

### High-response proportional flow control valve

10 to 50ℓ/min  
32MPa

#### Features

- Frequency response equivalent to an electro-hydraulic servo valve.
- Direct spool by a high-output proportional solenoid.
- Differential transformer for accurate spool positioning with minor feedback.
- Recovery of all port block positions following amp power off or wiring disconnection (Failsafe Function).
- Steel spool and spring for long life.

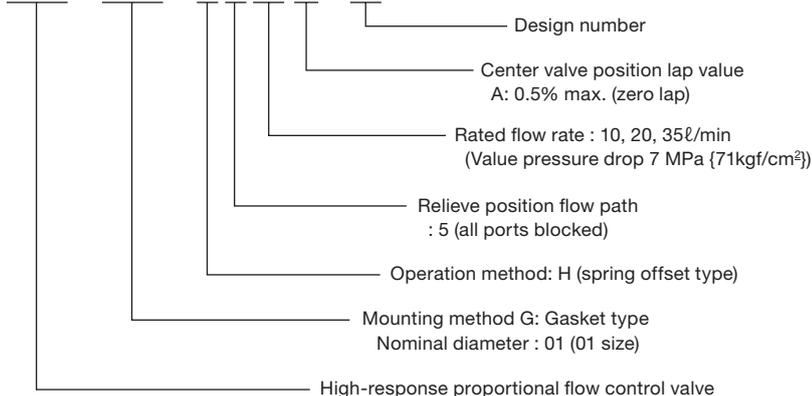
#### Specifications

Item	Model No.	ESH-G01-H510A-10	ESH-G01-H520A-10	ESH-G01-H540A-10
Maximum Operating Pressure P, A, B MPa(kgf/cm <sup>2</sup> )		32 {327}		
T Port Allowable Back Pressure MPa(kgf/cm <sup>2</sup> )		2.5 {25.5} max.		
Rated Flow Rate ℓ/min (Valve pressure drop 7MPa{71kgf/cm <sup>2</sup> })		10	20	35
Maximum Flow Rate ℓ/min		22	35	50
Limit Valve Pressure Drop MPa(kgf/cm <sup>2</sup> )		32 {327}	21 {214}	14 {143}
Hysteresis %		0.5 max.		
Step Response ms (0→100% Displacement)		16 max. (Note 1)		
Frequency Response Hz (90° Phase Delay ±10% Displacement)		At least 80 (Note 1)		
Center Drift	Supply Pressure	0.5% max/FS (Δp=25MPa{255kgf/cm <sup>2</sup> })		
	Oil Temperature	1.5% max/FS (Δt=40°C)		
Filtration		Class NAS9 max.		
Operating Oil Temperature Range °C (Recommended Oil Temperature Range °C)		0 to 60 (30 to 60)		
Water and Dust Resistance		IP53		
Weight kg		2.3		

Note) 1. Step response is typical value for a supply pressure of 7MPa {71kgf/cm<sup>2</sup>} and oil temperature of 40°C (kinematic viscosity: 40mm<sup>2</sup>/s).

#### Explanation of model No.

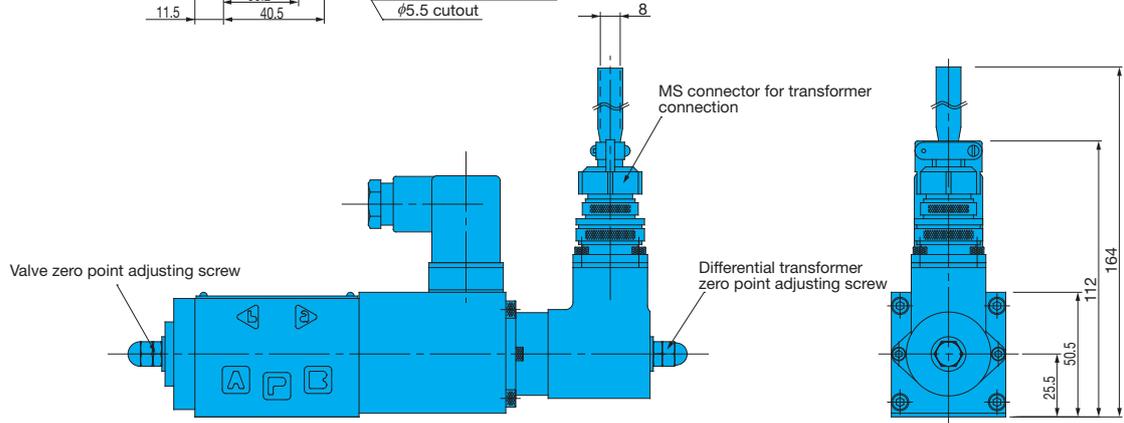
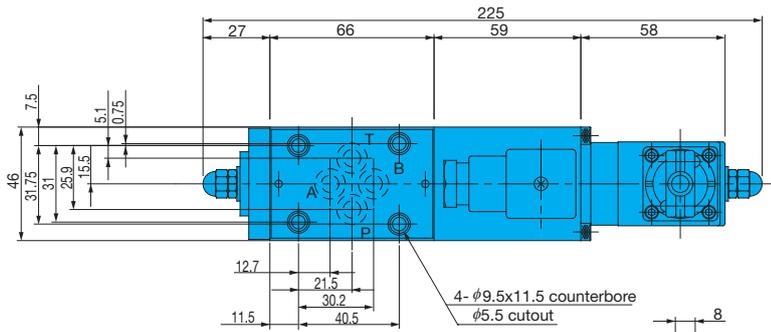
**ESH - G 01 - H 5 20 A - 10**



#### ● Handling

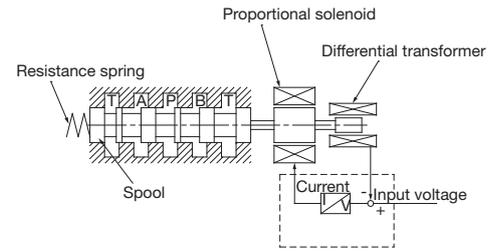
- 1 The amp and valve are adjusted to match at the factory, so be sure to use items that have the same MFG No.
- 2 The differential transformer zero adjust screw and valve zero adjust screw are adjusted and fixed at the factory. Because of this, you should not touch the screws (sealed cap nuts).
- 3 Install the valve so the spool axis line is horizontal.
- 4 In the case of 3-port applications and for the direction that throughflow is most common, use of the following flow is recommended P→A→B→T. P→A limit differential pressure is greater than that of P→B.
- 5 Be sure to perform sufficient flushing before a test run.
- 6 Use steel piping for this valve and the main actuator, and keep piping as short as possible.
- 7 There is no air bleeding.
- 8 Mineral oil hydraulic operating fluid is standard. Use an R&O type and wear-resistant type of ISO VG32, 46, or 68 or equivalent.
- 9 Use an operating fluid that conforms to the both of the following.  
Kinematic viscosity : 20 to 140mm<sup>2</sup>/s  
Oil temperature : 30 to 60°C
- 10 Filtration  
Maintain hydraulic operating fluid contamination so it is at least NAS Class 9.
- 11 Electrical wiring between the amp and valve should be no longer than 30 meters. For the solenoid valve use VCTF 2 mm<sup>2</sup> 2-conductor shielded wire, and for the differential transformer use VCTF 0.5 mm<sup>2</sup> 4-conductor shielded wire.
- 12 After disassembling the valve, be sure to fill the inside of the guide with operating fluid before reassembling.
- 13 Bundled Accessories (Valve Mounting Bolts)  
M5 x 45ℓ, (four)  
Tightening Torque :  
5 to 7N·m{51 to 71kgf·cm}

## Installation Dimension Drawings

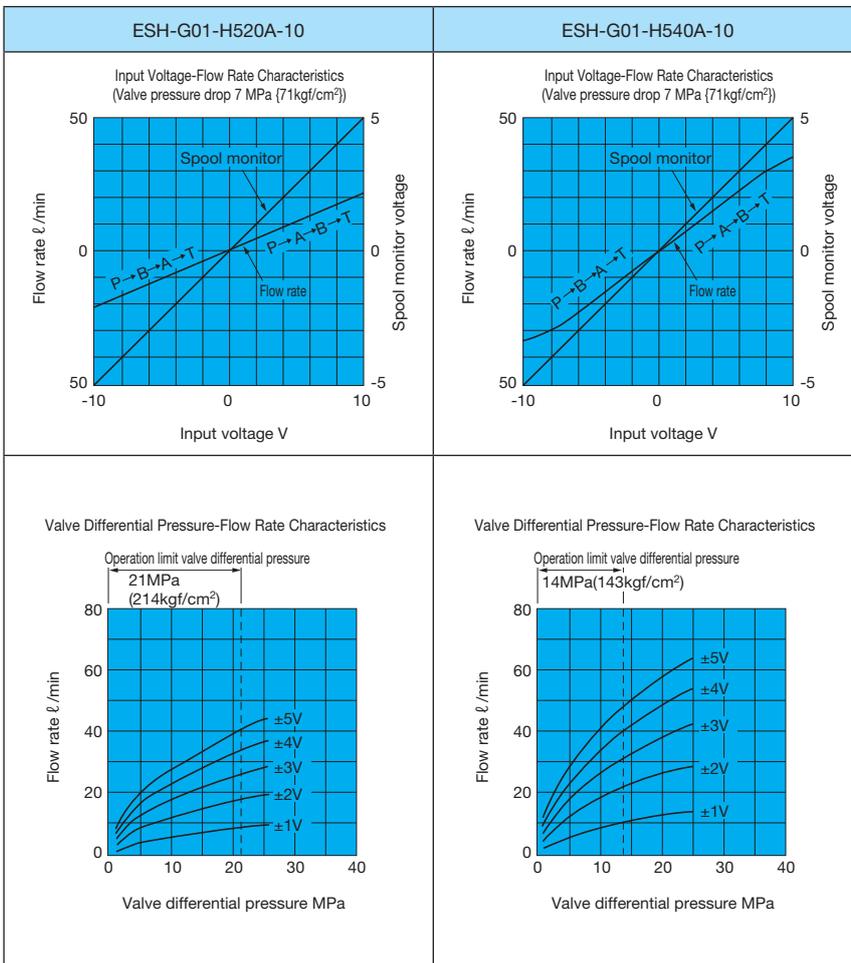


The gasket mounting method conforms to ISO4401-03-02-0-05.

## Operational Principle



## Performance Curves



Note) ±10V input amp factory default data.

Rotating the GAIN trimmer clockwise (rightward) increases the flow rate by up to 10%.

### ● Valve Pressure Drop and Rated Flow Rate

$$\text{Valve Pressure Drop } (\Delta P_x) = P_s - P_L - P_T$$

$P_s$  : Valve supply pressure

$P_L$  : Load pressure

$P_T$  : T Port back pressure

The rated flow rate is the value when the above valve pressure drop is 7MPa {71kgf/cm<sup>2</sup>}.

### ● Valve Pressure Drop and Control Flow Rate

The following is the maximum control flow rate when the size of the obtained valve pressure drop is

$$Q_x = Q_{rate} \times \sqrt{\frac{\Delta P_x}{7}}$$

$Q_{rate}$  : Rated flow rate

$$\Delta P_x = P_s - P_L - P_T$$

### ● Calculation example

When ESH-G01-H520A-10 is used under the following conditions:

$P_s = 10\text{MPa}$  {102kgf/cm<sup>2</sup>}

$P_L = 6\text{MPa}$  {61kgf/cm<sup>2</sup>}

$P_T = 1\text{MPa}$  {10kgf/cm<sup>2</sup>}

Maximum control flow rate  $Q_x$  is as shown below:

$$Q_x = Q_{rate} \times \sqrt{\frac{P_s - P_L - P_T}{7}} = 20 \times \sqrt{\frac{10 - 6 - 1}{7}} = 13\text{l/min}$$