Proportional spool valve stainless

**Flange construction**
- $Q_{\text{max}} = 30 \text{ l/min}$
- 3 volume flow levels
- $Q_{N\text{max}} = 20 \text{ l/min}$
- $p_{\text{max}} = 350 \text{ bar}$

**DESCRIPTION**
Direct operated proportional spool valve with 4 connections in 5-chamber system. Precise spool fit, low leakage, long service life time. Proportional to the solenoid current, the spool stroke, the spool opening and the valve volume flow increase. 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. The stainless execution is especially suitable for the use in wet and salty environment. 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 industrial as well as in the mobile hydraulics for the smooth control of hydraulic actuations.

**CERTIFICATES**

<table>
<thead>
<tr>
<th>Surface</th>
<th>Mining</th>
<th>Standard -25 °C to...</th>
<th>M248 Electronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEX</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<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

**SYMBOL**

**ACTUATION**

<table>
<thead>
<tr>
<th>Actuation</th>
<th>Proportional solenoid, wet pin push type, pressure tight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection</td>
<td>Cable gland for cable Ø 6,5...14 mm</td>
</tr>
</tbody>
</table>

Attention! The UL execution is always supplied without cable gland

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**NG6**

**ISO 4401-03**
- II 2 G Ex db IIC T6, T4
- II 2 D Ex tb III C T80 °C, T130 °C
- I M2 Ex db I Mb
Class I Division 1
Class I Zone 1

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### 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>NG6 according to ISO 4401-03</td>
</tr>
<tr>
<td>Actuation</td>
<td>Ex-protection proportional solenoid</td>
</tr>
</tbody>
</table>

**Ambient temperature**

- **Operation as T6**
  - -25...+40 °C (L9)
- **Operation as T4**
  - -25...+90 °C (L9)
  - -25...+70 °C (L15 / L17)
  In case of \( U_0 = 12 \text{ VDC} \), the max. ambient temperature has to be reduced by 10 °C

**Weight**

- 3.1 kg (1 solenoid)
- 4.9 kg (2 solenoids)

**MTTFd**

- 150 years

### ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Protection class</th>
<th>IP65 / 66 / 67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative duty factor</td>
<td>100 % DF</td>
</tr>
<tr>
<td>Voltage tolerance</td>
<td>± 10 % with regard to nominal voltage</td>
</tr>
<tr>
<td>Standard nominal voltage</td>
<td>12 VDC, 24 VDC</td>
</tr>
</tbody>
</table>

- **Limiting current at... °C**
  - **L15 / L17 / 70 °C:**
    - \( I_g = 445 \text{ mA (} U_0 = 24\text{VDC)} \)
    - \( I_g = 890 \text{ mA (} U_0 = 12\text{VDC)} \)
  - **L9 / 40 °C:**
    - \( I_g = 305 \text{ mA (} U_0 = 24\text{VDC)} \)
    - \( I_g = 610 \text{ mA (} U_0 = 12\text{VDC)} \)
  - **L9 / 90 °C:**
    - \( I_g = 265 \text{ mA (} U_0 = 24\text{VDC)} \)
    - \( I_g = 530 \text{ mA (} U_0 = 12\text{VDC)} \)

**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
HYDRAULIC SPECIFICATIONS

Working pressure \( p_{\text{max}} = 350 \text{ bar} \)
Tank pressure \( p_{T, \text{max}} = 160 \text{ bar} \)
Maximum volume flow \( Q_{\text{max}} = 30 \text{ l/min, see characteristics} \)
Nominal volume flow
- \( Q_N = 6 \text{ l/min, 12 l/min, 20 l/min (L15 / L17)} \)
- \( Q_N = 3 \text{ l/min, 7 l/min, 14 l/min (L9 ACB-S)} \)
- \( Q_N = 5 \text{ l/min, 10 l/min, 16 l/min (L9 ADB-V)} \)
Leakage oil On request
Hysteresis
- L15 / 70°C: ≤ 10 % at optimal dither signal
- L9 / 40°C: ≤ 12 % at optimal dither signal
- L9 / 90°C: ≤ 14 % at optimal dither signal
Fluid Mineral oil, other fluid on request
Viscosity range 12 mm\(^2\)/s...320 mm\(^2\)/s
Temperature range fluid
- Operation as T6
  - 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)
Contamination efficiency Class 18 / 16 / 13
Filtration Required filtration grade \( \beta 6...10 \geq 75 \), see data sheet 1.0-50

Attention! With the execution L9 for ambient temperatures up to 90 °C (L9/90 °C), \( Q_N \) is not reached

STANDARDS

Explosion protection Directive 2014 / 34 / EU (ATEX)
Flameproof enclosure EN / IEC / UL 60079-1, 31
Cable entry EN 60079-0, 1, 7, 15, 31
Mounting interface ISO 4401-03
Protection class EN 60 529
Contamination efficiency ISO 4406

SURFACE TREATMENT

◆ The valve body, the cover and the socket head screws are made of stainless steel
◆ 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

PERFORMANCE SPECIFICATIONS

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

\[
Q = f(p)
\]
Volume flow pressure characteristics
- \( I = I_0 \)
- Measured at 50 °C
- ACB-S, AC1-S, CB2-S
- Execution L15 / L17

\[
Q = f(p)
\]
Volume flow pressure characteristics
- \( I = I_0 \)
- Measured at 50 °C
- ACB-S, AC1-S, CB2-S
- Execution L9
Proportional spool valve

Volume flow pressure characteristics

\[ Q = f(p) \]

I = \( I_g \)

Measured at 50 °C

ADB-V, AD1-V, DB2-V

Execution L15 / L17

\[
\begin{array}{c|cccccccc}
\text{p [bar]} & 300 & 250 & 150 & 200 & 100 & 50 & 350 \\
\hline
\text{Q [l/min]} & 30 & 25 & 20 & 15 & 10 & 5 & 0 \\
\end{array}
\]

\( Q_N = 6 \) l/min

\( Q_N = 12 \) l/min

\( Q_N = 20 \) l/min

Pressure drop volume flow characteristics

\[ \Delta p = f(Q) \]

I = \( I_g \)

Measured at 50 °C

ACB-S, AC1-S, CB2-S

Execution L15 / L17

\[
\begin{array}{c|cccccccc}
\text{Q [l/min]} & 15 & 20 & 25 & 100 & 5 & 30 \\
\hline
\text{p [bar]} & 30 & 25 & 20 & 15 & 10 & 5 & 0 \\
\end{array}
\]

\( Q_N = 6 \) l/min

\( Q_N = 12 \) l/min

\( Q_N = 20 \) l/min

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K4225

K4227

K4229

K4230
Volume flow adjustment characteristics

Q = f (I)

\[ \Delta p = 10 \text{ bar} \]

Measured at 50 °C

ACB-S, AC1-S, CB2-S

Execution L15 / L17

Q [l/min]

I [%]

60 80 40 20 0 -40 -20 -60 -100 -80 100

QN = 6 l/min
QN = 12 l/min
QN = 20 l/min

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

Dimensions of the solenoid coil, refer to data sheet 1.1-183 and 1.1-184

Parts list

<table>
<thead>
<tr>
<th>Position</th>
<th>Article</th>
<th>Description</th>
</tr>
</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>154.2201</td>
<td>Knurled nut Ex M18 x 1,5 x 30</td>
</tr>
<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>239.2214</td>
<td>Socket head screw M20 x 1</td>
</tr>
<tr>
<td>70</td>
<td>160.2093</td>
<td>O-ring ID 9,25 x 1,78 (NBR)</td>
</tr>
<tr>
<td></td>
<td>160.8092</td>
<td>O-ring ID 9,25 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>

Installation notes

- Flange mounting
- 4 fixing holes for socket head screws M5 x 45
- Any, preferably horizontal
- Fixing screws $M_b = 5,2$ Nm (screw quality A4)
  - $M_b = 9$ 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.

Accessories

- 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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