Proportional directional control valve
- Integrated amplifier or controller electronics
- Integrated spool position control with LVDT
- Direct operated, not pressure compensated
  - \( Q_{\max} = 27 \text{ l/min} \)
  - \( Q_{N \max} = 20 \text{ l/min} \)
  - \( p_{\max} = 350 \text{ bar} \)

**DESCRIPTION**
Direct operated proportional spool valve with integrated electronics in flange design NG6 acc. to ISO 4401-03/7790 with 4 ports. The valve possesses an integrated positional control of the valve spool. This assures a minimal hysteresis and improved dynamic characteristics. Housing for electronics with protection class IP67 for harsh environment. The spool valve is designed acc. to the 5 chamber principle. The volume flow is adjusted by Wandfluh proportional solenoids (VDE standard 0580). Low pressure drop due to the body design and spool profiling. The spool is made of hardened steel. The body made of high grade hydraulic casting is painted. The solenoids are zinc coated and the housing for the electronics is made of aluminium.

**FUNCTION**
With the integrated spool position sensor (LVDT) the actual position of the spool is continuously recorded and made to follow the set-point value transmitted in an analogue manner. By means of this internal positional control, a minimal hysteresis and excellent dynamic characteristics are assured. With an increasing command value signal, the valve opening and therefore the volume flow changes. With 50 % of the solenoid current, the centre of the spool position (PTAB closed) is reached. In the case of an electric power failure, the spool by means of the spring force shifts into the basic position. Parameter setting and diagnosis with the free-of-charge software «PASO». Data are stored in a non volatile memory. Even after an electric power failure settings can easily be reproduced and transmitted. These valves are available with an integrated controller as an option. As feedback signal source sensors with voltage or current output signal can be directly connected. The available controller structure has been optimised for applications with hydraulic actuators.

**APPLICATION**
Proportional directional control valves with integrated electronics are highly suitable for demanding applications thanks to a high resolution, large volume flow, minimal hysteresis and very good dynamic characteristics. They are implemented in systems calling for good valve-to-valve reproducibility, easy installation, comfortable operation and high precision in industrial hydraulics as well as in mobile hydraulics for the smooth control of actuators. The integrated controller relieves the machine control system and operates the axis (position, angle, pressure, etc.) in a closed control loop. Application examples: pitch control of wind generators, forest and earth moving machines, machine tools and paper production machines with position controls, robotics and fan control.

**GENERAL SPECIFICATIONS**
- Designation: 4/3-way proportional valve with integrated electronics
- Nominal size: NG6-Mini acc. to ISO 4401-03/7790
- Construction: Direct operated spool valve
- Operations: Proportional solenoid, wet pin push type, pressure tight
- Mounting: Flange, 4 fixing holes for socket head cap screws M5x50
- Connections: Threaded connection plates, multi-flange subplates, longitudinal stacking system
- Ambient temperature: -20...+65 °C (typical)
- Mounting position: any, preferably horizontal
- Fastening torque: \( M_e = 5.5 \text{ Nm (quality 8.8)} \)
- Weight: \( m = 2.65 \text{ kg} \)

**TYPE CODE**
- Directional control valve, direct operated
- Proportional valve with integrated electronics
- Flange version
- International standard interface ISO, nominal size 6
- Designation of symbols acc. to table 1.10-83/2
- Nominal volume flow ranges \( Q_N \):
  - 10 l/min
  - 20 l/min

**FUNCTION**
- With analog signal (-10…+10 V voreingestellt)
- With CANopen acc. to DSP-408
- With Profibus DP in accordance with Fluid Power Technology
- no remark

**APPLICATION**
- Controller with current feedback signal (0…20 mA / 4…20 mA)
- Controller with voltage feedback signal (0…10 V)
- Design-Index (Subject to change)

**GENERAL SPECIFICATIONS**
- Designation: 4/3-way proportional valve with integrated electronics
- Nominal size: NG6-Mini acc. to ISO 4401-03/7790
- Construction: Direct operated spool valve
- Operations: Proportional solenoid, wet pin push type, pressure tight
- Mounting: Flange, 4 fixing holes for socket head cap screws M5x50
- Connections: Threaded connection plates, multi-flange subplates, longitudinal stacking system
- Ambient temperature: -20...+65 °C (typical)
- Mounting position: any, preferably horizontal
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  - 20 l/min
Proportional spool valves

**TYPE CHARTS/DESIGNATIONS OF SYMBOLS**

- ACB1 - S
  - S = Symmetrical control mode

- ACB1 - R
  - R = Meter-out control mode

**HYDRAULIC SPECIFICATIONS**

- Fluid: Mineral oil, other fluid on request
- Contamination efficiency: ISO 4406:1999, class 18/16/13
  - (Required filtration grade @ 6...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: $P_{max} = 350$ bar (connections A, B)
- Tank pressure: $P_{tank} = 160$ bar (connections T)
- Nominal volume flow: $Q_N = 10$ l/min, 20 l/min
- Max. volume flow: see characteristic
- Leakage volume flow: on request
- Hysteresis: < 0.4%
- Repeatability: < 0.4%
- Jump response: typically 25 ms from 10 to 90%

**ELECTRICAL SPECIFICATIONS**

- Protection class: IP 67 acc. to EN 60 529
  - with suitable connector and closed electronic housing
- Supply voltage: 24 VDC
- Ramps (amplifier only): separate adjustment for up and down for each solenoid
- Preset value generator: preset value speed adjustable
- Parameterisation: via fieldbus or USB
- Interface: USB (Mini B) for parameterisation
- Analog interface: with «PASO»
  - (under the closing screw of the housing cover, factory set parameters)
- Device receptacle (male)
  - M23, 12-poles
  - Mating connector: Plug (female), M23, 12-poles
  - Preset value signal: Voltage/current selected with software
- Fieldbus interface:
  - Device receptacle supply (male)
    - M12, 4-poles
    - Mating connector: Plug (female), M12, 4-poles
  - Device receptacle CANopen (male)
    - M12, 5-poles (acc. to DRP 303-1)
    - Mating connector: Plug (female), M12, 5-poles
  - Device receptacle Profibus (female)
    - M12, 5-poles, B-codiert (acc. to IEC 947-5-2)
    - Mating connector: Plug (male), M12, 5-poles, B-codier
  - Preset value signal: Fieldbus

**NOTE!**

- Detailed electrical characteristics and description of «DSV» electronics are shown on data sheet 1.13-75.

**CONNECTOR WIRING DIAGRAM**

**Analog interface:**

- Device receptacle supply (male) X1
  - MAIN
    - 1 = Supply voltage +
    - 2 = Reserved for extensions
    - 3 = Supply voltage 0 VDC
    - 4 = Chassis
  - Device receptacle CANopen (male) X3
    - CAN
      - 1 = not connected
      - 2 = not connected
      - 3 = CAN Gnd
      - 4 = CAN High
      - 5 = CAN Low
  - Device receptacle Profibus (female) X3
    - PROFIBUS
      - 1 = VP
      - 2 = RxD / TxD - N
      - 3 = DGND
      - 4 = RxD / TxD - P
      - 5 = Shield

- Parameterisation interface (USB, Mini B) X2
  - Under the closing screw of the housing cover

**Feedback signal interface:**

- Device receptacle Sensor (female) X4 (controller only)
  - 1 = Supply voltage (output) +
  - 2 = Feedback signal +
  - 3 = Supply voltage 0 VDC
  - 4 = not connected
  - 5 = stab. output voltage

**NOTE!**

- The mating connector and the cable to adjust the settings are not part of the delivery. To order the cable, look up the article no. in the chapter «Accessories».

**START-UP**

- Normally there is no need to adjust settings by the customer. The connectors have to be wired according to the chapter «Connector wiring diagram».
- Controllers will be supplied configured as amplifiers. Switching into controller mode and setting of the adjustments of the controller must be done by the customer using the set-up software (USB interface, Mini B).
- Additional information can be found on our website: «www.wandfluh.com»
- Free-of-charge download of the «PASO»-software and the instruction manual for the «DSV» hydraulic valves as well as the operation instruction CANopen protocol with device profile DSP-408 for «DSV».
**CHARACTERISTICS**

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

- $Q = f(p)$ Volume flow pressure characteristics ($s = 100\%$)
  - Type: ACB1-S
  - Type: ACB1-R

- $\Delta p = f(Q)$ Pressure loss/flow characteristics ($s = 100\%$)
  - Type: ACB1-S
  - Type: ACB1-R

- $Q = f(s, x)$ Volume flow-signal-characteristics ($\Delta p = 10$ bar)
  - Type: ACB1-S
  - Type: ACB1-R
  (s corresponds to preset value signal and x corresponds to spool stroke)

Factory settings:
- $\bullet$ = Deadband: 50% of the solenoid current with command signal $-2\%...+2\%$
- $\bullet$ = Opening point: at command signal ± 4%
- $\blacksquare$ = Flow at $\Delta p = 10$ bar over 2 metering edges at command signal ±70%

**NOTE!**

All values measured over 2 metering edges, A and B ports linked.
Proportional spool valves

DIMENSIONS

With analog interface
Amplifier and controller

NOTE!
The cable connector is not part of the delivery. The dimensions refer to those of the cable connector in the chapter «Accessories».

With fieldbus interface
Amplifier

With fieldbus interface
Controller

PARTS LIST

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<th>Description</th>
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<td>062.0102</td>
<td>Cover</td>
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<tr>
<td>21</td>
<td>223.1317</td>
<td>Dummy plug M16x1,5</td>
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<td>22</td>
<td>160.6131</td>
<td>O-ring ID 13,00x1,5</td>
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<td>30</td>
<td>072.0021</td>
<td>Gasket 33x2x59,9x2</td>
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<td>40</td>
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<td>50</td>
<td>246.2117</td>
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<tr>
<td>55</td>
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<td>Socket head cap screw M5x90 DIN 912</td>
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<td>60</td>
<td>160.2093</td>
<td>O-ring ID 9,25x1,78</td>
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ACCESSORIES

• Set-up software
  see start-up

• Cable to adjust the settings through interface USB
  (from plug type A to Mini B, 3 m)
  article no. 219.2896

• Cable connector for analog interface:
  – straight, soldering contact
  – 90°, soldering contact
  Recommended cable size:
  – Outer diameter 9…10,5 mm
  – Single wire max. 1 mm²
  – Recommended wire size:
    0…25 m = 0,75 mm² (AWG18)
    25…50 m = 1 mm² (AWG17)
  article no. 219.2330
  article no. 219.2331

Technical explanation see data sheet 1.0-100