

Photo	Type	Series	Description	Main Specifications
	Solenoid Valves	SS	Solenoid Valve	26.4 - 42.3gpm, 5000psi
	Solenoid Valves	SA	Solenoid Valve (DIN Connector Type)	26.4 - 42.3gpm, 5000psi
	Solenoid Valves	SE	Solenoid Valve (Low Current & Low Power Consumption Type)	7.9 - 26.4gpm 1428 - 3000psi
	Solenoid Valves	DSS (DSA)	Solenoid Controlled Pilot Operated Valve	158.5gpm, 4571psi
	Fine Solenoid Valves	SF	Fine Solenoid Valve (High-Low Valve)	2.6 - 10.6gpm, 3000psi
	Solenoid Valves	SAW	Solenoid Valve with Monitoring Switch	42.2gpm, 5076psi
	Manual Valves	DMA	Manually Operated Directional Valve	10.6 - 19.8gpm, 3571psi



Features

① 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.

②Low switching noise

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

③ High pressure, large capacity, with minimal pressure loss

Comprehensive fluid reaction force compen-

sation and low pressure compensation construction provide large capacity and low pressure loss.

G01 : 35MPa{357kgf/cm²}100 ℓ /min

G03 : 35MPa{357kgf/cm²}160 ℓ /min

④ Easy connections

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

⑤ Easy coil replacement

A plug-in type coil enables one-touch coil

replacement.

⑥ 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.

⑦Global 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.		SS-G01				SS-G03																					
		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 ℓ /min	Maximum Working Pressure MPa(kg/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kg/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kg/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kg/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kg/cm ²)																
	-A2X-	(gpm)	(psi)	(gpm)	(psi)	(gpm)	(psi)	(gpm)	(psi)	(gpm)	(psi)																
	-H2X-	30	35 (5000)	30	25{255} (3571)	40 (10.6)	35{357} (5000)	85 (22.4)	35{357} (5000)	85 (22.4)	25{255} (35.71)																
	-E2X-	(7.9)		85 (22.4)																							
	-A3X-	80		50 (13.2)		70 (18.5)		100 (26.4)		25{255} (3571)		35{357} (5000)	35{357} (5000)	85 (22.4)													
	-H3X-	(21.1)																									
	-E3X-	100 (26.4)																									
	-A3Z-	65 (17.1)																									
	-H3Z-																										
	-E3Z-																										
	-A4-	50 (13.2)													40 (10.6)	70 (18.5)	100 (26.4)	25{255} (3571)	35{357} (5000)	35{357} (5000)	85 (22.4)						
	-H4-																										
	-A5-	50 (13.2)																				70 (18.5)	100 (26.4)	25{255} (3571)	35{357} (5000)	35{357} (5000)	85 (22.4)
	-H5-																										
	-C2-																										
	-C5-																										
	-C9-																										
	-C1S-																										
	-C6S-																										
	-C1-		AC Solenoid 65 (17.1)																								
	-C6-		DC Solenoid 80 (21.1)																								
	-C4-																										
	-C7Y-																										
	-C8-																										

Note) The maximum flow rate of each valve depends on the pressure. For details, see pages S-9 and S-10.

			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		35(25)MPa{357(255)kgf/cm ² }(Note1) (5000psi)					
Maximum Allowable Backpressure	T port		21MPa{214kgf/cm ² } (3000psi)			16MPa{163kgf/cm ² } (2285psi)		
Switches/min.		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		JIS C 0920 IP64 (Dust-tight, Splash-proof)					
	Ambient Temperature		- 20 to 50°C					
	Operating Fluid	Temperature Range	- 20 to 70°C					
		Viscosity Range	15 to 300mm ² /s					
			25 microns or less					
Mounting bolt	Size × Length		M5 × 45 (Four) 10-24 × 1 3/4			M6 × 70 (Four) (M8 × 70 (Four)) 1/4-20 × 2 3/4		
	Tightening Torque		M5 5 to 7N·m{51 to 71kgf·cm} 10-24 3.6-5.1Lbs.ft.			M6 10 to 13N·m{102 to 133kgf·cm} (M8 20 to 25N·m{204 to 255kgf·cm}) 1/4-20 7.2-9.4Lbf.ft.		

Note) 1. Maximum operating pressure depends on the valve type. For details, see page S-1.
2. For mounting bolts, use 12T or equivalent.

Notes

- Pipe system so that tank line is always filled with oil.
- Surge pressure should be kept below maximum tank line back pressure rating.
- When using a 4-way valve as a 2-way or 3-way and blocking unused ports lowers the maximum flow.
- Keep hydraulic oil clean. (Degree of contamination: NAS grade 12 or better). When petroleum hydraulic oil is used, it should conform to ISO VG32, 46.
- Do not exceed permissible voltage range of the coil used.
- Do not supply electric power to the AC solenoid unless the coil is mounted to the valve.
- Provide drain piping from the T port, when valve spool types are A2X, H2X, E2X.
- If the changeover position is kept under high pressure for an extended period, malfunctions may occur due to hydraulic lock. Please consult us when you have such application.
- When the detent-type (E2X, E3X, E3Z) is used, we recommend that the electric power supply be continuous in order that the changeover position may be firmly maintained.
- Resistance force against the manual override pin changes, depending on the back pressure of the tank line.
- Solenoid coil could be hot by continuous operation. Do not touch the coil directly by hand.
- Gasket dimension
SA/SS-G01 = ISO 4401-03-02-0-94
SA/SS-G03 = ISO 4401-05-04-0-94

• 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	Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range
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	0.37		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 - J21

Design number

31: 01 size M5 bolt

E31: 01 size 10–24 mounting bolt

21: 03 size for mounting bolt M8

J21: 03 size for mounting bolt M6

E21: 03 size for mounting bolt 1/4-20

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, *3*, 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(R) = Connection port to tank

Operation Method

A	H	C	E
Spring Offset	Spring Center	Detent	

Nominal diameter

01 size

03 size

Mounting method

G: Cascade mounting

Wet type solenoid operated directional control valve

Options

(Auxiliary Symbol Explanations)

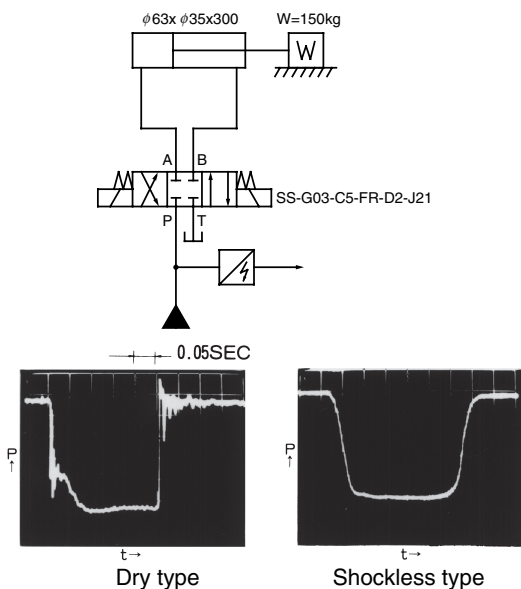
Shockless Type (Auxiliary Symbol: F)

Features

- Smooth start and stop performance
- Quiet operation
- Long life and reliable operations

Effects

- Eliminates shocks in the piping system.
- Prevents the piping connections from leaking oil.
- Extends the life of the hydraulic components.
- Maintenance-free operation of the hydraulic system.



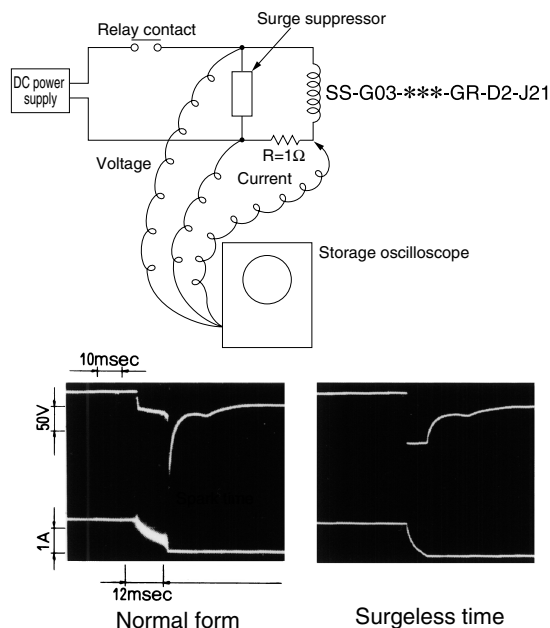
Surgeless type (Auxiliary Symbol: G)

Features

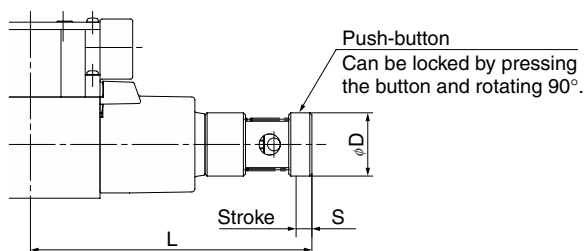
- Suppresses the surge voltage.
- Eliminates sparks between relay contacts.
- Extends the life of the relay contact.

Effects

- Improves the reliability of the control relay.
- Extends the life of conventional relays.
- Can be operated with a miniature relay.
- The RAC rectifier built-in DC model eliminates sparks at the control relay contact. It can be directly operated with a PLC (programmable logic controller).



Manual Button Type (Auxiliary Symbol: N)

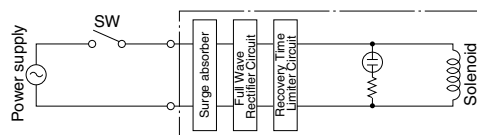


Model		L	S	D
SS-G01	AC solenoid	133.5 (5.26)	7.5 (0.30)	30 (1.18)
	DC solenoid	140.5 (5.53)		
SS-G03	AC solenoid	155.5 (6.12)	9.5 (0.37)	35 (1.38)
	DC solenoid	173.5 (6.83)		

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 The quick return mechanism is built in.



S-5

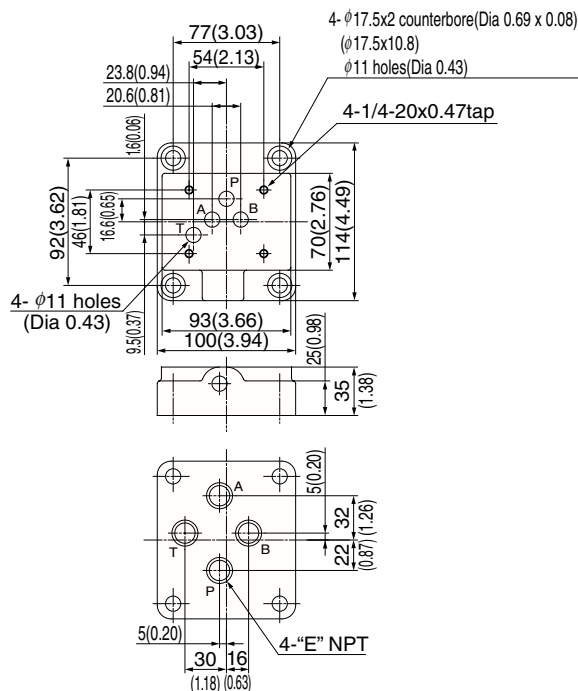
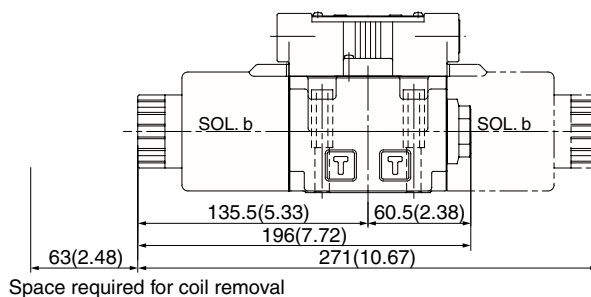
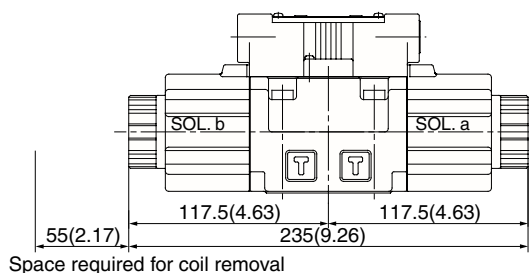
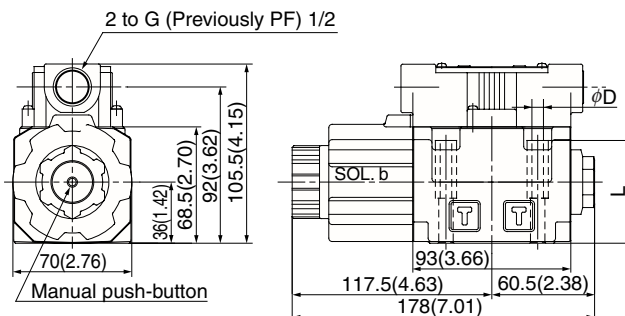
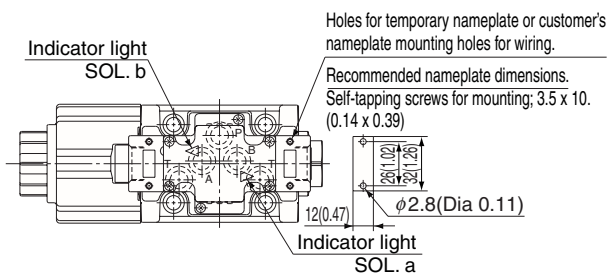
AC Solenoid
SS-G03-A**-R-C*-E21
SS-G03-H**-R-C*-E21

The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

	SS-G03-**-R**-J21	SS-G03-**-R**-21
ϕD	$\phi 6.8$ (Dia 0.27)	$\phi 8.5$ (Dia 0.33)
L	60.5(2.38)	58(2.28)

SS-G03-C**-R-C*-E21
SS-G03-E**-R-C*-E21

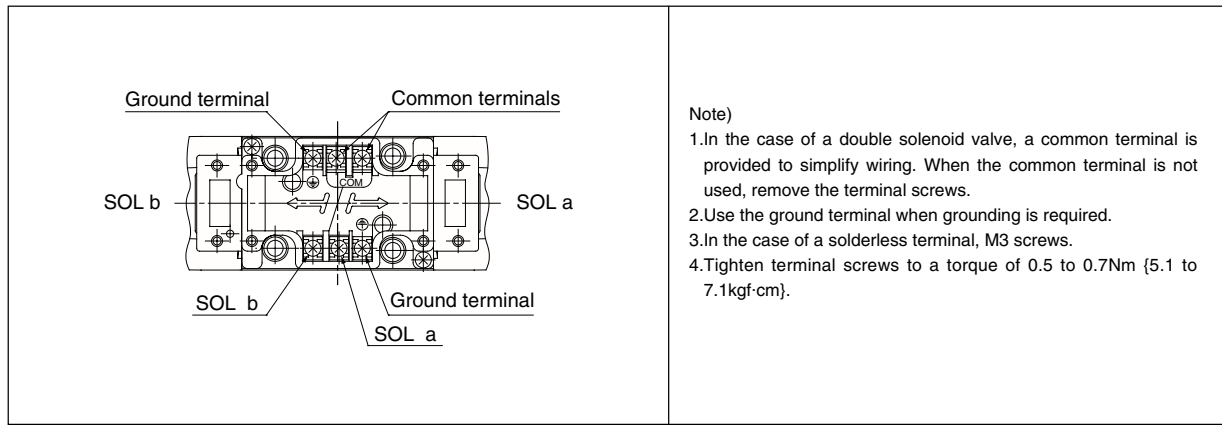
SS-G03-A **-R-D*/E*-E21
SS-G03-H **-R-D*/E*-E21
SS-G03-C **-R-D*/E*-E21
SS-G03-E **-B-D*/E*-E21



Mounting bolt	Model No.	E	Weight
1/4-20	MSA-03-E10	3/8	2.3kg
	MSA-03X-E10	1/2	

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

Wiring Diagram



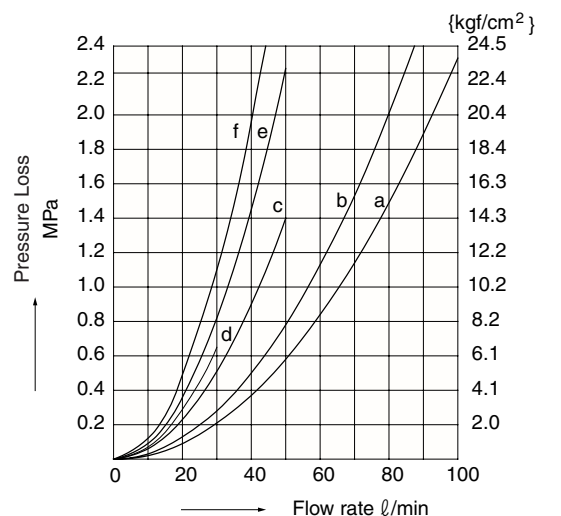
Electrical Circuit Diagram

Type	Model No.	Electrical Circuit
AC Solenoid	SS-G01-***-R-C* G03 E21	
AC Solenoid Surgeless Type	SS-G01-***-GR-C* G03 E21	
Built-in Rectifier	SS-G01-***-R-E* G03 E21	
DC Solenoid	SS-G01-***-R-D* G03 E21	
DC Solenoid Surgeless Type	SS-G01-***-GR-D* G03 E21	
Built-in Rectifier Quick Return Type	SS-G01-***-QR-E* G03 E21	See page E-4 for more information.

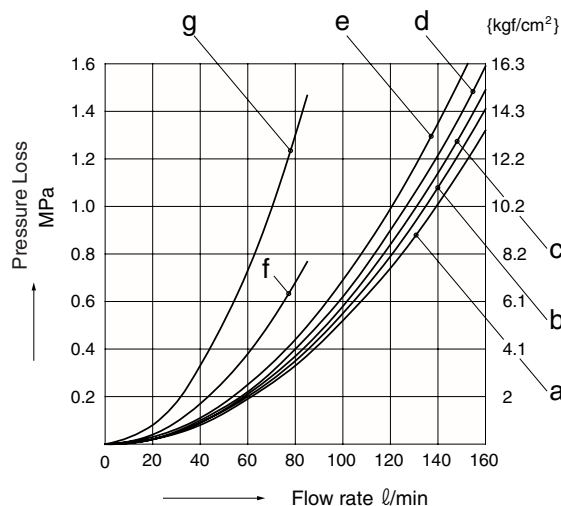
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

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	14MPa(143kgf/cm ²) 30 l/min
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*-E21	0.02 to 0.03	0.02 to 0.03	14MPa(143kgf/cm ²) 70 l/min
SS-G03-**-(G)R-D*-E21	0.06 to 0.09	0.03 to 0.05	
SS-G03-**-R-E*-E21	0.07 to 0.10	0.10 to 0.15	
SS-G03-**-F(G)R-D*-E21	0.13 to 0.15	0.08 to 0.15	
SS-G03-**-FR-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.)

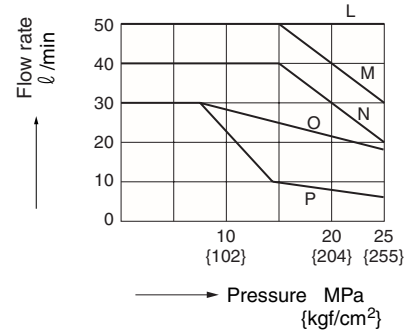
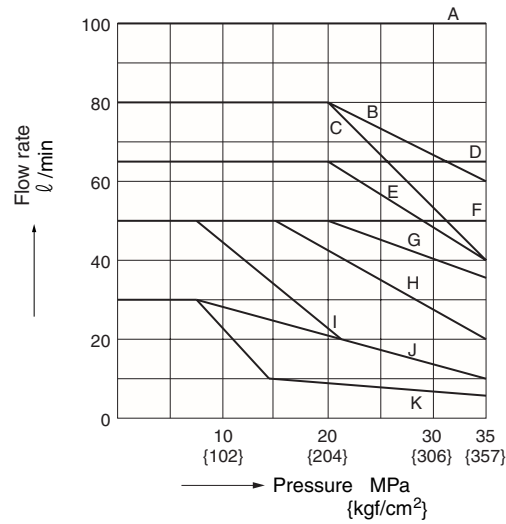
2. In the case of power supply type E* (with built-in rectifier), the spring return time using Quick Return (option symbol: Q) is the same as D*.

Pressure – Flow Volume Allowable Value

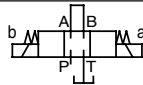
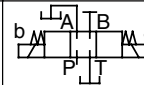
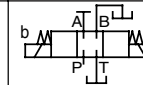
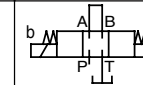
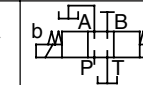
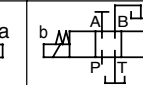
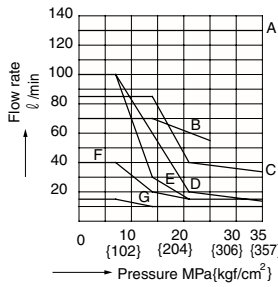
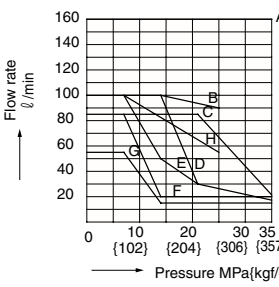
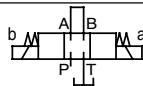
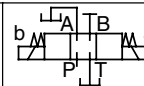
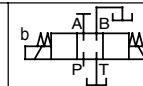
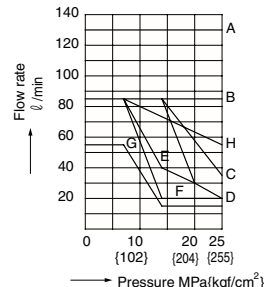
Size	Standard Form, with AC, DC solenoid		
	SS/SA-G01-**-R**-E31		
Operation Example Operation Symbol			
A2X, H2X	—	K	K
E2X	—	J	J
A3X, H3X	B	K	K
E3X	A	J	J
A3Z, H3Z	D	D	D
E3Z	D	D	D
A5	A	—	I
H5	A	I	—
C1, C6	Note1) C(E)	I	I
C1S, C5, C6S	A	I	I
C2, C9	A	K	K
A4	F	F	F
H4	F	F	F
C4	F	F	F
C7Y, C8	Note2) G(H)	K	K

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.

Size	Shockless Type, with DC solenoid		
	SS/SA-G01-**-FR**-E31		
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



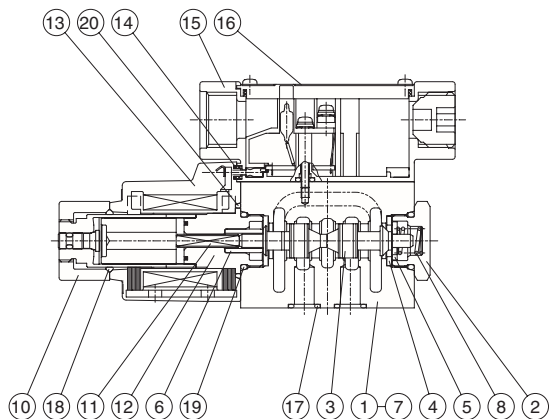
Pressure – Flow Volume Allowable Value

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

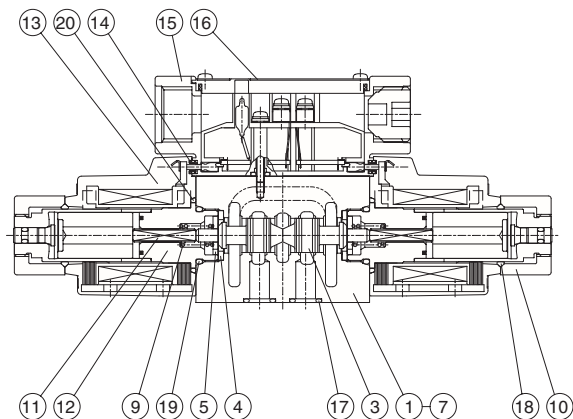
- Note) 1.Letter in parentheses is for solenoid with built-in rectifier (E*), but without Quick Return, and for DC solenoid (D*) with surge voltage absorbing diode on the electrical circuit.
2.There is no shockless type for the AC solenoid (C*), so use a solenoid with built-in rectifier (E*) when shockless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

Cross-sectional Drawing

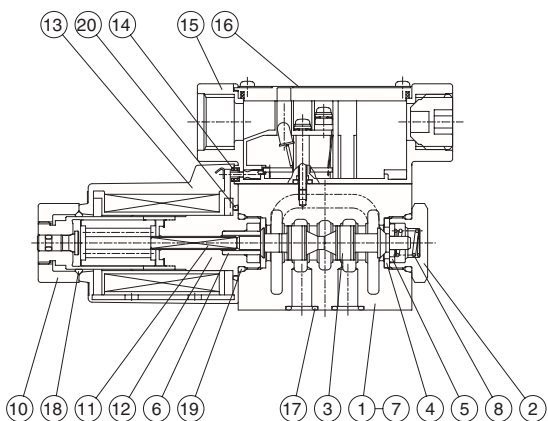
SS-G01-A**-R-C*-E31



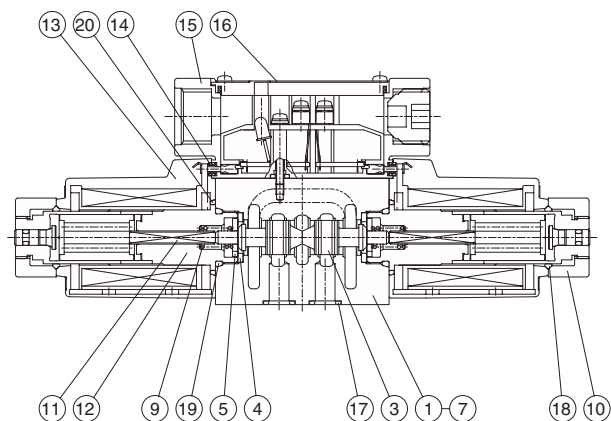
SS-G01-C**-R-C*-E31



SS-G01-A**-R-D/E*-E31



SS-G01-C**-R-D/E*-E31



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.

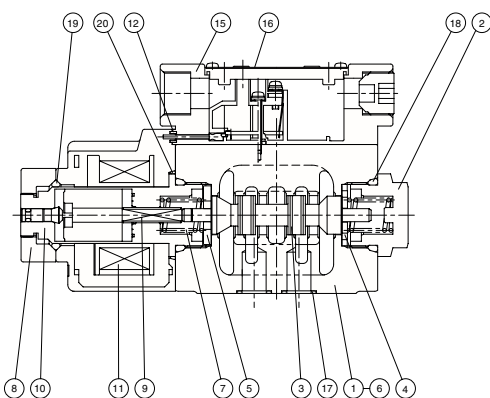
Seal Kit Number

Single Solenoid	Double Solenoid
EDCS-A	EDCS-C

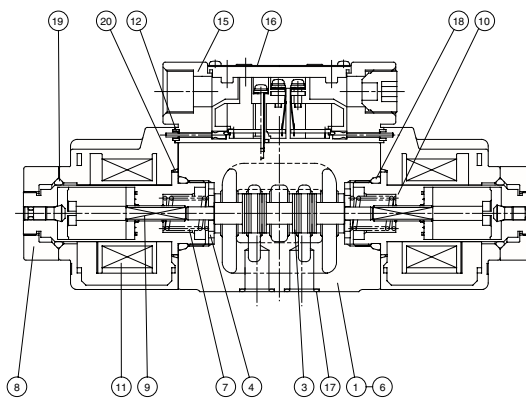
Part No.	Part Name	Part No.	Part Name
1	Body	11	Rod
2	Plug	12	Solenoid guide
3	Spool	13	Solenoid coil
4	Retainer A	14	Packing
5	Retainer B	15	Terminal box kit
6	Retainer C	16	Nameplate
7	Spacer	17	O-ring
8	Spring A	18	O-ring
9	Spring C	19	O-ring
10	Nut	20	O-ring

Cross-sectional Drawing

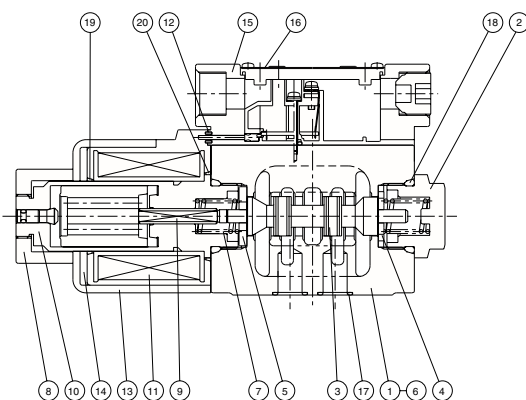
SS-G03-A**-R-C*-E21



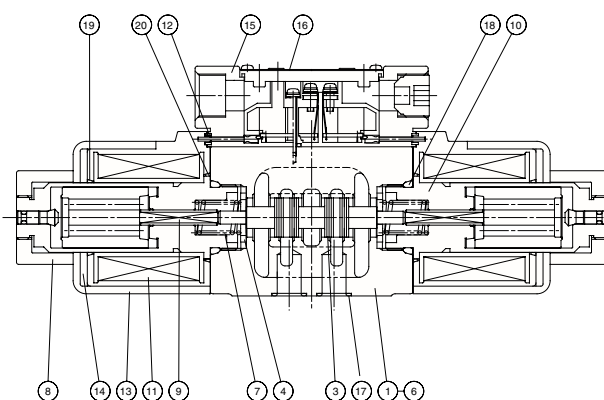
SS-G03-C**-R-C*-E21



SS-G03-A**-R-D/E*-E21



SS-G03-C**-R-D/E*-E21



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



Features

① 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.

② Low switching noise

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

③ Shockless

A switching speed adjustment mechanism enables direct, shockless operation (Option F).

④ No surge voltage

Sparking and surge voltage during solenoid switching is canceled for stable switching (Option G).

⑤ Easy coil replacement

A DIN connector type coil enables one-touch coil replacement.

⑥ 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.

⑦ 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				SA-G03									
		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 ℓ /min	Maximum Working Pressure MPa(kgℓ/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgℓ/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgℓ/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgℓ/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgℓ/cm ²)				
	-A2X-	(gpm)	(psi)	(gpm)	(psi)	(gpm)	(psi)	(gpm)	(psi)	(gpm)	(psi)				
	-H2X-	30 (7.9)	35 (5000)	30 (7.9)	25(255) (3571)	40 (10.6)	35(357) (5000)	85 (22.4)	35(357) (5000)	85 (22.4)	25(255) (35.71)				
	-E2X-					85 (22.4)									
	-A3X-	80 (21.1)													
	-H3X-														
	-E3X-	100 (26.4)													
	-A3Z-														
	-H3Z-	65 (17.1)													
	-E3Z-														
	--A4-	50 (13.2)													
	-H4-														
	-A5-					50 (13.2)		130 (34.3)				160 (42.2)		130 (34.3)	
	-H5-														
	-C2-														
	-C5-														
	-C9-														
	-C1S-														
	-C6S-														
	-C1-	AC Solenoid 65 (17.1) DC Solenoid 80 (21.1)													
	-C6-														
	-C4-														
	-C7Y-	50 (13.2)		40 (10.6)		70 (18.5)	25(255) (3571)	100 (26.4)	25(255) (3571)	85 (22.4)					
	-C8-														

Note) The maximum flow rate of each valve depends on the pressure. For details, see pages S-9 and S-10.

		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	35(25)MPa{357(255)kgf/cm²}(Note1)					
Maximum Allowable Backpressure	T port	21MPa{214kgf/cm²}			16MPa{163kgf/cm²}		
Switches/min.	Standard Type	300	120	300	240	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		JIS C 0920 IP65 (Dust-tight, Waterjet-proof) (Note 2)				
	Ambient Temperature		- 20 to 50°C				
	Operating Fluid	Temperature Range	- 20 to 70°C				
		Viscosity Range	15 to 300mm²/s				
		Filtration	25 microns or less				
Mounting bolt	Size × Length	M5 × 45 (Four) 10-24 × 1 3/4			M6 × 70 (Four) (M8 × 70 (Four)) 1/4-20 × 2 3/4		
	Tightening Torque	M5 5 to 7N·m{51 to 71kgf·cm} 10-24 to 3.6-5.1Lbs.ft.			M6 10 to 13N·m{102 to 133kgf·cm} (M8 20 to 25N·m{204 to 255kgf·cm}) 1/4-20 to 7.2-9.4Lbf.ft.		

Note) 1. Maximum operating pressure depends on the valve type. For details, see page S-13.
2. The power supply type for E* is IP64 (dust-tight, splash-proof).
3. For mounting bolts, use 12T or equivalent.

Notes

- Pipe system so that tank line is always filled with oil.
- Surge pressure should be kept below maximum tank line back pressure rating.
- When using a 4-way valve as a 2-way or 3-way and blocking unused ports lowers the maximum flow.
- Keep hydraulic oil clean. (Degree of contamination: NAS grade 12 or better). When petroleum hydraulic oil is used, it should conform to ISO VG32, 46.
- Do not exceed permissible voltage range of the coil used.
- Do not supply electric power to the AC solenoid unless the coil is mounted to the valve.
- Provide drain piping from the T port, when valve spool types are A2X, H2X, E2X.
- If the changeover position is kept under high pressure for an extended period, malfunctions may occur due to hydraulic lock. Please consult us when you have such application.
- When the detent-type (E2X, E3X, E3Z) is used, we recommend that the electric power supply be continuous in order that the changeover position may be firmly maintained.
- Resistance force against the manual override pin changes, depending on the back pressure of the tank line.
- Solenoid coil could be hot by continuous operation. Do not touch the coil directly by hand.
- Gasket dimension
SA/SS-G01 = ISO 4401-03-02-0-94
SA/SS-G03 = ISO 4401-05-04-0-94

● 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

31: 01 size for mounting bolt M5

E31: for mounting bolt 10-34

21: 03 size for mounting bolt M8

J21: 03 size for mounting bolt M6

E21: 03 size for mounting bolt 1/4-20

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

Auxiliary symbol (Can be combined in alphabetic sequence.)

F : Shockless type (Available with power supply D*, E)

GR: Surgeless type with indicator (Available with power supply C*, D*)

J : G screw conversion adapter (For power supply C*, D*)

N : With manual push-button

Q : Quick return type (Available with power supply E*)

R : With indicator light

Transition Flow Path (Specify for A2X, H2X, E2X, *3*, 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(R)=Connection port to tank

Operation Method

A	H	C	E
Spring Offset	Spring Center	Detent	

Nominal diameter

01 size

03 size

Mounting method

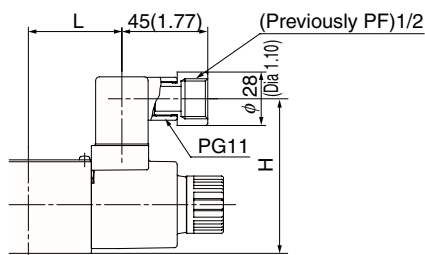
G: Cascade mounting

Wet type solenoid operated directional control valve with DIN connector

Options

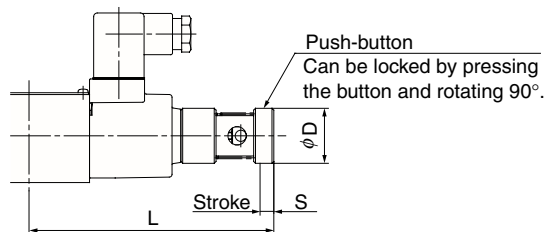
(Auxiliary Symbol Explanations)

G Screw Adapter (Auxiliary Symbol: J)



Model No.	L	H
SA-G01	49(1.92)	81(3.19)
SA-G03	60.5(2.38)	100.5(3.96)

With manual push-button (Auxiliary Symbol: N)

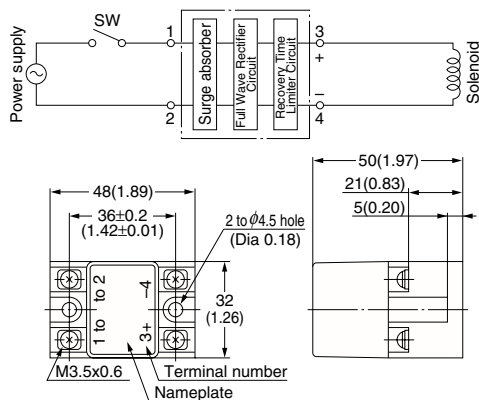


Model No.		L	S	D
SA-G01	AC Solenoid	133.5(5.26)	7.5(0.30)	30(1.18)
	DC Solenoid	140.5(5.53)		
SA-G03	AC Solenoid	155.5(6.12)	9.5(0.37)	35(1.38)
	DC Solenoid	173.5(6.83)		

Quick Return Type (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 The Quick Return device is not built in. Mount to the electrical box, etc.
- 3 Even when power supply type E* is equipped with a Quick Return mechanism, response is not fast. (Replace the DIN connector with EA41-1A or EA41-R*-1C, without changing the coil.)
- 4 When multiple Quick Return devices are used, do not wire COM to the output side (pin number 3 and 4 side).



Other Options

Note) For information about the shockless and surgeless options, see page S-4.

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

Manual push-button

Technical drawing of the SMC Solenoid Valve Model SCS100-50, showing front and side views with dimensions in mm and inches.

Front View Dimensions:

- Top Port Diameter: $\phi 7.5$ (Dia 0.30)
- Top Port Center-to-Center Distance: 49 (1.93)
- Top Port Spacing: 66 (2.60)
- Top Port Diameter: $\phi 5.5$ (Dia 0.22)
- Top Port Spacing: 39 (1.54)
- Top Port Diameter: $\phi 7.5$ (Dia 0.30)
- Top Port Spacing: 37.5 (1.48)
- Top Port Diameter: $\phi 5.5$ (Dia 0.22)
- Top Port Spacing: 66 (2.60)
- Top Port Diameter: $\phi 7.5$ (Dia 0.30)
- Top Port Spacing: 49 (1.93)
- Top Port Diameter: $\phi 7.5$ (Dia 0.30)

Side View Dimensions:

- Side Port Diameter: $\phi 7.5$ (Dia 0.30)
- Side Port Spacing: 102 (4.02)
- Side Port Diameter: $\phi 5.5$ (Dia 0.22)
- Side Port Spacing: 39 (1.54)
- Side Port Diameter: $\phi 7.5$ (Dia 0.30)
- Side Port Spacing: 141 (5.55)
- Side Port Diameter: $\phi 5.5$ (Dia 0.22)
- Side Port Spacing: 66 (2.60)
- Side Port Diameter: $\phi 7.5$ (Dia 0.30)
- Side Port Spacing: 49 (1.93)
- Side Port Diameter: $\phi 7.5$ (Dia 0.30)

Labels:

- SOL b
- A
- P
- T
- B

Technical drawing of the front view of a 2-position, 2-way solenoid valve. The drawing shows two solenoid coils labeled "SOL b" and "SOL a". Between the coils are three ports labeled "A", "P", and "B". Dimension lines indicate distances: 49.8(1.96) from the left edge to the start of the coil, 102(4.02) between the coils, and 204(8.03) for the total width.

SA-G01-A^{**}-D^{*}/E^{*}-E31
SA-G01-H^{**}-D^{*}/E^{*}-E31
SA-G01-C^{**}-D^{*}/E^{*}-E31
SA-G01-E^{**}-D^{*}/E^{*}-E31

Technical drawing of the 2500 Series Solenoid Valve showing dimensions in mm and inches. The drawing includes a side view and a top view. Key dimensions are labeled as follows:

- Top View Dimensions:
 - Overall width: 218 (8.58)
 - Distance from left face to center of solenoid coil: 109 (4.29)
 - Distance from center of solenoid coil to right face: 39 (1.54)
 - Distance from left face to center of solenoid coil (alternative measurement): 148 (5.83)
 - Distance from center of solenoid coil to right face (alternative measurement): 49 (1.93)
 - Distance from left face to center of solenoid coil (alternative measurement): 60.5 (2.38)
 - Distance from center of solenoid coil to right face (alternative measurement): 37.5 (1.46)
 - Distance from left face to center of solenoid coil (alternative measurement): 281 (3.19)
 - Distance from center of solenoid coil to right face (alternative measurement): 192.5 (3.64)
 - Distance from left face to center of solenoid coil (alternative measurement): 48 (1.89)
 - Distance from center of solenoid coil to right face (alternative measurement): 253 (10.0)
- Side View Dimensions:
 - Overall height: 100 (3.94)
 - Distance from top face to center of solenoid coil: 49 (1.93)
 - Distance from center of solenoid coil to bottom face: 39 (1.54)
 - Distance from top face to center of solenoid coil (alternative measurement): 148 (5.83)
 - Distance from center of solenoid coil to bottom face (alternative measurement): 49 (1.93)
 - Distance from top face to center of solenoid coil (alternative measurement): 60.5 (2.38)
 - Distance from center of solenoid coil to bottom face (alternative measurement): 37.5 (1.46)
 - Distance from top face to center of solenoid coil (alternative measurement): 281 (3.19)
 - Distance from center of solenoid coil to bottom face (alternative measurement): 192.5 (3.64)
 - Distance from top face to center of solenoid coil (alternative measurement): 48 (1.89)
 - Distance from center of solenoid coil to bottom face (alternative measurement): 253 (10.0)
- Other Labels:
 - SOL b (Solenoid Coil)
 - SOL a (Solenoid Coil)
 - Ø5.5 (Dia 0.22) (Bore Diameter)

Model No.	E	Weight
MSA-01X-E10	1/4	1.2kg
MSA-01Y-E10	3/8	1.2kg

Technical drawing of a rectangular plate with the following dimensions and features:

- Overall width: 98 (3.86)
- Overall height: 70 (2.76)
- Weight: 1.2kg
- Top edge dimensions (from left): 7.5 (0.30), 12 (0.47), 7.5 (0.30)
- Right edge dimensions (from top): 7.5 (0.30), 83 (3.27)
- Internal horizontal dimensions (from left): 20 (0.79), 40.5 (1.59), 30.2 (1.19)
- Internal vertical dimensions (from top): 5.1 (0.20), 7.5 (0.30), 12.7 (0.50)
- Bottom edge dimensions (from left): 7.5 (0.30), 4- ϕ 7.5 (Dia 0.30), 4-10-34x0.47tap, 4- ϕ 9.5x1counterbore (Dia 0.37 x 0.04), ϕ 5.5hole (Dia 0.22)
- Internal features: 4 holes labeled A, B, P, and 4 holes labeled I.

Technical drawing of the front view of a rectangular plate. The plate has four circular holes labeled A, B, P, and T. Dimension lines indicate the following measurements:

- Overall width: 71.5 (2.81) inches
- Distance from left edge to center of hole B: 41.5 (1.63) inches
- Distance from center of hole B to center of hole P: 11.5 (0.45) inches
- Distance from center of hole P to center of hole A: 11.5 (0.45) inches
- Distance from center of hole A to right edge: 11.5 (0.45) inches
- Overall height: 43.5 (1.71) inches
- Distance from top edge to center of hole T: 27.5 (1.08) inches
- Distance from center of hole T to center of hole P: 11.5 (0.45) inches
- Distance from center of hole P to bottom edge: 11.5 (0.45) inches

An arrow points to the bottom-left corner with the text "4-\"E\" NPT".

Installation Dimension Drawings

AC Solenoid

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

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

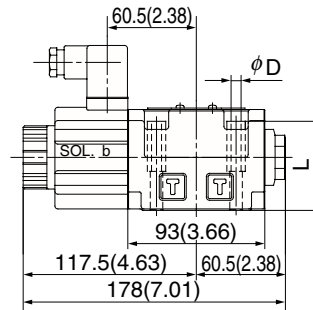
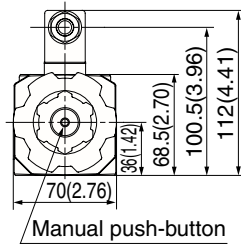
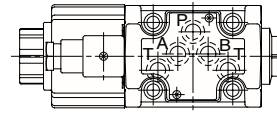
Note) SA-G03-H**-*-C*-E21

The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

	SA-G03-A**-*-C*-E21	SA-G03-H**-*-C*-E21
ϕD	$\phi 6.8$ (Dia 0.27)	$\phi 8.5$ (Dia 0.33)
L	60.5(2.38)	58(2.28)

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

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



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

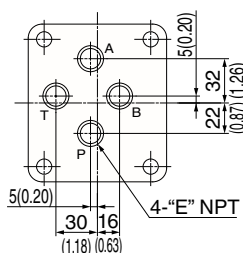
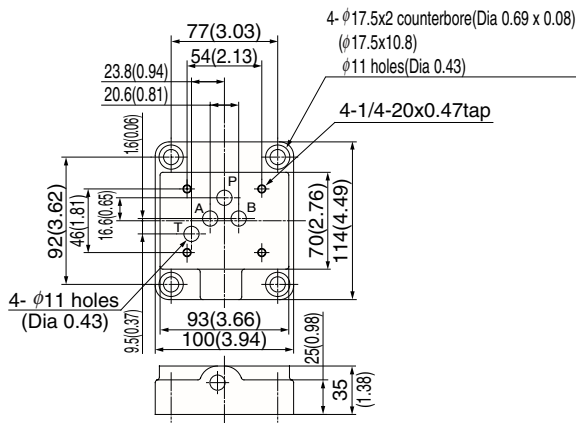
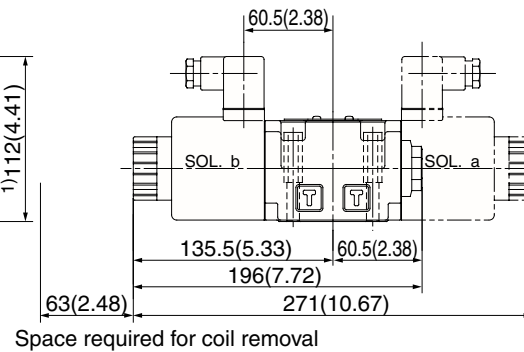
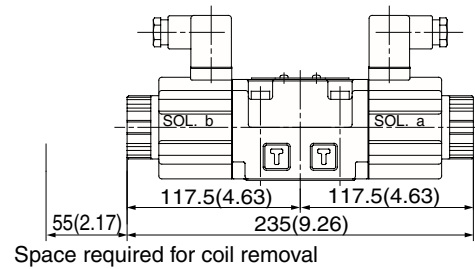
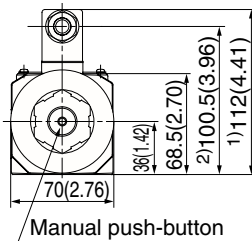
Note) 1.SA-G03-H**-*-D*/E*-E21

The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

2.SA-G03-A**-*-E*-E21

Dimension 1 is 115.5 (4.55)

Dimension 2 is 92.5 (3.64)

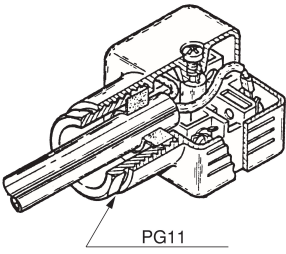
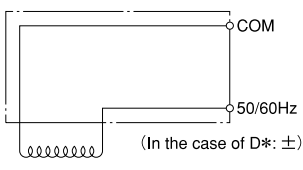
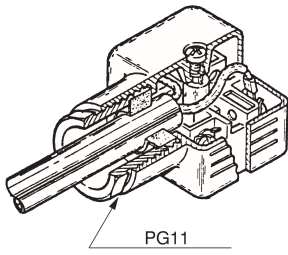
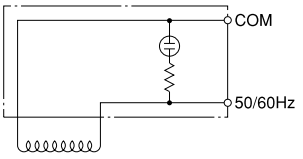
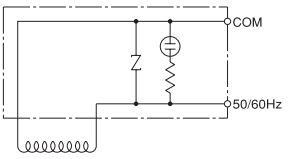
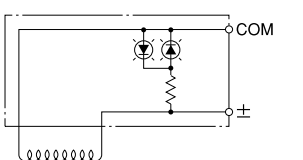
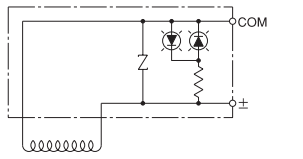
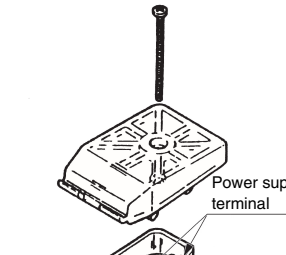
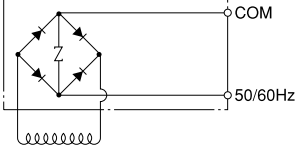
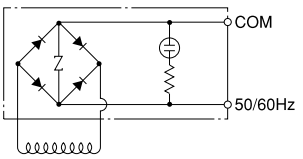


For sub plate SA-G03

Mounting bolt	Model No.	E	Weight
1/4-20	MSA-03-E10	3/8	2.3kg
M6	MSA-03X-E10	1/2	

M6 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-G01-***-C* E31 G03-D*(J)E21 (EA41-1A)	 PG11	 (In the case of D*: ±)
SA-G01-***-R-C* E31 G03-(J)E21 (EA41-R*-1C)	 PG11	
SA-G01-***-GR-C* E31 G03-(J)E21 (EA41-GRC*-1C)		
SA-G01-***-R-D* E31 G03-(J)E21 (EA41-DR*-1C)		
SA-G01-***-GR-D* E31 G03-(J)E21 (EA41-GRD*-1C)		
SA-G01-***-E* E31 G03-(J)E21 (EA42-1B)	 PG11	
SA-G01-***-R-E* E31 G03-(J)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 ϕ 8 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.

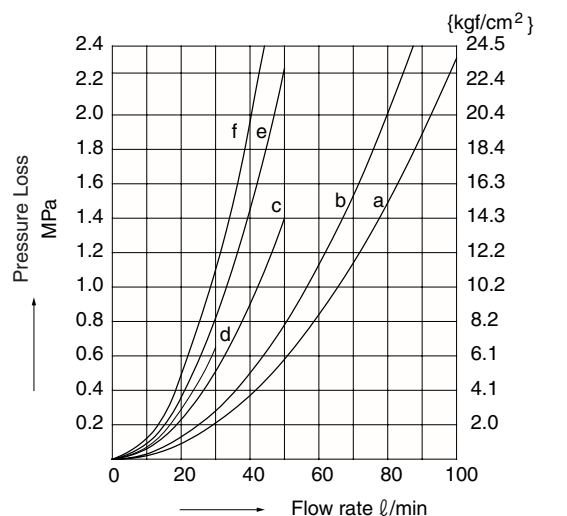
7.Tighten the M3 screws that secure connectors and terminals to a torque of 0.3 to 0.5Nm (3.1 to 5.1kgf·cm).

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.

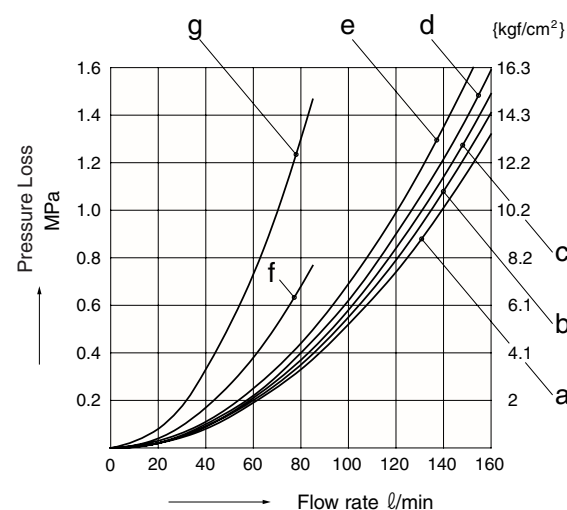
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

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	14MPa{143kgf/cm ² } 30 l/min
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	14MPa{143kgf/cm ² } 70 l/min
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.)

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*.

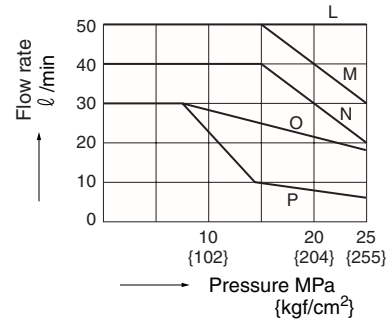
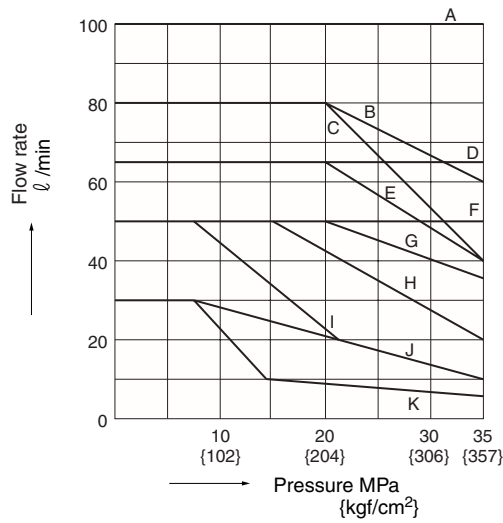
Pressure – Flow Volume Allowable Value

Size	Standard Form, with AC, DC solenoid		
	SS/SA-G01-**-R**-E31		
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

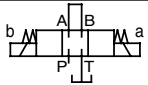
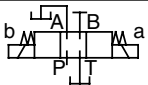
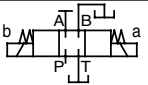
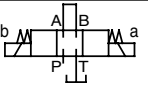
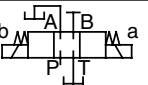
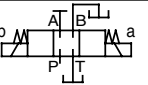
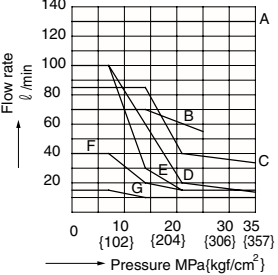
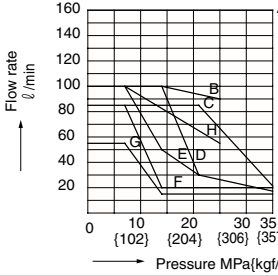
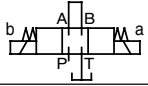
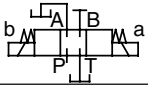
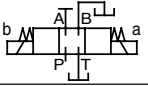
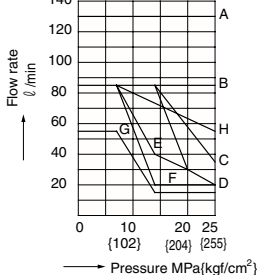
Size	Shockless Type, with DC solenoid		
	SS/SA-G01-**-FR**-E31		
Operation Example Operation Symbol			
A2X, H2X	—	P	—
E2X	—	O	P
A3X, H3X	L	P	P
E3X	L	O	L
A3Z, H3Z	L	L	L
E3Z	L	L	P
A5	L	—	—
H5	L	P	—
C1, C6	M	P	—
C1S, C2, C5, C6S, C9	L	P	—
A4, H4	L	L	—
C4	L	L	—
C7Y, C8	N	P	—

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.



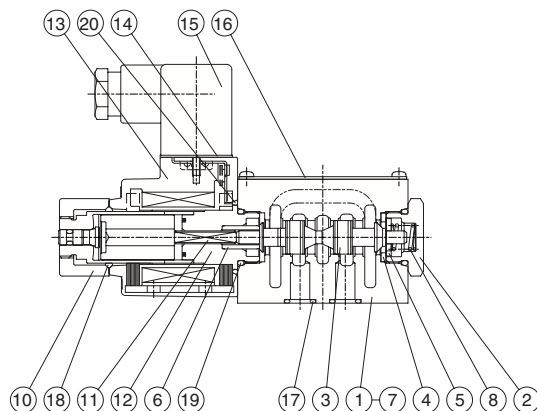
Pressure – Flow Volume Allowable Value

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	—	E	F
H2X	—	E	F	—	F	E
E2X	—	C	C	—	C	C
A3X	A	E	E	A	D	F
H3X	A	E	E	A	F	D
A3Z	A	A	C	A	C	C
H3Z	A	C	A	A	C	C
E3X, E3Z	A	C	C	A	C	C
A5	A	—	D	A	—	E
H5	A	D	—	A	E	—
C1, C1S, C5, C6, C6S	A	D	D	A	E	E
C2	A	G	D	A	G	E
A4, H4, C4	A	A	A	A	A	A
C9	A	G	G	A	G	G
C7Y, C8	B	B	B	Note1) B(H)	B(H)	B(H)
						
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	Note1) B(H)	B(H)	B(H)			
						

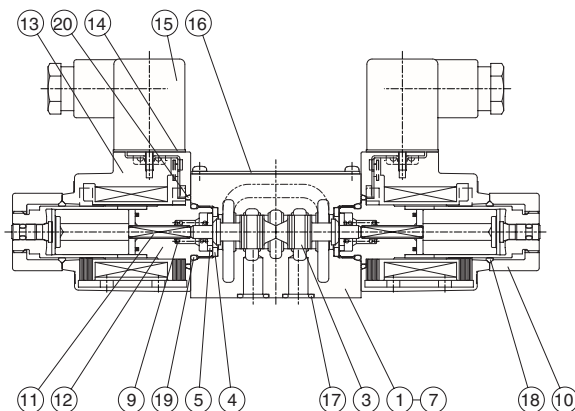
- Note) 1.Letter in parentheses is for solenoid with built-in rectifier (E*), but without Quick Return, and for DC solenoid (D*) with surge voltage absorbing diode on the electrical circuit.
2.There is no shockless type for the AC solenoid (C*), so use a solenoid with built-in rectifier (E*) when shockless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

Cross-sectional Drawing

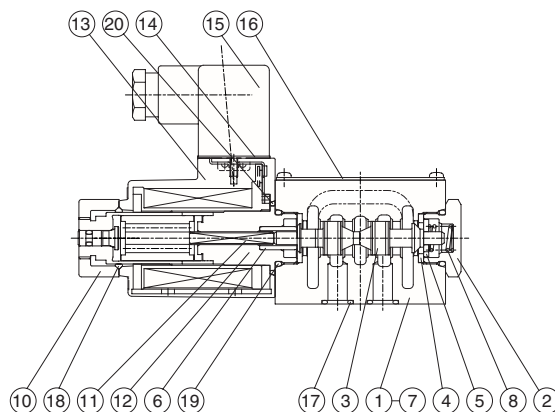
SA-G01-A**-C*-E31



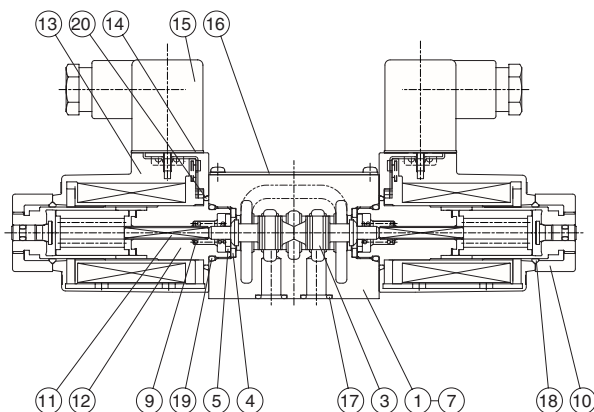
SA-G01-C**-C*-E31



SA-G01-A**-D/E*-E31



SA-G01-C**-D/E*-E31



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.

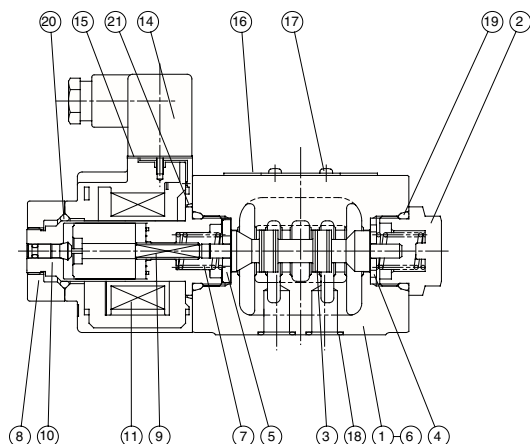
Seal Kit Number

Single Solenoid	Double Solenoid
EDCS-A	EDCS-C

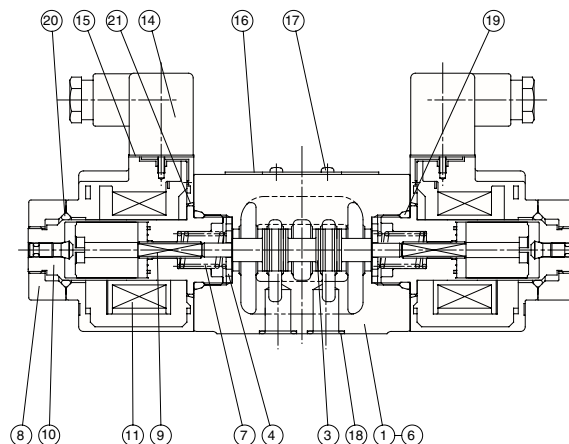
Part No.	Part Name	Part No.	Part Name
1	Body	11	Rod
2	Plug	12	Solenoid guide
3	Spool	13	Solenoid coil
4	Retainer A	14	Connector
5	Retainer B	15	Nameplate
6	Retainer C	16	Screw
7	Spacer	17	O-ring
8	Spring A	18	O-ring
9	Spring C	19	O-ring
10	Nut	20	O-ring

Cross-sectional Drawing

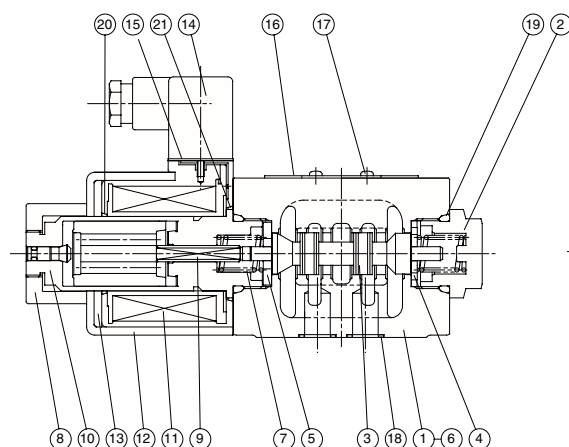
SA-G03-A**-C*-(J)E21



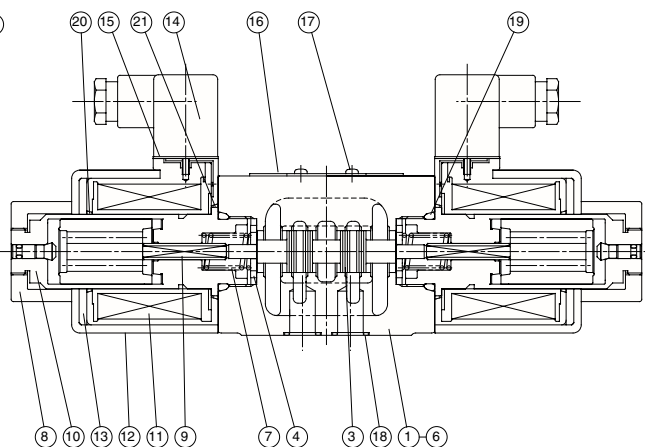
SA-G03-C**-C*-(J)E21



SA-G03-A**-D/E*-(J)E21



SA-G03-C**-D/E*-(J)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	Part No.	Part Name
1	Body	11	Solenoid coil
2	Plug	12	Coil case
3	Spool	13	Coil yoke
4	Retainer	14	Connector
5	Retainer B	15	Connector packing
6	Spacer	16	Nameplate
7	Spring	17	Screw
8	Nut	18	O-ring
9	Rod	19	O-ring
10	Solenoid guide	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 (Pilot Operated) Lower Power Solenoid Valve

G01: Direct type valve
G03: Pilot type valve

7.9 to 26.4gpm
1428 to 3000psi



Features

① Low current, low power

The SE series magnetic switching valve's solenoid has significantly lower power consumption.

② 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.

③ 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.

Specifications

Operation Symbol	SE-G01-**-GR-**-30			SE-G03-**-GR-**-J 20			
	JIS Symbol	Rated Flow Rate -Maximum Flow Rate ℓ/min(gpm)	Maximum Working Pressure MPa(psi)	JIS Symbol	Rated Flow Rate -Maximum Flow Rate ℓ/min(gpm)	Maximum Working Pressure MPa(psi)	
A2X		30 (7.9)	10 (1428)		100 (26.4)	21 (3000)	
A3X		35 (9.2)			80 (21.1)		
H2X					100 (26.4)		
H3X					80 (21.1)		
E3X		30 (7.9)	10 (1428)		100 (26.4)		
C4		40 (10.6)			40 (10.6)		
C5							
C6							
C6S							
C7Y					40 (10.6)		
C1					100 (26.4)		

Note) The maximum flow rate of each valve depends on the pressure. For details, see page S-29.

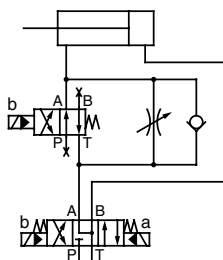
● Precautions During Use

The SE Series is an internal pilot and internal drain type valve, so the following precautions must be observed whenever using it.

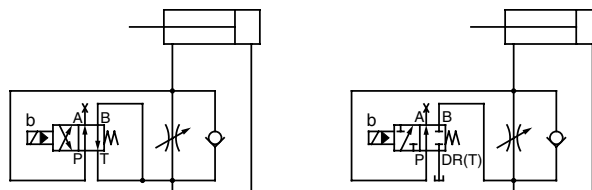
- 1) A pressure of 0.4MPa {57psi} or greater is required at the P port for valve switching and holding.
- 2) For valve switching, a pressure of 0.4MPa {57psi} or greater must be maintained between PT (DR) as minimum pilot pressure. In this case, make sure that P port pressure is always greater than T (DR) port pressure.
- 3) Never close the T (DR) port. Be sure to run piping from it.
- 4) A resistance valve is built in for flow paths C4 and C7Y, so there is no need to provide an external check valve.
- 5) Generally, operating fluid flow in the following directions: P→A, P→B, A→T, P→T. Do not configure for reverse flow.

Example of Non-allowed Circuits

When fast feed is done while SOL is ON, the valve does not switch because the pilot pressure cannot be obtained in the internal pilot.



The following shows the required circuit configurations in this case.



Solenoid Type		SE-G01-30			SE-G03-20			
		DC Solenoid	Internal DC solenoid for rectifier		AC Solenoid		DC Solenoid	
		D2	E1	E2	C1	C2	D1	D2
Maximum Working Pressure	P, A, B Ports	10MPa {1428psi}			21MPa {3000psi}			
Maximum Allowable Backpressure	T port	10MPa {1428psi} (In the case of 2MPa {300psi} operation symbol E3X)			7MPa {1000psi} (In the case of 2MPa {300psi} operation symbol E3X)			
Pilot Pressure (P-T Port Pressure)					0.4MPa{4kgf/cm²} minimum			
Changeover Frequency (per minute)		120			120			
Standard	Indicator light Surgeless	GR	R		GR			
Weight (kg)	Double Solenoid	2.5			3.5			
	Single Solenoid	1.8			3.3			
Operating Environment	Dust Resistance/Water Resistance Rank		JIS C0920 IP55 (Dust-tight, Rain-proof)			JIS C0920 IP63 (Dust-tight, Rain-proof)		
	Ambient Temperature		-20 to 50°C					
	Operating Fluid	Temperature Range		-20 to 70°C				
		Viscosity Range		15 to 300mm²/s				
		Filtration		25 microns or less				
Bundled Accessories	Mounting bolt		M5 x 30 (Four)			M5 x 35 (Four) (M8 x 70 (Four))		
	Tightening Torque		5 to 7N·m{51 to 71kgf·cm}			M6 10 to 13N·m {102 to 133kgf·cm} M8 20 to 25N·m {204 to 255kgf·cm}		

Note) For mounting bolts, use 12T or equivalent.

Understanding Model Numbers

SE - G 03 - A 3 X - GR - C2 - J20

Design number
30: For 01 size
J20: 03 size for mounting bolt M6 (20 if mounting bolt is M8)

Power supply

C: AC (50/60Hz) C1=AC100V C2=AC200V (Applicable for size 03 only)
D: DC D1=DC12V D2=DC24V (D1 is applicable for size 03 only)
E: For AC (joint 50/60 Hz inside rectifier) E1=AC 100 V E2=200 V (applicable for size 01 only)

Auxiliary symbol

GR: Surgeless type with indicator (applicable for power supply C*, D* only)
R2: With indicator light (applicable for power supply E* only)

Transition Flow Path (Specify for A2X, H2X, E2X, *3*, C7Y only.)

X	Y
Closed	Semi-open

Center valve position flow path

1	3	4	5	6	7	6S

Operation Method

A	H	C	E
Spring Offset	Spring Center	Detent	

Nominal pipe diameter
01 size
03 size

Mounting method
G: Gasket type

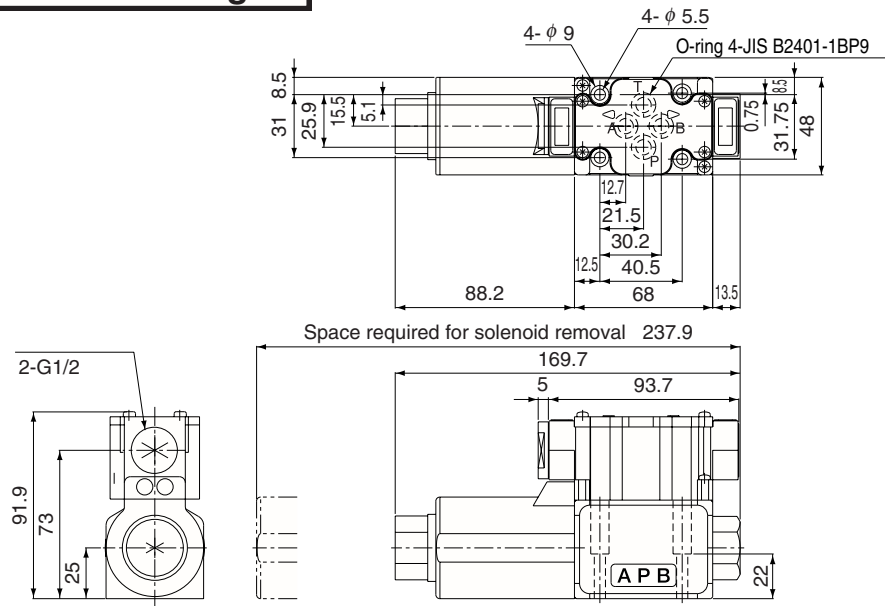
Low-power solenoid

● Solenoid Assembly Specifications

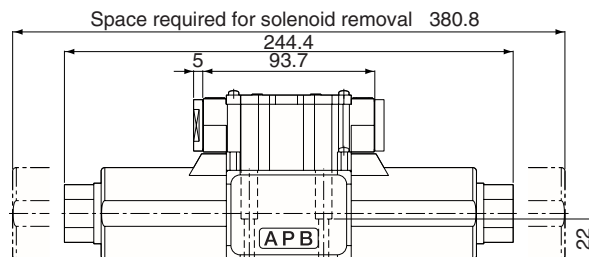
Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SE-G01				For SE-G03									
				Solenoid Coil Type	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)	Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)					
AC	C1	AC100	50					EE64-01C1-1A	0.29	0.19	6.1	80 to 110					
			60						0.24	0.135	4.1	90 to 120					
		AC110	60						0.265	0.165	5.3						
	C2	AC200	50					EE64-01C2-1A	0.145	0.095	6.1	160 to 220					
			60						0.12	0.07	4.1	180 to 240					
		AC220	60						0.135	0.085	5.3						
Built-in rectifier type AC	E1	AC100	50	SLH1-025B-R1-01	0.07	6.5	80 to 110										
			60				90 to 120										
		AC110	60		0.08	7.9											
	E2	AC200	50	SLH1-025B-R2-01	0.05	8.1	160 to 220										
			60				180 to 240										
		AC220	60		0.05	9.87											
DC	D1	DC12	—					EE64-01D1-1A	0.4	4.8	10.8 to 13.2						
	D2	DC24	—					SLH1-025B-D2-01	0.2	4.8	21.6 to 26.4	EE64-01D2-1A					

Installation Dimension Drawings

DC Solenoid
SE-G01-A***-GR-**-30



SE-G01-C**-GR-**-30
SE-G01-E3X-GR-**-30



Note) Gasket surface dimensions and the sub plate are the same as those for SS-G01. See page S-5 for more information.

Installation Dimension Drawings

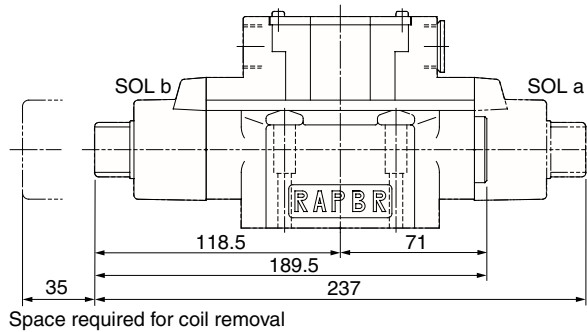
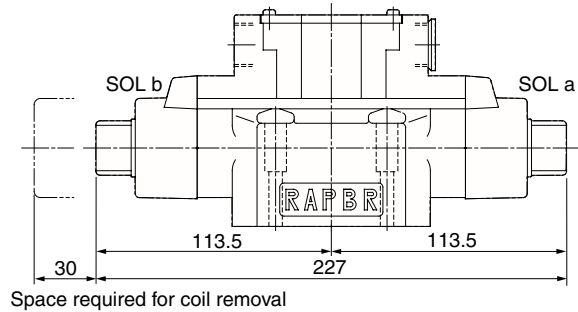
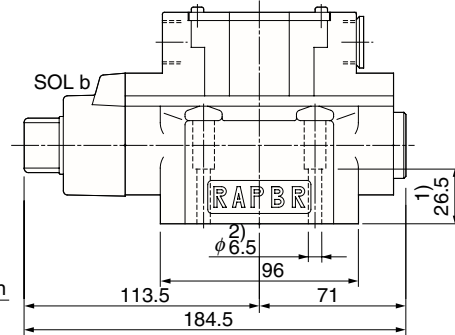
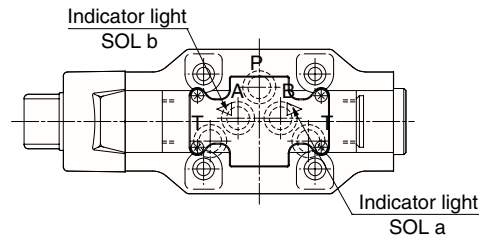
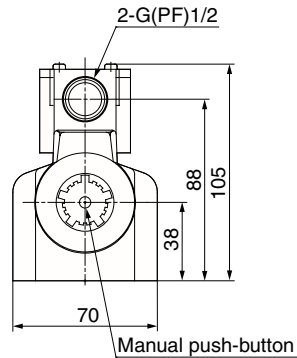
AC Solenoid

SE-G03-A**-GR-C*-J20

SE-G03-H**-GR-C*-J20

Note)

1. SE-G03-H**-GR-C*-J20
The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.
2. M8 mounting bolts
Dimension 1 is 59.
Dimension 2 is $\phi 8.5$.



SE-G03-C**-GR-C*-J20

SE-G03-E**-GR-C*-J20

DC Solenoid

SE-G03-A**-GR-D*-J20

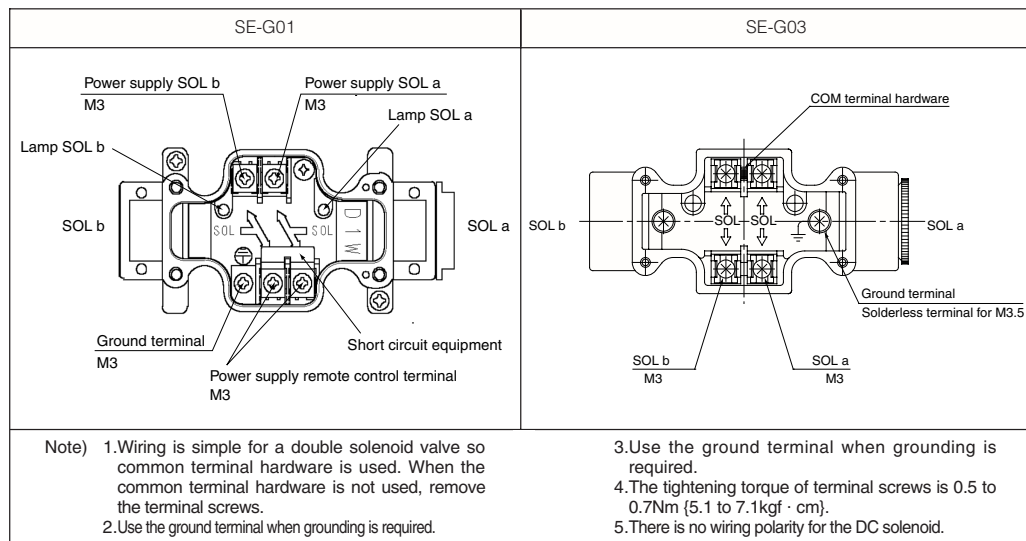
SE-G03-H**-GR-D*-J20

SE-G03-C**-GR-D*-J20

SE-G03-E**-GR-D*-J20

Note) Gasket surface dimensions and the sub plate are the same as those for SS-G03. See page S-6 for more information.

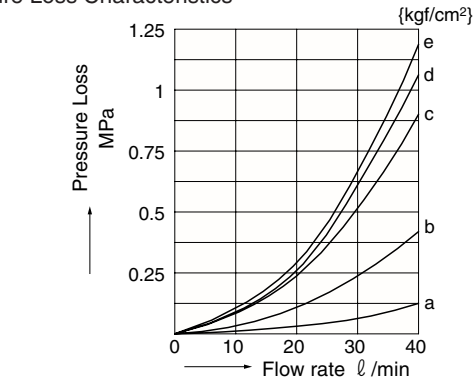
Wiring Diagram



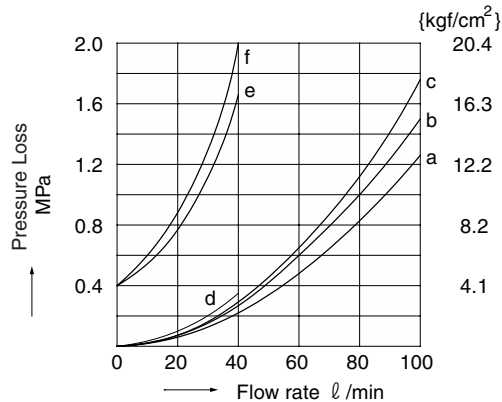
Performance Curves

Differential Hydraulic Fluid Viscosity 32mm²/s

Pressure Loss Characteristics



Pump Type	Flow Path	P→A	P→B	A→T	B→T	P→T
SE-G01	A2X	e	e	—	—	—
	A3X	e	e	d	d	—
	E3X	e	e	d	d	—
	C4	a	a	a	a	a
	C5	e	e	c	c	—
	C6	e	e	b	b	—



Pump Type	Flow Path	P→A	P→B	A→T	B→T	P→T
SE-G03	A2X, H2X	b	b	—	—	—
	A3X, H3X	b	b	c	c	—
	C1	b	b	a	b	—
	C4	e	e	a	a	e
	E3X, C5, C6S	b	b	b	b	—
	C6	b	b	a	a	—
	C7Y	f	f	d	d	e

Pressure - Flow Volume Allowable Value

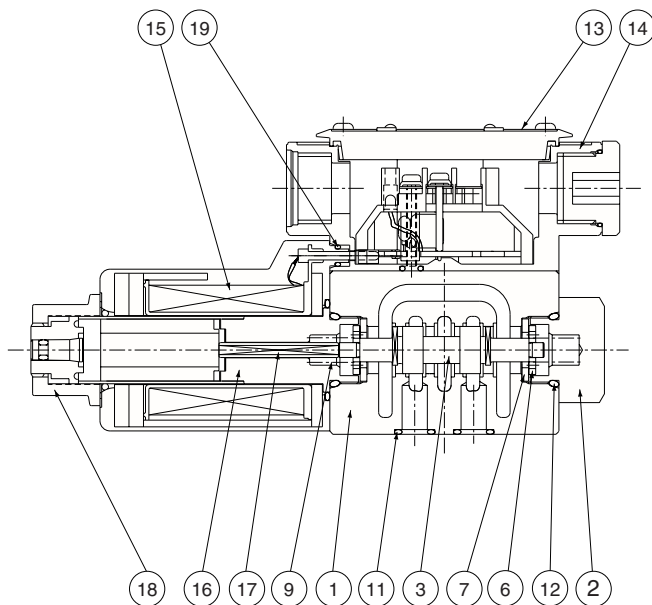
Pump Type	SE-G01			SE-G03		
Operation Example						
Operation symbol						
A2X	—	E	A	—	K	J
H2X				—	J	K
A3X	D	C	A	J	K	J
H3X				J	J	K
E3X	B	A	A	L	L	L
C1				J	J	J
C4	B	B	B	M	M	M
C5	A	B	B	J	J	J
C6	A	B	B	J	J	J
C6S				J	J	J
C7Y				M	M	M

Flow rate (l/min) vs Pressure (MPa) for SE-G01. The graph shows the allowable flow rate for different flow paths (A, B, C, D, E) as a function of pressure.	Flow rate (l/min) vs Pressure (MPa) for SE-G03. The graph shows the allowable flow rate for different flow paths (J, L, M, K) as a function of pressure.
--	---

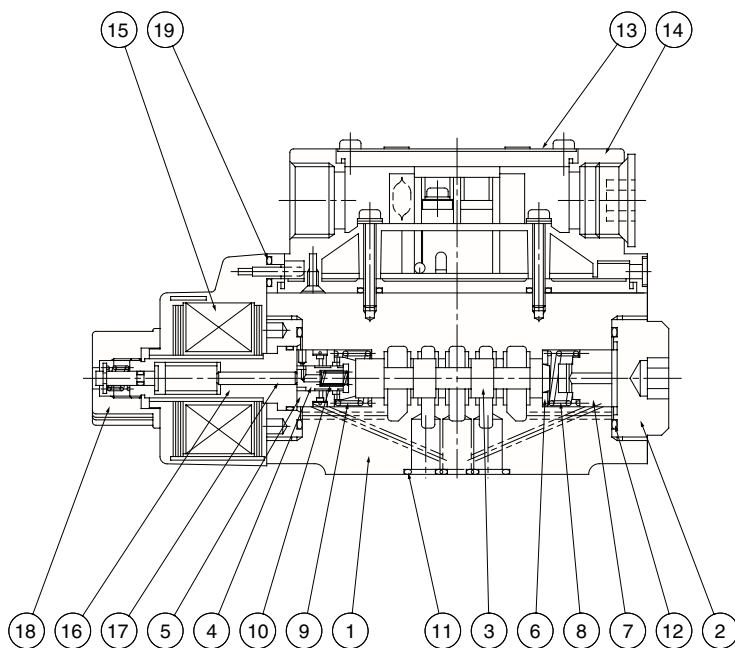
Note) 1.The maximum flow rate is the value when a rated 90%V is applied following solenoid temperature rise and saturation.
2.The maximum flow rate is the allowable value of each port.

Cross-sectional Drawing

SE-G03-A3X-GR-**-30



SE-G03-A3X-GR-**-20



Part No.	Part Name
1	Body
2	Plug
3	Spool
4	Piston
5	Sleeve
6	Retainer
7	Stopper
8	Spring
9	Spring
10	Spring
11	O-ring
12	O-ring
13	Nameplate
14	Terminal box
15	Coil
16	Guide
17	Rod
18	Nut
19	O-ring

List of Sealing Parts

Part No.	Part Name	SE-G01		SE-G03	
		Part Number	Q'ty		Part Number
			Single Solenoid	Double Solenoid	
11	O-ring	IB-P9	4	4	IB-P12
12	O-ring	IB-P18	2	2	S25(Hs90)
19	O-ring	S4	2	4	IA-P4

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

Seal Kit Number

SE-G01		SE-G03	
Single Solenoid	Double Solenoid	Single Solenoid	Double Solenoid
EECS-01A	EECS-01C	EES-03A-1A	EES-03C-1A

DSS (DSA) 22 Design Series Solenoid Control Valve

**158.5gpm
4571psi**



Features

- ① Long-life operation is ensured by use of the high-performance, renowned SS (SA)-G01 wet solenoid valve as the pilot valve.
- ② High pressure, high capacity
The 06 size delivers up to 600 ℓ /min.
- ③ Low pressure loss
An original flow path design provides wide-ranging low pressure loss and enhanced system circuit efficiency.
- ④ Internal modification of the pilot and drain can be accomplished without removing the valve by simply connecting and disconnecting plugs.
- ⑤ 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			06 Size		
Valve Model Number			DSS(DSA)-G06-***-R**-E22		
Maximum Working Pressure MPa{kgf/cm²} (psi)	P.A.B. Ports		32{326} (4570)		
	T Port	Internal Drain Type	16{163} (2286)		
		External Drain Type	21{214} (3000)		
Maximum Flow Rate ℓ /min (gpm)			600(158.3)		
Rated Flow Rate ℓ /min (gpm)			300(79.2)		
Maximum Pilot Pressure MPa{kgf/cm²} (psi)			25{255} (3571)		
Minimum pilot pressure MPa{kgf/cm²}(psi)	A** (Spring Offset Type)		0.8{8.2}(117.1)		
	E** (No-spring Detent Type)				
	C** (Spring Center Type)		1.2{12.2}(174.3)		
	D** (Pressure Center Type)				
	Built-in Pilot Pressure Check Valve Type (For Internal Pilot)				
Maximum Changeover Frequency (per minute)			120		
Pilot Volume (cm³)(in³)	A** (Spring Offset Type)		20.0(1.22)		
	C** (Spring Center Type)		10.0(2.44)		
Weight (kg)	A** (Spring Offset Type)		14.5(15.4)		
	E** (No-spring Detent Type)		15.0(15.9)		
	C** (Spring Center Type)				
	D** (Pressure Center Type)		16.5		
Operating Environment	Dust-resistance/Water-resistance Rank JIS C 0920		DSS: IP64 (Dust-tight, Splash-proof) DSA: IP65 (Dust-tight, Waterjet-proof)		
	Ambient Temperature		-20 to 50°C		
	Operating Fluid	Temperature Range	-20 to 70°C		
		Viscosity Range	15 to 300mm²/s		
		Filtration	25 microns or less		
Bundled Accessories	Mounting bolt		1/2 × 2 1/2 (UNC)		
	Tightening Torque N·m{kgf·cm} (Lbs.ft.)		M12 60 to 70{612 to 714} (44-51)		

- Note) 1.The maximum flow rate of each valve depends on the pressure. For details, see pages S-42.
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 S-3 and S-15.

● 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 S-43 for more information.
- 3 For the PT mounting type DSS (DSA)-G**-C7*-*-22, open cross over with

restrictor C7Y is standard.

- 4 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.
- 5 When using a detent type (E3*), use constant energization in order to securely maintain the switching position.
- 6 Use of the pressure center type is recommended for large-volume flow control.
- 7 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.

- 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.

Valve Model Number	DSS(DSA)-G06
Front Position	
Simplified Symbols	
Detailed Symbols	
Flow Regulator Adjusting Screw Positions	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

Design number

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

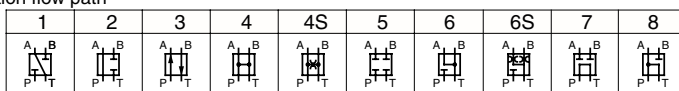
Auxiliary symbol (For multiple specifications, use alphabetic sequence.)

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
N: With manual lock
G: Surgeless type
Q: Quick return type

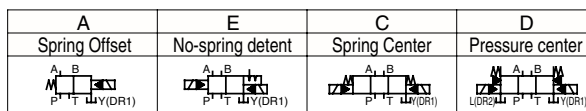
Pilot pressure check valve
None: No check valve
C: Built-in check valve

Transition flow path (Specify for *3*, *7* only.)
X: Closed Y: Restrictor open Z: Open

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



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



Nominal diameter 06 size

Mounting method G: Gasket type

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 25MPa[255kgf/cm²]

*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.

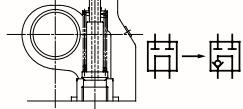
Do not connect any pipe that generates sudden surge pressure.

Built-in Pilot Solenoid Valve

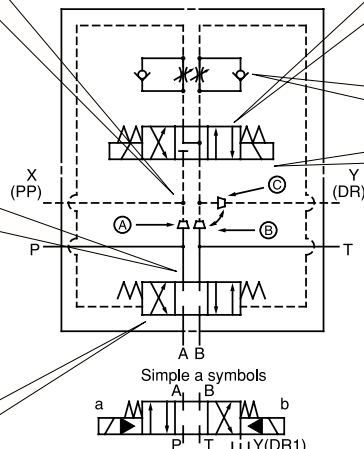
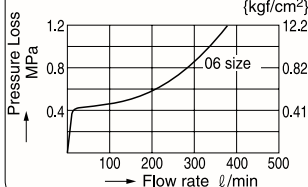
Valve Model Number	For G06
DSS(DSA)-G***-A**	SS(SA)-G01-H3X
DSS(DSA)-G***-E**	SS(SA)-G01-E3X
DSS(DSA)-G***-C**	SS(SA)-G01-C6
DSS(DSA)-G***-D**	SS(SA)-G01-C9

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



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.

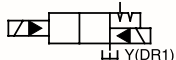
Y: The restrictor effect can be obtained especially when the solenoid is de-excited (actuator stopped).

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: 5 to 7N·m[51 to 71kgf-cm])

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.

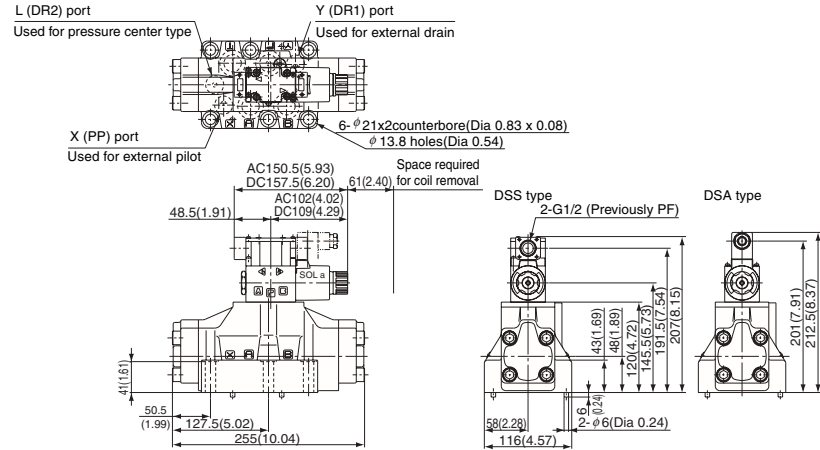
Pressure center

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

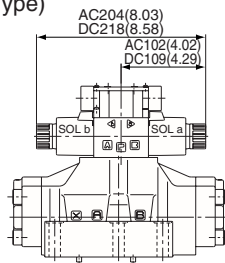
Sub Plate Number

Size	Model No.	Connecting Pipe Diameter	Weight (kgf)
For G06	MDS-06-E30	3/4 NPT	5.2
	MDS-06X-E30	1 NPT	

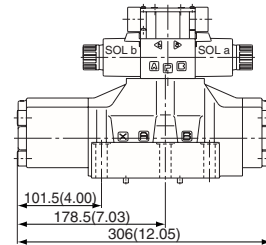
DSS(DSA)-G06-A**-R**-E22
(Spring Offset Type)



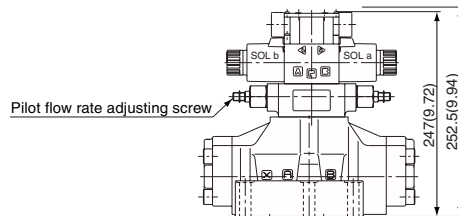
DSS(DSA)-G06-^E_C**R**-E22
(No-spring Detent Type)
(Spring Center Type)



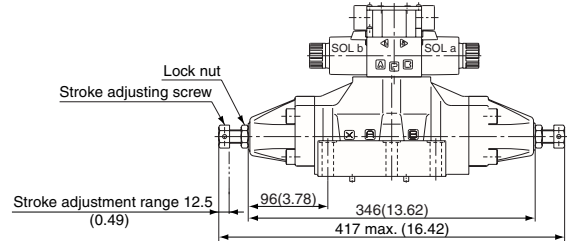
DSS(DSA)-G06-D**-R**-E22
(Pressure Center Type)



DSS(DSA)-G06-^A_E^C_D**RY**-E22
(Flow Regulator Type)



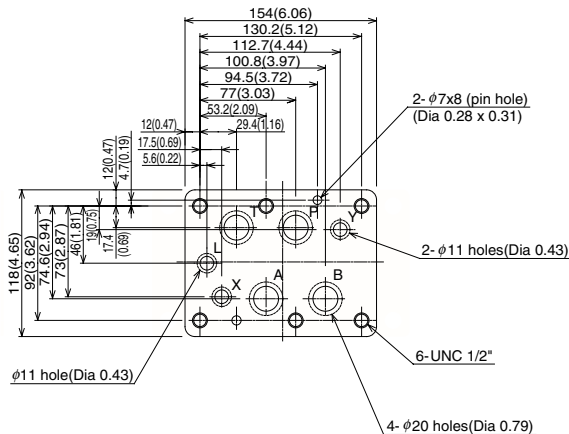
DSS(DSA)-G06-^A_E^C**LR**-E22
(Adjustable Stroke Type)



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

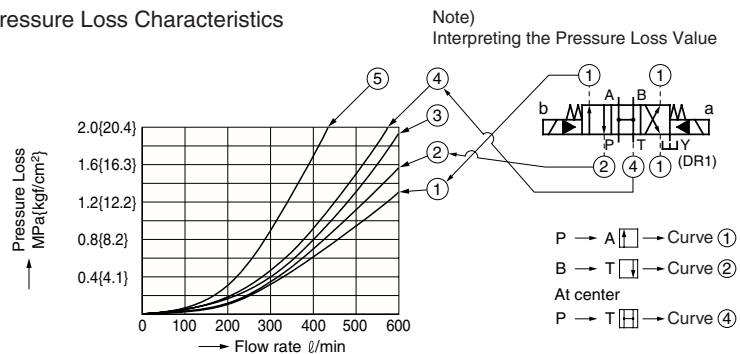
Gasket Surface Dimensions

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



Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value	Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value
2-Position Spring Offset Type	DSS(DSA) -G06 -A3X-		2-Position Spring Offset Type	DSS(DSA) -G06 -E3X-	
	-A3Z-			-E3Z-	
	-A3Y-			-E3Y-	
3-Position Spring Center Type	DSS(DSA) -G06 -C1-		3-Position Spring Center Type	DSS(DSA) -G06 -D1-	
	-C2-			-D2-	
	-C5-			-D5-	
	-C6-			-D6-	
	-C6S-			-D6S-	
	-C4S-			-D4S-	
	-C4-			-D4-	
	-C8-			-D8-	
	-C7X- -C7Y-			-D7X- -D7Y-	

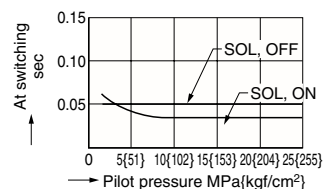
Pressure Loss Characteristics



Switching Response Time

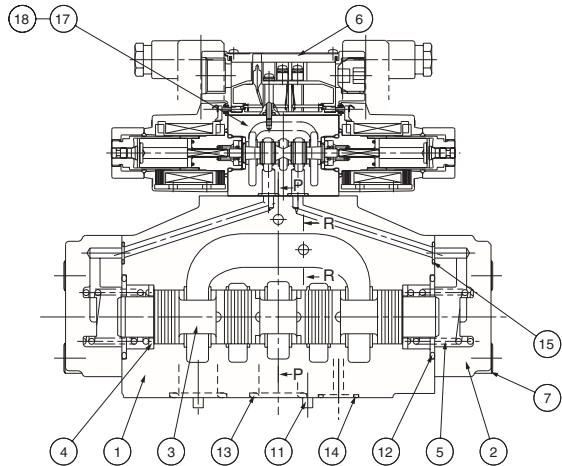
Model No. : DSS-G06-C5

Voltage Symbol: C1 (AC Solenoid)

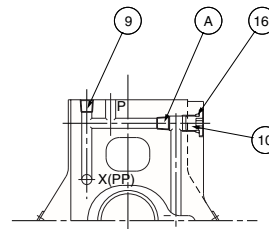


Cross-sectional Drawing

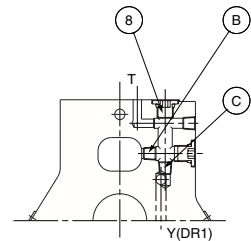
DSS(DSA)-G06-C**-R-C*-E22



Pilot, Drain System Change



Cross-sectional P-P



Cross-sectional R-R

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	8	Plug	14	O-ring
2	Cover	9	Plug	15	O-ring
3	Spool	10	Plug	16	O-ring
4	Ring	11	Pin	17	Solenoid Valves
5	Spring	12	O-ring	18	Screw
6	Nameplate	13	O-ring		
7	Screw				

Changing the Pilot and Drain Connections

After Change		Hexagon Socket Head Plug
Pilot	Internal	Remove from (A).
	External	Insert into (A).
Drain	Internal	Switch from (B) to (C).
	External	Switch from (C) to (B).

Note) A single hex head plug (NPTF 1/16) is required when changing to external pilot.

List of Sealing Parts

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

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

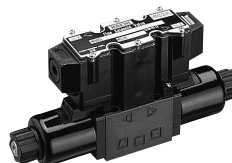
Seal Kit Number

06 Size	
Single Solenoid	Double Solenoid
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 10.6gpm
3000psi



Features

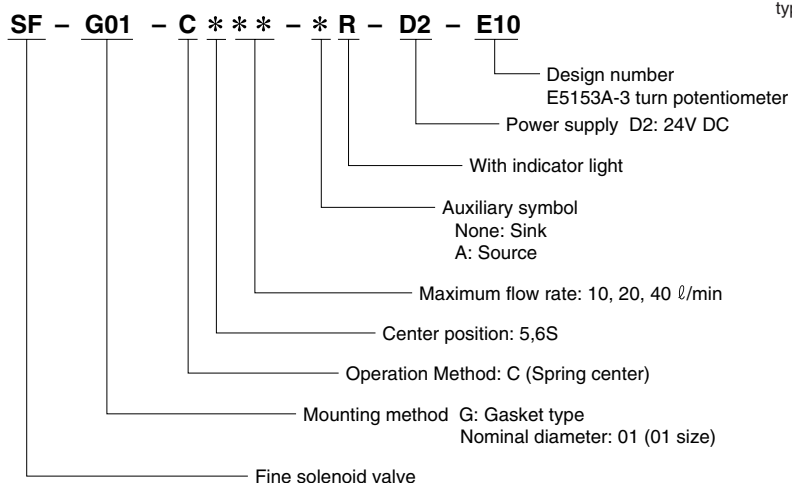
- ① The function of two valves in one
A two-speed controller provides smooth speed adjustment from low speed to high, and from high-speed to low.
- ② Quiet starts and stops
A low-speed startup and stop feature makes startups and stops smooth and soft.
- ③ Separate control of forward and back cylinder movement
There are five volume settings for high-speed 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-E10	SF-G01 -C*20-D2-E10	SF-G01 -C*40-D2-E10
Valve Maximum Operating Pressure MPa(psi)			21(3000)	
Maximum Flow Rate ℓ/min(Note1)(gpm)		10(2.6)	20(5.3)	40(10.6)
High-speed Flow Rate ℓ/min(Note1)(gpm)		5 to 10(1.3 to 2.6)	10 to 20(2.6 to 5.3)	20 to 40(5.3 to 10.6)
Low-speed Flow Rate ℓ/min(Note1)(gpm)		0.5 to 4(0.1 to 1.0)	2 to 8(0.5 to 2.1)	4 to 16(1.0 to 4.2)
Maximum Allowable Pressure MPa(psi)		7(1000)		
Acceleration/Deceleration Time Adjustment Range SEC		0.1 to 2		
Hysteresis (Note 2)		7%		
Repeatability (Note 2)		3%		
Power Supply Voltage V		D2: 24V DC regulated DC power supply		
Maximum Power Consumption W		36W		
Operating Environment	Dust Resistance/Water Resistance Rank	JIS C0920 IP63 (Dust-tight, Rain-proof)		
	Ambient Temperature	5 to 50°C		
	Operating Fluid	Temperature Range 5 to 60°C		
		Viscosity Range 15 to 300mm ² /s		
Mounting	Filtration	25 microns or less		
	Size x Length	10-24 x 1 3/4		
bol	Tightening Torque	5 to 7N·m{51 to 71kgf·cm} 3.6-5.1Lbs.ft.		

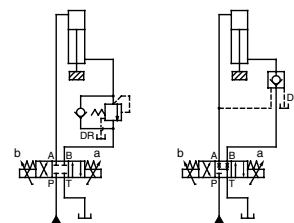
- Note) 1.The above high-speed and low-speed flow rates are obtained with a differential pressure (PA, PB) of 1.0MPa {146psi}. The flow rates depend on differential pressure.
2.Hysteresis and repeatability values are those at maximum flow rate.
3.For mounting bolts, use 12T or equivalent.
4.Mounting bolts are not included.

Understanding Model Numbers



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 3.5MPa {35.7kgf/cm²}.
- 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.)

5 Environmental conditions

- 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 5°C to 50°C.

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 performs restrictor valve control on all processes, temperature differential changes flow volume and acceleration/deceleration time. The recommended temperature range is 30°C to 60°C.

(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		

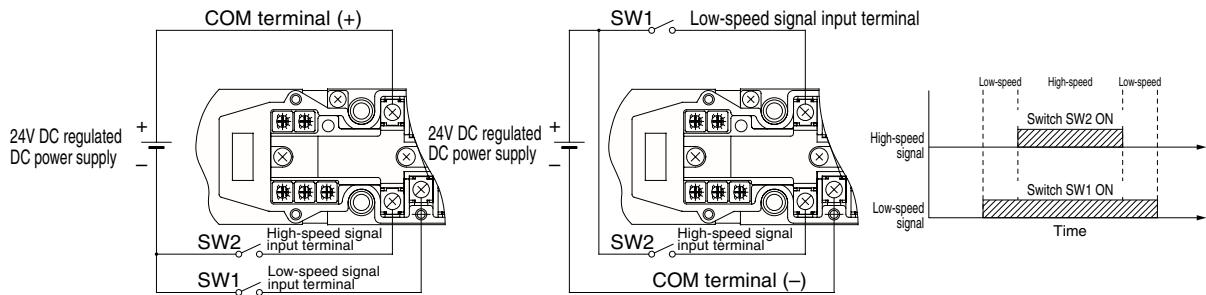
Electrical Wiring

● Sink Type (Auxiliary Symbol: None)

Switches on load and power supply minus side

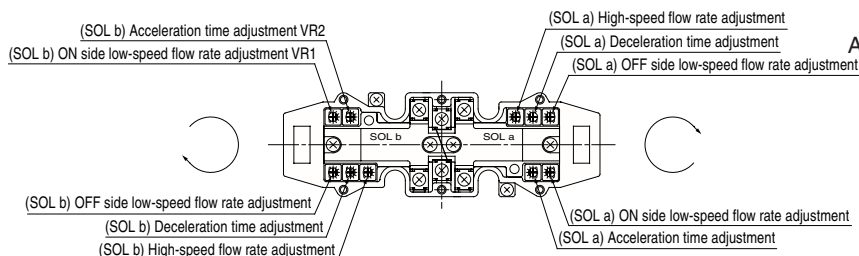
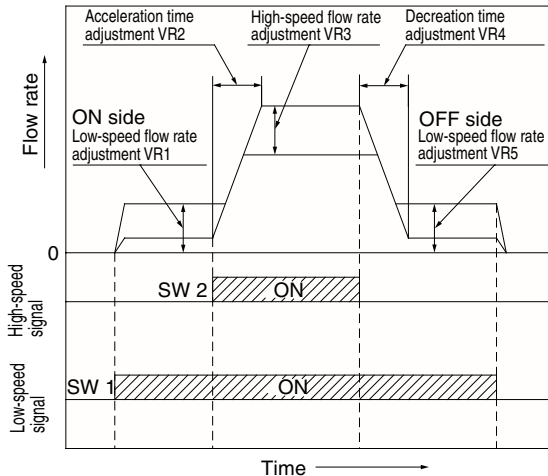
● Source Type (Auxiliary Symbol: A)

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.

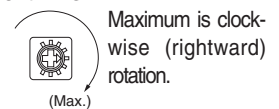
- The following are the factory default volume settings.

VR1 · 2 · 4 · 5

— Minimum setting

VR3 — Maximum setting

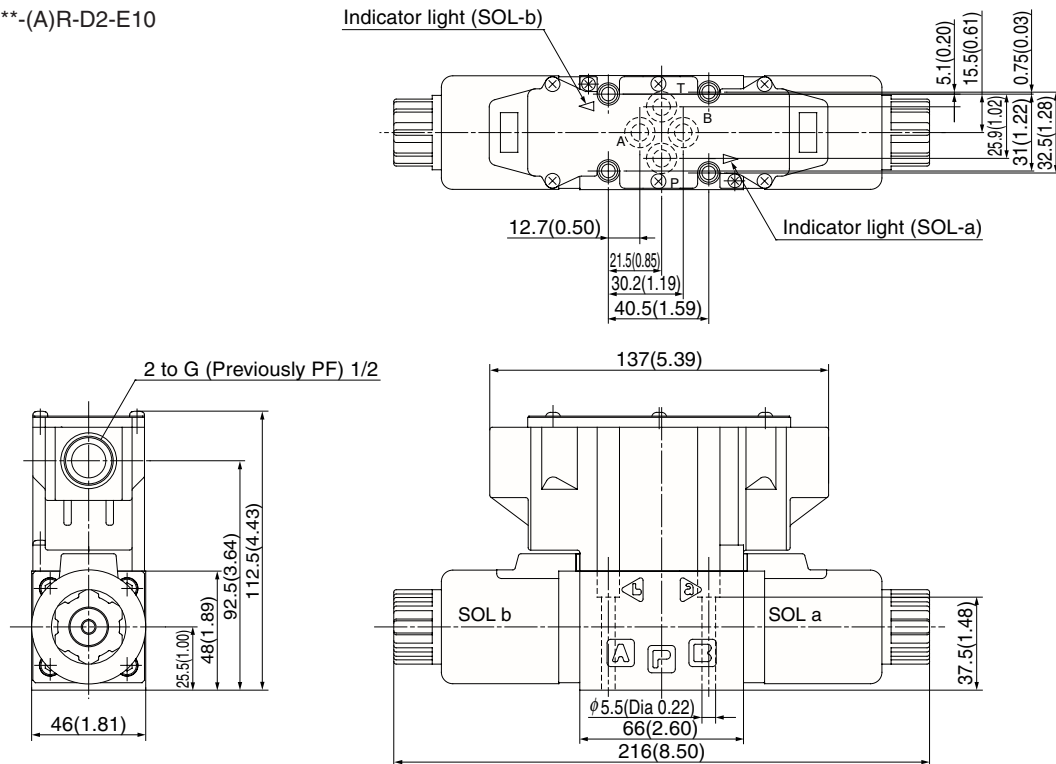
All Adjustment VRs



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

Installation Dimension Drawings

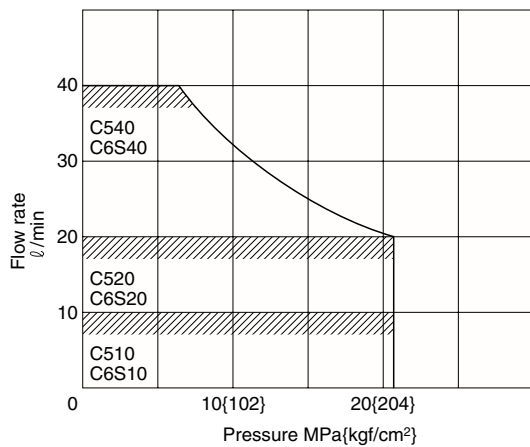
SF-G01-C***-(A)R-D2-E10



Performance Curves

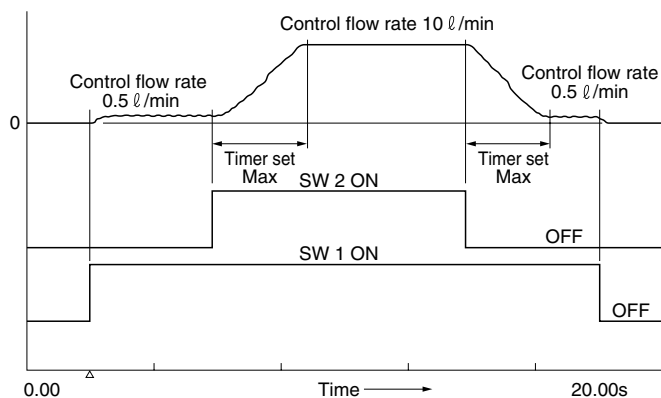
Hydraulic Operating Fluid Viscosity 32mm²/s

• Pressure - Flow Rate Characteristics

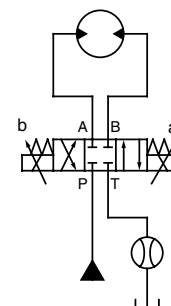


- Use the valve within the allowable flow rate range shown by the graph to the right.
- There are no operational problems within the allowable flow rate range, even when one-pass is used.

• Control Waveform Example

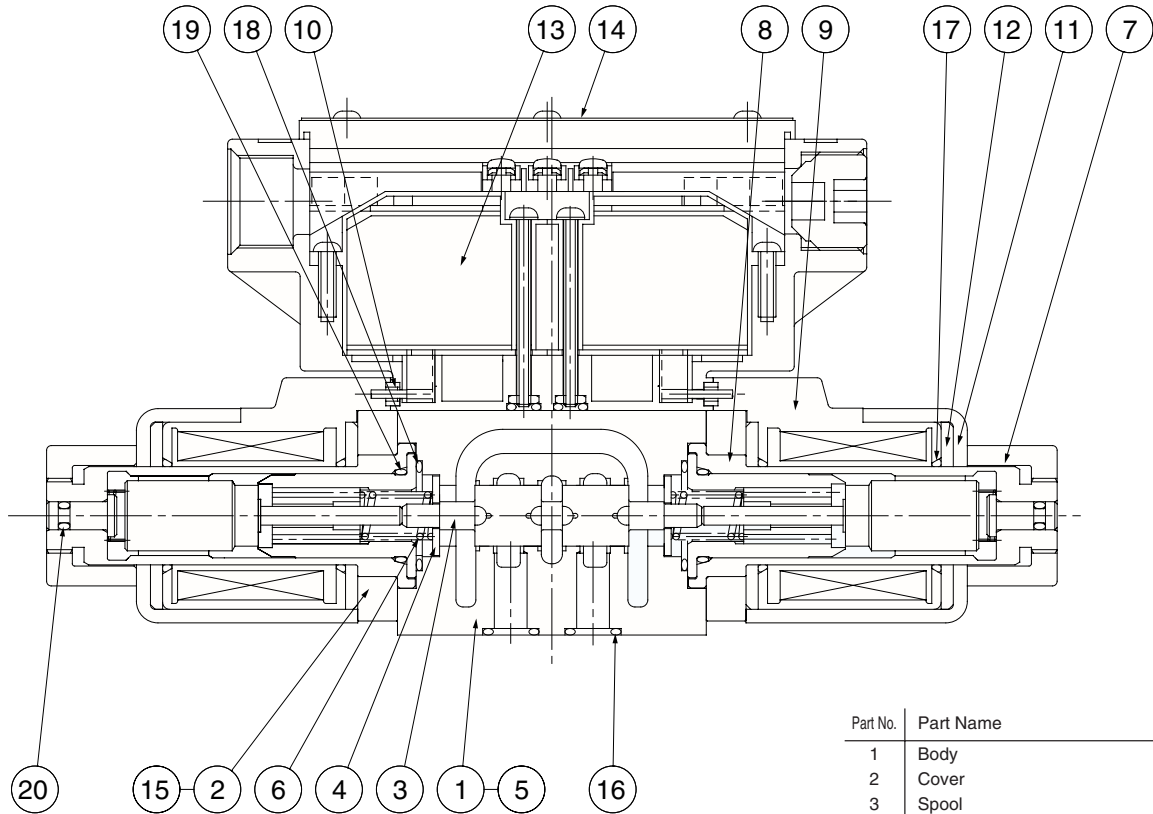


- Valve: SF-G01-C510-R-D2-E10
- Supply Pressure: 21MPa{214kgf/cm²}
- Hydraulic Circuit



Cross-sectional Drawing

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



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).

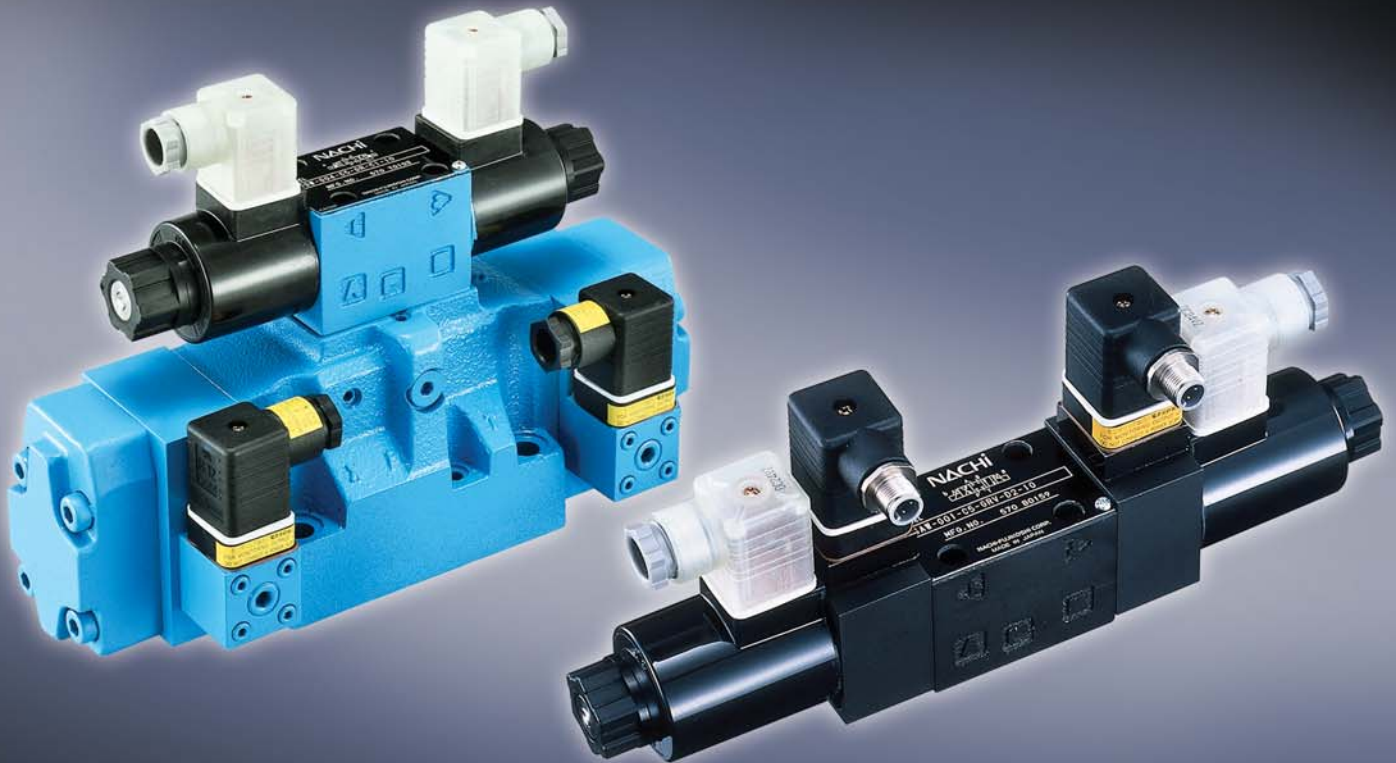
Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Retainer
5	Spacer
6	Spring
7	Nut
8	Solenoid guide
9	Solenoid coil
10	Packing B
11	Coil case
12	Coil yoke
13	Central terminal box kit
14	Nameplate
15	Hexagon Socket Head Bolt
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring

NACHI

Legato

SAW/DSW Series

*Solenoid Valve with Monitoring Switch
For Press Safety Confirming Systems*



SAW/DSW Series

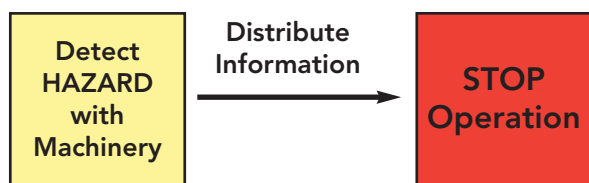
Solenoid Valve with Monitoring Switch For Press Safety Confirming Systems



Safety is critical in the manufacturing industry. Today, most manufacturers rely on a conventional system that detects danger and stops a machine during operation. In Japan, however, the trend is to utilize a Safety Monitoring System to monitor safety and allow a machine to operate after safety is confirmed. As new global safety standards are established, it is predicted that these Safety Monitoring Systems will be included in machine specifications at the design stage. Our Solenoid Valve with Monitoring Switch, Japan's first Safety Monitoring System, is specially designed to meet the requirements of machine integration and safety.

ISO 12100 will change the industry's perception of mechanical hazard protection. In the future, machines will require safety standards compliant with ISO 12100.

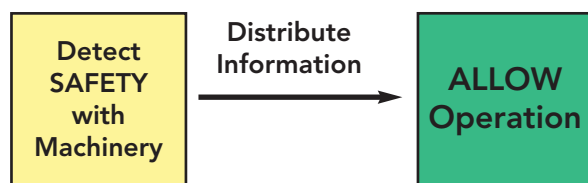
Hazard Detecting Type System (Conventional)



When hazard is detected, machine operation is not allowed and stopped.

(Accidents cannot be avoided due to machine not stopping, even after danger occurs when sensor breaks down or signal wire is disconnected.)

Safety Confirming Type System (Intrinsic Safety Design)



When safety is detected, machine operation is allowed.

(Accidents can be avoided due to machine not being allowed to operate when sensor breaks down or signal wire is disconnected.)

Features

This valve mechanically detects the movement of the solenoid valve spool to activate the switch and to transmit an electrical ON/OFF signal. In other words, this valve monitors a spool operating condition and can be used for sequence control according to its ON/OFF signal. It is also an information source for confirming safety conditions.

Fig.1 and 2 show the simplified actuation structure of a solenoid valve with monitoring switch. When the spool is in center position, the fixed contact (blue) contacts the traveling contact (red) and the both contacts become in conducting condition (Switch ON). When the solenoid is energized and the spool moves right, the traveling contact (red) detaches from the fixed contact (blue) in conjunction with the spool movement and both contacts become in non-conducting condition (Switch OFF).

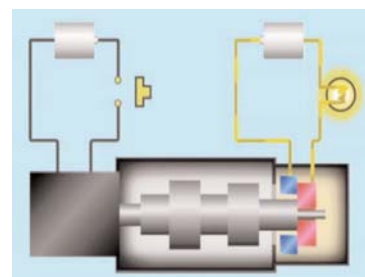


Fig.1 Solenoid not energized
(Switch ON)

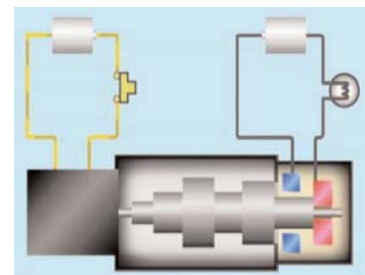
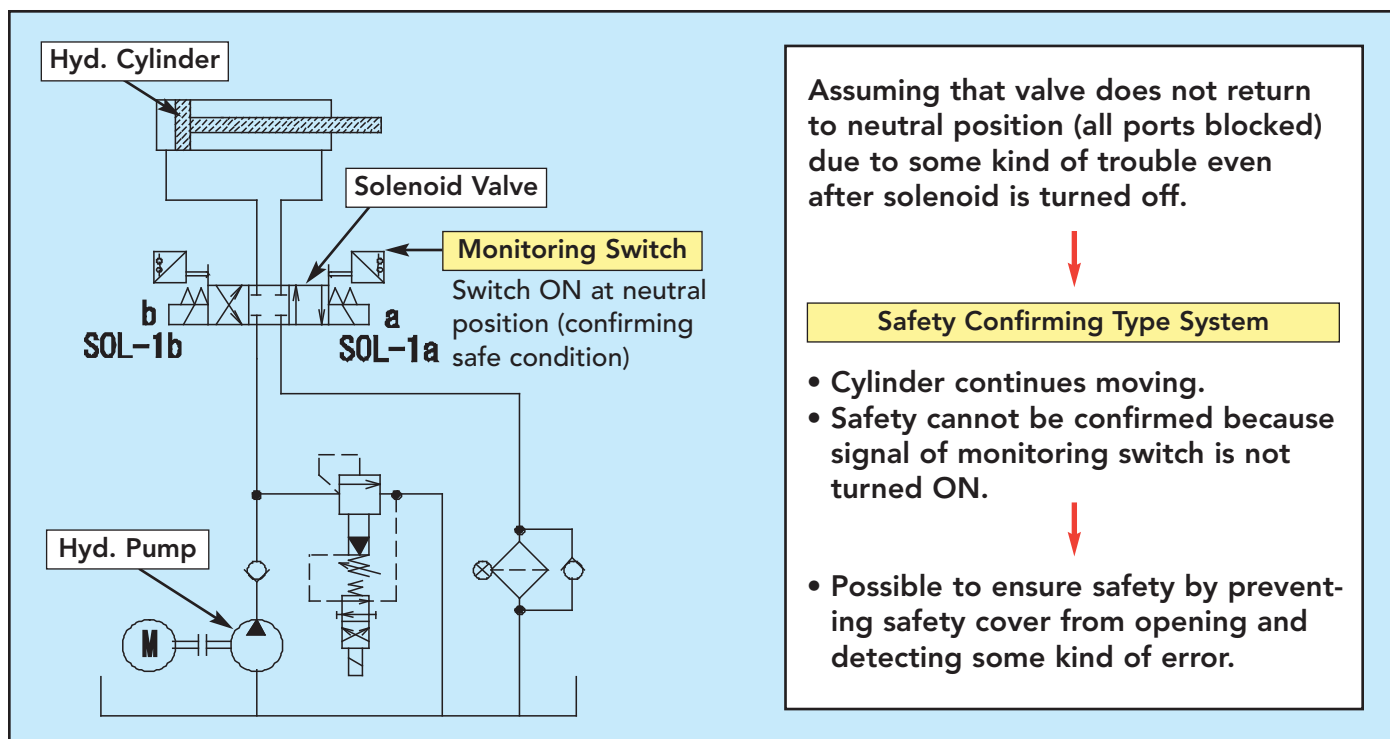


Fig.2 Solenoid energized
(Switch OFF)

Example of Use



Specifications

Series		SAW-G01	SAW-G03 (Note 1)	DSW-G04 (Note 1)
Operation Type		Direct operated type spool valve		Pilot operated type spool valve
Max. Working Pressure (Note 2)		35MPa (5,076psi)		
Max. Flow Rate (Note 3)		100L/min (26.4gpm)	160L/min (42.2gpm)	300L/min(79.2 gpm)
Max. Allowable Back-Pressure		21MPa (3,046psi)	16MPa (2,320psi)	21MPa (3,046psi)
Operating Environment	Dust Resistance/ Water Resistance Rank	JIS C 0920 IP65		
	Operating Fluid (Note 4)	Petroleum type		
	Ambient Temperature	-20 to 50° C (-4 to 122 °F)		
	Temperature Range	-20 to 70° C (-4 to 158 °F)		
	Viscosity Range	15 - 300 mm ² /s		
	Filtration	25μm or less		
Monitoring Switch	Rated Voltage	DC24V		
	Allowable Voltage Range	DC24V±20%		
	Max. Load Current	100mA		
	Residual Voltage (Note 6)	Max. 1.2V		
	Wiring to Connector	Lead wire or M12-4 pins connector		

(Note 1) SAW-G03 and DSW-G04 will be launched in the middle of 2006.

(Note 2) The maximum working pressure is dependent on the valve type.

(Note 3) The maximum flow rate is dependent on the valve type and the working pressure.

(Note 4) Use petroleum type operating fluid only. The fluid requires insulation performance for configuration of the monitoring switch being operated in the fluid. Fluids other than petroleum type (e.g. water-glycol, water in oil emulsion type, phosphate ester, fatty acid ester) are not acceptable. Even petroleum type must not exceed 0.1% of water content.

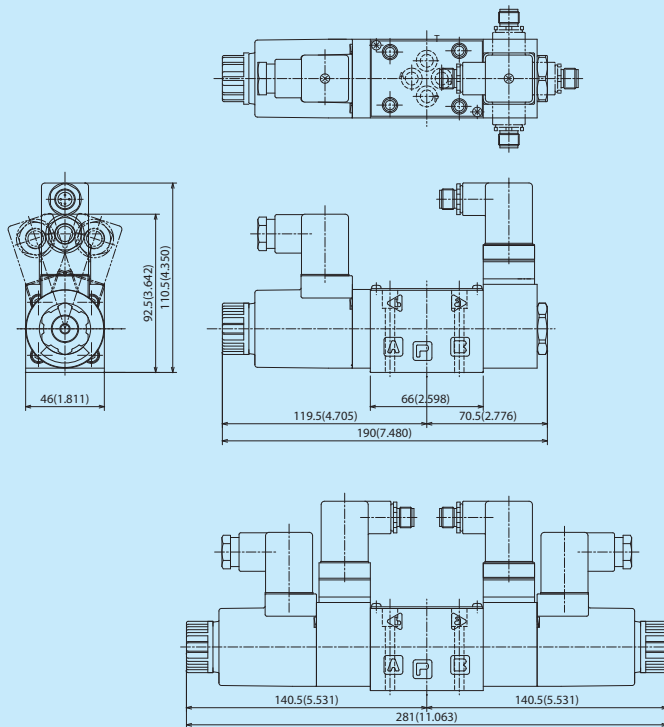
(Note 5) Plus (+) common method and minus (-) common method are available for programmable controller input circuit. Solenoid valve with monitoring switch employs source method (switch on at load and plus (+) side of the power supply) for safety of electric circuit. Consequently, when inputting a monitoring switch output into a programmable controller, use a minus (-) common type programmable controller.

(Note 6) Supply voltage to the monitoring switch shall be given within a range fulfilling the following condition. Load ON voltage + Residual voltage ≤ Switch supply voltage ≤ 28.8 V (Rated voltage + 20%).

Dimensional Drawings

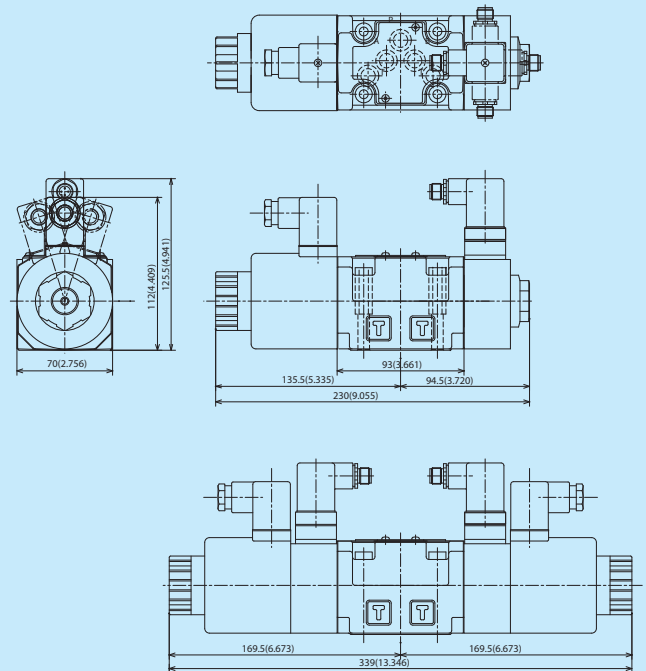
SAW-G01 series

The installation dimension on the gasket surface is the same as ISO 4401-03-02.



SAW-G03 series

The installation dimension on the gasket surface is the same as ISO 4401-05-04.



(Note 1) Dimension is for DC solenoid.

(Note 2) The connector for switch in the above is with M12-4 pin connector. Also available with lead wire.

(Note 3) The connector wiring port should be pointed in the direction shown in the above on the ground of packing when shipping. Change the direction as needed when wiring.

NACHI

NACHI AMERICA INC.

17500 23 Mile Road, Macomb, MI 48044

Tel. (800)622-4410 Fax. (586)226-5289

DMA Type Manually Operated Directional Valve

Features

- ① Compact design.
- ② Balanced design allows T-port back pressure up to 70 kgf/cm² (1000 psi) in G03 and 160 kgf/cm² (2286 psi) in G01 models.
- ③ D03 and D05 mounting pattern allows the use of modular valves to simplify circuit design.

Specifications

Model	Pipe Size (Valve Size)	Max. Operating Pressure kgf/cm ² (psi)	Back Pressure (Tank Port) kgf/cm ² (psi)	Rated Flow ℓ/min (gpm)	Stroke mm (inch)		Weight kg (lbs)
					Two Position	Three Position	
DMA-G01-***-20	1/8	350, 250 (3571), Note	160 (2286)	40 (10.6)	4 (0.16)	4 (0.16) x 2	1.3 (2.9)
DMA-G03-***-10	3/8	250 (3571)	70 (1000)	75 (19.8)	6 (0.24)	4 (0.24) x 2	3.0 (6.6)

Note: The figure in parenthesis is for tandem center type.

Position	Spool Type	JIS Symbol	Model
Two Position	Closed Crossover		DMA-G01-A3X-20
	Open Crossover		DMA-G01-A3Z-20
	Closed Crossover		DMA-G03-E3X-20
	Open Crossover		DMA-G03-E3Z-20
Three Position	All Ports Open Center		DMA-G01-C4-20
			DMA-G03-F4-20
	All Ports Blocked Center		DMA-G01-C5-20
			DMA-G03-F5-20
	Pressure Port Blocked Center		DMA-G01-C6-20
			DMA-G03-F6-20
	Tandem Center		DMA-G01-C7X-20
			DMA-G01-C7Y-20
			DMA-G03-F7X-20
			DMA-G03-F7Y-20
	B Port Blocked Center		DMA-G01-C8-20
			DMA-G03-F8-20

Notes

- The following three different methods are available to operate the valve handle.
 - Spring offset type(A-type)
With this type, the lever is always kept at the end position; when the lever is pulled, the flow is changed over from one direction to another. But when the lever is released, the flow returns to the initial direction.
 - Spring center type(C-type)
With this type, the spool is always kept at the center between the other two valve positions; when the lever is released after shifting the spool to either one of these valve positions, the spool returns to the center with the assistance of the spring.
 - Detent type (F- and E-types)
With this type, the spool comes to a standstill by its notch provided at the third or second position on this spool.
- The mounting direction of the lever can be changed optionally at every 90° if the direction of the cover on the lever side is changed.
- DMA-G**-7*-10 of the P and T port connection type is based on DMA-G**-7X-10 of the closed cross type.
- The following are the locking bolts furnished for each valve.

DMA-G01	10-24 UNC-3A x 1 3/4	4 pcs
DMA-G03	1/2-20 UNC-3A x 2 3/4	4 pcs

Note: Use the locking bolts with a torque rating of grade 12.9 or the equivalent.

- Select the desired subplate according to the following table if necessary.

Model	Pipe size	Max. Flow ℓ/min (gpm)	W'gt kg (lbs)	Applicable Valve Model
MSA-01Y-E10	3/8	30 (7.9)	1.3 (2.9)	DMA-G01-***-E20

Model	Pipe size(E)	Max. Flow ℓ/min (gpm)	W'gt kg (lbs)	Applicable Valve Model
MSA-03X-E10	1/2	80 (21.2)	2.3 (5.1)	DMA-G03-***-E10

