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>Z604 -40 °C to…</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEX</td>
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<td>x</td>
<td>x</td>
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<tr>
<td>IECEx</td>
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<td>CCC</td>
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<td>x</td>
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</tr>
<tr>
<td>EAC</td>
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<td>x</td>
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<tr>
<td>MA</td>
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<td>x</td>
<td></td>
</tr>
<tr>
<td>UL / CSA</td>
<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>

The certificates can be found on www.wandfluh.com

**Symbol**

**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

<table>
<thead>
<tr>
<th>BEA</th>
<th>BE1</th>
<th>EA2</th>
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<tbody>
<tr>
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<td><img src="image2.png" alt="Diagram" /></td>
<td><img src="image3.png" alt="Diagram" /></td>
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<table>
<thead>
<tr>
<th>AFB</th>
<th>AF1</th>
<th>FB2</th>
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<tr>
<td><img src="image4.png" alt="Diagram" /></td>
<td><img src="image5.png" alt="Diagram" /></td>
<td><img src="image6.png" alt="Diagram" /></td>
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<tr>
<th>AGB</th>
<th>AG1</th>
<th>GB2</th>
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<tr>
<td><img src="image7.png" alt="Diagram" /></td>
<td><img src="image8.png" alt="Diagram" /></td>
<td><img src="image9.png" alt="Diagram" /></td>
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</table>

## 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>
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<table>
<thead>
<tr>
<th>Nominal voltage $U_n$</th>
<th>12 VDC</th>
<th>15 V</th>
<th>24 VDC</th>
<th>230 VAC</th>
<th>230 VAC</th>
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<tr>
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<td>115 VAC</td>
<td>115 VAC</td>
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<td>2115</td>
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<table>
<thead>
<tr>
<th>Nominal power $P_n$</th>
<th>9 W</th>
<th>15 W</th>
<th>17 W</th>
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<tbody>
<tr>
<td></td>
<td>40 °C</td>
<td>78 °C</td>
<td>78 °C</td>
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<tr>
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<table>
<thead>
<tr>
<th>Certification</th>
<th>ATEX, IECEX, CCC, EAC</th>
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<tr>
<td>Australia</td>
<td>AU UL / CSA UL</td>
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<td>MA</td>
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<table>
<thead>
<tr>
<th>Sealing material</th>
<th>NBR NBR FKM (Viton) NBR -40 °C</th>
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<tbody>
<tr>
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<td>MA UL / CSA UL / UL UL / UL</td>
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<table>
<thead>
<tr>
<th>Design index (subject to change)</th>
<th>1.3-24</th>
</tr>
</thead>
</table>
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)

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

MTTFd
150 years

HYDRAULIC SPECIFICATIONS

Working pressure
p_{max} = 350 bar (p_{T} < 20 bar)

p_{max} = 315 bar (p_{T} > 20 bar)

Tank pressure
p_{T, max} = 160 bar

Maximum volume flow
Q_{max} = 30 l/min, see characteristic

Fluid
Mineral oil, other fluid on request

Viscosity range
12 mm²/s...320 mm²/s

Temperature range
fluid
NBR -25…+40 °C (L9)

FKM -20…+40 °C (L9)

NBR -25…+70 °C (L9 or L15 / L17)

FKM -20…+70 °C (L9 or L15 / L17)

NBR 872 -40…+70 °C (L15 / L17)

Contamination efficiency
Class 20 / 18 / 14

Filtration
Required filtration grade β 10...16 ≥ 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
± 10 % with regard to nominal voltage

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

AC = 50 to 60 Hz ± 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

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.

Note!

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

PERFORMANCE SPECIFICATIONS

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

\[
p = f (Q) \quad \text{Performance limits L15 / L17}
\]

Measured with nominal voltage -10% at 50 °C

Standard

\[
p = f (Q) \quad \text{Performance limits L9}
\]

Measured with nominal voltage -10% at 40 °C

Execution L9 90 °C on request
PERFORMANCE SPECIFICATIONS

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

**Performance limits**

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

**Pressure drop volume flow characteristics**

- **Standard**
- **Low Leakage (1/x)**

**Leakage volume flow characteristics**

- **per control edge**
- **Standard**
- **Low Leakage (1/x)**

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.
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 $M_T = 5.2\text{ Nm}$ (screw
quality 8.8, zinc coated)
$M_T = 9\text{ Nm}$ knurled nut

Note!  The length of the fixing screw depends on the base
material of the connection element.

Attention!  For stack assembly please observe the remarks in the
operating instructions.

SEALING MATERIAL

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

STANDARDS

<table>
<thead>
<tr>
<th>Standard</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>Explosion protection</td>
<td>Directive 2014 / 34 / EU (ATEX)</td>
</tr>
<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>
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</tbody>
</table>

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

SEALING MATERIAL

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

DIMENSIONS

4/3-way spool valve (spring centring)
4/2-way spool valve (impulse)

Dimensions of the solenoid coil see data sheet 1.1-183 and 1.1-184

The distance plate BDP4/12 has to be ordered separately

PARTS LIST

<table>
<thead>
<tr>
<th>Position</th>
<th>Article</th>
<th>Description</th>
</tr>
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<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>
</tr>
<tr>
<td>17</td>
<td>160.2251</td>
<td>O-ring ID 25.07 x 2.62 (NBR)</td>
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<tr>
<td>18</td>
<td>160.2170</td>
<td>O-ring ID 17.17 x 1.78 (NBR)</td>
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<tr>
<td>40</td>
<td>239.2206</td>
<td>Socket head screw M20 x 1</td>
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<td>50</td>
<td>173.1450</td>
<td>Distance plate BDP4 / 12</td>
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<td>160.2052</td>
<td>O-ring ID 5.28 x 1.78 (NBR)</td>
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<td></td>
<td>160.6052</td>
<td>O-ring ID 5.28 x 1.78 (FKM)</td>
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<tr>
<td>110</td>
<td>111.1080</td>
<td>Cable gland M20 x 1,5</td>
</tr>
</tbody>
</table>

HYDRAULIC CONNECTION

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