High-response proportional flow control valve ESH-G03,04,06

### Features
- Main spool minor feedback for greatly increased hysteresis and repeatability.
- Response characteristics suitable to 20Hz and high precision acceleration control.
- Recovery of center position following amp power off or wiring disconnection (FailSafe Function).
- Single rod cylinder spool available for easy use.
- Built-in pilot pressure reducing valve for stable operation.

### Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>ESH-G03-</th>
<th>ESH-G04-</th>
<th>ESH-G06-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D*****-(*)-11</td>
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</tr>
<tr>
<td>Maximum Operating Pressure MPa(kgf/cm²)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P,A,B Ports</td>
<td>External Pilot</td>
<td>28 (286)</td>
<td>32 (327)</td>
</tr>
<tr>
<td></td>
<td>Internal Pilot</td>
<td>25 (255)</td>
<td>25 (255)</td>
</tr>
<tr>
<td>T Port</td>
<td>21 (214)</td>
<td>21 (214)</td>
<td>21 (214)</td>
</tr>
<tr>
<td>P[sub]₁ Port</td>
<td>25 (255)</td>
<td>25 (255)</td>
<td>25 (255)</td>
</tr>
<tr>
<td>Minimum Pilot Pressure MPa(kgf/cm²)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.5 (15)</td>
<td>1.5 (15)</td>
<td>2.0 (20)</td>
</tr>
<tr>
<td>Rated Flow Rate ℓ/minute (Rated stroke, P[sub]→A pressure drop of 1MPa (10kgf/cm²) flow rate)</td>
<td>80</td>
<td>180</td>
<td>350</td>
</tr>
<tr>
<td>Maximum Flow Rate ℓ/minute</td>
<td>140</td>
<td>300</td>
<td>600</td>
</tr>
<tr>
<td>Pilot Pressure Reducing Valve Set Pressure MPa(kgf/cm²)</td>
<td>2.0 (20)</td>
<td>2.0 (20)</td>
<td>4.0 (40)</td>
</tr>
<tr>
<td>Hysteresis %</td>
<td>0.5 max.</td>
<td>0.5 max.</td>
<td>0.5 max.</td>
</tr>
<tr>
<td>Step Response ms (0→100% displacement)</td>
<td>50 (Note 1)</td>
<td>50 (Note 1)</td>
<td>50 (Note 1)</td>
</tr>
<tr>
<td>Frequency Response Hz (±10% input, 90° phase delay)</td>
<td>20 (Note 1)</td>
<td>20 (Note 1)</td>
<td>20 (Note 1)</td>
</tr>
<tr>
<td>Pilot Flow Rate ℓ/minute</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Y (DR1), L (DR2) allowable back pressure MPa(kgf/cm²)</td>
<td>0.2 (2)</td>
<td>0.2 (2)</td>
<td>0.2 (2)</td>
</tr>
<tr>
<td>Weight kg</td>
<td>8</td>
<td>12</td>
<td>18</td>
</tr>
</tbody>
</table>

Note 1. Step response is typical value for a supply pressure of 7MPa (71kgf/cm²) and oil temperature of 40°C (kinematic viscosity: 40mm²/s).

### Explanation of model No.

**ESH – G 04 – D 5 180 S1 – (*) – 11**

- **Design number:**
  - **Auxiliary symbol:**
    - None: Internal pilot, external drain
    - E: External pilot, external drain
- **Contraction ratio:**
  - **S[sub]1** (Normal):
    - P[sub]→A : B→T = 1:1
    - P[sub]→B : A→T = 1:1
  - **S[sub]2** (Single rod/cylinder):
    - P[sub]→A : B→T = 1:0.5
    - P[sub]→B : A→T = 0.5 : 1
- **Rated flow rate:**
  - Indicated through flow rate at rated stroke when pressure drop to P[sub]→A is 1MPa(10kgf/cm²).
  - Through flow rate for P[sub]→B, A→T, B→T pressure drop at 1.0MPa(10kgf/cm²) is determined by contraction ratio.
- **Center valve position flow path:**
- **Operation method:** D: Pressure center
- **Nominal diameter:** 03, 04, 06
- **Mounting method:** G: Gasket type
- **ESH:** High response proportional flow valve

### Handling
- **Air Bleeding:**
  - In order to ensure stable control, loosen the air vent and bleed air from the valve before starting operation.
- **Y (DR1), L (DR2) Ports:**
  - Connect ports Y (DR1) and L (DR2) directly to the fluid tank, so they are always supplied with operating fluid, in order to keep back pressure no greater than 0.2MPa (2kgf/cm²).
- **L (DR2) Port:**
  - Since this valve is a pressure center type, G04 and G06 have an L (DR2) port. Be sure to connect this port directly to the fluid tank.
  - G03 has a Y (DR1) port only, and this is connected internally to L.
- **Valve Mounting Orientation**
  - Install the valve so the spool axis line is horizontal.
- **Filtration:**
  - Maintain hydraulic operating fluid contamination so it is at least NAS Class 9.
- **The amp and valve are adjusted to match at the factory, so be sure to use items that have the same MFG No.**
- **Oil-based operating fluid is standard.**
  - Use an R&O type and wear-resistant type of ISO VG32, 46, or 68 or equivalent.
- **Use an operating fluid that conforms to the both of the following.**
  - Kinematic viscosity: 20 to 140mm²/s
  - Oil temperature: 30 to 60°C
- **Electrical wiring between the amp and valve should be no longer than 30 meters.**
  - For the solenoid valve use VCTF 2 mm² 2-conductor shielded wire, and for the differential transformer use VCTF 0.5 mm² 4-conductor shielded wire.
- **Bundled Accessories (Valve Mounting Bolts)**
- **With G03 and G04, providing command in the range of 0 to +10V to the amp’s RF input produces a flow of P→A→B→T. With G06, flow is P→B→A→T.**

### Model No.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Bolt Size</th>
<th>Q’ty</th>
<th>Tightening Torque N·m (kgf·cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESH-G03</td>
<td>M 6×35ℓ</td>
<td>4</td>
<td>10 to 13 (102 to 133)</td>
</tr>
<tr>
<td>ESH-G04</td>
<td>M10×50ℓ</td>
<td>4</td>
<td>45 to 55 (460 to 561)</td>
</tr>
<tr>
<td>ESH-G06</td>
<td>M6×45ℓ</td>
<td>2</td>
<td>10 to 13 (102 to 133)</td>
</tr>
<tr>
<td></td>
<td>M12×60ℓ</td>
<td>6</td>
<td>60 to 70 (610 to 715)</td>
</tr>
</tbody>
</table>

- **For G03 and G04, connect the ports and actuator to achieve a working of P→A→B→T.**
- **For G06, connect for a working of P→B→A→T.**
- **Contact your agent for a contraction ratio S2 with the G06 size.**
**Installation Dimension Drawings**

ESH-G03

ESH-G04

ESH-G06

**JIS Symbol**

Note: A stopper plug is needed for the area if the pilot is external.

**Gasket Surface Dimensions**

For G03, see ESD-G03 gasket surface dimensions, and for G04 and G06, see Dss-G04, 06-**-20 gasket surface dimensions. Y (DR1) and L (DR2) are required.

Gasket surface dimensions conform to the following.

- G03 : ISO 4401-05-04-0-05
- G04 : ISO 4401-07-07-0-05
- G06 : ISO 4401-08-08-0-05