Proportional spool valves

**FUNCTION**

Spool stroke, aperture and volume flow increase proportionally to the increase in the electric current at the proportional solenoid. This special design senses and compensates load induced flow changes. Flow remains constant with varying pressure. The optimised shape of the spool results in a good resolution of flow important for sensitive motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

**APPLICATION**

Because of the high resolution and low hysteresis, these valves are particularly suitable for demanding tasks. Applications: handling operations, robots, actuators, radar controlled vehicles, tool making and paper production machines, in other words where precise control systems are needed.

**DISCRIPTION**

Directly controlled spool valve, actuated by a Wandfluh proportional solenoid (VDE standard 0580), in five chamber design. Wet solenoid in oil. Spools with precision machined oil passages control the oil volume which is proportional to the solenoid current. Reduced pressure drop achieved by optimised flow channels. Precise spool fit, long life. Spool made of hardened steel, valve body made of high quality cast iron suitable for hydraulic valves. Flange type, threaded connection by means of a connecting plate.

**GENERAL SPECIFICATIONS**

- Nominal size: NG6 acc. to ISO 4401-03
- Designation: 4/2-, 4/3-way proportional control valve
- Mounting: Direct operated spool valve
- Fastening torque: Mₙ = 5.5 Nm (screw quality 8.8)
- Pipe connection: Connection plates, Multi-station flange subplate, Longitudinal stacking system
- Mounting position: any
- Ambient temperature: -20...+50 °C
- Weight: 4/2-way m = 1.85 kg, 4/3-way m = 2.85 kg

**HYDRAULIC SPECIFICATIONS**

- Fluid: Mineral oil, other fluid on request
- Contamination efficiency: ISO 4406:1999, class 18/16/13 (Required filtration grade B6...10:75) refer to data sheet 1.0-50/2
- Viscosity range: 12 mm²/s...320 mm²/s
- Fluid temperature: -20...+70 °C
- Working pressure: pₓₓ = 250 bar (Ports P, A, B)
- Tank pressure: max tank pressure in T
- Nominal volume flows: Qₑ = 2.5 l/min, Qₑ = 5 l/min, Qₑ = 10 l/min
- Min. volume flow: Qₑ = 0.02 l/min
- Leakage volume flow: see characteristic
- Resolution: 1 mA *
- Repeatability: ≤ 1 % *
- Hysteresis: ≤ 2 % *

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**TYPE CODE**

Control valve, proportional

<table>
<thead>
<tr>
<th>Nominal volume flow Qₑ</th>
<th>2.5 l/min</th>
<th>5 l/min</th>
<th>10 l/min</th>
<th>15 l/min</th>
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<tbody>
<tr>
<td>Normally closed</td>
<td>VWS 4</td>
<td>-</td>
<td>- TF -</td>
<td>#</td>
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</tbody>
</table>

Nominal voltage Uₙ

- 12 VDC
- 24 VDC

Design-Index (Subject to change)

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**Data sheet no. 1.10-11E 1/4**
Edition 11 02
ELECTRICAL SPECIFICATIONS

Construction: Proportional solenoid, wet pin push type, pressure tight.

Standard-Nominal voltage:
- U = 12 VDC
- U = 24 VDC

Limiting current:
- PI35V: \( I_g = 1250 \text{ mA} \), \( I_g = 680 \text{ mA} \) for VWS4.61 \( Q_N = 2.5 \ldots 10 \text{ l/min} \) for VWS4.62 \( Q_N = 2.5 \ldots 10 \text{ l/min} \)
- PI45V: \( I_g = 1780 \text{ mA} \), \( I_g = 810 \text{ mA} \) for VWS4.61 \( Q_N = 15 \ldots 20 \text{ l/min} \) for VWS4.62 \( Q_N = 15 \ldots 20 \text{ l/min} \)

Relative duty factor: 100 % DF (see data sheet 1.1-430)

Protection class: IP65 to EN 60 529

Connection / Power: Over device plug connection to ISO 4400 / DIN 43650 (2P+E)

Other electrical specifications see data sheet: 1.1-115 (PI35V), 1.1-130 (PI45V)

TYPE CHARTS / DESIGNATIONS OF SYMBOLS

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

Q = f (p) Volume flow-pressure-characteristics

\( Q_N = 2,5 \text{ l/min} \)

Q = f (p) Volume flow-pressure-characteristics

\( Q_N = 10 \text{ l/min} \)

Q = f (p) Volume flow-pressure-characteristics

\( Q_N = 20 \text{ l/min} \)

Q = f (l) Volume flow-signal-characteristics

\( Q_N = 20 \text{ l/min} \)

Q = f (l) Volume flow-signal-characteristics

\( Q_N = 10 \text{ l/min} \)

Q = f (l) Volume flow-signal-characteristics

\( Q_N = 2,5 \text{ l/min} \)

Q = f (p) Leakage volume flow characteristics per control edge

Q [cm³/min]

p [bar]
DIMENSIONS

4/3-way valve VWS4.61 for Q_0 2.5…10 l/min
4/3-way valve VWS4.62 for Q_0 2.5…10 l/min

4/2-way valve VWS4.61 for Q_0 2.5…10 l/min
4/2-way valve VWS4.62 for Q_0 2.5…10 l/min

4/3-way valve VWS4.61 for Q_0 15…20 l/min
4/3-way valve VWS4.62 for Q_0 15…20 l/min

4/2-way valve VWS4.61 for Q_0 15…20 l/min
4/2-way valve VWS4.62 for Q_0 15…20 l/min
# PARTS LIST

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<tr>
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<th>Article</th>
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<td>256.3454, 256.3426</td>
<td>Proportional solenoid PI35V-G24, PI35V-G12</td>
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<tr>
<td>15</td>
<td>256.4454, 256.4418</td>
<td>Proportional solenoid PI45V-G24, PI45V-G12</td>
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<td>20</td>
<td>253.8000</td>
<td>Plug with integrated manual override HB4,5</td>
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<td>253.8001</td>
<td>Plug with integrated manual override HB6</td>
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<td>219.2002</td>
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<td>Socket head cap screw M5 x 60 DIN 912</td>
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<td>Socket head cap screw M5 x 16 DIN 912</td>
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## ACCESSORIES

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<td>Proportional-amplifier</td>
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Explications techniques voir feuille 1.0-100