G761 Series Servovalves
ISO 10372 Size 04
**G761 SERIES SERVOVALVES**

The G761 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 1 to 16.5 gpm at 1000 psi 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 electrohydraulic position, speed, pressure or force control systems with high dynamic response requirements.

**Principle of operation**

An electrical command signal (flow rate set point) 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
- Low friction double nozzle pilot stage
- High spool control forces
- High dynamics
- Rugged, long-life design
- High resolution, low hysteresis
- Completely set-up at the factory
- Optional fifth port for separate pilot supply
- Field replaceable first stage disc filter

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:

\[ Q = Q_N \sqrt{\frac{\Delta p}{\Delta p_N}} \]

- \( Q \) gpm[l/min] = calculated flow
- \( Q_N \) gpm[l/min] = rated flow
- \( \Delta p \) psi[bar] = actual valve pressure drop
- \( \Delta p_N \) psi[bar] = rated valve pressure drop

This catalog is for users with technical knowledge. To ensure that all necessary characteristics for function and safety of the system are given, the user has to check the suitability of the products described here. In case of doubt, please contact Moog Inc.
**G761 SERIES**

**GENERAL TECHNICAL DATA**

**Operating Pressure**
- ports P, X, A and B up to 4,500 psi [315 bar]
- port T up to 3,000 psi [210 bar]

**Temperature Range**
- Fluid: -20 to 275°F [-29 to 135°C]
- Ambient: -20 to 275°F [-29 to 135°C]

**Seal Material**
- Fluorocarbon

**Operating Fluid**
- Compatible with common hydraulic fluids, other fluids on request.
  - Recommended viscosity: 60 – 450 SUS @ 100°F

**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 affects the performance (spool positioning, high resolution) and wear (metering edges, pressure gain, leakage) of the servovalve.
  - **Recommended Cleanliness Class**
    - For normal operation: ISO 4406 < 14/11
    - For longer life: ISO 4406 < 13/10
  - **Filter Rating**
    - For normal operation: β₁₀ ≥ 75 (10 µm absolute)
    - For longer life: β₁₀ ≥ 75 (5 µm absolute)

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

**Vibration**
- 30 g, 3 axes

**Weight**
- 2.4 lb (4.0 lb for steel body)

**Degree of Protection**
- EN50529P: class IP65, with mating connector mounted.
  - Delivered with an oil sealed shipping plate.

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

* Other seal material upon request
G761 SERIES
TECHNICAL DATA

Model...Type
Mounting Pattern
Valve Body Version
Pilot Stage
Pilot Connection
Fluid Supply
Supply Pressure
Proof Pressure
Rated Flow Tolerance
Symmetry
Threshold*
Hysteresis*
Null Shift

G761—........
ISO 10372 - 04 - 04 - 0 - 92
4-way
2-stage with spool–bushing assembly
Nozzle/Flapper
Optional, Internal or External
G761 series servovalves are intended to operate with constant supply pressure
Minimum
Maximum Standard
at “P” Port
at “T” Port
200 psi [14 bar]
4,500 psi [315 bar]
6,750 psi [473 bar]
4,500 psi [315 bar]
@ 1,000 psi ∆Pn [%] ±10
[%] < 10
[%] < 0.5
[%] < 3.0
with Temp., 100°F [55˚K] variation [%] < 2.0
with acceleration to 10 g
For every 1,000 psi [70 bar] supply pressure change
with return pressure 0 to 500 psi [0 to 35 bar]

* Measured at 3,000 psi pilot or operating pressure
NOTE: High response is available, consult factory

Frequency Response* Typical response characteristics for G761 series servovalves.

Step Response* Typical transient response of G761 series servovalves.
CONVERSION INSTRUCTION
For operation with internal or external pilot connection.

<table>
<thead>
<tr>
<th>Pilot flow supply</th>
<th>Screw &amp; Seal Washer Location (M4 X 6 DIN EN ISO 4762)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal P*</td>
<td>closed</td>
</tr>
<tr>
<td>External X</td>
<td>open</td>
</tr>
</tbody>
</table>

*The standard version of these valves is configured as internal pilot supply. Changing pilot supply configuration requires model number change.

Standard electrical connector mates with MS3106F14S-2S or equivalent.

The mounting manifold must conform to ISO 10372-04-04-0-92. Surface to which valve is mounted requires a finish, flat within 0.001 [0.03] TIR.

For external null adjust: flow out of port B will increase with clockwise rotation of null adjust (3/32 hex key). Flow bias is continually varied for a given port as the null adjust is rotated.
G761 SERIES
ELECTRICAL CONNECTIONS

**Rated current and coil resistance**
A variety of coils are available for G761 Series Servovalves.

**Coil connections**
A four-pin electrical box connector (that mates with an MS3106F14S2S cable connector) is standard. All four torque motor leads are available at the connector so external connections 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.

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**ELECTRICAL CONNECTIONS**
(Examples with typical G761 series coils)

<table>
<thead>
<tr>
<th></th>
<th>Parallel</th>
<th>Series</th>
<th>Single</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil Resistance [Ω]</td>
<td>40</td>
<td>160</td>
<td>80</td>
</tr>
<tr>
<td>Rated Current [mA]</td>
<td>±40</td>
<td>±20</td>
<td>±40</td>
</tr>
<tr>
<td>Coil Inductance @ 50 Hz [H]</td>
<td>0.18</td>
<td>0.66</td>
<td>0.22</td>
</tr>
<tr>
<td>Electrical Power [W]</td>
<td>.064</td>
<td>.064</td>
<td>.0128</td>
</tr>
<tr>
<td>Polarity for Valve Opening</td>
<td>A and C (+)</td>
<td>A (+), D (-)</td>
<td>A (+), B (-) or C (+), D (-)</td>
</tr>
<tr>
<td>P # B, A # T</td>
<td>B and D (-)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Before applying electrical signals the pilot stage has to be pressurized.
# G761 SERIES

## ORDERING INFORMATION

### SPARE PARTS AND ACCESSORIES

<table>
<thead>
<tr>
<th>Moog Part</th>
<th>Size</th>
<th>Moog Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPM 85 Shore O-Rings (included in delivery), for P, T, A and B</td>
<td>ID 0.426 x 0.070[10.8 x 1.8]</td>
<td>42082-022</td>
</tr>
<tr>
<td></td>
<td>ID 0.364 x 0.070[9.25 x 1.8]</td>
<td>42082-013</td>
</tr>
<tr>
<td>Mating Connector, waterproof IP 65 (not included in delivery)</td>
<td>49054FI452S(MS3106FI45S-25)</td>
<td></td>
</tr>
<tr>
<td>Flushing Block (not included in delivery)</td>
<td>55124</td>
<td></td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Moog Part</th>
<th>Size</th>
<th>Moog Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Bolts (not included in delivery)</td>
<td>[4 pieces] 5/16 - 18 NC x 1-3/4 long</td>
<td>A31324-228B</td>
</tr>
<tr>
<td></td>
<td>[4 pieces] [M8-1.25 x 45 mm long]</td>
<td>[B64929-8845]</td>
</tr>
<tr>
<td>Field Replaceable Filter Kit (includes service manual)</td>
<td>B52555SRK201K1</td>
<td></td>
</tr>
<tr>
<td>Pilot Supply Screw</td>
<td>M4 x 6 DIN EN ISO 4762</td>
<td>66098-040-006</td>
</tr>
<tr>
<td>Seal for Set Screw</td>
<td>A25528-040</td>
<td></td>
</tr>
</tbody>
</table>

## STANDARD MODELS

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Type Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>G761</td>
<td></td>
</tr>
</tbody>
</table>

### Optional Feature
- Series specification

### Model Designation
- Assigned at the factory

### Factory Identification (Revision Level)
- Rated Flow (\(\Delta P\) = 500 psi [35 bar] per land)
  - 04: 1.0 [4.0]
  - 10: 2.5 [10]
  - 19: 5.0 [19]
  - 38: 10.0 [38]
  - 63: 16.5 [63]

### Maximum Operating Pressure (P) and Body Material
- J: 4,500 psi [310 bar] aluminum

### Main Spool Type
- O: 4-way / Axis cut / linear
- D: 4-way / +/10% overlap / linear

### Rated Flow
- \(Q_h\) gpm [lpm] at \(\Delta P\), = 500 psi [35 bar] per land

### Internal Leakage
- (at 3,000 psi)

### Rated Current
- (Single Coil)

### Nominal Coil Resistance
- Ohms

### Signals for 100% Spool Stroke
- H: \(\pm 7.5\) mA (series)
- L: \(\pm 20\) mA (series)
- Z: \(\pm 100\) mA (series)

### Valve Connector
- P: Connector over P-side
- B: Connector over B-side

### Seal Material
- V: Fluorocarbon

### Spool Position without Electrical Signal
- M: Mid-position

### Pilot Stage
- F: Low Flow, Nozzle-Flapper, \(\leq 10\) lpm
- G: High Flow, Nozzle-Flapper, \(> 10\) lpm

### Standard Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Type Designation</th>
<th>Rated Flow ((\Delta P), = 500 psi [35 bar] per land)</th>
<th>Internal Leakage (at 3,000 psi)</th>
<th>Rated Current (Single Coil)</th>
<th>Nominal Coil Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>G761-3001</td>
<td>H04JOFM4VPL</td>
<td>1 4</td>
<td>&lt; 0.31 &lt; 1.2</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>G761-3002</td>
<td>H10JOFM4VPL</td>
<td>2.5 10</td>
<td>&lt; 0.38 &lt; 1.5</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>G761-3003</td>
<td>H19JOGM4VPL</td>
<td>5 19</td>
<td>&lt; 0.60 &lt; 2.3</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>G761-3004</td>
<td>H38JOGM4VPL</td>
<td>10 38</td>
<td>&lt; 0.60 &lt; 2.3</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>G761-3005</td>
<td>S63JOGM4VPL</td>
<td>16.5 63</td>
<td>&lt; 0.60 &lt; 2.3</td>
<td>40</td>
<td>80</td>
</tr>
</tbody>
</table>