

Proportional spool valve with integrated electronics and spool position control with LVDT

Flange construction

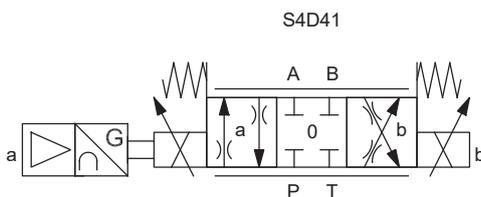
- ◆ direct operated
- ◆ $Q_{max} = 20 \text{ l/min}$
- ◆ $Q_{Nmax} = 8 \text{ l/min}$
- ◆ $p_{max} = 315 \text{ bar}$

DESCRIPTION

Direct operated proportional spool valve with 4 connections in 5-chamber system. With the integrated spool position sensor (LVDT), the actual position of the spool is continuously recorded and made to follow the transmitted command value. By means of this internal position control, a minimum hysteresis and excellent dynamic characteristics are assured. The Plug & Play valves are factory set and adjusted and have therefore a high valve-to-valve reproducibility. Proportional to the electronically transmitted command value, the spool stroke, the spool opening and the valve volume flow increase. The control takes place via an analogue interface or a fieldbus interface (CANopen, J1939 or Profibus DP). The parameterisation takes place by means of the free of cost parameterisation and diagnostics software «PASO» or via fieldbus interface. The USB parameterisation interface is accessible through a screw plug. As an option, these valves are available with integrated controller. As feedback value generators sensors with voltage or current output can be connected directly. The available controller structures are optimised for applications with hydraulic actuations.

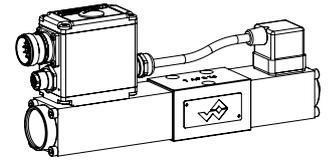
SYMBOL

Symmetrical control



NG4-Mini
Wandfluh standard

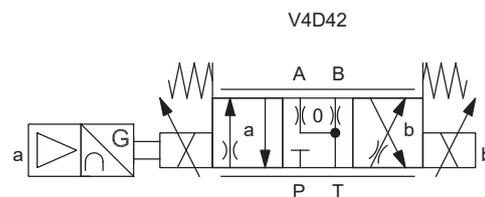
DSV
DIGITAL VALVE
MART



APPLICATION

Proportional spool valves are perfectly suitable for demanding tasks due to the high resolution, large volume flow and low hysteresis. They are used where good valve-to-valve reproducibility, easy installation, comfortable operation and high precision are very important. The integrated controller relieves the machine control and operates the axis (position, angle, pressure, etc.) in a closed control loop. The applications are in the industry as well as in the mobile hydraulics for the smooth control of hydraulic actuators. Some examples: control of the rotor blades of wind generators, forestry and earth moving machines, machine tools and paper production machines, simple position controls, robotics and fan control. Miniature valves are used where both, reduced dimensions and weight are important.

Meter-in control



ELECTRICAL SPECIFICATIONS

| | |
|------------------|--|
| Protection class | IP67 with suitable mating connector and closed housing cover |
| Ramps | Adjustable |
| Parameterisation | Via fieldbus or USB |
| Supply voltage | 24 VDC |

Note! Exact electrical specifications and detailed description of «DSV» electronics can be found on data sheet 1.13-76.



ACTUATION

| | |
|------------|--|
| Actuation | Proportional solenoid, wet pin push type, pressure tight |
| Connection | Via device receptacle |

TYPE CODE

| | | | | | | | | | | | | | | |
|---|---------|---------------------------------|--|----------------------|---------------------------------|---------------------------------|-----------------------|----|----------------------|----------------------|---|----------------------|---|----------------------|
| | | B R W | | <input type="text"/> | - | <input type="text"/> | - | 24 | <input type="text"/> | <input type="text"/> | - | <input type="text"/> | # | <input type="text"/> |
| Mounting interface according to Wandfluh standard | | | | | | | | | | | | | | |
| Integrated electronics, spool position control | | | | | | | | | | | | | | |
| Proportional spool valve | | | | | | | | | | | | | | |
| Designation of symbols according to table | | | | | | | | | | | | | | |
| Nominal volume flow rate Q_N | 4 l/min | <input type="text" value="4"/> | | | | | | | | | | | | |
| | 8 l/min | <input type="text" value="8"/> | | | | | | | | | | | | |
| Nominal voltage U_N | 24 VDC | | | | | | | | | | | | | |
| Hardware configuration | | | | | | | | | | | | | | |
| Analog command value signal | 12 pole | <input type="text" value="A2"/> | | 7 pole | <input type="text" value="D2"/> | | (-10 ... 10 V preset) | | | | | | | |
| Analog command value signal | 12 pole | <input type="text" value="A4"/> | | 7 pole | <input type="text" value="D4"/> | | (4 ... 20 mA preset) | | | | | | | |
| CANopen according to DSP-408 | | <input type="text" value="C1"/> | | | | | | | | | | | | |
| Profibus DP according to Fluid Power Technology | | <input type="text" value="P1"/> | | | | | | | | | | | | |
| CAN J1939 (on request) | | <input type="text" value="J1"/> | | | | | | | | | | | | |
| Function | | | | | | | | | | | | | | |
| Amplifier | | | | | | <input type="text"/> | | | | | | | | |
| Controller with current feedback value signal (0 ... 20 mA / 4 ... 20 mA) | | | | | | <input type="text" value="R1"/> | | | | | | | | |
| Controller with voltage feedback value signal (0 ... 10 V) | | | | | | <input type="text" value="R2"/> | | | | | | | | |
| Sealing material | | NBR | | | | <input type="text"/> | | | | | | | | |
| | | FKM (Viton) | | | | <input type="text" value="D1"/> | | | | | | | | |
| Design index (subject to change) | | | | | | | | | | | | | | |

1.10-70

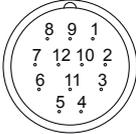
GENERAL SPECIFICATIONS

| | |
|---------------------|---|
| Designation | Proportional spool valve |
| Construction | Direct operated |
| Mounting | Flange construction |
| Nominal size | NG4-Mini according to Wandfluh standard |
| Actuation | Proportional solenoid |
| Ambient temperature | -20...+65 °C The upper temperature limit is a guideline for typical applications, in individual cases it may also be higher or lower. The electronics of the valve limit the power in case of a too high electronics temperature. More detailed information can be obtained from the operating instructions „DSV“. |
| Weight | 1,95 kg |

HYDRAULIC SPECIFICATIONS

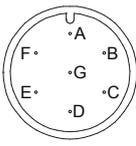
| | |
|--------------------------|---|
| Working pressure | $p_{max} = 315$ bar |
| Tank pressure | $p_T, max = 160$ bar |
| Maximum volume flow | $Q_{max} = 20$ l/min, see characteristics |
| Nominal volume flow | $Q_N = 4$ l/min, 8 l/min |
| Leakage oil | On request |
| Hysteresis | < 0,4 % |
| Repeatability | < 0,4 % |
| Fluid | Mineral oil, other fluid on request |
| Viscosity range | 12 mm ² /s...320 mm ² /s |
| Temperature range fluid | -25...+70 °C (NBR) -20...+70 °C (FKM) |
| Contamination efficiency | Class 18 / 16 / 13 |
| Filtration | Required filtration grade $\beta_{10...16} \geq 75$, see data sheet 1.0-50 |
| Step response | Typical 25 ms from 10% to 90% |

ELECTRICAL CONNECTION

| X1 | Analog interface (Main) |
|--|---|
| Device receptacle | M23, 12 pole male |
|  | 1 = Supply voltage + 2 = Supply voltage 0 VDC 3 = Stabilised output voltage 4 = Command value signal voltage + 5 = Command value signal voltage - 6 = Command value signal current + 7 = Command value signal current - 8 = Reserved for extensions 9 = Reserved for extensions 10 = Enable signal (Digital input) 11 = Error signal (Digital output) 12 = Chassis |
| Command value signal voltage (PIN 4/5) resp. current (PIN 6/7) are selected with parameterisation and diagnostics software PASO. | |

| X1 | Fieldbus interface (Main) |
|---|--|
| Device receptacle | M12, 4 pole male |
|  | 1 = Supply voltage + 2 = Reserved for extensions 3 = Supply voltage 0 VDC 4 = Chassis |

| X2 | Parameterisation interface |
|-------------|--|
| USB, Mini B | Under the screw plug of the housing cover Factory set |

| X1 | Analog interface (Main) |
|--|--|
| Device receptacle | Connector DIN EN 175201 - 804 |
|  | 7 pole male A = Supply voltage + B = Supply voltage 0 VDC C = Analog output - D = Command value signal + E = Command value signal - F = Analog output + G = Chassis |
| Command value signal: current (D4) or voltage (D2) to specify when placing the order | |

| X3 | Profibus interface according to IEC 947-5-2 |
|--|--|
| Device receptacle | M12, 5 pole female B-coded |
|  | 1 = VP 2 = Rx/D / Tx/D - N 3 = DGND 4 = Rx/D / Tx/D - P 5 = Shield |

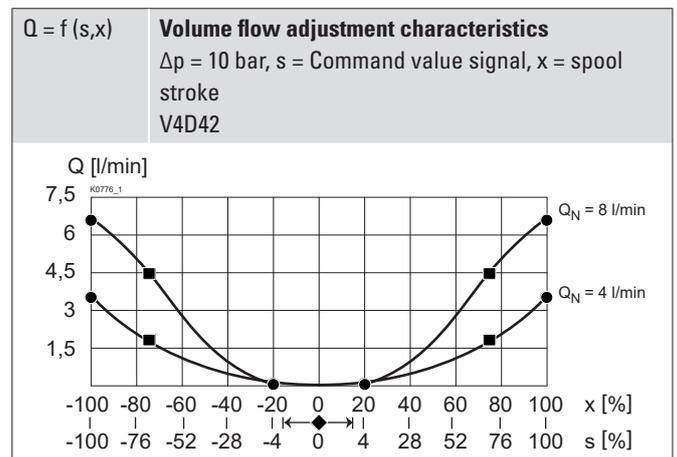
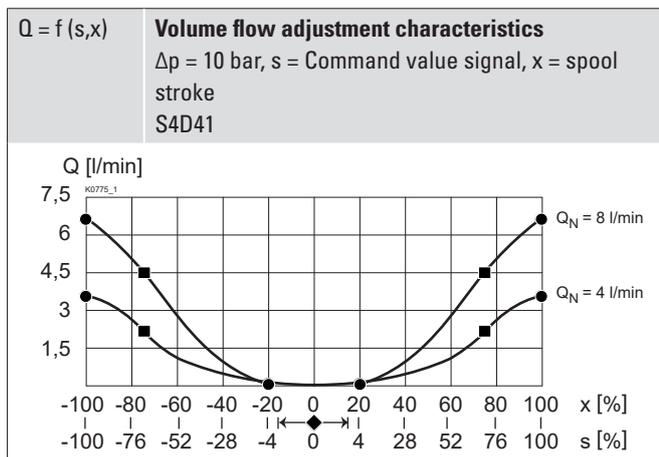
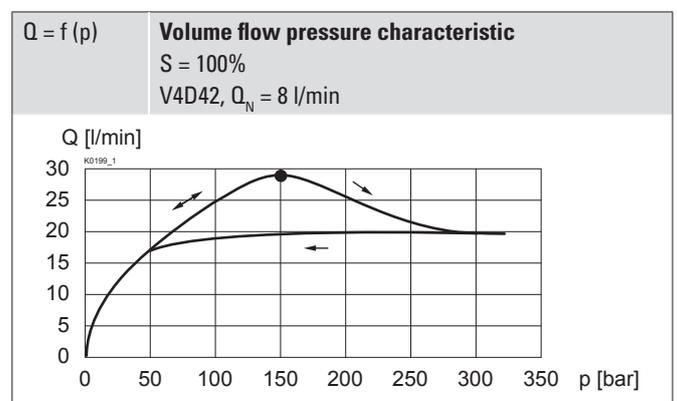
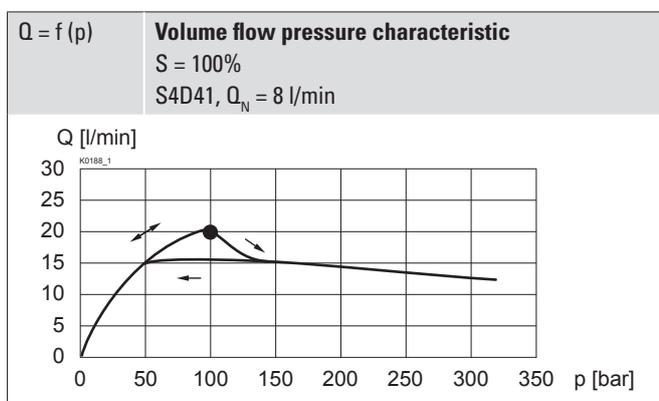
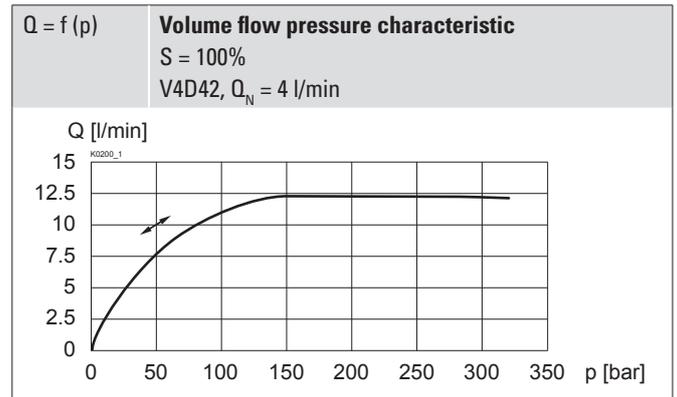
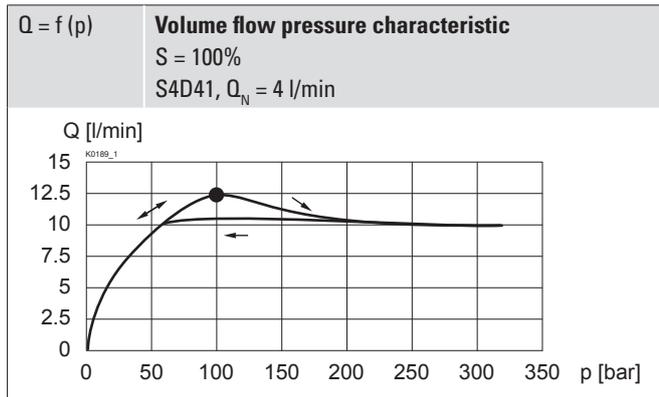
| X3 | CANopen interface according to DRP 303-1 |
|---|--|
| Device receptacle | M12, 5 pole male |
|  | 1 = Not connected 2 = Not connected 3 = CAN Gnd 4 = CAN High 5 = CAN Low |

| X4 (controller only) | Feedback value interface (sensor) |
|---|--|
| Device receptacle | M12, 5 pole female |
|  | 1 = Supply voltage (output) + 2 = Feedback value signal + 3 = Supply voltage 0 VDC 4 = Not connected 5 = Stabilised output voltage |
| Feedback value signal: current (R1) or voltage (R2) to specify when placing the order | |

Note! The mating connector is not included in the delivery



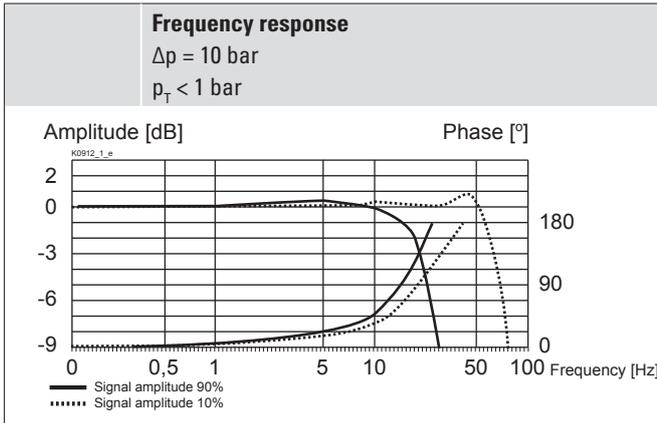
PERFORMANCE SPECIFICATIONS

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

FACTORY SETTINGS

Dither set for optimum hysteresis

- ◆ = Deadband: Both solenoids switched off at command value signal -2%... 2%
- = Opening pressure at command value signal +/- 4%
- = Flow at $\Delta p = 10 \text{ bar}$ over two control edges +/- 70% command value signal

| | | |
|-----------|----------|-------------------------|
| 2,1 l/min | at S4D41 | $Q_N = 4 \text{ l/min}$ |
| 4,5 l/min | at S4D41 | $Q_N = 8 \text{ l/min}$ |
| 1,9 l/min | at S4D41 | $Q_N = 4 \text{ l/min}$ |
| 4,5 l/min | at S4D41 | $Q_N = 8 \text{ l/min}$ |



Note!

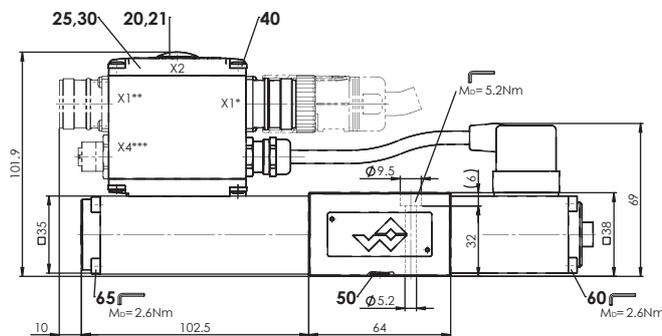


All values were measured over two control edges. The connections A and B were short-circuited.

DIMENSIONS

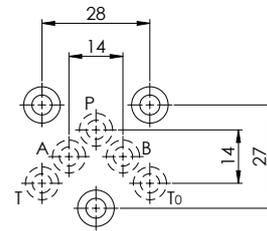
With analog interface, 12 pole connector

Amplifier and controller



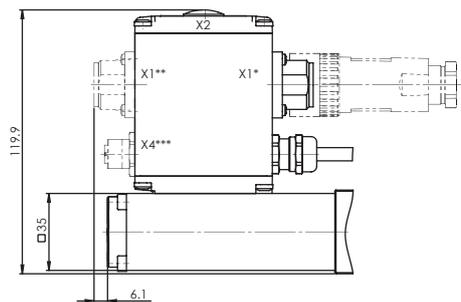
- * For amplifier
- ** For controller
- *** Only controller

HYDRAULIC CONNECTION



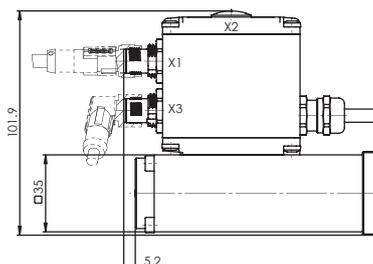
With analog interface, 7 pole connector

Amplifier and controller



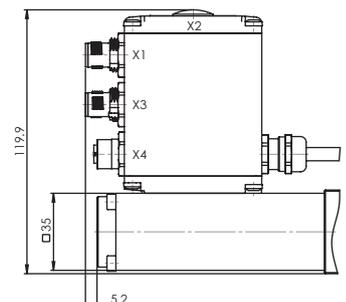
With fieldbus interface

Amplifier



With fieldbus interface

Controller



PARTS LIST

| Position | Article | Description |
|----------|----------|------------------------------------|
| 20 | 223.1317 | Dummy plug M16 x 1,5 |
| 21 | 160.6131 | O-ring ID 13,00 x 1,5 (FKM) |
| 25 | 062.0102 | Cover |
| 30 | 072.0021 | Gasket 33,2 x 59,9 x 2 |
| 40 | 208.0100 | Socket head screw M4 x 10 |
| 50 | 160.2052 | O-ring ID 5,28 x 1,78 (NBR) |
| | 160.6052 | O-ring ID 5,28 x 1,78 (FKM) |
| 60 | 246.1161 | Socket head screw M4 x 60 DIN 912 |
| 65 | 246.1191 | Socket head screw M4 x 100 DIN 912 |

INSTALLATION NOTES

| | |
|-------------------|--|
| Mounting type | Flange mounting 3 fixing holes for socket head screws M5 x 40 |
| Mounting position | Any, preferably horizontal |
| Tightening torque | Fixing screws $M_0 = 5,2 \text{ Nm}$ (screw quality 8.8, zinc coated) |

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



SURFACE TREATMENT

- ◆ The valve body is painted with a two component paint
- ◆ The solenoids are zinc nickel coated
- ◆ The electronics housing / chassis is made of aluminium

COMMISSIONING

For DSV amplifiers as a rule no parameter adjustments by the customer are required. The plugs have to be connected in accordance with the chapter «Electrical connection».

Controllers are supplied configured as amplifiers. The adjustment of the mode of control and of the controller are carried out by the customer by means of the software adjustment (USB interface, Mini B). Further information can be found on: «www.wandfluh.com». Free- of charge download of the «PASO» software and the operation instructions for «DSV» hydraulic valves as well as the operation instructions CANopen Protocol resp. Profibus DP Protocol, with Device Profile DSP-408 for «DSV».

Note! The mating connectors and the parameterisation cable are not part of the delivery. Refer to chapter «Accessories».



ACCESSORIES

| | |
|---|----------------------|
| Parameterisation software | See start-up |
| Parameterisation cable for interface USB (from plug type A on Mini B, 3 m) | Article no. 219.2896 |
| Mating connector (plug female) for analog interface | |
| straight, soldering contact M23, 12 pole | Article no. 219.2330 |
| angled, soldering contact M23, 12 pole | Article no. 219.2331 |
| straight, soldering contact, 7 pole | Article no. 219.2335 |
| 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 |

Note! Auxiliary conditions for the cable:

- External diameter 12 pol: 3,5...14,7 mm
- External diameter 7 pol: 8...10 mm
- Wire cross section max. 1 mm²
- Recommended wire cross section:
0...25 m = 0,75 mm² (AWG18)
25...50 m = 1 mm² (AWG17)



MANUAL OVERRIDE

None

SEALING MATERIAL

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

STANDARDS

| | |
|--------------------------|-------------------|
| CANopen | DRP 303-1 |
| Profibus DP | IEC 947-5-2 |
| Mounting interface | Wandfluh standard |
| Protection class | EN 60 529 |
| Contamination efficiency | ISO 4406 |