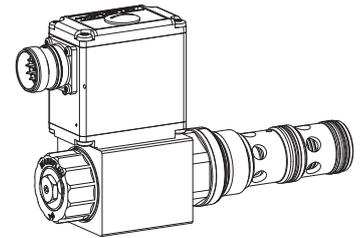


**Proportional 3-way flow control valve  
Screw-in cartridge**

- Integrated amplifier electronics
- Direct operated, pressure compensated
- $Q_{max} = 100 \text{ l/min}$ ,  $p_{max} = 350 \text{ bar}$
- $Q_{Nmax} = 63 \text{ l/min}$

**M33x2**  
 ISO 7789

**DESCRIPTION**

Direct operated, pressure compensated proportional flow control valve with integrated electronics as a screw-in cartridge with a thread M33x2 for cavity acc. to ISO 7789. These plug & play valves are factory set and adjusted. High valve-to-valve reproducibility. Housing for electronics with protection class IP67 for harsh environment. Two flow ranges are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Almost linear flow increase and low hysteresis are typical for this valve. The cartridge and the solenoid made of steel are zinc coated and therefore rust-protected. The housing for the electronics is made of aluminium.

**FUNCTION**

The 3-way flow control valve is designed to keep the oil flow to any actuator constant irrespective of the load. Surplus volume flow will be diverted to the tank line thus saving energy. Proportionally to the command signal applied to the electronics spool stroke, metering opening and volume flow increase. The control connection is provided by an analog interface or a fieldbus interface (CANopen, J1939 or Profibus DP). Parameter setting and diagnosis with the free-of-charge software «PASO» or via fieldbus interface. The USB parameterisation interface is accessible through a cover flap. «PASO» is a Windows program in the flow diagram style, which enables the intuitive setting and storing of all variable parameters. The data remain saved in case of a power failure and can also be reproduced and transferred to other DSVs.

**APPLICATION**

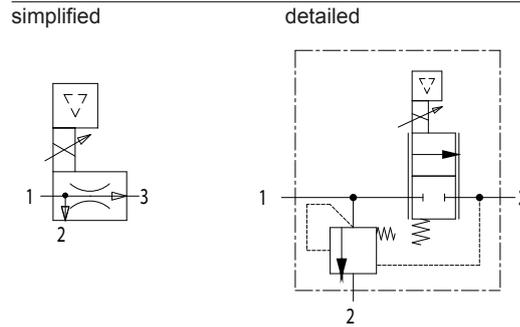
Proportional flow control valves are suitable for precise feed control system where the supply volume flow needs to be kept constant even when the load fluctuates. They are implemented in systems calling for good valve-to-valve reproducibility, easy installation, comfortable operation and high precision in industrial hydraulics as well as in mobile hydraulics. The screw-in cartridge is very suitable for mounting in control blocks, flange bodies and sandwich plates of the size NG10. Cavity tools are available for machining cartridge cavities (hire or purchase). Please refer to the data sheets in register 2.13.

**TYPE CODE**

		Q	D	P	PM33	-	-	/	M	E	-	-	[HB4.5]	#	
Flow control valve															
3-way															
Proportional															
Screw-in thread M33x2															
Nominal volume flow rate $Q_N$	32 l/min														
	63 l/min														
Nominal voltage $U_N$	12 VDC														
	24 VDC														
Slip-on coil	Metal housing, square														
Connection execution	Metal housing, square														
Hardware configuration															
With analog signal (0...+10 V factory set)															
With CANopen acc. to DSP-408															
With Profibus DP in accordance with Fluid Power Technology															
With CAN J1939 (on request)															
Sealing material	NBR														
	FKM (Vitron)														
Manual override															
Design-Index (Subject to change)															

**GENERAL SPECIFICATIONS**

Description	3-way proportional flow control valve with integrated electronics
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operations	Proportional solenoid, wet pin push type, pressure tight
Mounting	Screw-in thread M33x2
Ambient temperature	-20...65 °C (typical) (The upper temperature limit is a guideline value 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».)
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 80 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 1,6 \text{ kg}$
Flow direction	see symbol

**SYMBOLS**

**HYDRAULIC SPECIFICATIONS**

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$ ) see data sheet 1.0-50/2
Viscosity range	12 mm <sup>2</sup> /s...320 mm <sup>2</sup> /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{max} = 350 \text{ bar}$
Nominal volume flow rates	$Q_N = 32 \text{ l/min}, 63 \text{ l/min}$
Max. volume flow	$Q_{max} = 100 \text{ l/min}$ (1 → 2)
Min. volume flow	$Q_{min} = 0,2 \text{ l/min}$
Hysteresis	$\leq 5\%$

**ELECTRICAL SPECIFICATIONS**

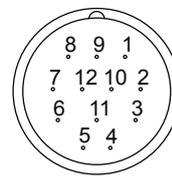
Protection class	IP 67 acc. to EN 60 529 with suitable connector and closed electronics housing
Supply voltage	12 VDC or 24 VDC
Ramps	adjustable
Parameterisation Interface	via fieldbus or USB USB (Mini B) for parameterisation with «PASO» under the closing screw of the housing cover. Preset ex-works

**Analog interface:**

Device receptacle (male)	M23, 12-poles
Mating connector	Plug (female), M23, 12-poles (not incl. in delivery)
Preset value signal	Input voltage / current as well as signal range can be set by software

**Fieldbus interface:**

Device receptacle supply (male)	M12, 4-poles
Mating connector	Plug (female), M12, 4-poles (not incl. in delivery)
Device receptacle CANopen (male)	M12, 5-poles (acc. to DRP 303-1)
Mating connector	Plug (female), M12, 5-poles (not incl. in delivery)
Device receptacle Profibus (female)	M12, 5-poles, B-coded (acc. to IEC 947-5-2)
Mating connector	Plug (male), M12, 5-poles, B-coded (not incl. in delivery)
Preset value signal	Fieldbus

**CONNECTOR WIRING DIAGRAM**
**Analog interface:**
**Device receptacle (male) X1**


- 1 = Supply voltage +
- 2 = Supply voltage 0 VDC
- 3 = Stabilised output voltage
- 4 = Preset value voltage +
- 5 = Preset value voltage -
- 6 = Preset value current +
- 7 = Preset value current -
- 8 = Reserved for extensions
- 9 = Reserved for extensions
- 10 = Enable control (Digital input)
- 11 = Error signal (Digital output)
- 12 = Chassis

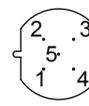
Preset value voltage (PIN 4/5) resp. current (PIN 6/7) are selected with set-up and diagnosis software PASO.  
Factory setting: Voltage (0...+10 V), (PIN 4/5)

**Fieldbus 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 = Rx/D / Tx/D - N
  - 3 = DGND
  - 4 = Rx/D / Tx/D - P
  - 5 = Shield

**Parameterisation interface (USB, Mini B) X2**

Under the closing screw of the housing cover



**NOTE!**  
 Detailed electrical characteristics and description of «DSV» electronics are shown on data sheet 1.13-76.

Free-of-charge download of the «PASO»-software and the instruction manual for the «DSV» hydraulic valves as well as the operation instruction **CANopen** eg. **Profibus DP** protocol with device profile DSP-408 for «DSV».

### START-UP

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



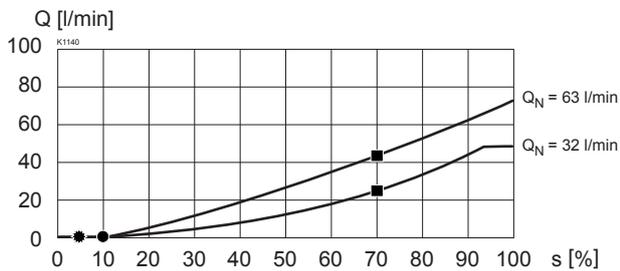
### NOTE!

The mating connectors and the cable to adjust the settings are not part of the delivery. Refer to chapter «Accessories».

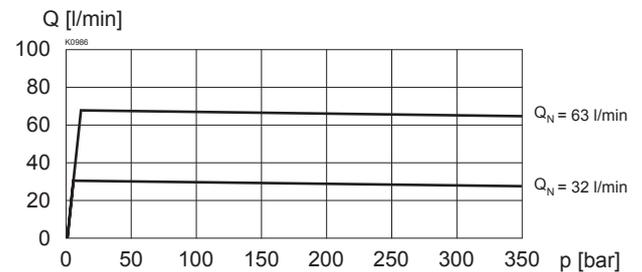
Additional information can be found on our website:  
 «[www.wandfluh.com](http://www.wandfluh.com)»

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

$Q = f(l)$  Volume flow adjustment characteristics  
 [at  $p=50\text{ bar}$ ]  
 ( $s$  corresponds to preset value signal)



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

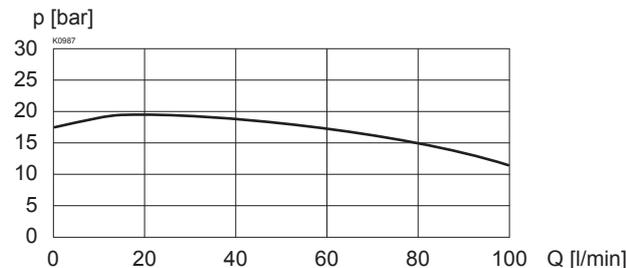


### Factory settings:

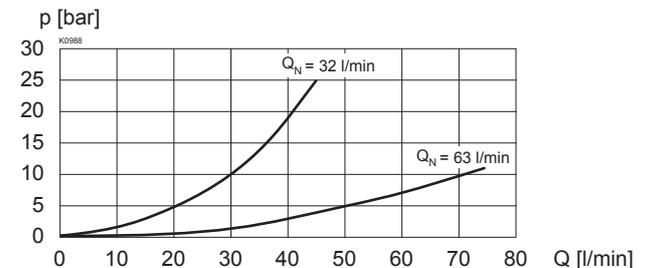
Dither set for optimal hysteresis

- \* = Deadband: Solenoid switched off with command signal <5%
- = Opening point: at 50%
- = Flow  $p = 50\text{ bar}$  with 70% value signal  
 42 l/min with  $Q_N = 25\text{ l/min}$  ( $Q$  in interface 1 = 80 l/min)  
 21 l/min with  $Q_N = 10\text{ l/min}$  ( $Q$  in interface 1 = 40 l/min)

$\Delta p = f(Q)$  Pressure drop volume flow characteristics 1 → 2

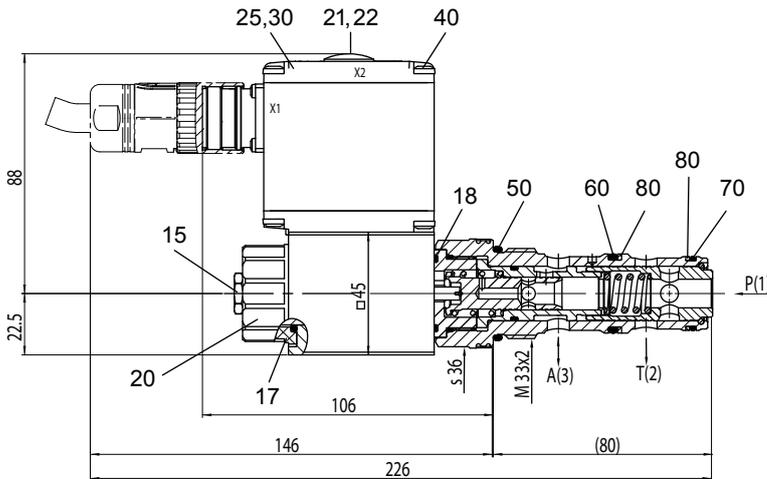
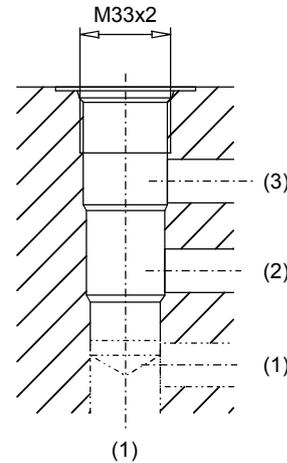


$\Delta p = f(Q)$  Pressure drop volume flow characteristics 1 → 3

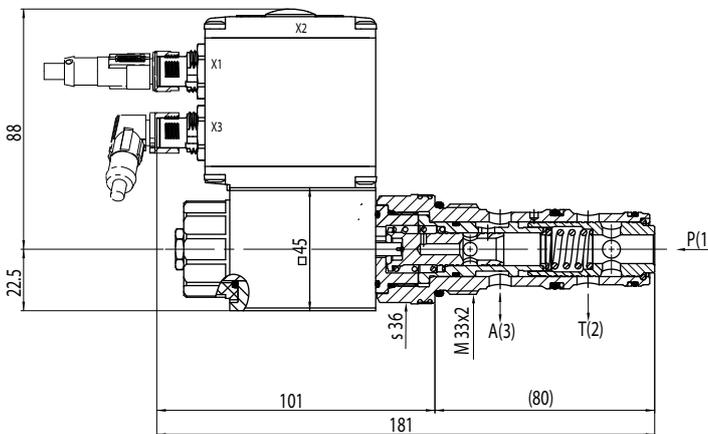


**DIMENSIONS / SECTIONAL DRAWINGS**

With analog interface


 Cavity drawing acc. to  
 ISO 7789-33-04-0-98

 For detailed cavity drawing and cavity tools  
 see data sheet 2.13-1040

With fieldbus interface


**PARTS LIST**

Position	Article	Description
15	253.8000	HB 4,5 Manual override (data sheet 1.1-300)
17	160.2187	O-ring ID 18,72x2,62 (NBR)
18	160.2220	O-ring ID 21,95x1,78 (NBR)
20	154.2700	Knurled nut
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
25	062.0102	Cover square
30	072.0021	Gasket 33,2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	160.2298	O-ring ID 29,82x2,62 (NBR)
	160.6296	O-ring ID 29,82x2,62 (FKM)
60	160.2238	O-ring ID 23,81x2,62 (NBR)
	160.6238	O-ring ID 23,81x2,62 (FKM)
70	160.2236	O-ring ID 23,52x1,78 (NBR)
	160.6236	O-ring ID 23,52x1,78 (FKM)
80	049.3297	Backup ring RD 24,5x29x1,4
90	049.3276	Backup ring RD 24,1x27x1,4

**ACCESSORIES**

- Flange and sandwich bodies Data sheet 2.6-862
- Line mount body Data sheet 2.9-210
- Set-up software see start-up
- Cable to adjust the settings through interface USB article no. 219.2896  
(from plug type A to Mini B, 3 m)
- Mating connector (plug female) for the analogue interface:
  - straight, soldering contact article no. 219.2330
  - soldering contact article no. 219.2331
- Recommended cable size:**
  - Outer diameter 9...10,5 mm
  - Single wire max. 1 mm<sup>2</sup>
  - Recommended wire size:
    - 0...25 m = 0,75 mm<sup>2</sup> (AWG18)
    - 25...50 m = 1 mm<sup>2</sup> (AWG17)

Technical explanation see data sheet 1.0-100


**NOTE!**

The cable connector is not part of the delivery. Regarding the dimensions see also the connector in the chapter «Accessories».