R4 232 to 3625	R1 174 to 1000 R2 203 to 2000 R3 232 to 3000 R4 232 to 3625
	Hysteresis %	3 max. (Note 2)	3 max. (Note 2)	3 max. (Note 2)
	Repeatability %	1	1	1
	Rated Current mA	800	800	800
	Coil Resistance Ω	20 (68℉)	20 (68℉)	20 (68℉)
Weight lbs		30.8	61.7	132

Note: 1.Indicates the pressure differential between the valve P port and A port.
2.Value when a Nachi-Fujikoshi special amplifier is used (with dithering).
3.These specifications apply to valves that include an electro-hydraulic proportional pilot relief valve (i.e. ESR-G06-250R2-11).
4.The maximum adjustment pressure is 3625 psi for a valve that does not include an electro-hydraulic proportional pilot relief valve. Factory default is minimum output (507 psi max.) Set this value in accordance with the pressure of the hydraulic circuit being used.

Understanding Model Numbers

ESR – G 06 – 250 (**) * 12

- 12: Design number (12: For 03, 06 size; 11: For 10 size)
- E: Unified Thread
- Pressure control function (None: Without electro-hydraulic proportional pilot relief valve (available with G03, G06); R ※: With electro-hydraulic proportional pilot relief valve)
- Rated flow rate
- Nominal diameter 03, 06, 10
- Mounting method G: Gasket type
- Pump type ESR: Load sensitive electro-hydraulic proportional relief and flow control valve

• Handling

1 In order to ensure stable control, loosen the air vent and bleed air from the valve before starting operation.

2 Manual Adjusting Screw
For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, pressure or flow rate can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, this adjusting screw should be returned completely to its original position and secured with the lock nut.

3 Drain Port
Minimum control pressure is increased by drain port back pressure, so be sure to connect the drain port directly to the fluid tank at a point that is below the oil surface.

4 Safety Valve Setting Pressure
For a safety valve without an electro-hydraulic proportional pilot relief valve, safety valve pressure is set to minimum pressure (507 psi). In the case of a safety valve with an electrohydraulic proportional pilot relief valve, the safety valve setting pressure is set to the minimum adjustment pressure plus 217 psi. When actually using the valve, adjust in accordance with hydraulic circuit pressure.

5 Minimum Relief Flow Rate During Pressure Control
Setting pressure can become unstable when the relief flow rate to the valve's T port is small. Because of this, use a relief flow rate of at least 2.6 gpm with a nominal diameter of .1", and a relief flow rate of at least 2.6 gpm with a nominal diameter of .39".

6 Valve Mounting Orientation
When an electro-hydraulic proportional pilot relief valve main valve is mounted on a vertical surface with the pilot relief valve part facing downwards make it difficult to bleed air from the pilot relief valve. Because of this, you should not use this type of mounting orientation.

7 Bundled Accessories (Valve Mounting Bolts)

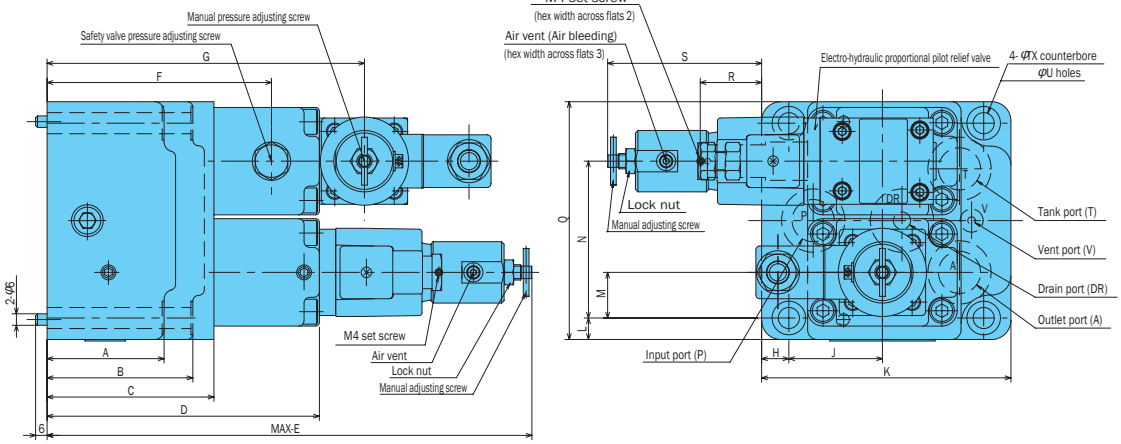
Model No.	Bolt Size	Q'ty	Tightening Torque ft lbs
ESR-G03	3/8-16 x 3 1/2	4	33 to 40
ESR-G06	5/8-11 x 5 1/4	4	140 to 173
ESR-G10	3/4-10 x 5	4	272 to 339

8 Sub Plate
See the next page for more information about sub plates.

9 Use an operating fluid that conforms to the both of the following. Oil temperature: -4 to 158°F
Viscosity: 12 to 400 centistokes. The recommended viscosity range is 15 to 60 centistokes.

10 Since this valve has a built-in pressure compensation valve, changing of the inertial load (using a high inertial oil motor, etc.) can create the risk of hunching under certain conditions. Contact your sales agent before changing the inertial load.

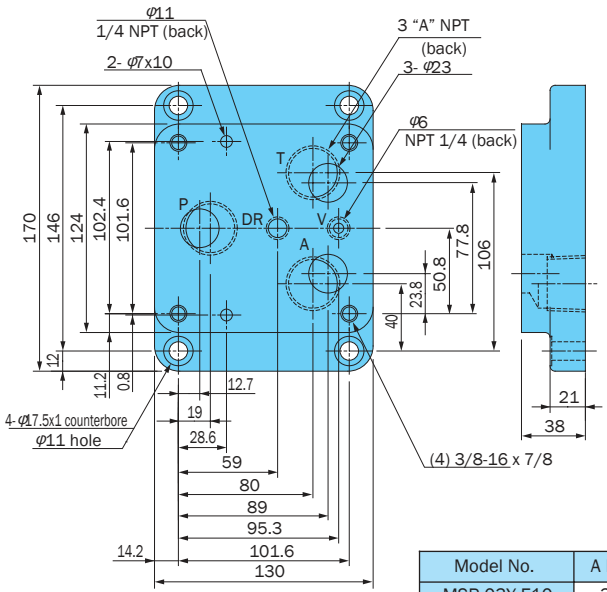
Installation Dimension Drawings



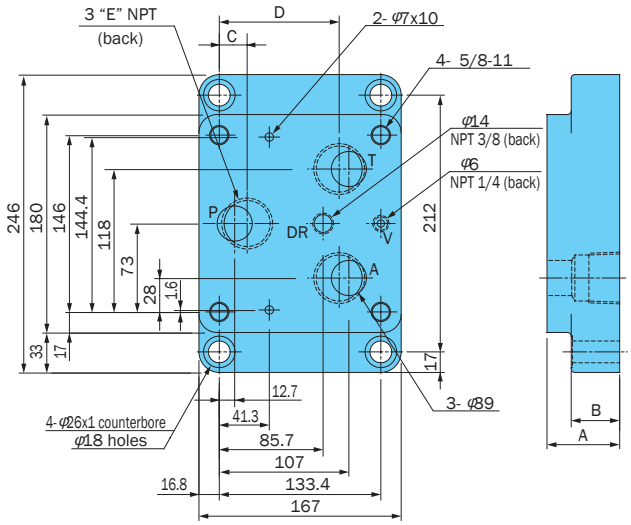
Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	T	U
ESR-G03	61	76	87	142	252.8	117	165.5	14.2	48.8	130	11.2	23.8	81.8	124	32	80.3	17.5	11
ESR-G06	76	110	120	172	282.8	154	195.5	16.8	57.2	167	17	28	118	180	21	68.3	26	18
ESR-G10	107	107	150	205	317.3	183	228.5	25	76	228	23.5	35	162	244	-3	35.3	32	22

Sub Plate

MSR-03*-E10



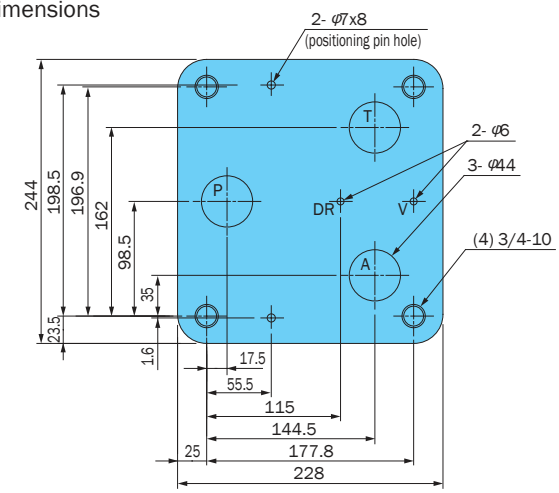
MSR-06*-E10



Model No.	A NPT
MSR-03Y-E10	3/4
MSR-03Z-E10	1

Model No.	A	B	C	D	E
MSR-06X-E10	95	25	16	107	1 NPT
MSR-06Y-E10	60	40	23	99	1¼ NPT

ESR-G10 Mounting Gasket Surface Dimensions



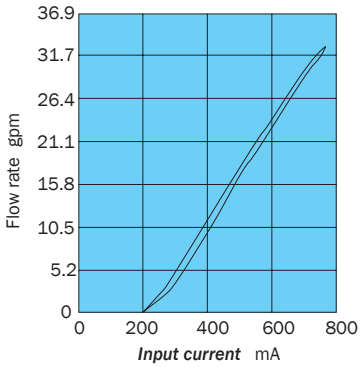
The gasket surface dimensions comply with the ISO standards shown below.
ESR-G03–ISO 6263-07-11-97
ESR-G06–ISO 6263-08-15-97

Performance Curves

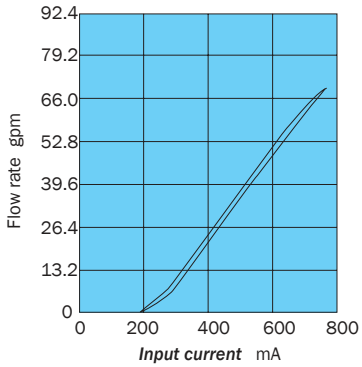
Hydraulic Operating Fluid Viscosity 32 centistokes

Input Current – Flow Rate Characteristics

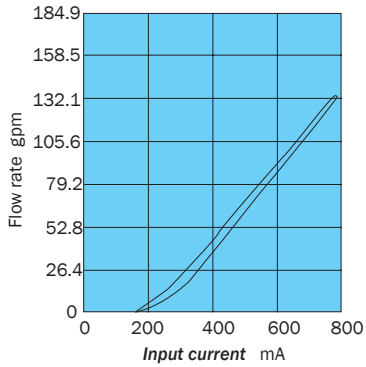
ESR-G03



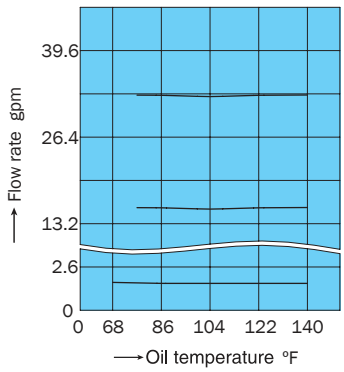
ESR-G06



ESR-G10

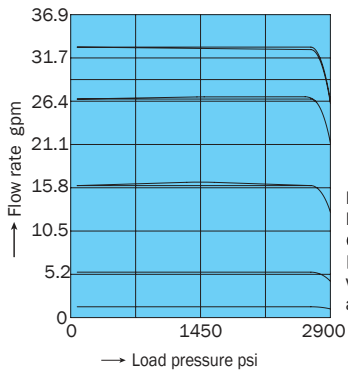


Fluid Temperature – Control Flow Rate Characteristics



Load Pressure: 1450 psi
Operating Fluid: VG32
Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

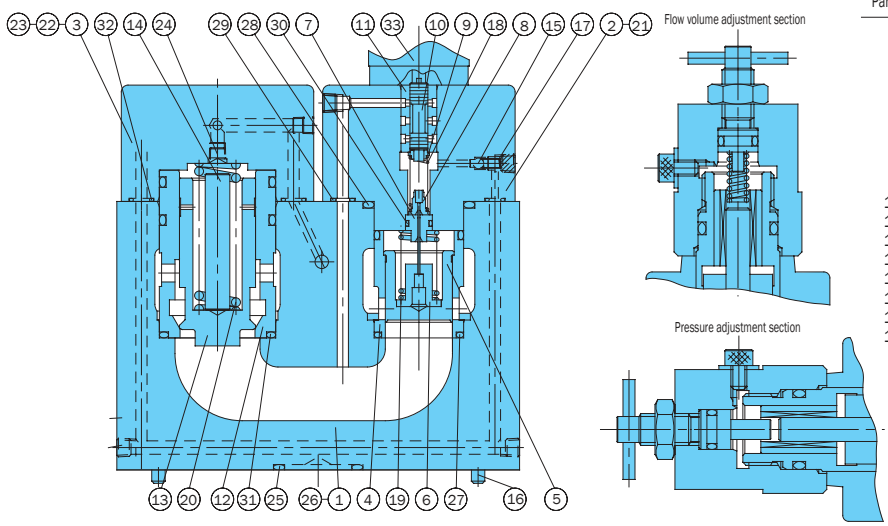
Pressure – Control Flow Rate Characteristics



Electro-hydraulic Proportional Pilot Relief Valve Setting Pressure 3045 psi
Operating Fluid: VG32
Fluid Temperature: 104° F
Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Cross-sectional Drawing

ESR-G**-***-11, 12



Part No.	Part Name	Part No.	Part Name
1	Body	18	Spring
2	Cover (A)	19	Spring
3	Cover (B)	20	Spring
4	Sleeve	21	Screw
5	Spool	22	Screw
6	Guide	23	Safety valve
7	Sleeve	24	Choke
8	Retainer	25	O-ring
9	Retainer	26	O-ring
10	Piston	27	O-ring
11	Sleeve	28	O-ring
12	Sleeve	29	O-ring
13	Poppet	30	O-ring
14	Guide	31	O-ring
15	Ball	32	O-ring
16	Pin	33	Proportional solenoid
17	Spring		

Note: Coil model number JD64-D2

List of Sealing Parts

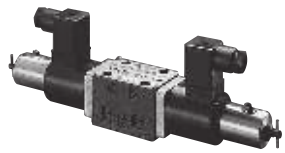
Part No.	Part Name	ESR-G03		ESR-G06		ESR-G10	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
25	O-ring	1B-P26	4	1B-G35	4	1B-P48	4
26	O-ring	1B-P9	1	1B-P9	1	1B-P9	1
27	O-ring	1B-G25	2	1B-G35	2	1B-G50	2
28	O-ring	1B-G35	1	1B-G45	1	1B-G60	1
29	O-ring	1B-P6	3	1B-P8	3	1B-P9	3
30	O-ring	1B-P9	1	1B-P9	1	1B-P9	1
31	O-ring	1B-G35	3	1B-P46	3	1B-G65	3
32	O-ring	1B-P6	2	1B-P8	2	1B-P9	2
Seal Kit Number		JLS-G03R		JLS-G06R		JLS-G10R	

Note: 1.O-ring 1B-** refers to JIS B2401-1B-**.

2.EPR-G01 seal is available separately. See page G-3 for more information.

Electro-Hydraulic Proportional Flow and Directional Control Valve

2.6 to 132 gpm
3625 psi



Features

This valve uses a DC solenoid in a traditional 4-way solenoid valve to create a solenoid valve capable of both direction switching and high-speed control. The lineup consists of the direct system 01 size and the pilot system 03, 04, and 06 sizes.

Direction control is performed by supplying ***input current*** to one of the two proportional solenoid valves, and the size of the flow rate is controlled in accordance with the size of the ***input current***. This type of valve can be used for remote control and shockless acceleration and deceleration control, and for simple configuration of hydraulic circuits.

Specifications

Item \ Model No.	ESD-G01-** 10 20 -12	ESD-G03-** 40 80 -(**)-12	ESD-G04-**140-(**)-12	ESD-G06-**250-(**)-13
Maximum Operating Pressure psi	3625			
Rated Flow Rate ℓ/min (gpm)	10/20 (2.6/5.2) (Note 1)	40/80 (10.5/21) (Note 1)	139 (36.9) (Note 1)	125/250 (66) (Note 1)
Maximum Flow Rate gpm	6.6(Note 2)	26.4(Note 2)	36.9(Note 2)	66(Note 2)
Pilot Pressure psi	–	At least 145(Note 3)		
Pilot Flow Rate gpm	–	At least .5(Note 4)	At least .79(Note 4)	At least 1.3(Note 4)
T Port Allowable Back Pressure psi	2.5{25.5}	Internal Drain: 362		
		External Drain: 3045		
Rated Current mA	850			
Coil Resistance Ω	20(68° F)			
Hysteresis %	5 max.(Note 5)			
Response Time s	0.04(Note 6)	0.05(Note 6)	0.08(Note 6)	0.1(Note 6)
Weight lbs	4.8	15.4	20.2	33

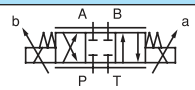
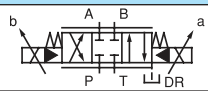
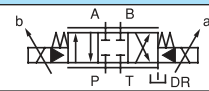
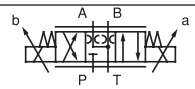
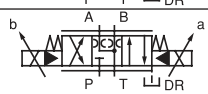
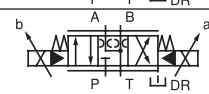
Note: 1.Value when pressure drop volume to P →A and P →B is ΔP = 145 psi
2.Indicates maximum throughput volume value between each port.
3.Indicates differential between the pilot port and tank port, or drain port.
4.Value when 0.1 second is assumed for the response time from zero to the rated flow volume.
5.Value when a Nachi-Fujikoshi special amplifier is used.
6.Response time is typical value for a supply pressure of 2030 psi and fluid temperature of 104° F (kinematic viscosity: 40 centistokes)

Understanding Model Numbers

ESD – G 03 – C5 80 – (***) * 12

- 12: Design number
- *: E: Unified Thread
- (***): Auxiliary symbol (Can be combined in alphabetic sequence.) (For G03, G04, G06 size only)
  - None: Internal pilot, external drain (standard)
  - A: Internal pilot, internal drain
  - E: External pilot, external drain
  - A E: External pilot, internal drain
  - G: Modular pilot
  - With pressure reducing valve (OG-G01-P1-21) (See Note 6 under "Handling.")
- 80: Rated flow rate (See the rated flow rate item in the specifications.)
- C5: Spool type (See Table 1.)
- 03: Nominal diameter: 01, 03, 04, 06
- G: Mounting method G: Gasket type
- ESD: Pump type ESD: Electro-hydraulic proportional flow and directional control valve

Table 1

Spool Type	Hydraulic Circuit		
	ESD-G01	ESD-G03, G04	ESD-G06
C5			
C6S			

- Handling

1 Air Bleeding
In order to ensure stable control, loosen the air vent and bleed air from the valve before starting oper-ation. For details, see the user's guide.

2 T Port Piping
When configuring piping, ensure that the T port (pilot valve T port for the G03, G04, and G06 sizes) is filled with operating fluid.

3 Manual Adjusting Screw
For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, the valve can be operated and valve pressure can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, the manual adjusting screw should be rotated back fully to the left (counterclockwise).

4 Valve Mounting Orientation
Install the valve so the spool axis line is horizontal.

5 Combining with a Pressure Compensation Valve
Use of the optional pressure compensation kit is recommended when higher precision flow rate control is required or in high-pressure applications. For details, see page G-20.

6 If pilot pressure (ESD-G03, G04, G06) exceeds 1300 psi use a modular type P port reduction valve (OG-G01-P1-21) at a setting of 290 psi.

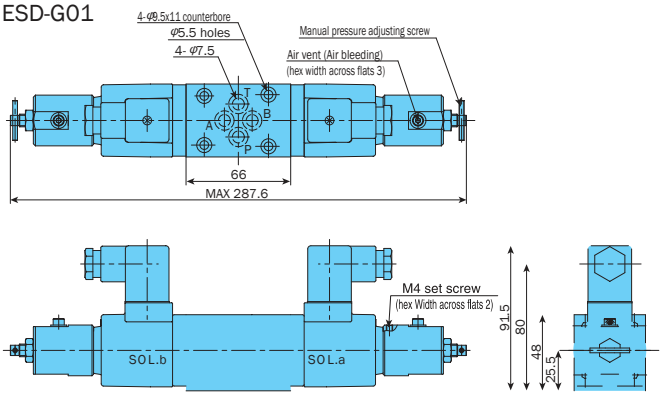
7 On a system that requires large brake pressure during deceleration or a system that uses a vertical cylinder, equip a counter balance valve.
Use a single rod, if the rod exit is not slowed sufficiently, use a counter balance valve on the rod.

8 Maintain hydraulic operating fluid contamination so it is at least Class 9. Use of a G01 modular filter (Absolute: 8μ m) is also helpful.

(Continued on next page)

Installation Dimension Drawings

ESD-G01



Bundled Accessories (Valve Mounting Bolts)

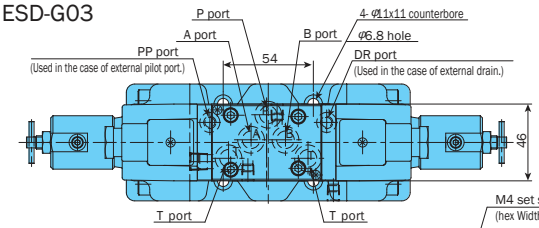
Model No.	Bolt Size	Q'ty	Tightening Torque ft lbs
ESD-G01	10-24 x 1 3/4	4	3.6 to 5 ft lbs
ESD-G03	1/4-20 x 1 3/8	4	7 to 9.5 ft lbs
ESD-G04	1/4-20 x 1 3/4	2	7 to 9.5 ft lbs
	3/8-16 x 2	4	33 to 40 ft lbs
ESD-G06	1/2-13 x 2 3/8	6	44 to 51 ft lbs

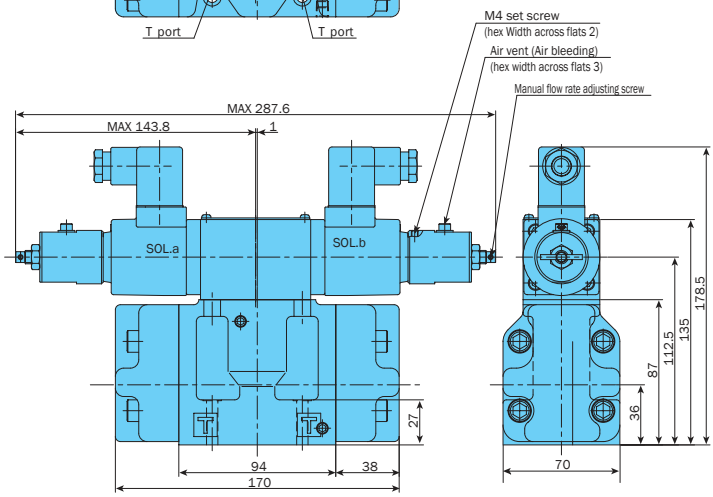
For information about sub plates, see MSA-01Y-E10 on page G-3.

Gasket Surface Dimensions (ISO 4401-03-02-0-94)

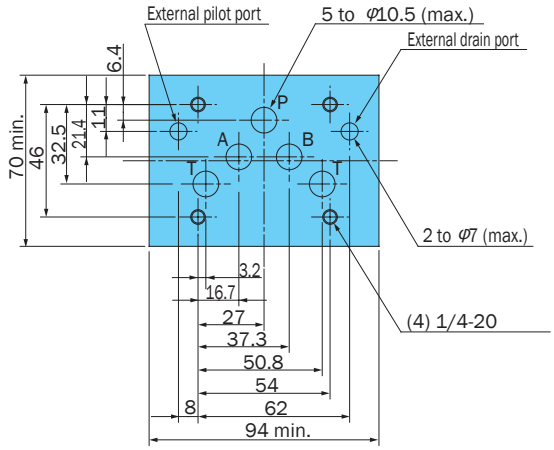
Use an operating fluid that conforms to both of the following.
Oil temperature: –4 to 158° F Viscosity:
12 to 400 centistokes. The recommended viscosity range is 15 to 60 centistokes.

ESD-G03





ESD-G03 Mounting Gasket Surface Dimensions
Gasket Surface Mounting Dimensions (ISO4401-05-0-94)

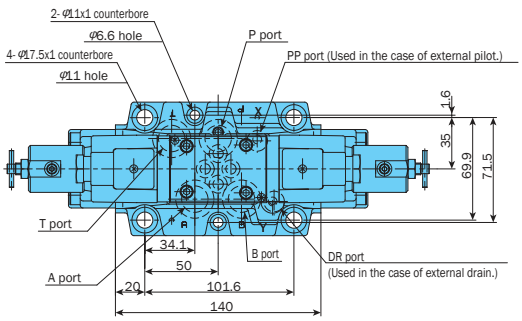


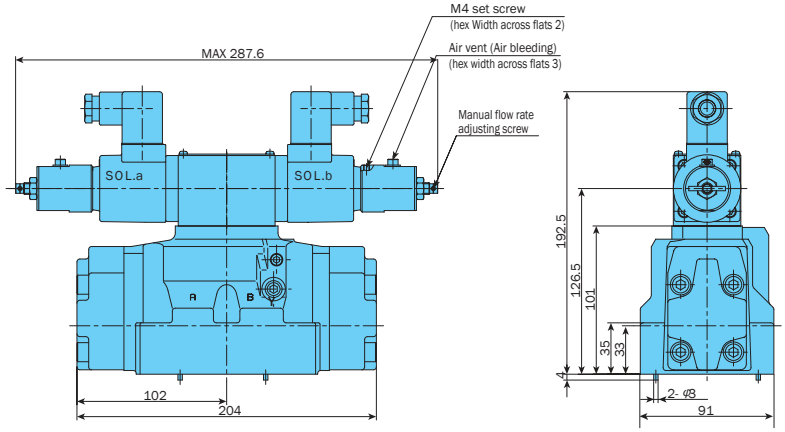
- Auxiliary symbol G: Equipping a modular type pilot reduction valve increases the height by 1.57".
- The gasket surface dimensions comply with the ISO standards shown below.

ESD-G04 – ISO 4401-07-06-0-94
ESD-G06 – ISO 4401-08-07-0-94
ESD-G10 – ISO 4401-10-08-0-94

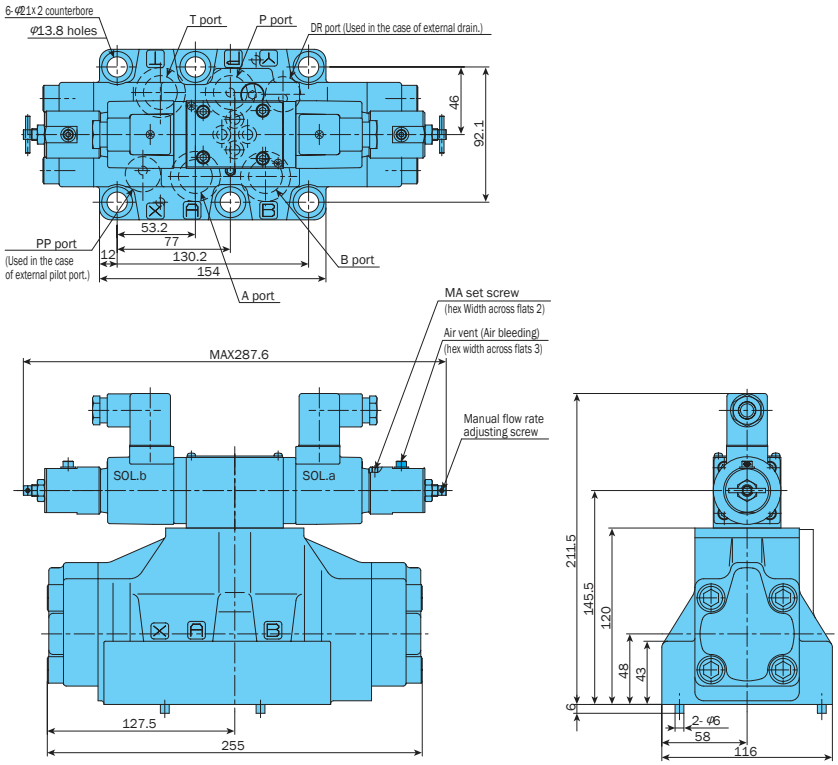
Note: The coil cover has an M4 set screw. To change the air vent orientation, loosen the M4 screw and then rotate the cover. After bleeding air, tighten the cover and then secure it with the M4 screw.

ESD-G04





ESD-G06



Performance Curves

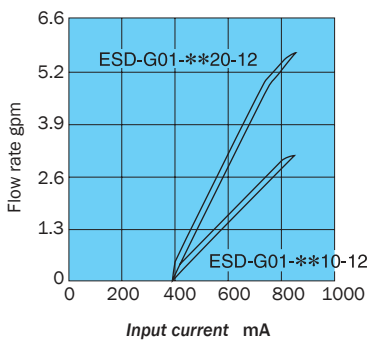
Hydraulic Operating Fluid Viscosity 32 centistokes

Input Current – Flow Rate Characteristics are characteristic when the P →A or P→B pressure drop is ΔP = 145 psi.

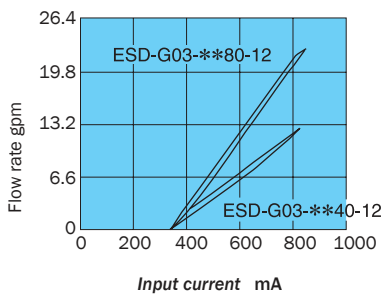
For Pressure – Flow Rate Characteristics, the horizontal shaft valve differential pressure indicates the pressure drop volume of the entire control valve (between P, A, B, T), and flow rate is measured at the oil motor.

Input Current – Flow Rate Characteristics

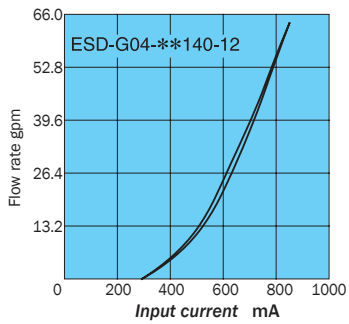
ESD-G01



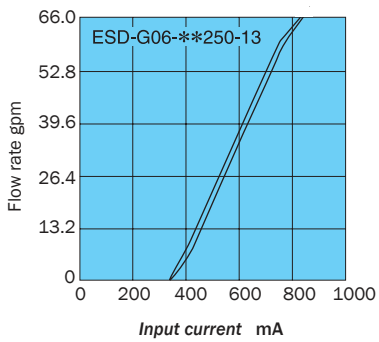
ESD-G03



ESD-G04

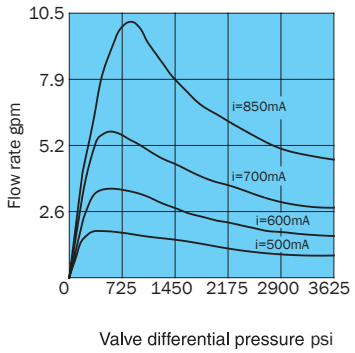


ESD-G06

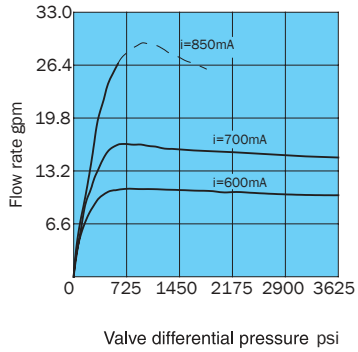


Pressure – Flow Rate Characteristics

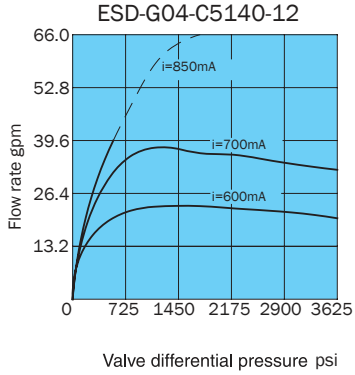
ESD-G01-C520-12



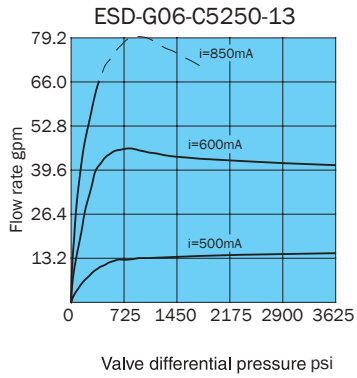
ESD-G03-C580-12



ESD-G04-C5140-12

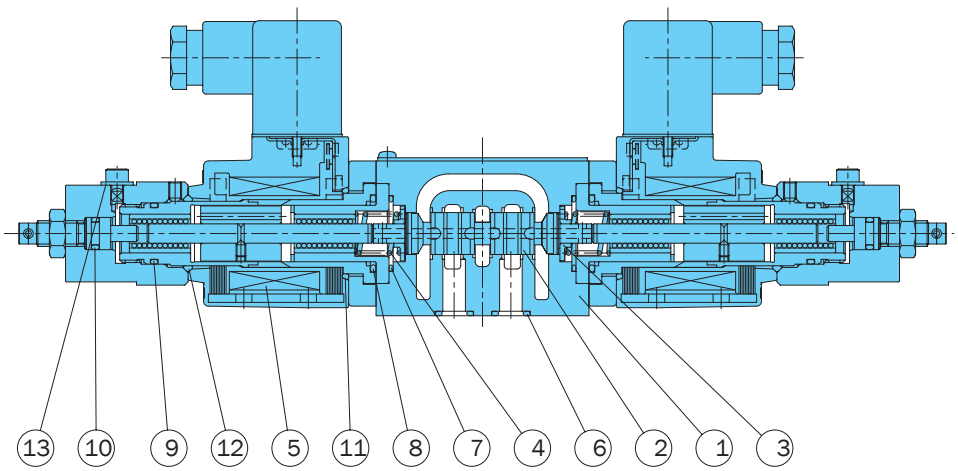


ESD-G06-C5250-13



Cross-sectional Drawing

ESD-G01-****-12



Part No.	Part Name
1	Body
2	Spool
3	Retainer
4	Spring
5	Coil
6	O-ring
7	O-ring
8	O-ring
9	O-ring
10	O-ring
11	O-ring
12	O-ring
13	Seal

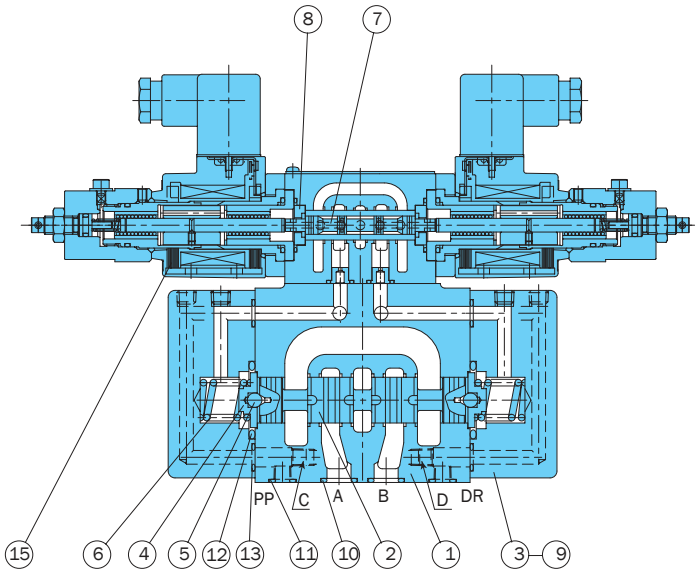
Note: Coil model number JD64-D2

Seal Part List (Kit Model Number JDS-G01-1A)

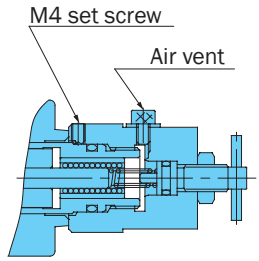
Part No.	Part Name	Part Number	Q'ty
6	O-ring	AS 568-012(Hs90)	4
7	O-ring	AS 568-019(Hs90)	2
8	O-ring	1B-P22	2
9	O-ring	AS 568-016(Hs90)	2
10	O-ring	1B-P7	2
11	O-ring	S-25	1
12	O-ring	1A-P20	1
13	Seal	CW1000F0	2

Note: O-ring 1A/B-** refers to JIS B2401-1A/B-**.

ESD-G03-****-(**)-12



Manual adjustment section
(ESD-G03, G04, G06, G10)

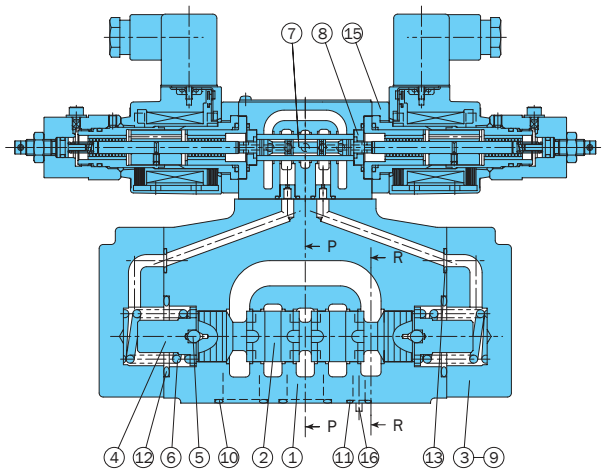


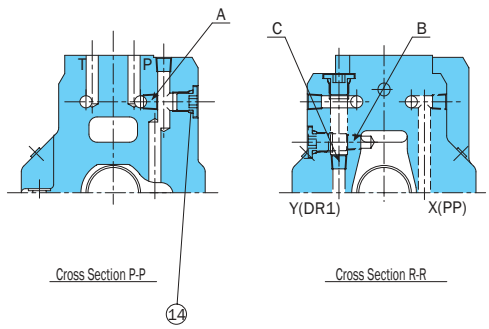
Note: The coil cover has an M4 set screw. When changing the orientation of the air vent, loosen the M4 screw and rotate the cover. Retighten after bleeding the air.

Methods for Changing the Pilot/Drain System

After Change		Hexagon Socket Head Plug
Pilot	Internal	Change to PP port from C.
	External	Change from PP port to C.
Drain	Internal	Change from D to DR port.
	External	Change from DR port to D.

ESD-G04-****-(***)-12





Part No.	Part Name
1	Body
2	Spool
3	Cover
4	Retainer
5	Ball
6	Spring
7	Pilot spool
8	Stopper
9	Screw
10	O-ring
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Proportional solenoid

Note: Coil model number JD64-D2

Methods for Changing the Pilot/Drain System

After Change		Hexagon Socket Head Plug
Pilot	Internal	Remove from A
	External	Insert from A
Drain	Internal	Change from B to C
	External	Change from C to B

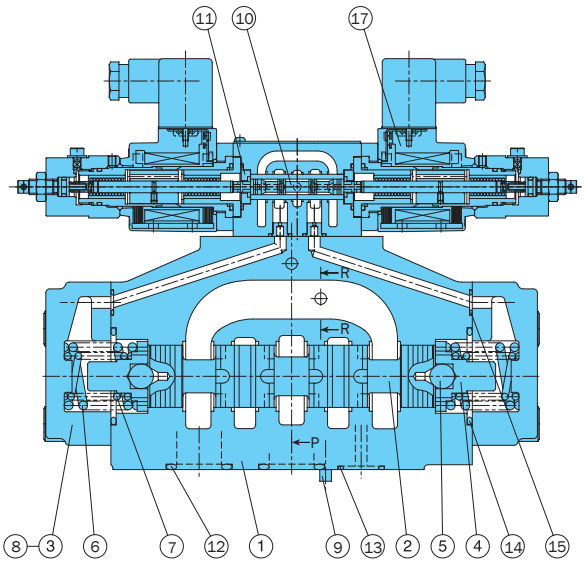
Note: A single hex head plug (NPTF 1/16) is required when changing to external pilot. Hex Head Plug: TPUA-1/16

Seal Part List (Kit Model Number JHS-***)

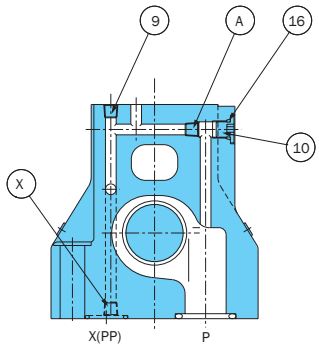
Part No.	Part Name	ESD-G03		ESD-G04	
		Part Number	Q'ty	Part Number	Q'ty
10	O-ring	1B-P12	5	1B-P22	4
11	O-ring	1B-P9	2	1B-P10A	2
12	O-ring	1B-P28	2	1B-P34	2
13	O-ring	1B-P9	6	1B-P9	2
14	O-ring	———	–	1B-P8	3
Kit Model No.		JHS-G03		JHS-G04	

Note: O-ring 1B-** refers to JIS B 2401-1B-**.

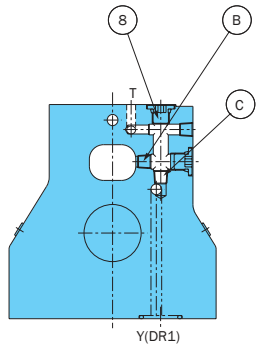
ESD-G06-****-(***)-13



Pilot, Drain System Change



Cross-sectional P-P



Cross-sectional R-R

Changing the Pilot and Drain Connections

After Change		Hexagon Socket Head Plug
Pilot	Internal	Switch from A to x .
	External	Switch from x to A .
Drain	Internal	Switch from B to C .
	External	Switch from C to B .

Seal Part List (Kit Model Number JHS-G06)

Part No.	Part Name	Part Number	Q'ty
12	O-ring	1B-P28	4
13	O-ring	1B-P20	2
14	O-ring	1B-G45	2
15	O-ring	1B-P10	2
16	O-ring	1B-P8	3

Note: O-ring 1B-** refers to JIS B 2401-1B-**.

Part No.	Part Name
1	Body
2	Spool
3	Cover
4	Retainer
5	Ball
6	Spring
7	Spring
8	Screw
9	Pin
10	Pilot spool
11	Stopper
12	O-ring
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Proportional solenoid

Pressure Compensation Valve Kit

Specifications

Item \ Model No.	JHF-01027	JHF-03040(E)	JHF-03080(E)	JHF-06170(E)
Maximum Operating Pressure psi	3045	3625	3625	3045
Pressure Compensation Differential Pressure psi	145	87	203	116
Maximum Flow Rate ℓ/min (gpm)	27 (7.1)	40 (10.5)	80 (21.1)	170 (44.9)
Weight lbs	3.3	10.3	11.0	26.4

Understanding Model Numbers

JHF – 03 040 (E)

- (E): Auxiliary symbol (See "Handling.")
  - None: Internal pilot
  - E : External pilot
- 040: Maximum flow rate
- 03: Nominal diameter 01, 03, 06
- JHF: Pressure compensation valve kit

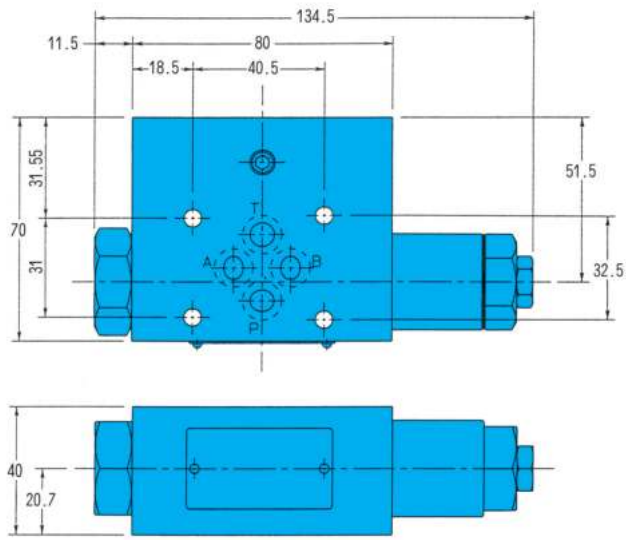
• Handling

When using the pressure compensation kit, use an external pilot type for the ESD valve (G03, 06).

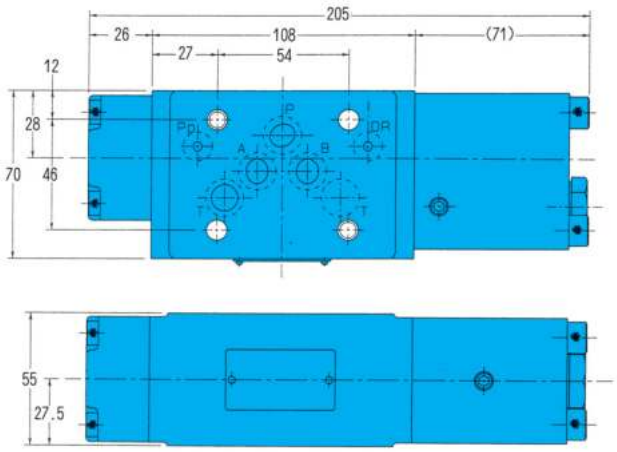
An internal pilot type pressure compensation valve kit is used when the pilot flow rate is supplied from the P port, without an eternal pilot port (Pp port) on the manifold. An external pilot type pressure compensation valve kit is used when there is an external pilot port (Pp port) on the manifold.

Installation Dimension Drawings

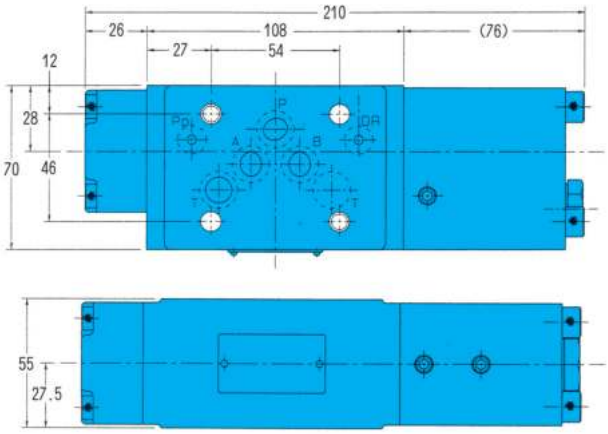
Pressure compensation valve kit
JHF-01027



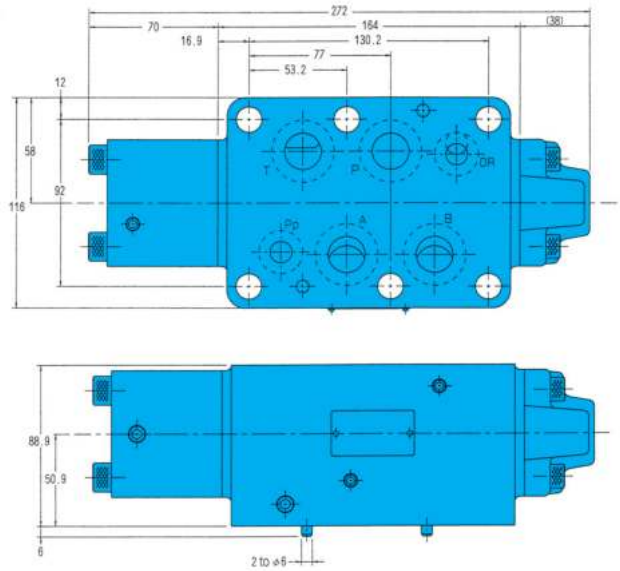
JHF-03040(E)



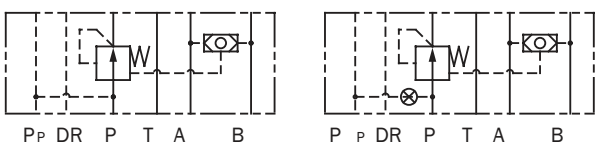
JHF-03080(E)



JHF-06170(E)



Note: Mounting bolts are not included with the pressure compensation kit. Use the valve mounting bolt lists on pages F-87 through F-89 to select mounting bolts.

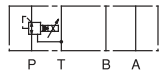


Internal pilot

External pilot

Modular Type Electro-Hydraulic Proportional Reducing Valve

7.9 gpm
43.5 to 2030 psi



Features

This valve incorporates the ease-ofuse principles of the modular valve into an electro-hydraulic proportional reducing valve to provide reduction control of hydraulic system pressure in proportion to ***input current.*** This valve is perfect for a small-scale hydraulic system, such as those used for continuous proportional control of lathe chuck pressure. A relief function ensures outstanding pressure response characteristics.

Specifications

Item \ Model No.	EOG-G01-P*-11
Maximum Operating Pressure psi	3625
Maximum Flow Rate gpm	7.9
Pressure Control Range psi	B: 43.5 to 362 1: 58 to 1000 2: 87 to 2000
T Port Allowable Back Pressure psi	362
Rated Current mA	850
Coil Resistance Ω	20 (68° F)
Hysteresis %	3 max. (Note 1)
Weight lbs	7.9

Note: Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

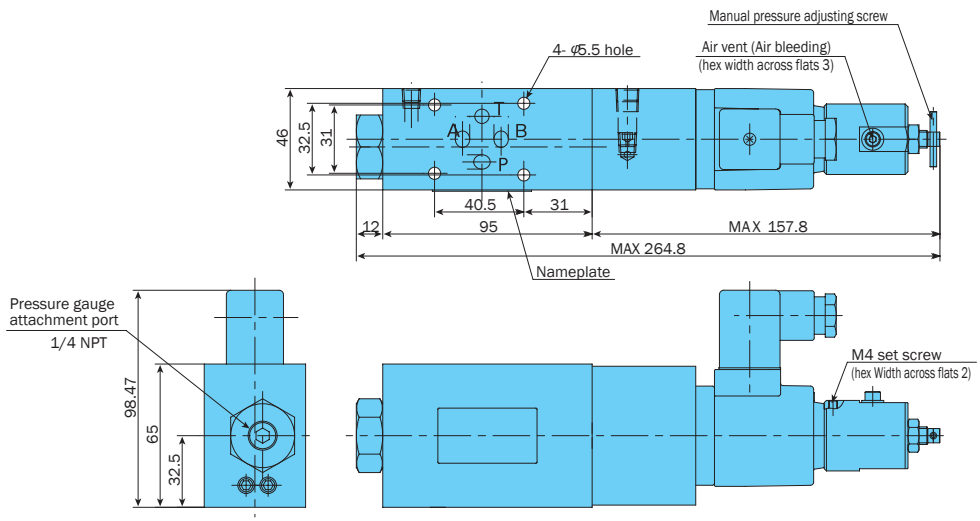
Understanding Model Numbers

EOG – G 01 – P 1 * 11

- 11 — Design number
- * — E: Unified Threads
- 1 — Pressure control range: B, 1, 2
- P — Control port: P port
- 01 — Nominal diameter 01
- G — Mounting method G: Gasket type
- EOG — Modular type electro-hydraulic proportional reducing valve

Installation Dimension Drawings

EOG-G01-P*-E11



• Handling

1 Air Bleeding
To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid.

2 Manual Pressure Adjusting Screw
For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, valve pressure can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, the manual adjusting screw should be rotated back fully to the left (counter-clockwise) and secured with the lock nut.

3 Minimum Control Pressure
Since this valve has an internal drain system, T port back pressure has an effect on minimum control pressure.

4 Load Capacity
Make load capacity (valve OUT side capacity) at least .13 gpm.

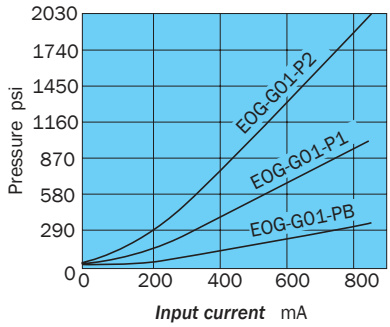
5 Use an operating fluid that conforms to the both of the following.
Oil temperature: –4 to 158°F
Viscosity: 12 to 400 centistokes
The recommended viscosity range is 15 to 60 centistokes.

Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

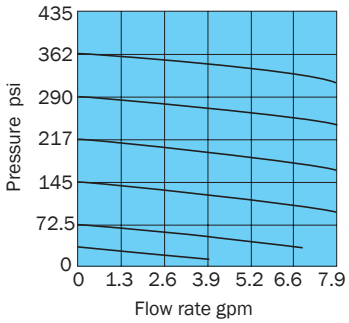
Input Current - Pressure Characteristics

EOG-G01

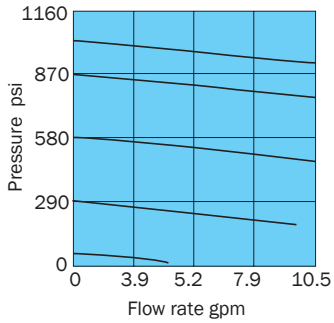


Flow Rate - Pressure Characteristics

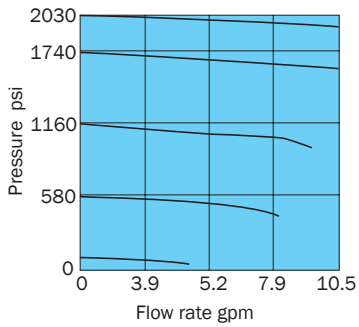
EOG-G01-PB



EOG-G01-P1

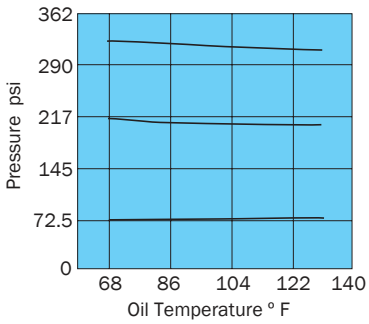


EOG-G01-P2

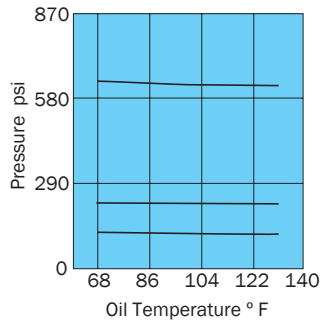


Fluid Temperature Characteristics

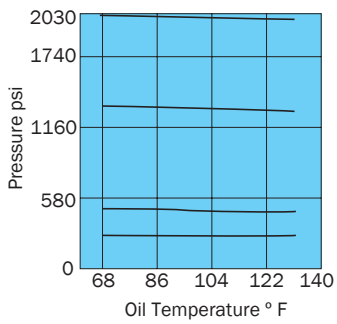
EOG-G01-PB



EOG-G01-P1

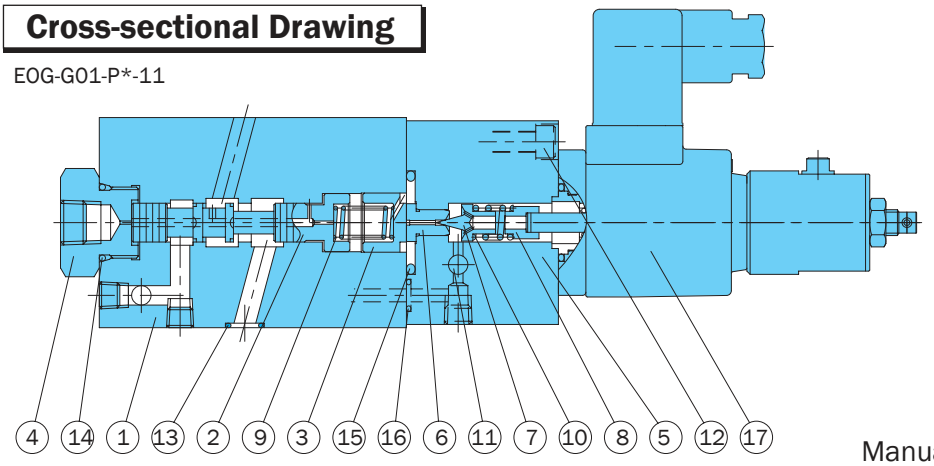


EOG-G01-P2



Cross-sectional Drawing

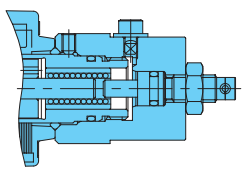
EOG-G01-P*-11



Part No.	Part Name	Part No.	Part Name
1	Body	10	Spring
2	Spool	11	Choke
3	Retainer	12	Screw
4	Plug	13	O-ring
5	Cover	14	O-ring
6	Seat	15	O-ring
7	Poppet	16	O-ring
8	Retainer	17	Proportional solenoid
9	Spring		

Note: Coil model number JD64-D2

Manual adjustment section



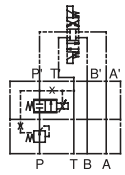
Seal Part List (Kit Model Number JBS-G01)

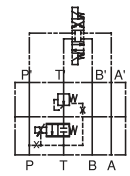
Part No.	Part Name	Part Number	Q'ty
13	O-ring	1B-P9	4
14	O-ring	1B-P20	1
15	O-ring	1B-P26	1
16	O-ring	1B-P7	1

Note: O-ring 1B-** refers to JIS B2401 1B-**.

Modular Type Electro-Hydraulic Proportional Flow Control Valve

.07 to 6.6 gpm
3045 psi





Features

An electro-hydraulic proportional restrictor valve and pressure compensation valve are combined into a modular configuration, available as one of two types: the meter in control EOF-G01-P and meter out control EOF-G01-T.

The pressure fluctuations have little influence on the setting flow rate making this valve perfect for electro-hydraulic proportional control of small hydraulic systems used for machine tool APC and ATC high-speed shockless control, remote control, etc.

Specifications

Item \ Model No.	EOF-G01- P/T 25-11
Maximum Operating Pressure psi	3045
Flow Rate Control Range ℓ/min (gpm)	0.3 to 25 (.07 to 6.6)
Flow Rate Control Port	EOF-G01-P : P port EOF-G01-T : T Port
T Port Allowable Back Pressure psi	362 max.
Hysteresis %	3 max. (Note 1)
Response Speed S	0.05
Rated Current mA	800
Coil Resistance Ω	20 (68° F)
Weight lbs	8.1

Note: Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Understanding Model Numbers

EOF – G 01 – P 25 * 11

- 11: Design number
- *: E: Unified Thread
- 25: Rated flow rate
- P: Control port: P, T
- 01: Nominal diameter 01
- G: Mounting method G: Gasket type
- EOF: Modular type electro-hydraulic proportional flow control valve

• Handling

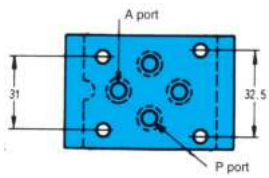
1 Air Bleeding
To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid. The position of the air vent can change by loosening the lock screw and rotating the cover.

2 Manual flow rate adjusting screw
For the initial adjustment or when there is no ***input current*** to the valve due to an electrical problem or some other reason, the flow rate can be adjusted by rotating the manual adjustment screw. Rotate clockwise (rightward) to increase flow rate.
Normally, this adjusting screw should be returned completely to its original position and secured with the lock nut.

3 T Port Back Pressure
Since this valve has an internal drain system, make sure that valve T port back pressure is no greater than 362 psi.

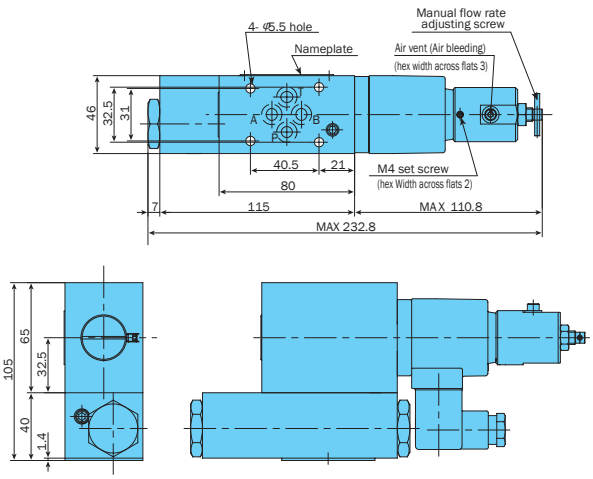
4 Use an operating fluid that conforms to the both of the following.
Oil temperature: –4 to 158°F
Viscosity: 12 to 400 centistokes
The recommended viscosity range is 15 to 60 centistokes.

5 O-ring Plate Orientation
- The port nearest the nameplate surface is the P port.
- The port with a mounting pitch width of 31 (narrow pitch width) is the A port.
- The cutout on the O-ring plate is on the A port side.

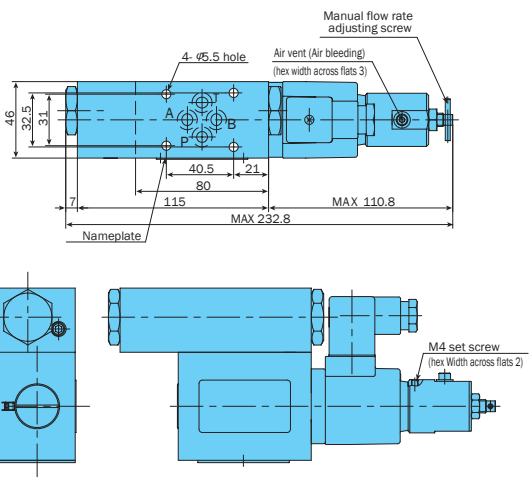


Installation Dimension Drawings

EOF-G01-P25-11



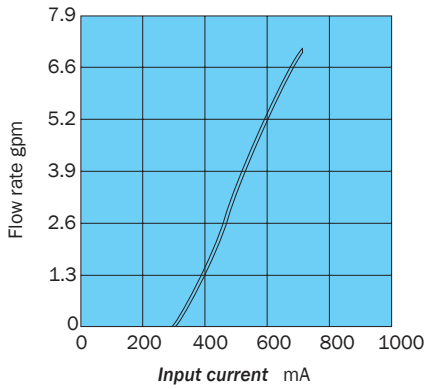
EOF-G01-T25-11



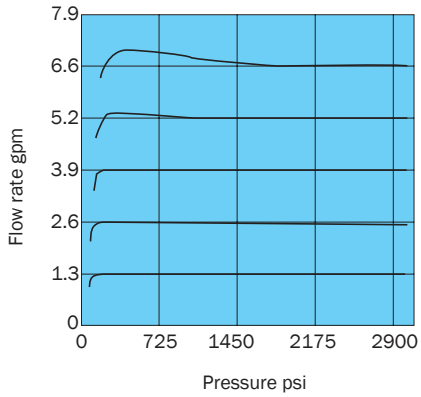
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

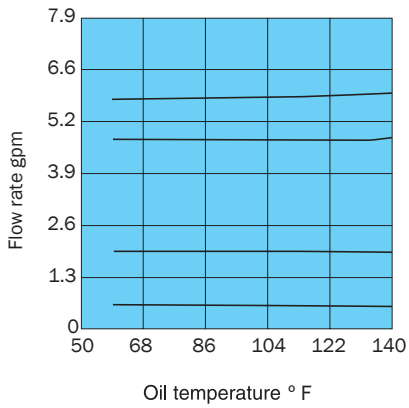
Input Current - Flow Rate Characteristics



Pressure - Flow Rate Characteristics

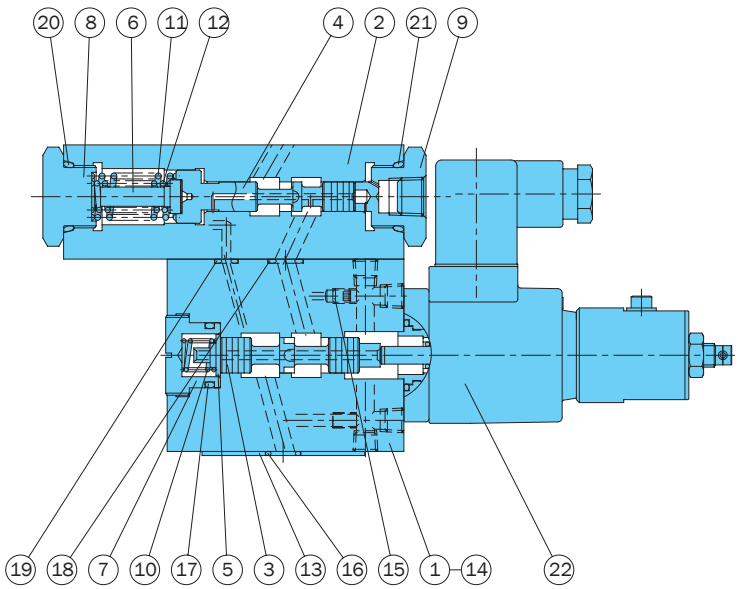


Fluid Temperature Characteristics



Cross-sectional Drawing

EOF-G01-T25



Part No.	Part Name
1	Body
2	Body
3	Spool
4	Piston
5	Retainer
6	Retainer
7	Plug
8	Plug
9	Plug
10	Spring
11	Spring
12	Spring
13	Plate
14	Screw
15	Screw
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring
21	O-ring
22	Proportional solenoid

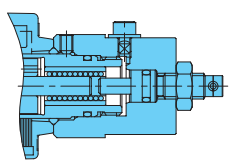
Note: Coil model number JD64-D2

Seal Part List (Kit Model Number JMS-G01)

Part No.	Part Name	Part Number	Q'ty
16	O-ring	1B-P9	4
17	O-ring	1B-P18	1
18	O-ring	1B-P9	4
19	O-ring	1B-P5	1
20	O-ring	1B-P20	1
21	O-ring	1B-P20	1

Note: 1B-** refers to JIS B2401-1B-**.

Manual adjustment section



Power Amplifier Series for Electro-Hydraulic Proportional Valve Drive

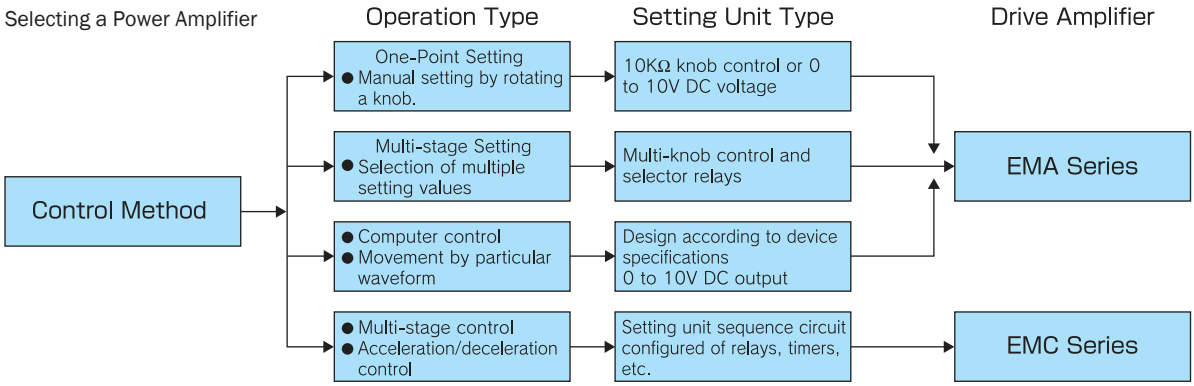
Overview

This special amplifier is for driving electrohydraulic proportional pressure control valves, electro-hydraulic proportional flow control valves, and electro-hydraulic proportional direction control valves. It comes in a choice of two different types: an amp type and a controller type.
Basically, the amp type converts 0 to 10V DC range command voltage to a ***DC current*** of in the range of 0 to 900mA, which is then supplied to the control valve.
The control type performs multi-stage control of ***output current*** in accordance with the ON-OFF signal of external contacts.

Power Amplifier Types and Functions

Type	Model No.	Drive Control Valve	Functions
Amp Type	EMA-PD5-N-20	Pressure Control Valves Flow Control Valves Direction Control Valves	Three functions: open loop control, feedback control, and acceleration/deceleration control.
Controller Type	EMC-PC6-A-20	Same as above.	Built-in command voltage setting units (potentiometers) Setting unit selection is performed by relay contacts, limit switches, timer contacts, etc.

Selecting a Power Amplifier



Specifications

Item \ Model No.	EMA-PD5-N-20	EMC-PC6-A-20
Function	Amp Type (Closed Loop)	Controller Type
Number of Inputs	5 DC inputs	–
Number of Channels	–	6
Maximum Output Current	900mA (20Ω solenoid)	900mA (20Ω solenoid)
Input voltage	0 to +10V DC	–
Feedback Voltage	0 to +10V DC	–
Input Impedance	At least 50kΩ	–
Externally Set Variable Resistance	10kΩ	–
Zero Adjust(NULL)	0 to 900mA	0 to 900mA
Time Lag (T-UP, DOWN)	0.3 to 3sec	–
Gain Adjustment (GAIN)	$\frac{900mA}{10V_{DC}}$ to $\frac{900mA}{1.5V}$	0 to $\frac{900mA}{80\%\ channel\ setting}$
External power supply	$+10V_{DC}$ (10mA)	–
External Contact Resistance	–	10Ω max. when closed
Dither (Internal, semi-fixed)	Level: 0 to 500mAp-p Frequency: 50 to 220Ha	Level: 0 to 500mAp-p Frequency: 50 to 220Ha
Channel Time Lag (TIME)	–	0.3 to 3 seconds Externally variable
Power Supply Voltage	AC100, 110, 200, 220V (±10%)50/60Hz	AC100, 110, 200, 220V (±10%)50/60Hz
Power Consumption	50VA	50VA
Allowable Ambient Temperature	32 to 122° F	32 to 122° F
Temperature Drift	0.2mA/℃ max.	0.2mA/℃ max.
Weight lbs	7.7	7.7

Understanding Model Numbers

EMA – P D5 – N – [ ][ ][ ][ ] – 20

- Design number
- Auxiliary symbol (Up to six characters can be combined in alphabetic sequence.)
- Input amplifier
- D5, DC 5 input
- Mounting method: Panel type
- Electro-hydraulic proportional valve amplifier

(Auxiliary Symbol List)

C	4-20mA input (R1, RT3) 1-5V input (R2, RT4)
D	Adjustment by 10-rotation potentiometer
K	Moisture resistance
T1	T-UP,T-DOWN 0.1-1sec
T5	0.5-5sec
T10	1-10sec

EMC – P C6 – A – [ ][ ][ ][ ] – 20

- Design number
- Auxiliary symbol (Up to five characters can be combined in alphabetic sequence.)
- Externally variable channel time lag
- C6, 6 channel
- Mounting method: Panel type
- Electro-hydraulic proportional valve controller

(Auxiliary Symbol List)

D	Adjustment by 10-rotation potentiometer
K	Moisture resistance
T1	T-UP,T-DOWN 0.1-1sec
T5	0.5-5sec
T10	1-10sec

Note: T-UP, DOWN, and TIMER all become 0.3-3 sec when there is no signal for T1, T5, and T10.

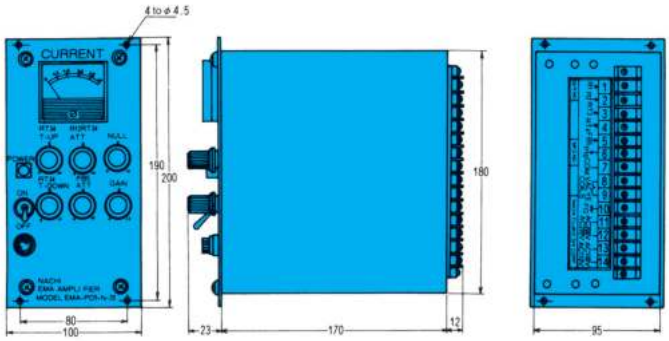
• Handling

1 Power supply voltage can be either 110V or 230V.
2 When selecting a location, avoid areas subject to high temperatures and high humidity, and select an area where there is little vibration and dust.
3 Use shielded wire for the analog signal and valve output signal wires.
4 When performing valve output signal line ON-OFF switching with a relay, connect a surge absorber or varistor parallel with the relay.

Power Amplifier Series for Electro-Hydraulic Proportional Valve Drive

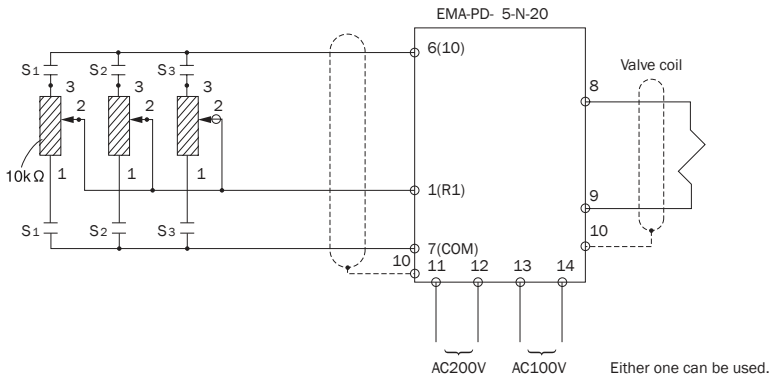
EMA-PD5-N-20

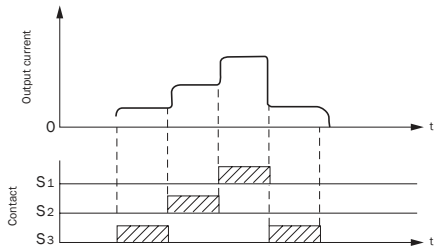
No.	Name		No.	Name
1	R1	Input	8	Output terminal to
2	R2	Input	9	VALVE COIL valve
3	RT3, delay input		10	FG, case ground
4	RT4, delay input		11	AC200, 220V
5	FB5, feedback input		12	
6	P10, external power supply		13	AC100, 110V
7	COM, signal land		14	



Application Examples

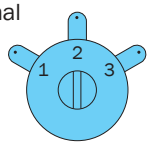
1. Multi-stage Setting Using Multiple Potentiometers





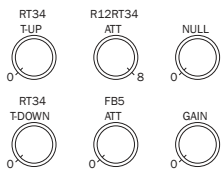
(1) Wiring the amp and external potentiometer

A potentiometer has three terminals numbered 1, 2, and 3.



(2) Setting the adjusting knobs

Terminals 2 (R2), 3 (RT3), and 4 (RT4) can also be used in place of terminal 1. An RT34T-UP and RT34T-DOWN acceleration/deceleration timer can also be used in the case of terminal 3 (RT3) and terminal 4 (RT4). In this case, the settings of the knobs on the front panel of the amp are normally as shown in the illustration below. The manual setting unit provides ***output current*** control in the range of 0 to 900mA as it is rotated from full counterclockwise to full clockwise.

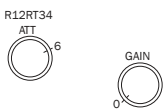


Wiring

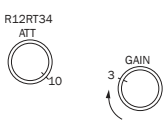
Amp terminal 7 (0V)
Potentiometer terminal 1
Amp terminal 6 (10V)
Potentiometer terminal 3
Amp terminal 1 (R1)
Potentiometer terminal 2

With this wiring, rotating the potentiometer clockwise causes the ***output current*** to increase.

• If an output in the range of 0 to 600mA is desired even while the manual setting unit is rotated fully clockwise, restrict the setting of R12RT34ATT to 6.



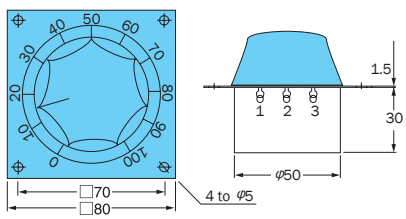
• When the level deceleration ratio and other factors limit the effective use of the manual setting unit to only 150° of the 300°, use GAIN to adjust the ***output current*** to 900mA.



Note: 1. A range of 5KΩ to 10KΩ is recommended for external knobs and potentiometers.
2. In order to prevent ***current*** loss across terminals 6 and 7, insert relays between terminal 6 and the potentiometers and terminal 7 and the potentiometers.
3. Do not enable more than one potentiometer at the same time.

(3) The following is available for the external setting knob.

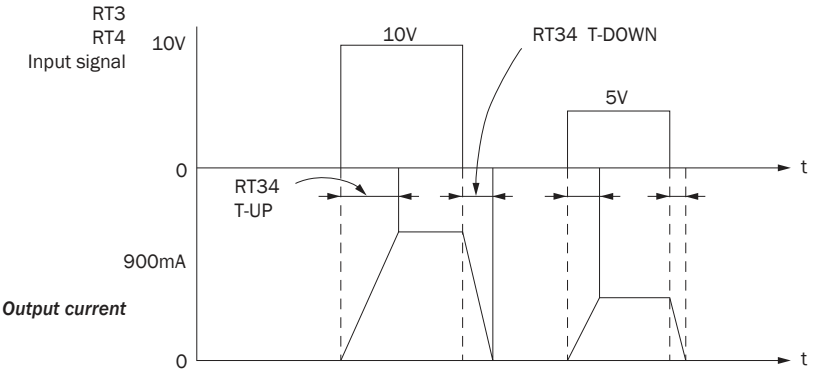
Model No. F ZS-6350-101



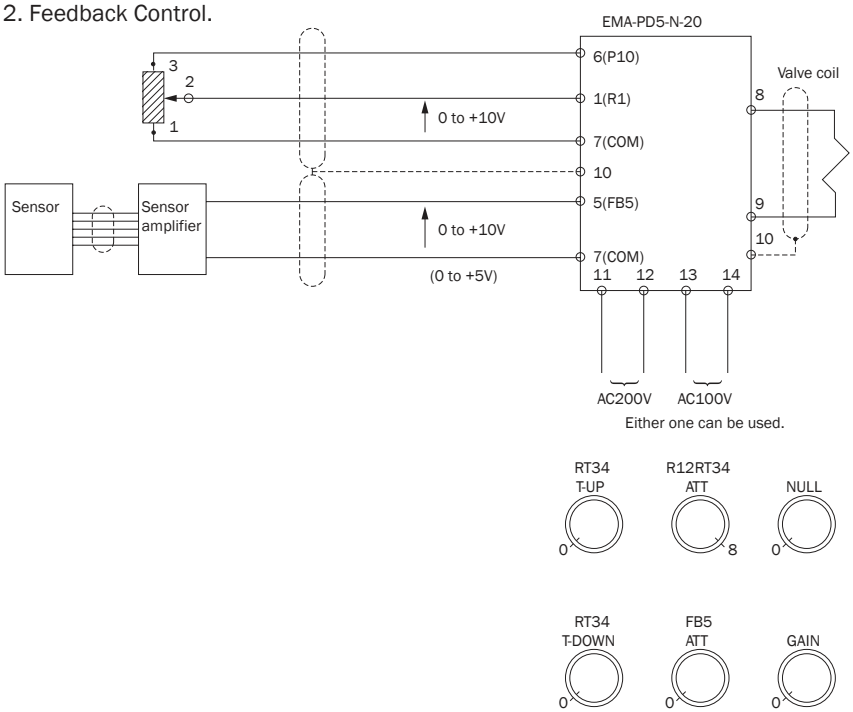
G

Proportional Valves

(4) Acceleration time adjustment (RT34T-UP) and deceleration time adjustment (RT34T-DOWN)

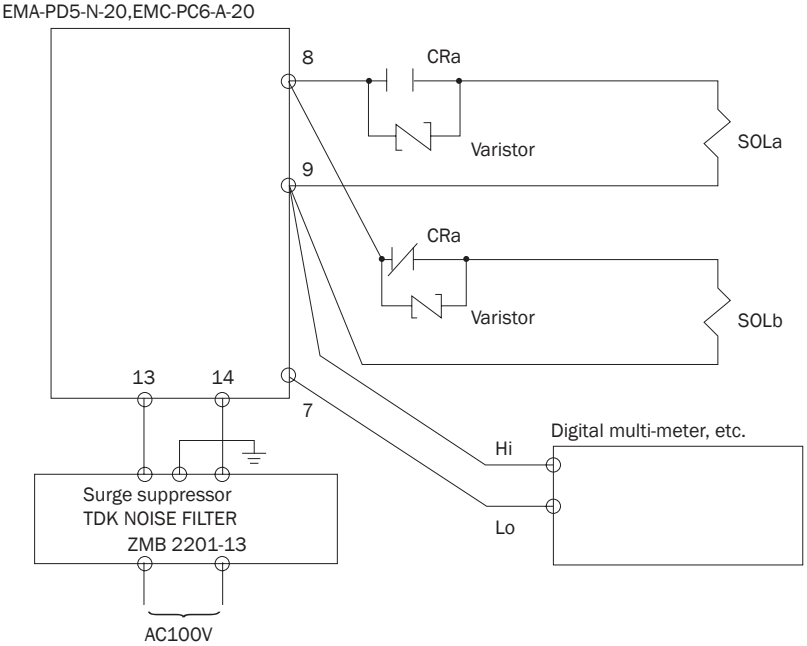


2. Feedback Control.



3. Direction Control Valve (ESD) Drive

EMA-PD5-N-20,EMC-PC6-A-20



This circuit creates a fixed acceleration time lag in accordance with the voltage that added the input signal to terminals 3 and 4 (RT3, RT4).
The time lag is adjustable in the range of 0.3 to 3 seconds, as standard.
As shown in the diagram to the left, even when RT34T-UP is set to 3 seconds, the change to 5V during stepped input from 0 to 10V and stepped input from 0 to 5V takes 1.5 seconds, which is half the set time.

With the wiring shown to the left, ***output current*** is increased or decreased in accordance with the feedback signal of the sensor, which regulates pressure or the flow rate.

Note:
Using terminal 3 (RT3) and terminal 4 (RT4) in place of terminal 1 (R1) enables T-UP and T-DOWN, which allows feedback control without overshooting or undershooting, even when input signal voltage is stepped.

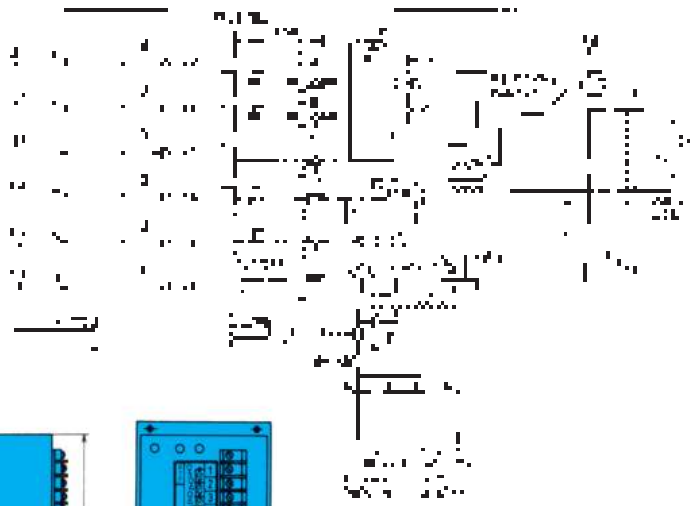
Adjustment Method
- Initially, set FB5ATT to 0 as shown in the illustration to the left, and check to see if open look control is possible.
- Next, set FB2ATT to 2 and GAIN to 2, and input a feedback signal. Gradually rotate FB5ATT clockwise and increase gain. Set the feedback gain to the level that is immediately before the point where vibration is generated in the control system. (FB5ATT, GAIN)

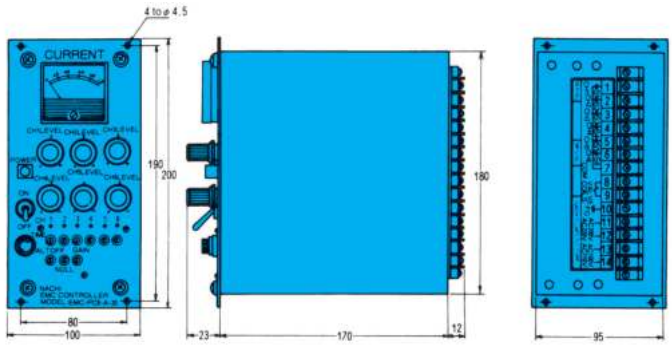
Note:
1 To measure ***current***, measure the voltage at terminal 9, using terminal 7 as reference. The voltage across the 0.5Ω ***current*** detection resistor at 1A is 0.5V. Use a measurement device with an input impedance of at least 1MΩ.
2 Switch the terminal 8 line using a relay. Make sure that both relays are not on at the same time.
3 To absorb surge voltage, include 82V varistors in parallel with the relay contacts.
Recommended Varistor
Tama Electric Co., Ltd. NV082D10
Matsushita ERZV10D820
4 For relays, use OMRON LY type power relays or the equivalent.
5 Too much noise in the 110V AC or 230V AC power supply line can result in unstable ***output current***. If this happens, equip a surge absorber on the power supply.
Recommended Model
TDK NOISE FILTER
ZMB2201-13

Power Amplifier Series for Electro-hydraulic Proportional Valve Drive

EMC-PC6-A-20

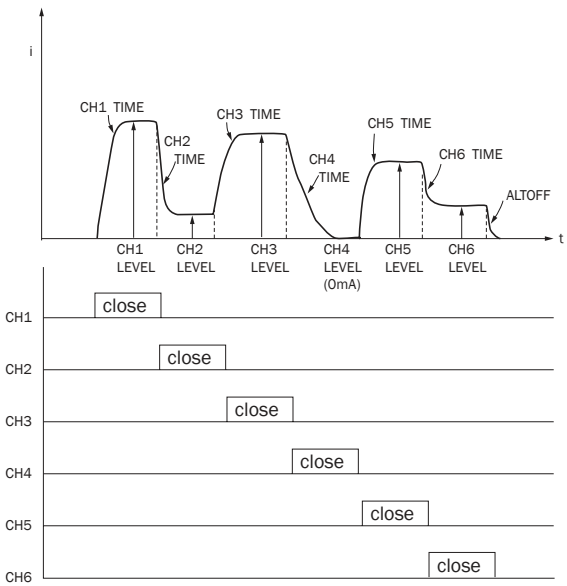
No.	Name	No.	Name
1	CH1 Input command contact	8	Output terminal to valve
2	CH2 "	9	VALVE COIL
3	CH3 "	10	FG, case ground
4	CH4 "	11	AC200 220V
5	CH5 "	12	
6	CH6 "	13	AC100 110V
7	Common COM input contact	14	





Note: When external contacts S1 through S6 are closed, use a non-voltage contact no greater than 10 Ω .

Application

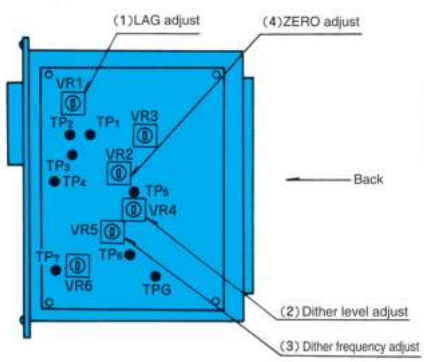


- LEDs are provided to indicate channel selection.
- The TIME knob of each channel adjusts the time until the selected channel's level is reached, as shown to the left. Make sure that the lap time (or time when channel is not selected) when changing the channel selection is 30msec maximum.
- Use independent external contacts. Even when external contacts are superimposed, output is not the sum of each channel, so use of superimposed external contacts is not supported.

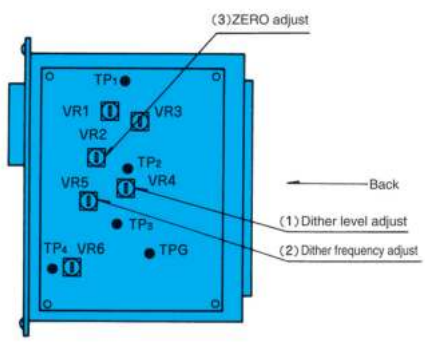
Note: When replacing a Design Number 10 controller with a Design Number 20 controller, you must also change the sequence from superimposed external contacts to independent.

Dither Adjustment Method (Dither is set to load 400mAp-pm 100Hz.)

(1) EMA-PD-N-20



(2) EMC-PC6-A-20



Removing the left side panel when viewed from the front reveals the configuration shown in the illustrations to the left.

1. If piping or other items vibrate in response to the dither, raise the dither frequency by rotating the trimmer clockwise.
2. When repeat stability is poor and the hysteresis is large, increase the dither level by rotating clockwise. If this does not resolve the problem, lower the dither frequency by rotating the trimmer counterclockwise.
3. When repeatability is poor with the ES valve or ESD valve due to insufficient air bleeding within the guide, raise the dither frequency by rotating the tripper clockwise, as described in 1.

Small Type Power Amplifier Series for Electro-Hydraulic Proportional Valve Drive

Features

This power amplifier provides high efficiency and reliability in a compact configuration.

Lightweight, compact design — The configuration of this amplifier is 1/3 the weight and 1/2 the volume of existing models.

High efficiency — A PWM control system enables a highly efficient design with little heat generation.

High reliability — All functions are integrated onto a single circuit board for a highly reliable design with no internal wiring.

Specifications

Item \ Model No.	EBA-PD1-N-C1-10	EBA-PD1-NW-C1-10	EBA-PD1-N(Z)-D2-10	EBA-PD1-NW(Z)-D2-10
Function	Amp Type (Open Loop)	Amp Type (Open Loop)	Amp Type (Open Loop)	Amp Type (Open Loop)
Number of Inputs	1 DC inputs	1 DC inputs	1 DC inputs	1 DC inputs
Drive Solenoid	SOL a	SOL a, SOL b	SOL a	SOL a ,SOL b
Maximum Output Current	900mA (20Ω solenoid)	900mA (20Ω solenoid)	900mA (20Ω solenoid)	900mA (20Ω solenoid)
Input voltage	0 to +10V DC	−10 to +10V DC	0 to +10V DC	−10 to +10V DC
Input Impedance	50kΩ	50kΩ	50kΩ	50kΩ
Externally Set Variable Resistance	10kΩ	10kΩ	10kΩ	10kΩ
Zero Adjust (NULL)	0 to 900mA	0 to 900mA	0 to 900mA	0 to 900mA
Gain Adjustment (GAIN)	0 to $\frac{900mA}{5V\ input}$	0 to $\frac{900mA}{5V\ input}$	0 to $\frac{900mA}{5V\ input}$	0 to $\frac{900mA}{5V\ input}$
External power supply	+5V DC (5mA)	+5V DC (5mA) −5V DC (5mA)	+5V DC (5mA)	+5V DC (5mA) −5V DC (5mA)
Dither Frequency (DITHER)	Variable: 80 to 220Hz	Variable: 80 to 220Hz	Variable: 80 to 220Hz	Variable: 80 to 220Hz
Time Lag (LAG)	Internally Variable: 0.05 to 2 seconds	Internally Variable: 0.05 to 2 seconds	Internally Variable: 0.05 to 2 seconds	Internally Variable: 0.05 to 2 seconds
Power Supply Voltage	AC100 · 110V ±10% (50/60Hz)	AC100 · 110V ±10% (50/60Hz)	DC24V (DC24 to 30V)	DC24V (DC24 to 30V)
Power Consumption	30VA	30VA	30VA	30VA
Allowable Ambient Temperature	32 to 122° F	32 to 122° F	32 to 122° F	32 to 122° F
Temperature Drift	0.2mA/°F max.	0.2mA/°F max.	0.2mA/°F max.	0.2mA/°F max.
Weight lbs	4.8	4.8	.3 (1.3 with Z)	3.0 (1.3 with Z)
Driven Valve	Pressure Control Valves Flow Control Valves	Direction Control Valve	Pressure Control Valves Flow Control Valves	Direction Control Valve

• Handling

1 When selecting a location, avoid areas subject to high temperatures and high humidity, and select an area where there is little vibration and dust.

2 Use shielded wire for the analog signal and valve output signal wires.

3 The brightness of the LED changes in accordance with the size of the output current.

Understanding Model Numbers

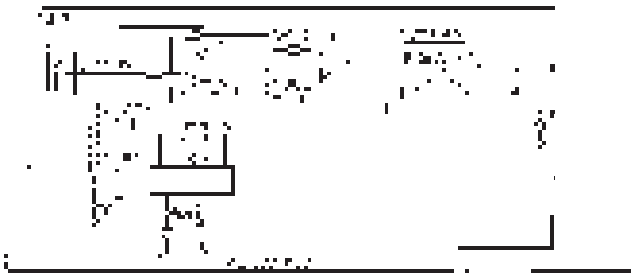
EBA – PD1 – NWZ – D2 – 10

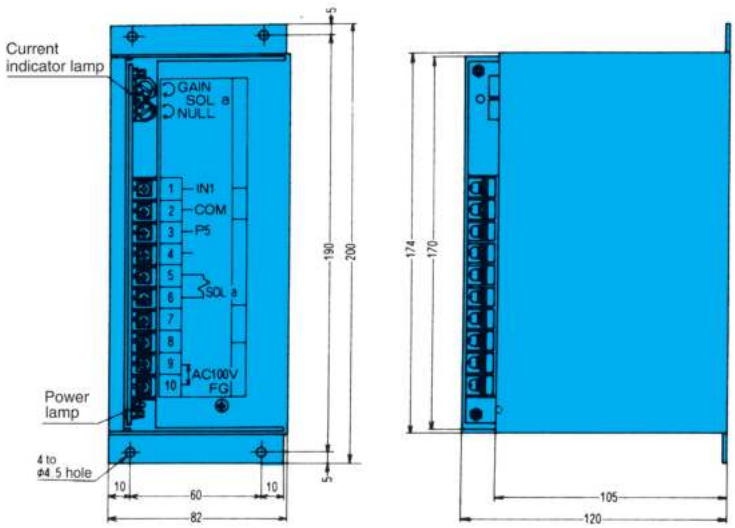
- 10 — Design number
- D2 — Voltage symbol
  - C1 : AC100,110V ±10%(50/60Hz)
  - D2 : DC24V
- NWZ — Auxiliary symbol
  - N : Open loop with one output (SOL a)
  - NW : Open loop with two outputs (SOL a, SOL b)
  - Z : With case (Can be used with voltage symbol D2 only.)
- PD1 — Type Classification
  - D1, DC 1 input
- EBA — Small type power amplifier

Installation Dimension Drawings

EBA-PD1-N-C1-10

No.	Name	No.	Name
1	Input signal terminal IN1	5	Output terminal to valve SOL a
2	Input signal terminal COM	6	
3	External power supply P5	7	
		8	
		9	AC100 · 110V
		10	



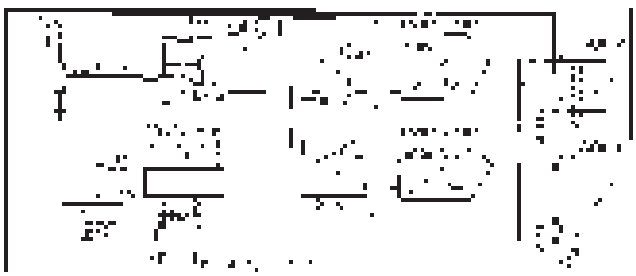


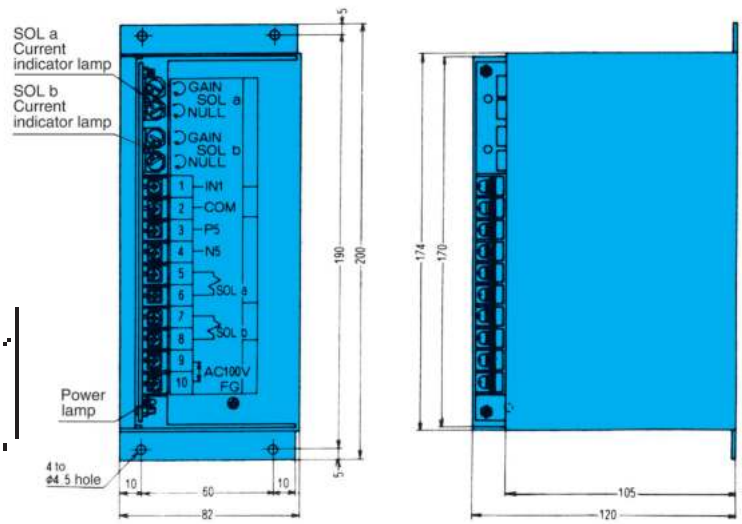
• With EBA-PD1-N (Z), ***current*** is supplied to the control valve in proportion to input signal voltage in the range of 0 to +10V.
• To measure ***current***, measure the voltage at terminal 6, using terminal 2 as reference. The voltage across the 0.5Ω ***current*** detection resistor at 1A is 0.5V. Input impedance of the measurement device should be at least 1MΩ.

• With EBA-PD1-NW (Z), the polarity of the input voltage is determined, and current is supplied to SOLa when it's positive and to SOLb when it is negative.
• NULL and GAIN for SOL a and SOL b are enabled when each of their input signal voltage is ±0.1V or more.

EBA-PD1-NW-C1-10

No.	Name	No.	Name
1	Input signal terminal IN1	5	Output terminal to valve SOL a
2	Input signal terminal COM	6	
3	External power supply P5	7	Output terminal to valve SOL b
4	External power supply N5	8	
		9	AC100 · 110V
		10	



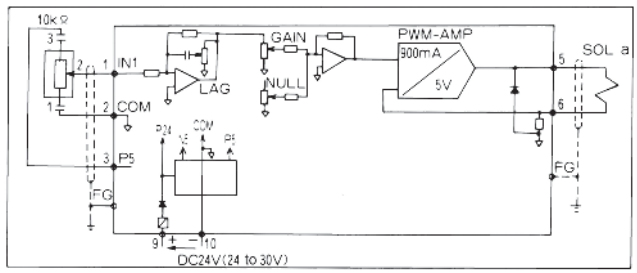


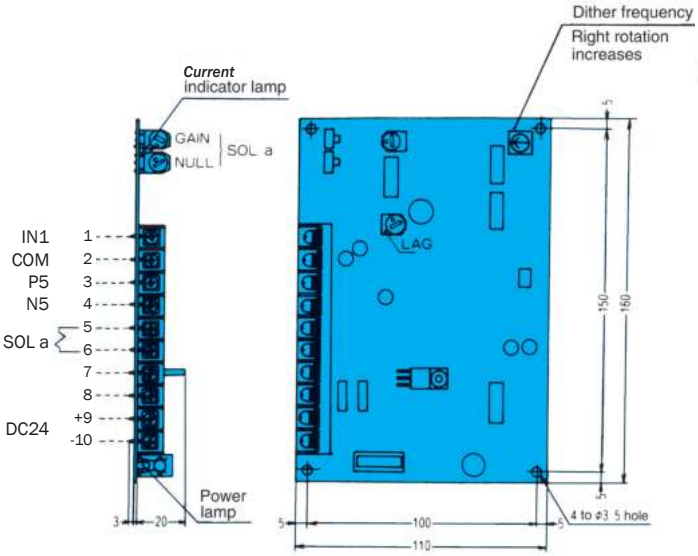
• To measure ***current***, measure the voltage at SOLa terminal 6 and SOLb terminal 6, using terminal 2 as reference. The voltage across

• the 0.5Ω ***current*** detection resistor at 1A is 0.5V. Input impedance of the measurement device should be at least 1MΩ.

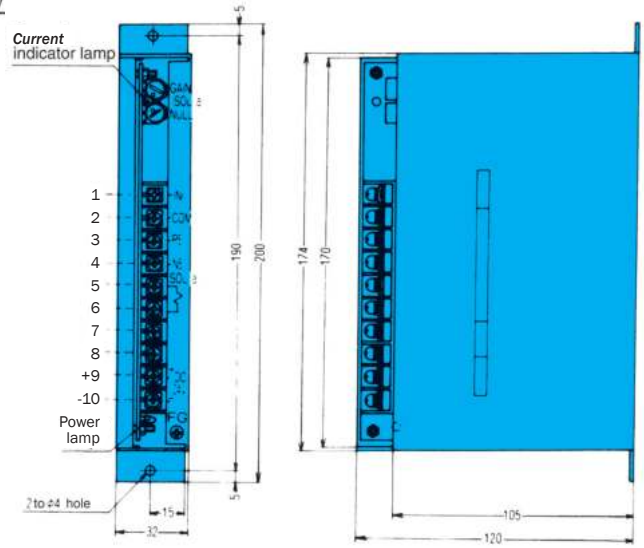
EBA-PD1-N(Z)-D2-10

No.	Name	No.	Name
1	Input signal terminal IN1	5	Output terminal to valve SOL a
2	Input signal terminal COM	6	
3	External power supply P5	7	
		8	
		9	+ DC24V
		10	−





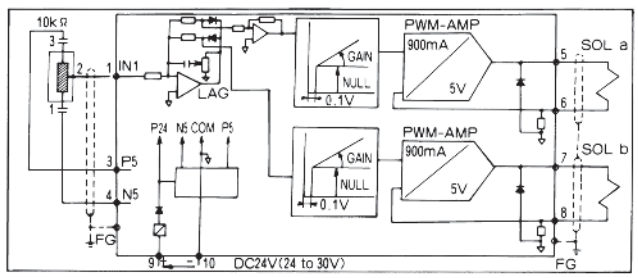
EBA-PD1-N-D2-10

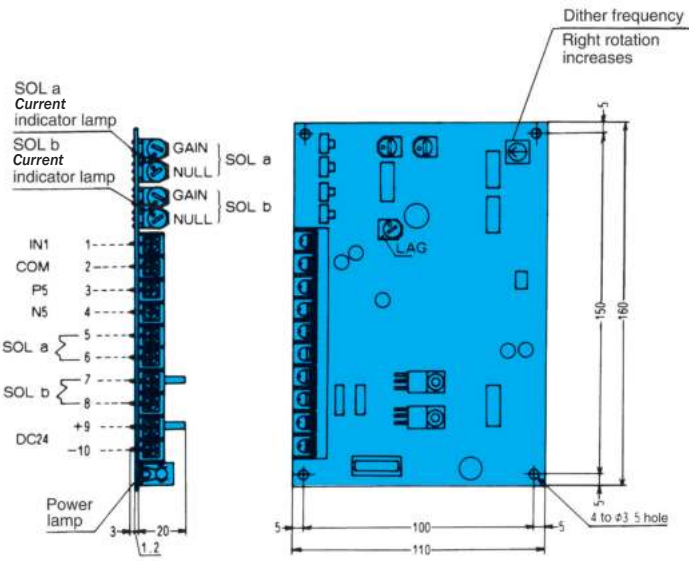


EBA-PD1-NZ-D2-10

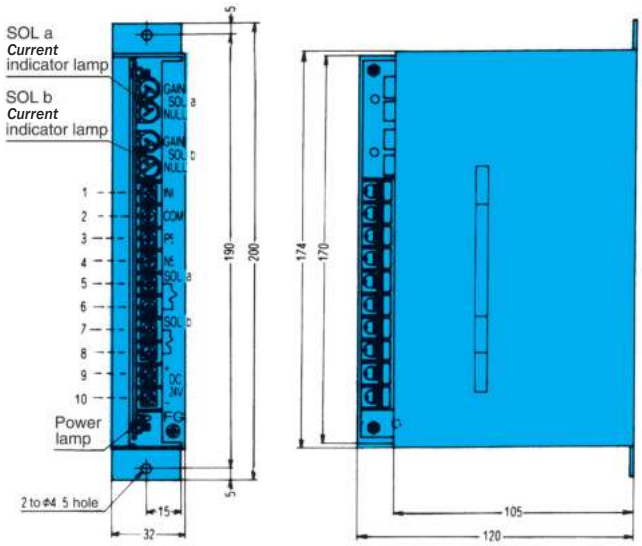
EBA-PD1-NW(Z)-D2-10

No.	Name	No.	Name
1	Input signal terminal IN1	5	Output terminal to valve SOL a
2	Input signal terminal COM	6	
3	External power supply P5	7	Output terminal to valve SOL b
4	External power supply N5	8	
		9	+ DC24V
		10	−





EBA-PD1-NW-D2-10



EBA-PD1-NWZ-D2-10

Note: Use a 24V switching regulator with a capacitance of at least 1A.

Example

Manufacturer	Model No.	Capacity
COSEL	R25A-24	24V 1.1A
TDK	EAK24-1R3G	24V 1.3A
DENSEI-LAMBDA	EWS25-24	24V 1.2A

• General Precautions

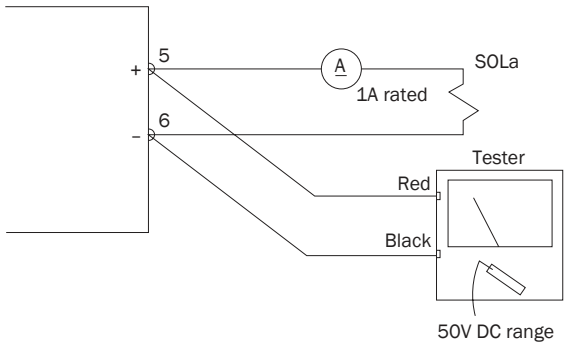
1 Measuring ***current*** flow in the solenoid coil
As shown in the illustration below, disconnect the line supplying ***current*** to the solenoid coil, and then insert a 1A DC rated ***current*** meter or measure voltage across terminals 5 and 6. Solenoid coil resistance is 20Ω, so the relationship between voltage and ***current*** is as shown below. Note, however, that these values are not exact, because coil resistance changes with temperature.

Voltage (V)	***Current*** (mA)
0	0
4	200
8	400
12	600
16	800

Measurements across terminals 7 and 8 can be performed the same as shown in the illustration below.

2 Never energize only the solenoid coil. The amp will not operate correctly if the iron coil is not inserted.

3 For connection between the amp/controller and solenoid coil, use a 2-conductor shielded wire with a conductor nominal cross-section area of 2.0mm². Type VCTF (Rated Voltage: 300V vinyl cab tire cord.
Wiring between the command voltage generator and amplifier should be VCTF 0.75m² 3-conductor wire.
Use a shield that conforms to JIS Class 3 grounding. If the ground line is unstable, do not connect the shield to anything.

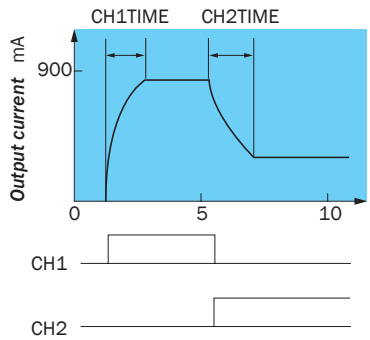


Power Amplifier Operation and Terminology

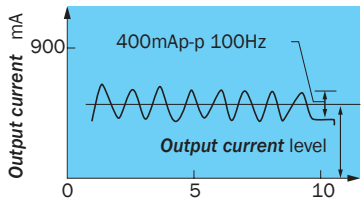
• **Zero Adjust (NULL)**
This knob sets the lower limit of the operating pressure and flow rate. Rotating it clockwise increases the ***output current***. This knob is also used for manual control while checking valve operation.

• **Gain Adjust (GAIN)**
This knob adjusts ***output current*** in proportion to input signal voltage or the channel level knob rotation angle. Rotating it clockwise increases gain.

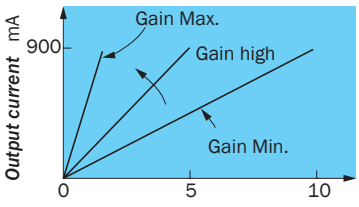
• **Channel Time Lag (TIME)**
This knob adjusts the time it takes for a channel selected by external contact to reach its channel level. Rotating it clockwise increases the time leg.



• **Dither**
Dither plays a role in improving control valve hysteresis, response, stability, etc.

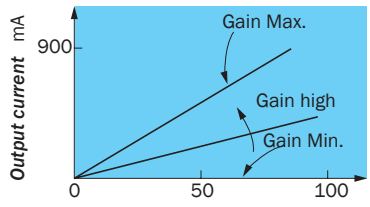


EMA-PD5-N-20



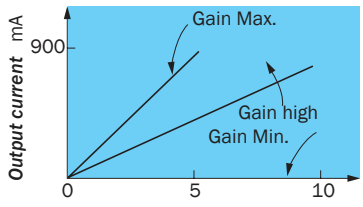
Input voltage (deviation voltage) (V)

EMC-PC6-A-20



LEVEL volume rotation angle (%)

EBA-PD1-N(WZ)- $\frac{D2}{C1}$-10



Input voltage (V)

Small Type Multi-Function Power Amplifier

Features

This compact, multi-function power amplifier uses advanced hybrid integrated circuits (HIC).

Compact design — Less than half the size of previous models.

High reliability — Circuit board configuration eliminates the need for wiring.

Multi-Function —
- Simultaneous driving of two valves
- Controller with built-in amplifier (EDC-PC6-AWZ-D2-20)
- Dither frequency selection function (From Designs 11, 20)

Specifications

Item \ Model No.	EDA-PD1-NWZ-D2-11	EDC-PC6-AWZ-D2-20
Function	Amp Type	Amp/Controller Type
Input type	1 DC inputs	Contacts, 6 inputs, DC 2 inputs
Maximum Output Current	900mA (20Ω solenoid)	900mA (20Ω solenoid)
Input voltage	–10 to +10VDC	0 to +10VDC
Input Impedance	50kΩ	50kΩ
Externally Set Variable Resistance	10kΩ	10kΩ
Drive Solenoid	SOL a, SOL b	SOL 1, SOL 2
Zero Adjust (NULL)	0 to 900mA	0 to 900mA
Gain Adjust (GAIN)	0 to $\frac{900mA}{2.5V}$	0 to $\frac{900mA}{2.5V}$
External power supply	+5VDC(5mA) –5VDC(5mA)	+5VDC(10mA)
Time Lag (LAG)	0 to 2sec	0 to 2sec
Dither Frequency (DITHER)	80 to 250Hz	80 to 250Hz
Power Supply Voltage	DC24V (DC24 to 30V)	DC24V (DC24 to 30V)
Power Consumption	30VA	60VA
Allowable Ambient Temperature	32 to 122° F	32 to 122° F
Temperature Drift	0.2mA/°F max.	0.2mA/°F max.
Weight lbs	.6 lbs	.8 lbs
Driven Valve	Pressure, flow, direction control valves	Pressure, flow, direction control valves

• Handling

1 When selecting a location, avoid areas subject to high temperatures and high humidity, and select an area where there is little vibration and dust.

2 Use shielded wire for the analog signal and valve output signal wires. See page G-33 for general precautions.

3 The brightness of the LED changes in accordance with the size of the ***output current***.

Power Amplifier Operation and Terminology

(1) Amp Type

ED A – P D 1 – N W Z – (□) – D2 – 11

- 11: Design number
- D2: Voltage symbol D2 : DC24V
- (□): Auxiliary symbol

None	1-rotation adjustor knob
D	3-rotation adjustor knob (1-rotation trimmer for dither)

- Z: With case
- W: 4-direction valve drive possible
- N: Standard type
- 1: Number of inputs 1: 1 input
- D: Amp DC input
- P: Panel type
- A: Amp type
- ED: Small type, multi-function power amp

(2) Amp/Controller Type

ED C – P C 6 – A W Z – (□□□□) – D2 – 20

- 20: Design number
- D2: Voltage symbol D2 : DC24V
- (□□□□): Auxiliary symbol (Up to four characters can be combined in alphabetic sequence.)

None	1-rotation adjustor knob Variable TIMER Range: 0.1 to 2 seconds
D	3-rotation trimmer for controller block LEVEL, TIME, TOFF only
E	3-rotation for amp block GAIN, NULL, OFFSET, LAG only
F	3-rotation trimmer for controller/amp block LEVEL, TIME, TOFF, GAIN, NULL, OFFSET, LAG
T5	Variable TIMER Range: 0.5 to 5 seconds
T10	Variable TIMER Range: 1 to 10 seconds.

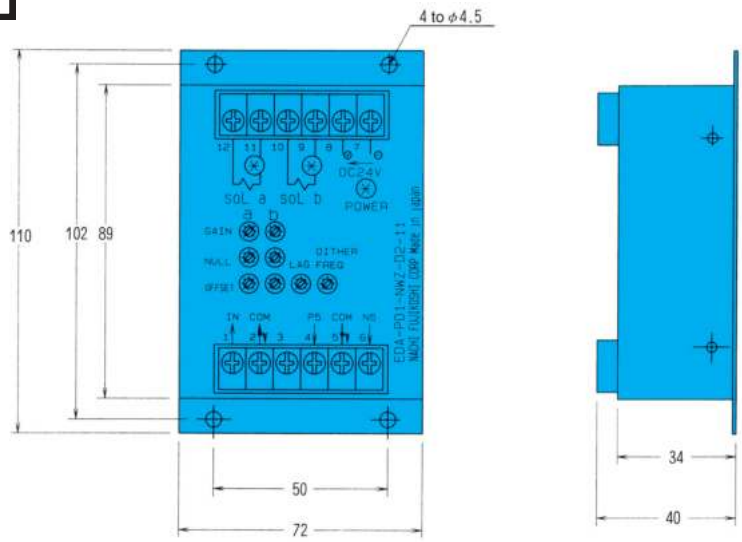
Note) D, E, F designs all have 1-rotation trimmer.

- Z: With case
- W: 4-direction valve drive possible
- A: With acceleration timer
- 6: Number of inputs 6: 6 input
- C: Controller type contact input
- P: Panel type
- C: Controller type
- ED: Small type, multi-function power amp

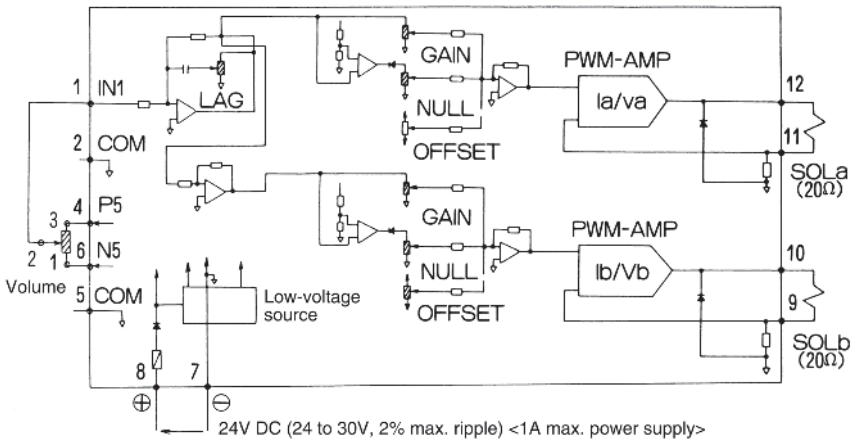
Power Amplifier Operation and Terminology

EDA-PD1-NWZ-D2-11

No.	Name	No.	Name
1	Input signal terminal IN1	7	– DC24V +
2	Input signal terminal COM	8	
3		9	Output terminal to valve SOL b
4	External power supply P5	10	
5	Input signal terminal COM	11	Output terminal to valve SOL a
6	External power supply N5	12	



Block Diagram



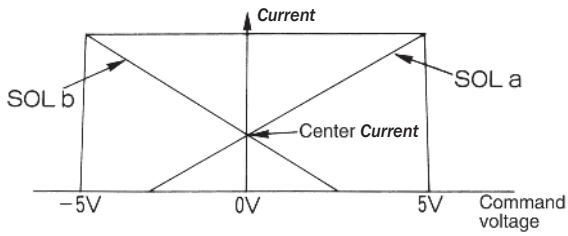
• ***Current*** is supplied to SOL a when input signal voltage polarity is positive, and to SOL b when negative. Either SOL a or SOL b can be driven at any one time.
• Push-pull drive is also supported.
• To measure ***current***, measure the voltage at SOL a terminal 11 and SOL b terminal 9, using terminal 5 as reference. The voltage across the 0.5Ω ***current*** detection resistor at 1A is 0.5V. Use a measurement device with an input impedance of at least 1MΩ.
• To use SOL a only, connect terminal 1 of the knob to amp terminal 2, use an input voltage range of 0 to 5V. (ER, ES only)

Application Examples

Adjusting Push-pull Drive for a Special Proportional Valve (Special Specification Direction Control Valve)

a)Overlap Type Proportional Valve ESD-G01-C5 $\frac{10}{20}$-6333D:300mA (Center ***Current***)

b)Zero-Lap Type Proportional Valve ESD-G01-C5 $\frac{10}{20}$-6586C:200mA (Center ***Current***)



As shown in the figure to the left, push-pull control aims at increasing response at the zero point by simultaneously energizing both solenoids.

Adjustment Procedure

1 NULL, GAIN, OFFSET
Rotate all seven knobs counterclockwise as far as they will go.

2 Without any connection between terminals 1 and 2, use the OFFSET knob to simultaneously energize SOL a and SOL b as follows.
SOL a 300mA(200mA)
SOL b 300mA(200mA)

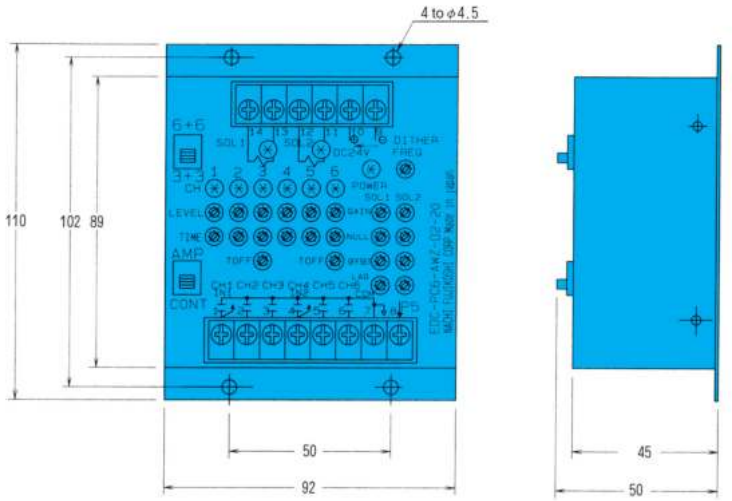
3 Next, apply +5V to terminal 1 (connecting 1 and 4), and set the SOL a GAIN knob to the following:
SOL a 850mA
SOL b 300mA
For the SOL b ***current*** here, SOL b GAIN should be fully rotated counterclockwise,

4 and its setting should not be changed.
Apply –5V to terminal 1 (connecting 1 and 6), and set the SOL b GAIN knob for the following:
SOL a 0mA
SOL b 850mA

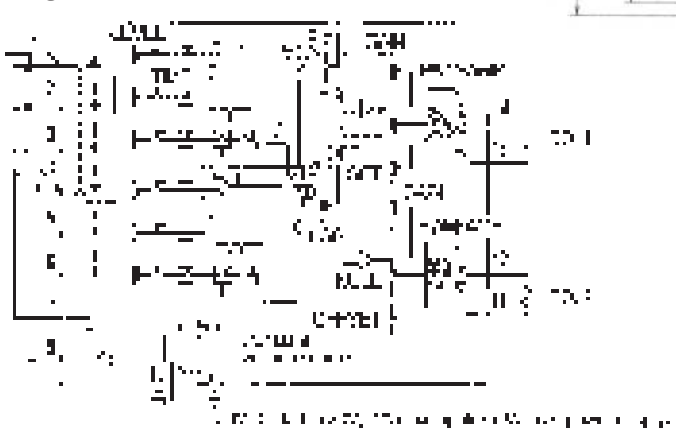
This completes the setting procedure.
• The three LAG and NULL knobs should be left rotated fully counterclockwise. There is no need to change their settings.
• EDA-PD1-NWZ-D2-11 is configured with a feedback system, so it does not have a feedback gain adjustment function. In this case, use EDA-PD1-NWZ-D2-11 in combination with the EA-PD4-D10-*-10 NACHI servo amp.

EDC-PC6-AWZ-D2-20

No.	Name	No.	Name
1	CH1 select terminal / Input signal terminal	7	COM
		8	External power supply P5
2	CH2 select terminal	9	–
3	CH3 select terminal	10	+ DC24V
4	CH4 select terminal / Input signal terminal	11	Output terminal to valve SOL 2
		12	
5	CH5 select terminal	13	Output terminal to valve SOL 1
6	CH6 select terminal	14	



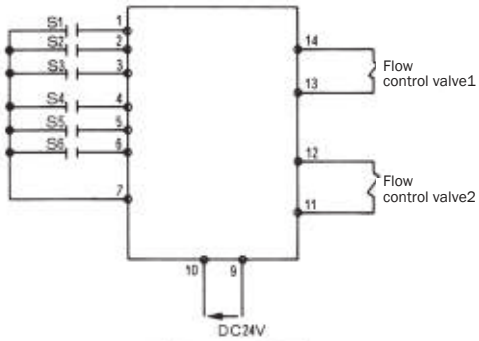
Block Diagram



- Dual simultaneous output to SOL 1 and SOL 2 is supported.
- To measure ***current***, measure the voltage at SOL a terminal 13 and SOL b terminal 1, using terminal 7 as reference. The voltage across the 0.5Ω current detection resistor at 1A is 0.5V. Use a measurement device with an input impedance of at least 1MΩ.

Application Examples

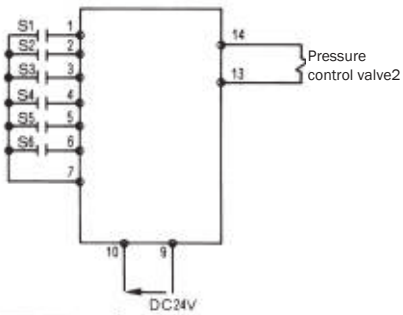
1) Switch Position
- CONT
- 3+3



- Simultaneous control using two flow control valves (3-speed)

As shown in the diagram to the left, flow control 1 speed is controlled with CH1 LEVEL when CH1 and CH2 are turned on at the same time.
Next, flow control valve 2 speed is controlled by CH4 LEVEL, and simultaneous control is possible by adjusting flow control valve 1 speed in the same way. 3-speed synchronous control is possible by grouping CH1 through CH3 and CH4 thorough CH6.

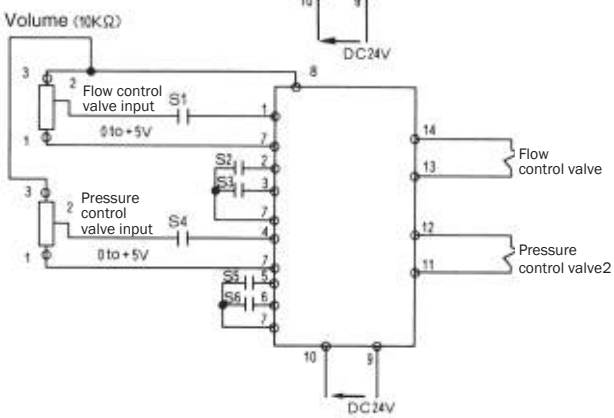
2) Switch Position
- CONT
- 6+6



- Pressure control valve 6-pressure control

As shown in the diagram to the left, this amplifier can be use as a 6-channel controller for a single pressure control valve. Minimum pressure at this time is in accordance with the setting of the OFFSET knob. The NULL knob cannot be used to configure settings unless a channel is selected.

3) Switch Position
- AMP
- 3+3

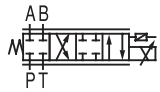


- 2-output amplifier for simultaneous control of load-sensitive system pressure and flow rate

As shown in the diagram to the left, 0 to +5V input and channel CH2 or CH3 input are added together and output to the flow control valve.
Likewise, 0 to +5V and CH5 or CH6 input is added together and output to the pressure control valve.

High-Response Proportional Flow Control Valve ESH-G01

2.6 to 13.2 gpm
4640 psi



Features

Frequency response equivalent to an electro-hydraulic servo valve.
Direct spool by a high-output proportional solenoid.
Differential transformer for accurate spool positioning with minor feedback.

Recovery of all port block positions following amp power off or wiring disconnection (Failsafe Function).
Steel spool and spring for long life.

Specifications

Item \ Model No.		ESH-G01-H510A-10	ESH-G01-H520A-10	ESH-G01-H540A-10
Maximum Operating Pressure P, A, B psi		4640		
T Port Allowable Back Pressure psi		362 max.		
Rated Flow Rate ℓ/min (gpm) (Valve pressure drop 1000 psi)		10 (2.6)	20 (5.2)	40 (9.2)
Maximum Flow Rate gpm		5.8	9.2	13
Limit Valve Pressure Drop psi		4640	3045	2030
Hysteresis %		0.5 max.		
Step Response ms (0→100% Displacement)		16 max. (Note 1)		
Frequency Response Hz (90° Phase Delay ±10% Displacement)		At least 80 (Note 1)		
Center Drift	Supply Pressure	0.5% max/FS (Δp=3625 psi)		
	Fluid Temperature	1.5% max/FS (Δt=104°F)		
Filtration		Class NAS9 max.		
Operating Fluid Temperature Range ° F (Recommended Fluid Temperature Range ° F)		32 to 140° F (86 to 140° F)		
Water and Dust Resistance		IP53		
Weight lbs		5		

Note: 1. Step response is typical value for a supply pressure of 1000 psi and fluid temperature of 104° F (kinematic viscosity: 40 centistokes)

Understanding Model Numbers

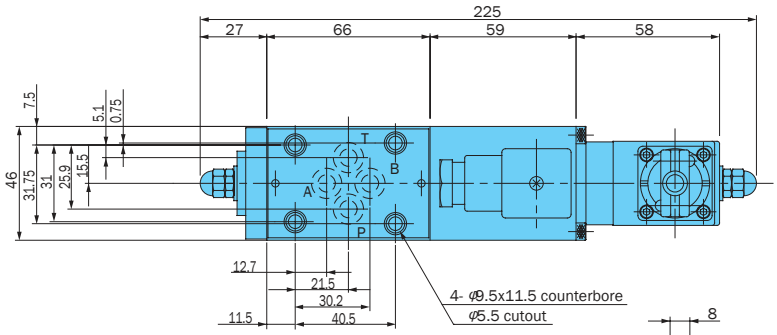
ESH – G01 – H 5 20 A * 10

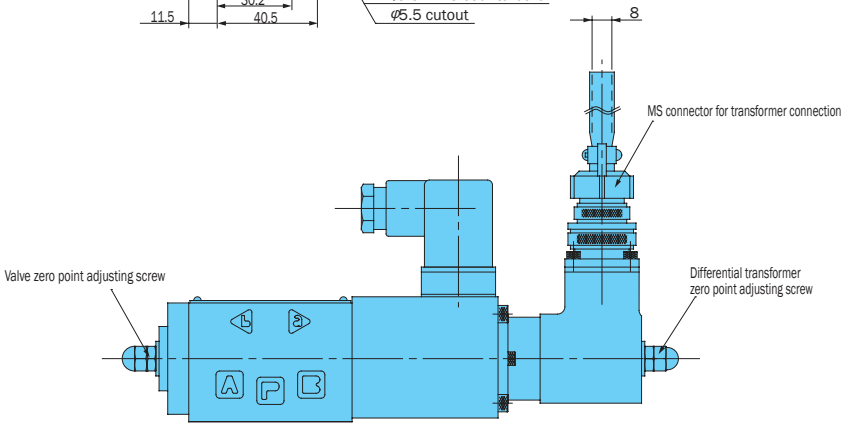
- 10 — Design number
- * — E: Unified Threads
- A — Center valve position lap value A: 0.5% max. (zero lap)
- 20 — Rated flow rate:10, 20, 35ℓ/min (Valve pressure drop 1000 psi)
- 5 — Relieve position flow path : 5 (all ports blocked)
- H — Operation method: H (spring offset type)
- G01 — Mounting method G: Gasket type Nominal diameter : 01 (01 size)
- ESH — High-response proportional flow control valve

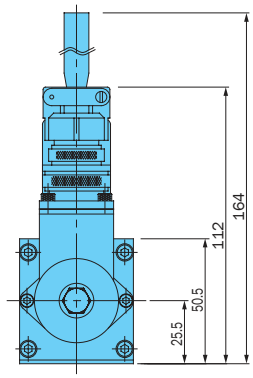
• Handling

1 The amp and valve are adjusted to match at the factory, so be sure to use items that have the same MFG No.
2 The differential transformer zero adjust screw and valve zero adjust screw are adjusted and fixed at the factory. Because of this, you should not touch the screws (sealed cap nuts).
3 Install the valve so the spool axis line is horizontal.
4 In the case of 3-port applications and for the direction that throughflow is most common, use of the following flow is recommended P→A→B→T. P→A limit differential pressure is greater than that of P→B.
5 Be sure to perform sufficient flushing before a test run.
6 Use steel piping for this valve and the main actuator, and keep piping as short as possible.
7 There is no air bleeding.
8 Mineral oil hydraulic operating fluid is standard. Use an R&O type and wear resistant type of ISO VG32, 46, or 68 or equivalent.
9 Use an operating fluid that conforms to the both of the following.
Kinematic viscosity: 20 to 140 centistokes
Oil temperature: 86 to 140° F
10 Filtration
Maintain hydraulic operating fluid contamination so it is at least NAS Class 9.
11 Electrical wiring between the amp and valve should be no longer than 30 meters. For the solenoid valve use VCTF 2 mm², 2-conductor shielded wire, and for the differential transformer use VCTF 0.5 mm², 4-conductor shielded wire.
12 After disassembling the valve, be sure to fill the inside of the guide with operating fluid before reassembling.
13 Bundled Accessories (Valve Mounting Bolts)
(4) 10-24 x 1 3/4"
Tightening Torque: 3.5 to 5 ft lbs

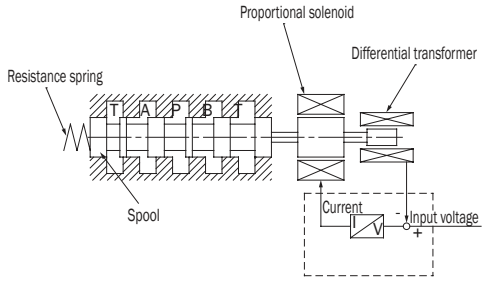
Installation Dimension Drawings







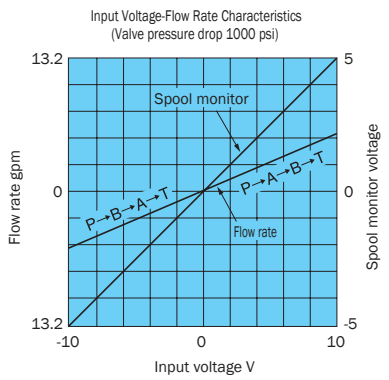
Operation Principle



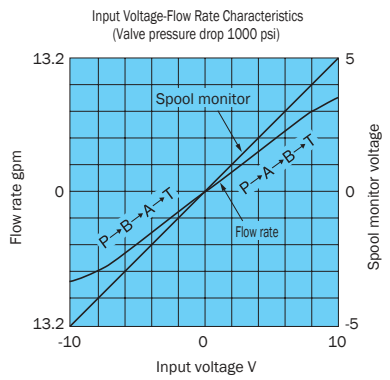
The gasket mounting method conforms to ISO4401-AB-03-4-A.

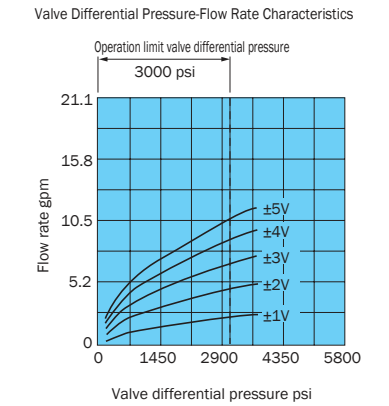
Performance Curves

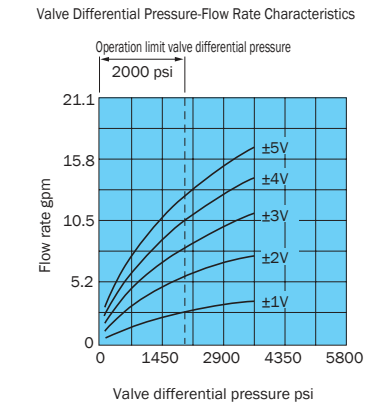
ESH-G01-H520A-10



ESH-G01-H540A-10







Note: ±10V input amp factory default data.
Rotating the GAIN trimmer clockwise (rightward) increases the flow rate by up to 10%.

• Valve Pressure Drop and Rated Flow Rate

Valve Pressure Drop (ΔP_X)
$=P_S-P_L-P_T$
P_S : Valve supply pressure
P_L : Load pressure
P_T : T Port back pressure

The rated flow rate is the value when the above valve pressure drop is 1000 psi.

• Valve Pressure Drop and Control Flow Rate

The following is the maximum control flow rate when the size of the obtained valve pressure drop is ΔP_X,

$$Q_x = Q_{rate} \times \sqrt{\frac{\Delta P_x}{7}}$$

Qrate : Rated flow rate
$\Delta P_X=P_S-P_L-P_T$

• Calculation example

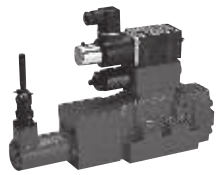
When ESH-G01-H520A-10 is used under the following conditions:
P_S=102kgf/cm² (1450 psi)
P_L=61kgf/cm² (870 psi)
P_T=10kgf/cm² (145 psi)
Maximum control flow rate Q_X is as shown below:

$$Q_x = Q_{rate} \times \sqrt{\frac{P_S - P_L - P_T}{7}}$$

$$= 20 \times \sqrt{\frac{10 - 6 - 1}{7}} = 13\ \ell/\text{min}$$

High-Response Proportional Flow Control Valve ESH-G03, 04, 06

21 to 158 gpm
4060 to 4640 psi



Features

¡Main spool minor feedback for greatly increased hysteresis and repeatability.
¡Response characteristics suitable to 20Hz and high precision acceleration control.
¡Recovery of center position following amp power off or wiring disconnection (Failsafe Function).
¡Single rod cylinder spool available for easy use.
¡Built-in pilot pressure reducing valve for stable operation.

Specifications

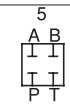
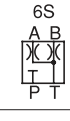
Item			Model No. ESH-G03-D*****-(*)-11	ESH-G04-D******-(*)-11	ESH-G06-D******-(*)-11
Maximum Operating Pressure psi	P,A,B Ports	External Pilot	4060	4640	4640
		Internal Pilo	3625	3625	3625
	T Port		3045	3045	3045
	Pp Port		3625	3625	3625
Minimum Pilot Pressure psi			217	217	217
Rated Flow Rate ℓ/min (gpm) Rated stroke, P→A pressure drop, 145 psi			80 (21)	180 (47.5)	350 (92.5)
Maximum Flow Rate gpm			37	79.2	158
Pilot Pressure Reducing Valve Set Pressure psi			290	290	580
Hysteresis %			0.5 max.	0.5 max.	0.5 max.
Step Response ms (0 →100% displacement)			50(Note1)	50(Note1)	50(Note1)
Frequency Response Hz (±10% input, 90 ° phase delay)			20(Note1)	20(Note1)	20(Note1)
Pilot Flow Rate gpm			1	2.1	3.1
Y (DR1), L (DR2) allowable back pressure psi			29	29	29
Weight lbs			17.6	26.4	39.7

Note: 1. Step response is typical value for a supply pressure of 1000 psi and fluid temperature of 104° F (kinematic viscosity: 40 centistokes)

Understanding Model Numbers

ESH – G 04 – D 5 180 S1 – (*) – 11

- ESH: High response proportional flow valve
- Mounting method G: Gasket type
- Nominal diameter 03, 04, 06
- Operation method D: Pressure center
- Center valve position flow path

5	 20% Center Position
6S	 20% Center Position

- Rated flow rate (See the rated flow rate item in the specifications.)
  Indicated through flow rate at rated stroke when pressure drop to P→A is ΔP= 145 psi
  Through flow rate for P→A, A→T, B→T pressure drop at 145 psi is determined by contraction ratio.

S1 (Normal)	P→A : B→T=1 : 1 P→B : A→T=1 : 1
S2 (Single rod/cylinder)	P→A : B→T=1 : 0.5 P→B : A→T=0.5 : 1

- Contraction ratio
- Auxiliary symbol
  None: External pilot, external drain
  E: External pilot, external drain
- Design number

• Handling

1 Air Bleeding
In order to ensure stable control, loosen the air vent and bleed air from the valve before starting operation.

2 Y (DR1), L (DR2) Ports
Connect ports Y (DR1) and L (DR2) directly to the fluid tank so they are always supplied with operating fluid, in order to keep back pressure no greater than 29 psi.

3 L (DR2) Port
Since this valve is a pressure center type, G04 and G06 have an L (DR2) port. Be sure to connect this port directly to the fluid tank.
G03 has a Y (DR1) port only, and this is connected internally to L.

4 Valve Mounting Orientation
Install the valve so the spool axis line is horizontal.

5 Filtration
Maintain hydraulic operating fluid contamination so it is at least NAS Class 9.

6 The amp and valve are adjusted to match at the factory, so be sure to use items that have the same MFG No.

7 Oil-based operating fluid is standard. Use an R&O type and wear-resistant type of ISO VG32, 46, or 68 or equivalent.

8 Use an operating fluid that conforms to the both of the following.
Kinematic viscosity: 20 to 140 centistokes
Oil temperature: 86 to 140° F

9 Electrical wiring between the amp and valve should be no longer than 30 meters. For the solenoid valve use VCTF 2 mm2 2-conductor shielded wire, and for the differential transformer use VCTF 0.5 mm2 4-conductor shielded wire.

10 Bundled Accessories (Valve Mounting Bolts)

Model No.	Bolt Size	Q'ty	Tightening Torque ft lbs
ESH-G03	1/4-20 x 1 3/8"	4	7 to 9.5
ESH-G04	3/8-16 x 2"	4	33 to 40
	1/4-20 x 1 3/4"	2	7 to 9.5
ESH-G06	1/2-13 x 2 3/8"	6	44 to 51

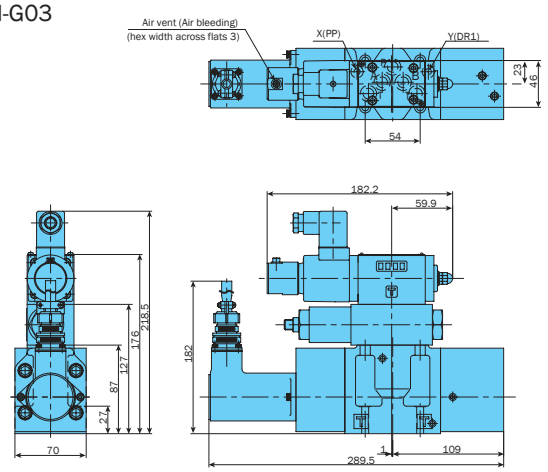
11 With G03 and G04, providing command in the range of 0 to +10V to the amp's RF input produces a flow of P→A→B→T. With G06, flow is P→B→A→T.

12 For G03 and G04, connect the ports and actuator to achieve a working of P→A→B→T. For G06, connect for a working of P→B→A→T.

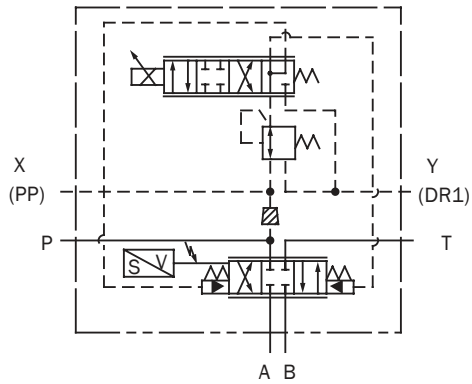
13 Contact your agent for a contraction ratio S2 with the G06 size.

Installation Dimension Drawings

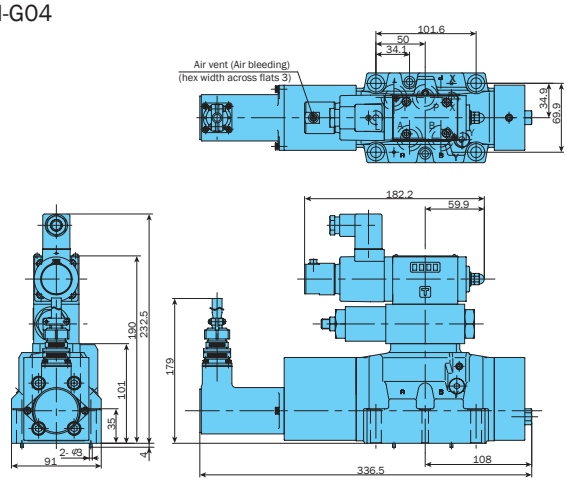
ESH-G03

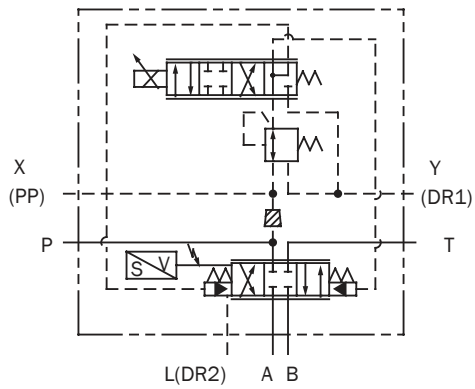


JIS Symbol

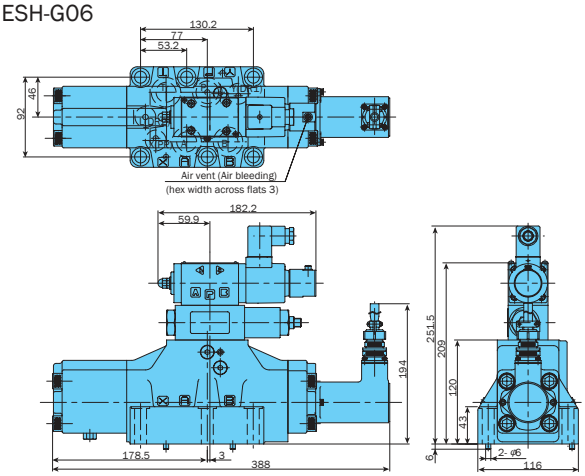


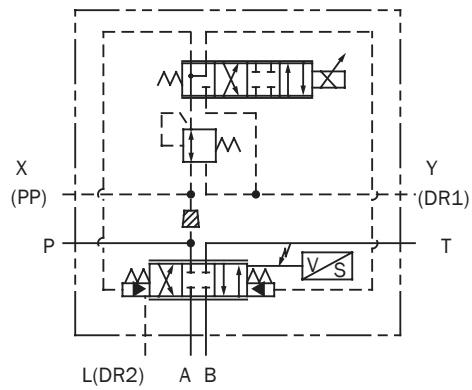
ESH-G04





ESH-G06





Note:
A stopper plug is needed for the area if the pilot is external.

Gasket Surface Dimensions

For G03, see ESD-G03 gasket surface dimensions, and for G04 and G06, see DSS-G04, 06-**-20 gasket surface dimensions. Y (DR1) and L (DR2) are required. Gasket surface dimensions conform to the following.
G03: ISO 4401-03-02-0-94 (D05)
G04: ISO 4401-07-06-0-94 (D07)
G06: ISO 4401-08-07-0-94 (D08)

High-Speed Response Proportional Control Valve Amplifier EHA Series

Features

Coil current feedback and spool position feedback amplification for stable, high-speed spool positioning.
Built in check connector ICS simplifies maintenance.

A single printed circuit board allows separation of connectors and the terminal box.
Built-in differential transformer disconnect detection circuit drops ***coil current*** to 0mA when disconnection occurs.
Servo ready and servo ON interfaces.
Power supply and ***current*** control switching system for improved efficiency.

Specifications

Power Supply Voltage	24V DC (22V DC to 28V DC) Lip Noise: 150mVp-p max.
Power Supply Capacity	At leas 2.1A (COSEL R50A-24 equivalent switching regulator)
Ambient Temperature	32 to 122° F
Ambient Temperature	35 to 85% RH (non-condensation)
Input Signal Voltage	0 to ±5V DC or 0 to ±10V DC
Input Impedance	50kΩ
Power Consumption	2.1A maximum consumption current at 24V
Weight lbs	2
External Supply Voltage	+5V : (10mA maximum supply possible) −5V : (10mA maximum supply possible)
Drive Coil	2.5Ω; max. 2.7A or 5 Ω; max. 2.4A
Spool Displacement Measurement	Differential transformer (LVDT)
Servo ON	Application of 24V DC during valve operation
Ready	During normal valve operation: ON
Spool displacement monitor	0 to ±5V

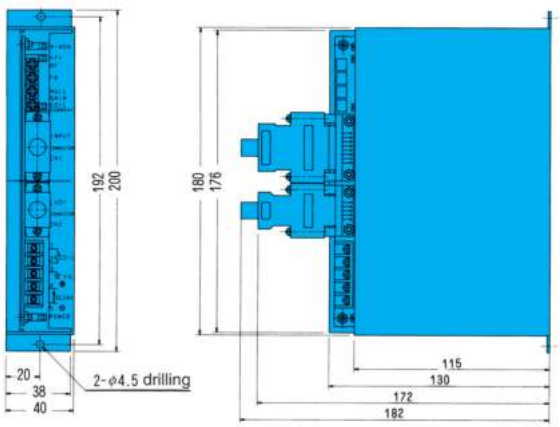
Understanding Model Numbers

EH A – P D 2 – 10 01 – D2 – 10

- 10 — Design number
- D2 — Amp power supply voltage symbol: D2 : DC24V
- 01 — Driver valve size: 01: Nominal diameter 01, 03: Nominal diameter 03, 04: Nominal diameter 04, 06: Nominal diameter 06
- 10 — Input voltage: 05: 0 to ±5V; 10: 0 to ±10V
- 2 — Number of input terminals: 2: 2 inputs
- D — Input type: D: DC voltage
- P — Mounting method: P: Panel type
- A — Ambient humidity: A: Amp
- EH — High-response proportional valve digital device

Note: Select an amp that matches the valve size.

Installation Dimension Drawings



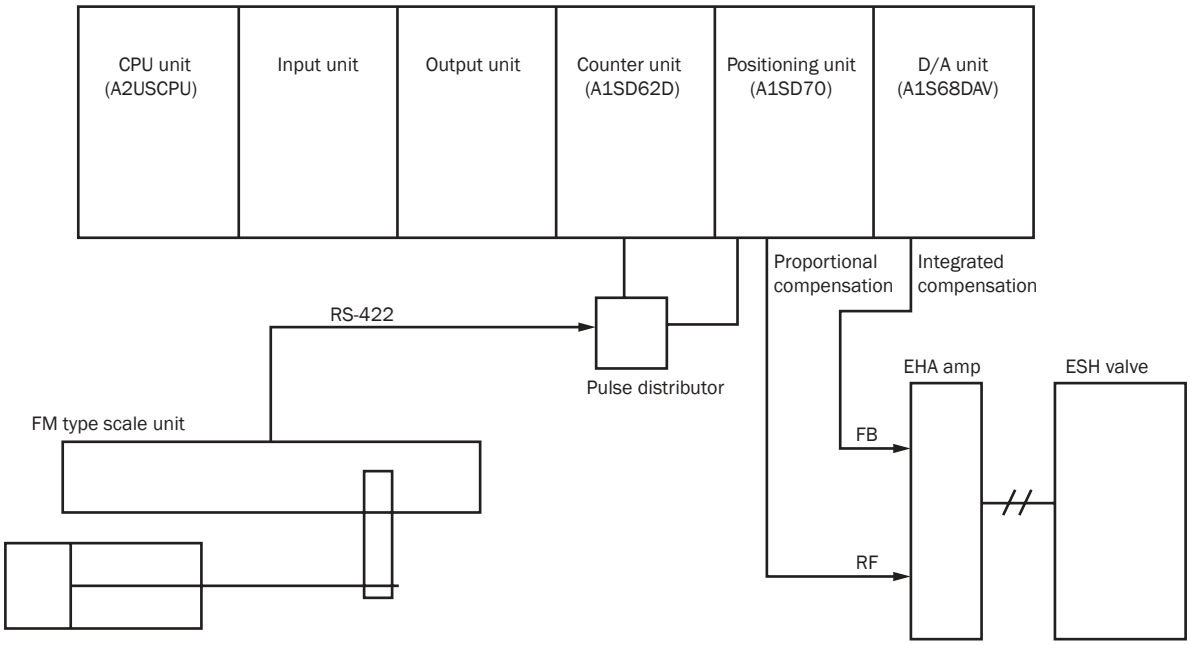
Block Diagram

Floating 24V DC output (isolated input and output) power supply
Load required is 24V, 2.1 A

Note:
Since G03, G04, and G05 are pilot operation types, there is an LVDT on the main spool, but connection is identical.

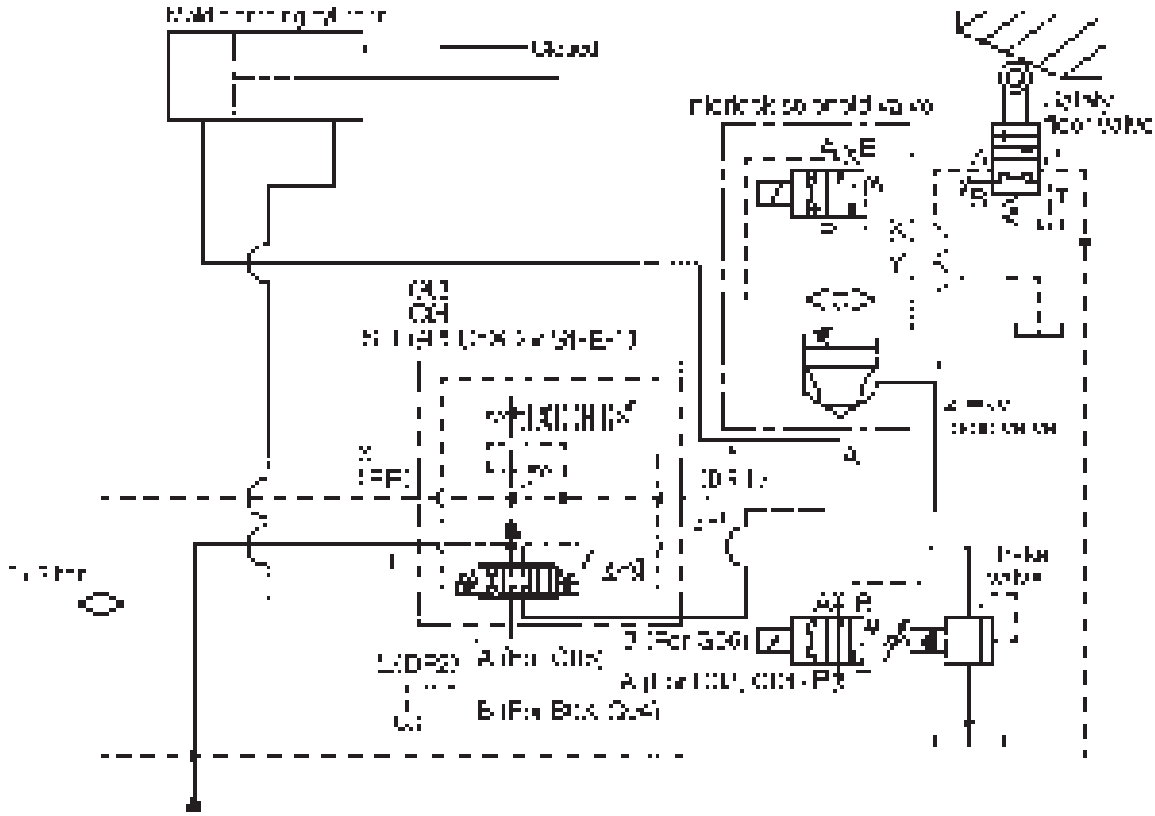
(1) Example Application in ESH-G01 Positioning Circuit

This is an ESH-G01 positioning circuit using a sequencer. Proportional control is performed by the positioning unit, while integral compensation is performed by the counter unit and D/A unit. The result is high-precision positioning.



(2) Example Application in ESH-G03, G04, G06 Molding Machine Mold Clamping Circuit

This hydraulic circuit is a basic application example. The actual application hydraulic circuit would require modification to match the machinery and to provide the necessary functions. Cut off flow to the cylinder with the safety door valve and interlock solenoid valve, in accordance with the logic valve.



Electro-Hydraulic Servo Valve Driver Amplifier

Features

Compact design.
Capable of driving virtually all NACHI-MOOG servo valve series.
Power supply support for 24V DC in addition to 100V AC and 200V AC.

Specifications

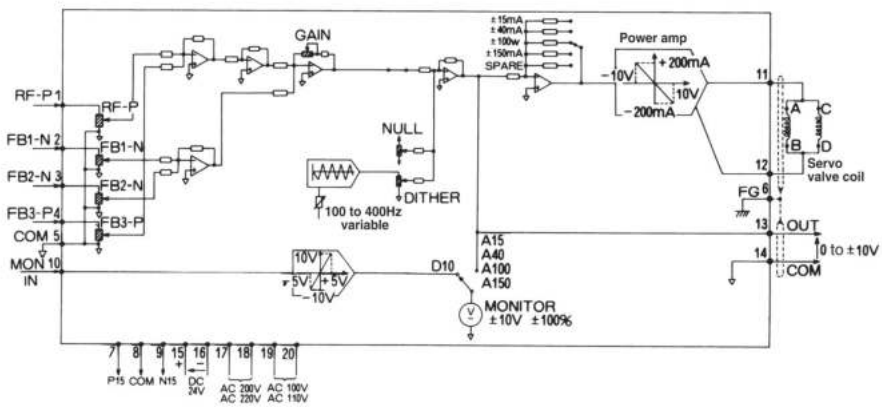
Item	Description
Number of Inputs	4 (RF-P,FB1-N,FB2-N,FB3-P)
Input Voltage Range	±10VDC (Command Signal/ Feedback Signal)
Input Impedance	50kΩ
Gain Adjust (GAIN)	1 to 20 X/5 to 100 X switchable
Zero Adjust (NULL)	0 to ±20%
Frequency Characteristics	–3dB attenuation at 700Hz
Dither (DITHER)	100 to 400Hz variable (Factory default; 200Hz)
Power Supply Voltage	AC100, 110, 200, 220V (±10%) 50/60Hz
Power Consumption	20VA
External power supply	+15V (200mA) –15V (200mA)
Allowable Ambient Temperature	32 to 122° F
Temperature Drift	50μV/℃ max.
Weight lbs	6.6
Servo Valve Coil Drive Current	± 15mA(100Ω) ± 40mA(40Ω) ±100mA(14Ω) ±150mA(14Ω) It is possible to switch the output voltage ±10V for the four types noted above. Resistance values in parentheses indicate resistance in the case of parallel wiring of the servo valve coil.

Understanding Model Numbers

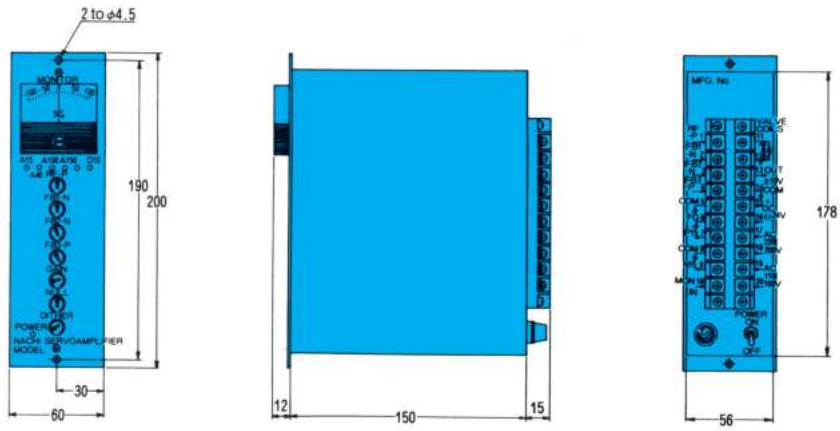
EA – P D4 – A100 – ** – 10

- 10: Design number
- **: Power supply voltage: No signal: 100, 110, 220, 220V AC ±10%; D2 : DC24V
- A100: Output A100 : ±100mA; A150 : ±150mA; A15 : ±15mA; A40 : ±40mA; D10 : ±10V
- D4: Number of inputs D4: DC 4 inputs
- P: Mounting method: Panel type
- EA: Power amplifier for NACHI-MOOG servo valve drive

Note: 24V DC only can be used in the case of power supply voltage signal D2. 100V, 200V AC cannot be used.



No.	Name	No.	Name
1	RF-P input	11	Control current
2	FB1-N- feedback input	12	Output terminal
3	FB2-N- feedback input	13	Control voltage
4	FB3-P- feedback input	14	Output terminal
5	COM signal land	15	+ – DC24V
6	FG case ground	16	
7	P15 external power supply	17	AC200, 220V
8	COM signal land	18	
9	N15 external power supply	19	AC100, 110V
10	MON/IN monitor in	20	

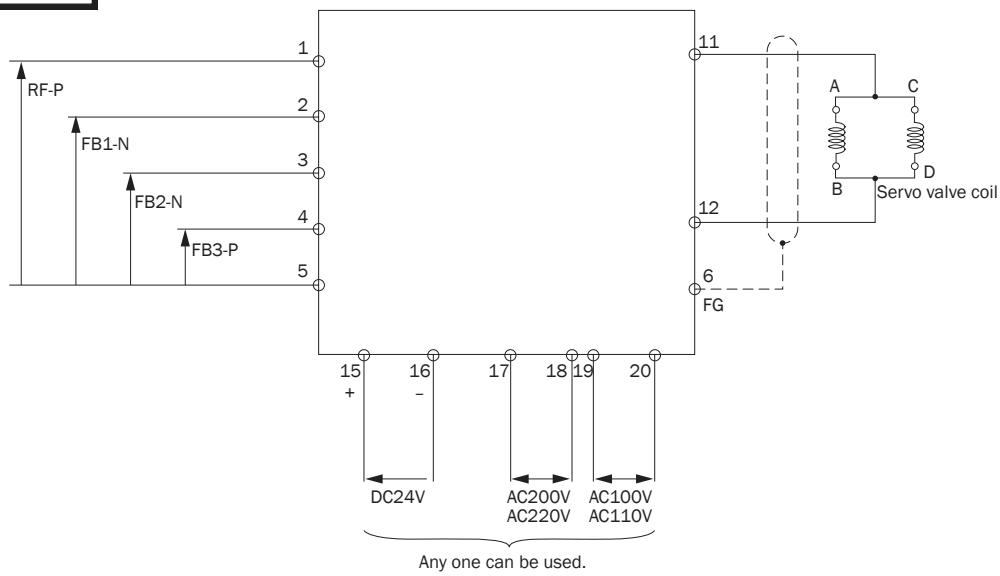


Installation Dimension Drawings

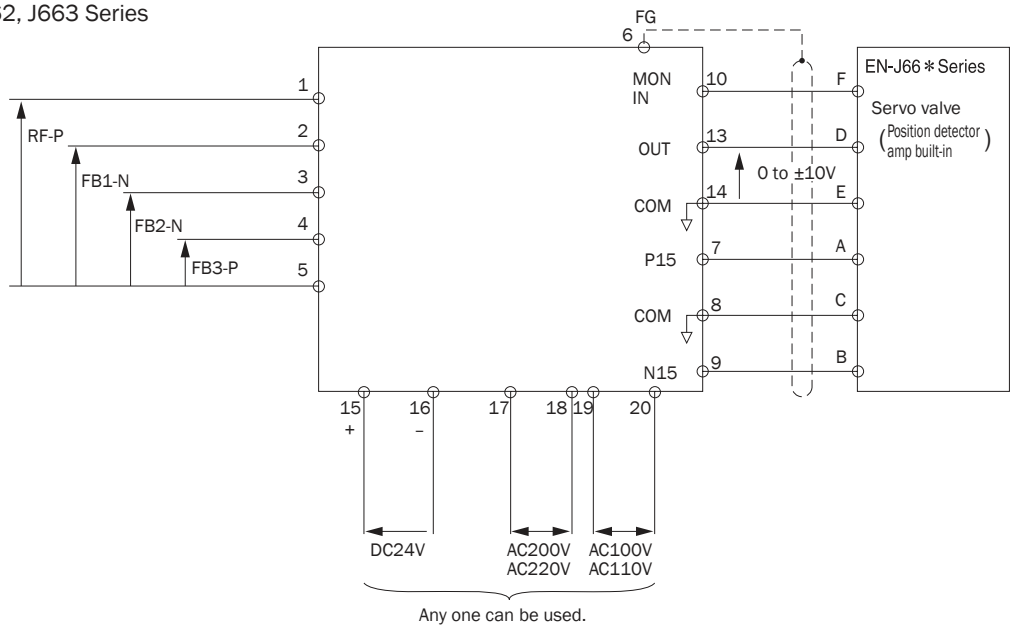
Servo Model Number	Rated Output	Applicable Servo Amplifier Model Number
EN-J631 Series	±100mA (parallel wiring)	EA-PD4-A100
EN-31 Series Center Flow 19.8 gpm Rated Models	±150mA (parallel wiring)	EA-PD4-A150
EN-J072-401, EN-J072-402, EN-J073-401, EN-J073-402, EN-J073-403, EN-J073-404, EN-J073-405, EN-J076-401, EN-J076-402, EN-J076-403, EN-J076-404, EN-J076-405	±15mA (parallel wiring)	EA-PD4-A15
EN-J072-403, EN-J770, EN-J073-406, EN-J076-406	±40mA (parallel wiring)	EA-PD4-A40
EN-J661 EN-J662 (Main Valve Position Detector or AmP Built In) EN-J663	±10V	EA-PD4-D10

Wiring Diagram

EN-J631, J072, J073,
J076, J770 Series

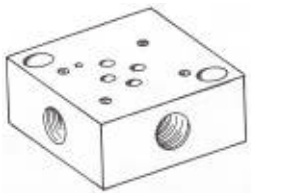


EN-J661, J662, J663 Series



G

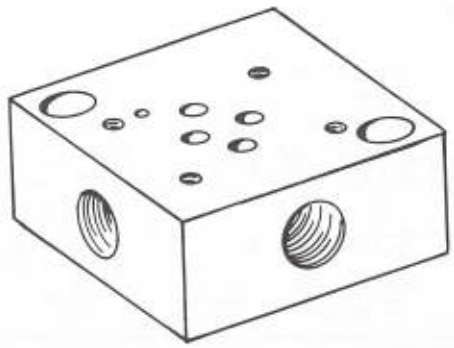
Proportional Valves



MSA-01/03-S10 & MDS-06-S10 Series Aluminum Subplates

Features

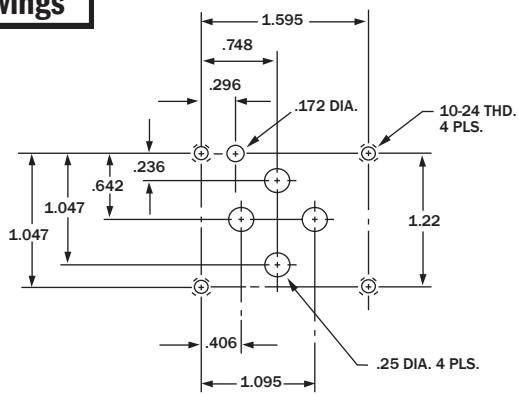
Aluminum construction with “SAE” Ports. Workports are located on sides for easy piping.

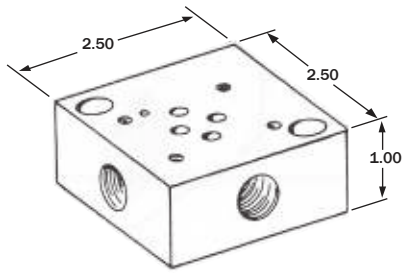


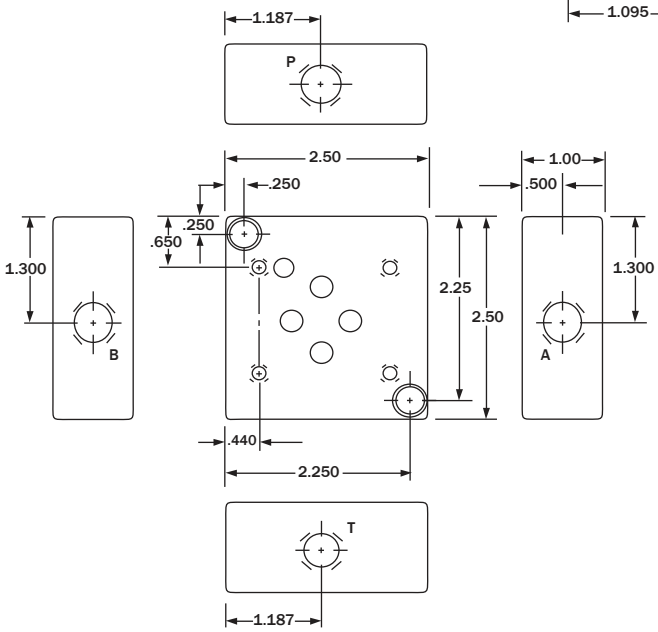
Specifications

Model	NFPA Mfg. Standard	Material	Max Pressure Rating
MSA-01Y-T-S10 Side Ported 9/16-18 SAE	D03 P B A T	Aluminum 6061-T6	3000 psi

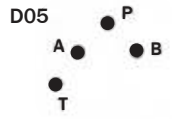
Installation Dimension Drawings



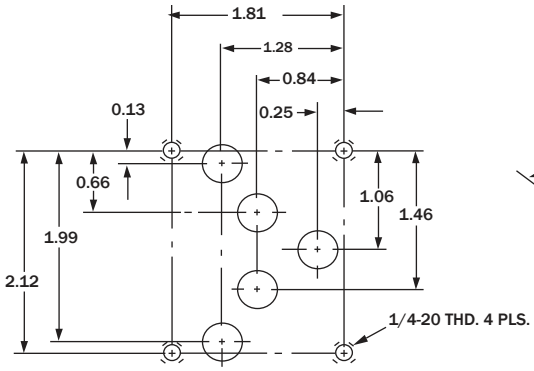


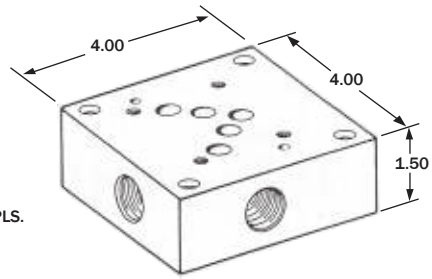


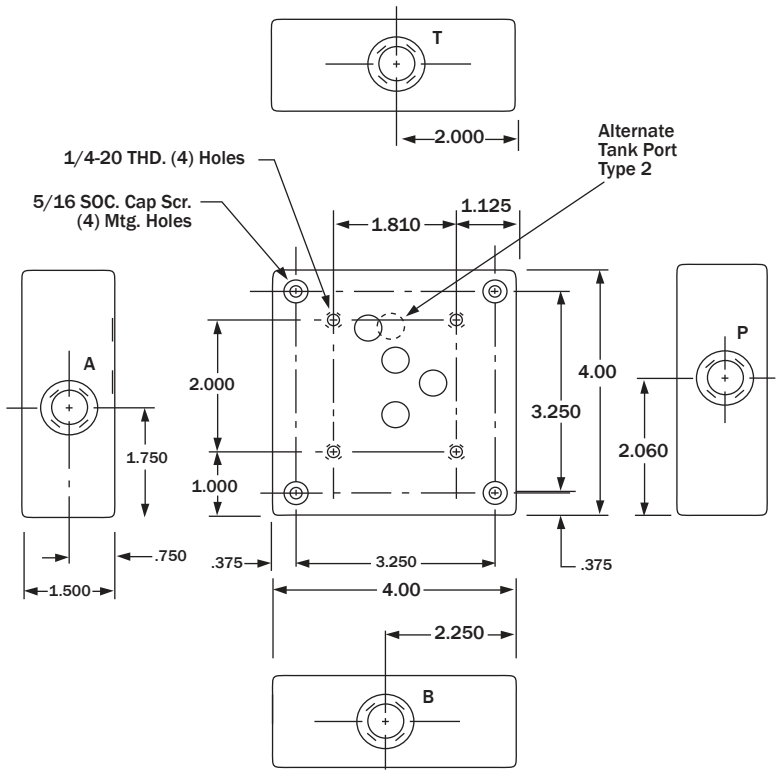
Specifications

Model	NFPA Mfg. Standard	Material	Max Pressure Rating
MSA-03X-T-S10 Side Ported 3/4-16 SAE	D05 	Aluminum 6061-T6	3000 psi

Installation Dimension Drawings



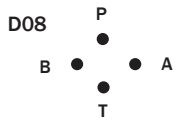




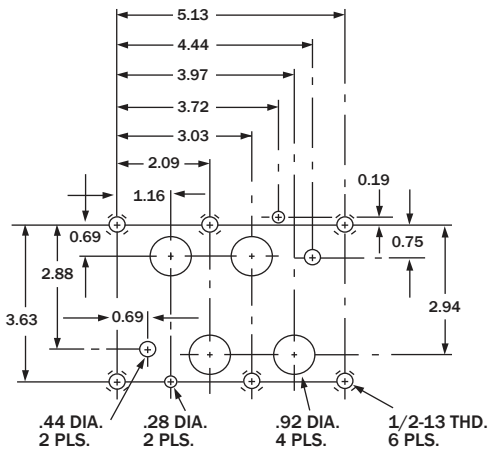
H

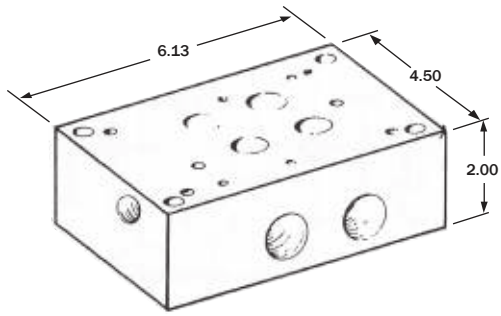
Subplates

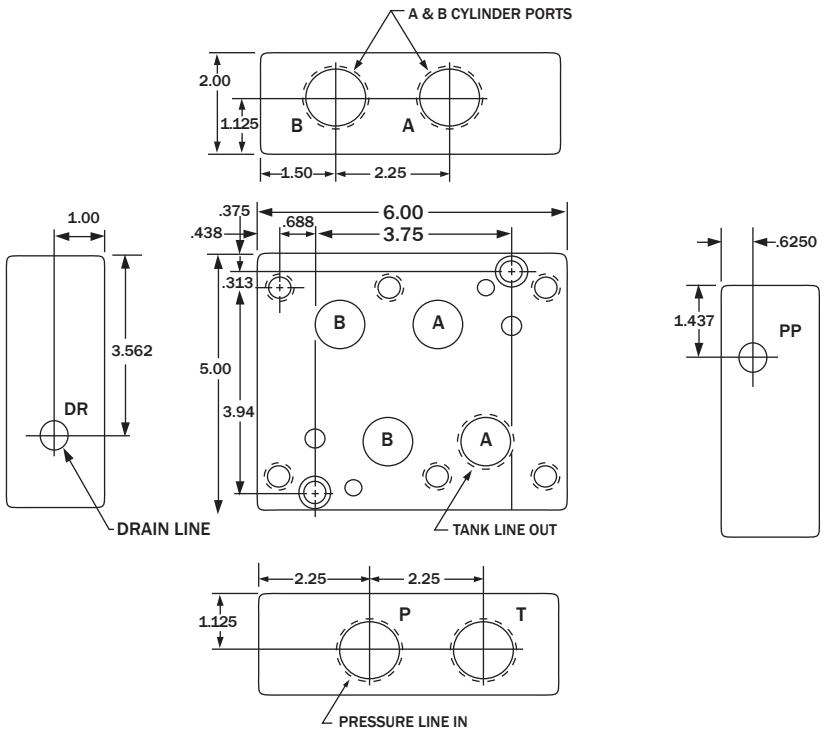
Specifications

Model	NFPA Mfg. Standard	Material	Max Pressure Rating
MSA-06Y-T-S10 Side Ported 1 5/16-12 SAE	D08 	Aluminum 6061-T6	3000 psi

Installation Dimension Drawings







Solenoid Valve/Modular Valve Subplate

Features

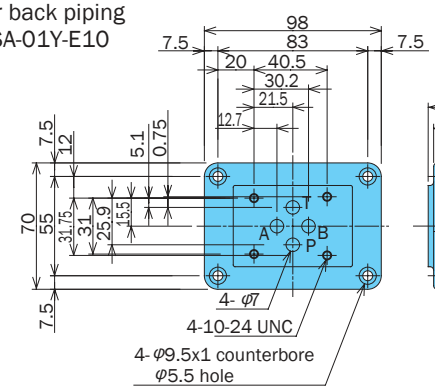
This plate is for when only a single solenoid valve and modular is used.

The 01 and 03 sizes include one-side piping types. E includes NPT piping.

Installation Dimension Drawings

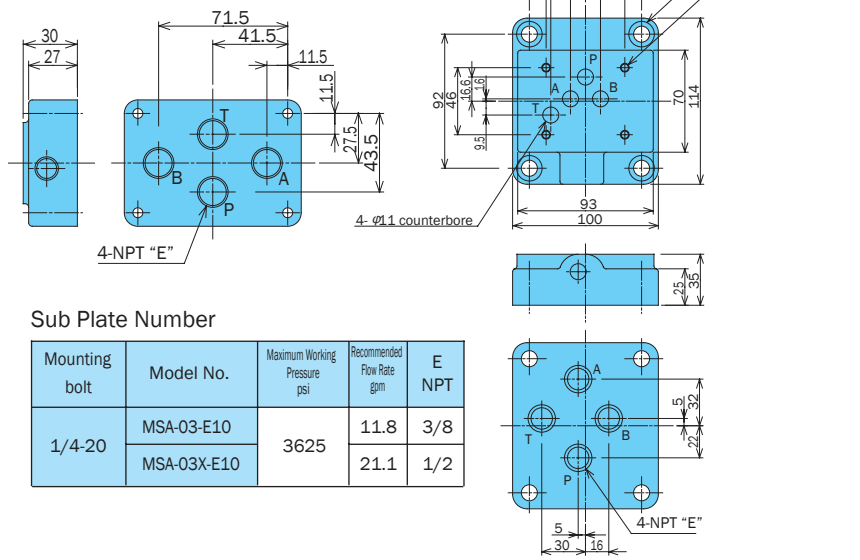
Use the following table for specification when a sub plate is required.

01 (nominal diameter)
For back piping
MSA-01Y-E10



Model No.	Pipe Outlet Size E	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs
MSA-01X-E10	1/4	3625	5.2	2.6
MSA-01Y-E10	3/8		10.5	2.6

03 (nominal diameter)
For back piping: MSA-03(X)-E10;

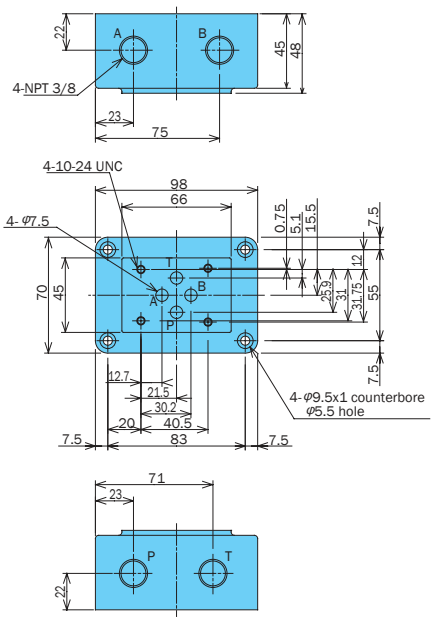


Sub Plate Number

Mounting bolt	Model No.	Maximum Working Pressure psi	Recommended Flow Rate gpm	E NPT
1/4-20	MSA-03-E10	3625	11.8	3/8
	MSA-03X-E10		21.1	1/2

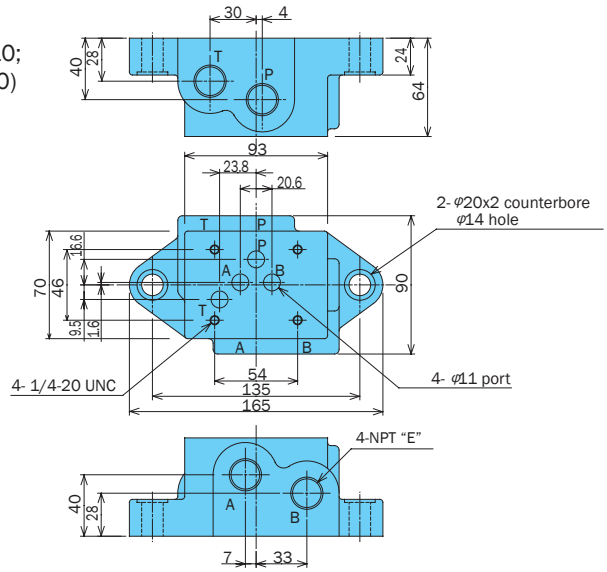
Note: Dimensions in parentheses indicate MS-03 (X) -30.

For side piping MSA-01Y-T-E10



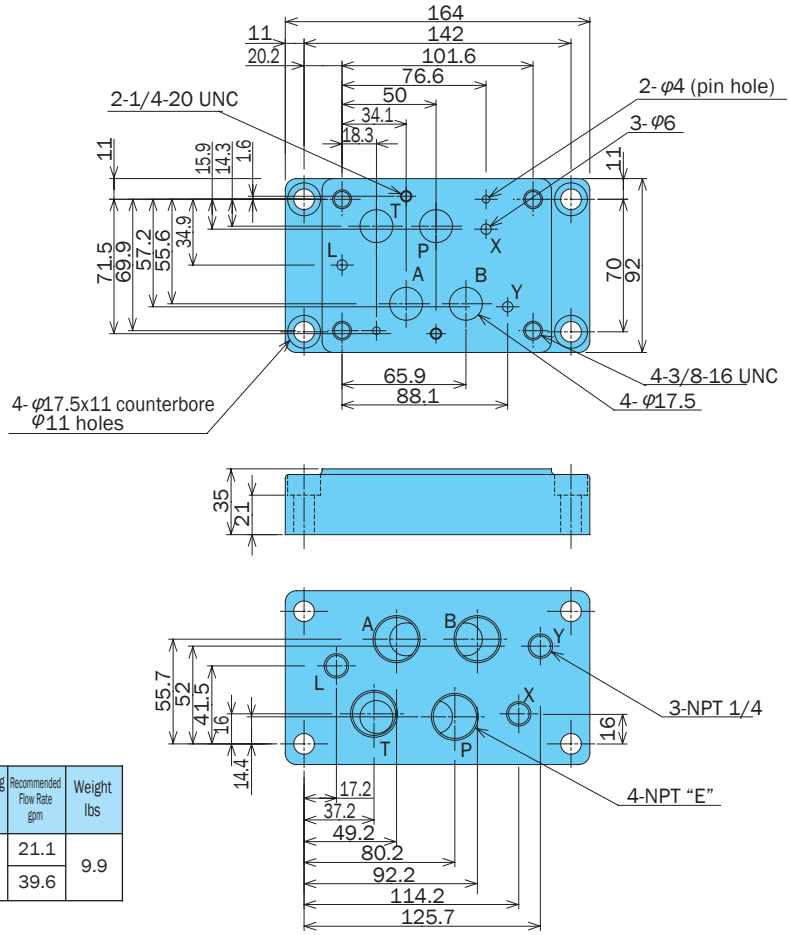
Model No.	Pipe Outlet Size E	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs
MSA-01Y-T-E10	3/8	3625	10.5	4.1

For side piping
MSA-03(X)-T-E10;
(MS-03(X)-T-E10)



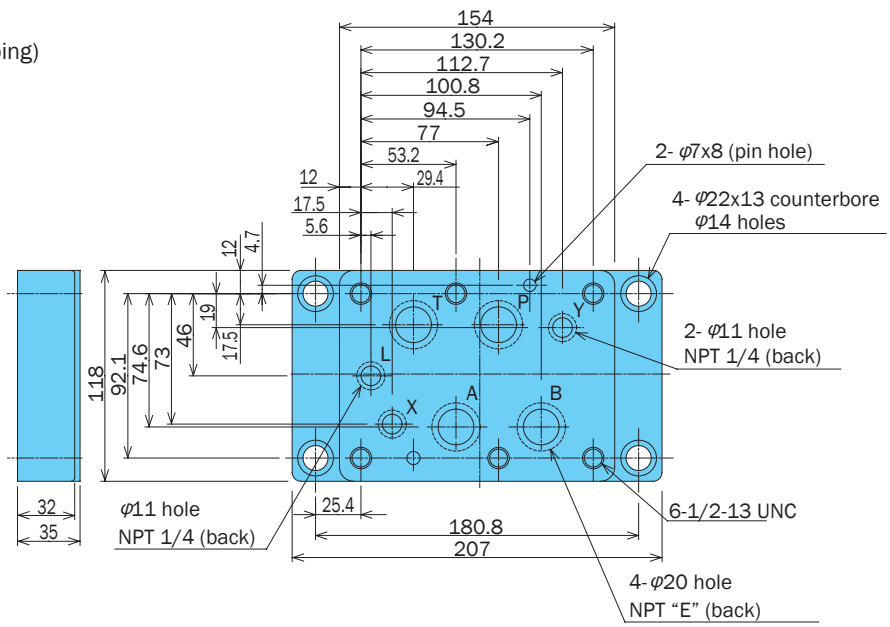
Mounting bolt	Model No.	Maximum Working Pressure psi	Recommended Flow Rate gpm	Pipe Outlet Size E	Weight lbs
1/4-20	MSA-03-T-E10	3625	11.1	3/8	8.3
	MSA-03X-T-E10		21.1	1/2	

04 (nominal diameter)
MDS-04(X)-E10



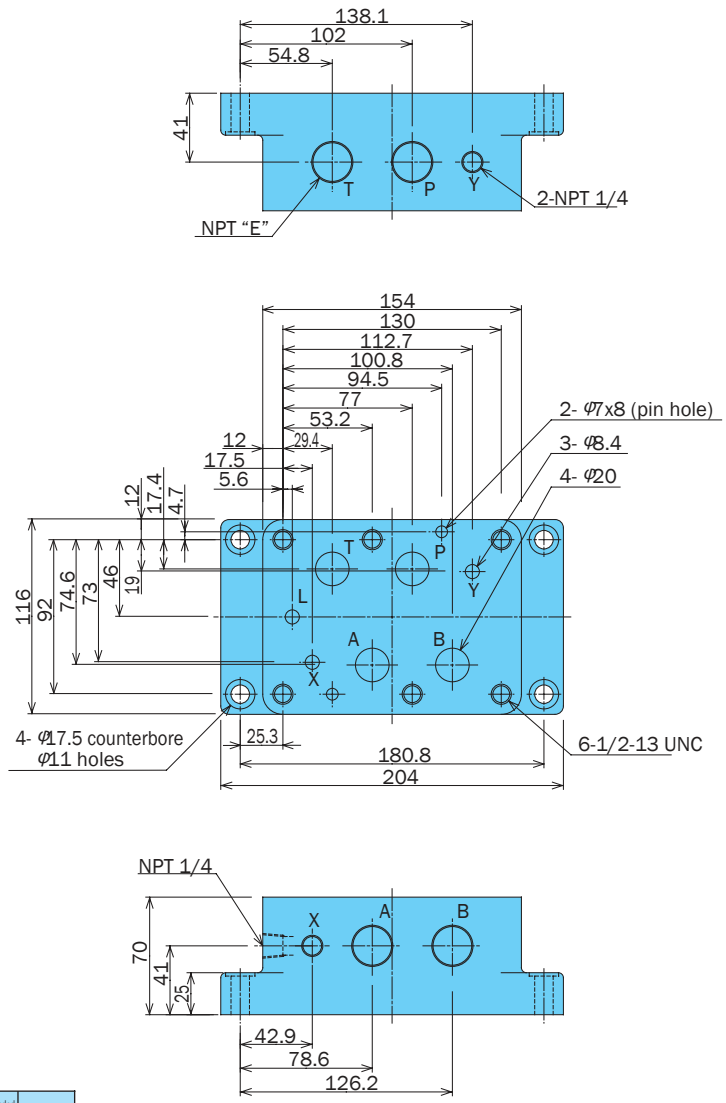
Model No.	Pipe Outlet Size E	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs
MDS-04-E10	1/2	3625	21.1	9.9
MDS-04X-E10	3/4		39.6	

06 (nominal diameter)
MDS-06(X)-E30(for back piping)



Model No.	Pipe Outlet Size E	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs
MDS-06-E30	3/4	3625	39.6	11.4
MDS-06X-E30	1		79.2	

MDS-06(X)-T-10(for side piping)



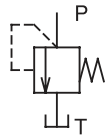
Model No.	Pipe Outlet Size E	Maximum Working Pressure psi	Recommended Flow Rate gpm	Weight lbs
MDS-06-T-E10	3/4	3625	39.6	19.8
MDS-06X-T-E10	1		79.2	

NACHI

Balanced Piston Type Relief Valve

Relief Valve

5.2 to 100 gpm
3045 psi



Features

Balanced piston relief valve.
Optimum pressure control for hydraulic circuit allows operation as a safety valve.

A vent port enables remote control of pressure and use of an unloading circuit.

Specifications

Model No.		Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure adjustment range psi	Weight lbs	
Screw Mounting	Gasket Mounting					T Type	G Type
R-T03- A-12 B-12	R-G03- A-E12 B-E12	3/8	3045 P, X (Vent Ports)	5.2	0 to 145 0 to 362	6.6	9.5
R-T03- 1-12 3-12	R-G03- 1-E20 3-E20	3/8		21	0 to 1000 500 to 3000	6.6	9.5
R-T06- 1-E20 3-E20	R-G06- 1-E20 3-E20	3/4		45	0 to 1000 500 to 3000	8.5	11.6
R-T10- 1-E20 3-E20	R-G10- 1-E20 3-E20	1¼		100	0 to 1000 500 to 3000	17	17

Note: See the Flow Rate - Low Pressure characteristics for information about items marked with an asterisk (*).

Handling

1 To adjust pressure, loosen the lock nut and then rotate the handle clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
2 Make sure that tank port back pressure is no greater than 29 psi. For tank piping of the A and B type pressure adjusting ranges, return directly to the tank without connecting any other piping and eliminate back pressure.
3 The pressure adjustment range for the high vent type is 188 psi. Note that R-T/G03 is not a high vent type.
4 When using a relief valve as a safety valve, use a pressure override that is higher than the required circuit pressure.
5 When using a remote control valve, connect piping to the relief valve port. Pipe capacity can be a source of vibration. Use of thick iron pipe with an inside diameter of no more than .15 in. and a connection length of no more than three meters is recommended.
6 Pressure becomes unstable when at slow control flow rates. Use a flow rate of no less than 2.1 gpm for the 03, 06 sizes, and 2.6 gpm for the 10 size. Use a drain type relief valve in the case of a flow rate that is less than the minimum flow rate.
7 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Weight lbs	Applicable Valve Model
MR-03-E10	3/8	3.5	R-G03-*-12
MR-06-E20	3/4	7.7	R-G06-*-E20
MR-06X-E20	1		
MR-10-E20	1¼	18.7	R-G10-*-E20
MR-10X-E20	1½		

8 The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
R-G03-*-12	3/8-16 x 3"	4	33 to 40
R-G06-*-E20	5/8-11 x 3 1/8"	4	140 to 173
R-G10-*-E20	7/8-9 x 4 1/8"	4	272 to 339

Note: For mounting bolts, use grade 8 or equivalent.

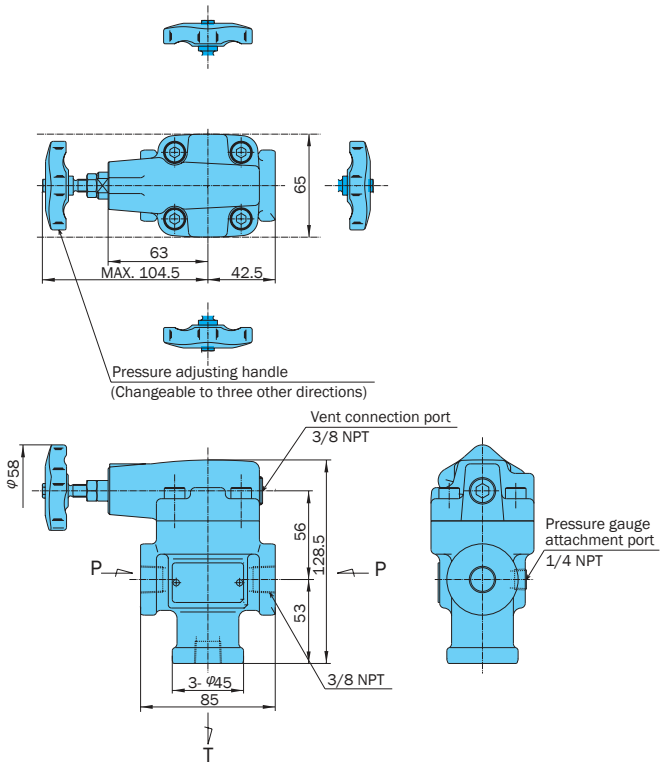
Understanding Model Numbers

R – T 06 – 1 – (H) * 20

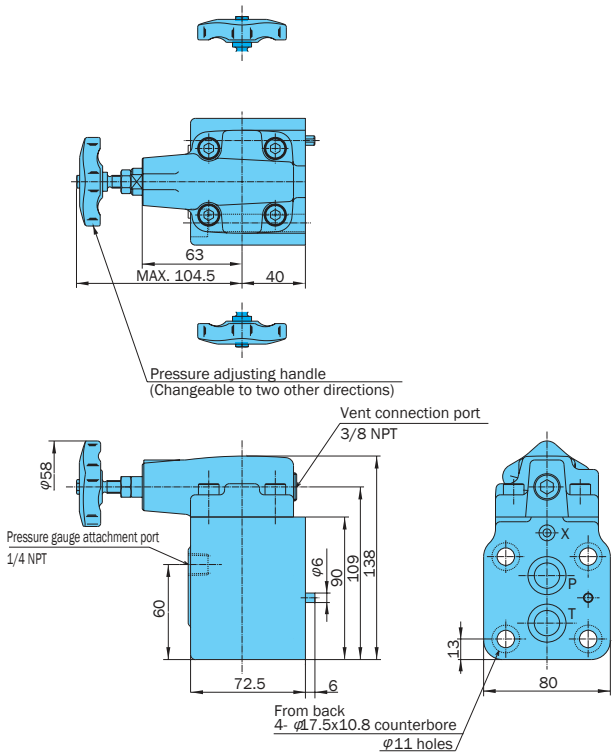
- 20: Design number
- E: Unified thread
- (H): Auxiliary symbol H: High vent (excluding 03 size)
- 1: Pressure adjustment range 1, 3, A, B
- 06: Nominal diameter (size)
- T: Mounting method T: Screw connection G: Gasket type
- R: Relief valve

Installation Dimension Drawings

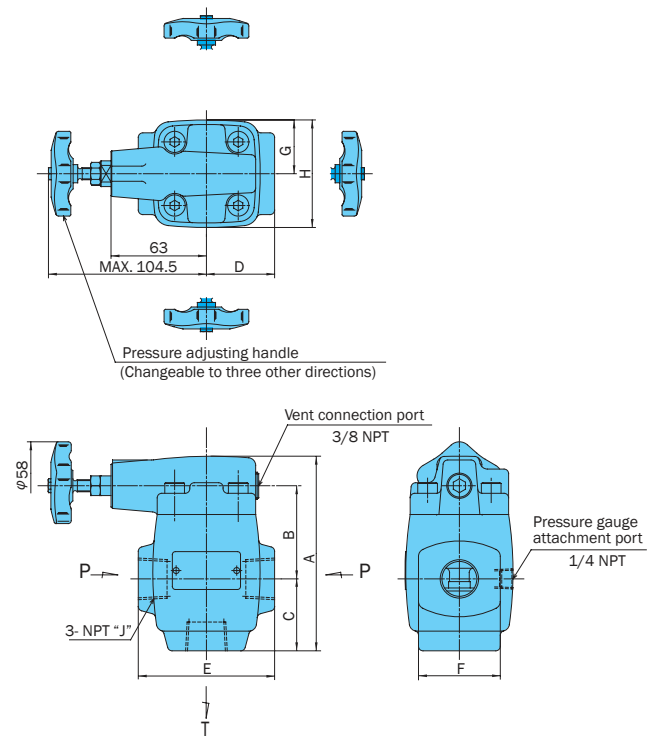
R-T03-*- E12 (Screw Mounting)



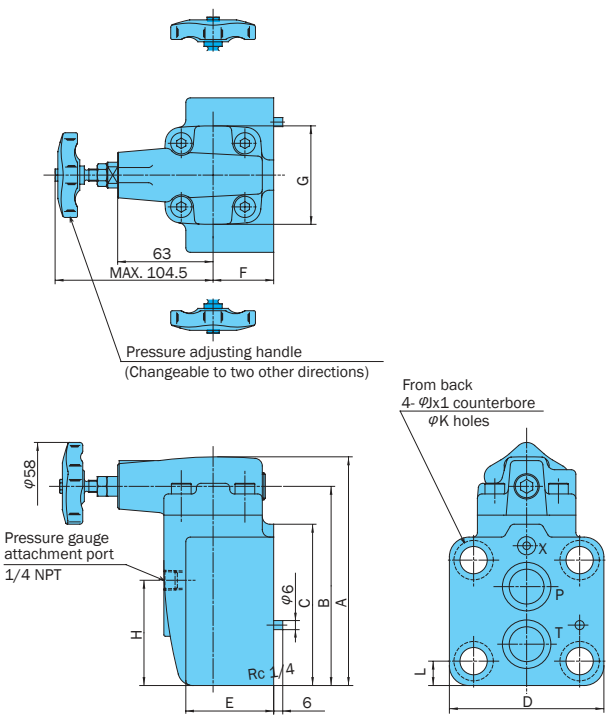
R-G03-*-12 (Gasket Mounting)



R-T**-*- E20 (Screw Mounting)



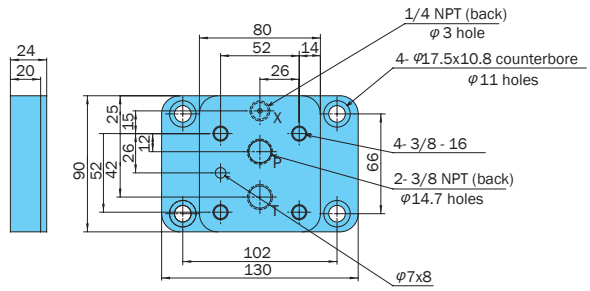
R-G**-*-20 (Gasket Mounting)



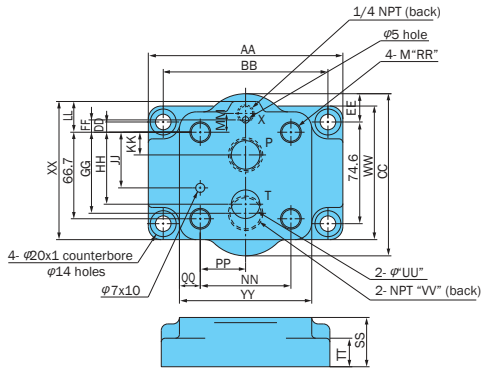
Model No.	A	B	C	D	E	F	G	H	J
R-T06-*-20	128.5	61.5	47.5	45	90	54	35.5	71	3/4
R-T10-*-20	153.5	72	62	62.5	125	69	47	94	1 1/4

Model No.	A	B	C	D	E	F	G	H	J	K	L
R-G06-*-20	151	131.5	106.5	102	58	40	65	69.5	26	18	16.1
R-G10-*-20	162.5	143	110	127	80	50	86	70.5	32	22	17.7

Sub Plate MR-03- E10



MR-**- E20



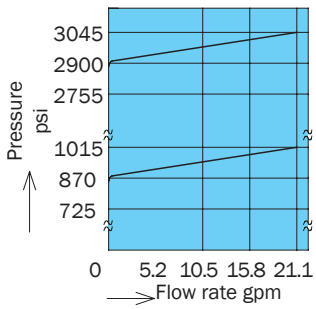
Model No.	Dimensions (mm)																					
	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU	VV	WW	XX	YY
MR-06-E20	150	127	125	7.9	21.8	9.5	62.5	55.5	42.9	17.5	23.7	14.5	69.9	34.9	16.1	5/8-11	38	22	22	3/4	98.5	106.5	102
MR-06X-E20																				1			
MR-10-E20	175	152.4	150	6.4	39.2	15.9	71.3	58.7	50.8	14.3	25.6	25.9	92.1	46.1	17.5	7/8-9	55	22	28.5	$1\frac{1}{4}$	102.5	110	127
MR-10X-E20																				$1\frac{1}{2}$			

Performance Curves

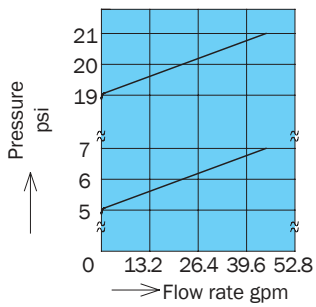
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure - Flow Rate Characteristics

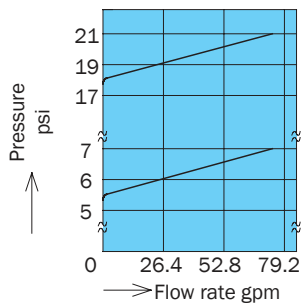
R-*03-*-E12



R-*06-*-E20

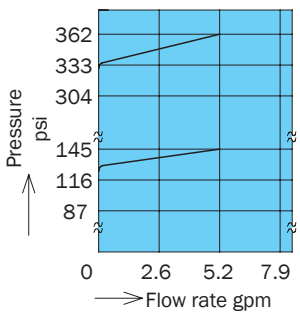


R-*10-*-E20

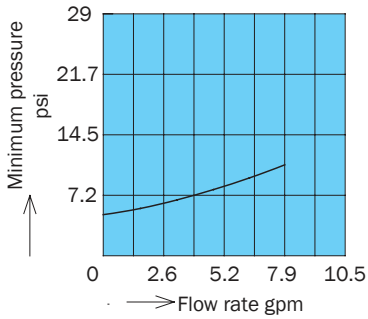


Flow Rate - Minimum Pressure Characteristics

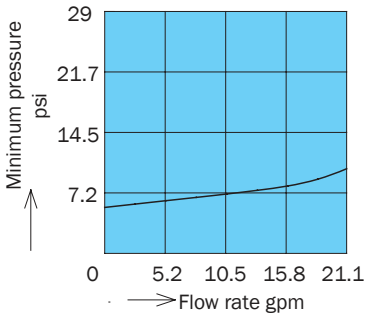
R-*03-$\frac{A}{B}$-E12



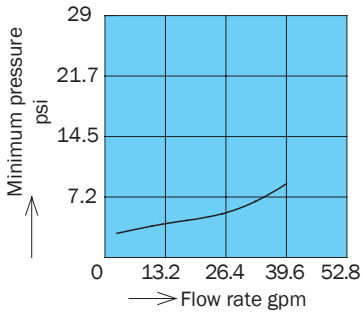
R-*03-$\frac{A}{B}$-E12



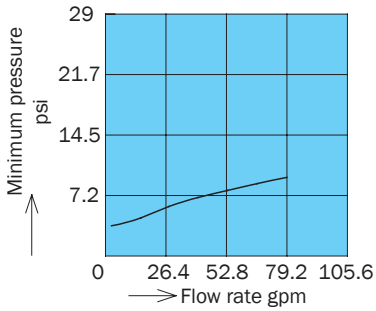
R-*03-1-E12



R-*06-1-E20



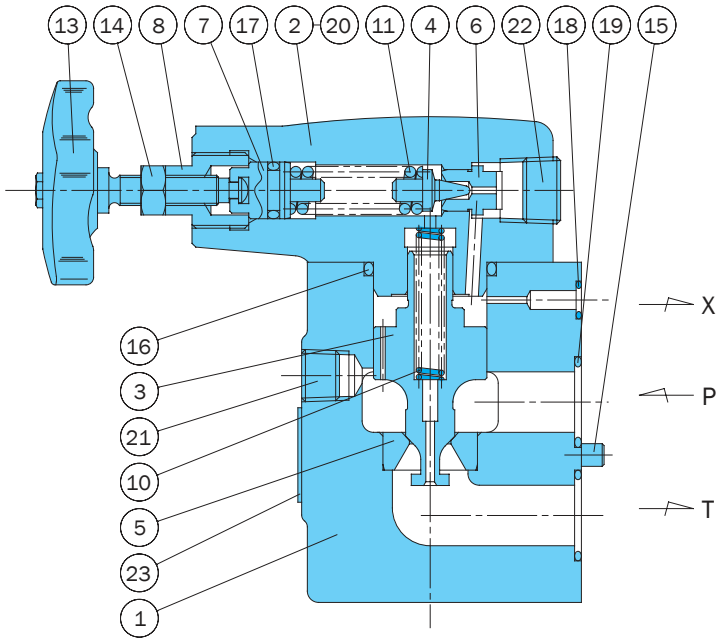
R-*10-1-E20



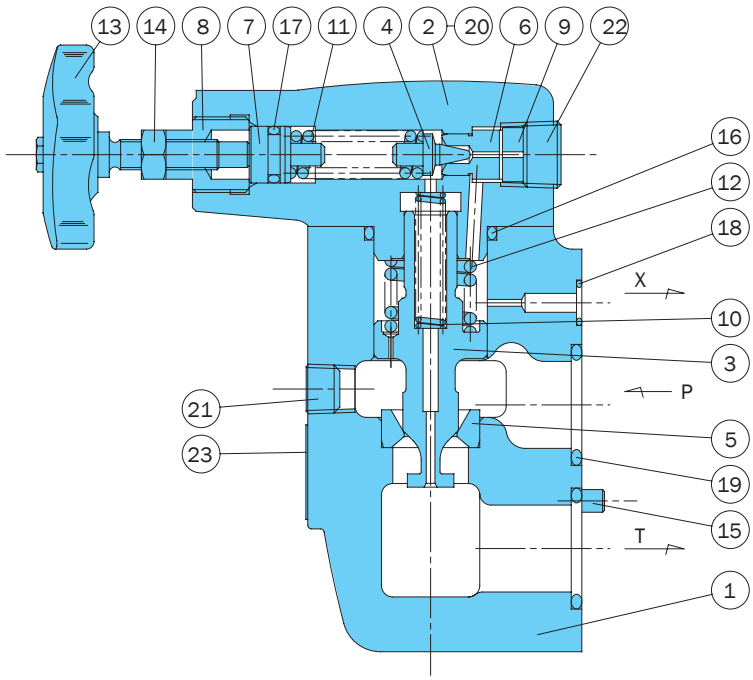
Note: The performance curves do not include T port back pressure.

Installation Dimension Drawings

R-G03-$\frac{A}{B}$-12



R-G03-$\frac{1}{3}$-12 R-G$\frac{06}{10}$-$\frac{1}{3}$-20



Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Poppet
5	Seat
6	Seat
7	Plunger
8	Retainer
9	Collar
10	Spring
11	Spring
12	Spring
13	Handle
14	Nut
15	Spring pin
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	Screw
21	Plug
22	Plug
23	Nameplate

Note:
The No. 12 spring is not included when auxiliary symbol H is selected (except with the 03 size).

Seal Part List (Kit Model Number RRS-*** (03 size)
RRBS-*** (06, 10 size))

Part No.	Part Name	Type/Part Number						Q'ty
		R-G03-*-12	R-T03-*-12	R-G06-*-20	R-T06-*-20	R-G10-*-20	R-T10-*-20	
16	O-ring	IB-G30	IB-G30	IB-G30	IB-G30	IB-G40	IB-G40	1
17	O-ring	IA-P11	IA-P11	IA-P11	IA-P11	IA-P11	IA-P11	1
18	O-ring	IB-P7	–	IB-P9	–	IB-P9	–	1
19	O-ring	IB-P20	–	IB-P26	–	IB-G35	–	2

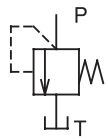
Note: O-ring 1A/B-** refers to JIS B2401-1A/B.
*** in the kit number is used for specification of the valve size (G03, T06, etc.)

NACHI

Balanced Piston Type Relief Valve
(with ISO Type)

RI Series Relief Valve (ISO Mounting, Balanced Piston Type)

10.5 to 84.5 gpm
5075 psi



Features

Balanced piston relief valve.
Optimum pressure control for hydraulic circuit allows operation as a safety valve.

A vent port enables remote control of pressure and use of an unloading circuit.

Specifications

Model No. Gasket Mounting	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure adjustment range psi	Weight lbs	Gasket Surface Dimensions
RI-G03-C-20	3/8	5075 P, X Ports	10.5	21 to 507	9.9	ISO 6264-AR-06-2-A
RI-G03-1-20 3 5	3/8		39.6	116 to 1000 507 to 3625 507 to 5075	9.9	
RI-G06-1-20 3 5	3/4		84.5	116 to 1000 507 to 3625 507 to 5075	12.3	ISO 6264-AS-08-2-A

Handling

1 To adjust pressure, loosen the lock nut and then rotate the handle clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
2 Make sure that tank port back pressure is no greater than 29 psi.
3 For use as a safety valve, use a pressure override that is higher than the required circuit pressure.
4 When using a remote control valve, connect piping to the relief valve port. Pipe capacity can cause vibration. Use of thick iron pipe with an inside diameter of no more than .15" and a connection length of no more than three meters is recommended.
5 The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
RI-G03-*-20	3/8 - 16	4	55 to 70
RI-G06-*-20	5/8 - 11	4	140 to 173

Note: For mounting bolts, use grade 8 or equivalent.

6 A small control flow rate can cause pressure instability. Use a control flow rate that is at least 2.1 gpm. Use a drain type relief valve in the case of a flow rate that is less than the minimum flow rate.
7 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Weight lbs	Applicable Valve Model
MRI-03-E10	3/8	5.7	RI-G03
MRI-03X-E10	1/2		
MRI-06-E10	3/4	7.7	RI-G06
MRI-06X-E10	1		

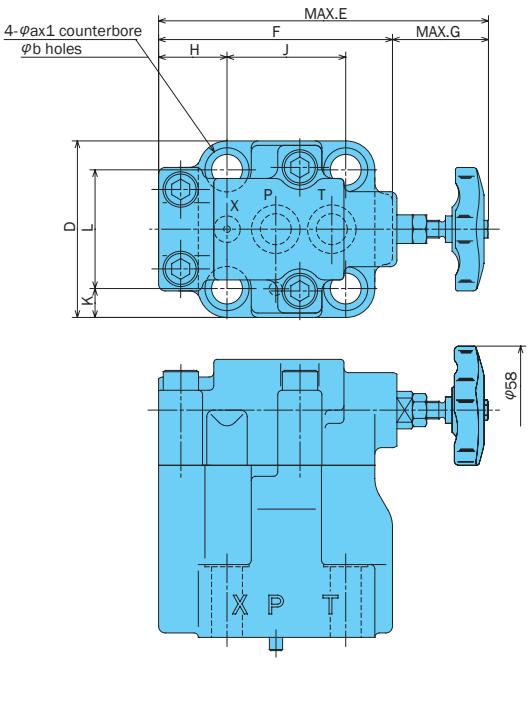
Understanding Model Numbers

RI – G 06 – 1 – 20

- 20: Design number
- 1: Pressure adjustment range C, 1, 3, 5
- 06: Nominal diameter (size)
- G: Mounting method G: Gasket type
- RI: RI series relief valve

Installation Dimension Drawings

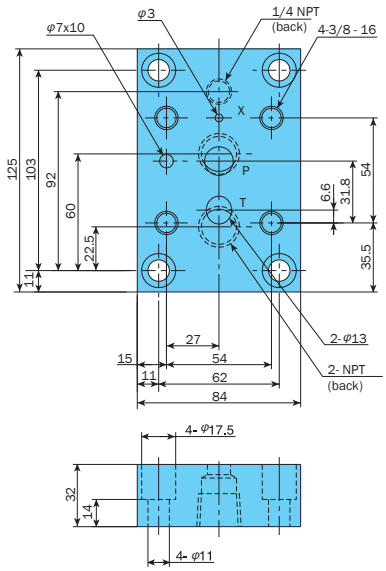
RI-G**-*-20



Model No.	A	B	C	D	E	F	G	H	J	K	L	a	b
RI-G03-*-20	132	78	32	80	149.5	106	43.5	31	53.8	13.1	53.8	20	14
RI-G06-*-20	137	83	36	100	158.5	119	39.5	37	66.7	15	70	26	17.5

Sub Plate MRI-03*-E10

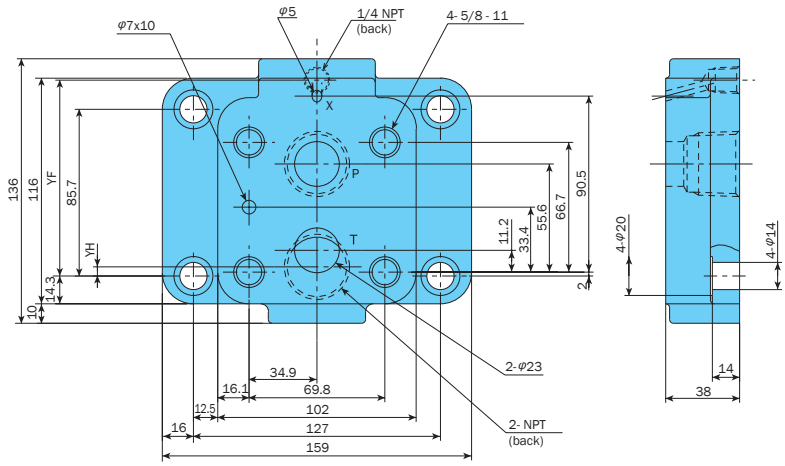
(Maximum Operating Pressure: 3625 psi)



Model No.	A
MRI-03-E10	3/8
MRI-03X-E10	1/2
MRI-06-E10	3/4
MRI-06X-E10	1

Sub Plate MRI-06*-E10

(Maximum Operating Pressure: 3625 psi)



Attach a plug when the vent (X) port is not used.

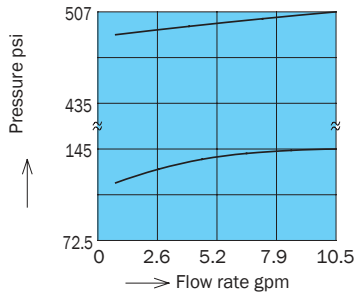
Model No.	YF	YH
MRI-06-E10	92.5	13.2
MRI-06X-E10	100.7	4.7

Performance Curves

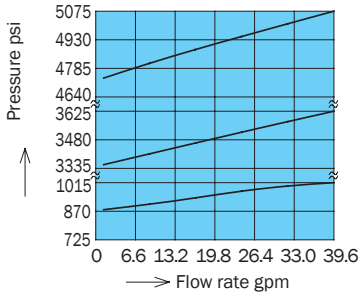
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure - Flow Rate Characteristics

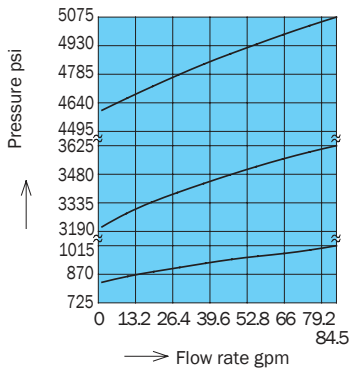
RI-G03-C-20



RI-G03-*-20



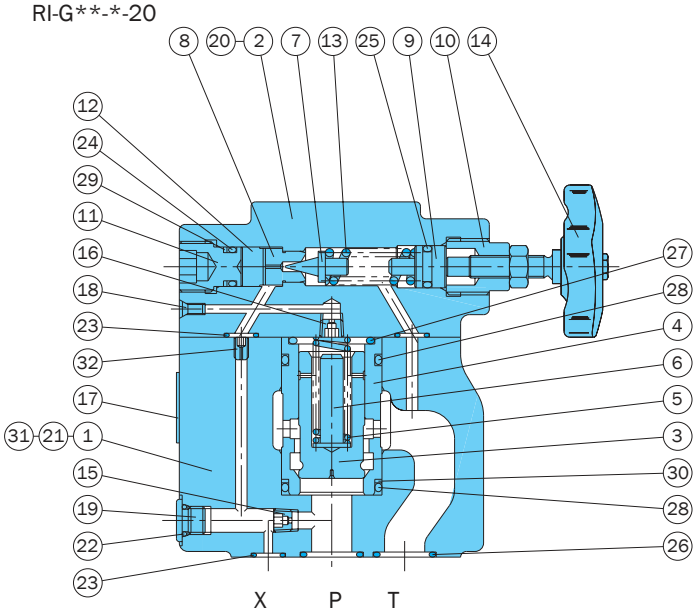
RI-G06-*-20



Note: The performance curves do not include T port back pressure.

Cross-sectional Drawing

RI-G**-*-20



Part No.	Part Name	Part No.	Part Name
1	Body	17	Plate
2	Cover	18	Plug
3	Poppet	19	Plug
4	Sleeve	20	Screw
5	Spring	21	Pin
6	Spacer	22	O-ring
7	Poppet	23	O-ring
8	Seat	24	O-ring
9	Plunger	25	O-ring
10	Retainer	26	O-ring
11	Plug	27	O-ring
12	Collar	28	O-ring
13	Spring	29	Backup ring
14	Handle assy	30	Backup ring
15	Orifice	31	Screw
16	Orifice	32	Choke

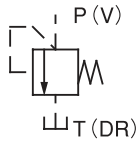
Seal Part List (Kit Model Number REBS-***)

Part No.	Part Name	Nominal Diameter/Part Number		Q'ty
		G03	G06	
22	O-ring	1B-P8	1B-P8	1
23	O-ring	1B-P9	1B-P9	3
24	O-ring	1B-P10A	1B-P10A	1
25	O-ring	1A-P11	1A-P11	1
26	O-ring	1B-P18	1B-P28	2
27	O-ring	1B-G25	1B-P28	1
28	O-ring	1B-G30	1B-P32	2
29	Backup ring	T2-P10A	T2-P10A	1
30	Backup ring	T2-G30	T2-P32	1

Note: O-ring 1A/B-** refers to JIS B 2401-1A/1B-**.
For the *** part of the kit number, specify the valve size (G03, G06).

Remote Control Relief Valve

.52 to 3.9 gpm
3045 psi



Features

Connecting a relief valve or reducing valve to the vent port of a balanced piston type pressure control valve provides simple remote control of pressure. RCD type can also be used as a direct type relief valve.

Specifications

Model No.		Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure adjustment range psi	Weight lbs
Screw Mounting	Gasket mounting					
RCD-T02-1-11 3-11	–	1/4	3045 P, V ports	3.9	116 to 1015 507 to 3045	4.6
RC-T02-1-12 3-12	RC-G02-1-21 3-21			.52	116 to 1015 507 to 3045	3.0

Note: The pressure adjustment range indicates cracking pressure.

Understanding Model Numbers

RC – G 02 – 1 – (K) – 21

- 21 — Design number
- (K) — Adjusting bolt type (gasket type only)
- 1 — Pressure adjustment range 1, 3
- 02 — Nominal diameter (size)
- G — Mounting method
  T: Screw connection type
  G: Gasket type
- RC — Remote control relief valve

• Handling

1 To adjust pressure, loosen the lock nut and then rotate the handle clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
2 Make sure that drain port back pressure is no greater than 29 psi.
3 When configuring pipes for the pressure control valve and remote control valve, use of thick iron pipe with an inside diameter of no more than .15” and a connection length of no more than three meters is recommended. Pipe capacity can be a source of vibration.
4 When an adjustment bolt type is required for the pressure adjustment block, insert K for the type specification. See the dimension drawings, RC-G02 only.
5 Use the following to specify a sub plate.

Model No.	Weight lbs
MRC-02-20	2.2

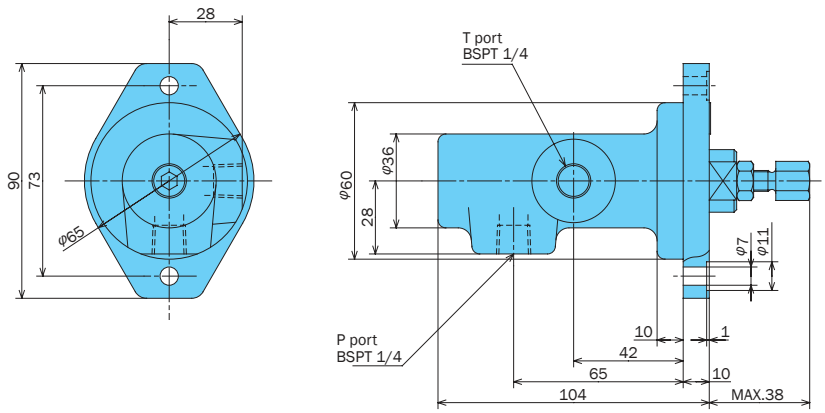
6 The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
RC-G02-*-21	M8 × 25r	4	14 to 18.5

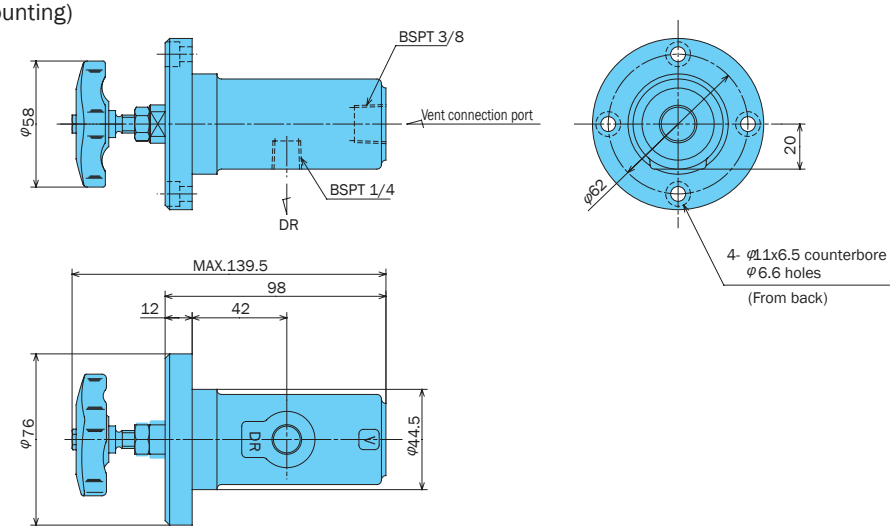
Note: For mounting bolts, use 12T or equivalent.

Installation Dimension Drawings

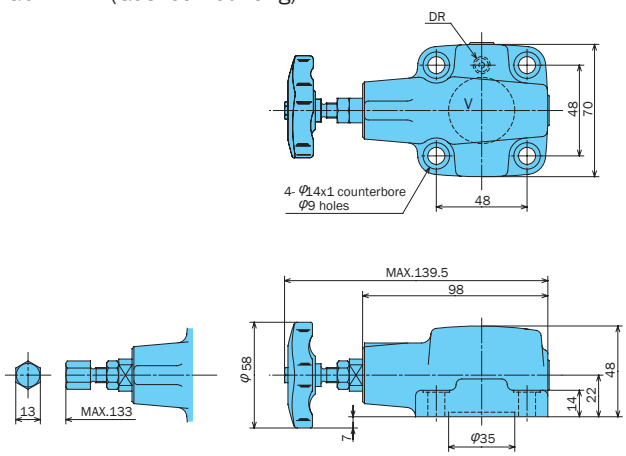
RCD-T02-*-11 (Screw Mounting)



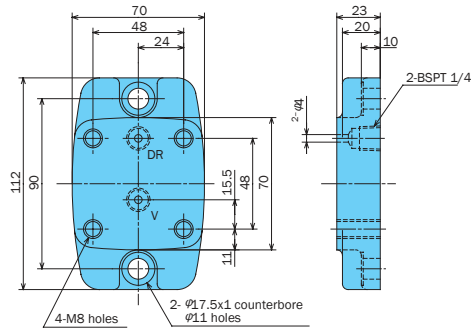
RC-T02-*-12 (Screw Mounting)



RC-G02-*-21 (Gasket Mounting)

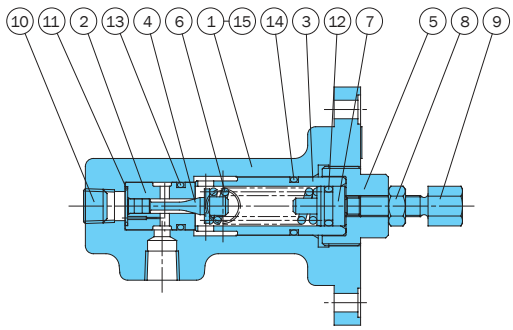


Sub Plate MRC-02-20



Cross-sectional Drawing

RCD-T02-*-11



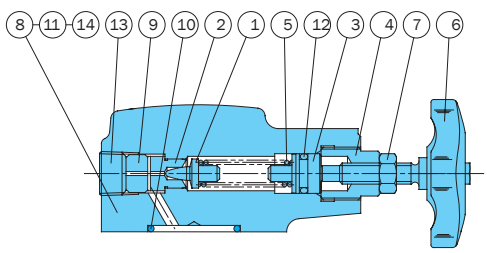
Part No.	Part Name	Part No.	Part Name
1	Body	12	O-ring
2	Sleeve	13	O-ring
3	Sleeve	14	O-ring
4	Poppet	15	Nameplate
5	Retainer		
6	Spring		
7	Guide		
8	Nut		
9	Screw		
10	Plug		
11	O-ring		

Seal Part List (Kit Model Number RCS-T02CD)

Part No.	Part Name	Part Number	Q'ty
11	O-ring	S12.5(NOK)	1
12	O-ring	1A-P11	1
13	O-ring	1B-P14	1
14	O-ring	1B-P18	1

Note: O-ring 1A/B-** refers to JIS B2401 1A/B.

RC-G02-*-(K)-21



Part No.	Part Name	Part No.	Part Name
1	Poppet	8	Cover
2	Seat	9	Collar
3	Plunger	10	O-ring
4	Retainer	11	O-ring
5	Spring	12	O-ring
6	Handle	13	Plug
7	Nut	14	Plate

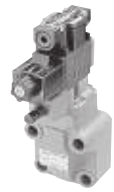
Seal Part List (Kit Model Number RCBS-G02)

Part No.	Part Name	Part Number	Q'ty
10	O-ring	1B-G30	1
11	O-ring	1B-P6	1
12	O-ring	1A-P11	1

Note: O-ring 1A/B-** refers to JIS B2401 1A/B.

Solenoid Controlled Relief Valve

7.9 to 100 gpm
3045 psi

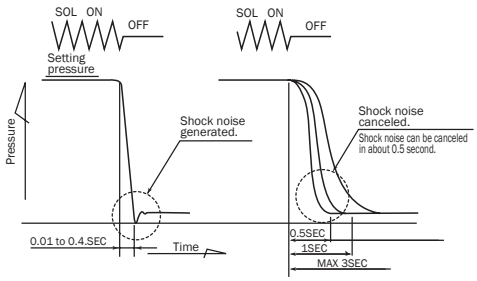


Features

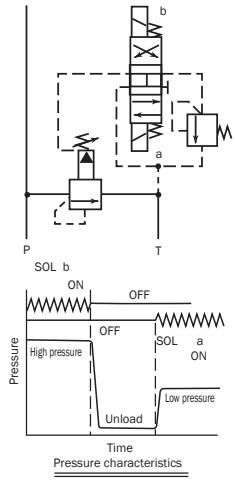
This valve adds a wet type solenoid valve to a balanced type piston type relief valve to form a hydraulic device unload circuit. The shockless type has an internal structure that prevents shock generated during unloading. This valve can also be used in a pressure relief circuit, and has a maximum adjustment time of three seconds. See the pressure relief circuit example.

A two-pressure control circuit can be configured by adding a relief modular valve. Contact your agent for more information.

(Pressure Relief Circuit Example)

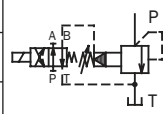
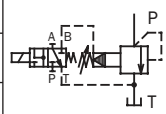


(Two-pressure Control Circuit Example)

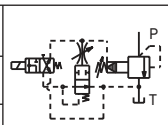


Pressure characteristics

Specifications

Model No.		Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure adjustment range psi	Weight lbs		JIS Symbol	Used Solenoid Valve Model Number
Screw Mounting	Gasket Mounting					T Type	G Type		
RSS (RSA) -T03-AQ 1/3-**-15	RSS (RSA) -G03-AQ 1/3-**-15	3/8	3045 P, X Ports	21	Type 1 0.8 to 7 116 to 1015	7	9.9		SS (SA) -G01-A3X-**-31
RSS (RSA) -T06-AQ 1/3-**-E23	RSS (RSA) -G06-AQ 1/3-**-E23	3/4		45		8.8	14		
RSS (RSA) -T10-AQ 1/3-**-E23	RSS (RSA) -G10-AQ 1/3-**-E23	1¼		100		19.4	22		
RSS (RSA) -T03-AR 1/3-**-15	RSS (RSA) -G03-AR 1/3-**-15	3/8		21	Type 3 3.5 to 21 507 to 3045	7	9.9		SS (SA) -G01-AR-**-31
RSS (RSA) -T06-AR 1/3-**-E23	RSS (RSA) -G06-AR 1/3-**-E23	3/4		45		8.8	14		
RSS (RSA) -T10-AR 1/3-**-E23	RSS (RSA) G10-AR 1/3-**-E23	1¼		100		19.4	22		

Shockless Type

RSS (RSA) -T03-1/3F-**-15	RSS (RSA) -G03-1/3F-**-15	3/8	3045 P, X Ports	21	Type 1 1 to 7 145 to 1015 Type 3 3.5 to 21 507 to 3045	9.2	12		SS (SA) -G01-A8X0-**-31
RSS (RSA) -T06-1/3F-**-E23	RSS (RSA) -G06-1/3F-**-E23	3/4		45		11	16.3		
RSS (RSA) -T10-1/3F-**-E23	RSS (RSA) G10-1/3F-**-E23	1¼		100		21.6	26.4		

Note: For information about electrical specifications, see the SS type and SA type solenoid valve items on pages D-4 and D-16.

• Handling

1 To adjust pressure, loosen the lock nut and then rotate the adjusting bolt clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
2 To adjust the time from onload to unload, loosen the lock nut and rotate the restrictor adjusting bolt clockwise (rightward) to make the time longer, or counterclockwise (leftward) to make it shorter.
3 Make sure that tank port back pressure is no greater than 29 psi.
4 The ** before the design number in the model number of the solenoid valve used shows voltage. See the voltage symbols in the model number explanation.
5 Pressure becomes unstable when at slow control flow rates. Use a flow rate of no less than 2.1 gpm for the 03, 06 sizes, and 2.6 gpm for the 10 size.
6 Use 90 to 110% of rated voltage.
7 The pressure adjustment range for the high vent type is 188 psi. Note that RSS (RSA) -T/G03 is not a high vent type.
8 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Weight lbs	Applicable Valve Type
MR-03-E10	3/8	3.5	RSS (RSA) -G03-***-**-15
MR-06-E20	3/4	7.7	RSS (RSA) -G06-***-**-23
MR-06X-E20	1		
MR-10-E20	1¼	18.7	RSS (RSA) -G10-***-**-23
MR-10X-E20	1½		

Note: See page relief valve page item on I-3 for dimensions.

9 The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
RSS (RSA) -G03-***-**-15	3/8 - 16	4	33 to 40.5
RSS (RSA) -G06-***-**-23	5/8 - 11	4	140 to 173
RSS (RSA) -G10-***-**-23	7/8 - 9	4	272 to 339

Note: For mounting bolts, use 12T or equivalent.

10 The coil surface temperature increases if this pump is kept continuously energized. Install the valve so there is not chance of it being touched directly by hand.

Understanding Model Numbers

RSS (RSA) – G 06 – A Q 1 – (H) – C1 * 23

- Design number
- E: Unified thread
- Voltage symbol
  - C1: AC100V 50/60Hz
  - C2: AC200V 50/60Hz
  - D1: DC12V
  - D2: DC24V
  - E1: AC100V 50/60Hz
  - E2: AC200V 50/60Hz
- Auxiliary symbol
  - H: High vent (excluding 03 size)
  - F: With shock canceller (See shockless type item.)
- Pressure adjustment range 1, 3
- Stop position flow path (Not required with the shockless type.)
  - Q: Open
  - R: Blocked
- Operation method A: Spring offset
- Nominal diameter (size)
- Mounting method T: Screw connection type, G: Gasket type
- Solenoid controlled relieve valve (with SA type solenoid valve)
- Solenoid controlled relieve valve (with SS type solenoid valve)

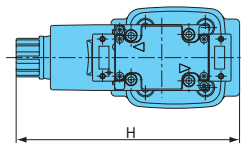
Other auxiliary symbols can be used (enter them in alphabetic order if there are 2 or more).

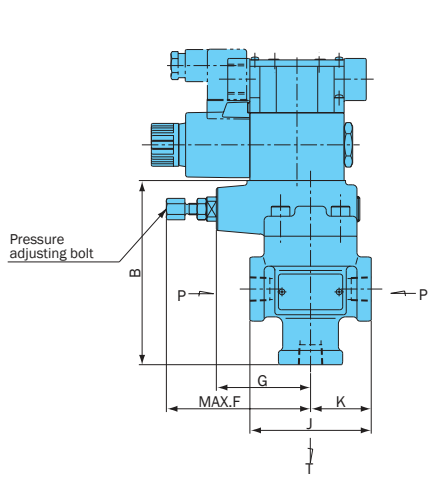
With SS type solenoid valve	G, N, Q (R is omitted).
With SA type solenoid valve	GR, J, N, Q, R

Installation Dimension Drawings

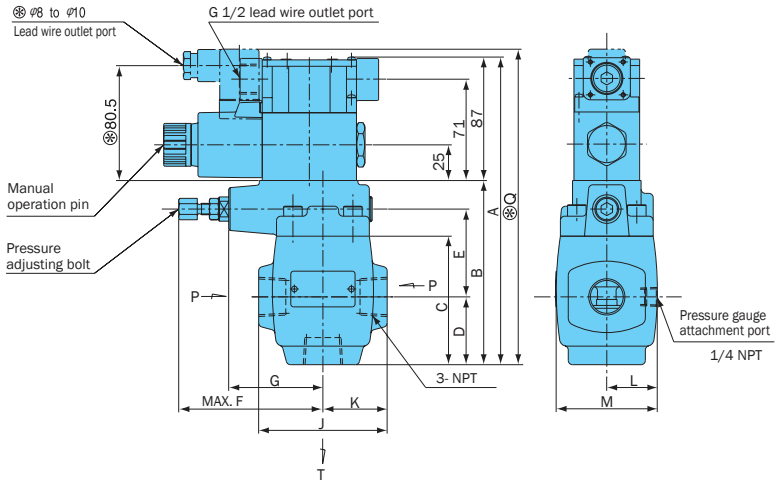
RSS (RSA) -T**-A**-**-E23

Note: Dimensions marked with ⊛ are for the RSA type.
Note: Dimensions in parentheses apply in the case of a DC solenoid valve.





RSS (RSA) -T03-A**-**-15

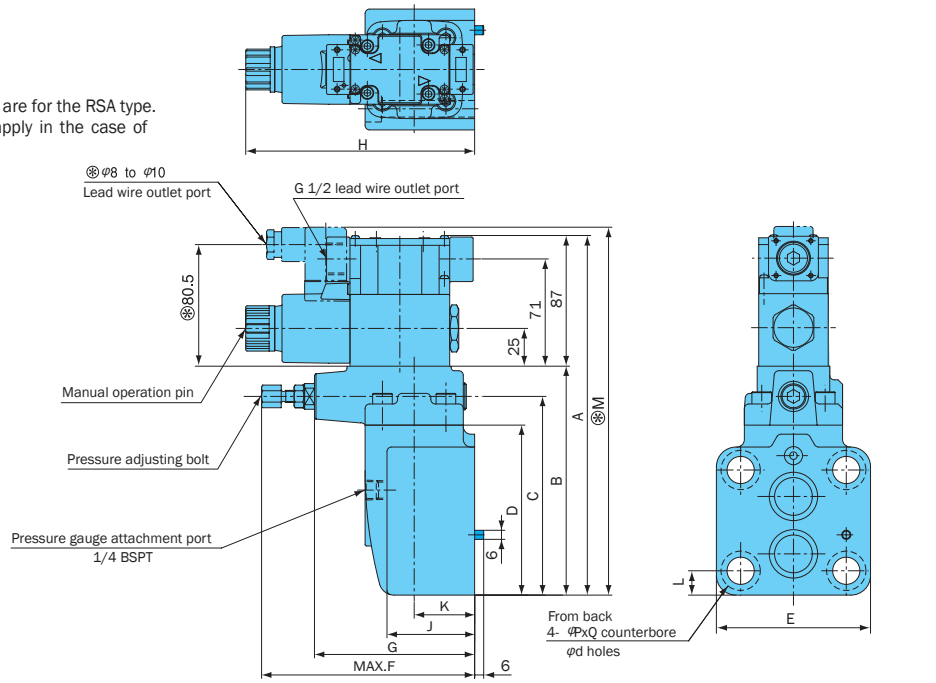


RSS (RSA) -T 06 10 -A**-**-E23

Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	Q
RSS (RSA) -T03-A**-**-15	214.5	129	90	53	56	101	66	154 (161)	85	42.5	32.5	65	3/8	221.5
RSS (RSA) -T06-A**-**-E23	214.5	129	90	47.5	61.5	101	66	156.5 (163.5)	90	45	35.5	71	3/4	221.5
RSS (RSA) -T10-A**-**-E23	239	153.5	111.5	62	72	98	63	164.5 (171.5)	125	62.5	47	94	1¼	246

RSS (RSA) -G**-A**-**-E23

Note: Dimensions marked with ⊛ & are for the RSA type.
Note: Dimensions in parentheses apply in the case of a DC solenoid valve.

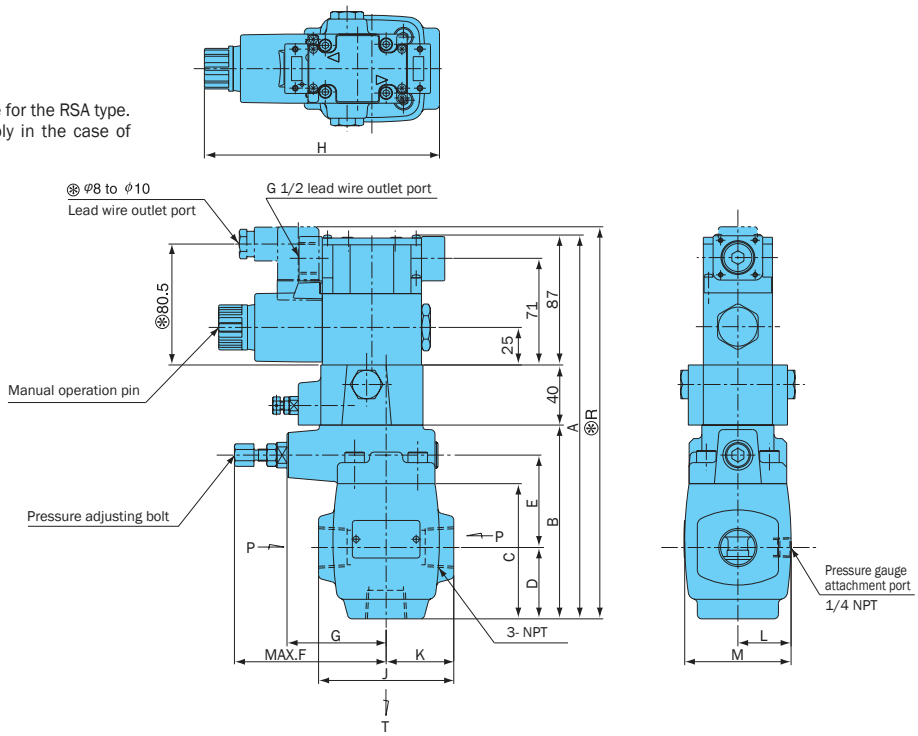


Model No.	A	B	C	D	E	F	G	H	J	K	L	P	Q	d	M
RSS (RSA) -G03-A**-**-15	214.5	129	109	90	80	141	106	150.5 (157.5)	72.5	40	13	17.5	10.8	11	221.5
RSS (RSA) -G06-A**-**-E23	237	151.5	131.5	112.5	102	141	106	151.5 (158.5)	58	40	16.1	26	1	18	244
RSS (RSA) -G10-A**-**-E23	248	162.5	143	120.5	127	148	113	152 (159)	80	50	17.7	32	1	22	255

Note: For gasket surface dimensions, see R-G**-* 12/20.

RSS (RSA) -T**-*-F-**-E23

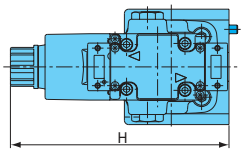
Note: Dimensions marked with ⊛ & are for the RSA type.
Note: Dimensions in parentheses apply in the case of a DC solenoid valve.

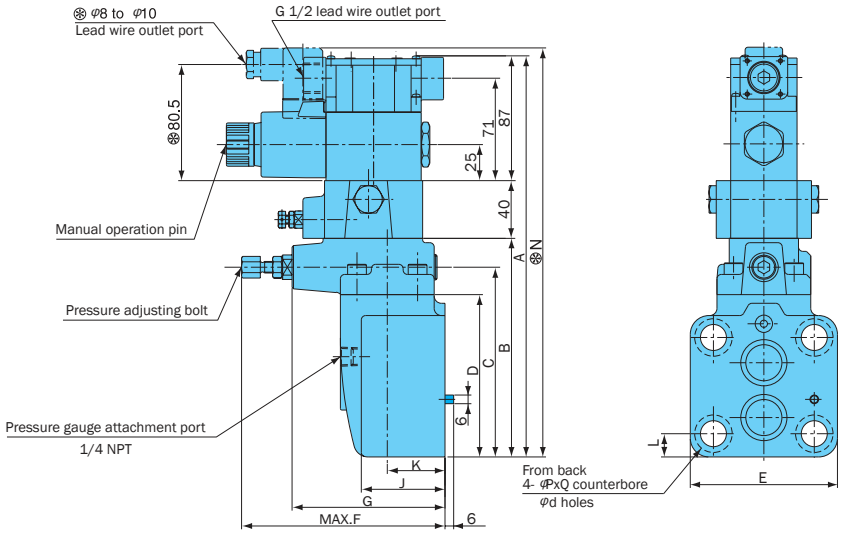


Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	Q	R
RSS (RSA) -T03-*-F-**-15	254.5	129	90	53	56	101	66	154 (161)	85	42.5	32.5	65	32	3/8	261.5
RSS (RSA) -T06-*-F-**-E23	254.5	129	90	47.5	61.5	101	66	156.5 (163.5)	90	45	35.5	71	33	3/4	261.5
RSS (RSA) -T10-*-F-**-E23	279	153.5	111.5	62	72	98	63	164.5 (171.5)	125	62.5	47	94	32.5	1¼	286

RSS (RSA) -G**-*-F-**-23

Note: Dimensions marked with ⊛& are for the RSA type.
Note: Dimensions in parentheses apply in the case of a DC solenoid valve.



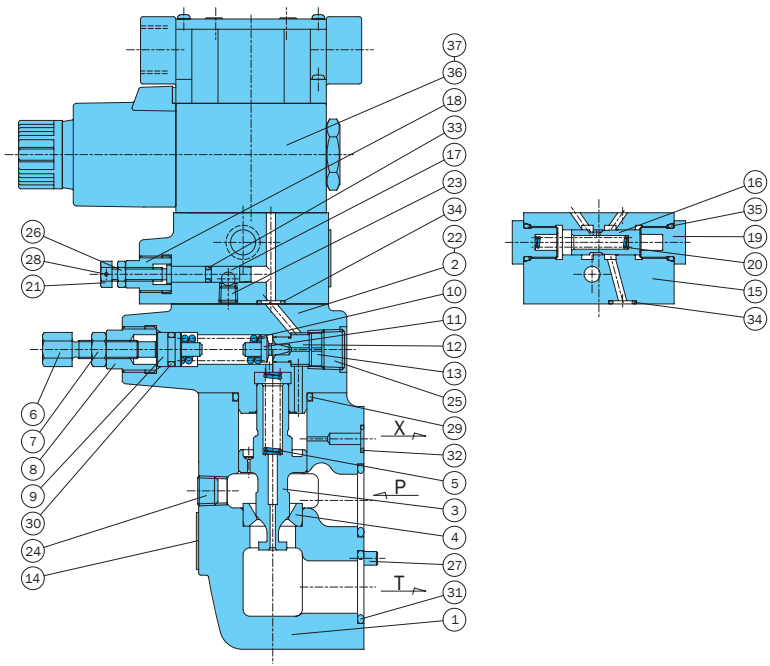


Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	d
RSS (RSA) -G03-*-F-**-15	254.5	129	109	90	80	141	106	150.5 (157.5)	72.5	40	13	32	261.5	17.5	10.8	11
RSS (RSA) -G06-*-F-**-23	277	151.5	131.5	112.5	102	141	106	151.5 (158.5)	58	40	16.1	33	284	26	1	18
RSS (RSA) -G10-*-F-**-23	288	162.5	143	120.5	127	148	113	152 (159)	80	50	17.7	32.5	295	32	1	22

Note: For gasket surface dimensions, see R-G**-* 12/20.

Cross-sectional Drawing

RSS-G**-*-F-**-23



Part No.	Part Name	Part No.	Part Name
1	Body	20	Spring
2	Cover	21	Nut
3	Spool	22	Screw
4	Seat	23	Plug
5	Spring	24	Plug
6	Screw	25	Plug
7	Nut	26	Nut
8	Retainer	27	Spring pin
9	Plunger	28	Spring pin
10	Spring	29	O-ring
11	Poppet	30	O-ring
12	Seat	31	O-ring
13	Collar	32	O-ring
14	Nameplate	33	O-ring
15	Body	34	O-ring
16	Spool	35	O-ring
17	Throttle	36	Solenoid Valves
18	Retainer	37	Screw
19	Spring guide		

Seal Parts List (Kit Model Number RSBS-***F)

Part No.	Part Name	Type/Part Number			Q'ty
		RSS-G03-*-F-**-15	RSS-G06-*-F-**-23	RSS-G10-*-F-**-23	
29	O-ring	1B-G30	1B-G30	1B-G40	1
30	O-ring	1A-P11	1A-P11	1A-P11	1
31	O-ring	1B-P20	1B-P26	1B-G35	2
32	O-ring	1B-P7	1B-P9	1B-P9	1
33	O-ring	1B-P4	1B-P4	1B-P4	1
34	O-ring	1B-P9	1B-P9	1B-P9	2
35	O-ring	1B-P12.5	1B-P12.5	1B-P12.5	2

Note: 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. For the *** part of the kit number, specify the valve size (G03, G06, G10).
3. SS (SA)-G01 pilot valve seal is available separately. For details, see pages D-14 (D-26).

NACHI

Solenoid Controlled Relief Valve
(with ISO Type)

RI Series Solenoid Controlled Relief Valve

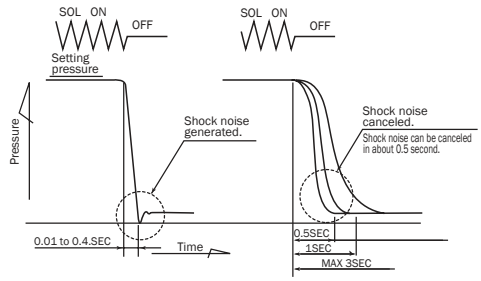
39.6 to 84.5 gpm
5075 psi

Features

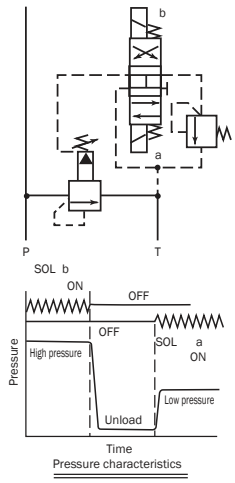
This valve adds a wet type solenoid valve to a balanced type piston type relief valve to form a hydraulic device unload circuit. The shockless type has an internal structure that prevents shock generated during unloading. This valve can also be used in a pressure relief circuit, and has a maximum adjustment time of three seconds. See the pressure relief circuit example.

A two-pressure control circuit can be configured by adding a relief modular valve.
Contact your agent for more information.

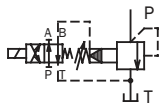
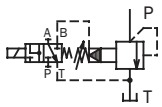
(Pressure Relief Circuit Example)



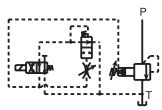
(Two-pressure Control Circuit Example)



Specifications

Model No. Gasket Mounting	Nominal Diameter (Size)	Maximum Flow Rate gpm	Maximum Working Pressure psi	Pressure adjustment range psi	Weight lbs	Gasket Surface Dimensions	JIS Symbol	Used Solenoid Valve Type
RIS-G03-AQ 1 3-**-21 5	3/8	39.6	5075 P, X Ports	Type 1: 116 to 1015 Type 3: 507 to 3625 Type 5: 507 to 5075	13.2	ISO 6264-AR-06-2-A		SS-G01-A3X-**-31
RIS-G06-AQ 1 3-**-21 5	3/4	84.5			15.6	ISO 6264-AS-08-2-A		
RIS-G03-AR 1 3-**-21 5	3/8	39.6			13.2	ISO 6264-AR-06-2-A		SS-G01-AR-**-31
RIS-G06-AR 1 3-**-21 5	3/4	84.5			15.6	ISO 6264-AS-08-2-A		

Shockless Type

RIS-G03- 1 3-F-**-21 5	3/8	39.6	5075 P, X Ports	Type 1: 145 to 1015 Type 3: 507 to 3625 Type 5: 507 to 5075	15.4	ISO 6264-AR-06-2-A		SS-G01-A3X-**-31
RIS-G06- 1 3-F-**-21 5	3/4	84.5			17.8	ISO 6264-AS-08-2-A		

Note: For electrical specifications, see the SS type solenoid valve item on page D-4.

Handling

1 To adjust pressure, loosen the lock nut and then rotate the handle clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
2 To adjust the time from onload to unload, loosen the lock nut and rotate the restrictor adjusting bolt clockwise (rightward) to make the time longer, or counterclockwise (leftward) to make it shorter.
3 Make sure that tank port back pressure is no greater than 29 psi.
4 The ** before the design number in the model number of the solenoid valve used shows voltage. See the voltage symbols in the model number explanation.
5 A small control flow rate can cause pressure instability. Use a control flow rate that is at least 2.1 gpm. Use a drain type relief valve in the case of a flow rate that is less than the minimum flow
6 rate.
7 Use 90 to 110% of rated voltage.
Use the following table for specification when a sub plate is required. Maximum operating pressure is 3625 psi.

Model No.	Pipe Diameter	Weight lbs	Applicable Valve Model
MRI-03-E10	3/8	5.7	RIS-G03
MRI-03X-E10	1/2		
MRI-06-E10	3/4	7.7	RIS-G06
MRI-06X-E10	1		

8 The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
RIS-G03-***-**-21	3/8 - 16	4	55 to 70
RIS-G06-***-**-21	5/8 - 11	4	140 to 173

Note: For mounting bolts, use Grade 8 or equivalent.

9 The coil surface temperature increases if this pump is kept continuously energized.
Install the valve so there is not chance of it being touched directly by hand.

Understanding Model Numbers

RIS – G 06 – A Q 1 – (F) – C1 – 21

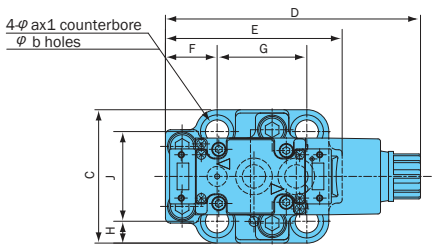
- Design number: 21
- Voltage symbol: C1: AC100V 50/60Hz D1: DC12V; C2: AC200V 50/60Hz D2: DC24V; E1: AC100V 50/60Hz; E2: AC200V 50/60Hz
- Auxiliary symbol: F: With shock canceller (See shockless type item.)
- Pressure adjustment range: 1, 3, 5
- Stop position flow path: Q: Open; R: Blocked
- Operation method: A: Spring offset
- Nominal diameter (size): 06
- Mounting method: G: Gasket type
- RI Series solenoid controlled relieve valve (with SS type solenoid valve)

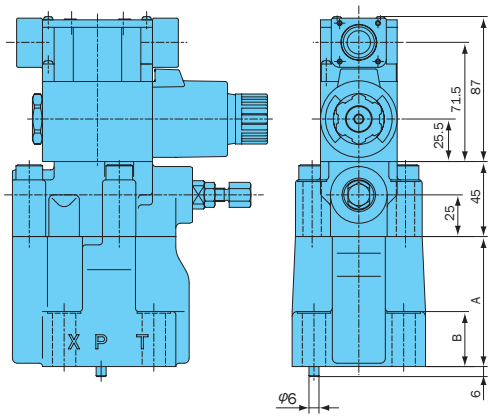
Not required with the shockless type.

Other auxiliary symbols G, N, and Q (R is omitted) can be used (enter them in alphabetic order if there are 2 or more).

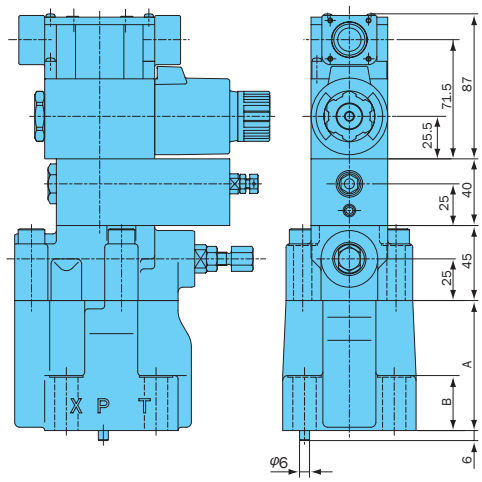
Installation Dimension Drawings

RIS-G**-A**-**-21





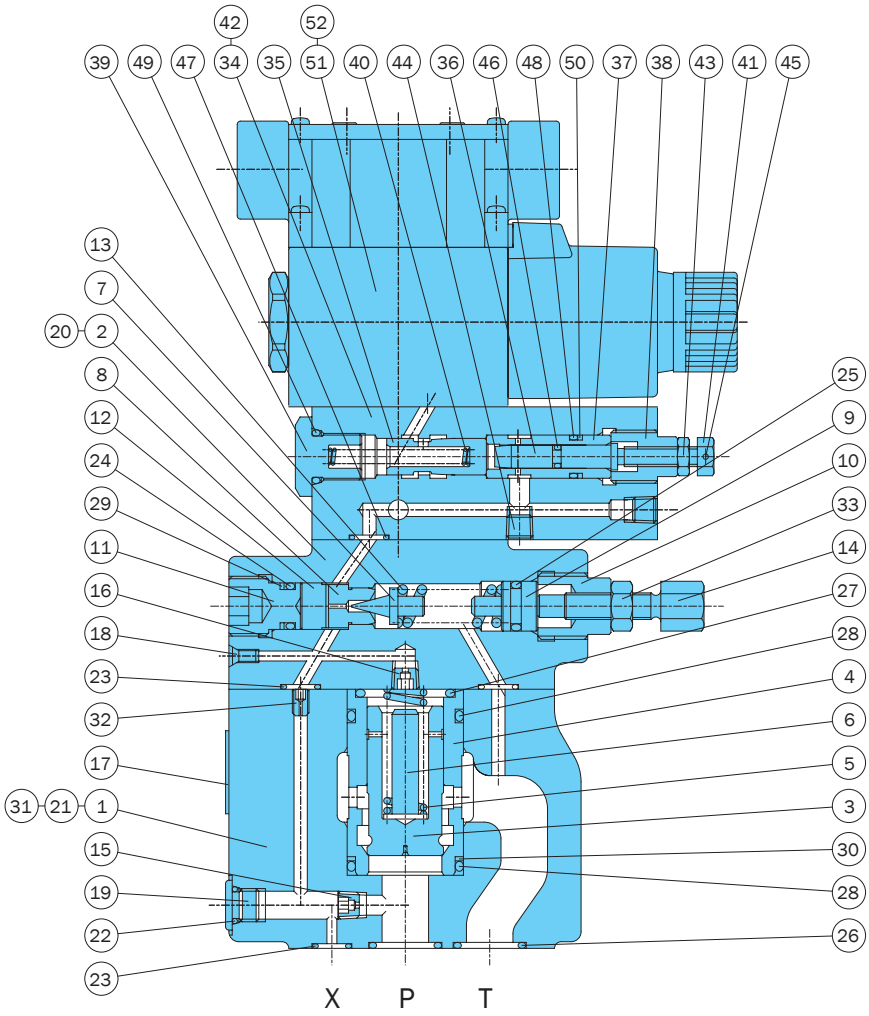
RIS-G**-*-F-**-21



Model No.	A	B	C	D	E	F	G	H	J	a	b
RIS-G03-***-**-21	78	32	80	153 (160)	106	31	53.8	13.1	53.8	20	14
RIS-G06-***-**-21	83	36	100	162 (169)	119	37	66.7	15	70	26	17.5

Note: 1. For gasket surface dimensions, see RI-G**-* on page I-5.
2. Figures in (parenthesis) are for the DC solenoid valve.

Cross-sectional Drawing



Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Sleeve
5	Spring
6	Spacer
7	Poppet
8	Seat
9	Plunger
10	Retainer
11	Plug
12	Collar
13	Spring
14	Handle assy
15	Orifice
16	Orifice
17	Plate

Part No.	Part Name
18	Plug
19	Plug
20	Screw
21	Pin
22	O-ring
23	O-ring
24	O-ring
25	O-ring
26	O-ring
27	O-ring
28	O-ring
29	Backup ring
30	Backup ring
31	Screw
32	Choke
33	Nut
34	Body

Part No.	Part Name
35	Spool
36	Throttle
37	Sleeve
38	Retainer
39	Guide
40	Spring
41	Nut
42	Plate
43	Nut
44	Plug
45	Pin
46	O-ring
47	O-ring
48	O-ring
49	O-ring
50	Backup ring
51	Solenoid Valves
52	Screw

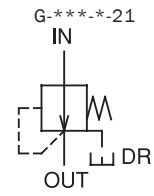
Seal Part List (Kit Model Numbers: Main REBS-***, Restrictor Valve DFS-01H)

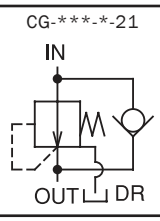
Component Parts	Part No.	Part Name	Nominal Diameter/Part Number		Q'ty
			G03	G06	
Main	22	O-ring	1B-P8	1B-P8	1
	23	O-ring	1B-P9	1B-P9	3
	24	O-ring	1B-P10A	1B-P10A	1
	25	O-ring	1A-P11	1A-P11	1
	26	O-ring	1B-P18	1B-P28	2
	27	O-ring	1B-G25	1B-P28	1
	28	O-ring	1B-G30	1B-P32	2
	29	Backup ring	T2-P10A	T2-P10A	1
	30	Backup ring	T2-G30	T2-P32	1
Restrictor Valve	46	O-ring	1B-P4		1
	47	O-ring	1B-P9		2
	48	O-ring	1B-P10		1
	49	O-ring	1B-P12.5		1
	50	Backup ring	T2-P10		1

Note: 1. O-ri ng 1A/1B-** refers to JIS B 2401-1A/1B-**.
2. For the *** part of the kit number, specify the valve size (G03, G06).
3. The restrictor valve kit is required only when a shockless valve is included.
4. SS (SA)-G01 pilot valve seal is available separately. For details, see pages D-14 (D-26).

Pressure Reducing (and Check) Valve

5.2 to 73.9 gpm
3045 psi





Features

This valve is used when part of the circuit uses pressure that is lower than the main circuit.
Even when pressure changes in the primary main circuit, the reduced secondary pressure is adjusted automatically and maintained at a constant level. Connecting a remote control valve to the vent port allows remote control of adjustment pressure.

The mounting surface of the gasket conforms to the ISO standards shown in the table below.

Specifications

Model No.		Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure adjustment range psi	Weight lbs		Gasket Surface Dimensions
Screw Mounting	Gasket Mounting					T Type	G Type	
(C)G-T03- A-21 B-21	(C)G-G03- A-21 B-21	3/8	3045 IN, OUT, Vent Port	5.2	36 to 145 43 to 362	7.2 7.9	8.5 9.2	ISO 5781-AG-06-2-A
(C)G-T03-1-21 3-21	(C)G-G03-1-21 3-21	3/8		13.2	116 to 1015 507 to 3045	7.2 7.9	8.5 9.2	
(C)G-T06-1-21 3-21	(C)G-G06-1-21 3-21	3/4		31.7	116 to 1015 507 to 3045	12.5 13.4	13.6 14.5	ISO 5781-AH-08-2-A
(C)G-T10-1-21 3-21	(C)G-G10-1-21 3-21	1¼		73.9	116 to 1015 507 to 3045	22 25	26 29	ISO 5781-AJ-10-2-A

Weight values in parentheses are for when a check valve is included.
The cracking pressure of the check valve is 14.5 psi.

Understanding Model Numbers

(C)G – T 03 – 1 – 21

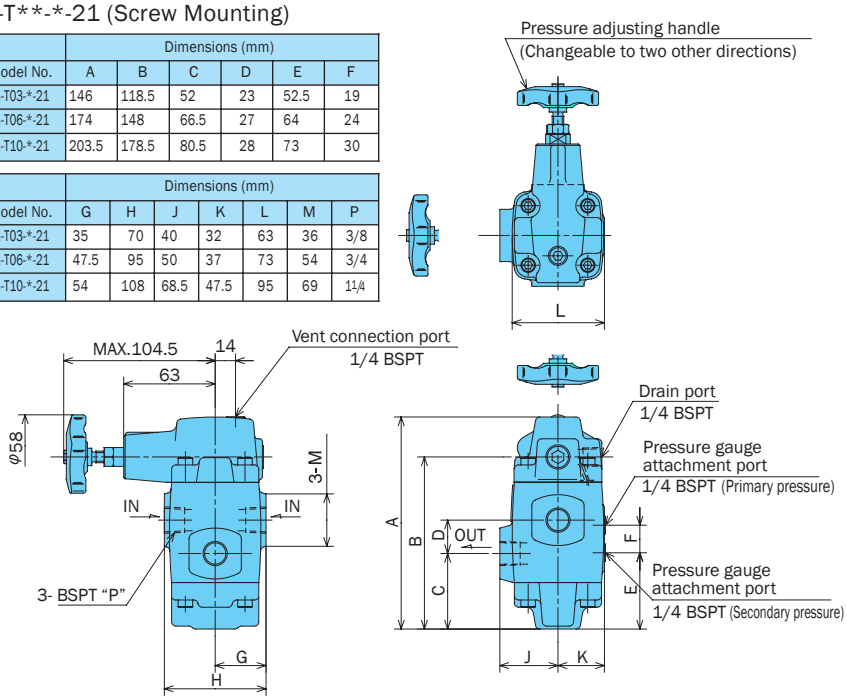
- 21: Design number
- 1: Pressure adjustment ranges 1, 3, A, B
- 03: Nominal diameter (size)
- T: Mounting method — T: Screw connection type G: Gasket type
- G: Reducing valve
- (C)G: Reducing and check valve

Installation Dimension Drawings

G-T**-*-21 (Screw Mounting)

	Dimensions (mm)					
Model No.	A	B	C	D	E	F
G-T03-*-21	146	118.5	52	23	52.5	19
G-T06-*-21	174	148	66.5	27	64	24
G-T10-*-21	203.5	178.5	80.5	28	73	30

	Dimensions (mm)						
Model No.	G	H	J	K	L	M	P
G-T03-*-21	35	70	40	32	63	36	3/8
G-T06-*-21	47.5	95	50	37	73	54	3/4
G-T10-*-21	54	108	68.5	47.5	95	69	1¼



• Handling

1 Provide an independent drain pipe directly to the tank.
2 When using a remote control valve, connect piping to the reducing valve vent port. Pipe capacity can be a source of vibration. Use of thick iron pipe with an inside diameter of no more than .15" and a connection length of no more than three meters is recommended.
3 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Weight lbs	Applicable Valve Model
MG-03-20	3/8	3.5	(C)G-G03-*-21
MG-03X-20	1/2		
MG-06-20	3/4	8.6	(C)G-G06-*-21
MG-06X-20	1		
MG-10-20	1¼	14.7	(C)G-G10-*-21
MG-10X-20	1½		

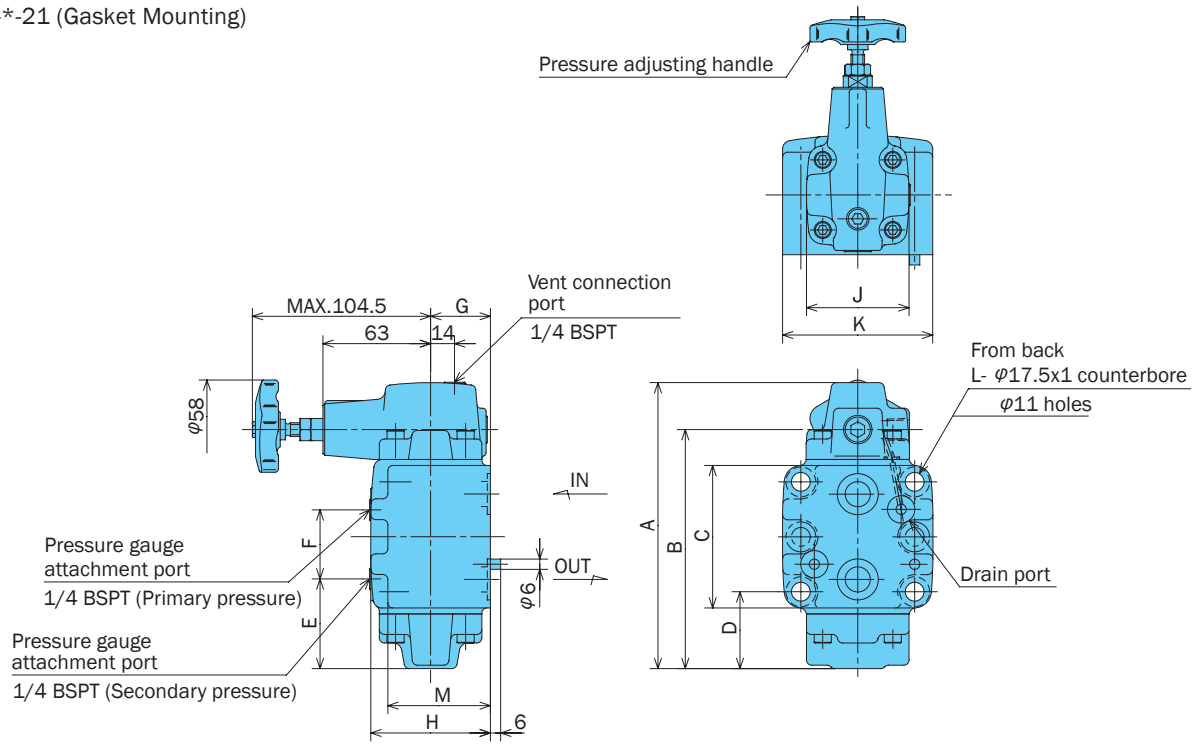
These sub plates can also be used for pressure control valves.

4 The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
(C)G-G03-*-21	M10 × 75 ℓ	4	33 to 40.5
(C)G-G06-*-21	M10 × 85 ℓ	4	
(C)G-G10-*-21	M10 × 105 ℓ	6	

Note: For mounting bolts, use 12T or equivalent.

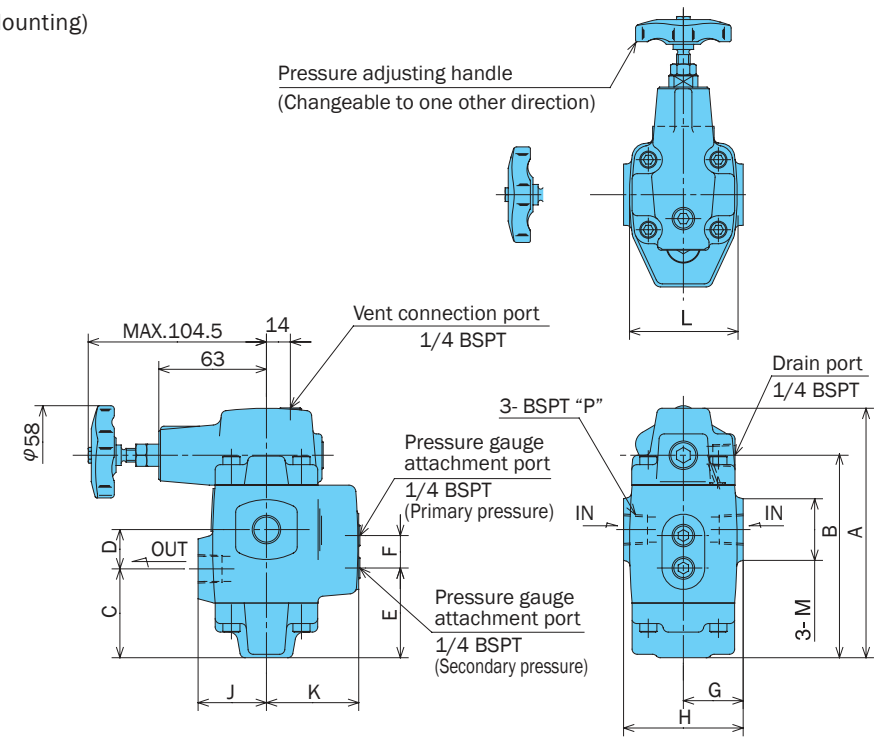
G-G**-*-21 (Gasket Mounting)



Model No.	A	B	C	D	E	F	G	H	J	K	L	M
G-G03-*-21	146	118.5	62	45.1	52.5	19	35	70	60	88	4	60
G-G06-*-21	174	148	82	51.4	64	24	40	80	70	102	4	70
G-G10-*-21	203.5	178.5	102	54	73	30	51	102	92	122	6	92

Note: The orientation of the pressure adjusting handle cannot be change.

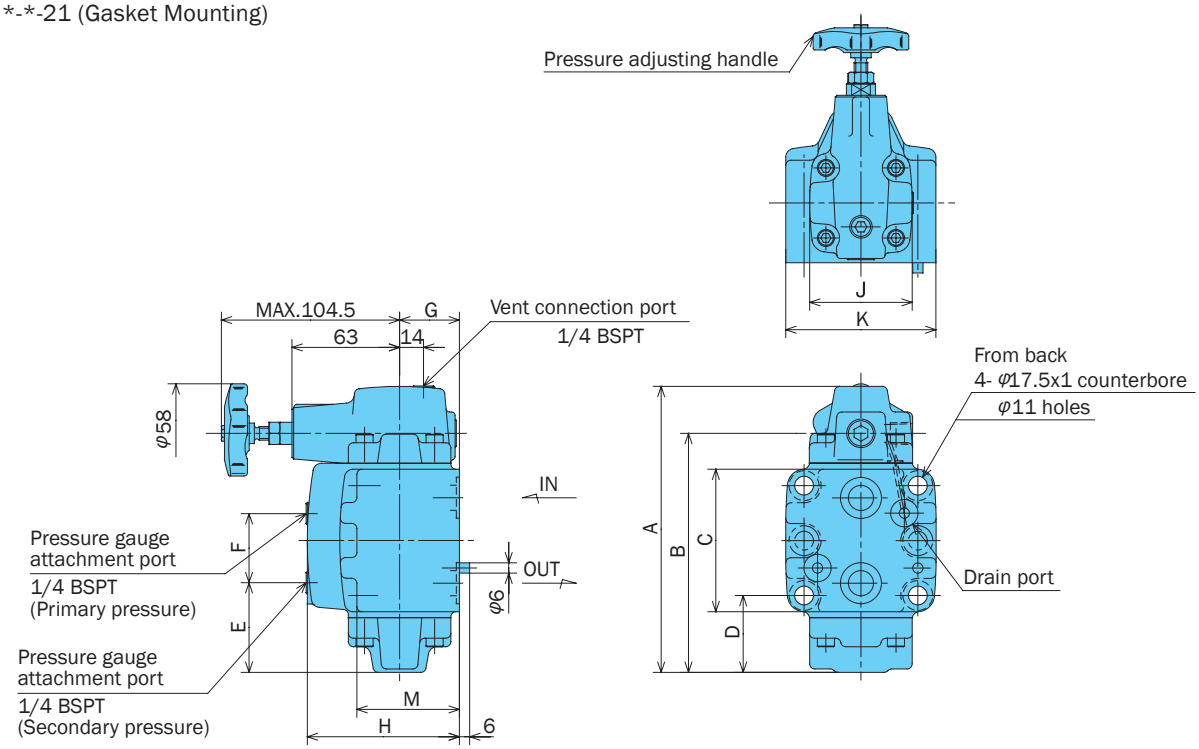
CG-T**-*-21 (Screw Mounting)



Model No.	A	B	C	D	E	F	G	H	J	K	L	M	P
CG-T03-*-21	146	118.5	52	23	52.5	19	35	70	40	54	63	36	3/8
CG-T06-*-21	174	148	66.5	27	64	24	47.5	95	50	60	73	54	3/4
CG-T10-*-21	203.5	178.5	80.5	28	73	30	54	108	68.5	80	95	69	1¼

Note: After the orientation of the pressure adjusting handle has been changed, also modify the cover alignment surface ring (1B-P6).

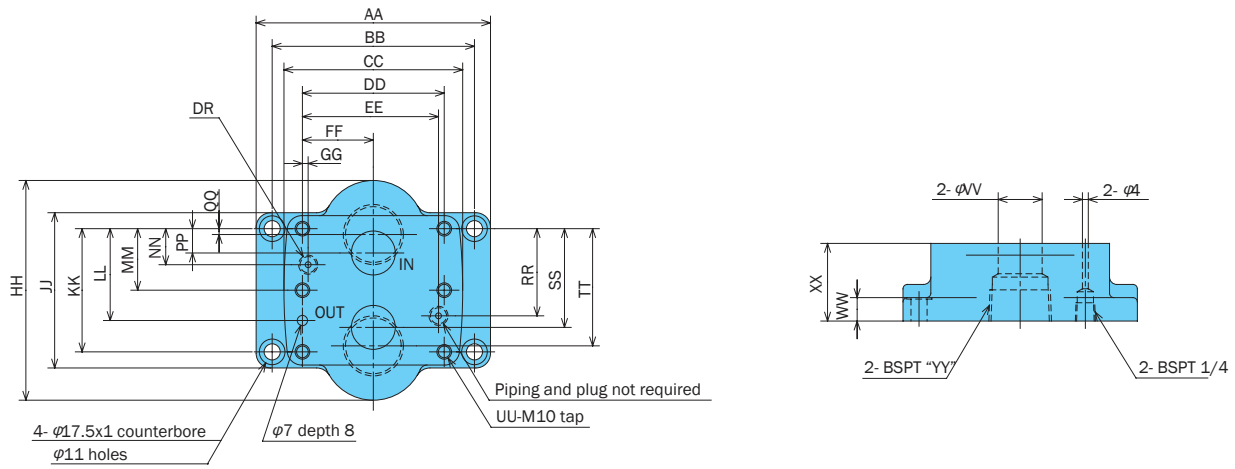
CG-G**-*-21 (Gasket Mounting)



	Dimensions mm											
Model No.	A	B	C	D	E	F	G	H	J	K	L	M
CG-G03-*-21	146	118.5	62	45.1	52.5	19	35	89	60	88	4	60
CG-G06-*-21	174	148	82	51.4	64	24	40	100	70	102	4	70
CG-G10-*-21	203.5	178.5	102	54	73	30	51	131	92	122	6	92

Note: The orientation of the pressure adjusting handle cannot be change.

Sub Plate MG-***-20



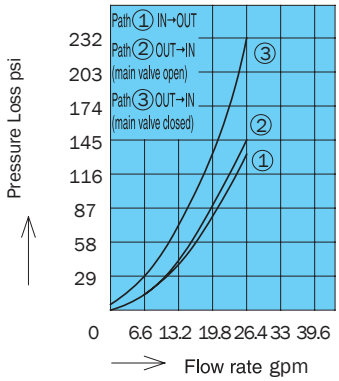
	Dimensions mm																						
Model No.	A A	BB	CC	DD	EE	FF	GG	HH	J J	K K	LL	M M	NN	PP	QQ	RR	SS	TT	UU	V V	W W	XX	YY
MG-03-20	128	106.4	88	66.6	58.7	33.3	7.9	76	62	42.9	31.8	–	21.4	7.2	3.5	21.5	35.7	39.5	4	14	11	30	3/8
MG-03X-20																							1/2
MG-06-20	146	123.8	102	79.3	72.9	39.7	6.4	110	82	60.3	44.5	–	20.6	11.1	3.7	39.7	49.2	56.7	4	22	16	40	3/4
MG-06X-20																							1
MG-10-20	160	138.1	122	96.8	92.9	48.4	3.9	150	102	84.1	62.7	42.1	24.6	16.7	4.1	59.5	67.5	80.1	6	30	16	53	$1\frac{1}{4}$
MG-10X-20																							$1\frac{1}{2}$

Performance Curves

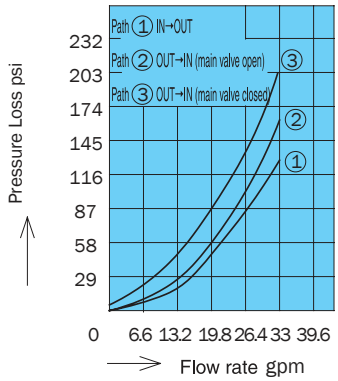
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

(C)G-G03-*-21

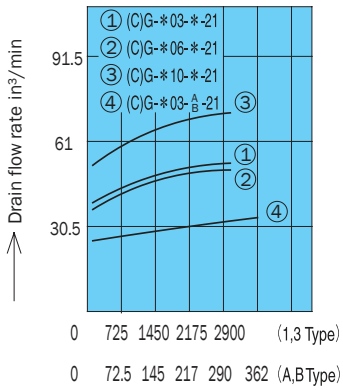


(C)G-T03-*-21



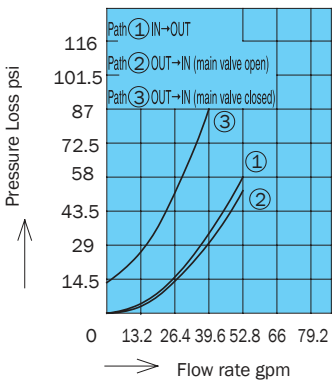
Pressure – Drain Flow Rate Characteristics

(C)G-***-*-21



Secondary Pressure – Flow Rate Characteristics

(C)G-G06-*-21



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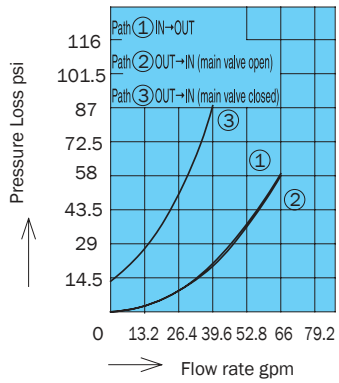
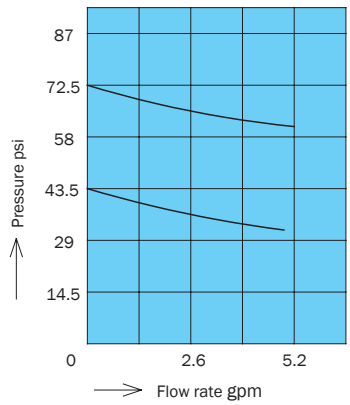
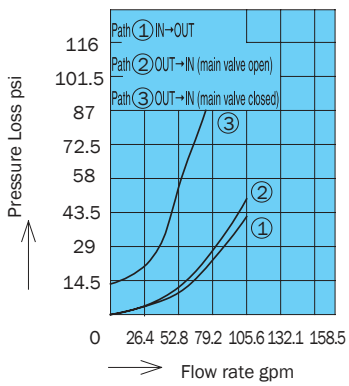


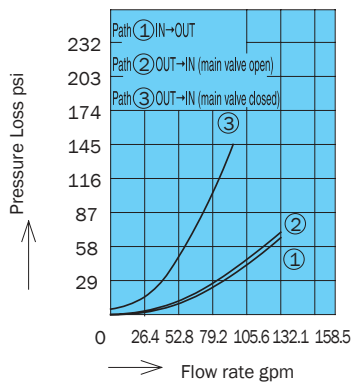
(C)G-*03-A/B-21



(C)G-G10-*-21

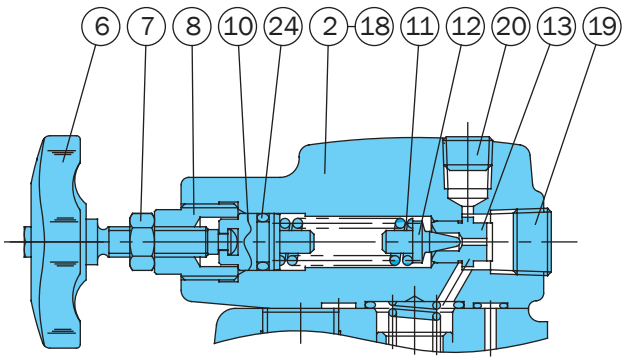


(C)G-T10-*-21

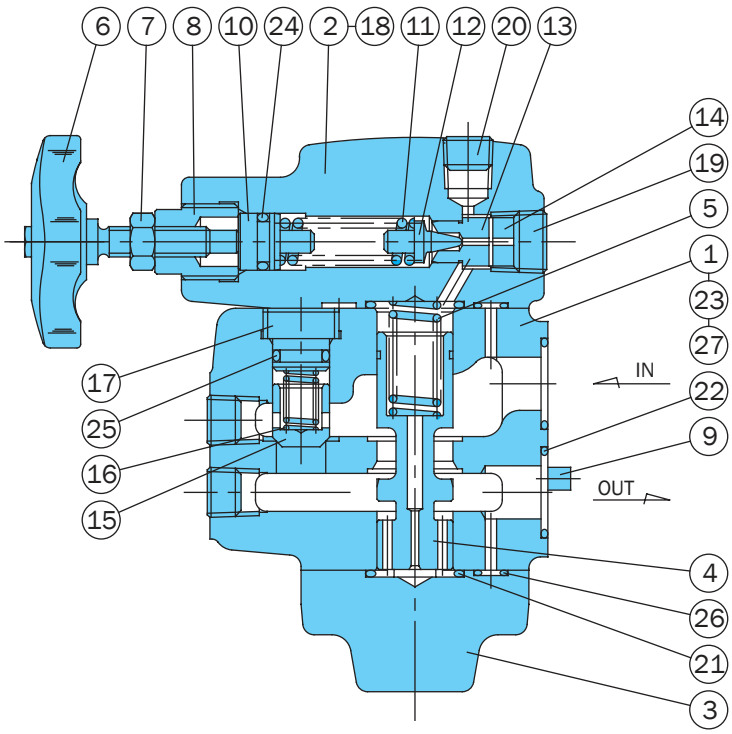


Cross-sectional Drawing

(C)G-G**-$\frac{A}{B}$-21



CG-G-**-*-21



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Piston
5	Spring
6	Handle
7	Nut
8	Retainer
9	Spring pin
10	Push rod
11	Spring
12	Poppet
13	Seat
14	Collar
15	Poppet
16	Spring
17	Spring guide
18	Screw
19	Plug
20	Plug
21	O-ring
22	O-ring
23	O-ring
24	O-ring
25	O-ring
26	O-ring
27	Nameplate

Note: Part numbers 15, 16, 17, and 25 are not required when there is no check valve.

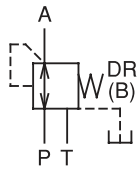
Seal Part List (Kit Model Number RGBS-***)

Part No.	Part Name	Part Number						Q'ty
		CG-G03-*-21	CG-T03-*-21	CG-G06-*-21	CG-T06-*-21	CG-G10-*-21	CG-T10-*-21	
21	O-ring	1B-P22	1B-P22	1B-G30	1B-G30	1B-G40	1B-G40	2
22	O-ring	1B-P20	–	1B-P26	–	1B-G35	–	2
23	O-ring	1B-P12	–	1B-P12	–	1B-P12	–	2
24	O-ring	1A-P11	1A-P11	1A-P11	1A-P11	1A-P11	1A-P11	1
25	O-ring	1B-P11	1B-P11	1B-P14	1B-P14	1B-P22	1B-P22	1
26	O-ring	1B-P6	1B-P6	1B-P6	1B-P6	1B-P6	1B-P6	4

Note: O-ring 1A/B-** refers to JIS B2401 1A/B-**.
*** in the kit number is used for specification of the valve size (G03, T06, etc.) To specify inclusion of a check valve, add C to the end.

Balancing Valve (Pressure Reducing and Relief Valve)

7.9 to 13.2 gpm
2030 psi



Features

2-in-1 operation allows a simpler circuit configuration. Combination valve that provides both pressure reducing and counter balance functions.

Pressure adjustment using a single screw (bolt).
Compact and lightweight valve that can be mounted using the same methods as a 01, 03 size solenoid valve.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure adjustment range psi	Weight lbs	Gasket Surface Dimensions
GR-G01- A1-20 A2	1/8	3045 P port	30	116 to 1015 507 to 2030	3.3	ISO 4401-03-02-0-94
GR-G03- A1-(B)-20 A2	3/8		50	145 to 1015 507 to 2030	7.7	ISO 4401-05-04-0-94

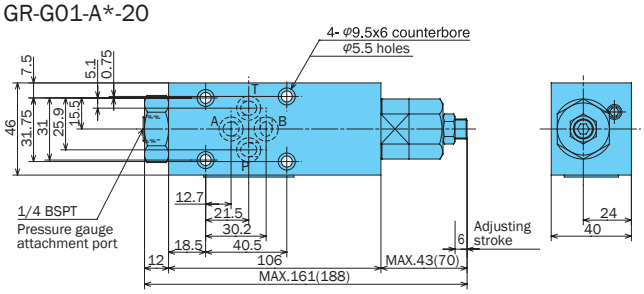
Understanding Model Numbers

GR – G 03 – A 1 – BK – 20

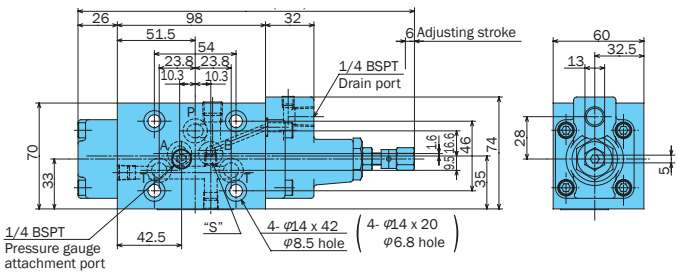
- 20: Design number
  Note: For 03 size, relationship between mounting bolts and design number is indicated as J20: M6, 20: M8.
- BK: Auxiliary symbol
  B: External drain (03 size only)
  K: With handle
- 1: Pressure adjustment range 1, 2
- A: Control port: A port
- 03: Nominal diameter (size)
- G: Mounting method G: Gasket type
- GR: Balancing valve

Installation Dimension Drawings

GR-G01-A*-20



GR-G03-A*-B-20



- Handling

1 To adjust pressure, loosen the lock nut and then rotate the adjusting screw (bolt) clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
2 For the 01 size, draining is from the gasket side B port.
3 For the drain of a 03 size valve when auxiliary symbol B is specified, run a pipe from the drain discharge port directly to the tank. The drain discharge port can also be plugged for direct draining from the gasket side B port. In the case of modification, be sure to change the valve type marking on the nameplate. When using drain piping, use a tightening torque of 16-18.4 ft lbs for pipe joints.
4 The drain of 03 size valve that does not have a B auxiliary symbol can be directly from the T port.
5 Make sure that drain back pressure is no greater than 29 psi.
6 When an adjustment handle is required for pressure adjustment block, insert K for the type specification.
7 Set the difference between the pressure at the primary circuit (port P) and the secondary circuit (port A) at least 72 psi.
8 Use the following table for specification when a sub plate is required.

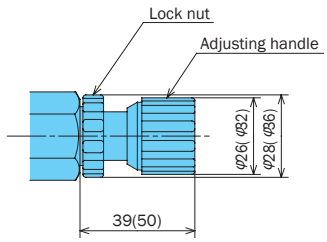
Model No.	Pipe Outlet Size	Weight lbs
MSA-01Y-E10	3/8	2.6
MSA-03-E10	3/8	8.3
MSA-03X-E10	1/2	

The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
GR-G01-A*-20	10-24 x 1 3/4"	4	3.6 to 5
GR-G03-A*-20	1/4-20 x 1 1/8"	4	14.7 to 18.4

Note: For mounting bolts, use grade 8 or equivalent.

Adjusting Handle (Option)



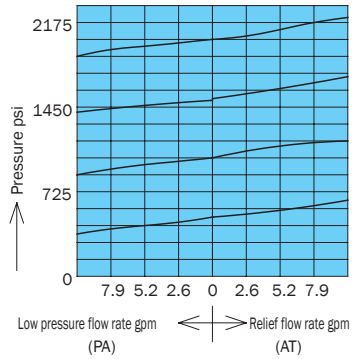
Note: 1. For size 03, an escape valve with piping from the drain discharge port is standard for the drain (GR-G03-A*-B-20). To change from internal drain to external drain, install a plug (NPTF 1/16) in part S, and remove the drain discharge port plug (1/4 BSPT). To change from external drain to internal drain, install a plug (1/4 BSPT) into the drain discharge port, and remove the S part plug (NPTF 1/16). In this case, however, the B port cannot be used as the tank port.
2.Dimensions in parentheses show dimensions with handle (K type).

Performance Curves

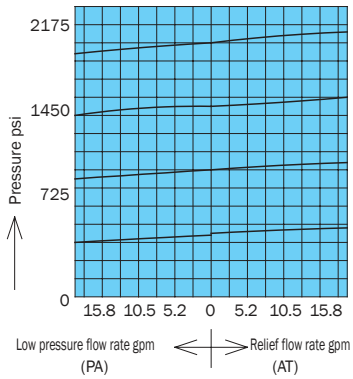
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure – Flow Rate Characteristics

GR-G01-A*-20

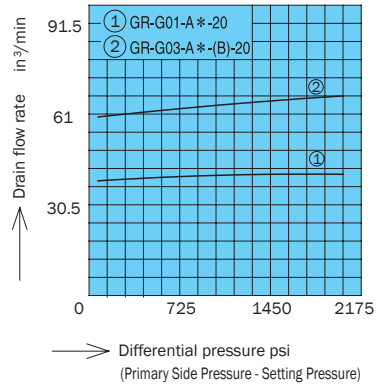


GR-G03-A*-(B)-20



Setting Pressure – Drain Flow Rate Characteristics

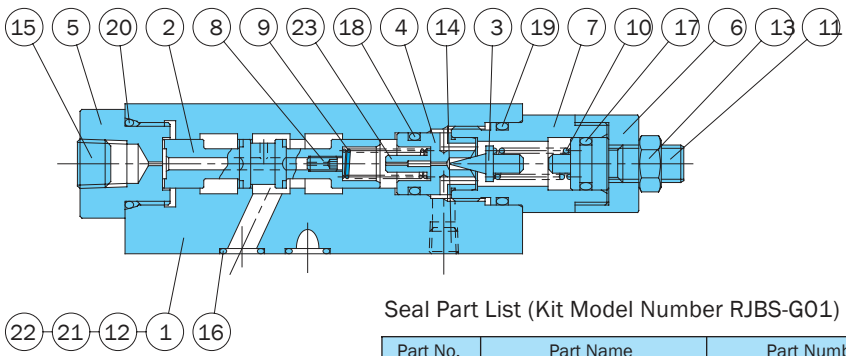
GR-G01-A*-20 ①
GR-G03-A*-(B)-20 ②



Cross-sectional Drawing

Note: O-ring 1A/B-** refers to JIS B2401- 1A/B-**.

GR-G01-A*-20

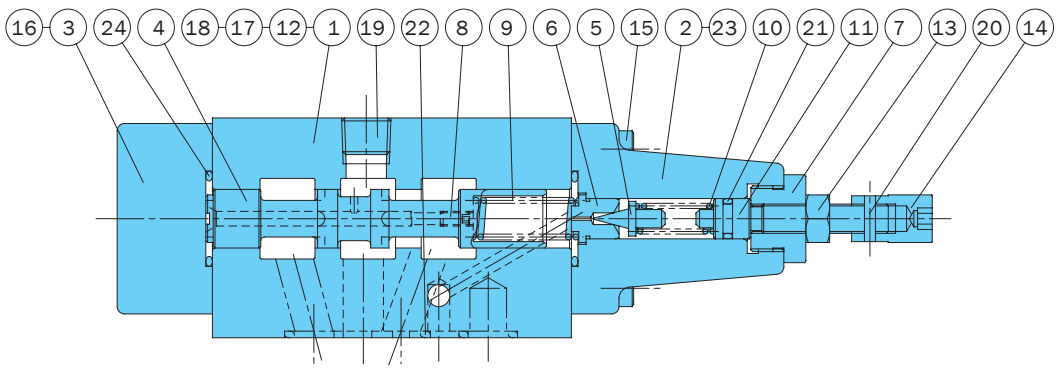


Part No.	Part Name	Part No.	Part Name
1	Body	7	Retainer
2	Spool	8	Choke
3	Poppet	9	Spring
4	Seat	10	Spring
5	Bushing	11	Screw
6	Bushing	12	Plate
		13	Nut
		14	Plug
		15	Plug
		16	O-ring
		17	O-ring
		18	O-ring
		19	O-ring
		20	O-ring
		21	Plug
		22	Spacer
		23	Choke

Seal Part List (Kit Model Number RJBS-G01)

Part No.	Part Name	Part Number	Q'ty
16	O-ring	1B-P9	4
17	O-ring	1A-P10A	1
18	O-ring	1B-P12.5	1
19	O-ring	1B-P18	1
20	O-ring	1B-P20	1

GR-G03-A*-B-20



Part No.	Part Name
1	Body
2	Cover (A)
3	Cover (B)
4	Spool
5	Poppet
6	Seat
7	Retainer
8	Choke
9	Spring
10	Spring
11	Screw
12	Plate
13	Nut
14	Nut
15	Screw
16	Screw
17	Plug
18	Plug
19	Plug
20	Pin
21	O-ring
22	O-ring
23	O-ring
24	O-ring

Seal Part List (Kit Model Number RJBS-G03)

Part No.	Part Name	Part Number	Q'ty
21	O-ring	1A-P8	1
22	O-ring	1B-P12	5
23	O-ring	1B-P9	1
24	O-ring	1B-P22	2

Pressure Control (and Check) Valve

13.2 to 73.9 gpm
2030 psi

Features

This circuit control valve works as a sequence valve, unloading valve, and counter balance valve.

Maximum operating pressure is 3045 psi. Though a direct type valve, there is little pressure override.

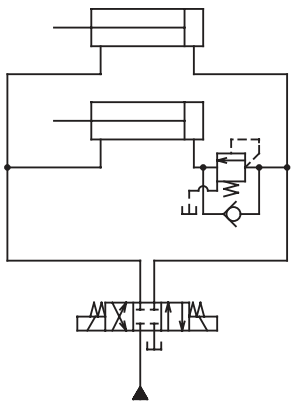
The mounting surface of the gasket conforms to the ISO standards shown in the table below.

Specifications

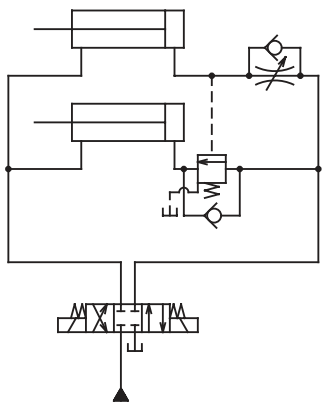
Model No.		Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Pressure adjustment range psi	Weight lbs		Gasket Surface Dimensions
Screw Mounting	Gasket Mounting					T Type	G Type	
(C)Q-T03-*A-21 B C D E	(C)Q-G03-*A-21 B C D E	3/8	3045 IN, OUT, PP Ports	13.2	Type A 36 to 123 Type B 72 to 253	6.3	7.7	ISO 5781-AG-06-2-A
(C)Q-T06-*A-21 B C D E	(C)Q-G06-*A-21 B C D E	3/4		31.7	Type C 123 to 507 Type D 253 to 1015	11	13.2	ISO 5781-AH-08-2-A
(C)Q-T10-*A-21 B C D E	(C)Q-G10-*A-21 B C D E	1¼		73.9	Type E 507 to 2030	21.6	25.3	ISO 5781-AJ-10-2-A

Weight values in parentheses are for when a check valve is included. The cracking pressure of the check valve is 14.5 psi.

Example circuit 1
When using type 2.



Example circuit 2
When using type 3.



Understanding Model Numbers

(C)Q – G 10 – 1 B – 21

- 21: Design number
- B: Pressure adjustment range A, B, C, D, E (Note: Type E pressure adjustment is not available for Type 1.)
- 1: Type 1, 2, 3, 4 (See page F-28)
- 10: Nominal diameter (size)
- G: Mounting method T: Screw connection G: Gasket type
- Q: Pressure control valve
- (C): Pressure control and check valve

• Handling

1 To adjust pressure, loosen the lock nut and then rotate the adjusting bolt clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
2 The pressure adjustment range is expressed in terms of cracking pressure.
3 Run the out port of Q-T/G** type 1 and 4 directly to the tank.
4 The following describes the method for using Types 2 and 3. Application of back pressure to the valve output side such as in the example circuit shown below, use Type 2 or Type 3 and run the drain port directly to the tank.
5 When two or more of these valves are ganged in sequence, make sure the setting pressure (cracking pressure) differential between them is at least 145 psi.
6 Vibration (chattering) may occur with the (C) Q-***-1E-21 depending on operating conditions when using type 1 and pressure adjustment range E. Use external drain type 2E if it happens.
7 Type 2 is standard. When Type 1, 3, or 4 is required, make modifications in accordance with the figures on the next page. Modifications change the valve type, so be sure to change the markings on the nameplate.
8 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Weight lbs	Applicable Valve Model
MG-03-20	3/8	3.5	(C)Q-G03-**-21
MG-03X-20	1/2		
MG-06-20	3/4	8.5	(C)Q-G06-**-21
MG-06X-20	1		
MG-10-20	1¼	14.7	(C)Q-G10-**-21
MG-10X-20	1½		

Note: These sub plates can also be used for reducing valves.

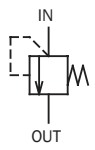
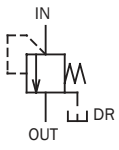
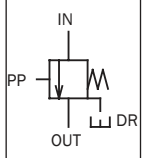
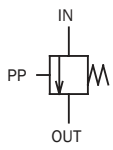
The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
(C)Q-G03-**-21	M10 × 75	4	33 to 40
(C)Q-G06-**-21	M10 × 85	4	
(C)Q-G10-**-21	M10 × 105	6	

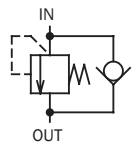
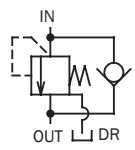
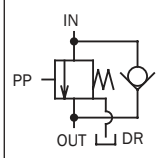
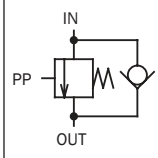
Note: For mounting bolts, use 12T or equivalent.

Performance Curves

Q-***-**-21

Type	Type 2	Type 3	Type 4
			

CQ-***-**-21

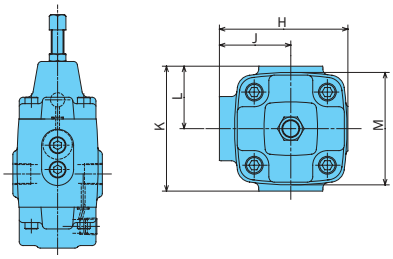
Type	Type 2	Type 3	Type 4
			

Type 2 is standard.

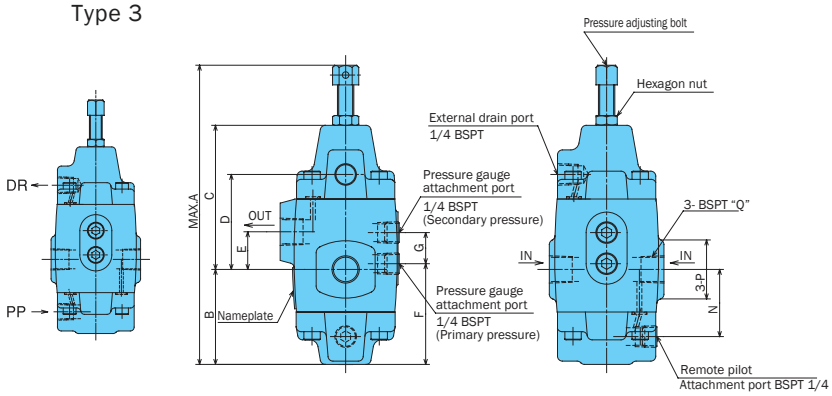
Installation Dimension Drawing

Q-T**-2*-21 (Screw Mounting)

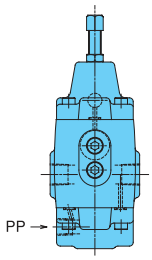
Type 1



Type 3



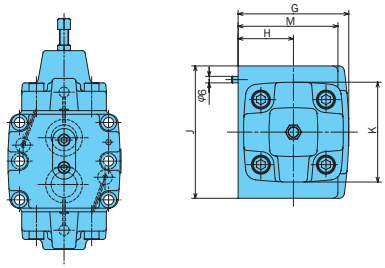
Type 4



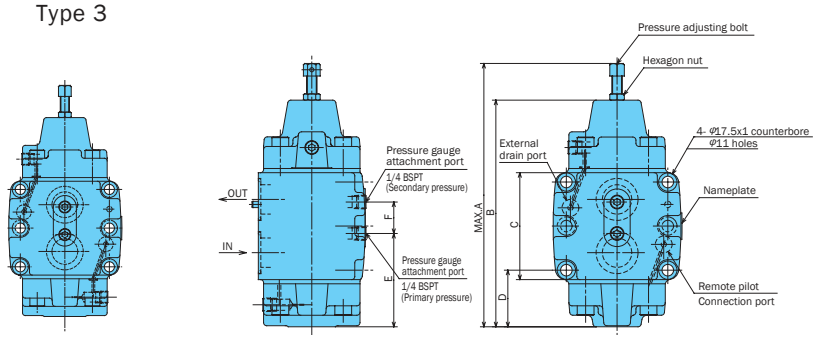
Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
(C)Q-T03-**-21	179.5	58	88	58	23	61.5	19	72	40	70	35	63	41	36	3/8
(C)Q-T06-**-21	204.5	69.5	101.5	71.5	27	85	24	87	50	95	47.5	73	52.5	54	3/4
(C)Q-T10-**-21	251	83.5	132.5	87.5	28	89	30	116	68.5	108	54	95	62.5	69	1¼

Q-G**-2*-21 (Gasket Mounting)

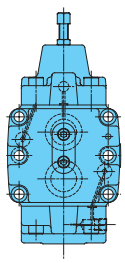
Type 1



Type 3



Type 4

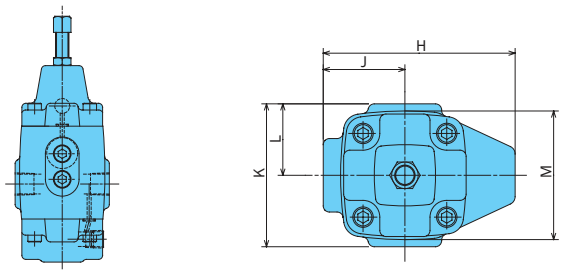


Model No.	A	B	C	D	E	F	G	H	J	K	L	M
Q-G03-**-21	179.5	146	62	45.1	61.5	19	72	35	88	60	4	60
Q-G06-**-21	204.5	171	82	51.4	75	24	80	40	102	70	4	70
Q-G10-**-21	251	216	102	54	89	30	102	51	122	92	6	92

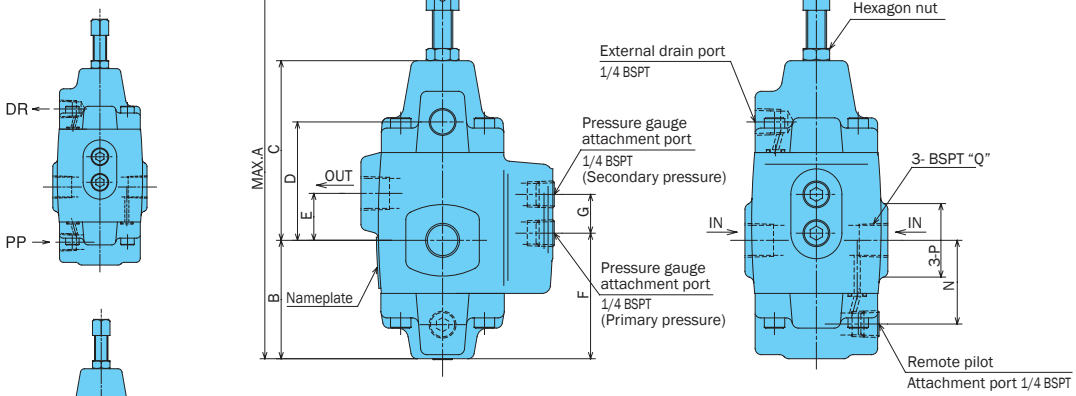
Installation Dimension Drawing

CQ-T**-2*-21 (Screw Mounting)

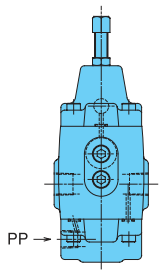
Type 1



Type 3



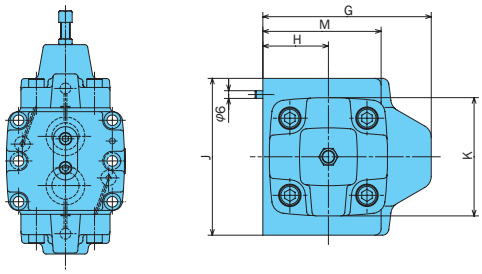
Type 4



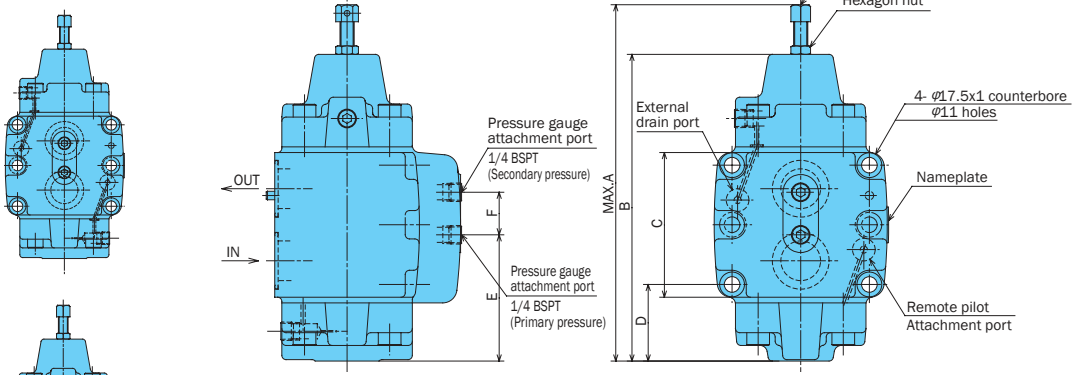
Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
CQ-T03-**-21	179.5	58	88	58	23	61.5	19	94	40	70	35	63	41	36	3/8
CQ-T06-**-21	204.5	69.5	101.5	81.5	27	75	24	110	50	95	47.5	73	52.5	54	3/4
CQ-T10-**-21	251	83.5	132.5	87.5	28	89	30	148.5	68.5	108	54	95	62.5	69	1¼

CQ-G**-2*-21 (Gasket Mounting)

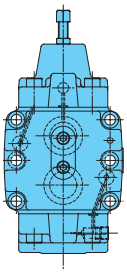
Type 1



Type 3

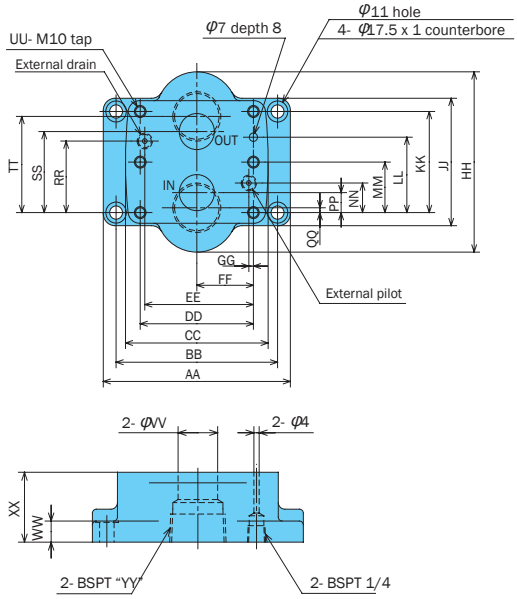


Type 4



Model No.	A	B	C	D	E	F	G	H	J	K	L	M
CQ-G03-**-21	179.5	146	62	45.1	61.5	19	89	35	88	60	4	60
CQ-G06-**-21	204.5	171	82	51.4	75	24	100	40	102	70	4	70
CQ-G10-**-21	251	216	102	54	89	30	131	51	122	92	6	92

Sub Plate MG-***-20



Note 1: The figure shows size 10(X), with four M10 tap holes for size 03(X) and 06(X) valve mounting bolts.
Note 2: When a valve cover external drain and external pilot port are used, remove the plugs from the sub plate external drain and external pilot port.

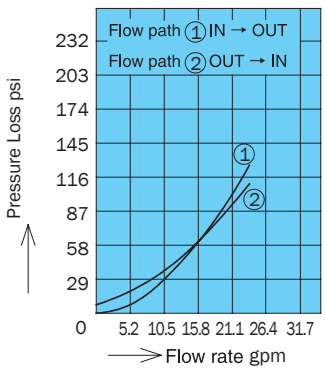
Model No.	A A	BB	CC	DD	EE	FF	GG	HH	J J	K K	LL	M M	NN	PP	QQ	RR	SS	TT	UU	V V	W W	XX	YY
MG-03-20	128	106.4	88	66.6	58.7	33.3	7.9	76	62	42.9	31.8	–	21.4	7.2	3.5	21.4	35.7	39.5	4	14	11	30	3/8
MG-03X-20																							1/2
MG-06-20	160	123.8	102	79.3	72.9	39.7	6.4	110	82	60.3	44.5	–	20.6	11.1	3.7	39.7	49.2	56.7	4	22	16	40	3/4
MG-06X-20																							1
MG-10-20	160	138.1	122	96.8	92.9	48.4	3.9	150	102	84.1	62.7	42.1	24.6	16.7	4.1	59.5	67.5	80.1	6	30	16	53	$1\frac{1}{4}$
MG-10X-20																							$1\frac{1}{2}$

Performance Curves

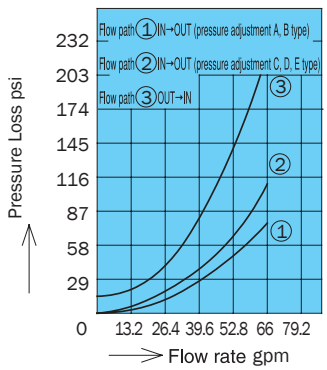
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

(C)Q-T03-**-21



(C)Q-T06-**-21



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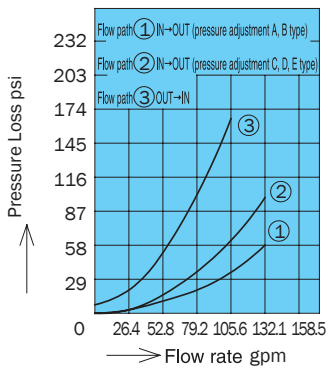

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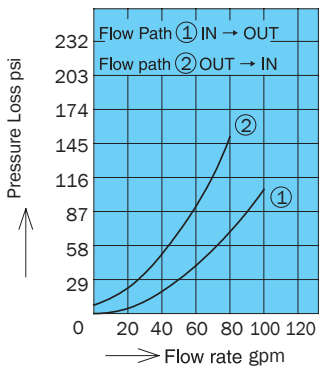

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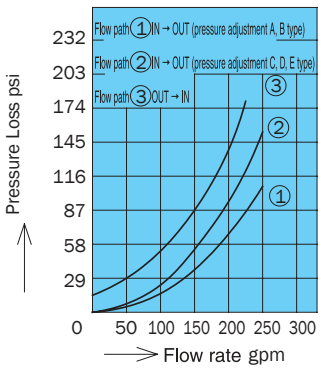

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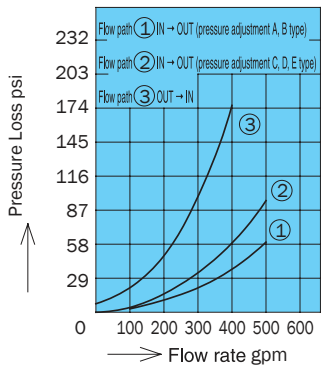
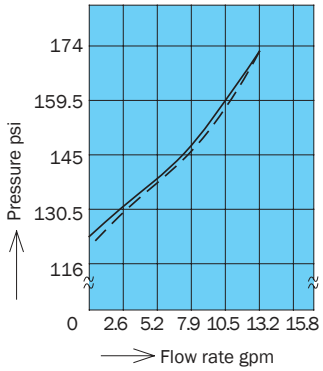
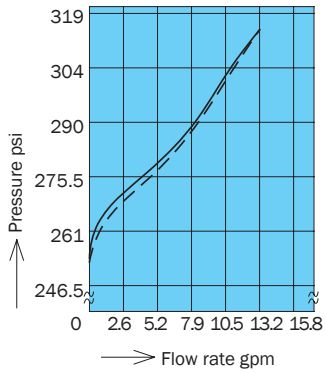


Pressure – Flow Rate Characteristics (——— : Press rise ----- : Pressure drop)

(C)Q-*03-2A-21



(C)Q-*03-2B-21



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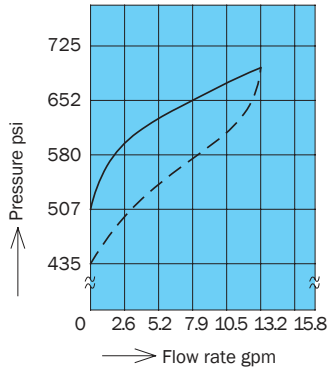

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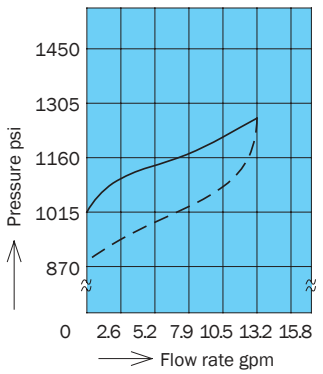

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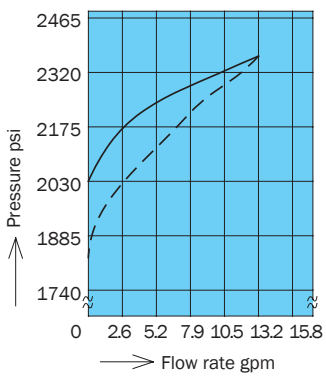

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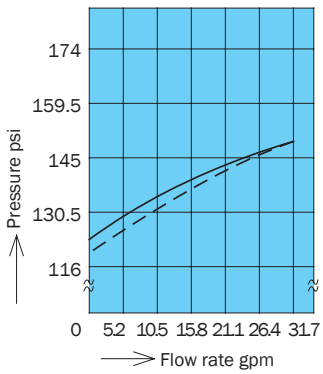

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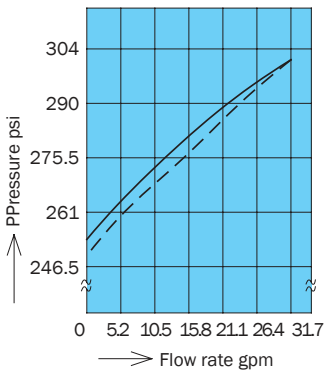

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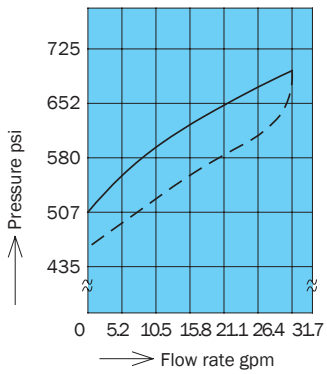
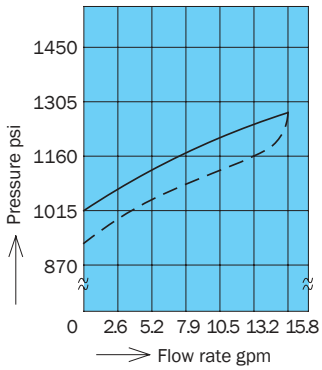
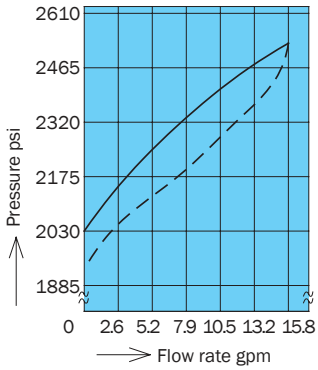


Pressure – Flow Rate Characteristics (——— : Press rise ----- : Pressure drop)

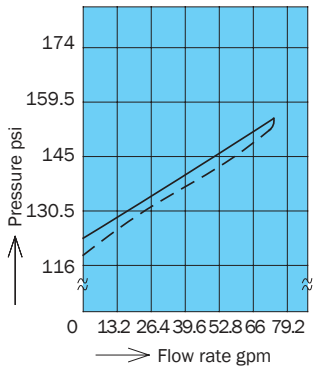
(C)Q-*06-2D-21



(C)Q-*06-2E-21



(C)Q-*10-2A-21



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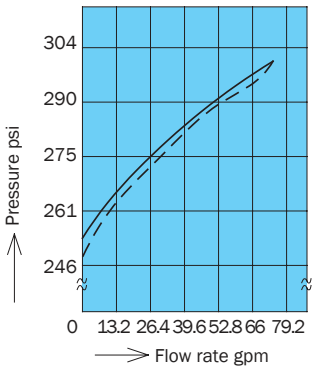

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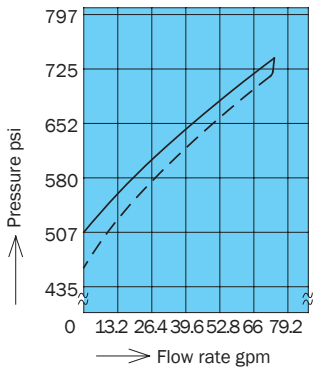

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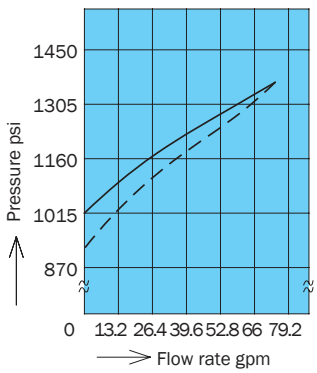

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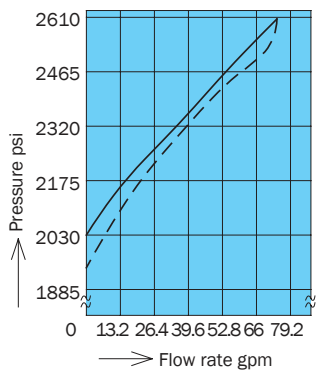
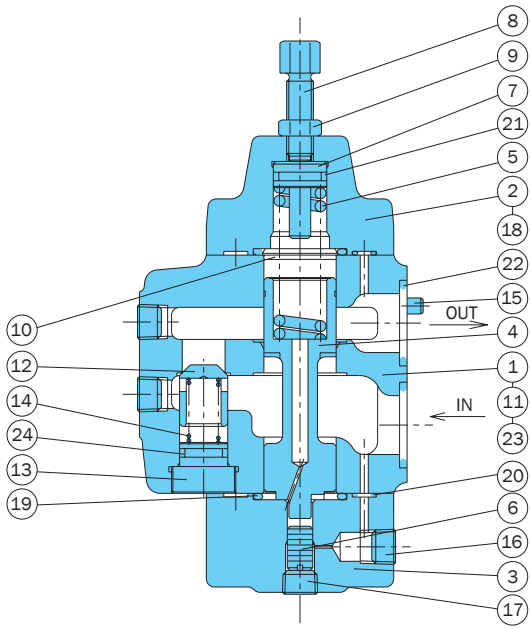


CQ-G**-**-21



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Piston
5	Spring
6	Plunger
7	Push rod
8	Screw
9	Nut
10	Spacer
11	Nameplate
12	Poppet
13	Spring guide
14	Spring
15	Pin
16	Plug
17	Plug
18	Screw
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	O-ring
24	O-ring

Note: The illustration shows the configuration for pressure adjustment ranges Type C, Type D, and Type E. For Type A and Type B, the #6 piston is eliminated, and the #4 spool and #5 spring are different.

Note: Part numbers 12, 13, 14, and 24 are not required when there is no check valve.

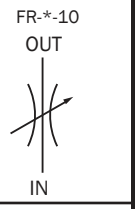
Seal Part List (Kit Model Number RQBS-***(C))

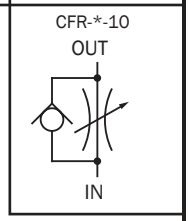
Part No.	Part Name	Type/Part Number						Q'ty
		CQ-G03-**-21	CQ-T03-**-21	CQ-G06-**-21	CQ-T06-**-21	CQ-G10-**-21	CQ-T10-**-21	
19	O-ring	1B-P22	1B-P22	1B-G30	1B-G30	1B-P40	1B-G40	2
20	O-ring	1B-P6	1B-P6	1B-P6	1B-P6	1B-P6	1B-P6	4
21	O-ring	1B-P11	1B-P11	1B-P16	1B-P16	1B-P22A	1B-P22A	1
22	O-ring	1B-P20	–	1B-P26	–	1B-G35	–	2
23	O-ring	1B-P12	–	1B-P12	–	1B-P12	–	2
24	O-ring	1B-P11	1B-P11	1B-P14	1B-P14	1B-P22	1B-P22	1

Note: O-ring 1B-** refers to JIS B2401-1B-**.
For the *** part of the kit number, specify the valve size (G03, T06). To specify inclusion of a check valve, add C to the end.

Throttle (and Check) Valve

50 gpm
3045 psi





Features

Compact and lightweight, requires very little space for installation.
Special needle valve configuration provides smooth flow rate control.

Pressure is internally balanced for light handle operation, even at high pressure.

Specifications

Model No.		Nominal Diameter (Size)	Maximum Flow Rate gpm	Cracking pressure psi	Maximum Working Pressure psi	Weight lbs	
Screw Mounting	Gasket Mounting					T Type	G Type
(C)FR-T03-10	(C)FR-G03-10	3/8	7.9	21.7	3045	2.8	3.7
(C)FR-T06-10	(C)FR-G06-10	3/4	19.8	14.5		6.6	8.1
(C)FR-T10-10	(C)FR-G10-10	1¼	50			12.3	12.7

• Handling

1 The control flow rate is increased by counter clockwise (leftward) rotation of the flow rate control handle.
2 The control flow rate does not become zero even if the handle is fully turned.
3 There is no pressure or temperature compensation mechanism.
4 Bi-directional restriction is possible when there is no check valve.
5 Use the table to the right for specification when a sub plate is required.
6 See the table to the right for installation hex socket bolts. However, bolts are not included for a screw mounting type.

Applicable Pump Model	Bolt Size	Q'ty	Tightening Torque ft lbs
(C)FR-G03-10	M8 × 65 ℓ	4	14.7 to 18.4
(C)FR-G06-10	M12 × 75 ℓ	4	55 to 70
(C)FR-G10-10	M14 × 90 ℓ	4	88 to 110

Note: For mounting bolts, use 12T or equivalent.

• Sub Plate

Model No.	Pipe Diameter	Recommended Flow Rate gpm	Weight lbs	Applicable Valve Type
MFR-03-10	3/8	7.9	2.2	(C)FR-G03-10
MFR-06-10	3/4	19.8	4.8	(C)FR-G06-10
MFR-10-10	1¼	50	9	(C)FR-G10-10

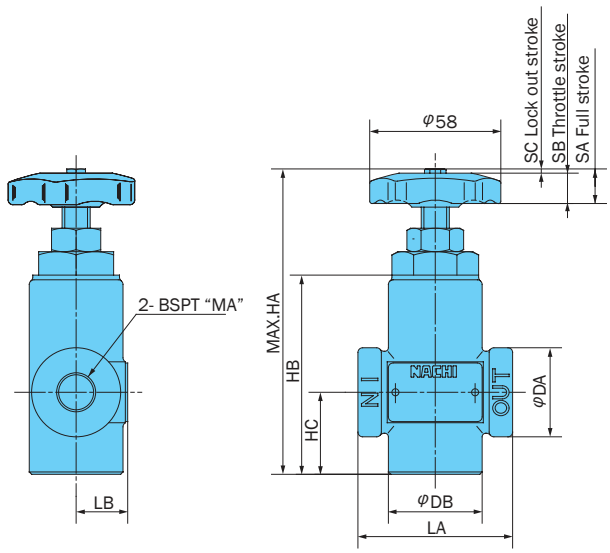
Understanding Model Numbers

(C)FR – G 03 – 10

- 10 — Design number
- 03 — Nominal diameter (size)
- G — Mounting method (T: Screw connection G: Gasket type)
- FR — Throttle valve
- (C) — Throttle and check valve

Installation Dimension Drawings

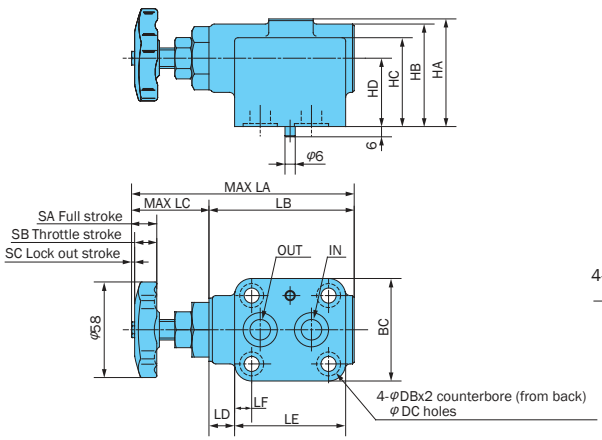
(C)FR-T**-10 (Screw Mounting)



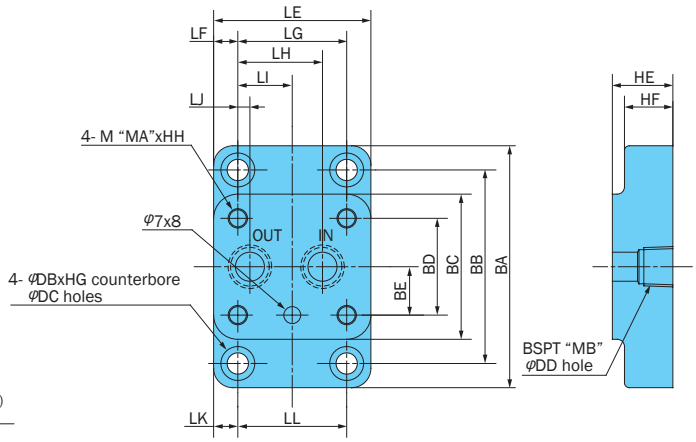
Model No.	LA	LB	DA	DB
(C)FR-T03-10	66	21.5	38	40
(C)FR-T06-10	95	30.5	55	55
(C)FR-T10-10	130	38.5	74	70

HA	HB	HC	SA	SB	SC	MA
130.5	85	35	7	6	1	3/8
175.5	123	55	10	9	1	3/4
206.5	150	70	14	12	2	$1\frac{1}{4}$

(C)FR-G**-10 (Gasket Mounting)



Sub Plate MFR-**-10



DB	DC	DD	MA	MB	SA	SB	SC
14	8.8	12	8	3/8	7	6	1
20	13	20	12	3/4	10	9	1
23	15	30	14	$1\frac{1}{4}$	14	12	2

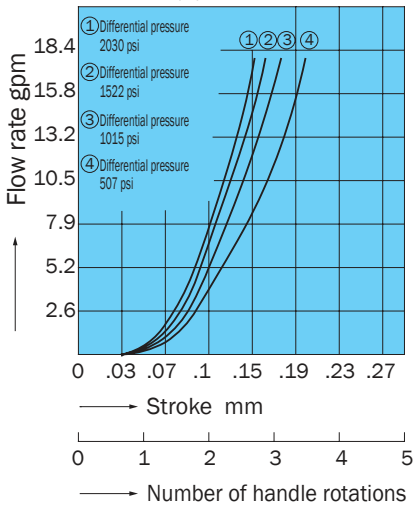
Model Number	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	BA	BB	BC	BD	BE	HA	HB	HC	HD	HE	HF	HG	HH
(C)FR-G03-10	130.5	85	45	15	65	10	45	35	22.5	5	10	45	100	80	60	40	20	63	60	52	40	25	20	8.6	18
(C)FR-G06-10	175.5	123	52	14	96	13	70	55	35	15	14	68	132	106	80	54	27	71	68	57	40	30	25	13	20
(C)FR-G10-10	206.5	150	56	14	120	15	90	72.5	45	17.5	16	88	154	122	90	60	30	83	80	68	45	40	35	15.2	25

Performance Curves

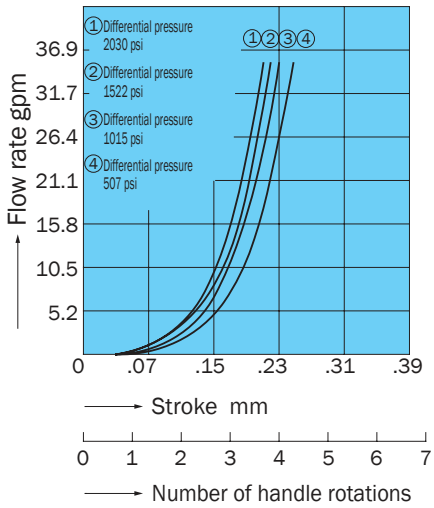
Hydraulic Operating Fluid Viscosity 32 centistokes

Stroke – Flow Rate Characteristics

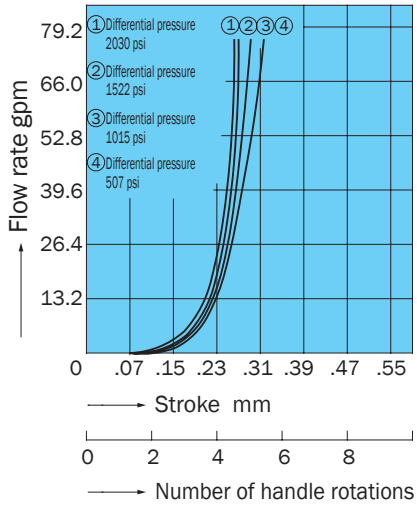
(C)FR-*03-10



(C)FR-*06-10



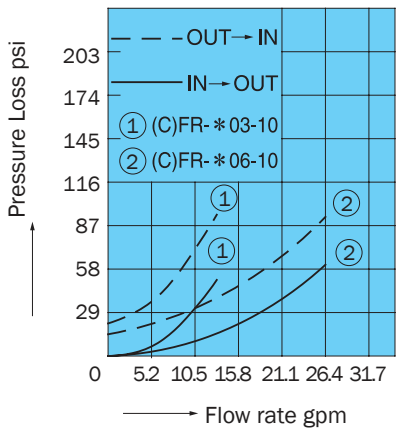
(C)FR-*10-10



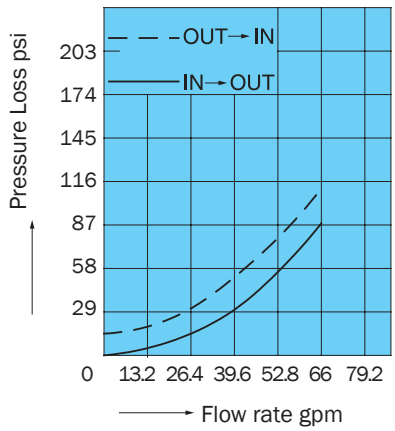
Pressure Loss Characteristics

(C)FR-*03-10

(C)FR-*06-10

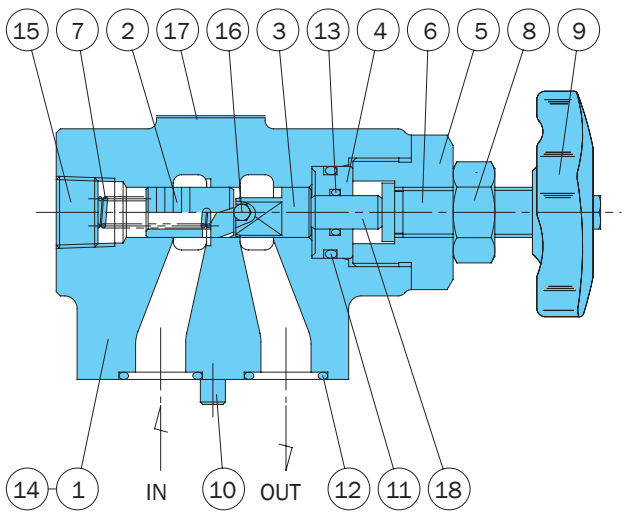


(C)FR-*10-10



Cross-sectional Drawing

CFR-G**-10



Part No.	Part Name
1	Body
2	Poppet
3	Piston
4	Bracket
5	Stopper
6	Screw
7	Spring
8	Nut
9	Handle
10	Pin
11	O-ring
12	O-ring
13	O-ring
14	Plug
15	Plug
16	Ball
17	Plate
18	Rod

Seal Part List (Kit Model Number FSS-***)

Part No.	Part Name	CFR-G03-10		CFR-G06-10		CFR-G10-10	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
11	O-ring	IB-P18	1	IB-G25	1	IB-G25	1
12	O-ring	IB-P16	2	IB-G25	2	IB-G35	2
13	O-ring	IB-P8	1	IB-P8	1	IB-P8	1

Note: O-ring 1B-** refers to JIS B2401-1B-**.
*** in the kit number is used for specification of the valve size (G03, T06, etc.)

NACHI

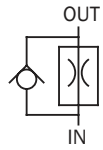
Temperature Compensated Flow Control (and Check) Valve

FT Type Flow Control (and Check) Valve (with Pressure and Temperature Compensation)

.01 to 28 gpm
3045 psi

FT-G0*-**-22

CFT-G02-*-22



Features

Pressure compensation and temperature compensation mechanisms provide a stable control flow rate, even when fluid temperature fluctuates.
A wider control flow rate range as well as easier minute flow rate adjustability than previous products.

Specifications

Model No.	Nominal Diameter (Size)	Volume control flow rate gpm	Maximum Working Pressure psi	Reverse Flow Rate gpm	Cracking pressure psi	Weight lbs	Gasket Surface Dimensions
(C)FT-G02-8-22 30-22	1/4	.01 to 2.1 .02 to 7.9	3045	13.2	14.5	8.1	ISO 6263-AK-06-2-A
FT-G03-42-22 106-22	3/8	.02 to 11.0 .05 to 28.0		31.7		17.4	ISO 6263-AM-07-2-A

Asterisk (*) indicates values for auxiliary plate with check valve.

• Handling

1 In the temperature range of 68°F to 140°F, flow rate fluctuation is within ±5% of the standard flow rate at 104°F.
2 In the pressure range of 145 to 3045 psi, flow rate fluctuation is within ±5% of the setting flow rate.
3 Note that flow rate fluctuation exceeds the rated fluctuation amount slightly in the vicinity of the minimum control flow rate, due to changes in operating temperature and hydraulic fluid viscosity.
4 When controlling flow rates that are less than .05 gpm, use with a filter that does not exceed 10μm.
5 For flow rate control, make sure that the pressure differential between the input port and output port is at least 145 psi.
6 The control flow rate is increased by clockwise (rightward) rotation of the control handle.
7 See the table below for installation hex socket bolts.
8 Use the following table for specification when a sub plate is required.

• Sub Plate and Auxiliary Plate Application Table

Name	Model No.	Pipe Diameter	Recommended Flow Rate gpm	Weight lbs	Applicable Valve Type	Use With Sub Plate
Sub Plate	MF-02X-10	3/8	7.9	4.8	(C)FT-G02-*-22	–
	MF-02Y-20	1/2	13.2			
Sub Plate	MF-03-10	3/8	11	7.2	FT-G03-**-22	–
	MF-03Y-20	3/4	19.8			
	MF-03Z-20	1	31.7	10.3		
Sub Plate with Check Valve	MF-03Y-C-22	3/4	19.8	12.5		
	MF-03Z-C-22	1	31.7	12.3		
Auxiliary Plate A with Check Valve	MCF-03-A-22	φ23	31.7	7.0		MF-03*-*

9 Though FT-G03 does not have a built-in check valve, a sub plate with check valve and auxiliary plate with check valve is used in addition to the normal sub-plate. (Use the auxiliary plate in combination with the sub plate.)

Applicable Model	Bolt Size	Q'ty	Tightening Torque ft lbs
(G)FT-G02-*-22	M8 × 55 ℓ	4	14.7 to 18.4
FT-G03-*-22	M10 × 75 ℓ	4	55 to 70
With FT-G03 Auxiliary Plate	M10 × 110 ℓ	4	55 to 70

Note: For mounting bolts, use grade 8 or equivalent.

Understanding Model Numbers

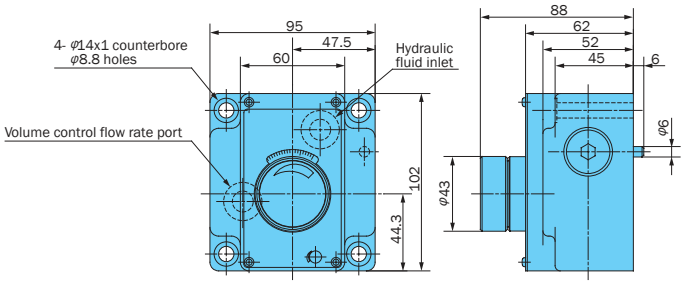
(C) FT – G 02 – 8 – (F) – 22

- 22 — Design number
- (F) — Anti-jumping mechanism (option)
- 8 — Maximum control flow rate
- 02 — Nominal diameter (size)
- G — Mounting method G: Gasket type
- FT — Temperature compensated flow control valve
- (C) — Temperature compensated flow control and check valve

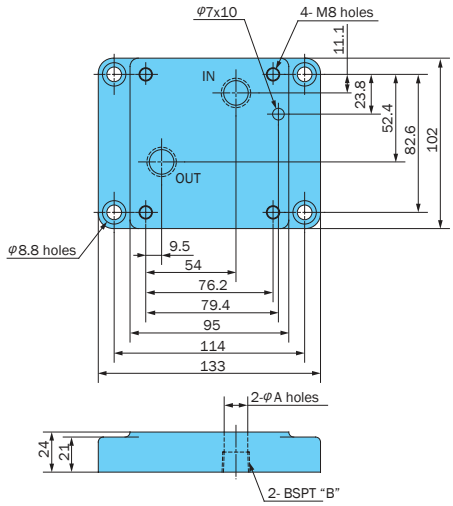
J
Flow Control Valves

Installation Dimension Drawings

(C)FT-G02-**-22

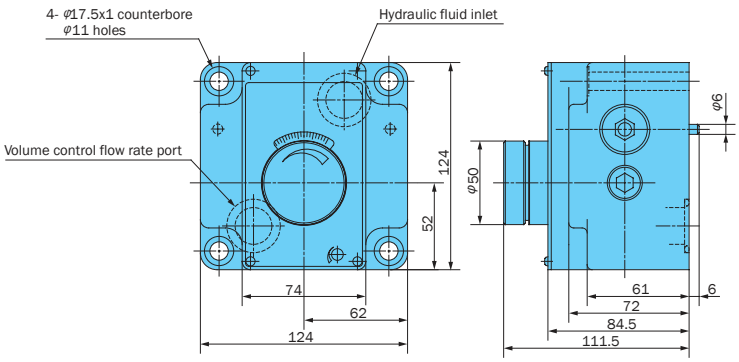


Sub Plate MF-02*-*



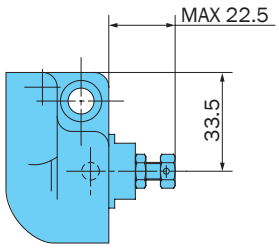
Sub Plate	A	B
MF-02X-10	14.7	3/8
MF-02Y-20	17	1/2

FT-G03-***-22

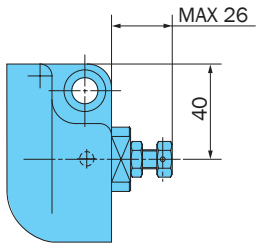


Anti-jumping mechanism

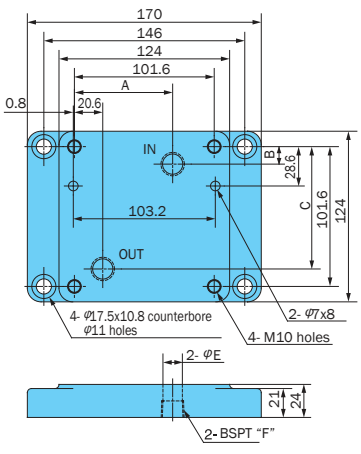
(C)FT-G02-*-F-22



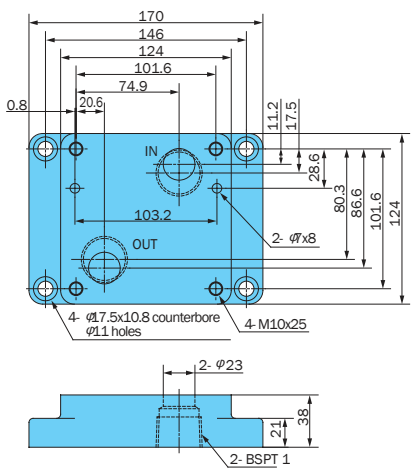
(C)FT-G03-**-F-22



Sub Plate MF-03-10
MF-03Y-20

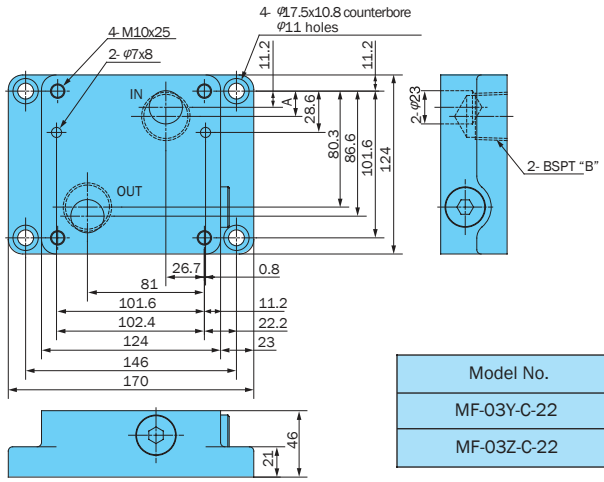


MF-03Z-20



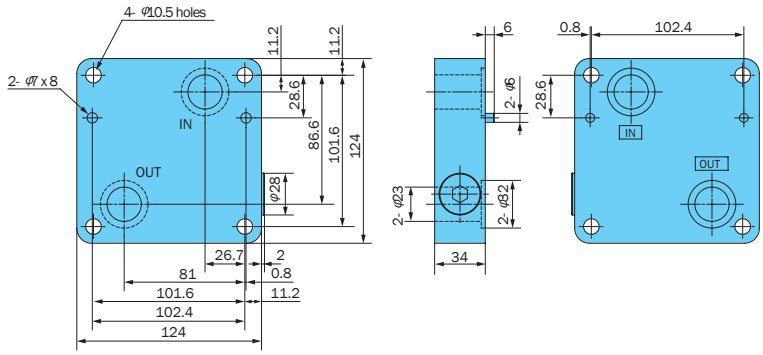
Sub Plate	A	B	C	E	F
MF-03-10	71.4	12.7	88.9	14.7	3/8
MF-03Y-20	74.9	11.2	86.6	23.0	3/4

Sub Plate with Check Valve MF-03*-C-22



Model No.	A	B
MF-03Y-C-22	11.2	3/4
MF-03Z-C-22	17.5	1

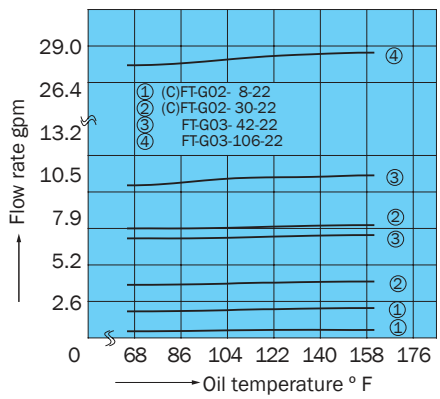
Auxiliary Plate with Check Valve MCF-03-A-22



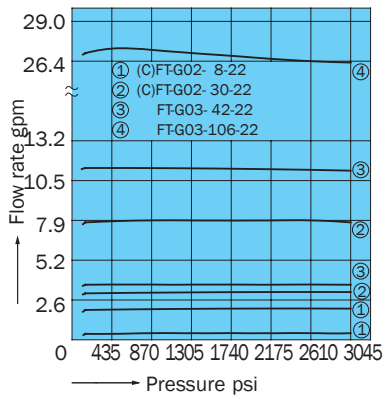
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

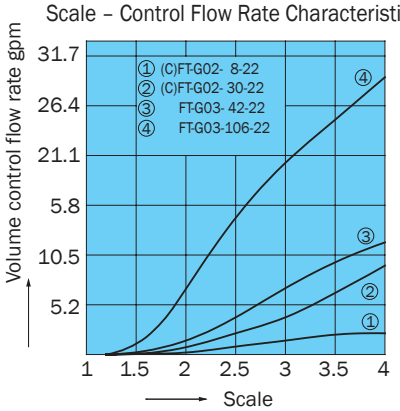
Fluid Temperature – Control Flow Rate Characteristics



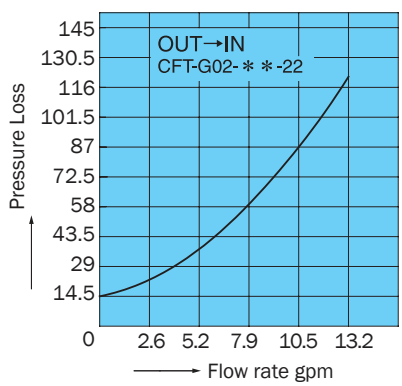
Pressure – Control Flow Rate Characteristics



Scale – Control Flow Rate Characteristics



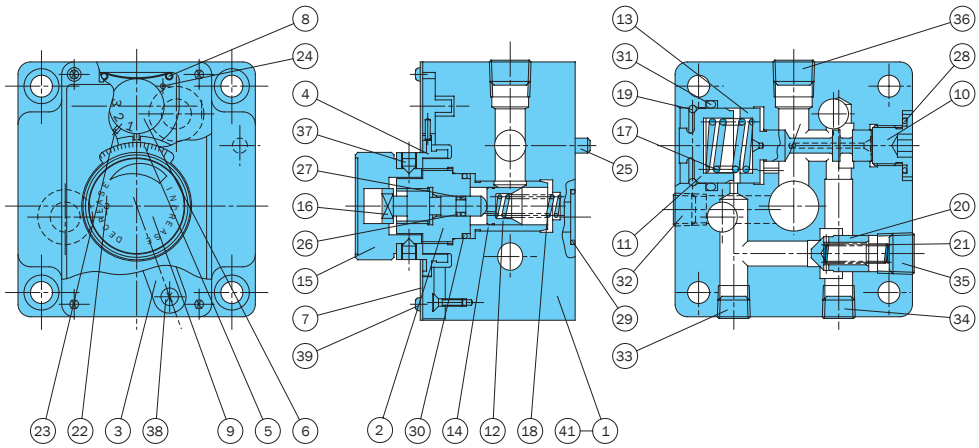
Pressure Loss Characteristics



Cross-sectional Drawing

Note: O-ring 1A/B-** refers to JIS B2401-1A/B.

CFT-G02-*-22



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	15	Knob	29	O-ring
2	Retainer	16	Screw	30	O-ring
3	Stopper	17	Spring	31	O-ring
4	Dial	18	Spring	32	Plug
5	Plate	19	Snap ring	33	Plug
6	Plate	20	Poppet	34	Plug
7	Plate	21	Spring	35	Plug
8	Spring	22	Pin	36	Plug
9	Plate	23	Pin	37	Screw
10	Plug	24	Pin	38	Screw
11	Plug	25	Pin	39	Screw
12	Throttle	26	Backup ring	40	Washer
13	Piston	27	O-ring	41	O-ring
14	Sleeve	28	O-ring		

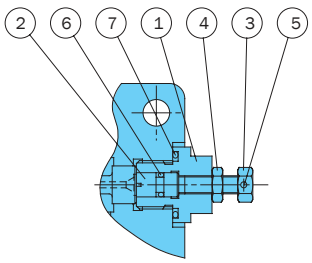
Seal Part List (Kit Model Number FBBS-***)

Part No.	Part Name	(C)FT-G02-*-22		FT-G03-*-22	
		Part Number	Q'ty	Part Number	Q'ty
26	Backup ring	T2-P5	1	T2-P5	1
27	O-ring	IB-P5	1	IB-P5	1
28	O-ring	IB-P18	1	IB-P20	1
29	O-ring	IB-P18	2	IB-P26	2
30	O-ring	IB-P22	1	IB-P26	1
31	O-ring	IB-P30	1	IB-P38	1
41	O-ring	–	–	IB-P20	1
Seal Kit Number		FBBS-G02-1A		FBBS-G03	

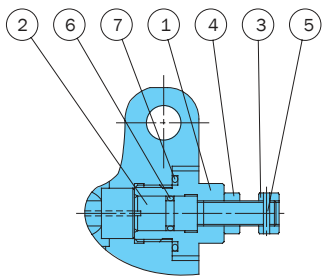
Note: 1.O-ring 1B-** refers to JIS B2401-1B-**.
2.Backup ring indicates JIS B2407-T2**.

Anti-jumping mechanism

(C)FT-G02-*-F-22



(C)FT-G03-*-22



Anti-jumping mechanism

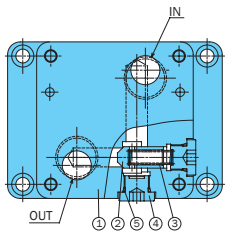
Part No.	Part Name
1	Retainer
2	Bolt
3	Nut
4	Nut
5	Spring pin
6	O-ring
7	O-ring

List of Sealing Parts

Part No.	Part Name	(C)FT-G02-*-22		FT-G03-*-22	
		Part Number	Q'ty	Part Number	Q'ty
6	O-ring	IB-P5	1	IB-P8	1
7	O-ring	IB-P18	1	IB-P20	1

Note: 1.O-ring 1B-** refers to JIS B2401-1B-**.
2.#7 O-ring and #29 O-ring are interchangeable.

Sub Plate MF-03*-C-22

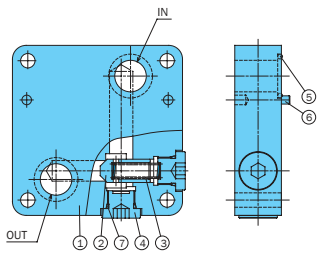


Part No.	Part Name	Part No.	Part Name
1	Sub Plate	4	Plug
2	Poppet	5	O-ring
3	Spring		

List of Sealing Parts

Part No.	Part Name	Part Number	Q'ty
5	O-ring	1B-P18	2

MCF-03-A-22



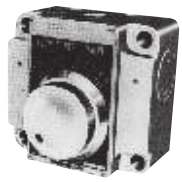
Part No.	Part Name	Part No.	Part Name
1	Sub Plate	5	O-ring
2	Poppet	6	Pin
3	Spring	7	O-ring
4	Plug	8	Screw

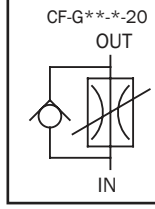
List of Sealing Parts

Part No.	Part Name	Part Number	Q'ty
5	O-ring	1B-P26	2
7	O-ring	1B-P18	2

F Type Flow Control (and Check) Valve (with Pressure Compensation)

2.3 to 98.5 gpm
3045 psi





Features

Wide control flow rate range.
A pressure compensation mechanism ensures that the control flow rate does not change, even when there is pressure fluctuation.

Specifications

Model No.	Nominal Diameter (Size)	Volume control flow rate gpm	Maximum Working Pressure psi	Cracking pressure psi	Weight lbs	Gasket Surface Dimensions
(C)F-G06-170-20	3/4	2.3 to 44.9	3045	14.5	45.2	ISO 6263-AP-08-2-A
(C)F-G10-373-20	1¼	5.2 to 98.5			95	–

• Handling

1 In the pressure range of 145 to 3045 psi, flow rate fluctuation is within ±5% of the setting flow rate.
2 For flow rate control, make sure that the pressure differential between the input port and output port is at least 145 psi.
3 The control flow rate is increased by clockwise (rightward) rotation of the control handle.
4 See the table below for installation hex socket bolts.
5 Use the following table for specification when a sub plate is required.

Sub Plate Application Table

Model No.	Pipe Diameter	Recommended Flow Rate gpm	Weight lbs	Applicable Valve Type
MF-06-10	3/4	28	13.8	(C)F-G06-170-20
MF-06X-20	1	44.9	21.3	
MF-10-10	1¼	64.9	46.5	(C)F-G10-373-20

Applicable Model	Bolt Size	Q'ty	Tightening Torque ft lbs
(C)F-G06	M16 × 100 ℓ	4	140 to 173
(C)F-G10	M20 × 115 ℓ	4	272 to 339

Note: For mounting bolts, use 12T or equivalent.

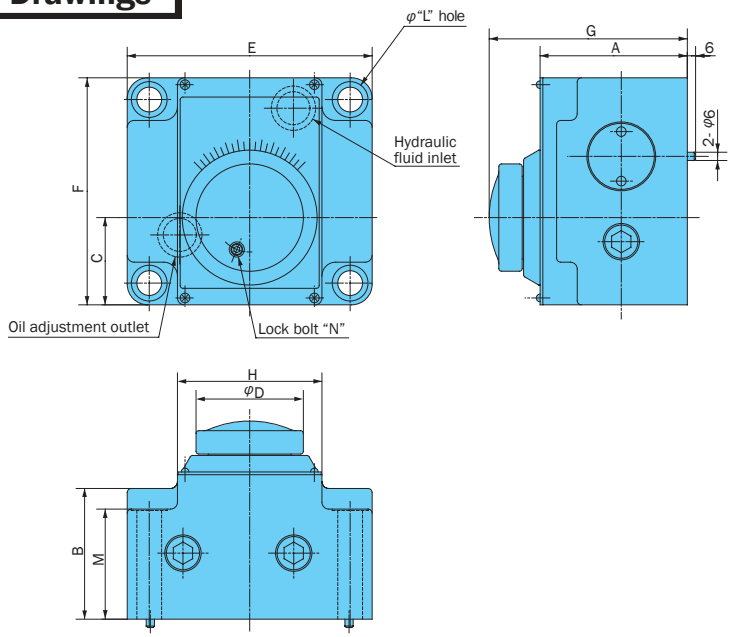
Understanding Model Numbers

(C) F – G 06 – 170 – 20

- 20: Design number
- 170: Maximum control flow rate
- 06: Nominal diameter (size)
- G: Mounting method G: Gasket type
- F: Flow control valve
- (C): Flow control and check valve

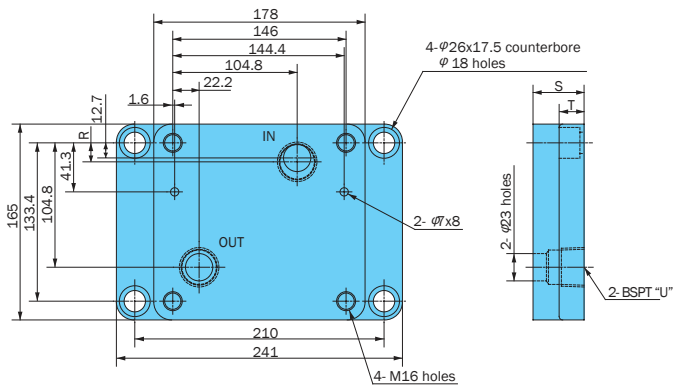
Installation Dimension Drawings

(C)F-G**-*-20



Model No.	Dimensions mm												
	A	B	C	D	E	F	G	H	J	K	L	M	N
(C)F-G06-*-20	107	95	63.4	80	178	165	144.5	105	26	1	18	80	M5
(C)F-G10-*-20	124	108	81.8	90	245	225	169.5	140	32	1	22	89	M6

Sub Plate MF-06*-20

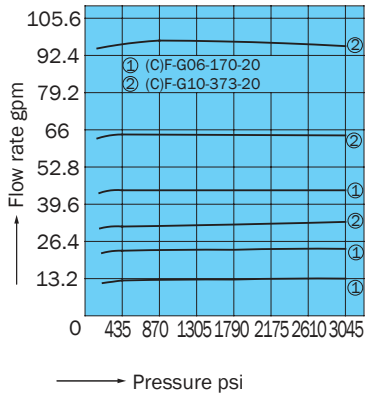


Sub Plate	Dimensions mm			
	R	S	T	U
MF-06-20	12.7	25	22	3/4
MF-06X-20	16	43	21	1

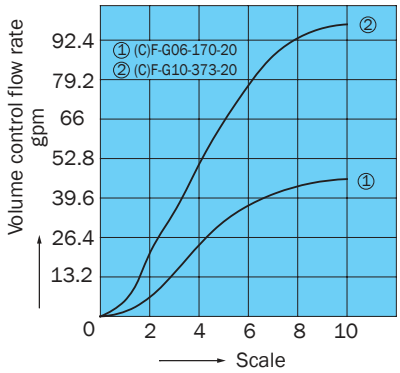
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

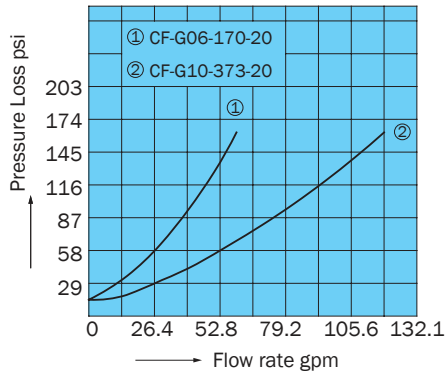
Pressure – Control Flow Rate Characteristics



Scale – Control Flow Rate Characteristics

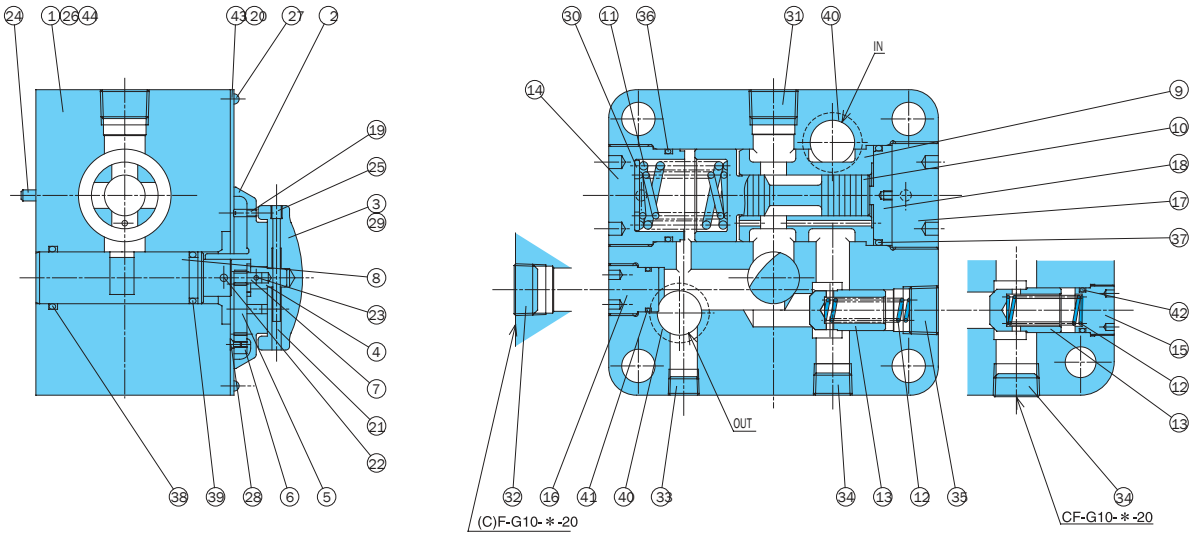


Pressure Loss Characteristics



Cross-sectional Drawing

CF-G**-***-20



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	9	Sleeve	18	Retainer	27	Screw	36	O-ring
2	Cover	10	Piston	19	Stopper	28	Screw	37	O-ring
3	Knob	11	Spring	20	Pin	29	Screw	38	O-ring
4	Gear	12	Spring	21	Pin	30	Washer	39	O-ring
5	Gea	13	Poppet	22	Pin	31	Plug	40	O-ring
6	Gear	14	Plug	23	Pin	32	Plug	41	O-ring
7	Bushing	15	Plug	24	Pin	33	Plug	42	O-ring
8	Throttle	16	Plug	25	Screw	34	Plug	43	Plate
		17	Plug	26	Screw	35	Plug	44	Screw

Seal Part List (Kit Model Number FBBS-***)

Part No.	Part Name	CF-G06-170-20		CF-G10-373-20	
		Part Number	Q'ty	Part Number	Q'ty
36	O-ring	IB-G45	1	IB-G60	1
37	O-ring	IB-P48	1	IB-G65	1
38	O-ring	IB-P28	1	IB-P45	1
39	O-ring	IB-P22A	1	IB-P39	1
40	O-ring	IB-P29	2	IB-P32	2
41	O-ring	IB-P20	1	–	–
42	O-ring	–	–	IB-P26	1

Note: O-ring 1B-** refers to JIS B2401-1B-**.
For the *** part of the kit number, specify the valve size (G06, G10).

NACHI

Temperature Compensated Flow Control (and Check) Valve

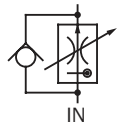
TN Type Flow Control (and Check) Valve

(Fine Adjustment Type with Pressure and Temperature Compensation)

.0079 to 2.1 gpm
1522 psi

TN-G02-*-11

CTN-G02-*-11



Features

With a very compact, lightweight configuration, the intelligent design of this valve makes it a low-cost option.
Minute flow rate control from 1.8 in³.

Stable control of each setting flow rate, even as pressure and fluid temperature are fluctuating. Dial markings are proportional to flow rate for simple and accurate control flow rate adjustment.

Specifications

Model No.	Nominal Diameter (Size)	Volume control flow rate gpm	Maximum Working Pressure psi	Reverse Flow Rate gpm	Cracking pressure psi	Weight lbs
(C)TN-G02-2-11 8-11	1/4	.007 to .52 .01 to 2.1	1522	9.2	14.5	4.8

• Handling

1 In the temperature range of 68° to 140° F, flow rate fluctuation is within ±5% of the standard flow rate at 104° F.
2 In the pressure range 145 to 1522 psi, flow rate fluctuation is within ±5% of the setting flow rate.
3 Note that flow rate fluctuation exceeds the rated flow rate fluctuation amount slightly in the vicinity of the minimum control flow rate, due to changes in operating temperature and hydraulic fluid viscosity.
4 When controlling flow rates that are less than .05 gpm, use with a filter that does not exceed 10μm.
5 Make sure that the pressure differential between the inlet port and outlet is at least 87 psi at 1 gpm or less, and at least 145 psi at 16 gpm or greater.
6 The control flow rate is increased by clockwise (rightward) rotation of the adjustment handle.
7 For connection to piping, normally connect to the sub plate. Valve mounting is gasket type, using an O-ring. When a screw in connection is required, seal the gasket surface, remove the side plug, and create a screw in connection directly to the valve unit. In this case, remove all seal material affixed to the plug.
8 Use the following table for specification when a sub plate is required.

Model No	Pipe Diameter	Recommended Flow Rate gpm	Weight lbs
MTL-03-10	3/8	9.2	2.8

9 Bundled Accessories: Hex Socket Bolts M8 x 60 ℓ, (four)
Note: 1.For mounting bolts, use 12T or equivalent.
2.Tightening torque is 14.7 to 18.4 ft lbs.

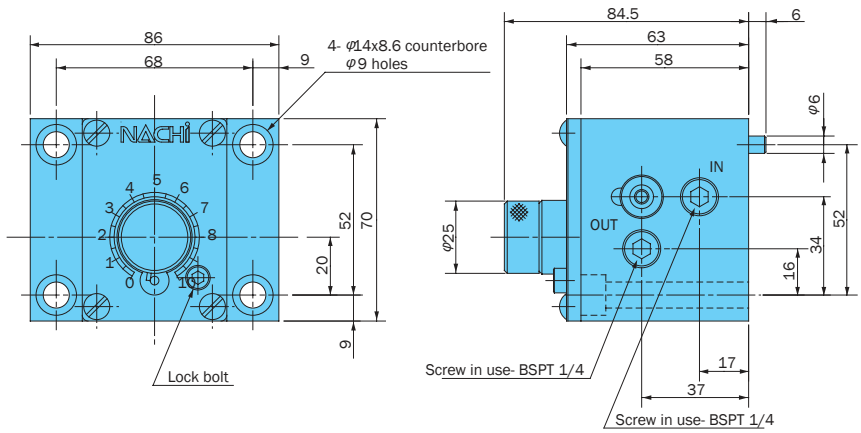
Understanding Model Numbers

(C) TN – G 02 – 2 – (F) – 11

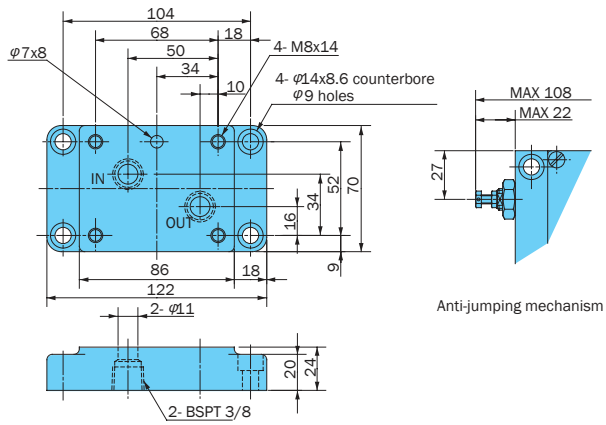
- 11: Design number
- (F): Anti-jumping mechanism (option)
- 2: Maximum control flow rate
- 02: Nominal diameter (size)
- G: Mounting method G: Gasket type
- TN: Flow control valve
- (C): Flow control and check valve

Installation Dimension Drawings

(C)TN-G02-**-11



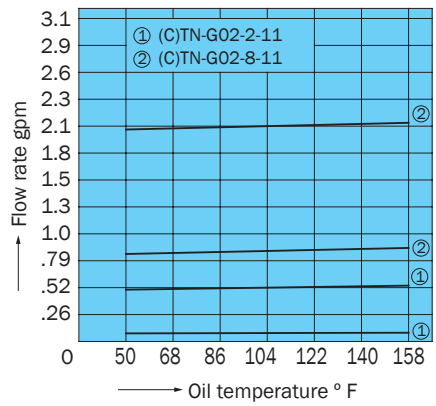
Sub Plate MTL-03-10



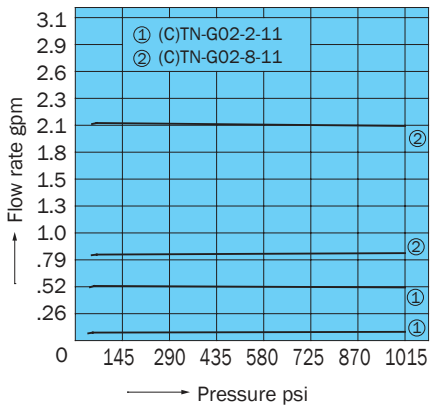
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

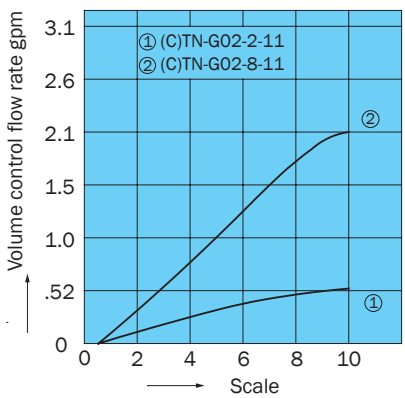
Fluid Temperature – Control Flow Rate Characteristics



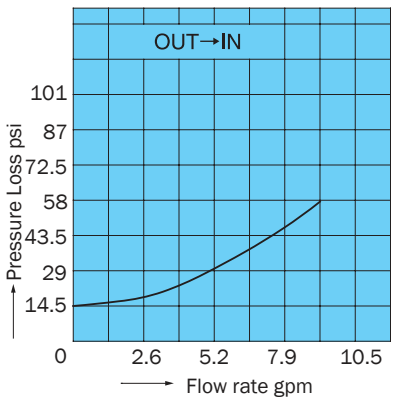
Pressure – Control Flow Rate Characteristics



Scale – Control Flow Rate Characteristics



Pressure Loss Characteristics

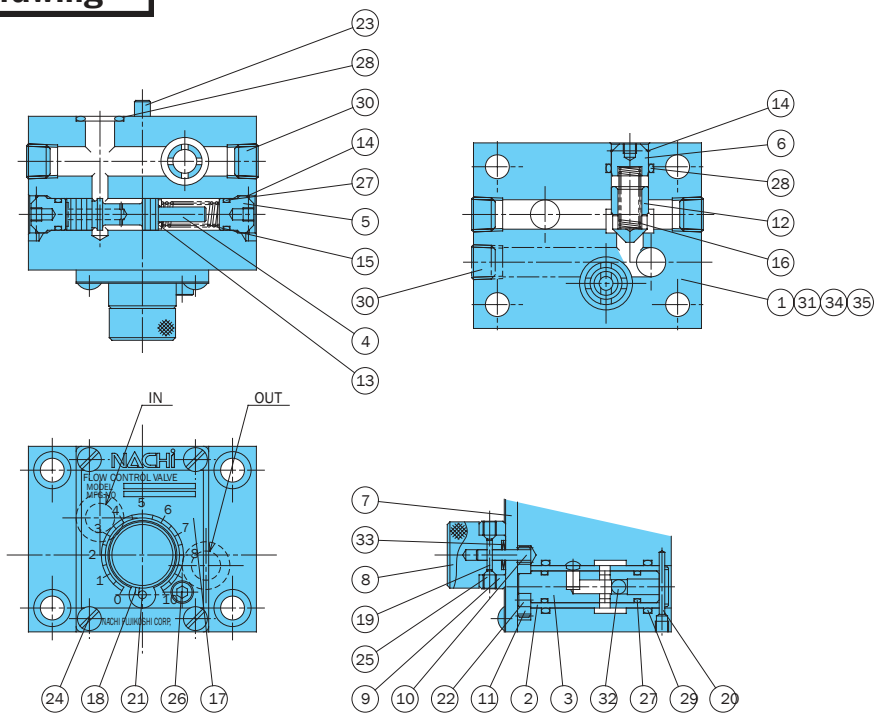


J

Flow Control Valves

Cross-sectional Drawing

CTN-G02-*-11



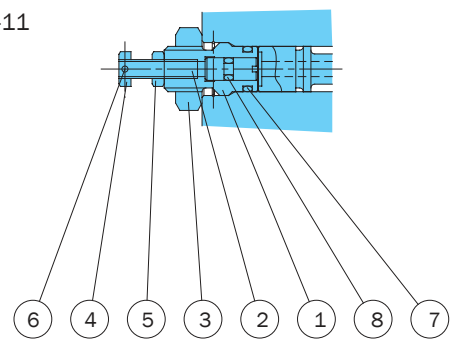
Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	13	Spacer	25	Screw
2	Sleeve	14	Snap ring	26	Screw
3	Spool	15	Spring	27	O-ring
4	Piston	16	Spring	28	O-ring
5	Plug	17	Plate	29	O-ring
6	Plug	18	Pin	30	Plug
7	Plate	19	Pin	31	Ball
8	Knob	20	Pin	32	Ball
9	Ring	21	Pin	33	Washer
10	Gear	22	Pin	34	Screw
11	Gear	23	Pin	35	Plate
12	Poppet	24	Screw		

Seal Part List (Kit Model Number FNS-G02(C))

Part No.	Part Name	TN-G02-*-11		CTN-G02-*-11	
		Part Number	Q'ty	Part Number	Q'ty
27	O-ring	IA-P9	4	IA-P9	4
28	O-ring	IA-P14	2	IA-P14	3
29	O-ring	IA-P16	2	IA-P16	2

Note: Specify C at the end of the model number for the CTN kit.
Note: O-ring 1A-** refers to JIS B2401-1A-**.

Anti-jumping mechanism
(C)TN-G02-*-F-11



Part No.	Part Name
1	Retainer
2	Bolt
3	Nut
4	Nut
5	Nut
6	Spring pin
7	O-ring
8	O-ring

Seal Part List

Part No.	Part Name	Part Number	Q'ty
7	O-ring	IA-P9	1
8	O-ring	IA-P3	1

Note: #7 O-ring and #27 O-ring are interchangeable.

NACHI

Temperature Compensated Flow Control (and Check) Valve

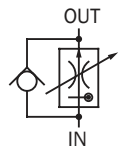
TS Type Flow Control (and Check) Valve

(Fine Adjustment Type with Pressure and Temperature Compensation)

.002 to .52 gpm
1522 psi

TS-G01-2-11

CTS-G01-2-11



Features

Original compact, lightweight configuration.
High-precision control up to minute flow rates of .61 in³.
Design allows large 5.2 gpm reverse flow rate relative to control flow rate, which means there is no need to include an extra valve in the quick return circuit.
Stable control of each setting flow rate, even as pressure and fluid temperature are fluctuating.

Specifications

Model No.	Nominal Diameter (Size)	Volume control flow rate gpm	Maximum Working Pressure psi	Reverse Flow Rate gpm	Cracking pressure psi	Weight lbs
(C)TS-G01-2-11	1/8	.002 to .52	1522	5.2	11.6	1.9

• Handling

1 In the temperature range of 68° to 140° F, flow rate fluctuation is within ±5% of the standard flow rate at 104° F.
2 In the pressure range of 87 to 1522 psi, flow rate fluctuation is within ±5% of the setting flow rate.
3 Note that flow rate fluctuation exceeds the rated fluctuation amount slightly in the vicinity of the minimum control flow rate, due to changes in operating temperature and hydraulic fluid viscosity.
4 When controlling flow rates that are less than .05 gpm, use with a filter that does not exceed 10 µm.
5 For flow rate control, make sure that the pressure differential between the input port and output port is at least 87 psi.
6 The control flow rate is increased by clockwise (rightward) rotation of the control handle.
7 Use the table to the right for specification when a sub plate is required.

Model No.	Pipe Diameter	Recommended Flow Rate gpm	Weight lbs
MTS-01Y-10	3/8	5.2	1.7

8 Bundled Accessories: Hex Socket Bolts: M4 x 35 ℓ (four)

Note: 1.For mounting bolts, use 12T or equivalent.
2.Tightening torque is 1.9 to 2.4 ft lbs.

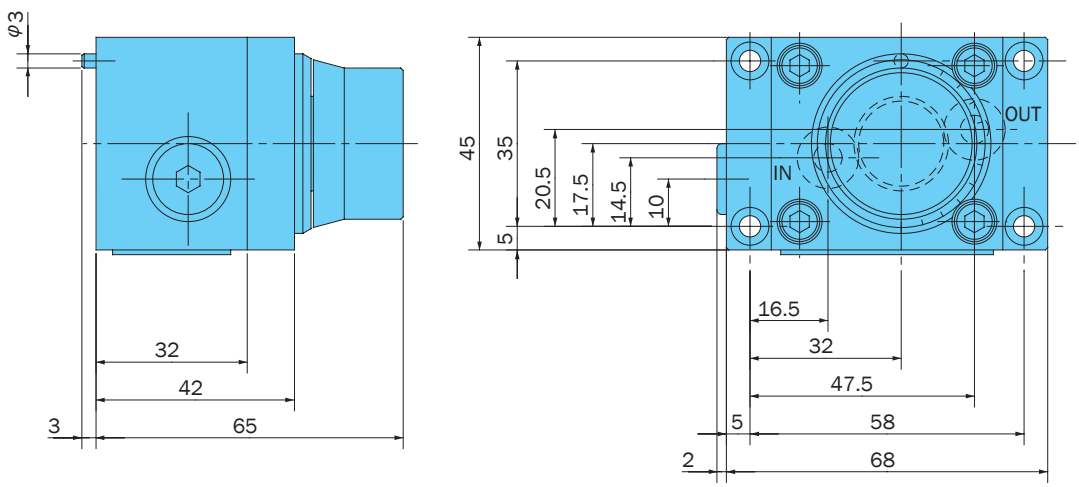
Understanding Model Numbers

(C) TS – G 01 – 2 – 11

- 11: Design number
- 2: Maximum control flow rate
- 01: Nominal diameter (size)
- G: Mounting method G: Gasket type
- TS: Flow control valve
- (C): Flow control and check valve

Installation Dimension Drawings

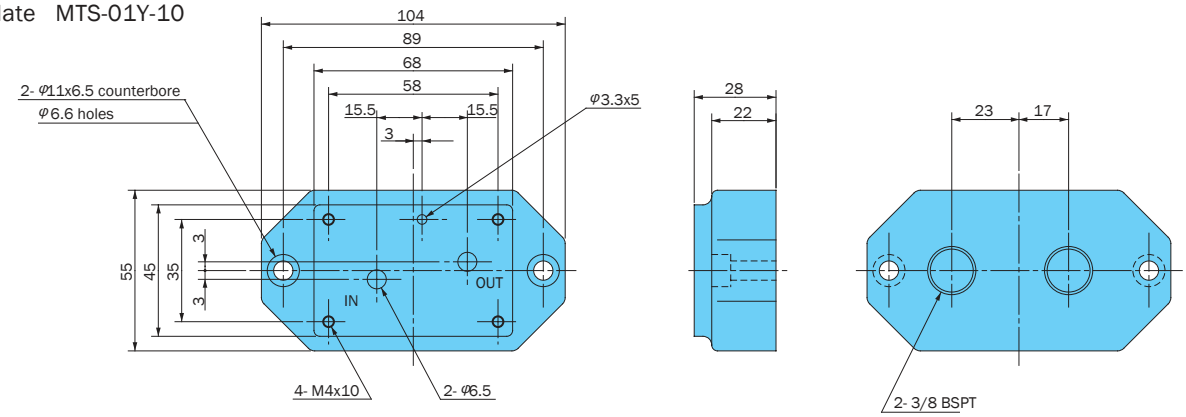
(C)TS-G01-2-11



J

Flow Control Valves

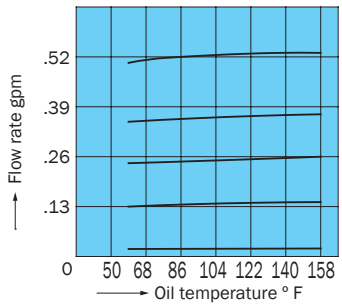
Sub Plate MTS-01Y-10



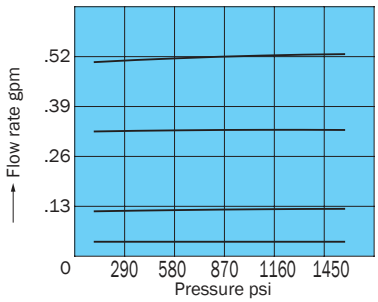
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

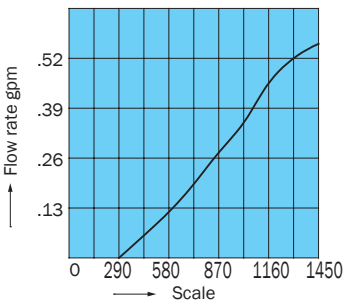
Fluid Temperature – Control Flow Rate Characteristics



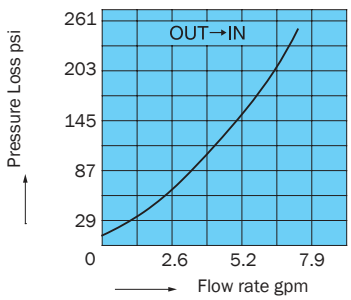
Pressure – Control Flow Rate Characteristics



Scale – Control Flow Rate Characteristics

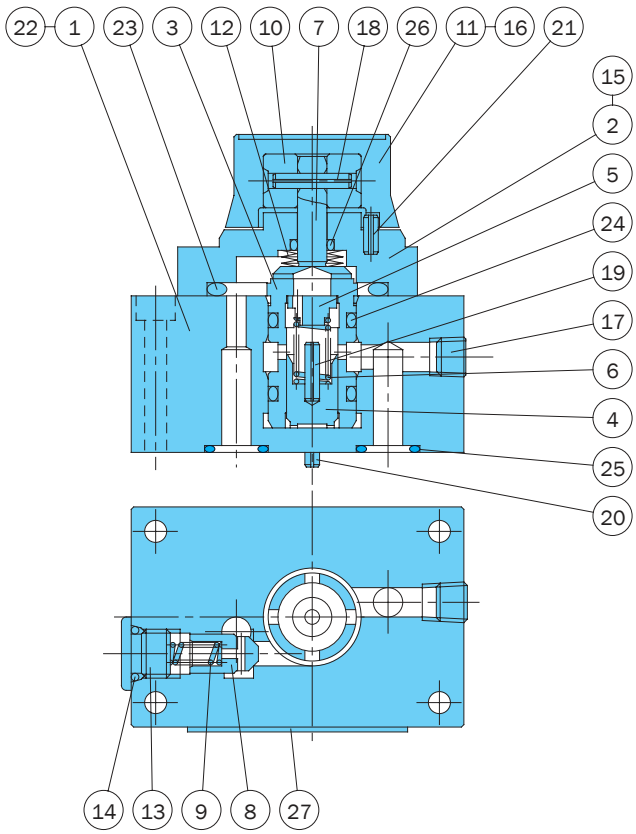


Pressure Loss Characteristics



Cross-sectional Drawing

CTS-G01-2-11



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	10	Spacer	19	Spring pin
2	Cover	11	Knob	20	Spring pin
3	Sleeve	12	Spring	21	Spring pin
4	Piston	13	Plug	22	Spring pin
5	Guide	14	O-ring	23	O-ring
6	Spring	15	Screw	24	O-ring
7	Throttle	16	Screw	25	O-ring
8	Poppet	17	Plug	26	O-ring
9	Spring	18	Spring pin	27	Nameplate

Seal Part List (Kit Model Number FKS-G01(C))

Part No.	Part Name	TS-G01-2-11		CTS-G01-2-11	
		Part Number	Q'ty	Part Number	Q'ty
14	O-ring	—	—	IB-P8	1
23	O-ring	IB-P31	1	IB-P31	1
24	O-ring	IB-P14	2	IB-P14	2
25	O-ring	IB-P10	2	IB-P10	2
26	O-ring	IB-P6	1	IB-P6	1

Note: O-ring 1B-** refers to JIS B2401-1B-**.
Specify C at the end of the model number for the CTS kit.

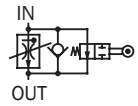
NACHI

Rapid Traverse and Fee Control Valve

TL (TLT) Type Feed Control Valve
(Fine Control Type with Pressure Compensation)

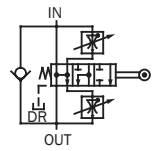
.02 to 2.1 gpm
1000 psi

TL-G0*-*-11



Note: 04 has DR

TLT-G04-*-*-11



Features

Very compact, lightweight, and economically priced.
Applicable for control of machine tool table operations. For example, a single valve provides smooth control of: Fast Feed => Cutting Feed (2 stage) => Fast Return.
Stable control of each setting flow rate, even as pressure and fluid temperature are fluctuating.
Dial markings are proportional to flow rate for simple control flow rate adjustment
Sealing the gasket surface allows as-is screw-in connection.

Specifications

Model No	Nominal Diameter (Size)	Volume control flow rate gpm		Reverse Flow Rate gpm	Maximum Working Pressure psi	Cracking pressure psi	Weight lbs
		Feed 1	Feed 2				
TL-G03-2-11 8-11	3/8	.02 to .5 .02 to 2.1	–	9.2	1015	14.5	4.8
TL-G04-2-11 8-11	1/2	.02 to .5 .02 to 2.1	–	14.0			15.4
TLT-G04-2-1.5-11 8-2-11		.02 to .5 .02 to 2.1	.02 to .39 .02 to .5				

• Handling

1 In the temperature range of 68° F to 140° F, flow rate fluctuation is within ±5% of the standard flow rate at 104° F.
2 In the pressure range of 145 to 1000 psi, flow rate fluctuation is within ±5% of the setting flow rate.
3 Note that flow rate fluctuation exceeds the rated fluctuation amount slightly in the vicinity of the minimum control flow rate, due to changes in operating temperature and hydraulic fluid viscosity.
4 When controlling flow rates that are less than .05 gpm, use with a line filter no greater than 10µm.
5 Make sure that the pressure differential between the inlet port and outlet is at least 87 psi at 1 gpm or less, and at least 145 psi at 1 gpm or greater.
6 The control flow rate is increased by clockwise (rightward) rotation of the control handle.
7 For connection to piping, normally connect to the sub plate. Valve mounting is gasket type, using an O-ring. When a screw in connection is required, seal the gasket surface, remove the side plug, and create a screw in connection directly to the valve unit. In this case, remove all seal material affixed to the plug.
8 See the table below for installation hex socket bolts.
9 Use the table to the right for specification when a sub plate is required.

Model No.	Pipe Diameter	Recommended Flow Rate gpm	Applicable Valve Type
MTL-03-10	3/8	9.2	TL-G03-*-11
MTL-04-10	1/2	14.0	TL(T)-G04-*-*-11

TL-G03-11 -
Cam Down Force
27 lbs minimum
TLT-G04-*-*-11
Feed 1 Cam Down Force
31 lbs minimum
Feed 2 Cam Down Force
45 lbs minimum

10 Make the cam angle no greater than 30 degrees.

Applicable Model	Bolt Size	Q'ty	Tightening Torque ft lbs
TL-G03-*-11	M8 × 60r	4	14.7 to 18.4
TL(T)-G04-*-11	M10 × 75r	4	33 to 40.5

Note: For mounting bolts, use 12T or equivalent.

Understanding Model Numbers

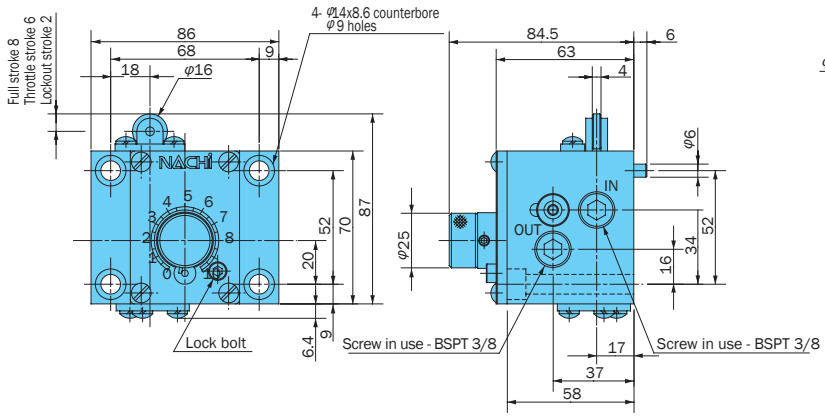
TLT – G 04 – 2 – (1.5) – (F) – 11

- 11: Design number
- (F): Anti-jumping mechanism (option)
- (1.5): Maximum volume control flow rate (Feed 2)
- 2: Maximum control flow rate
- 04: Nominal diameter (size)
- G: Mounting method G: Gasket type
- TL: 2-position feed control valve
- TLT: 1-position feed control valve

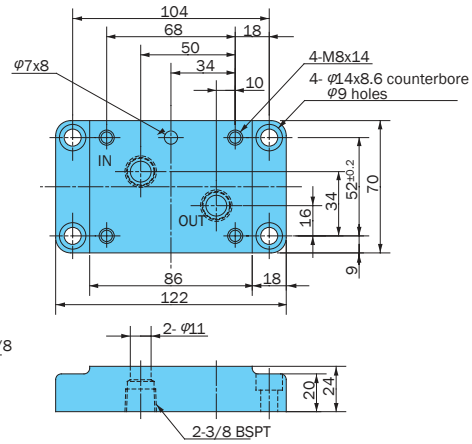
J
Flow Control Valves

Installation Dimension Drawings

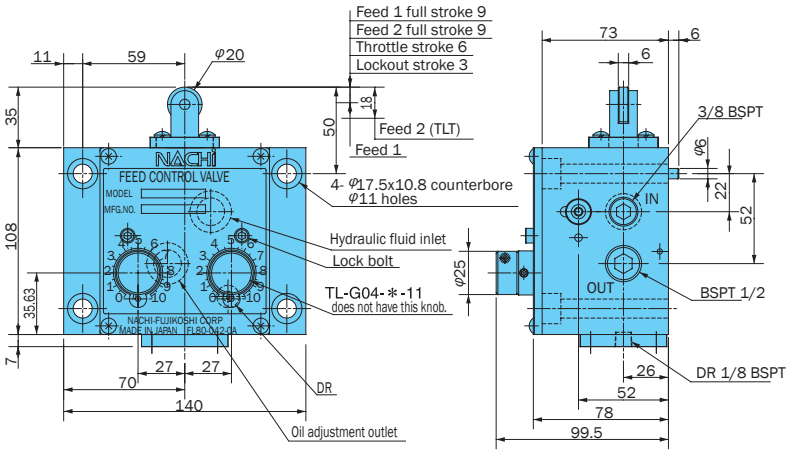
TL-G03-*-11



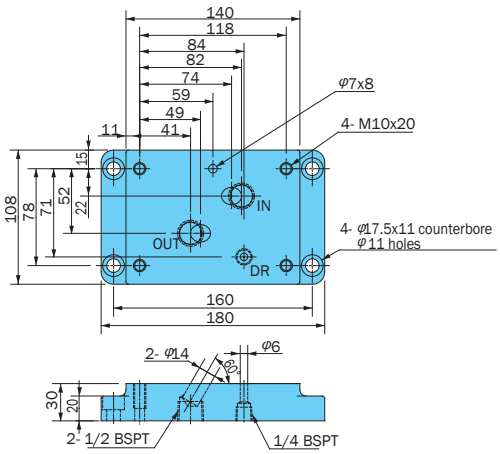
Sub Plate MTL-03-10



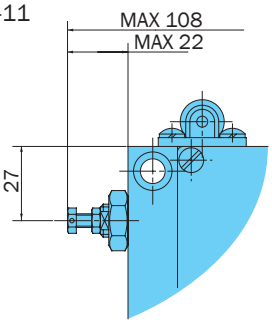
TL(T)-G04-*-*-11



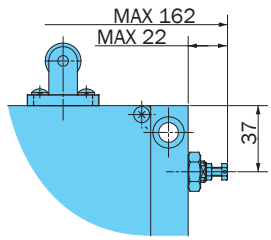
Sub Plate MTL-04-10



Anti-jumping Mechanism TL-G03-*-F-11



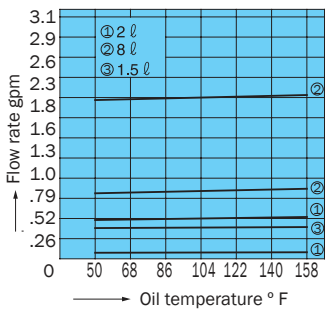
TL(T)-G04-*-*-F-11



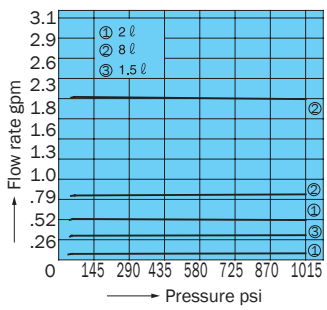
Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

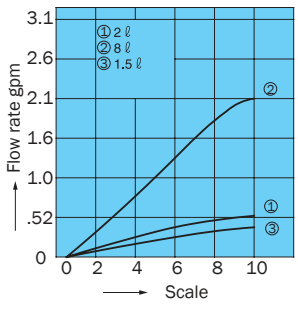
Fluid Temperature – Control Flow Rate Characteristics



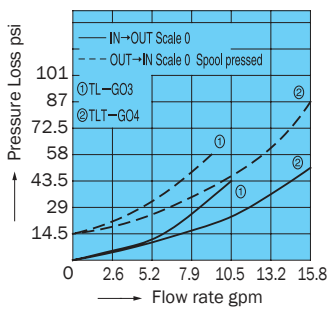
Pressure – Control Flow Rate Characteristics



Scale – Control Flow Rate Characteristics

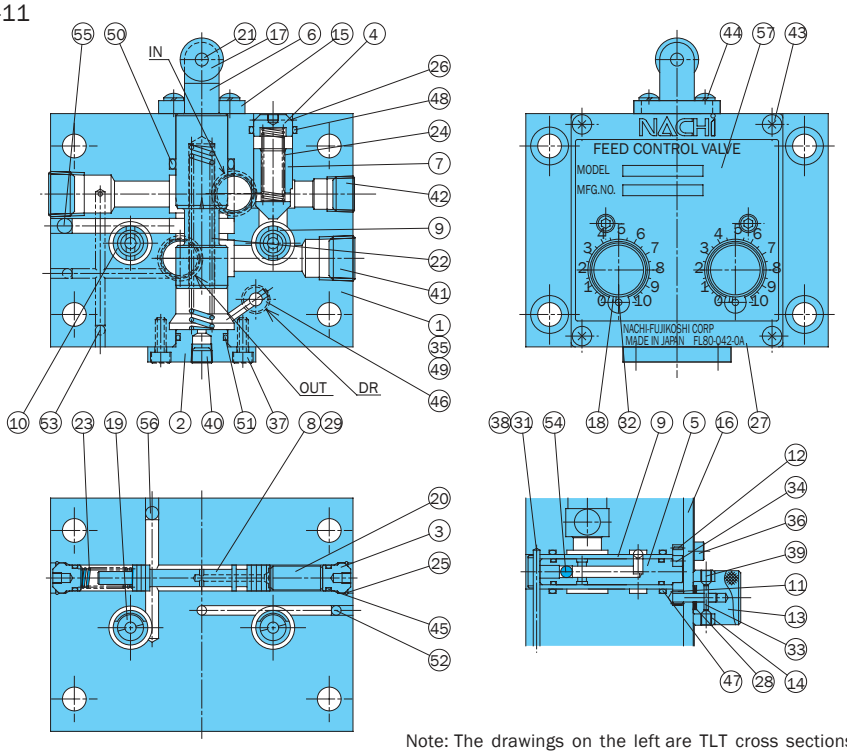


Pressure Loss Characteristics



Cross-sectional Drawing

TLT-G04-*-*-11



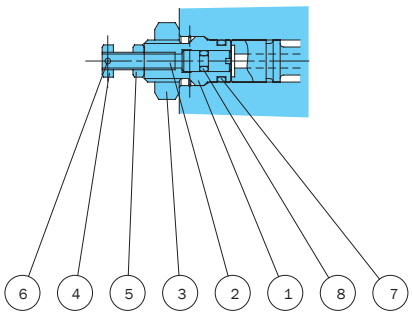
Note: The drawings on the left are TLT cross sections. In the case of TL, there is no knob on the right side.

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	20	Spacer	39	Screw
2	Cover	21	Pin	40	Plug
3	Plug	22	Spring	41	Plug
4	Plug	23	Spring	42	Plug
5	Throttle	24	Spring	43	Screw
6	Spool	25	Snap ring	44	Screw
7	Poppet	26	Snap ring	45	O-ring
8	Piston	27	Plate	46	O-ring
9	Sleeve	28	Washer	47	O-ring
10	Sleeve	29	Pin	48	O-ring
11	Gear	30	Pin	49	O-ring
12	Gear	31	Pin	50	O-ring
13	Knob	32	Pin	51	O-ring
14	Ring	33	Pin	52	Ball
15	Stopper	34	Pin	53	Ball
16	Plate	35	Pin	54	Ball
17	Roller	36	Screw	55	Ball
18	Pin	37	Screw	56	Ball
19	Spacer	38	Screw	57	Plate

Anti-jumping mechanism

TL-G03-*-F-11

TL(T)-G04-*-*-F-11



Part No.	Part Name
1	Retainer
2	Bolt
3	Nut
4	Nut
5	Nut
6	Spring pin
7	O-ring
8	O-ring

Seal Part List

Part No.	Part Name	Part Number	Q'ty
7	O-ring	IA-P9	1
8	O-ring	IA-P3	1

Note: 1.#7 O-ring and #45 O-ring are interchangeable.
2.O-ring 1A-** refers to JIS B2401-1A-**.

Seal Part List (Kit Model Number FLS-***(2))

Part No.	Part Name	TL-G03-*-11		TL-G04-*-11		TLT -G04-*-*-11	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
45	O-ring	IA-P9	4	IA-P9	4	IA-P9	6
46	O-ring	–	–	IA-P10	1	IA-P10	1
47	O-ring	IA-P16	2	IA-P16	2	IA-P16	4
48	O-ring	IA-P14	1	IA-P18	1	IA-P18	1
49	O-ring	IA-P14	2	IA-P20	2	IA-P20	2
50	O-ring	IA-P18	2	IA-P24	1	IA-P24	1
51	O-ring	–	–	IA-P20	1	IA-P20	1

Note: 1. *** in the kit number is used for specification of the valve size. To specify TLT, add 2 to the end.
2. O-ring 1A-** refers to JIS B2401-1A-**.

Right Angle Check Valve
In-Line Check Valve

84.5 gpm
3045 psi

Features

The right angle type check valve changes the flow direction of fluid 90 degrees, while the in-line check valve allows only axial direction flow.

The cracking pressures of these valves are fixed, so fluid passes freely in one direction, but is restricted from flowing in the opposite direction.

Specifications

	Model No.		Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Cracking Pressure psi	Weight lbs	
	Screw Mounting	Gasket Mounting					T Type	G Type
Right Angle Check Valve	CA-T03-1-20 2 3	CA-G03-1-20 2 3	3/8	3045	10.5	5.8 50 72	2.2	3.9
	CA-T06-1-20 2 3	CA-G06-1-20 2 3	3/4		29	5.8 50 72	4.8	8.5
	CA-T10-1-20 2 3	CA-G10-1-20 2 3	1¼		84.5	5.8 50 72	8.8	13.4
In-line Check Valve	CN-T03-1-11 2 3	–	3/8		7.9	5.8 50 72	.8	–
	CN-T06-1-11 2 3		3/4		19.8	5.8 50 72	1.5	
	CN-T10-1-11 2 3		1¼		50	5.8 50 72	4.8	

• Handling

1 Use the following table for specification when a sub plate is required.

2 The following are the bundled mounting bolts.

Model No.	Pipe Diameter	Recommended Flow Rate gpm	Weight lbs	Applicable Valve Type
MCA-03-20	3/8	10.5	3	CA-G03-*-20
MCA-06-20	3/4	29	7.7	CA-G06-*-20
MCA-10-20	1¼	84.5	13.4	CA-G10-*-20

Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
CA-G03-*-20	M8 × 45 ℓ	4	14.7 to 18.4
CA-G06-*-20	M16 × 65 ℓ	4	140 to 173
CA-G10-*-20	M20 × 75 ℓ	4	272 to 339

Note: For mounting bolts, use 12T or equivalent.

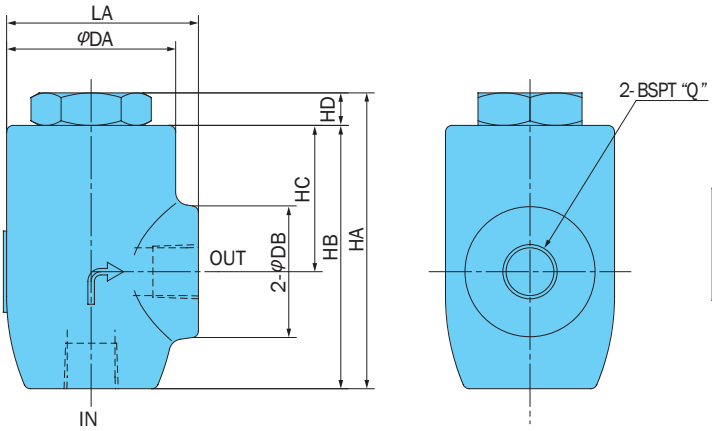
Understanding Model Numbers

CA – T 03 – 1 – 20

- 20 — Design number
  - 11: In-line type
  - 20: Right angle type
- 1 — Cracking pressure
  - 1, 2, 3
- 03 — Nominal diameter (size)
- T — Mounting method
  - T: Screw connection type
  - G: Gasket type
- CA — CA: Right angle check valve
  - CN: In-line check valve

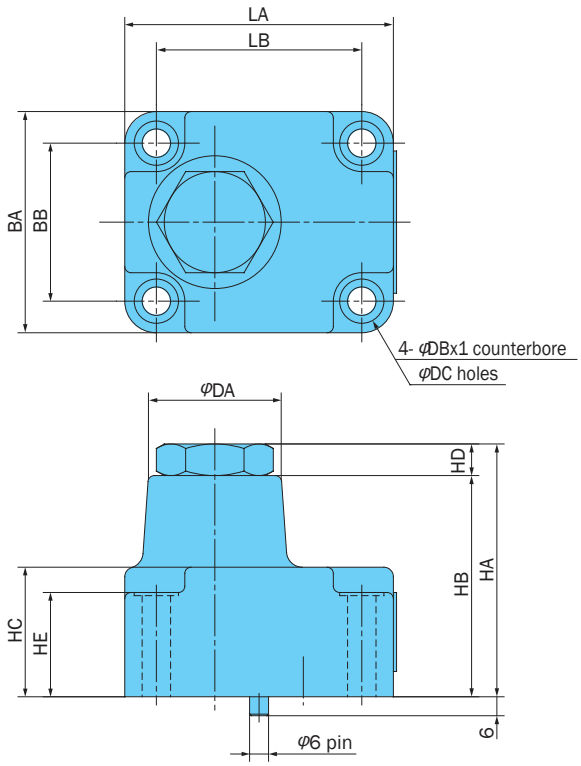
Installation Dimension Drawings

CA-T**-20(Screw Mounting)

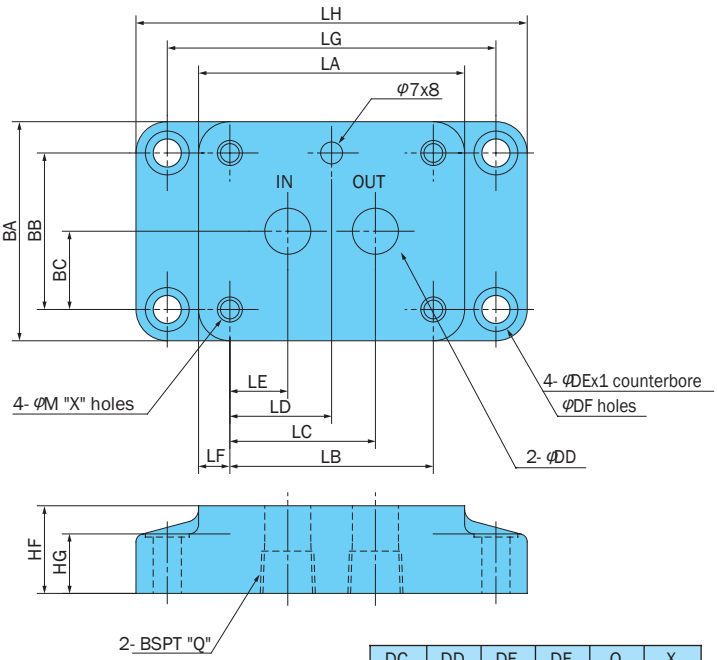


Model No.	LA	HA	HB	HC	HD	DA	DB	Q
CA-T03-*-20	59	91	81	45	10	52	40	3/8
CA-T06-*-20	72	106	96	55	10	60	45	3/4
CA-T10-*-20	96	139	127	70	12	80	62	1¼

CA-G**-*-20(Gasket Mounting)



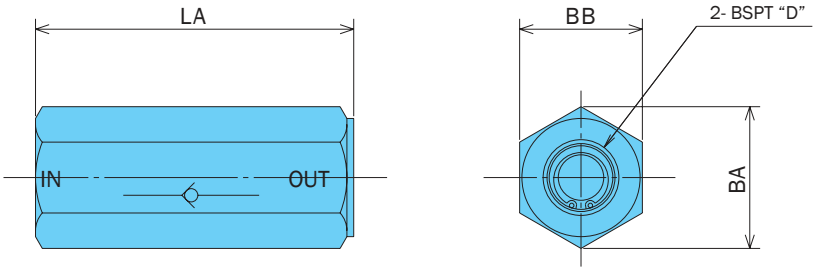
Sub Plate MCA-**-20



DC	DD	DE	DF	Q	X
9	14.7	14	9	3/8	8
17	23	20	14	3/4	16
22	30	20	14	1¼	20

Model No.	LA	LB	LC	LD	LE	LF	LG	LH	BA	BB	BC	HA	HB	HC	HD	HE	HF	HG	DA	DB
CA-G03-*-20	86	65	46.5	32.5	18.5	10.5	105	125	71	50	25	80	70	41	10	33	28	19	42	14
CA-G06-*-20	117	81	68.2	40.5	22.2	18	140	172	101	65	32.5	98	88	58	10	43	31	19	52	26
CA-G10-*-20	133	92	71.4	46	20.6	20.5	152	187	133	92	46	119	107	65	12	46	40	28	68	32

CN-T**-*-11(Screw Mounting)



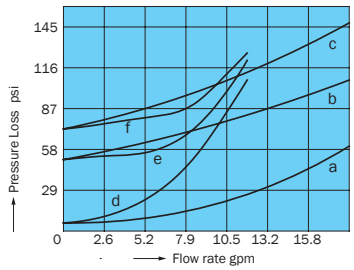
Model No.	LA	BA	BB	D
CN-T03-*-11	70	31.2	27	3/8
CN-T06-*-11	95	43.9	38	3/4
CN-T10-*-11	130	69.3	60	1¼

Performance Curves

Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

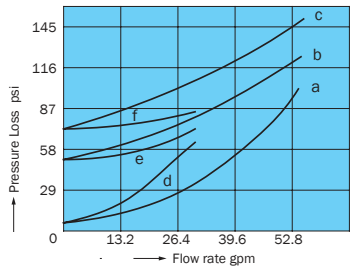
CA-*03 CN-T03



Applicable Valve Type

a. CA-*03-1-20
b. CA-*03-2-20
c. CA-*03-3-20
d. CN-T03-1-11
e. CN-T03-2-11
f. CN-T03-3-11

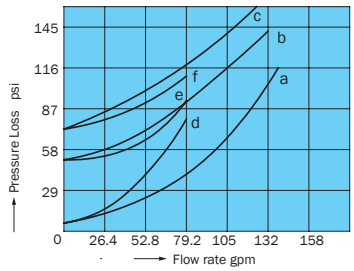
CA-*06 CN-T06



Applicable Valve Type

a. CA-*06-1-20
b. CA-*06-2-20
c. CA-*06-3-20
d. CN-T06-1-11
e. CN-T06-2-11
f. CN-T06-3-11

CA-*10 CN-T10

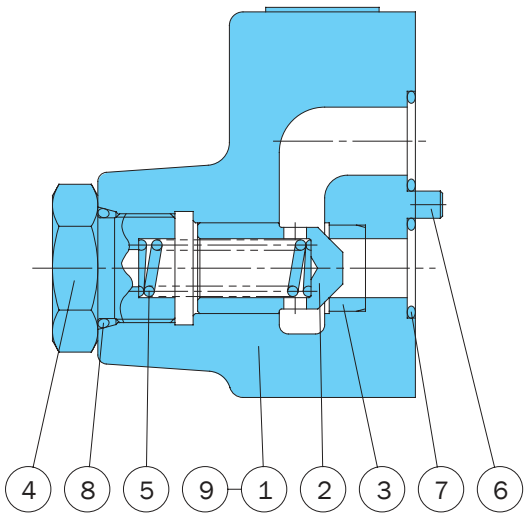


Applicable Valve Type

a. CA-*10-1-20
b. CA-*10-2-20
c. CA-*10-3-20
d. CN-T10-1-11
e. CN-T10-2-11
f. CN-T10-3-11

Cross-sectional Drawing

CA-G**-*-20



Part No.	Part Name
1	Body
2	Poppet
3	Seat
4	Plug
5	Spring
6	Pin
7	O-ring
8	O-ring
9	Nameplate

Seal Part List (Kit Model Number DAS-***)

Part No.	Part Name	Type/Part Number			Q'ty
		CA-G03	CA-G06	CA-G10	
7	O-ring	1B-P18	1B-G30	1B-G40	2
8	O-ring	1B-P22	1B-P30	1B-P42	1

Note: O-ring 1B-**refers to JIS B2401-1B-**.
*** in the kit number is used for specification of the valve size (G03, G06, G10, etc.)

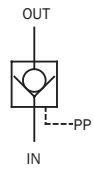
NACHI

Pilot Operated Check Valve

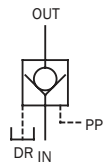
Pilot Check Valve

84.5 gpm
3045 psi

Normal form



External drain type



Features

Normally, fluid is allowed to flow in a single direction, just as with a standard check valve. Reverse flow can be enabled, however, when the check valve is pushed upwards by external pilot pressure.
Very compact configuration.

Specifications

Model No		Nominal Diameter (Size)	Maximum Working Pressure psi	Maximum Flow Rate gpm	Cracking Pressure psi	Weight lbs		Area Ratio		
Screw Mounting	Gasket Mounting					T Type	G Type	Pilot Piston	Valve	Small Valve
CP-T03-1-*-20 2	CP-G03-1-*-20 2	3/8	3045	10.5	29 72.5	8.3 (10.3)	9.4 (11.4)	1	0.35	0.05
CP-T06-1-*-20 2	CP-G06-1-*-20 2	3/4		29.0	29 72.5	15.4 (18)	14.5 (17.1)	1	0.37	0.03
CP-T10-1-*-20 2	CP-G10-1-*-20 2	1¼		84.5	29 72.5	26.4 (31.5)	27.5 (32.6)	1	0.36	0.03

Note: Weight values in parentheses are for the external drain type.

• Handling

1 The following explains how to use the external drain. Be sure to always use the external drain type when back pressure is applied to fluid outlet port side A during reverse flow as in the circuit illustrated below.

2 Minimum pilot pressure is altered by input side B pressure during reverse flow. Because of this, operate the valve so pressure is at least twice as high as the required pilot pressure obtained using the minimum pilot pressure characteristics.

3 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Recommended Flow Rate gpm	Weight lbs	Applicable Valve Type
MCP-03-20	3/8	10.5	2.4	CP-G03-*-20
MCP-06-20	3/4	29	3.7	CP-G06-*-20
MCP-10-20	1¼	84.5	7.9	CP-G10-*-20

4 The following are the bundled mounting bolts.

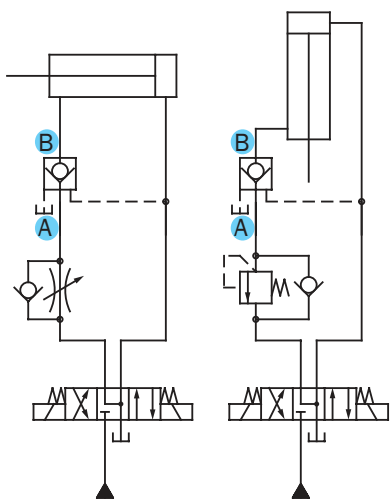
Model No.	Bolt Dimensions	Q'ty	Tightening Torque ft lbs
CP -G03-*-*-20	M8 × 45 ℓ	4	14.7 to 18.4
-G06-	M10 × 55 ℓ	4	33 to 40.5
-G10-	M10 × 65 ℓ	6	33 to 40.5

Note: For mounting bolts, use 12T or equivalent.

Understanding Model Numbers

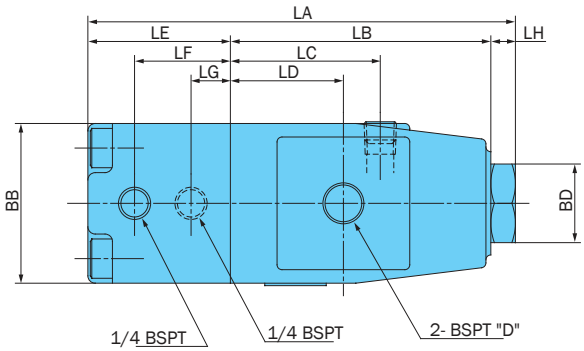
CP – G 03 – 1 – B – 20

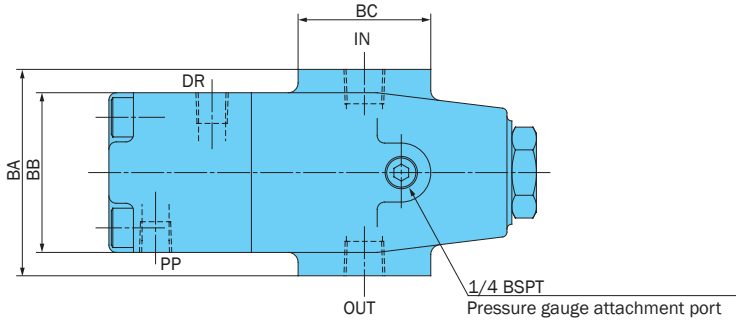
- 20: Design number
- B: Auxiliary symbol
  None: Standard
  B: External drain type
  F: With anti-shock mechanism (decompression type)
  BF: With external drain, with shock-resistant mechanism
- 1: Cracking pressure
  1, 2
- 03: Nominal diameter (size)
- G: Mounting method
  T: Screw connection type
  G: Gasket type
- CP: Pilot check valve



Installation Dimension Drawings

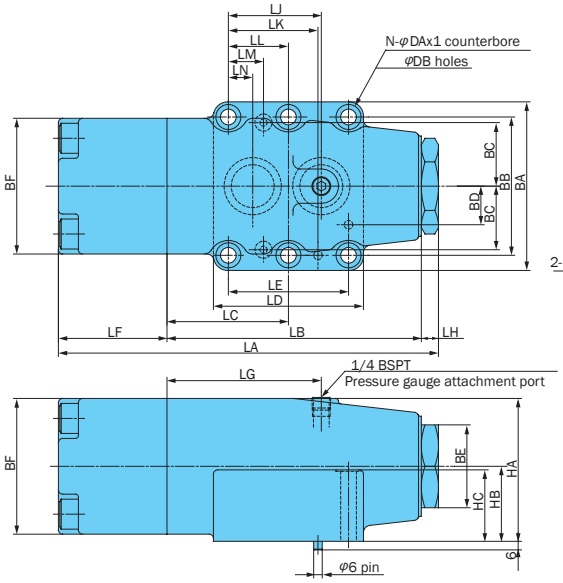
CP-T**-*-*-20 (Screw Mounting)



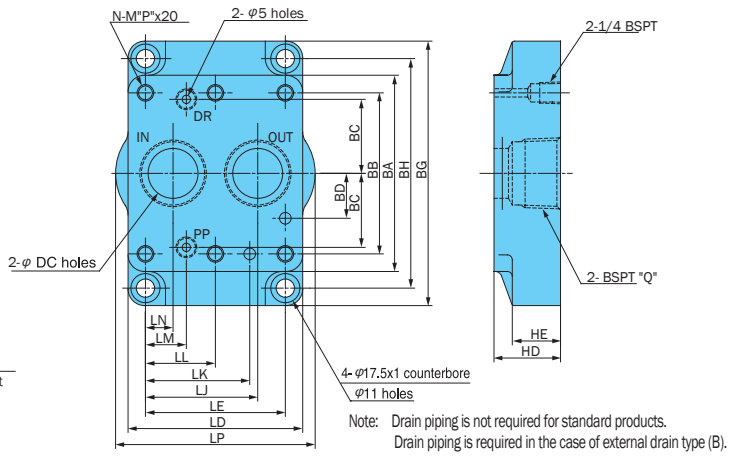


Model No.	LA	LB	LC	LD	LE	LF	LG	LH	BA	BB	BC	BD	D
CP-T03-*-(F)-20	146	106	61	46	30	15	–	10	84	65	54	32	3/8
CP-T03-*-B(F)-20	174				58	39	16						
CP-T06-*-(F)-20	180	140	85	66	30	15	–	10	122	76	64	41	3/4
CP-T06-*-B(F)-20	212				62	43	16						
CP-T10-*-(F)-20	225	178	108	85	35	15	–	12	150	95	85	58	1¼
CP-T10-*-B(F)-20	266				76	57	16						

CP-G**-*-*-20 (Gasket Mounting)



Sub Plate MCP-**-20



Note: Drain piping is not required for standard products.
Drain piping is required in the case of external drain type (B).

BH	HA	HB	HC	HD	HE	DA	DB	DC	N	P	Q
106	68	35.5	33	30	19	14	9	14.7	4	8	3/8
124	79	41	38	30	19	17.5	11	22	4	10	3/4
138	100	52.5	50	40	29	17.5	11	30	6	10	1¼

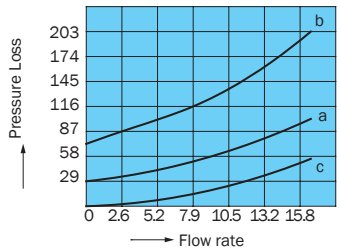
Model No.	LA	LB	LC	LD	LE	LF	LG	LH	LJ	LK	LL	LM	LN	LP	BA	BB	BC	BD	BE	BF	BG
CP-G03-*-(F)-20	146	106	51	64	44	30	61	10	37	–	–	16	7	–	82	64	23	18	32	65	126
CP-G03-*-B(F)-20	174					58															
CP-G06-*-(F)-20	180	140	66	83	60.3	30	85	10	49.2	44.5	–	20.6	11.1	–	102	79.4	33.3	–	41	76	146
CP-G06-*-B(F)-20	212					62															
CP-G10-*-(F)-20	225	178	85	105	84.1	35	108	12	67.5	62.7	42.05	24.6	16.6	120	118	96.8	44.5	–	58	95	159
CP-G10-*-B(F)-20	266					76															

Performance Curves

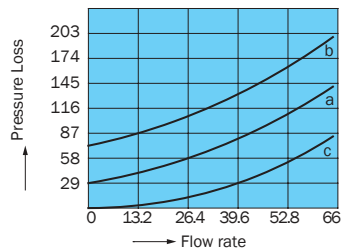
Hydraulic Operating Fluid Viscosity 32 centistokes

Pressure Loss Characteristics

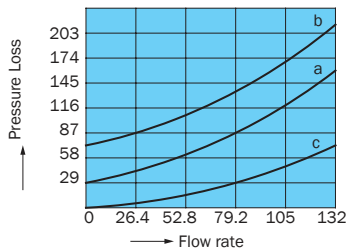
CP-*03 Applicable Valve Type
a. CP-*03-1-*-20 Free Flow
b. CP-*03-2-*-20 〃
c. CP-*03-*-*-20 Reverse Flow



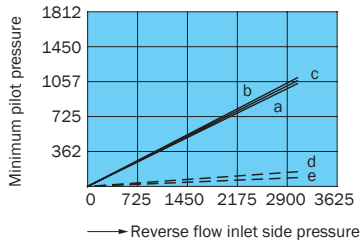
CP-*06 Applicable Valve Type
a. CP-*06-1-*-20 Free Flow
b. CP-*06-2-*-20 〃
c. CP-*06-*-*-20 Reverse Flow



CP-*10 Applicable Valve Type
a. CP-*10-1-*-20 Free Flow
b. CP-*10-2-*-20 〃
c. CP-*10-*-*-20 Reverse Flow



Minimum Pilot Pressure Characteristics



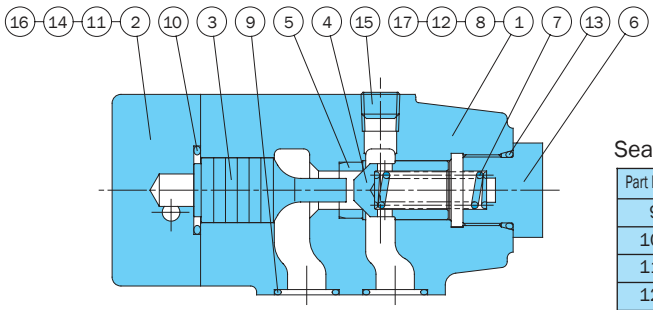
Applicable Valve

Model No.	Valve Open	Small Valve Open
CP-*03	a	d
CP-*06	b	e
CP-*10	c	e

Cross-sectional Drawing

Note: O-ring 1B-** refers to JIS B2401-1B-**.

CP-G**-*-20



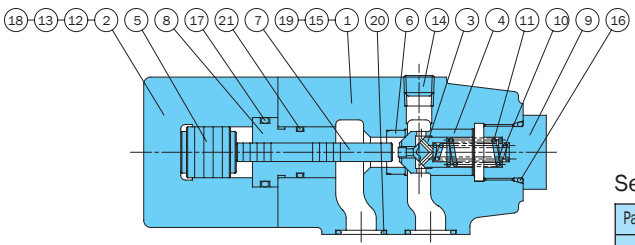
Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	7	Spring	13	O-ring
2	Cover	8	Pin	14	Screw
3	Piston	9	O-ring	15	Plug
4	Poppet	10	O-ring	16	Plug
5	Seat	11	O-ring	17	Plate
6	Plug	12	O-ring		

Seal Part List (Kit Model Number DPS-***)

Part No.	Part Name	CP-G03-*-20	CP-G06-*-20	CP-G10-*-20	Q'ty
9	O-ring	1B-P18	1B-G25	1B-G35	2
10	O-ring	1B-G25	1B-G40	1B-G55	1
11	O-ring	1B-P7	1B-P9	1B-P9	2
12	O-ring	1B-P9	1B-P9	1B-P9	2
13	O-ring	1B-P22	1B-P30	1B-P42	1

***in the kit number is used for specification of the valve size.

CP-G**-*-BF-20



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	9	Plug	17	O-ring
2	Cover	10	Spring	18	O-ring
3	Poppet	11	Spring	19	O-ring
4	Poppet	12	Screw	20	O-ring
5	Piston	13	Plug	21	O-ring
6	Seat	14	Plug	22	Plate
7	Rod	15	Pin		
8	Bushing	16	O-ring		

Seal Part List (Kit Model Number DPS-***R)

Part No.	Part Name	CP-G03-*-BF-20	CP-G06-*-BF-20	CP-G10-*-BF-20	Q'ty
16	O-ring	1B-P22	1B-P30	1B-P42	1
17	O-ring	1B-G25	1B-G40	1B-G55	1
18	O-ring	1B-P7	1B-P9	1B-P9	2
19	O-ring	1B-P9	1B-P9	1B-P9	2
20	O-ring	1B-P18	1B-G25	1B-G35	2
21	O-ring	1B-P18	1B-P30	1B-G45	1

***in the kit number is used for specification of the valve size.

Gauge Cock

5075 psi

Features

Ultra-compact configuration requires minimal installation space.
Intelligent design packs plenty of function into a simple configuration.

Maximum operating pressure of 5075 psi allows operation across a wide range.

Specifications

Model No.		G "A" (Nominal Dimension)	B mm	C mm	Maximum Working Pressure psi	Weight lbs
Float Type	Flange Type					
K2-T02-11	K2-F02-11	G1/4 (BSPP)	10	19	3045	.77
K2-T03-10	K2-F03-10	G3/8 (BSPP)	16	23	5075	
K2-T04-10	K2-F04-10	G1/2 (BSPP)	16	26		

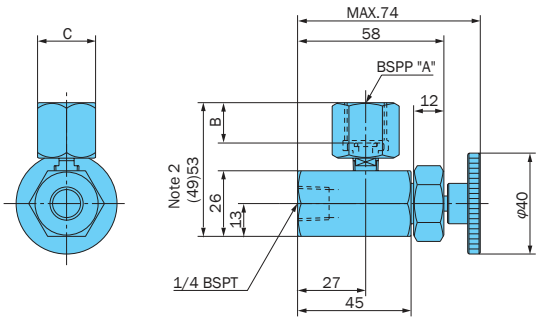
Understanding Model Numbers

K2 – T 02 – 10(11)

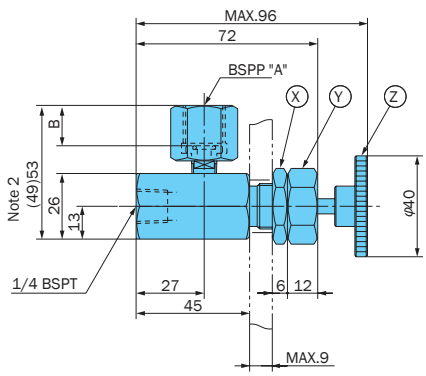
- Design number
  11: For K2-T02, F02
- Nominal diameter (size)
- Mounting method
  T: Float type F: Flange type
- Gauge cock K2: Rotatable pressure gauge attachment.

Installation Dimension Drawings

K2-T**-10 (11)



K2-F**-10 (11)



Note: 1. Maximum iron plate thickness: 9t;Mouting Bolt Hole Diameter: φ20
When mounted to panel
Loosen the X lock nut and Y cap nut, and pull out the Z adjusting screw. To return to its original position, reverse this process.
2. Dimensions in parentheses are for the 02 size.
3. For information about G "A" and B, see the specifications. The O-ring shown below is used as a pressure gauge seal beneath screw G.
G1/4 JIS B2401-1B-P5
G3/8 JIS B2401-1B-P6
G1/2 JIS B2401-1B-P9

Flange Type Check Valve / Throttle Valve
Pilot Operated Check Valve

33 to 343 gpm
3625 psi

Features

This series provides high capacity and flange connection, as well as compliance with new standards.

Measurable higher pressure and higher capacity than previous models.

Specifications

Contact your agent for more information about mounting methods, etc.

	Model No. / Flange Mounting	Nominal Diameter (Size)	Maximum Working Pressure psi	Rated flow rate gpm	Cracking pressure psi	Weight lbs
Right Angle Check Valve	CA-F06-1-30 2 3	3/4	3625	33	5.8 50 72	8.3
	CA-F10-1-30 2 3	1¼		79	5.8 50 72	16.5
	CA-F16-1-30 2 3	2		158	5.8 50 72	44.3
	CA-F24-1-30 2 3	3		343	5.8 50 72	139
Pilot Operated Check Valve	CP-F06-1-*-30 2	3/4	3625	33	29 72	14.1
	CP-F10-1-*-30 2	1¼		66	29 72	25.3
	CP-F16-1-*-30 2	2		158	29 72	70.5

	Model No. / Flange Mounting	Nominal Diameter (Size)	Maximum Working Pressure psi	Rated flow rate gpm	Cracking pressure psi	Weight lbs
Slot Valve	(C)FR-F06-30	3/4	3625	22.4	14.5	10.3
	(C)FR-F10-30	1¼		60.7		24.2
	(C)FR-F16-30	2		132		47.4

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