FLOW CONTROL SERVOVALVES
J869 SERIES

TWO STAGE SERVOVALVES FOR INDUSTRIAL APPLICATIONS

WHAT MOVES YOUR WORLD
J869 Series flow control servovalves are throttle valves for 3- and preferably 4-way applications. They are a high performance, two-stage design that covers the range of rated flows from 3.2 to 64 L/min at 7.0 MPa valve drop. The output stage is a closed center, four-way, sliding spool. The pilot stage is a symmetrical double-nozzle and flapper, driven by a double air gap, dry torque motor. Mechanical feedback of the spool position is provided by a cantilever spring. The valve design is simple and rugged for dependable, long life operation. These valves are suitable for Industrial Robots, Manipulators, Machine Tools, Press Machines, Test Machines, and other applications with high stability and high repeatability.

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Note: The information or details stated in this document is subject to change without notice. Please contact us for the latest information.
Principle of operation

- An electrical command signal is applied to the torque motor coils and creates a magnetic force, which acts on the ends of the pilot stage armature.

- This causes a deflection of armature / flapper assembly within the flexure tube. Deflection of the flapper restricts fluid flow through one nozzle, which is carried through to one spool end, displacing the spool.

- Movement of the spool opens the supply pressure port (P) to one control port while simultaneously opening the tank port (T) to the other control port. The spool motion also applies a force to the cantilever spring, creating a restoring torque on the armature / flapper assembly.

- Once the restoring torque becomes equal to the torque from the magnetic forces, the armature / flapper assembly moves back to the neutral position, and the spool is held open in a state of equilibrium until the command signal changes to a new level.

In summary, the spool position is proportional to the input current. With constant pressure drop across the valve, flow to the load is proportional to the spool position.

Valve Features

- 2-stage design with dry torque motor
- High resolution, low hysteresis
- Low friction double nozzle pilot stage
- High stability
- High spool control forces
- Rugged, long-life design

The actual flow is dependent upon electrical command signal and valve pressure drop. The flow for a given valve pressure drop can be calculated using the square root function for sharp edge orifices:

\[ Q = Q_N \sqrt{\frac{\Delta P}{\Delta P_N}} \]

- \( Q \) L/min = calculated flow
- \( Q_N \) L/min = rated flow
- \( \Delta P \) MPa = actual valve pressure drop
- \( \Delta P_N \) MPa = rated valve pressure drop
General Technical Data

**Proof Pressure**
- P, A and B port: 31.5 MPa (Static pressure)
- T port: 21.0 MPa (Static pressure)

**Temperature Range**
- Fluid: −10 〜 80℃
- Ambient: −10 〜 80℃

**Seal Material**
- NBR
- Other seal material upon request

**Operating Fluid**
- Compatible with common hydraulic fluids, other fluids on request

**Recommended Viscosity**
- 10 〜 400 mm²/s

**System Filtration**
- High pressure filter (without bypass, but with dirt alarm) mounted in the main flow and if possible, directly upstream of the valve. Refer to Moog filtration catalog for recommended filtration scheme.

**Class of Cleanliness**
- The cleanliness of the hydraulic fluid greatly effects the performance (spool positioning, high resolution) and wear (metering edges, pressure gain, leakage) of the servovalve.

**Recommended Cleanliness Class**
- For normal operation: ISO 4406 < 16 / 13
- For longer life: ISO 4406 < 14 / 11

**Filter Rating**
- Recommended
- For normal operation: $\beta_{w} \geq 75$ (10 $\mu$m absolute)
- For longer life: $\beta_{s} \geq 75$ (5 $\mu$m absolute)

**Installation Operations**
- Any position, fixed or movable

**Vibration**
- 10 g, 3 axes

**Weight**
- 1.1 kg

**Shipping Plate**
- Delivered with an oil sealed shipping plate.

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**Valve Flow Diagram**

Valve flow for maximum valve opening (100% command signal) as a function of the valve pressure drop.
Technical Data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Supply Pressure</td>
<td>21.0 MPa</td>
</tr>
<tr>
<td>Operating Pressure Range</td>
<td>1 ~ 21.0 MPa</td>
</tr>
<tr>
<td>Proof Pressure (Supply)</td>
<td>31.5 MPa</td>
</tr>
<tr>
<td>Proof Pressure (Return)</td>
<td>21.0 MPa</td>
</tr>
<tr>
<td>Rated Current (Series connection)</td>
<td>15 mA</td>
</tr>
<tr>
<td>Nominal Coil Resistance</td>
<td>200 Ω / coil</td>
</tr>
<tr>
<td>Null Bias</td>
<td>&lt; ±2 %</td>
</tr>
<tr>
<td>Null Shift</td>
<td>&lt; 1.0 %</td>
</tr>
<tr>
<td></td>
<td>&lt; 0.5 %</td>
</tr>
<tr>
<td></td>
<td>&lt; 0.5 % (Acceleration (1 G))</td>
</tr>
<tr>
<td></td>
<td>&lt; 2.0 % (Supply Pressure (30 % of Rated Pressure))</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>&lt; 2.5 % (Test Pressure 21 MPa)</td>
</tr>
<tr>
<td>Threshold</td>
<td>&lt; 0.1 % (Test Pressure 21 MPa)</td>
</tr>
<tr>
<td>Frequency Response</td>
<td>Amplitude Ratio — 3dB &gt; 40 Hz</td>
</tr>
<tr>
<td></td>
<td>90° phase lag &gt; 50 Hz</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-10 ~ 80 °C</td>
</tr>
<tr>
<td>Operating Fluid</td>
<td>10 ~ 400 mm²/s Petroleum base hydraulic fluid</td>
</tr>
<tr>
<td>Required Filtration</td>
<td>β₁₀ ≧ 75</td>
</tr>
<tr>
<td>Weight</td>
<td>1.1 kg</td>
</tr>
</tbody>
</table>

Frequency Response

Test Condition
- Input Current: ±25 %, ±100 %
- Temperature: 40 °C
- Supply Pressure: 21.0 MPa
Installation Drawing

Null Adjust (Fixed)
Mounting Screws
4 - M6xP1x48L
Mounting Holes 4 - ø6.5
Control Port (A)
Control Port (B)
Pressure Port (P)
3 - ø8
O-Ring AS568-013
Locating Pin Hole
Surface Roughness 1.6a Flatness<0.01

Mounting Manifold

Connector
Mate with MS3106x-145-2S
Locating Pin
ø3.2 MAX.
Return Port (T)
ø10 MAX.
O-Ring AS568-015
Coil Connection
Electrical Connections

Rated current and coil resistance
A variety of coils are available for J869 Series Servovalves.

Coil connections
A four-pin electrical box connector (that mates with an MS31 06A -14S-2S cable connector) is standard. All four torque motor leads are available at the connector so external connection can be made for series, parallel or single coil operation.

Servoamplifier
The servoamplifier responds to input current, so a servoamplifier that has high internal impedance (as obtained with current feedback) should be used. This will reduce the effects of coil inductance and will minimize changes due to coil resistance variations.

Electrical Connections (Examples with typical J869 Series coil)

<table>
<thead>
<tr>
<th>Composition</th>
<th>Parallel</th>
<th>Series</th>
<th>Single</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil Resistance</td>
<td>100 Ω</td>
<td>400 Ω</td>
<td>200 Ω</td>
</tr>
<tr>
<td>Rated Current</td>
<td>±30 mA</td>
<td>±15 mA</td>
<td>±30 mA</td>
</tr>
<tr>
<td>Coil Inductance</td>
<td>0.7 H</td>
<td>2.1 H</td>
<td>0.7 H</td>
</tr>
<tr>
<td>Electrical Power</td>
<td>0.09 W</td>
<td>0.09 W</td>
<td>0.18 W</td>
</tr>
<tr>
<td>Polarity for valve opening</td>
<td>P → A, B → T, A and C (+), B and D (−)</td>
<td>P → A, B → T, A (+), D (−)</td>
<td>P → A, B → T, A (+), B (−) or C (+), D (−)</td>
</tr>
</tbody>
</table>

Ordering Information

Standard Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated Flow</th>
<th>Internal Leakage</th>
<th>Rated Current</th>
<th>Nominal Coil Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Valve Drop</td>
<td>System Pressure</td>
<td>(Series Connection)</td>
<td></td>
</tr>
<tr>
<td>J869 - 1000A</td>
<td>3.2 L/min</td>
<td>1.1 L/min</td>
<td>15 mA</td>
<td>200 Ω</td>
</tr>
<tr>
<td>J869 - 1001A</td>
<td>5.3 L/min</td>
<td>1.2 L/min</td>
<td>15 mA</td>
<td>200 Ω</td>
</tr>
<tr>
<td>J869 - 1002A</td>
<td>10.6 L/min</td>
<td>1.4 L/min</td>
<td>15 mA</td>
<td>200 Ω</td>
</tr>
<tr>
<td>J869 - 1003A</td>
<td>21.0 L/min</td>
<td>1.8 L/min</td>
<td>15 mA</td>
<td>200 Ω</td>
</tr>
<tr>
<td>J869 - 1004A</td>
<td>32.0 L/min</td>
<td>2.1 L/min</td>
<td>15 mA</td>
<td>200 Ω</td>
</tr>
<tr>
<td>J869 - 1005A</td>
<td>42.0 L/min</td>
<td>2.5 L/min</td>
<td>15 mA</td>
<td>200 Ω</td>
</tr>
<tr>
<td>J869 - 1006A</td>
<td>64.0 L/min</td>
<td>3.2 L/min</td>
<td>15 mA</td>
<td>200 Ω</td>
</tr>
</tbody>
</table>

Spare parts and Accessories

<table>
<thead>
<tr>
<th>Part</th>
<th>Size</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>O - Rings (included in delivery)</td>
<td>P, A, B</td>
<td>AS568 - 013</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>AS568 - 015</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A47622 - 008</td>
</tr>
<tr>
<td>Mounting Bolts (included in delivery)</td>
<td>M6 x 48mm (4 pieces)</td>
<td>A04001 - 006 - 048</td>
</tr>
<tr>
<td>Mating Connector</td>
<td></td>
<td>MS3106A1452S (MS3106A-145-25)</td>
</tr>
<tr>
<td>Clamp for Mating Connector</td>
<td></td>
<td>MS3057 - 6A</td>
</tr>
<tr>
<td>Flushing Block</td>
<td></td>
<td>C63761 - 001 (P → TONLY)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C63904 - 001 (P → B, A → T)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C63904 - 002 (P → A, B → T)</td>
</tr>
</tbody>
</table>
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