Proportional spool valve

Flange construction

◆ $Q_{\text{max}} = 100 \text{ l/min}$
◆ $Q_{\text{Nmax}} = 65 \text{ l/min}$
◆ $p_{\text{max}} = 350 \text{ bar}$

**DESCRIPTION**

Direct operated proportional spool valve with 4 connections in 5-chamber system. Precise spool fit, low leakage, long service life time. The volume flow adjustment takes place by a Wandfluh proportional solenoid. Proportional to the solenoid current, the spool stroke, the spool opening and the valve volume flow increase. For the control, Wandfluh proportional amplifiers are available (see register 1.13).

**APPLICATION**

Proportional spool valves are perfectly suitable for demanding tasks due to the high resolution, large volume flow and low hysteresis. The applications are in the industry as well as in the mobile hydraulics for the smooth control of hydraulic actuators. Some examples: control of the rotor blades of wind generators, forestry and earth moving machines, machine tools and paper production machines, simple position controls, robotics and fan control.

**SYMBOL**

Symmetrical control

![ACB-S](image1)

![AC1-S](image2)

![CB2-S](image3)

Meter-in control

![ADB-V](image4)

![AD1-V](image5)

![DB2-V](image6)

**GENERAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Proportional spool valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Direct operated</td>
</tr>
<tr>
<td>Mounting</td>
<td>Flange construction</td>
</tr>
<tr>
<td>Nominal size</td>
<td>NG10 according to ISO 4401-05</td>
</tr>
<tr>
<td>Actuation</td>
<td>Proportional solenoid</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-25…+70 °C if &gt;50 °C, l is only conditionally achievable</td>
</tr>
<tr>
<td>Weight</td>
<td>3.9 kg (1 solenoid) 5.4 kg (2 solenoids)</td>
</tr>
</tbody>
</table>

**HYDRAULIC SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Working pressure $p_{\text{max}}$</th>
<th>350 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank pressure $p_{\text{max}}$</td>
<td>180 bar</td>
</tr>
<tr>
<td>Maximum volume flow $Q_{\text{max}}$</td>
<td>100 l/min, see characteristics</td>
</tr>
<tr>
<td>Nominal volume flow $Q_{\text{Nmax}}$</td>
<td>65 l/min</td>
</tr>
<tr>
<td>Leakage oil</td>
<td>see characteristics</td>
</tr>
<tr>
<td>Hysteresis $\leq 7 %$ at optimal dither signal</td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>Mineral oil, other fluid on request</td>
</tr>
<tr>
<td>Viscosity range 12 mm$^3$/s…320 mm$^3$/s</td>
<td></td>
</tr>
<tr>
<td>Temperature range -25…+70 °C (NBR) fluid -20…+70 °C (FKM)</td>
<td></td>
</tr>
<tr>
<td>Contamination efficiency</td>
<td>Class 18 / 16 / 13</td>
</tr>
<tr>
<td>Filtration</td>
<td>Required filtration grade $\beta 6…10 \geq 75$, see data sheet 1.0-50</td>
</tr>
</tbody>
</table>

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**TYPE CODE**

<table>
<thead>
<tr>
<th>Spool valve</th>
<th>Directly operated</th>
<th>Proportional</th>
<th>Flange construction</th>
<th>International standard interface ISO, NG10</th>
<th>Designation of symbols acc. to table</th>
</tr>
</thead>
<tbody>
<tr>
<td>W D P F A10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Nominal volume flow rate $Q_N$: 65 l/min
- Nominal voltage $U_N$: 12 VDC, 24 VDC
- Slip-on coil: Metal housing, round W, Metal housing, square M
- Connection execution:
  - Connector socket EN 175301-803 / ISO 4400 D
  - Connector socket AMP Junior-Timer J
  - Connector Deutsch DT04-2P G
- Sealing material: NBR, FKM (Viton) D1
- Manual override: Integrated EF1, Push-button HF1, Spindle HF1

**ELECTRICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Protection class</th>
<th>Connection execution D: IP65</th>
<th>Connection execution J: IP66</th>
<th>Connection execution G: IP67 and IP69K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Relative duty factor: 100 % DF
- Standard nominal voltage: 12 VDC, 24 VDC
- Limiting current at 50 °C: $I_u = 2255$ mA ($U_u = 12$ VDC), $I_u = 1105$ mA ($U_u = 24$ VDC)

**INSTALLATION NOTES**

- Mounting type: Flange mounting
- Mounting position: Any, preferably horizontal
- Tightening torque: Fixing screw $M_s = 10.5$ Nm ± 10 % (screw quality 8.8, zinc coated)
  - max. tank pressure 80 bar
  - $M_s = 13.5$ Nm ± 10 % (screw quality 10.9, zinc coated)
  - Knurled nut $M_s = 5$ Nm
- Note! The length of the fixing screw depends on the base material of the connection element.

**STANDARDS**

<table>
<thead>
<tr>
<th>Mounting interface</th>
<th>Solenoids</th>
<th>Connection execution D</th>
<th>Protection class</th>
<th>Contamination efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 4401-05</td>
<td>DIN VDE 0580</td>
<td>EN 175301 – 803</td>
<td>EN 60 529</td>
<td>ISO 4406</td>
</tr>
</tbody>
</table>

**ACTUATION**

- Actuation: Switching solenoid, wet pin push type, pressure tight
- Execution:
  - W.664 / 31 x 72 (Data sheet 1.1-190)
  - M.660 / 31 x 72 (Data sheet 1.1-193)
- Connection: Connector socket EN 175301 – 803, Connector socket AMP Junior-Timer, Connector Deutsch DT04 – 2P

Note: Other electrical specifications see data sheet 1.1-190 (slip-on coil W) and 1.1-193 (slip-on coil M)
PERFORMANCE SPECIFICATIONS

Oil viscosity $\nu = 30$ mm$^2$/s

### Volume flow pressure characteristics

- **Q = f (p)**
  - $I = I_3$
  - ACB-S, AC1-S, CB2-S

![Graph 1](#)

### Pressure drop volume flow characteristics

- **$\Delta p = f (Q)$**
  - $I = I_3$
  - ACB-S, AC1-S, CB2-S

![Graph 2](#)

### Volume flow adjustment characteristics

- **Q = f (I)**
  - $\Delta p = 10$ bar
  - ACB-S, AC1-S, CB2-S

![Graph 3](#)

### Leakage volume flow characteristics

- **Q$_L = f (p)$**
  - per control edge

![Graph 4](#)

**Note!** All values were measured over two control edges. The connections A and B were short-circuited.
**DIMENSIONS**

- **4/3-way spool valve (spring centred)**
  - [Diagram](image)

- **4/2-way spool valve**
  - [Diagram](image)

**HYDRAULIC CONNECTION**

- [Diagram](image)

**PARTS LIST**

<table>
<thead>
<tr>
<th>Position</th>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>206.3…</td>
<td>W.E64 / 31 x 72</td>
</tr>
<tr>
<td></td>
<td>260.9…</td>
<td>M.A60 / 31 x 72</td>
</tr>
<tr>
<td>50</td>
<td>160.2120</td>
<td>O-ring ID 12,42 x 1,78 (NBR)</td>
</tr>
<tr>
<td></td>
<td>160.8124</td>
<td>O-ring ID 12,42 x 1,78 (FKM)</td>
</tr>
<tr>
<td>60</td>
<td>160.2282</td>
<td>O-ring ID 28.24 x 2.62 (NBR)</td>
</tr>
<tr>
<td>70</td>
<td>154.2706</td>
<td>Knurled nut</td>
</tr>
<tr>
<td>80</td>
<td>253.7006</td>
<td>Push-button</td>
</tr>
<tr>
<td>90</td>
<td>253.7005</td>
<td>Spindle</td>
</tr>
</tbody>
</table>

**MANUAL OVERRIDE**

- Integrated (–) Actuation pin integrated in the armature tube. Actuation by pressing the pin
- Push-button (HF1) Integrated in the knurled nut. Actuation by pressing the push-button
- Spindle (HS1) Integrated in the knurled nut. Actuation by turning the spindle (continuously variable valve actuation)

**Attention!**

The actuation of the manual override is possible up to a tank pressure of:
- 20 bar Integrated (–)
- 20 bar Push-button (HF1)
- 80 bar Spindle (HS1)

**ACCESSORIES**

- Proportional amplifier: Register 1.13
- Mating connector grey (A): Article no. 219.2001
- Mating connector black (B): Article no. 219.2002
- Threaded subplates: Data sheet 2.9-40
- Multi-station subplates: Data sheet 2.9-70
- Horizontal mounting blocks: Data sheet 2.9-110
- Technical explanations: Data sheet 1.0-100
- Filtration: Data sheet 1.0-50
- Relative duty factor: Data sheet 1.1-430

**SEALING MATERIAL**

NBR or FKM (Viton) as standard, choice in the type code

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