Solenoid operated spool valve

Flange construction
- 4/3-way with spring centred mid position
- 4/2-way with spring reset
- \( Q_{\text{max}} = 80 \text{l/min} \)
- \( p_{\text{max}} = 350 \text{bar} \)

**NG6**
ISO 4401-03

**APPLICATION**
Spool valves are mainly used for controlling direction of movement and stopping of hydraulic cylinders and motors. The direction of movement is determined by the position of the spool and its symbol. Switching performance limits and leakage of the valves must be taken into account when designing the system. Solenoid operated spool valves are suitable for machine tools and handling systems of any kind.

**DESCRIPTION**
Direct operated solenoid spool valve with 4 connections in 5 chamber design. With the solenoids deenergised, the spool is held in the center position by the spring (4/3), or switched back to the offset position (4/2). Precise spool fit, low leakage, long service life time. Spool made from hardened steel, body from high quality hydraulic cast steel. Wide range of standard and special voltages.

**SYMBOL**

![Symbol Diagram]

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB1</td>
<td>Direct operated solenoid spool valve with 4 connections in 5 chamber design.</td>
</tr>
<tr>
<td>AB2</td>
<td>Switching performance limits and leakage of the valves must be taken into account when designing the system.</td>
</tr>
<tr>
<td>ACB</td>
<td>Precise spool fit, low leakage, long service life time.</td>
</tr>
<tr>
<td>AC1</td>
<td>Spool made from hardened steel, body from high quality hydraulic cast steel.</td>
</tr>
<tr>
<td>CB2</td>
<td>Wide range of standard and special voltages.</td>
</tr>
</tbody>
</table>

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TYPE CODE

Spool valve, direct operated
Slip-on coil, Medium
Flange construction
International standard interface ISO, NG6
Designation of symbols acc. to table

<table>
<thead>
<tr>
<th>Nominal voltage $U_n$</th>
<th>12 VDC</th>
<th>115 VAC</th>
<th>24 VDC</th>
<th>230 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_{12}$</td>
<td>$U_{115}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$U_{24}$</td>
<td>$U_{230}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal power $P_n$</td>
<td>8 Watt</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Slip-on coil Metal housing, square
Connection execution Connector socket EN 175301-803 / ISO 4400 D 
Connector socket AMP Junior-Timer J (only for $U_n \leq 75$ VDC) 
Connector Deutsch DT04 - 2P (only for $U_n \leq 75$ VDC)
Sealing material NBR 
FKM (Viton) D1
Manual override Integrated 
Push-button HF1 
Spindle HS1

Design index (subject to change)

GENERAL SPECIFICATIONS

Designation 4/2-, 4/3-spool valve
Construction Direct operated
Mounting Flange construction
Nominal size NG6 according to ISO 4401-03
Actuation Switching solenoid
Ambient temperature -25…+70 °C (NBR) 
-20…+70 °C (FKM) 
if $> +50$ °C, then no undervoltage is admissible
Weight 1.70 kg (1 solenoid) 
2.50 kg (2 solenoids)
MTTFd 150 years

INSTALLATION NOTES

Mounting type Flange mounting 
4 fixing holes for socket head screws M5 x 50
Mounting position Any, preferably horizontal
Tightening torque $M_1 = 5.2$ Nm (screw quality 8.8, zinc coated) Fixing screws 
$M_2 = 7$ Nm knurled nut
Note! The length of the fixing screw depends on the base material of the connection element.

ACTUATION

Actuation Switching solenoid, wet pin push type, pressure tight
Execution M.S45 / 23 x 50 (Data sheet 1.1-181)
Connection Connector socket EN 175301 – 803 
Connector socket AMP Junior-Timer 
Connector Deutsch DT04 - 2P

ACCESSORIES

Mating connector grey (A) Article no. 219.2001
Mating connector black (B) Article no. 219.2002
Mounting screws Data sheet 1.0-60
Threaded subplates Data sheet 2.9-30
Multi-station subplates Data sheet 2.9-60
Horizontal mounting blocks Data sheet 2.9-100
Technical explanations Data sheet 1.0-100
Hydraulic fluids Data sheet 1.0-50
Filtration Data sheet 1.0-50
Relative duty factor Data sheet 1.1-430

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### ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class</td>
<td>Connection execution D: IP65</td>
</tr>
<tr>
<td></td>
<td>Connection execution J: IP66</td>
</tr>
<tr>
<td></td>
<td>Connection execution G: IP67 and IP69K</td>
</tr>
<tr>
<td>Relative duty factor</td>
<td>100% DF</td>
</tr>
<tr>
<td>Switching frequency</td>
<td>15,000/h</td>
</tr>
<tr>
<td>Service life time</td>
<td>10⁷ (number of switching cycles, theoretically)</td>
</tr>
<tr>
<td>Voltage tolerance</td>
<td>± 10% with regard to nominal voltage</td>
</tr>
<tr>
<td>Standard nominal power</td>
<td>12 VDC, 24VDC, 115 VAC, 230 VAC AC = 50 to 60 Hz, rectifier integrated in the connector socket</td>
</tr>
</tbody>
</table>

**Note!** Other electrical specifications see data sheet 1.1-181

### HYDRAULIC SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working pressure</td>
<td>$p_{\text{max}} = 350$ bar</td>
</tr>
<tr>
<td>Tank pressure</td>
<td>$p_{\text{max}} = 200$ bar</td>
</tr>
<tr>
<td>Maximum volume flow</td>
<td>$Q_{\text{max}} = 80$ l/min, see characteristics</td>
</tr>
<tr>
<td>Leakage volume flow</td>
<td>See characteristics</td>
</tr>
<tr>
<td>Fluid</td>
<td>Mineral oil, other fluid on request</td>
</tr>
<tr>
<td>Viscosity range</td>
<td>12 mm²/s…320 mm²/s</td>
</tr>
<tr>
<td>Temperature range fluid</td>
<td>-20…+70 °C</td>
</tr>
<tr>
<td>Contamination efficiency</td>
<td>Class 20 / 18 / 14</td>
</tr>
<tr>
<td>Filtration</td>
<td>Required filtration grade B 10…16 ≥ 75, see data sheet 1.0-50</td>
</tr>
</tbody>
</table>

### PERFORMANCE SPECIFICATIONS

- Oil viscosity $\nu = 30$ mm²/s
- $p = f(Q)$
- $\Delta p = f(Q)$
- $Q_L = f(Q)$
**DIMENSIONS**

4/3-way valve (spring centred)

4/2-way valve (spring reset)

**HYDRAULIC CONNECTION**

**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:

- 40 bar Integrated (–)
- 40 bar Push-button (HF1)
- 100 bar Spindle (HS1)

**STANDARDS**

- Mounting interface: ISO 4401-03
- Solenoids: DIN VDE 0580
- Connection execution D: EN 175301 – 803
- Protection class: EN 60 529
- Contamination efficiency: ISO 4406

**PARTS LIST**

<table>
<thead>
<tr>
<th>Position</th>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>206.7...</td>
<td>M.S45 / 23 x 50</td>
</tr>
<tr>
<td>50</td>
<td>160.2093</td>
<td>O-ring ID 9.25 x 1.78 (NBR)</td>
</tr>
<tr>
<td></td>
<td>160.6092</td>
<td>O-ring ID 9.25 x 1.78 (FKM)</td>
</tr>
<tr>
<td>60</td>
<td>160.2222</td>
<td>O-ring ID 22.22 x 2.62 (NBR)</td>
</tr>
<tr>
<td>70</td>
<td>154.2701</td>
<td>Knurled nut</td>
</tr>
<tr>
<td>80</td>
<td>253.7004</td>
<td>Push-button</td>
</tr>
<tr>
<td>90</td>
<td>253.7002</td>
<td>Spindle</td>
</tr>
</tbody>
</table>

**SURFACE TREATMENT**

- The valve body is painted with a two component paint
- The screw plug is zinc coated
- The slip-on coil and the armature tube are zinc-nickel coated

**SEALING MATERIAL**

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

Wandfluh AG  Postfach  CH-3714 Frutigen
Tel. 033 672 72 72  Fax 033 672 72 12  sales@wandfluh.com

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