

ESD Series

Electro-hydraulic Proportional Directional and Flow Control Valve (ESD)

This is an electro-hydraulic proportional control valve which is composed of DC proportional solenoids in addition to the conventional 4-way solenoid valve to provide both directional control and flow control functions. The available sizes are 01 size of the direct acting system and the 03, 06 and 10 sizes of the pilot system.

Directional control is performed by applying an input current on one of the two proportional solenoids. And the flow volume is controlled by changing the magnitude of the input current. Remote control and shockless acceleration and deceleration control are possible and the hydraulic circuit can be simplified.

NOTE: ESD SERIES VALVES ARE METER IN / METER OUT DESIGN.

Specifications

Model	ESD-G01	ESD-G03	ESD-G06	ESD-G10
Item	10-※11	40-※11	125-※11	500-※11
Max. operating pressure kgf/cm ² (psi)	20	80	250	500
Rated flow ℓ/min (gpm)	10/20 (2.6/5.3) (Note 1)	40/80 (10.6/21.1) (Note 1)	125/250 (33.0/66.1) (Note 1)	500 (132.1) (Note 1)
Max. flow ℓ/min (gpm)	25 (16.6) (Note 2)	100 (26.4) (Note 2)	250 (66.1) (Note 2)	500 (132.1) (Note 2)
Pilot pressure kgf/cm ² (psi)	—	10 (143) or more (Note 3)	—	—
Pilot flow ℓ/min (gpm)	—	2(0.5) or more (Note 4)	5(1.3) or more (Note 4)	8(2.1) or more (Note 4)
Allowable back pressure of T port kgf/cm ² (psi)	25 (357)	25 (357) (Internal drain) 210 (3000) (External drain)	—	—
Rated current (mA)	—	850	—	—
Coil resistance (Ω)	—	20 (20°C) (68°F)	—	—
Hysteresis (%)	—	5 or less (Note 5)	—	—
Response time (sec)	0.04 (Note 6)	0.05 (Note 6)	0.1 (Note 6)	0.3 (Note 6)
Weight kgf (lbs)	2.2 (4.9)	7 (15)	14 (31)	43 (95)

Note 1) This is the value when the P→A or P→B pressure drop ΔP = 10 kgf/cm² (143 psi).

Note 2) This value indicates the maximum flow between respective ports.

Note 3) This value indicates the difference between the pilot port and tank port or between the pilot port and drain port.

Note 4) This is the value when the response time from zero to rated current is assumed to be 0.1 sec. (0.3 sec. in case of G10 size)

Note 5) This is the hysteresis when NACHI's amplifier is provided for the valve.

Note 6) Response time is measured at 140 kgf/cm² (2000 psi), Oil temp. 40°C (104°C), Oil Viscosity 40cSt.

Model Code

ESD-G 03-C5 80-(※)-※11

Design number
Mounting bolt No code: Metric thread
E: Unified thread
Auxiliary symbol (Applied only to G03, G06, and G10 sizes)
No code: Internal pilot, external drain (Standard)
A: Internal pilot, internal drain.
E: External pilot external drain.
AE: External pilot, internal drain.
G: With modular type pilot reducing valve.
(OG-G01-P1-20)

Rated flow

Spool type. Refer to Table 1.

Valve Size: 01, 03, 06, 10

Mounting G: Gasket mounting

ESD: Electro-hydraulic Proportional Flow and Directional Control Valve

Table 1.

Spool Type	Hydraulic Symbol		
	ESD-G01	ESD-G03	ESD-G06, G10
C5			
C6S			

Note 1) Only in case of ESD-G03, the SOL symbol will be as indicated in ().

Handling

- Air Bleeding**
Loosen the air vent and bleed the air thoroughly at the start of operation to obtain stable control operation.
- T-port Piping**
Provide piping so that the T-port (Pilot valve T-port in case of G03, G06 and G10 sizes) is always full of oil.
- Manual Adjusting Screw**
When there is no input current supplied to the valve in the case of initial adjustment or due to an electrical fault, the valve can be operated temporarily by turning the manual adjusting screw. In normal operation, the manual adjusting screw must be completely retracted to its original position.
- Mounting Position of Valve**
Mount the valve in proper position so that the spool axis will be horizontal.
- Combination with Pressure Compensation Valve**
Combined use with a pressure compensation valve (option) is recommended when flow control of higher accuracy is required or when it is to be used at high pressure. NACHI'S pressure reducing type pressure compensation valves listed in the page PV-23 are available for this purpose.
- Pilot Pressure (ESD-G03, G06 and G10)**
When the pilot pressure exceeds 90 kgf/cm² (1286 psi), use the modular type P-port pressure reducing valve (OG-G01-P1-20), and set pressure 20kgf/cm² (286 psi).
- Provide a counter balance valve in case of a system that requires a large brake force for deceleration or system which uses a vertical type cylinder.
- Mounting bolt

Valve Model	Bolt Size	Quantity
ESD-G01	M5x45ℓ (E: 10-24UNCx1 3/4")	4
ESD-G03	M6x35ℓ (E: 1/4-20UNCx1 3/8")	4
ESD-G06	M12x60ℓ (E: 1/2-13UNCx2 3/8")	6
ESD-G10	M20x75ℓ (E: 3/4-10UNCx3")	6

9. Tightening Torque

Valve Model	Tightening Torque
ESD-G01	50 ~ 70 kgf-cm (3.6 ~ 5.1 lbs-ft)
ESD-G03	100 ~ 130 kgf-cm (7.2 ~ 9.4 lbs-ft)

10. Please maintain oil cleanliness class equal to NAS 9 or better.

11. Oil temperature
-20°C ~ 70°C (-4°F ~ 158°F)

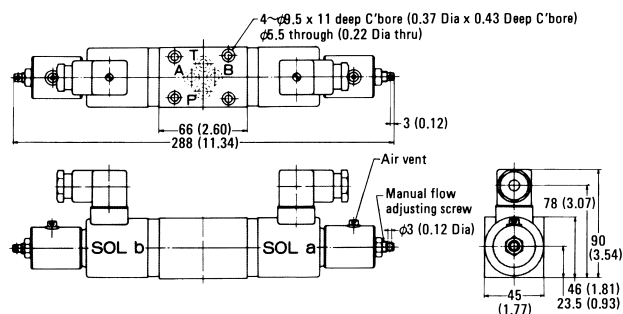
12. Oil viscosity
12 ~ 400 cSt
15 ~ 60 cSt is recommended.

Frequency Response	
ESD Series	f (Hz)
G01	15 Hz
G03	10 Hz
G06	5 Hz
G10	3 Hz

ESD Series

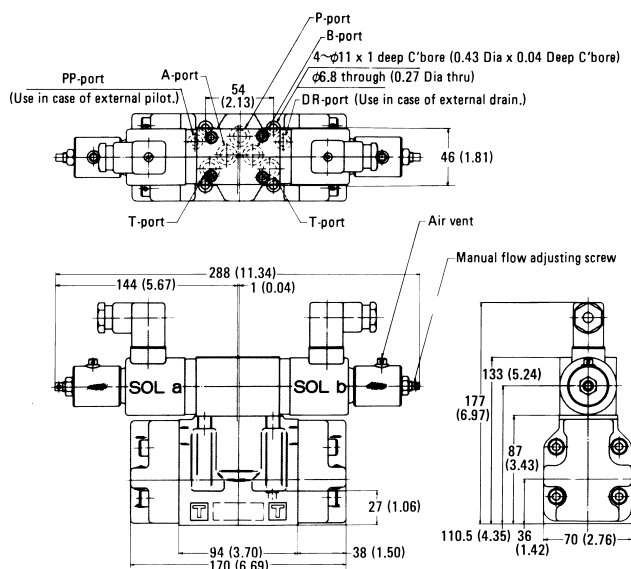
Installation Dimensions mm (inch)

ESD-G01

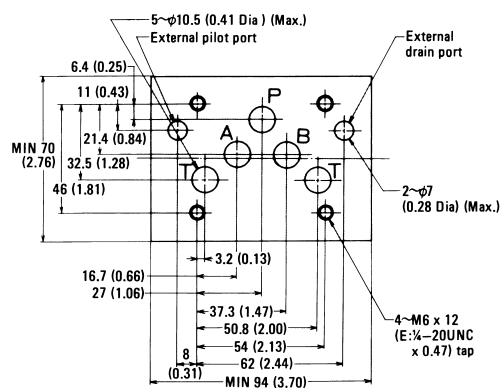


Refer to MSA-01Y-(E)10 on page 3 for details of subplate.

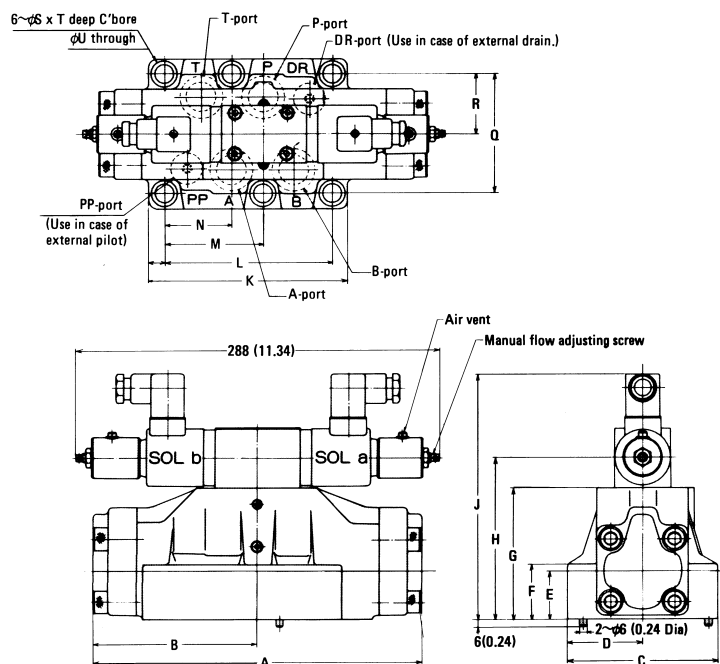
ESD-G03



ESD-G03 Mounting Gasket Dimensions



ESD-G06, G10



mm (inch)

Model	A	B	C	D	E
ESD-G06	254 (10.00)	127 (5.00)	116 (4.57)	58 (2.28)	38 (1.50)
ESD-G10	390 (15.35)	195 (7.68)	195 (7.68)	97.5 (3.84)	63 (2.43)

F	G	H	J	K	L	M
43 (1.69)	102 (4.01)	125.5 (4.94)	192 (7.56)	154 (6.06)	130.2 (5.13)	77 (3.03)
45 (1.77)	165 (6.50)	188.5 (7.42)	255 (10.04)	226.5 (8.92)	190.5 (7.50)	114.3 (4.50)

N	P	Q	R	S	T	U
53.2 (2.09)	12 (0.47)	92.1 (3.63)	46.1 (1.81)	20 (0.79)	2 (0.08)	14 (0.55)
76.2 (3.00)	18 (0.71)	158.8 (6.25)	79.4 (3.13)	32 (1.26)	2 (0.08)	22 (0.87)

ESD Series

Performance Curve

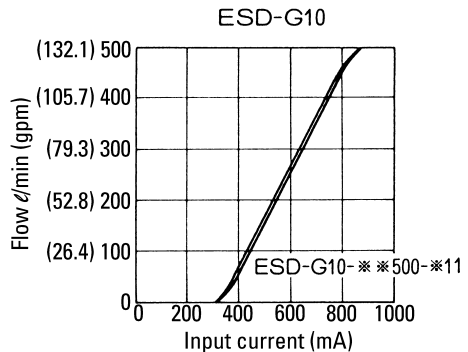
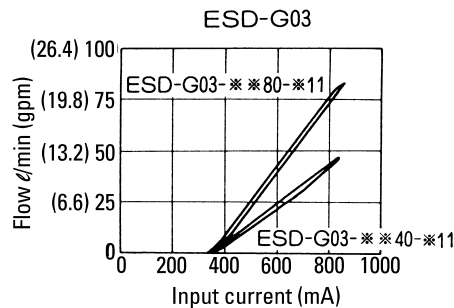
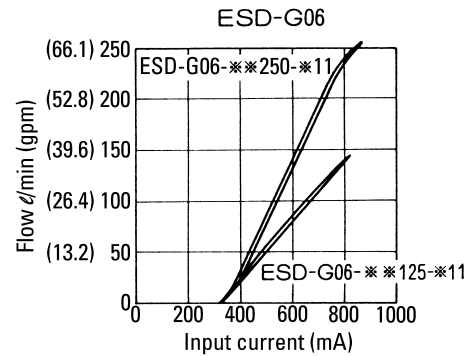
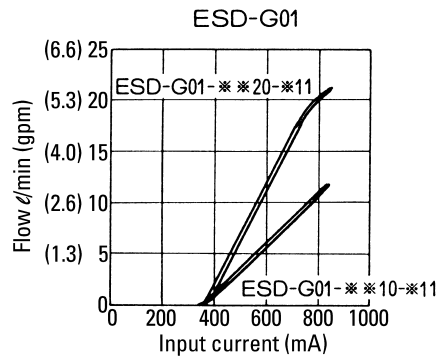
Oil viscosity = 32 cSt

The input current — flow rate characteristics are the characteristics when the control valve pressure drop ΔP of P→A or P→B is 10 kgf/cm² (143 psi) ($\Delta P = 10 \text{ kgf/cm}^2$ (143 psi)). The valve differential pressure

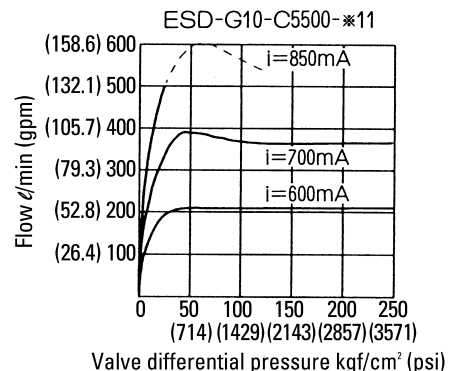
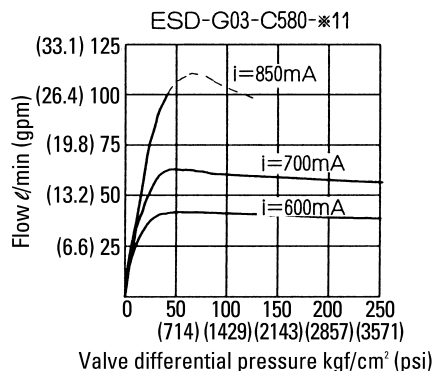
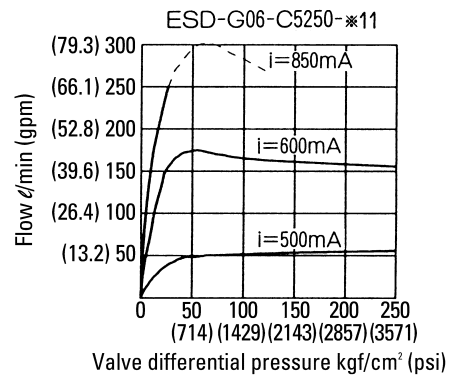
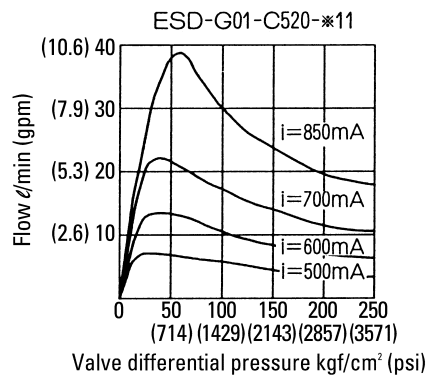
represented by the abscissa in the pressure — flow performance curve indicates the overall pressure drop of the control valve (pressure drop of P-A-B-T). The flow rate is measured by an oil motor.

Input Current — Flow Rate Characteristics

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Pressure — Flow Rate Characteristics



ESD Series

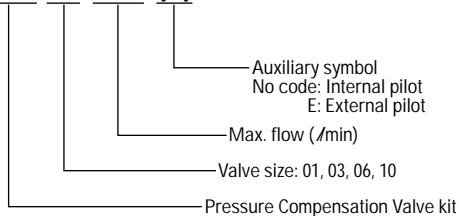
Pressure Compensation Valve Kit

Specifications

Item \ Model		JHF-01027	JHF-03040(E)	JHF-03080(E)	JHF-06170(E)	JHF-10500(E)
Max. operating pressure	kgf/cm ² (psi)	210 (3000)	250 (3571)	250 (3571)	210 (3000)	210 (3000)
Differential pressure for compensation	kgf/cm ² (psi)	10 (143)	6 (86)	14 (200)	8 (114)	8 (114)
Max. flow	l/min(gpm)	27 (7.1)	40 (10.6)	80 (21.2)	170 (44.9)	500 (132.2)
Weight	kgf (lbs)	1.5 (3.3)	4.7 (10.4)	5.0 (11.0)	12 (26.5)	35 (77.3)

Model Code

JHF-03 040 (E)



Handling

1. Use external pilot style ESD valve for this Pressure Compensation Valve kit.
2. Internal pilot type Pressure Compensation Valve Kit is used when there is no pilot port on manifold, and you have to supply pilot flow from P port.
3. External pilot type Pressure Compensation Valve kit is used when there is external pilot port on manifold.