D765 Series
Servovalves with Electronic Feedback
and Integrated Electronics
ISO 10372 Size 04
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] = calculated flow
- \( Q_N \) [gpm] = rated flow
- \( \Delta p \) [psi] = actual valve pressure drop
- \( \Delta p_N \) [psi] = rated valve pressure drop

**Principle of operation**
An electrical command signal (flow rate set point) is applied to the integrated position controller 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.

The position transducer (LVDT), which is excited via an oscillator, measures the position of the spool (actual value, position voltage). The signal is then demodulated and fed back to the controller where it is compared with the command signal. The controller drives the pilot stage until the error between command signal and feedback signal will be zero. Thus, the position of the main spool is proportional to the electrical command signal.

**EXTERNAL PILOT PRESSURE**
If large flow rates with high valve pressure drop are required an appropriate higher pilot pressure has to be chosen to overcome the flow forces. An approximate value can be calculated as follows:

\[ P_x \geq 2.5 \cdot 10^2 \cdot \frac{Q}{A_s} \cdot \sqrt{\Delta p} \]

- \( P_x \) [psi] = pilot pressure
- \( Q \) [gpm] = max. flow
- \( \Delta p \) [psi] = valve pressure drop with \( Q \)
- \( A_s \) [in²] = spool drive area
- \( \Delta p_N \) [psi] = rated valve pressure drop

The pilot pressure \( P_x \) has to be at least 215 psi above the return pressure of the pilot stage.
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
- Ambient: -4°F to 140°F (-20°C to 60°C)
- Fluid: -4°F to 176°F (-20°C to 80°C)

Seal Material
- Fluorocarbon, others on request

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.

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
- Recommended for normal operation: βₐ ≥ 75 (10 µm absolute)
- Recommended for longer life: βₐ ≥ 75 (5 µm absolute)

Installation Operations
- Any position, fixed or movable.

Vibration
- 30 g, 3 axes

Weight
- 2.43 lbs (1.1 kg)

Degree of Protection
- EN60529: class IP65, with mating connector mounted.

Shipping Plate
- Delivered with an oil sealed shipping plate.

Valve Flow Diagram
Valve flow for maximum valve opening (100% command signal) as a function of the valve pressure drop.
### D765 SERIES

#### TECHNICAL DATA

**Model... Type**

**Mounting Pattern**

**Valve Body Version**

<table>
<thead>
<tr>
<th>Pilot Stage</th>
<th>Optional, Internal or External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot Connection</td>
<td>(±10%) at Δp = 1,000 psi</td>
</tr>
<tr>
<td>Rated Flow</td>
<td>Standard [gpm] 1.0 2.5 5.0 10.0 16.5</td>
</tr>
<tr>
<td></td>
<td>High Response [gpm] 1.0 2.5 5.0 10.0 —</td>
</tr>
<tr>
<td>Response Time*</td>
<td>Standard [ms] 4 4 4 4 8</td>
</tr>
<tr>
<td></td>
<td>High Response [ms] 2 2 2 3 —</td>
</tr>
<tr>
<td>Threshold*</td>
<td>[ % ] &lt; 0.1</td>
</tr>
<tr>
<td>Hysteresis*</td>
<td>[ % ] &lt; 0.3</td>
</tr>
<tr>
<td>Null Shift</td>
<td>at ΔT = 100°F [ % ] &lt; 1.0</td>
</tr>
<tr>
<td>Null Leakage Flow*</td>
<td>max. [gpm] 0.40 to 0.61</td>
</tr>
<tr>
<td>Pilot Leakage Flow*</td>
<td>typical [gpm] 0.21</td>
</tr>
<tr>
<td>Pilot Flow*</td>
<td>For 100% Step Input [gpm] 0.11</td>
</tr>
<tr>
<td>Spool Drive Area</td>
<td>Standard [in²] 0.08</td>
</tr>
<tr>
<td></td>
<td>High Response [in²] 0.05</td>
</tr>
</tbody>
</table>

* Measured at 3,000 psi (210 bar) pilot or operating pressure, and fluid viscosity of 32 mm²/s

**Flow Gain** in the null region (±3% signal) typically 50 to 200% nominal gain

#### Typical Characteristic Curves

with ±5%, ±40% and ±90% input signal, measured at 3,000 psi (210 bar) pilot or operating pressure respectively, and fluid viscosity of 32 mm²/s and fluid temperature of 104°F (40°C).

**Standard Valves**

**High Response Valves**
The mounting manifold must conform to ISO 10372-04-04-0-92. Mounting surface needs to be flat within 0.005 [0.01mm]. Average surface finish value, Ra, better than 0.8µm.

CONVERSION INSTRUCTION

For operation with internal or external pilot connection.

<table>
<thead>
<tr>
<th>Pilot flow supply</th>
<th>Set screw bore 1 (M4 X 6 DIN 6912)</th>
<th>Set screw bore 2 M4x6 DIN 6912 with seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal P</td>
<td>closed</td>
<td>open</td>
</tr>
<tr>
<td>External X</td>
<td>open</td>
<td>closed</td>
</tr>
</tbody>
</table>

SPARE PARTS AND ACCESSORIES

O-Rings (included in delivery), FPM 85 Shore
- for P, T, A and B
  ID 0.426 x 0.070
  ID 0.364 x 0.070
- Mating Connector, waterproof IP 65 (not included in delivery)
  6+PE-pole
  EN 175201 part 804*
  B97007-061
- Flushing Plate
  55127-001 (int.)
  55127-002 (ext.)

Mounting Bolts (not included in delivery)
- M8 x 45 DIN EN ISO 4762-10.9 (4 pieces)
  A03665-080-045
  Required torque: 13.3 ft-lbs
- Replaceable Filter
  A67999-065
- O-Rings for Filter Change (2 pieces)
  A25163-013-015
- Screw Internal/External M4 x 6 DIN 6912
  76689-040-006
- Seal for Screw Internal/External
  A25528-040
- Seal for Null Adjust Screw Plug
  76425-050
Command signal 0 to ±10 mA Valves with current command input, floating
The spool stroke of the valve is proportional to \(I_o = -I_e\). 100% valve opening P ◦ B and A ◦ T is achieved at \(I_o = +10\) mA. At 0 mA command, the spool is in centered position. The input pins D and E are inverting. Either pin D or E is used according to the required operating direction. The other pin is connected to signal ground \(\perp (0\) V) at cabinet side.

Command signal 0 to ±10 V Valves with voltage command input
The spool stroke of the valve is proportional to differential input \((U_o - U_e)\). 100% valve opening P ◦ B and A ◦ T is achieved at \((U_o - U_e) = +10\) V. At 0 V command, the spool is in centered position. If only one command signal is available, pin D or E is connected to signal ground according to the required operating direction (to be done at cabinet side).

Actual value 0 to ±10 mA Valves with current command input
The actual spool position value can be measured at pin F. This signal can be used for monitoring and fault detection purposes. The spool stroke range corresponds to ±10 mA. +10 mA corresponds to 100% valve opening P ◦ B and A ◦ T.

Actual value 0 to ±10 V Valves with voltage command input
The actual spool position value can be measured at pin F. This signal can be used for monitoring and fault detection purposes. The spool stroke range corresponds to ±10 V. +10 V corresponds to 100% valve opening P ◦ B and A ◦ T.

GENERAL REQUIREMENTS

➤ Supply ±15 VDC ±3%. Ripple < 50 mVpp. Current consumption max. ±100 mA

➤ All signal lines, all those of external transducers, shielded

➤ Shielding connected radially to \(\perp (0\) V), power supply side, and connected to the mating connector housing (EMC)

➤ EMCI: Meets the requirements of EN 55011/03.91 class B, EN 50081-1/01.92 and EN 50082-2/03.95, performance criterion class A.

➤ Minimum cross section of all leads ≥ 0.75 mm². Consider voltage losses between cabinet and valve.

➤ Note: When making electrical connections to the valve (shield, protective grounding), appropriate measures must be taken to ensure that locally different earth potentials do not result in excessive ground currents. See also Moog Application Note AM 353 E.

CONNECTOR WIRING

Valve with 6+PE pole connector to EN 175201 part 804 and mating connector (type R and S, metal shell) with leading protective earth connection (\(\perp\)).

<table>
<thead>
<tr>
<th>Function</th>
<th>Voltage Command</th>
<th>Current Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply</td>
<td>+15 VDC ±3%, ripple &lt; 50 mVpp</td>
<td></td>
</tr>
<tr>
<td>Supply</td>
<td>−15 VDC ±3%, ripple &lt; 50 mVpp</td>
<td></td>
</tr>
<tr>
<td>Supply / Signal Ground</td>
<td>(\perp (0) V)</td>
<td></td>
</tr>
<tr>
<td>Input Command Valve Flow</td>
<td>0…±10 VDC, Input Resistance = 10 k(\Omega)</td>
<td>0…±10 mA, Load Resistance (diff.) = 1 k(\Omega)</td>
</tr>
<tr>
<td>Input Inverted Command Valve Flow</td>
<td>0…±10 VDC, Input Resistance = 10 k(\Omega)</td>
<td>0…±10 mA, Load Resistance (diff.) = 1 k(\Omega)</td>
</tr>
<tr>
<td>Output Actual Value(^a) Spool Position</td>
<td>0…±10 VDC, Load Resistance min. = 1 k(\Omega)</td>
<td>0…±10 mA, Load Resistance max. = 1 k(\Omega)</td>
</tr>
<tr>
<td>Protective Earth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
D765 SERIES
ORDERING INFORMATION
SPARE PARTS AND ACCESSORIES

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Type Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>D765 • • • •</td>
<td>• • • • • • • • •</td>
</tr>
</tbody>
</table>

### Specification Status
- Series specification
- Preseries specification
- Special specification

### Model Designation
- Assigned at the factory

### Factory Identification (Revision Level)

### Valve Version
- S Standard response
- H High response

### Rated Flow

<table>
<thead>
<tr>
<th>Series</th>
<th>Standard</th>
<th>High Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>10</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>19</td>
<td>3.0</td>
<td>5.0</td>
</tr>
<tr>
<td>38</td>
<td>10.0</td>
<td>10.0 (only to 3625 psi)</td>
</tr>
<tr>
<td>63</td>
<td>16.5</td>
<td>—</td>
</tr>
</tbody>
</table>

### Maximum Operating Pressure $p_p$ and Body Material
- F 3,000 psi aluminum
- J 4,500 psi aluminum
- K 5,000 psi steel

### Spool Position without Electrical Signal
- A P, B, A T
- B P, A, B  T
- M Mid position

### Electrical Supply
- 0 ±15 VDC ±3%, ripple < 50 mV

### Signals for 100% Spool Stroke
- Command
  - A ±10 V
  - X ±10 mA, floating

### Valve Connector
- R 6 + PE pole DIN 43563 over port A
- S 6 + PE pole DIN 43563 over port B

### Seal Material
- V Fluorocarbon
- Others on request

### Pilot Connections and Pressure

#### Pressure (psi)
- Supply
  - A 215 to 3,000 internal
  - C 215 to 3,000 external
  - E 215 to 4,500 internal
  - G 215 to 4,500 external
  - J 350 to 5,000 internal
  - L 350 to 5,000 external

### Pilot Stage
- G with additional mechanical feedback

Preferred configurations highlighted.
All combinations may not be available.
Options may increase price and delivery.
Technical changes are reserved.