Solenoid operated spool valve

Flange construction

◆ 4/2-way impulse valve execution detented
◆ 4/3-way with spring centred mid position
◆ 4/2-way with spring reset
◆ $Q_{\text{max}} = 30 \, \text{l/min}$
◆ $p_{\text{max}} = 350 \, \text{bar}$

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). With the impulse spool (4/2), the spool is held in the switching position by the detent. The pressure tight encapsulated Ex-protection solenoid coil prevents an explosion on the inside penetrating to the outside as well as an ignitable surface temperature.

APPLICATION

These valves are suitable for applications in explosion-hazard areas, open cast and also in mines. 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. Miniature values are used where both, reduced dimensions and weight are important.

CERTIFICATES

<table>
<thead>
<tr>
<th>Surface</th>
<th>Mining</th>
<th>Standard -25 °C to…</th>
<th>ZEO4 -40 °C to…</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEX</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>IECEx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>EAC</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Australia</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>MA</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>UL / CSA</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

The certificates can be found on www.wandfluh.com

ACTUATION

Actuation
Switching solenoid, wet pin push type, pressure tight

Execution
MKY45 / 18x60 (data sheet 1.1-183)
MKU45 / 18x60 (data sheet 1.1-184)

Connection
Cable gland for cable Ø 6.5…14 mm

Attention! The UL execution is always supplied without cable gland

SYMBOL

[Diagram and symbols are shown here, but not transcribed as text]

www.wandfluh.com  Illustrations are not binding  Data subject to change  1/5  Edition: 19 41 1.3-24E
**Solenoid operated spool valve**

### SYMBOL

![Symbol Diagrams]

### TYPE CODE

**Spool valve direct operated**

**Explosion proof execution Ex d**

**Flange construction**

**NG4-Mini to Wandfluh standard**

**Designation of symbols acc. to table**

<table>
<thead>
<tr>
<th>Spool specification</th>
<th>Standard</th>
<th>Low Leakage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage $U_n$</td>
<td>12 VDC</td>
<td>115 VAC</td>
</tr>
<tr>
<td>Nominal power $P_n$</td>
<td>9 W</td>
<td>$40 , ^{\circ}C$ or $90 , ^{\circ}C$</td>
</tr>
<tr>
<td>Certification</td>
<td>ATEX, IECEx, EAC</td>
<td>Australia</td>
</tr>
<tr>
<td>Sealing material</td>
<td>NBR</td>
<td></td>
</tr>
</tbody>
</table>

**Design index (subject to change)**

1.3-24
GENERAL SPECIFICATIONS

Designation
4/2-, 4/3-spool valve

Construction
Direct operated

Mounting
Flange construction

Nominal size
NG4-Mini according to Wandfluh standard

Actuation
Ex-protection switching solenoid

Ambient temperature
- Operation as T6
  -25...+40 °C (L9)
- Operation as T4
  -25...+90 °C (L9)
  -25...+70 °C (L15 / L17)
  -40...+70 °C (L15 / L17)
In case of \( U_n = 12 \) VDC, the max.
ambient temperature has to be reduced
by 10 °C.

Weight
2.6 kg (1 solenoid)
4.4 kg (2 solenoids)

MTTFd
150 years

HYDRAULIC SPECIFICATIONS

Working pressure
\( p_{max} = 350 \text{ bar} \) \( (p_1 < 20 \text{ bar}) \)
\( p_{max} = 315 \text{ bar} \) \( (p_2 > 20 \text{ bar}) \)

Tank pressure
\( p_{Tmax} = 160 \text{ bar} \)

Maximum volume flow
\( Q_{max} = 30 \text{ l/min, see characteristic} \)

Leakage oil
See characteristics

Fluid
Mineral oil, other fluid on request

Viscosity range
12 mm²/s...320 mm²/s

Temperature range
- Operation as T6
  fluid
  NBR -25...+40 °C (L9)
  FKM -20...+40 °C (L9)
- Operation as T4
  NBR -25...+70 °C (L9 or L15 / L17)
  FKM -20...+70 °C (L15 / L17)
  FKM -20...+90 °C (L9)
  NBR 872 -40...+70 °C (L15 / L17)

Contamination
Class 20 / 18 / 14

Filtration
Required filtration grade \( \beta 10...16 \geq 75 \),
see data sheet 1.0-50

ELECTRICAL SPECIFICATIONS

Protection class
IP65 / 66 / 67

Relative duty factor
100 % DF

Switching frequency
12 000 / h

Voltage tolerance
\( \pm 10 \% \) with regard to nominal voltage

Standard nominal voltage
12 VDC, 24VDC, 115 VAC, 230 VAC

AC = 50 to 60 Hz \( \pm 2 \% \), with built-in
two-way rectifier

Standard nominal power
9 W, 15 W, 17 W

Temperature class
Nominal power 9 W: T1...T6
Nominal power 15 W / 17 W: T1...T4

Note!
Other electrical specifications see data sheet 1.1-183
and 1.1-184

MANUAL OVERRIDE

HB6 as standard
Optionally: HN (K)
see data sheet 1.1-311

SURFACE TREATMENT

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

COMMISSIONING

Attention!
The solenoid coil must only be put into operation, if the
requirements of the operating instructions supplied are
observed to their full extent. In case of non-observance,
no liability can be assumed.

PERFORMANCE SPECIFICATIONS

Oil viscosity \( \nu = 30 \text{ mm²/s} \)

\[ p = f(Q) \]

Performance limits L15 / L17
Measured with nominal voltage -10% at 50 °C
Standard

\[ p = f(Q) \]

Performance limits L9
Measured with nominal voltage -10% at 40 °C
Execution L9 90 °C on request
PERFORMANCE SPECIFICATIONS

Oil viscosity \( \eta = 30 \text{ mm}^2/\text{s} \)

**Note!**
With the L15 / L17 execution for ambient temperatures up to 70 °C, the performance specifications have been evaluated with an ambient temperature of 50 °C.

**Attention!**
For valves for the temperature ranges "-40 °C to..." (Z604) the leakage volume flow can be up to eight times higher.

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**p = f (Q)**

**Perfomance limits**
Measured with nominal voltage -10 %
Low Leakage (1 / x)

**\( \Delta p = f (Q) \)**

**Pressure drop volume flow characteristics**
Standard

**\( Q_L = f (Q) \)**

**Leakage volume flow characteristics**
per control edge
Standard

---

**Flow direction**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>P - A</th>
<th>P - B</th>
<th>P - T</th>
<th>A - T</th>
<th>B - T</th>
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<tbody>
<tr>
<td>AB1</td>
<td>2</td>
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<td>AB3</td>
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<tr>
<td>ACB</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ADB</td>
<td>2</td>
<td>2</td>
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<td>1</td>
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<tr>
<td>BEA</td>
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<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
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<tr>
<td>AFB</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>AGB</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
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</table>

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**Flow direction**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>P - A</th>
<th>P - B</th>
<th>P - T</th>
<th>A - T</th>
<th>B - T</th>
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<tbody>
<tr>
<td>AB1</td>
<td>1</td>
<td>1</td>
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<td>1</td>
<td>2</td>
</tr>
<tr>
<td>AB3</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ADB</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

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**\( Q_L = f (Q) \)**

**Leakage volume flow characteristics**
per control edge
Low Leakage (1 / x)
**INSTALLATION NOTES**

**Mounting type**
- Flange mounting
  - 3 fixing holes for socket head screws M5 x 40 or M5 x 50 (with distance plate BDP4/12)

**Mounting position**
- Any, preferably horizontal

**Tightening torque**
- Fixing screws $M_d = 5.2 \text{ Nm}$ (screw quality 8.8, zinc coated)
  - $M_d = 9 \text{ Nm}$ knurled nut

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**STANDARDS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Standard</th>
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<tbody>
<tr>
<td>Explosion protection</td>
<td>Directive 2014 / 34 / EU (ATEX)</td>
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<tr>
<td>Flameproof enclosure</td>
<td>EN / IEC / UL 60079-1, 31</td>
</tr>
<tr>
<td>Cable entry</td>
<td>EN 60079-0, 1, 7, 15, 31</td>
</tr>
<tr>
<td>Mounting interface</td>
<td>Wandfluh standard</td>
</tr>
<tr>
<td>Protection class</td>
<td>EN 60 529</td>
</tr>
<tr>
<td>Contamination efficiency</td>
<td>ISO 4406</td>
</tr>
</tbody>
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**SEALING MATERIAL**

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

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**INSTALLATION NOTES**

**Accessories**

- Fixing screws
  - Data sheet 1.0-60
- Threaded subplates
  - Data sheet 2.9-10
- Multi-station subplates
  - Data sheet 2.9-50
- Module type manifold blocks
  - Data sheet 2.9-90
- Technical explanations
  - Data sheet 1.0-100
- Filtration
  - Data sheet 1.0-50
- Relative duty factor
  - Data sheet 1.1-430

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**SEALING MATERIAL**

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

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**DIMENSIONS**

4/3-way spool valve (spring centring)

4/2-way spool valve (impulse)

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**PARTS LIST**

<table>
<thead>
<tr>
<th>Position</th>
<th>Article</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>263.6...</td>
<td>Solenoid coil MK.45 / 18 x 60</td>
</tr>
<tr>
<td>12</td>
<td>154.2603</td>
<td>Knurled nut Ex M18 x 1,5 x 18</td>
</tr>
<tr>
<td>15</td>
<td>253.8001</td>
<td>HB6 Manual override „-25 °C to…“</td>
</tr>
<tr>
<td></td>
<td>253.8025</td>
<td>HB6-Z604 Manual override „-40 °C to…“</td>
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<tr>
<td>17</td>
<td>160.2251</td>
<td>O-ring ID 25.07 x 2.62 (NBR)</td>
</tr>
<tr>
<td>18</td>
<td>160.2170</td>
<td>O-ring ID 17.17 x 1.78 (NBR)</td>
</tr>
<tr>
<td>40</td>
<td>239.2206</td>
<td>Socket head screw M20 x 1</td>
</tr>
<tr>
<td>50</td>
<td>173.1450</td>
<td>Distance plate BDP4 / 12</td>
</tr>
<tr>
<td>70</td>
<td>160.2052</td>
<td>O-ring ID 5.28 x 1.78 (NBR)</td>
</tr>
<tr>
<td></td>
<td>160.6052</td>
<td>O-ring ID 5.28 x 1.78 (FKM)</td>
</tr>
<tr>
<td>110</td>
<td>111.1080</td>
<td>Cable gland M20 x 1,5</td>
</tr>
</tbody>
</table>

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**HYDRAULIC CONNECTION**

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