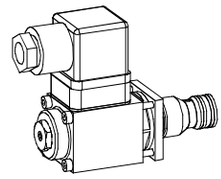
Proportional throttle valve
Screw-in cartridge
- **Direct operated, not pressure compensated**
- **Throttle in one flow direction**
- **Q_{max} = 12 l/min, p_{max} = 250 bar**
- **$Q_{N\ max}$ = 6,3 l/min**

M18x1,5
ISO 7789



DESCRIPTION
Direct operated proportional throttle valve. Thread M18x1,5 and cavity in accordance with ISO 7789. Spool options „normally closed“ and „normally open“. Two flow ranges are available. The volume flow is adjusted by a Wandfluh-proportional solenoid (VDE standard 0580). Progressive increase and decrease of volume flow and reduced hysteresis are characteristics of this valve. The cartridge body is made of steel. Its special surface coating protects the outside against corrosion and reduces friction of the control spool. The solenoid is zinc coated.

FUNCTION
The force controlled wet pin proportional solenoid acts directly on the control spool which opens or closes the trottle segments of the radial holes in the valve body. The throttle opening and therefore the flow volume changes proportionally to the current input to the proportional solenoid. With deenergised solenoid the control spool is held in closed respectivly open position by a spring. To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION
Proportional throttel valves are suitable for precise feed control systems. Very sensitive opening and closing characteristics allow smooth control of movements in stationary or mobile installations, e.g. machine tools, public vehicles. Installation of the screw-in cartridge in control blocks as well as in the Wanfluh sandwich plates (vertical stacked systems) and flange valves of the NG3-Mini types. (Please note the separate data sheets in register 2.6). Cavity tools are available for machining the cavities in steel and aluminium (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

D ☐ P PM18 - ☐ - ☐ # ☐

Throttle valve		
Normally closed	N	
Normally open	O	
Proportional		
Screw-in cartridge M18x1,5		
Nominal volume flow rate Q_N	4 l/min	4
	6,3 l/min	6,3
Nominal voltage U_N	12 VDC	G12
	24 VDC	G24
Design-Index (Subject to change)		

GENERAL SPECIFICATIONS

Description	Direct operated proportional throttle valve
Construction	Screw-in cavity acc. to ISO 7789
Operations	Proportional solenoid
Befestigungsart	Screw-in thread M18x1,5
Ambient temperature	-20…50 °C
Mounting position	any
Fastening torque	M_D = 30 Nm for screw-in cartridge M_D = 1,2 Nm (Qual. 8.8) for solenoid screws
Weight	m = 0,25 kg
Volume flow direction	1 → 2

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade ß 6...10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20...+70 °C
Peak pressure	p_{max} = 250 bar
Nominal volume flow rates	Q_N = 4 l/min, Q_N = 6,3 l/min at 10 bar pressure drop
Max. Volume flow	Q_{max} = 12 l/min
Leakage volume flow	see characteristics
Resolution	1 mA
Repeatability	≤ 1 % ∗
Hysteresis	≤ 2 % ∗ ∗ at optimal dithersignal

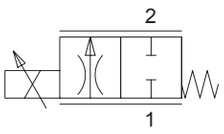
ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight.	
Standard-Nominal voltage	U_N = 12 VDC	U_N = 24 VDC
Limiting current	I_G = 1080 mA	I_G = 540 mA
Relative duty factor	100 % DF (see data sheet 1.1-430)	
Protection class	IP 65 to EN 60 529	
Connection/Power supply	Over device plug connection to ISO 4400 / DIN 43 650 (2P+E)	

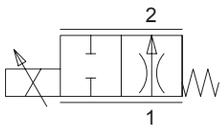
Other electrical specifications see data sheet 1.1-90 (PI29V)

SYMBOLS

Normally closed

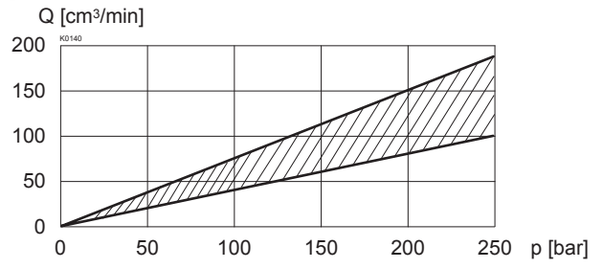


Normally open

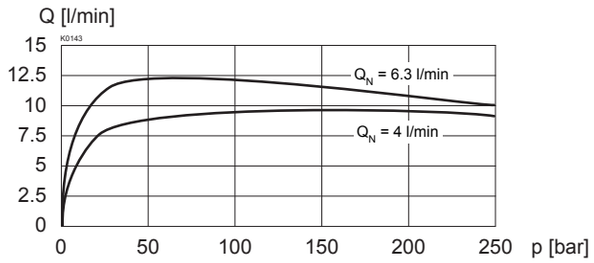


CHARACTERISTICS Oil viscosity υ = 30 mm²/s

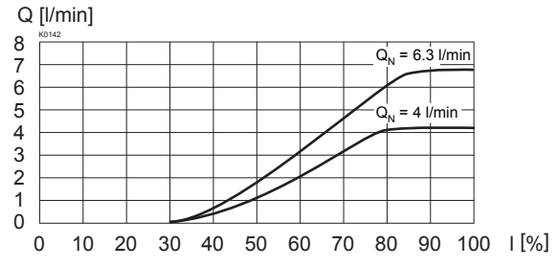
Q_L = f (p) Leakage volume flow characteristics



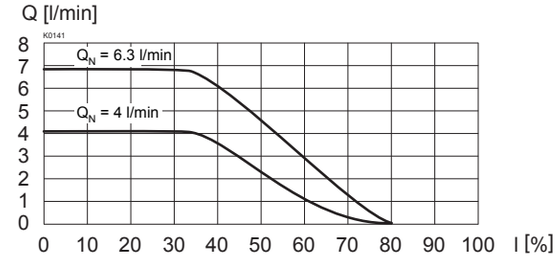
Q = f (p) Volume flow pressure characteristics



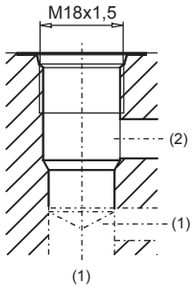
Q = f (I) Volume flow adjustment characteristics DNPPM18



Q = f (I) Volume flow adjustment characteristics DOPPM18

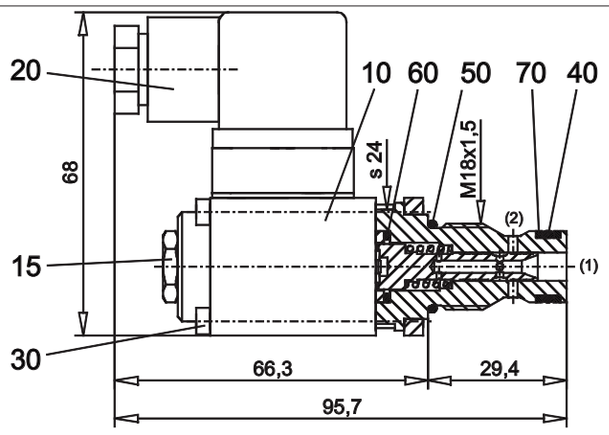


DIMENSIONS / SECTIONAL DRAWINGS



Cavity drawing according to ISO 7789–18–01–0–98

For detailed cavity drawing and cavity tools see data sheet 2.13-1002.



PARTS LIST

Position	Article	Description
10	256.2453 256.2418	Proportional solenoid PI29V-G24 Proportional solenoid PI29V-G12
15	253.8000	Mounted screw with integrated manual override HB4,5
20	219.2002	Plug (black)
30	246.0146	Socket head cap screw M3x45 DIN912
40	160.2111	O-ring ID 11,11x1,78
50	160.2156	O-ring ID 15,60x1,78
60	160.2120	O-ring ID 12,42x1,78
~~70~~	~~049.3156~~	~~Back up ring RD 12,1x15x1,4~~

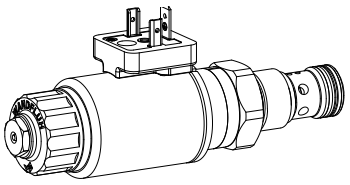
ACCESSORIES

Flange-/sandwich plate NG3-Mini	Data sheet 2.6-700
Line mount body Data sheet	2.9-205
Proportional amplifi er	Register 1.13
Mating connector EN 175301-803	Article Nr. 219.2002

Technical explanation see data sheet 1.0-100

Proportional throttle valve
Screw-in cartridge
- **Direct operated, not pressure compensated**
- **Throttle in one flow direction**
- **Q_{max} = 32 l/min, p_{max} = 350 bar**
- **$Q_{N\,max}$ = 25 l/min**

M22x1,5
ISO 7789



DESCRIPTION

Direct operated proportional throttle valve with thread M22x1,5 and cavity in accordance with ISO 7789. Three nominal flow rates are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Progressive increase and decrease of volume flow and reduced hysteresis are characteristics of this valve. The cartridge body is made of steel. Its special surface coating protects the outside against corrosion and reduces friction of the control spool. The solenoid coil is zinc-/nickel-coated.

FUNCTION

The force controlled wet pin proportional solenoid acts directly on the throttle spool which opens, resp., closes the openings on the cartridge body. The throttle opening, and therefore the flow volume, changes proportionally to the current absorption of the proportional solenoid. To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

Proportional throttle valves are suitable for precise feed control systems. Very sensitive opening and closing characteristics allow smooth control of movements in stationary or mobile installations, e.g. machine tools, public vehicles. Installation of the screw-in cartridge in control blocks as well as in the Wandfluh sandwich plates (vertical stacked systems) and flange valves of the NG4-Mini and NG6 types. size. (Please note the separate data sheets in register 2.6). Cavity tools are available for machining the cavities in steel and aluminium (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

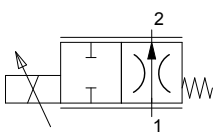
D☐P PM22-☐-☐/☐☐-☐☐#☐

Throttle valve			
Normally open		O	
Normally closed		N	
Proportional			
Screw-in cartridge M22x1,5			
Nominal volume flow rate Q_N	6,3 l/min	6,3	
	10 l/min	10	
	25 l/min	25	
Nominal voltage U_N	12 VDC	G12	
	24 VDC	G24	
	without coil	X5	
Slip-on coil	Metal housing, round	W	
	Metal housing, square	M*	
Connection execution	Connector socket EN 175301-803 / ISO 4400		D
	Connector socket AMP Junior-Timer		J
	Connector Deutsch DT04-2P		G
Sealing material	NBR		
	FKM (Viton)	D1	
Manual override	Armature tube closed (standard)		
	Screwed sealing plug		HB0
	Manual emergency actuation		HB4.5
Design-Index (Subject to change)			

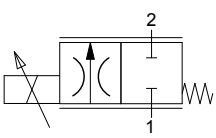
* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-173)

SYMBOL

normally open



normally close



GENERAL SPECIFICATIONS

Description	Direct operated proportional throttle valve
Construction	Screw-in cavity acc. to ISO 7789
Operation	Proportional solenoid
Mounting	Screw-in thread M22x1,5
Ambient temperature	-20…70 °C
Mounting position	any, preferably horizontal
Fastening torque	M_D = 50 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 0,57 kg
Volume flow direction	1 → 2

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1320 mA	I_G = 660 mA
Relative duty factor	100 % ED / DF (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	

For further electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

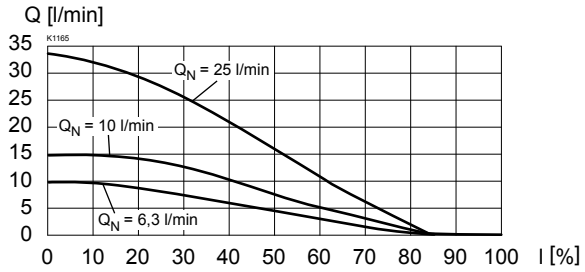
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 6,3 l/min, 10 l/min, 25 l/min at 10 bar pressure drop
Max. volume flow	Q_{max} = 32 l/min
Leakage volume flow	on request
Hysteresis	≤ 8%*

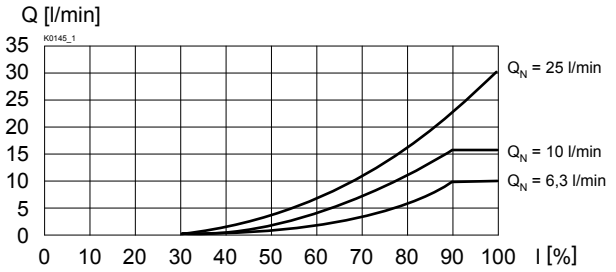
* at optimal dither signal

CHARACTERISTICS Oil viscosity υ = 30 mm²/s

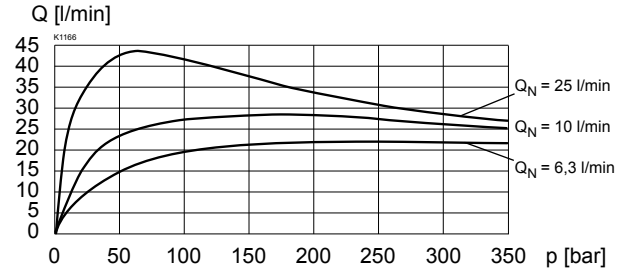
Q = f (I) Volume flow adjustment characteristics (Δp = 20 bar) normally open



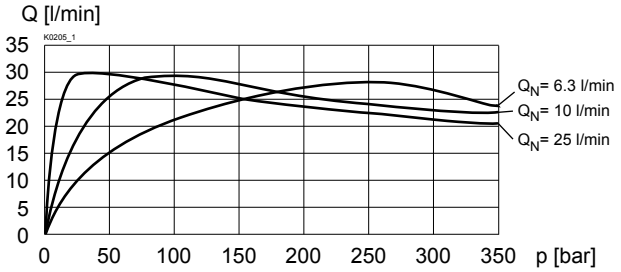
Q = f (I) Volume flow adjustment characteristics (Δp = 20 bar) normally closed



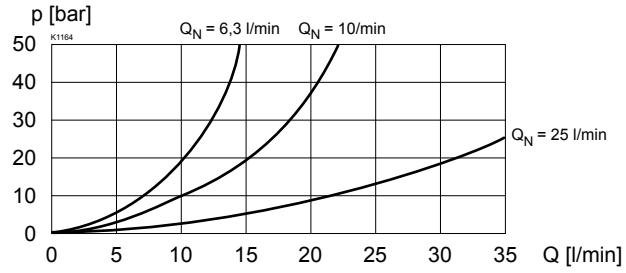
Q = f (p) Volume flow pressure characteristics ($I = I_G$) normally open



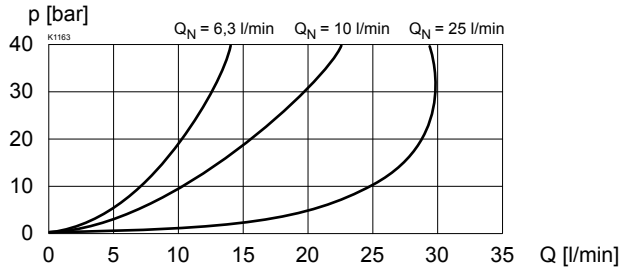
Q = f (p) Volume flow pressure characteristics ($I = I_G$) normally closed



Δp = f (Q) Pressure drop volume flow characteristics ($I = I_G$) normally open

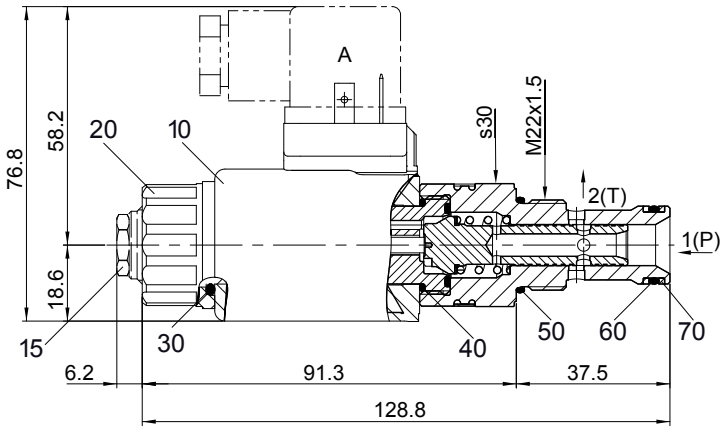


Δp = f (Q) Pressure drop volume flow characteristics ($I = I_G$) normally closed



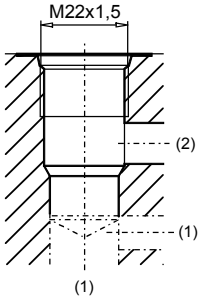
DIMENSIONS / SECTIONAL DRAWINGS

Normally open



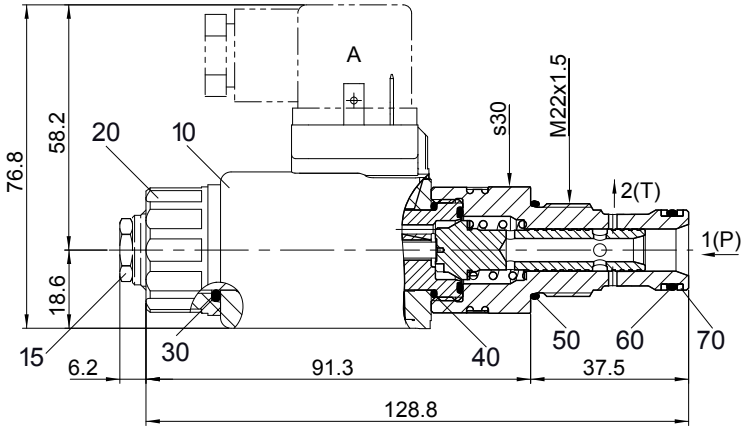
Dimensions of the other connection versions see data sheet 1.1-173

Cavity drawing accorging to
ISO 7789–22–01–0–98



For detailed cavity drawing
and cavity tools see data sheet 2.13-1008

Normally closed



PARTS LIST

Position	Article	Description
10		EN 175301
	206.2201	Solenoid coil WDS37 / 19 x 50-G24
	206.2200	Solenoid coil WDS37 / 19 x 50-G12
		Junior-Timer
	206.2203	Solenoid coil WJS37 / 19 x 50-G24
	206.2202	Solenoid coil WJS37 / 19 x 50-G12
		Deutsch
	206.2205	Solenoid coil WGS37 / 19 x 50-G24
	206.2204	Solenoid coil WGS37 / 19 x 50-G12
15	253.8000	HB 4,5 Manual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	154.2700	Knurled nut
30	160.2187	O-ring ID 18,72 x 2,62 (NBR)
	160.6187	O-ring ID 18,72 x 2,62 (FKM)
40	160.2170	O-ring ID 17,17 x 1,78 (NBR)
	160.6172	O-ring ID 17,17 x 1,78 (FKM)
50	160.2188	O-ring ID 18,77 x 1,78 (NBR)
	160.6188	O-ring ID 18,77 x 1,78 (FKM)
60	160.2156	O-ring ID 15,60 x 1,78 (NBR)
	160.6156	O-ring ID 15,60 x 1,78 (FKM)
70	049.3196	Back up ring RD 16,1 x 19 x 1,4

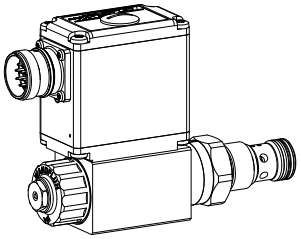
ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.6-720
Flange-/sandwich plate NG6	Data sheet 2.6-740
Line mount body Data sheet	2.9-205
Proportional amplifi er	Register 1.13
Mating connector EN 175301-803	Article Nr. 219.2002

Technical explanation see data sheet 1.0-100

Proportional throttle valve
Screw-in cartridge construction
- **Integrated amplifier electronics**
- **Direct operated, not pressure compensated**
- **Q_{max} = 32 l/min**
- **$Q_{N\ max}$ = 25 l/min**
- **p_{max} = 350 bar**

M22x1,5
ISO 7789



DESCRIPTION

Direct operated proportional throttle valve with integrated electronics as a screw-in cartridge with a thread M22x1,5 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. Three flow ranges are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). The cartridge and the solenoid made of steel are zinc coated and therefore rustprotected. The housing for the elctronics is made of aluminium.

FUNCTION

The force controlled wet pin proportional solenoid acts directly on the throttle spool which opens, resp., closes the openings on the cartridge body. 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 throttle valves with integrated electronics are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. 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 proportional throttle cartridge is very suitable for mounting in control blocks, flange bodies and sandwich plates of the size NG4, NG6 and NG10. Cavity tools are available for machining the cavities in steel and aluminium (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

D ☐ P PM22 - ☐ - ☐ / M E ☐ - ☐ ☐ # ☐

Throttle valve		
Normally open		O
Normally closed		N
Proportional		
Screw-in thread M22x1,5		
Nominal volume flow rate Q_N	6,3 l/min	6,3
	10 l/min	10
	25 l/min	25
Nominal voltage U_N	12 VDC	G12
	24 VDC	G24
Slip-on coil	Metal housing, square	
Connection execution	Integrated electronics	
Hardware configuration		
With analog signal (0…+10 V factory set)		A1
With CANopen acc. to DSP-408		C1
With Profibus DP in accordance Fluid Power Technology		P1
With CAN J1939 (on request)		J1
Sealing material	NBR	
	FKM (Viton)	D1
Manual override	Armature tube closed (standard)	
	Screwed sealing plug	HB0
	Manual emergency actuation	HB4.5
Design-Index (Subject to change)		

GENERAL SPECIFICATIONS

Description	Direct operated proportional throttle 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 M22x1,5
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 = 50 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 0,95 kg
Flow direction	1 → 2

HYDRAULIC SPECIFICATIONS

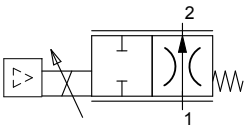
Fluid	Mineral oil, other fluids on request
Contamination efficiency	ISO 4406:1999, classe 18/16/13 (Required filtration grade ß 6…10≥75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20...+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow	Q_N= 6,3 l/min, 10 l/min, 25 l/min (at Δp_N = 10 bar)
Max. volume flow	Q_{max} = 32 l/min
Leakage volume flow	see characteristic
Hysteresis	≤ 8 %

ELECTRICAL SPECIFICATIONS

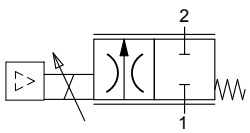
Protection class	IP 67 acc. to EN 60 529 with suitable connector and closed electronics housing
Supply voltage	12 VDC or 24 VDC
Ramps	adjustable
Parameterisation	via fieldbus or USB
Interface	USB (Mini B) for parameterisation with «PASO» under the closing screw of the housing cover, Preset ex-works
Analog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

SYMBOL

«normally open»



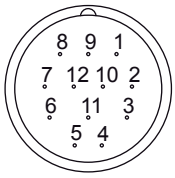
«normally closed»



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:

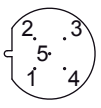
Device receptacle supply (male) X1

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 = 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

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**».

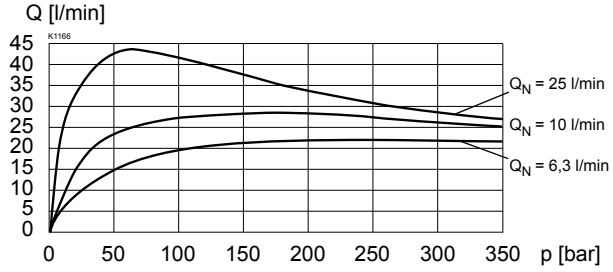
START-UP
For DSV amplifiers as a rule no parameter settings by the customer are required. The plugs have to be connected in accordance with the chapter «Pin assignment».
.

Additional information can be found on our website:
«www.wandfluh.com»

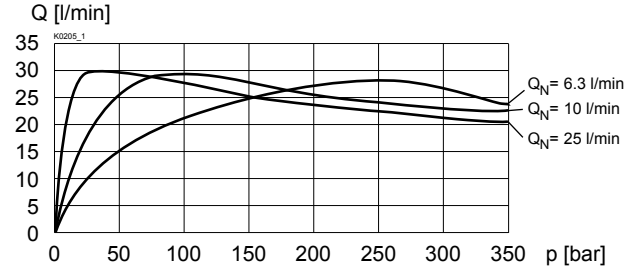
NOTE!
The mating connectors and the cable to adjust the settings are not part of the delivery. Refer to chapter «Accessories».

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

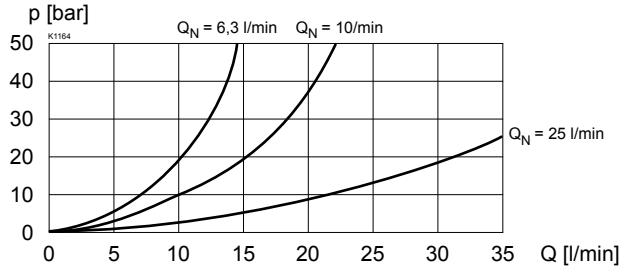
Q = f (p) Volume flow pressure characteristics (I = I_G) normally open



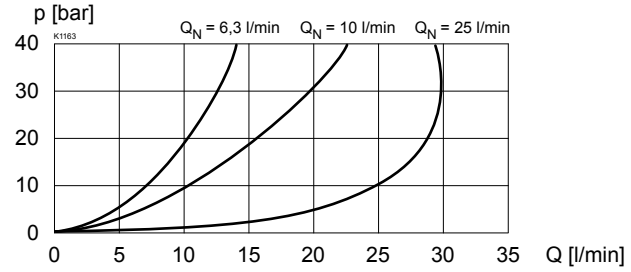
Q = f (p) Volume flow pressure characteristics (I = I_G) normally closed



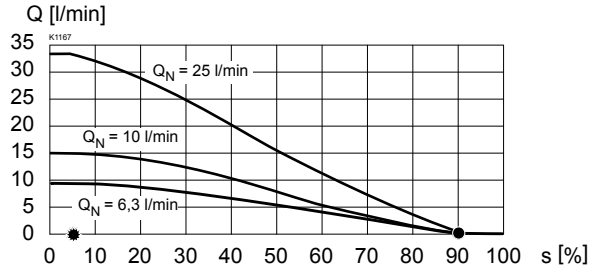
Δp = f (Q) Pressure drop volume flow characteristics (I = I_G) normally open



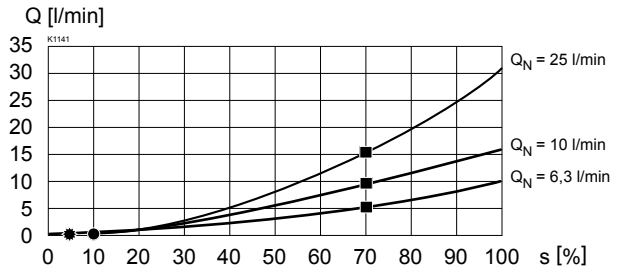
Δp = f (Q) Pressure drop volume flow characteristics (I = I_G) normally closed



Q = f (s) Volume flow adjustment characteristics (p1 - p2 = 20 bar) / (s corresponds to preset value signal) normally open



Q = f (s) Volume flow adjustment characteristics (p1 - p2 = 20 bar) / (s corresponds to preset value signal) normally closed

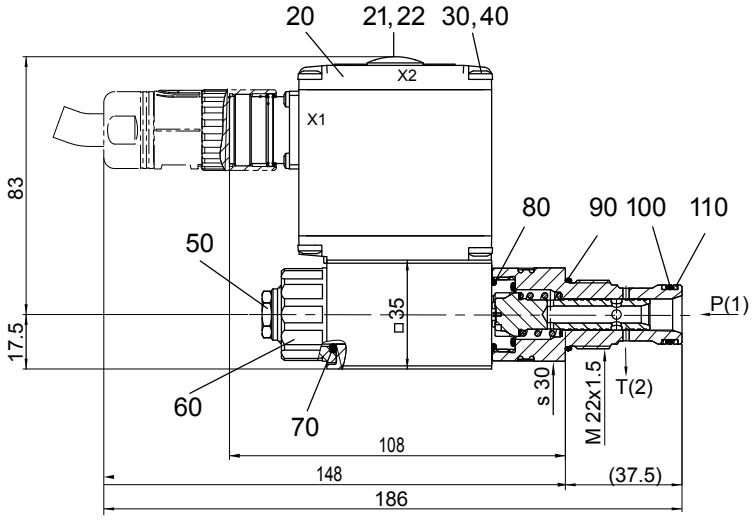


Factory settings:
Dither set for optimal hysteresis
✹ = Deadband: Solenoid switched off with command signal <5%
● = Closing point: at 90%

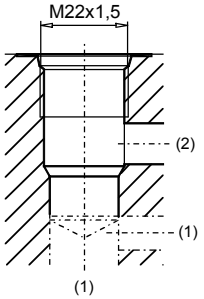
Factory settings:
Dither set for optimal hysteresis
✹ = Deadband: Solenoid switched off with command signal <5%
● = Opening point: at 10%
■ = Flow Δp = 30 bar with 70 % value signal
15,0 l/min for Q_N = 25 l/min
10,0 l/min for Q_N = 10 l/min
5,2 l/min for Q_N = 6,3 l/min

DIMENSIONS / SECTIONAL DRAWINGS

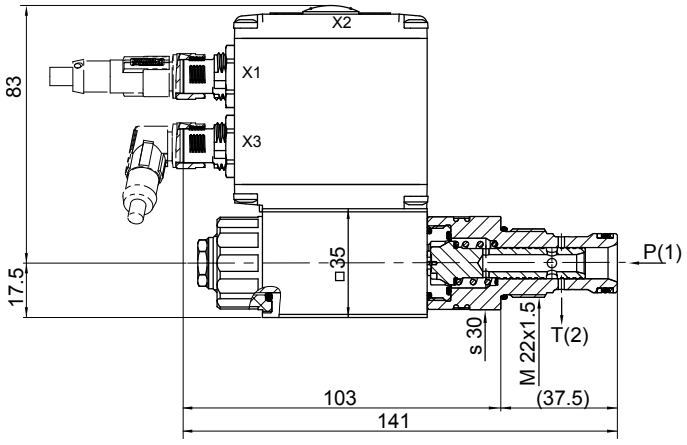
With analogue interface



Cavity drawing according to
ISO 7789–22–01–0–98



With fieldbus interface



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1008

PARTS LIST

Position	Article	Description
20	062.0102	Cover square
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33,2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	253.8000 239.2033	HB 4,5 Manual override (data sheet 1.1-300) HB 0 Plug screw (data sheet 1.1-300)
60	154.2700	Knurled nut
70	160.2187 160.6187	O-ring ID 18,72x2,62 (NBR) O-ring ID 18,72x2,62 (FKM)
80	160.2170 160.6172	O-ring ID 17,17x1,78 (NBR) O-ring ID 17,17x1,78 (FKM)
90	160.2188 160.6188	O-ring ID 18,77x1,78 (NBR) O-ring ID 18,77x1,78 (FKM)
100	160.2156 160.6156	O-ring ID 15,60x1,78 (NBR) O-ring ID 15,60x1,78 (FKM)
110	049.3196	Back up ring RD 16,1x19x1,4

ACCESSORIES

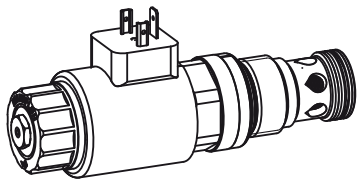
Flange-/sandwich plate NG4-Mini — Data sheet 2.6-720
Flange-/sandwich plate NG6 — Data sheet 2.6-740
Line mount body Data sheet — 2.9-205

- 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
- 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 mm²
  – Recommended wire size:
  0…25 m = 0,75 mm² (AWG18)
  25…50 m = 1 mm² (AWG17)

Technical explanation see data sheet 1.0-100

Proportional throttle valve
Screw-in cartridge
- **Direct operated, not pressure compensated**
- **Throttle in one flow direction**
- **Q_{max} = 65 l/min, p_{max} = 350 bar**
- **$Q_{N\,max}$ = 63 l/min**

M33x2
ISO 7789



DESCRIPTION
Direct operated proportional throttle valve with thread M33x2 and cavity in accordance with ISO 7789. Two nominal flow rates are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Progressive increase and decrease of volume flow and reduced hysteresis are characteristics of this valve. The cartridge body is made of steel. Its special surface coating protects the outside against corrosion and reduces friction of the control spool. The solenoid coil is zinc-/nickel-coated.

FUNCTION
The force controlled proportional solenoid running in the fluid acts directly on the control spool which opens or closes the triangular shaped throttling notches in the cartridge body. The throttle opening, and therefore the flow volume, changes proportionally to the current absorption of the proportional solenoid. When the solenoid is without current, the control spool is held in the closed position by a spring. To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION
Proportional throttle valves are suitable for precise feed control systems. Very sensitive opening and closing characteristics allow smooth control of movements in stationary or mobile installations, e.g. machine tools, public vehicles. Installation of the screw-in cartridge in control blocks as well as in the Wandfluh sandwich plates (vertical stacked systems) and flange valves of the NG10 size. (Please note the separate data sheets in register 2.6). Cavity tools are available for machining the cavities in steel and aluminium (hire or purchase). Please refer to the data sheets in register 2.13.

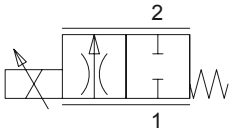
TYPE CODE

D N P PM33 - [ ] - [ ] / [ ] [ ] - [ ] [ ] # [ ]

Throttle valve			
Normally closed			
Proportional			
Screw-in cartridge M33x2			
Nominal volume flow rate Q_N	63 l/min	63	
	32 l/min	32	
Nominal voltage U_N	12 VDC	G12	
	24 VDC	G24	
	without coil	X5	
Slip-on coil	Metal housing, round	W	
	Metal housing, square	M*	
Connection execution	Connector socket EN 175301-803 / ISO 4400		D
	Connector socket AMP Junior-Timer		J
	Connector Deutsch DT04-2P		G
Sealing material	NBR		
	FKM (Viton)	D1	
Manual override	Armature tube closed (standard)		
	Screwed sealing plug		HB0
	Manual emergency actuation		HB4.5
Design-Index (Subject to change)			

* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-181)

SYMBOL
«normally closed»



GENERAL SPECIFICATIONS

Description	Direct operated proportional throttle valve
Construction	Screw-in cavity acc. to ISO 7789
Operation	Proportional solenoid
Mounting	Screw-in thread M33x2
Ambient temperature	-20…70 °C
Mounting position	any, preferably horizontal
Fastening torque	M_D = 80 Nm for screw-in cartridge M_D = 7 Nm for knurled nut
Weight	m = 0,9 kg
Volume flow direction	1 → 2

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1560 mA	I_G = 780 mA
Relative duty factor	100 % ED / DF (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	

For further electrical specifications see data sheet 1.1-180 (W)
1.1-181 (M)

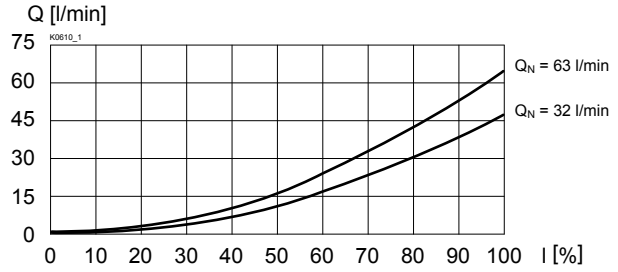
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 32 l/min, 63 l/min
Max. volume flow	Q_{max} = 65 l/min
Leakage volume flow	on request
Hysteresis	≤ 8 %*

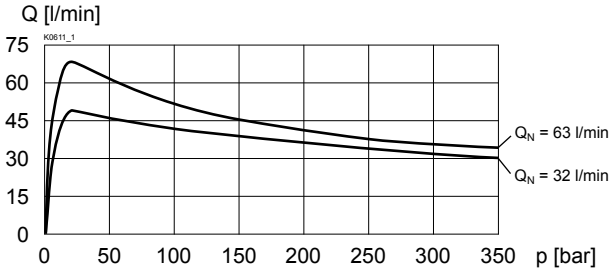
* at optimal dither signal

CHARACTERISTICS Oil viscosity υ = 30 mm²/s

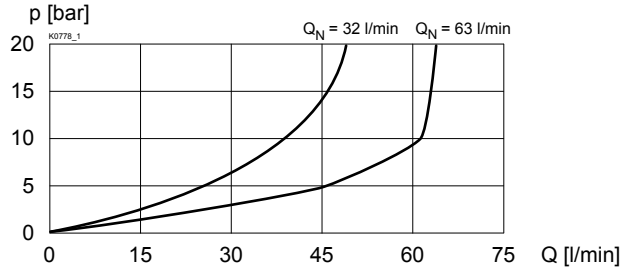
Q = f (I) Volume flow adjustment characteristics (Δp = 20 bar)



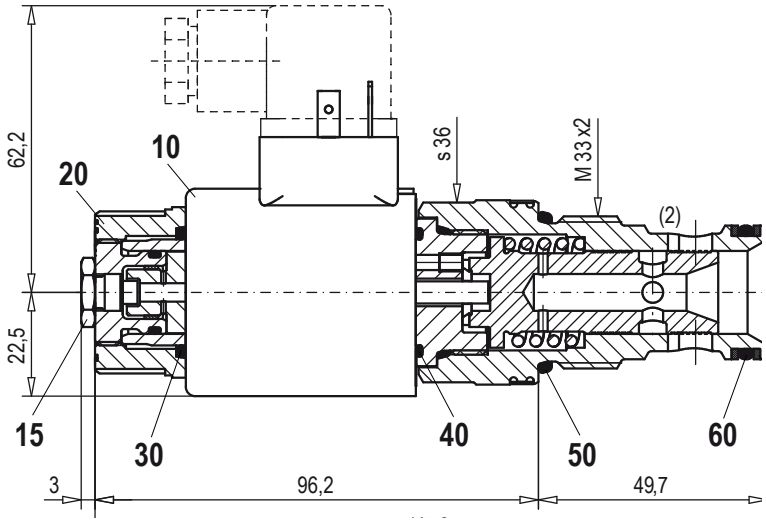
Q = f (p) Volume flow pressure characteristics (I = I_G)



Δp = f (Q) Pressure drop volume flow characteristics (I = I_G)

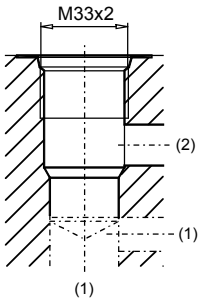


DIMENSIONS / SECTIONAL DRAWINGS



Dimensions of the other connection versions see data sheet 1.1-180

Cavity drawing accorging to
ISO 7789–33–01–0–98



For detailed cavity drawing
and cavity tools see data sheet 2.13-1005

PARTS LIST

Position	Article	Description
10		EN 175301
	206.1200	Solenoid coil WDS45/23x50-G24
	206.1203	Solenoid coil WDS45/23x50-G12
		Junior-Timer
	206.1201	Solenoid coil WJS45/23x50-G24
	206.1204	Solenoid coil WJS45/23x50-G12
		Deutsch
	206.1202	Solenoid coil WGS45/23x50-G24
	206.1205	Solenoid coil WGS45/23x50-G12
15	253.8000	HB 4,5 Manual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	154.2701	Knurled nut
30	160.2222	O-ring ID 22,12x2,62 (NBR)
	160.6222	O-ring ID 22,12x2,62 (FKM)
40	160.6218	O-ring ID 21,95x1,78 (FKM)
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	049.3297	Back up ring RD 24,5x29x1,4

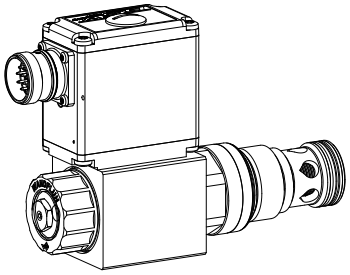
ACCESSORIES

Flange-/sandwich plate NG10	Data sheet 2.6-760
Line mount body	Data sheet 2.9-205
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional throttle valve
Screw-in cartridge construction
- **Integrated amplifier electronics**
- **Direct operated, not pressure compensated**
- **Q_{max} = 65 l/min**
- **$Q_{N\ max}$ = 63 l/min**
- **p_{max} = 250 bar**

M33x2
ISO 7789



DESCRIPTION

Direct operated proportional throttle 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. The volume flow is adjusted by a Wandfluh-proportional solenoid (VDE standard 0580). The cartridge and the solenoid made of steel are zinc coated and therefore rustprotected. The housing for the elctronics is made of aluminium.

FUNCTION

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 throttle valves with integrated electronics are well suited for demanding appli-cations where high resolution, high volume flow and low hysteresis are requested. They are implemented in systems calling for good valve-to-valve reproducibility, easy installation, comfortable operation and high precission in industrial hydraulics as well as in mobile hydraulics. The proportional throttle cartridge is very suitable for mounting in control blocks, flange bodies and sandwich plates of the size NG10. Cavity tools are available for machining the cavities in steel and aluminium (hire or pur-chase). Please refer to the data sheets in re-gister 2.13.

TYPE CODE

D N P PM33 - [ ] - [ ] / M E [ ] - [ ] [ ] # [ ]

Throttle valve			
Normally closed			
Proportional			
Screw-in thread M33x2			
Nominal volume flow rate Q_N		32 l/min	32
		63 l/min	63
Nominal voltage U_N	12 VDC		G12
	24 VDC		G24
Slip-on coil	Metal housing, square		
Execution connection	Integrated electronics		
Hardware configuration			
With analog signal (0…+10 V factory set)			A1
With CANopen acc. to DSP-408			C1
With Profibus DP in accordance with Fluid Power Technology			P1
With CAN J1939 (on request)			J1
Sealing material	NBR		
	FKM (Vitron)		D1
Manual override	Armature tube closed (standard)		
	Screwed sealing plug		HB0
	Manual emergency actuation		HB4.5
Design-Index (Subject to change)			

GENERAL SPECIFICATIONS

Description	Direct operated proportional throttle valve with integrated electronics
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operations	Proportional solenoid
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 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 1,5 kg
Flow direction	1 → 2

HYDRAULIC SPECIFICATIONS

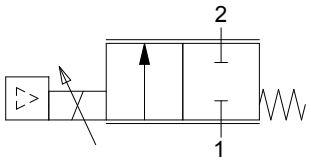
Fluid	Mineral oil, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade ß 6…10≥75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 250 bar
Nominal volume flow rates	Q_N = 63 l/min Q_N = 32 l/min
Max. volume flow	Q_{max} = 65 l/min
Leakage volume flow	on request
Hysteresis	≤ 8 %

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	via fieldbus or USB
Interface	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

SYMBOL

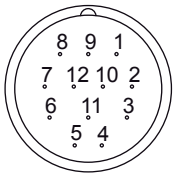
«normally closed»



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:

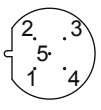
Device receptacle supply (male) X1

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 = 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

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**».

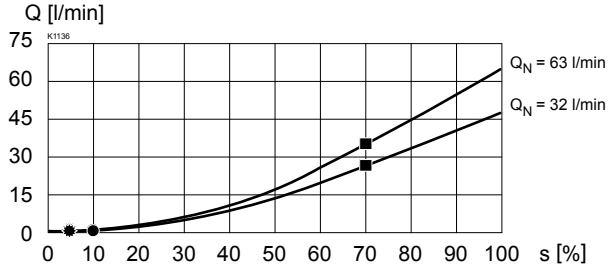
START-UP
For DSV amplifiers as a rule no parameter settings by the customer are required. The plugs have to be connected in accordance with the chapter «Pin assignment».
.

Additional information can be found on our website:
«www.wandfluh.com»

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

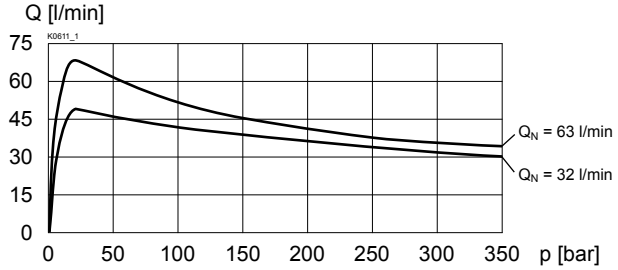
CHARACTERISTICS oil viscosity υ = 30 mm²/s

Q = f (s) Volume flow adjustment characteristics (Δp = 20 bar)
(s corresponds to preset value signal)

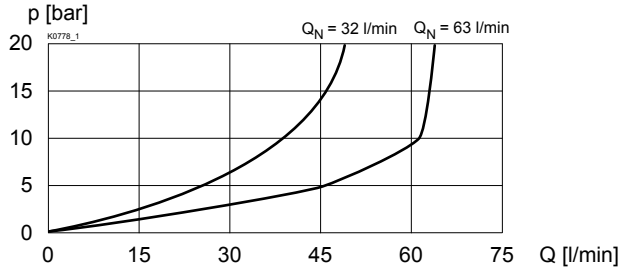


Factory settings:
Dither set for optimal hysteresis
- ✹ = Deadband: Solenoid switched off with command preset value signal <5%
- ● = Opening point: at command signal 10%
- ■ = Flow at Δp = 20 bar at command signal ±70%
  24 l/min for Q_N = 32 l/min
  34 l/min for Q_N = 63 l/min

Q = f (p) Volume flow pressure characteristics
(Preset value signal = 100 %)

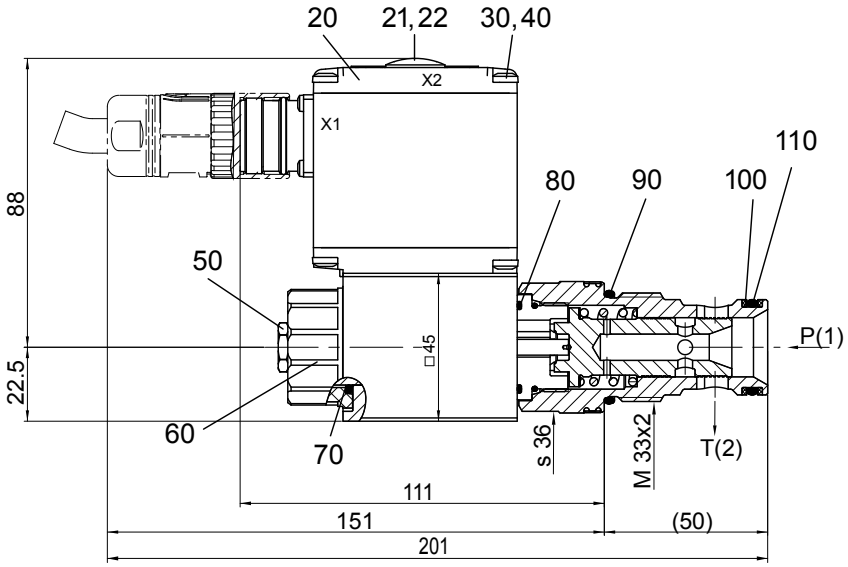


Δp = f (Q) Pressure drop volume flow characteristics
(Preset value signal = 100 %)

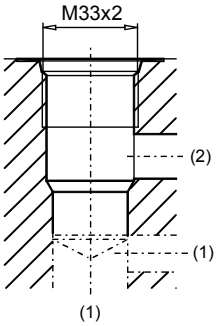


DIMENSIONS / SECTIONAL DRAWINGS

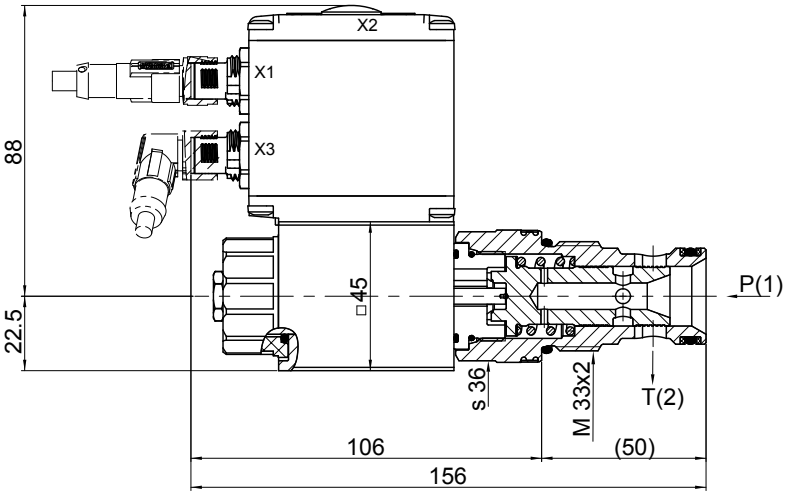
With analogue interface



Cavity drawing according to ISO 7789–33–01–0–98



With fieldbus interface



For detailed cavity drawing and cavity tools see data sheet 2.13-1005.

PARTS LIST

Position	Article	Description
20	062.0102	Cover square
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33,2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	253.8000 239.2033	HB 4,5 Manual override (data sheet 1.1-300) HB 0 Plug screw (data sheet 1.1-300)
60	154.2700	Knurled nut
70	160.2187 160.6187	O-ring ID 18,72x2,62 (NBR) O-ring ID 18,72x2,62 (FKM)
80	160.6218	O-ring ID 21,95x1,78 (FKM)
90	160.2298 160.6296	O-ring ID 29,82x2,62 (NBR) O-ring ID 29,82x2,62 (FKM)
100	160.2238 160.6238	O-ring ID 23,81x2,62 (NBR) O-ring ID 23,81x2,62 (FKM)
110	049.3297	Back up ring RD 24,5x29x1,4

ACCESSORIES

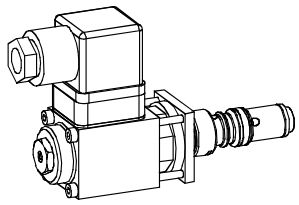
Flange-/sandwich plate NG10 — Data sheet 2.6-760
Line mount body — Data sheet 2.9-205

- 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
- 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 mm²
  – Recommended wire size:
  0…25 m = 0,75 mm² (AWG18)
  25…50 m = 1 mm² (AWG17)

Technical explanation see data sheet 1.0-100

Proportional 2-way flow control valve
Screw-in cartridge
- **Direct operated, pressure compensated**
- **Q_{max} = 6,3 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 6,3 l/min**

M18x1,5
Wandfluh standard



DESCRIPTION
Direct operated, pressure compensated proportional flow regulating valve, as a screw-in cartridge with a thread M18x1,5 for cavity acc. to Wandfluh standard. 3 flow ranges are available. The volume flow is adjusted by a proportional solenoid (VDE standard 0580). A progressive increase in volume flow and reduced hysteresis are characteristic of this valve. The cartridge body and the solenoid made of steel are zinc coated and therefore rust-protected.

FUNCTION
The force controlled proportional solenoid running in the fluid acts directly on the control spool wich opens the triangular shaped throttling notches in the cartridge body. The throttle opening, and therefore the flow volume changes proportionally to the current absorption of the proportional solenoid. If pressure in the system changes the pressure compensator will change the area of the oil passage to an extend as to keep the pressure drop over the restrictor constant. When the solenoid is without courrent, the control spool is held in the closed position by a spring. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

APPLICATION
The 2-way flow control valve is designed to keep the oil flow to any actuator constant irrespectiv of the load. 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. The screw-in cartridge is very suitable for mounting in control blocks.

TYPE CODE

Q Z P PM18 - ☐ - ☐ # ☐

Flow control valve		
2-way		
Proportional		
Screw-in cartridge M18x1,5		
Nominal volume flow rate Q_N	2 l/min	2
	4 l/min	4
	6,3 l/min	6,3
Nominal voltage U_N	12 VDC	G12
	24 VDC	G24
Design-Index (Subject to change)		

GENERAL SPECIFICATIONS

Description	2-way proportional flow control valve
Construction	Screw-in cartridge for cavity acc. to Wandfluh standard
Operations	Proportional solenoid
Mounting	Screw-in thread M18x1,5
Ambient temperature	-20...50 °C
Mounting position	any
Fastening torque	M_D = 30 Nm for screw-in cartridge M_D = 1,2 Nm (Qual. 8.8) for solenoid screws
Weight	m = 0,7 kg

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight.	
Standard-Nominal voltage	U_N = 12 VDC	U_N = 24 VDC
Limiting current	I_G = 1080 mA	I_G = 540 mA
Relative duty factor	100% DF (see data sheet 1.1-430)	
Protection class	IP 65 to EN 60 529	
Connection/Power supply	Over device plug connection to ISO 4400 / DIN 43 650 (2P+E)	

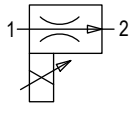
Other electrical specifications see data sheet 1.1-90 (PI29V)

HYDRAULIC SPECIFICATIONS

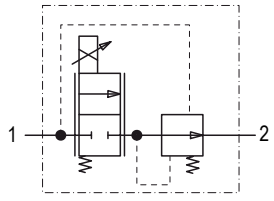
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade ß6...10≥75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s...320 mm²/s
Fluid temperature	-20...+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow	Q_N = 2 l/min, Q_N= 4 l/min, Q_N = 6,3 l/min
Max. Volume flow	Q_{max} = 6,3 l/min
Min. Volume flow	Q_{min} = 0,02 l/min
Leakage volume flow	see characteristics
Resolution	1 mA
Repeatability	≤ 1 % *
Hysteresis	≤ 3 % *
	* at optimal dither signal

SYMBOLS

simplified

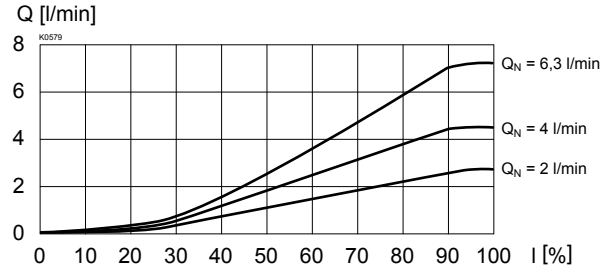


detailed

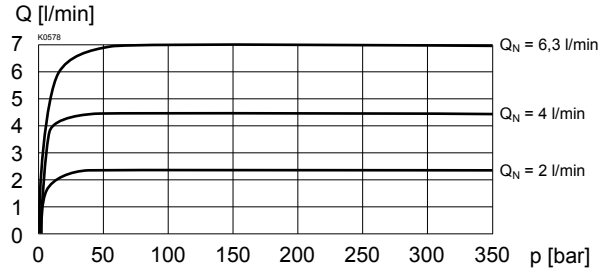


CHARACTERISTICS Oil viscosity υ = 30mm²/s

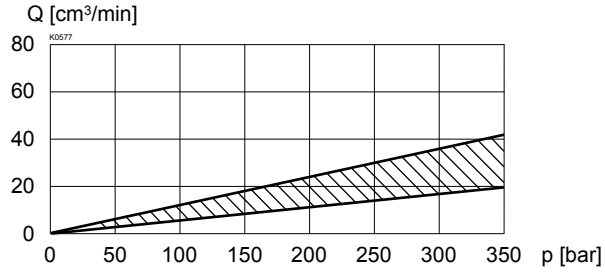
Q = f (I) Volume flow adjustment characteristics



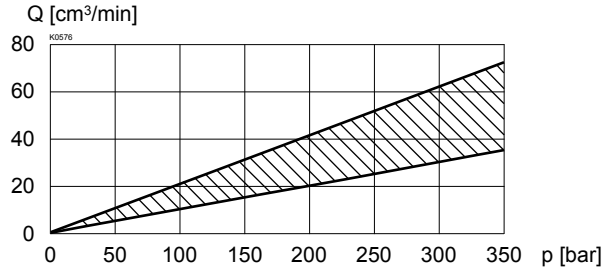
Q = f (p) Volume flow pressure characteristics



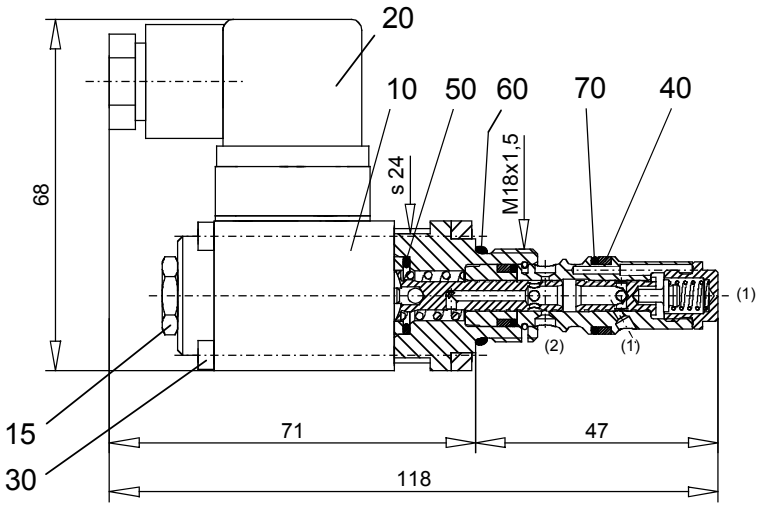
Q_L = f (p) Leakage volume flow characteristics
Q_N = 2 l/min



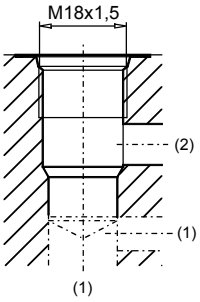
Q_L = f (p) Leakage volume flow characteristics
Q_N = 4 l/min; 6,3 l/min



DIMENSIONS / SELECTIONAL DRAWING



Cavity drawing acc. to
Wandfluh standard



For detailed cavity drawing
see data sheet no. 2.13-1038

PARTS LIST

Position	Article	Description
10	256.2453 256.2418	Proportional solenoid PI29V-G24 Proportional solenoid PI29V-G12
15	253.8000	Plug with integrated manual override HB4,5
20	219.2002	Plug (black)
30	246.0151	Cyl. screw M3x50 DIN 912
40	160.2111	O-ring ID 11,11x1,78
50	160.2120	O-ring ID 12,42x1,78
60	160.2156	O-ring ID 15,60x1,78
70	049.3156	Back-up ring RD 12,1x15x1,4

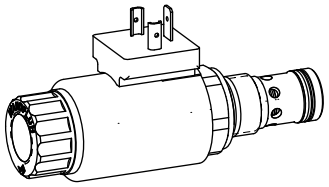
ACCESSORIES

Line mount body Data sheet	2.9-205
Proportional amplifi er	Register 1.13
Mating connector EN 175301-803	Article Nr. 219.2002

Technical explanation see data sheet 1.0-100

Proportional 2-way flow control valve
Screw-in cartridge
- **Direct operated, pressure compensated**
- **Q_{max} = 25 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 25 l/min**

M22x1,5
ISO 7789



DESCRIPTION

Direct operated, pressure compensated proportional flow control valve, as a screw-in cartridge with a thread M33 x 2 for cavity acc. to ISO 7789. Four flow ranges are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). The cartridge body is made of steel. A special surface treatment guarantees a good protection against corrosion and wear as well as very good low-friction characteristics of the pressure compensating- and throttle spool. The solenoid coil is zinc-/nickel-coated.

FUNCTION

The 2-way flow control valve with following pressure compensation (secondary controller) serves for maintaining the speed of a consumer constant independent of the load. The power controlled, proportional solenoid running in oil acts directly on the throttle spool, which opens the throttle segments in the cartridge body. Proportional to the current demand of the proportional solenoid, the throttle aperture changes, and with this the volume flow. In case of pressure fluctuations, the flow cross-section in the pressure compensation spool changes in such a manner, that the pressure difference in the measuring diaphragm is maintained constant. In case of a current-free solenoid, the throttle spool is held in closed position by a spring. For driving the valve, Wandfluh proportional amplifiers are available (see Register 1.13).

APPLICATION

Proportional flow control valves are suitable for feed control systems, where the consumer flow has to be maintained constant with a changing load. The screw-in cartridge is suitable for installation in control blocs as well as in flange- and sandwich valves of the NG4 and NG6 ranges. Cavity tools are available for machining the cartridge cavities in steel and aluminium (for hire or for purchase). Please refer to the data sheets in Reg. 2.13 of our documentation.

TYPE CODE

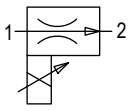
Q N P PM22 - [ ] - [ ] / [ ] [ ] - [ ] [ ] # [ ]

Flow control valve				
Normally closed				
Proportional				
Screw-in cartridge M22x1,5				
Nominal volume flow rate Q_N	3,2 l/min	3,2		
	8 l/min	8		
	16 l/min	16		
	25 l/min	25		
Nominal voltage U_N	12 VDC		G12	
	24 VDC		G24	
	without coil		X5	
Slip-on coil	Metal housing, round		W	
	Metal housing, square		M*	
Connection execution	Connector socket EN 175301-803 / ISO 4400			D
	Connector socket AMP Junior-Timer			J
	Connector Deutsch DT04-2P			G
Sealing material	NBR			
	FKM (Viton)		D1	
Manual override	Armature tube closed (standard)			
	Screwed sealing plug			HB0
	Manual emergency actuation			HB4.5
Design-Index (Subject to change)				

* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-174)

SYMBOLS

simplified



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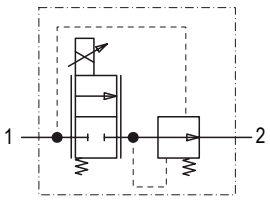


GENERAL SPECIFICATIONS

Description	2-way proportional flow control valve
Construction	Screw-in cartridge for cavity acc. ISO 7789
Operations	Proportional solenoid
Mounting	Screw-in thread M22x1,5
Ambient temperature	-20…50 °C
Mounting position	any
Fastening torque	M_D = 50 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 0,64 kg
Flow direction	1 → 2

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1360 mA	I_G = 680 mA
Relative duty factor	100 % ED (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP65 J: IP66 G: IP67 and 69K	

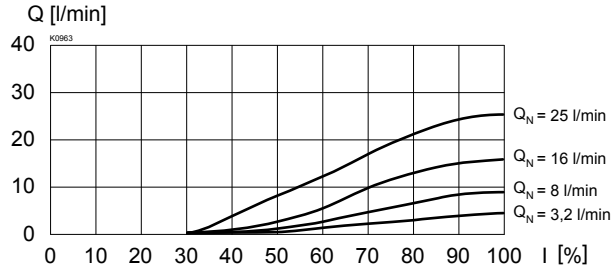
For further electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

HYDRAULIC SPECIFICATIONS

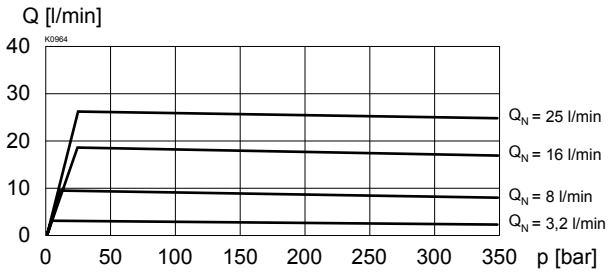
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Recommended filtration grade ß 6...10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow	Q_N = 3,2/8/16/25 l/min
Max. Volume flow	Q_{max} = 25 l/min
Min. Volume flow	Q_{min} = 0,1 l/min
Leakage volume flow	see characteristics
Repeatability	≤ 2 %*
Hysteresis	≤ 5 %*
	* at optimal dither signal

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

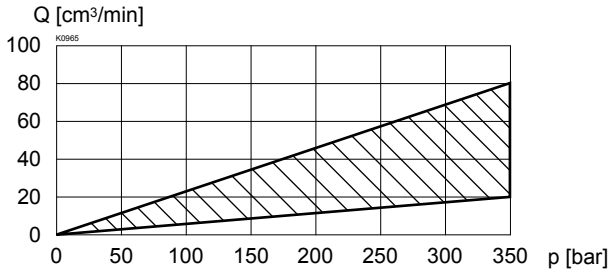
Q = f (I) Volume flow adjustment characteristics



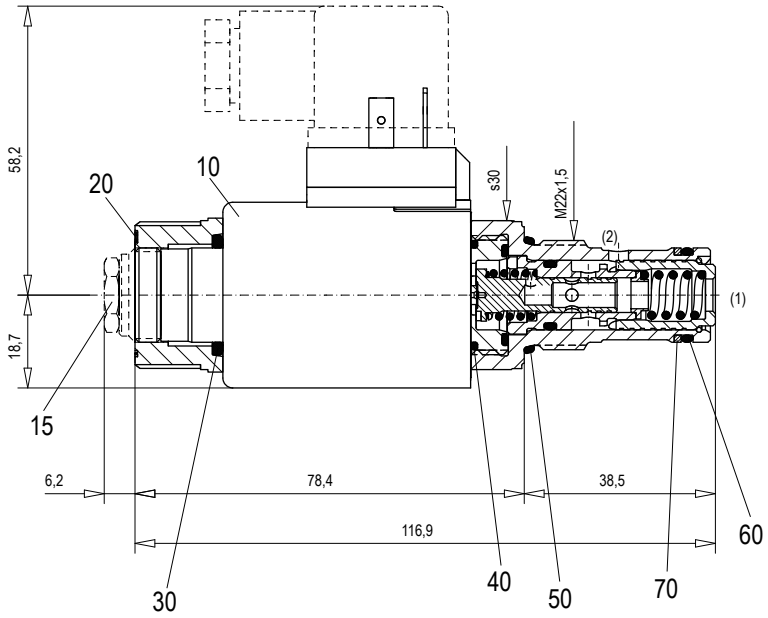
Q = f (p) Volume flow pressure characteristics



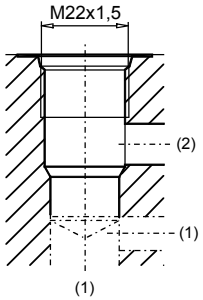
Q = f (p) Leakage volume flow characteristics



DIMENSIONS / SECTIONAL DRAWINGS



Cavity drawing acc. to
ISO 7789–22–01–0–98



For detailed cavity drawing and cavity tools see data sheet 2.13-1008

PARTS LIST

Position	Article	Description
10		EN 175301
	206.2201	Solenoid coil WDS37 / 19 x 50-G24
	206.2200	Solenoid coil WDS37 / 19 x 50-G12
		Junior-Timer
	206.2203	Solenoid coil WJS37 / 19 x 50-G24
	206.2202	Solenoid coil WJS37 / 19 x 50-G12
		Deutsch
	206.2205	Solenoid coil WGS37 / 19 x 50-G24
	206.2204	Solenoid coil WGS37 / 19 x 50-G12
15	253.8000	HB 4,5 Manual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	154.2700	Knurled nut
30	160.2187	O-ring ID 18,72 x 2,62 (NBR)
	160.6187	O-ring ID 18,72 x 2,62 (FKM)
40	160.2170	O-ring ID 17,17 x 1,78 (NBR)
	160.6172	O-ring ID 17,17 x 1,78 (FKM)
50	160.2188	O-ring ID 18,77 x 1,78 (NBR)
	160.6188	O-ring ID 18,77 x 1,78 (FKM)
60	160.2156	O-ring ID 15,60 x 1,78 (NBR)
	160.6156	O-ring ID 15,60 x 1,78 (FKM)
70	049.3196	Backup ring RD 16,1 x 19 x 1,4

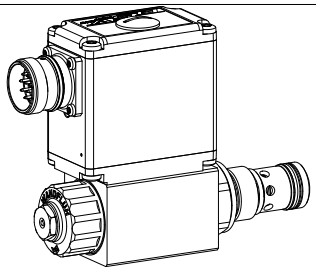
ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.6-820
Flange-/sandwich plate NG6	Data sheet 2.6-840
Line mount body Data sheet	2.9-205
Proportional amplifi er	Register 1.13
Mating connector EN 175301-803	Article Nr. 219.2002

Technical explanation see data sheet 1.0-100

Proportional 2-way flow control valve
Screw-in cartridge
- **InteIntegrated amplifier electronics**
- **Direct operated, pressure compensated**
- **Q_{max} = 25 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 25 l/min**

M22x1,5
ISO 7789



DESCRIPTION

Direct operated, pressure compensated proportional flow control valve with integrated electronics as a screw-in cartridge with a thread M22 x1,5 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. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Allmost linear flow increase and low hysteresis are typical for this valve. The cartridge and the solenoid made of steel are zinc coated and therefore rustprotected. The housing for the elctronics is made of aluminium.

FUNCTION

The 2-way flow control valve is designed to keep the oil flow to any actuator constant irrespective of the load. 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 precission 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 NG4-mini and NG6. Cavity tools are available for machining cartridge cavities (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

Q N P PM22 - □ - □ / M E □ - □ □ # □

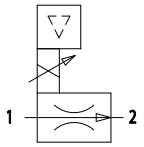
Flow control valve		
Normally closed		
Proportional		
Screw-in thread M22x1,5		
Nominal volume flow rate Q_N	3,2 l/min	3,2
	8 l/min	8
	16 l/min	16
	25 l/min	25
Nominal voltage U_N	12 VDC	G12
	24 VDC	G24
Slip-on coil	Metal housing, square	
Connection execution	Integrated electronics	
Hardware configuration		
With analog signal (0…+10 V factory set)		A1
With CANopen acc. to DSP-408		C1
With Profibus DP in accordance with Fluid Power Technology		P1
With CAN J1939 (on request)		J1
Sealing material	NBR	
	FKM (Viton)	D1
Manual override	Armature tube closed (standard)	
	Screwed sealing plug	HB0
	Manual emergency actuation	HB4.5
Design-Index (Subject to change)		

GENERAL SPECIFICATIONS

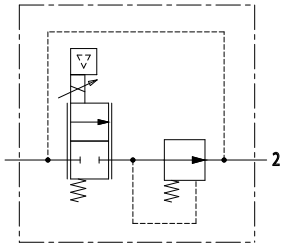
Description	2-way proportional flow control valve with integrated electronics
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operations	Proportional solenoid, wet pin push type, pressure tight
Mounting	Screw-in thread M33x2
Ambient temperature	-20…65 °C (typical) (The upper temperature limit 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 = 50 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 0,95 kg
Flow direction	1 → 2

SYMBOLS

simplified



detailed



HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 3,2 l/min, 8 l/min,16 l/min, 25 l/min
Max. volume flow	Q_{max} = 100 l/min (1 → 2)
Min. volume flow	Q_{min} = 0,2 l/min
Leakage volume flow	see characteristics
Repeatability	≤ 2 %
Hysteresis	≤ 5 %

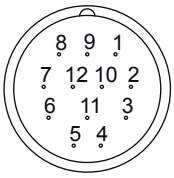
ELECTRICAL SPECIFICATIONS

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	via fieldbus or USB
Interface	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:

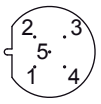
Device receptacle supply (male) X1

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 = 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

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».

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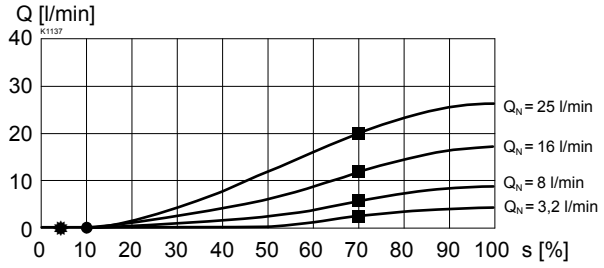
Additional information can be found on our website:
«www.wandfluh.com»

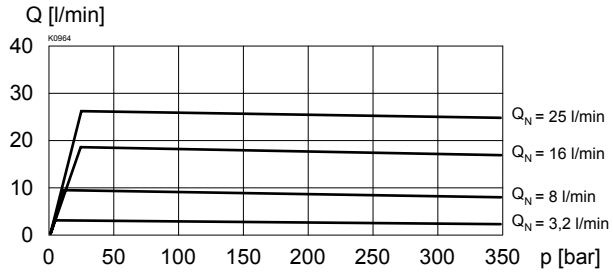
NOTE!
The mating connectors and the cable to adjust the settings are not part of the delivery. Refer to chapter «Accessories».

CHARACTERISTICS Oil viscosity υ = 30mm²/s

Q = f (I) Volume flow adjustment characteristics
[at 50 bar difference of pressure]
(s corresponds to preset value signal)

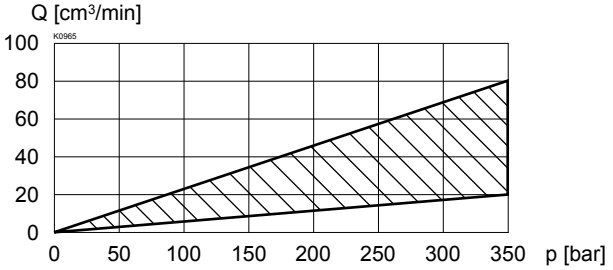


Q = f (p) Volume flow pressure characteristics



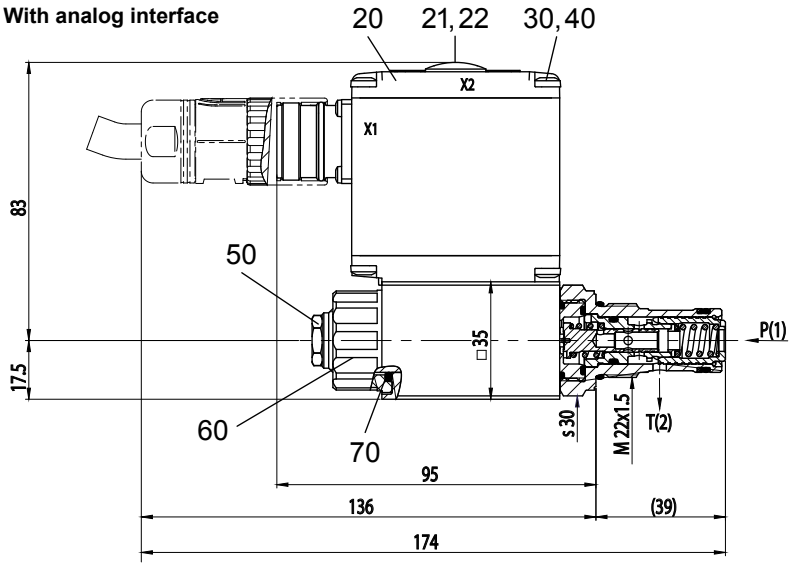
Factory settings:
Dither set for optimal hysteresis
- ✹ = Deadband: Solenoid switched off with command signal <5 %
- ● = Beginning of control: at 10 % of preset vale signal
- ■ = Regulated volume flow at 70 % of preset value signal
  18,0 l/min bei Q_N = 25 l/min
  11,9 l/min bei Q_N = 16 l/min
  6,0 l/min bei Q_N = 8 l/min
  2,6 l/min bei Q_N = 3,2 l/min

Q_L = f (p) Leakage volume flow characteristics

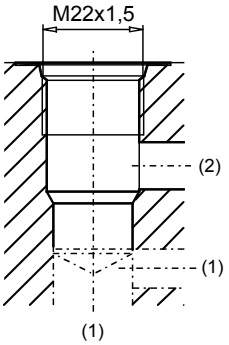


DIMENSIONS / SECTIONAL DRAWINGS

With analog interface

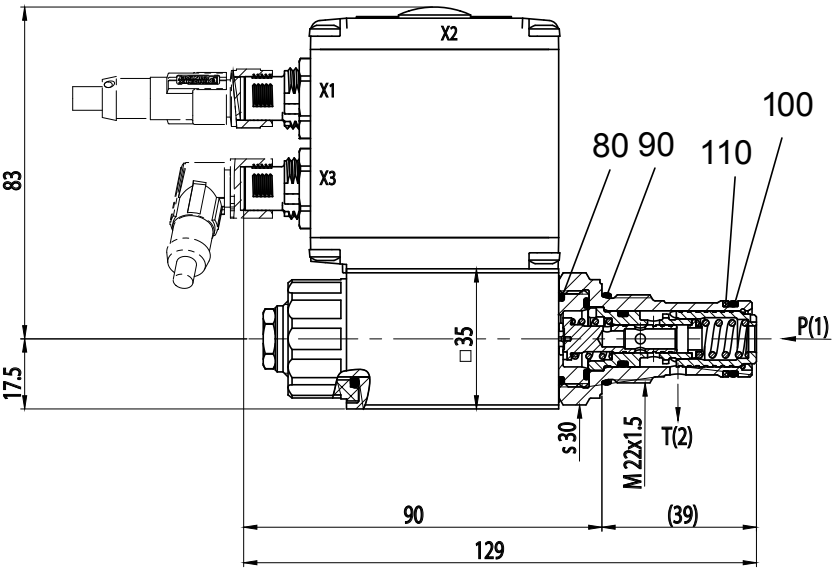


Cavity drawing acc. to
ISO 7789–22–04–0–98



For detailed cavity drawing and cavity tools see data sheet 2.13-1008

With fieldbus interface



PARTS LIST

Position	Article	Description
20	062.0102	Cover square
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33,2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	253.8000 239.2033	HB 4,5 Manual override (data sheet 1.1-300) HB 0 Plug screw (data sheet 1.1-300)
60	154.2700	Knurled nut
70	160.2187 160.6187	O-ring ID 18,72x2,62 (NBR) O-ring ID 18,72x2,62 (FKM)
80	160.2170 160.6172	O-ring ID 17,17x1,78 (NBR) O-ring ID 17,17x1,78 (FKM)
90	160.2188 160.6188	O-ring ID 18,77x1,78 (NBR) O-ring ID 18,77x1,78 (FKM)
100	160.2156 160.6156	O-ring ID 15,60x1,78 (NBR) O-ring ID 15,60x1,78 (FKM)
110	049.3196	Backup ring RD 16,1x19x1,4

ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.6-820
Flange-/sandwich plate NG6	Data sheet 2.6-840
Line mount body Data sheet	2.9-205
Proportional amplifi er	Register 1.13
Mating connector EN 175301-803	Article Nr. 219.2002

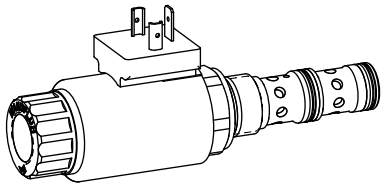
- Set-up software — see start-up
- Cable to adjust the settings through interface USB (from plug type A to Mini B, 3 m) — article no. 219.2896
- Mating connector (plug female) for the analogue interface:
  – straight, soldering contact — article no. 219.2330
  – soldering contact — article no. 219.2331

  Recommended cable size:
  – Outer diameter 9…10,5 mm
  – Single wire max. 1 mm²
  – Recommended wire size:
  0…25 m = 0,75 mm² (AWG18)
  25…50 m = 1 mm² (AWG17)

Technical explanation see data sheet 1.0-100

Proportional 3-way flow control valve
Screw-in cartridge
- **Direct operated, pressure compensated**
- **Q_{max} = 40 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 25 l/min**

M22x1,5
ISO 7789



DESCRIPTION

Direct operated, pressure compensated proportional flow control valve as screw-in cartridge with a thread M22x1,5 for cavity acc. to ISO 7789. Three flow ranges are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). The cartridge body is made of steel. A special surface treatment guarantees a good protection against corrosion and wear as well as very good low-friction characteristics of the pressure compensating- and throttle spool. The solenoid coil is zinc-/nickel-coated.

FUNCTION

The 3-way flow control valve serves for maintaining the speed of a consumer constant independent of the load. Superfluous pump output flow is fed into the return flow system in a cost saving manner, and as a result, prevents an overheating of the hydraulic system. The power controlled, proportional solenoid running in oil acts directly on the throttle spool, which opens the throttle segments in the cartridge body. Proportional to the current demand of the proportional solenoid, the throttle aperture changes, and with this the volume flow. In case of a current-free solenoid, the throttle spool is held in closed position by a spring. For driving the valve, Wandfluh proportional amplifiers are available (see Register 1.13).

APPLICATION

Proportional flow control valves are suitable for feed control systems, where the consumer flow has to be maintained constant with a changing load. The screw-in cartridge is suitable for installation in control blocs as well as in flange- and sandwich valves of the size NG6. Cavity tools are available for machining the cartridge cavities in steel and aluminium (for hire or for purchase). Please refer to the data sheets in Reg. 2.13 of our documentation.

TYPE CODE

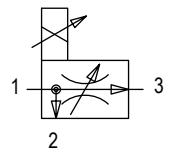
Q D P PM22 - [ ] - [ ] / [ ] [ ] - [ ] [ ] # [ ]

Flow control valve			
3-way			
Proportional			
Screw-in cartridge M22 x 1,5			
Nominal volume flow rate Q_N	8 l/min	8	
	16 l/min	16	
	25 l/min	25	
Nominal voltage U_N	12 VDC	G12	
	24 VDC	G24	
	without coil	X5	
Slip-on coil	Metal housing, round	W	
	Metal housing, square	M*	
Connection execution	Connector socket EN 175301-803 / ISO 4400		D
	Connector socket AMP Junior-Timer		J
	Connector Deutsch DT04-2P		G
Sealing material	NBR		
	FKM (Viton)	D1	
Manual override	Armature tube closed (standard)		
	Screwed sealing plug		HB0
	Manual emergency actuation		HB4.5
Design-Index (Subject to change)			

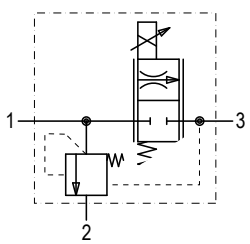
* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-174)

SYMBOLS

simplified



detailed



GENERAL SPECIFICATIONS

Description	3-way proportional flow control valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operation	Proportional solenoid
Mounting	Screw-in thread M22x1,5
Ambient temperature	-20…50 °C
Mounting position	any
Fastening torque	M_D = 50 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 0,66 kg
Flow direction	see symbol

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1360 mA	I_G = 680 mA
Relative duty factor	100 % ED (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	

For further electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

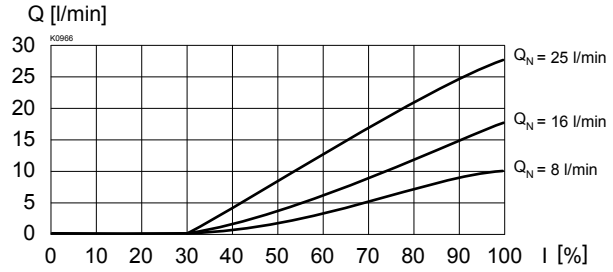
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 8 l/min, 15 l/min, 25 l/min
Max. volume flow	Q_{max} = 40 l/min (1 → 2)
Min. volume flow	Q_{min} = 0,1 l/min
Hysteresis	≤ 7 % *

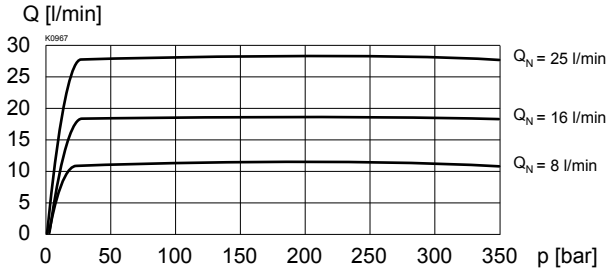
* at optimal dither signal

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

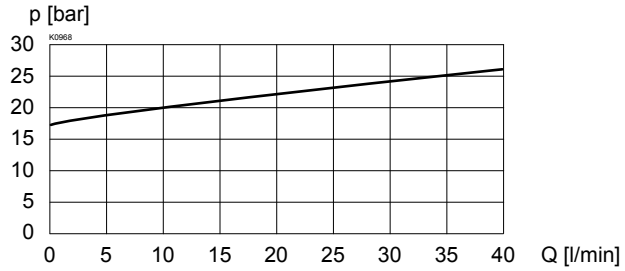
Q = f (I) Volume flow adjustment characteristics 1 → 3 (p_3 = 200 bar)



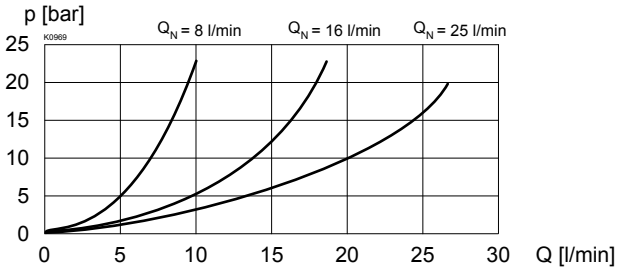
Q = f (p) Volume flow pressure characteristics (I = I_G)



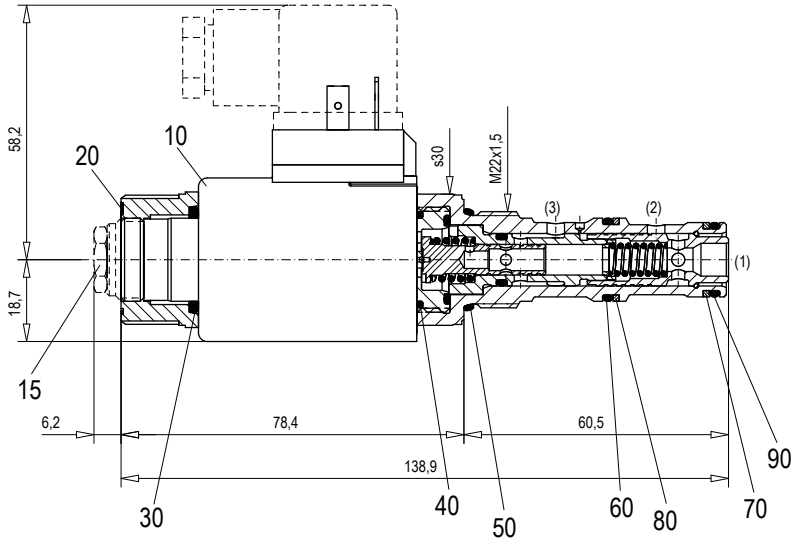
Δp = f (Q) Pressure drop-volume flow characteristics 1 → 2 (I = 0 mA)



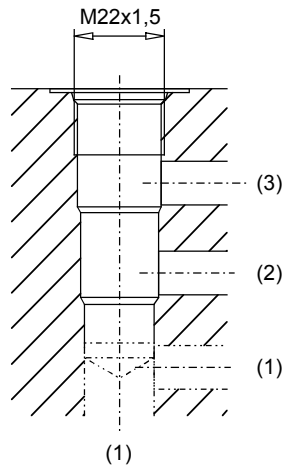
Δp = f (Q) Pressure drop-volume flow characteristics 1 → 3 (I = I_G)



DIMENSIONS / SECTIONAL DRAWINGS



Cavity drawing acc. to
ISO 7789–22–04–0–98



For detailed cavity drawing and
cavity tools see data sheet 2.13-1004

PARTS LIST

Position	Article	Description
10		EN 175301
	206.2201	Solenoid coil WDS37 / 19 x 50-G24
	206.2200	Solenoid coil WDS37 / 19 x 50-G12
		Junior-Timer
	206.2203	Solenoid coil WJS37 / 19 x 50-G24
	206.2202	Solenoid coil WJS37/ 19 x 50-G12
		Deutsch
	206.2205	Solenoid coil WGS37 / 19 x 50-G24
	206.2204	Solenoid coil WGS37 / 19 x 50-G12
15	253.8000	HB 4,5 anual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	154.2700	Knurled nut
30	160.2187	O-ring ID 18,72 x 2,62 (NBR)
	160.6187	O-ring ID 18,72 x 2,62 (FKM)
40	160.2170	O-ring ID 17,17 x 1,78 (NBR)
	160.6172	O-ring ID 17,17 x 1,78 (FKM)
50	160.2188	O-ring ID 18,77 x 1,78 (NBR)
	160.6188	O-ring ID 18,77 x 1,78 (FKM)
60	160.2156	O-ring ID 15,60 x 1,78 (NBR)
	160.6156	O-ring ID 15,60 x 1,78 (FKM)
70	160.2140	O-ring ID 14,00 x 1,78 (NBR)
	160.6141	O-ring ID 14,00 x 1,78 (FKM)
80	049.3196	Backup ring RD 16,1 x 19 x 1,4
90	049.3176	Backup ring RD 14,1 x 17 x 1,4

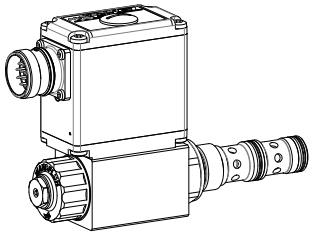
ACCESSORIES

Flange-/sandwich plate NG6	Data sheet 2.6-842
Line mount body	Data sheet 2.9-210
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional 3-way flow control valve
Screw-in cartridge
- **Integrated electronic**
- **Direct operated, pressure compensated**
- **Q_{max} = 40 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 25 l/min**

M22x1,5
ISO 7789



DESCRIPTION

Direct operated, pressure compensated proportional flow control valvewith integrated electronics as a screw-in cartridge with a thread M22x1,5 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. Three flow ranges are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Allmost linear flow increase and low hysteresis are typical for this valve. The cartridge and the solenoid made of steel are zinc coated and therefore rustprotected. The housing for the elctronics 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 NG6. 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 PM22 - □ - □ / M E □ - □ □ # □

Flow control valve		
3-way		
Proportional		
Screw-in thread M33x2		
Nominal volume flow rate Q_N	8 l/min	8
	15 l/min	15
	25 l/min	25
Vominal voltage U_N	12 VDC	G12
	24 VDC	G24
Slip-on coil	Metal housing, square	
Connection execution	Integrated electronics	
Hardware configuration		
With analog signal (0…+10 V factory set)		A1
With CANopen acc. to DSP-408		C1
With Profibus DP in accordance with Fluid Power Technology		P1
With CAN J1939 (on request)		J1
Sealing material	NBR	
	FKM (Vitron)	D1
Manual override	Armature tube closed (standard)	
	Screwed sealing plug	HB0
	Manual emergency actuation	HB4.5
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 M22x1,5
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 = 50 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 1,0 kg
Flow direction	see symbol

HYDRAULIC SPECIFICATIONS

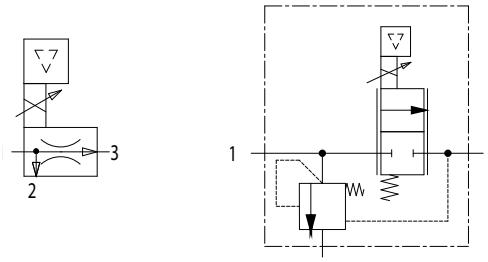
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 8 l/min, 15 l/min, 25 l/min
Max. volume flow	Q_{max} = 40 l/min (1 → 2)
Min. volume flow	Q_{min} = 0,1 l/min
Hysteresis	≤ 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	via fieldbus or USB
Interface	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

SYMBOLS

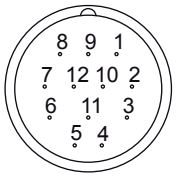
simplified detailed



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:

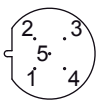
Device receptacle supply (male) X1

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 = 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

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».

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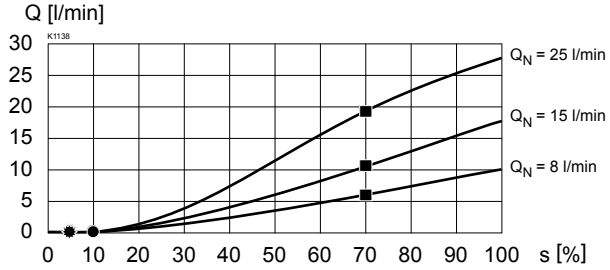
Additional information can be found on our website:
«www.wandfluh.com»

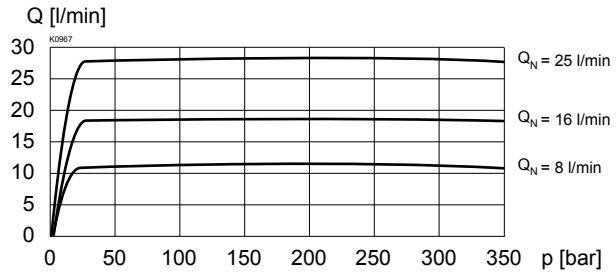
NOTE!
The mating connectors and the cable to adjust the settings are not part of the delivery. Refer to chapter «Accessories».

CHARACTERISTICS Oil viscosity υ = 30mm²/s

Q = f (I) Volume flow adjustment characteristics
[at p=50 bar]
(s corresponds to preset value signal)

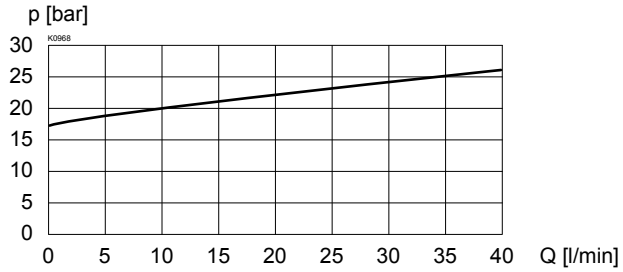


Q = f (p) Volume flow pressure characteristics

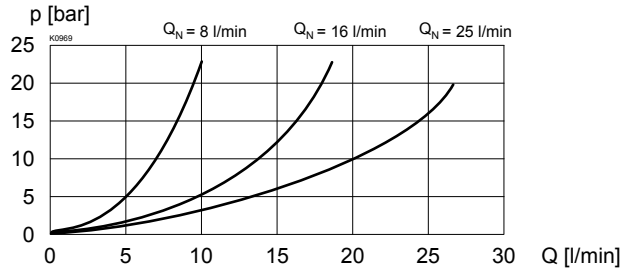


Factory settings:
Dither set for optimal hysteresis
✹ = Deadband: Solenoid switched off with command signal <5%
● = Opening point: at 10%
■ = Flow p = 50 bar with 70 % value signal
18,5 l/min with Q_N = 25 l/min (Q in interface 1 = 30 l/min)
11,0 l/min with Q_N = 15 l/min (Q in interface 1 = 30 l/min)
6,4 l/min with Q_N = 8 l/min (Q in interface 1 = 30 l/min)

Δp = f (Q) Pressure drop volume flow characteristics 1 → 2

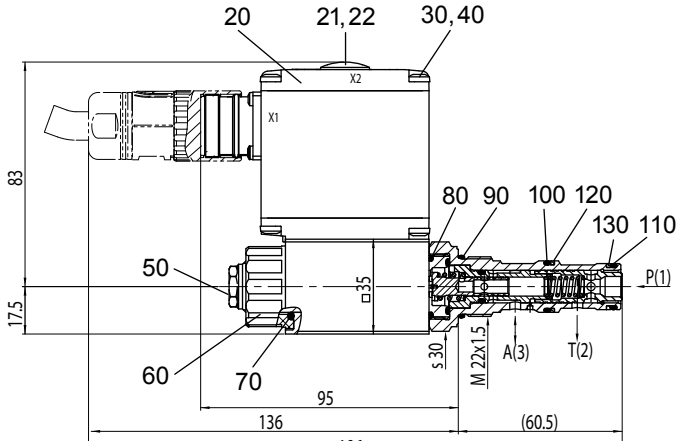


Δp = f (Q) Pressure drop volume flow characteristics 1 → 3

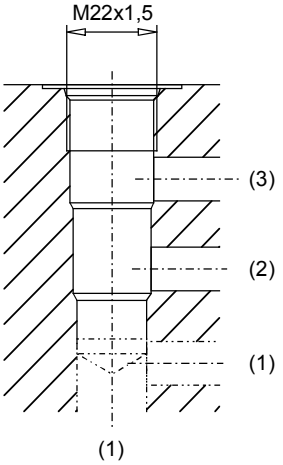


DIMENSIONS / SECTIONAL DRAWINGS

With analog interface

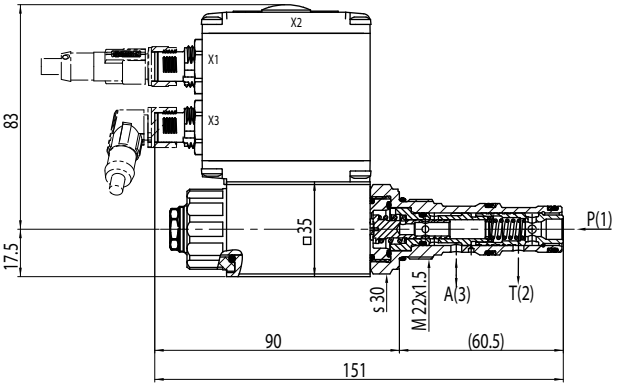


Cavity drawing acc. to
ISO 7789–22–04–0–98



For detailed cavity drawing and cavity tools
see data sheet 2.13-1004

With fieldbus interface



PARTS LIST

Position	Article	Description
20	062.0102	Cover square
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33,2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	253.8000 239.2033	HB 4,5 Manual override (data sheet 1.1-300) HB 0 Plug screw (data sheet 1.1-300)
60	154.2700	Knurled nut
70	160.2187 160.6187	O-ring ID 18,72x2,62 (NBR) O-ring ID 18,72x2,62 (FKM)
80	160.2170 160.6172	O-ring ID 17,17x1,78 (NBR) O-ring ID 17,17x1,78 (FKM)
90	160.2188 160.6188	O-ring ID 18,77x1,78 (NBR) O-ring ID 18,77x1,78 (FKM)
100	160.2156 160.6156	O-ring ID 15,60x1,78 (NBR) O-ring ID 15,60x1,78 (FKM)
110	160.2140 160.6141	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
120	049.3196	Backup ring RD 16,1x19x1,4
130	049.3176	Backup ring RD 14,1x17x1,4

ACCESSORIES

Flange-/sandwich plate NG6 — Data sheet 2.6-842
Line mount body — Data sheet 2.9-210

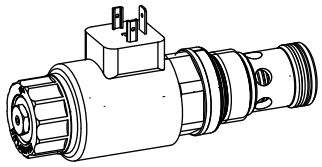
- Set-up software — see start-up
- Cable to adjust the settings through interface USB (from plug type A to Mini B, 3 m) — article no. 219.2896
- Mating connector (plug female) for the analogue interface:
  – straight, soldering contact — article no. 219.2330
  – soldering contact — article no. 219.2331
  Recommended cable size:
  – Outer diameter 9…10,5 mm
  – Single wire max. 1 mm²
  – Recommended wire size:
  0…25 m = 0,75 mm² (AWG18)
  25…50 m = 1 mm² (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».

Proportional 2-way flow control valve
Screw-in cartridge
- **Direct operated, pressure compensated**
- **Q_{max} = 80 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 80 l/min**

M33 x 2
ISO 7789



DESCRIPTION
Direct operated, pressure compensated proportional flow control valve, as a screw-in cartridge with a thread M33x2 for cavity acc. to ISO 7789. Three flow ranges are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Allmost linear flow increase and low hysteresis are typical for this valve. The cartridge body made of steel is special surface coated for corrosion rust protection and low friction of control- and throttle spools. The solenoid coil is zinc-/nickel-coated.

FUNCTION
The 2-way flow control valve is designed to keep the oil flow to any actuator constant irrespective of the load. The force controlled proportional solenoid running in the fluid acts directly on the restrictor spool wich opens the throttling notches in the cartridge body. The throttle opening, and therefore the flow volume changes proportionally to the current absorption of the proportional solenoid. If pressure in the system changes the pressure compensator will change the area of the oil passage to an extend as to keep the pressure drop over the restrictor constant. When the solenoid is with-out courrent, the restrictor spool is held in the closed position by a spring. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

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. The screw-in cartridge is very suitable for mounting in control blocks, flange bodys and sandwich plates size NG10. Stepped tools are available for making the receptacle bores in steel and aluminium (hire or purchase). Please refer to the data sheets in register 2.13.

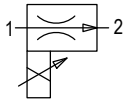
TYPE CODE

Q N P PM33 - ☐ - ☐ / ☐ ☐ - ☐ ☐ # ☐

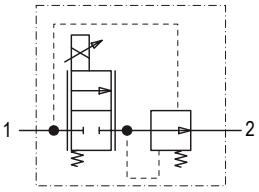
Flow control valve				
Normally closed				
Proportional				
Screw-in cartridge M33 x 2				
Nominal volume flow rate Q_N	32 l/min	32		
	63 l/min	63		
	80 l/min	80		
Nominal voltage U_N	12 VDC		G12	
	24 VDC		G24	
	without coil		X5	
Slip-on coil	Metal housing, round		W	
	Metal housing, square		M*	
Connection execution	Connector socket EN 175301-803 / ISO 4400			D
	Connector socket AMP Junior-Timer			J
	Connector Deutsch DT04-2P			G
Sealing material	NBR			
	FKM (Viton)		D1	
Manual override	Armature tube closed (standard)			
	Screwed sealing plug			HB0
	Manual emergency actuation			HB4.5
Design-Index (Subject to change)				

* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-181)

SYMBOLS
simplified



detailed



GENERAL SPECIFICATIONS

Description	2-way proportional flow control valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operations	Proportional solenoid
Mounting	Screw-in thread M33 x 2
Ambient temperature	-20…50 °C
Mounting position	any
Fastening torque	M_D = 80 Nm for screw-in cartridge M_D = 7 Nm for knurled nut
Weight	m = 0,90 kg
Volume flow direction	1 → 2

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1560 mA	I_G = 780 mA
Relative duty factor	100 % ED / DF (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP65 J: IP66 G: IP67 and 69K	

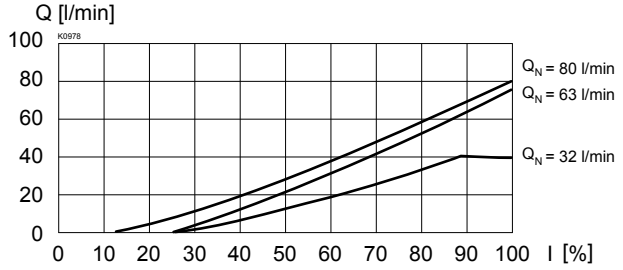
For further electrical specifications see data sheet 1.1-180 (W)
1.1-181 (M)

HYDRAULIC SPECIFICATIONS

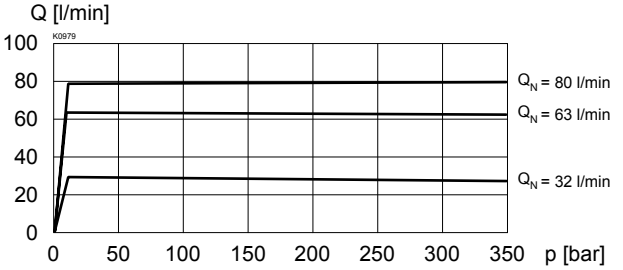
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade ß 6...10 ≥ 75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 32 / 63 / 80 l/min
Max. volume flow	Q_{max} = 80 l/min
Min. volume flow	Q_{min} = 0,2 l/min
Leakage volume flow	see characteristics
Repeatability	≤ 2 %*
Hysterese	≤ 5 %*
	* at optimal dither signal

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

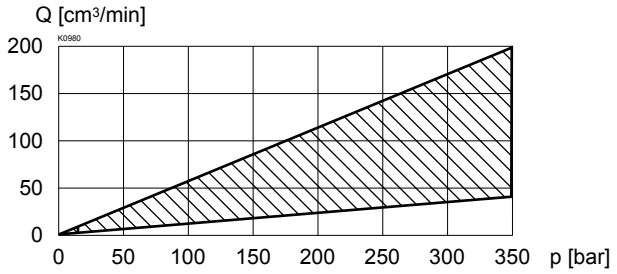
Q = f (I) Volume flow adjustment characteristics



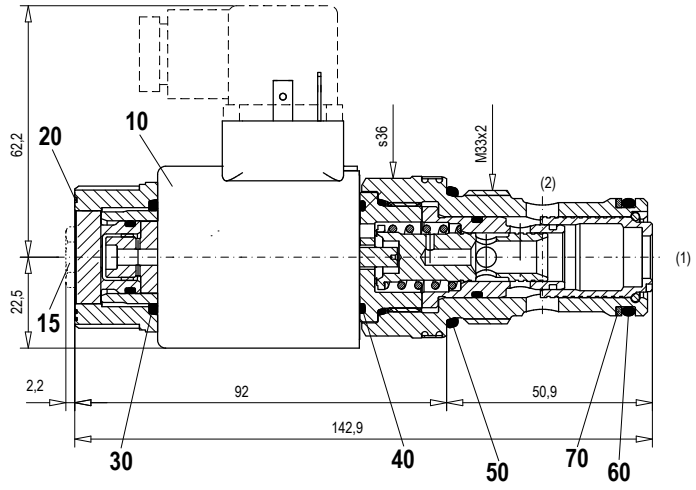
Q = f (p) Volume flow pressure characteristics



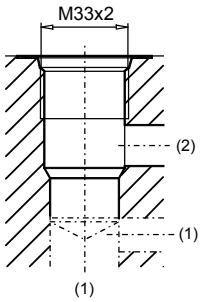
Q_L = f (p) Leakage volume flow characteristics



DIMENSIONS / SECTIONAL DRAWINGS



Cavity drawing accorging to
ISO 7789–33–01–0–98



For detailed cavity drawing
and cavity tools see data sheet 2.13-1005

PARTS LIST

Position	Article	Description
10		EN 175301
	206.1200	Solenoid coil WDS45/23x50-G24
	206.1203	Solenoid coil WDS45/23x50-G12
		Junior-Timer
	206.1201	Solenoid coil WJS45/23x50-G24
	206.1204	Solenoid coil WJS45/23x50-G12
		Deutsch
	206.1202	Solenoid coil WGS45/23x50-G24
	206.1205	Solenoid coil WGS45/23x50-G12
15	253.8000	HB 4,5 Manual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	154.2701	Knurled nut
30	160.2222	O-ring ID 22,22x2,62 (NBR)
	160.6222	O-ring ID 22,22x2,62 (FKM)
40	160.6218	O-ring ID 21,95x1,78 (FKM)
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	049.3297	Back up ring RD 24,5x29x1,4

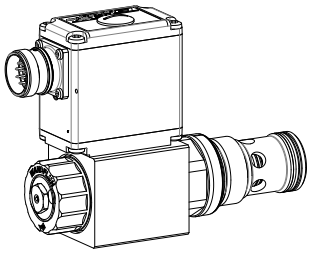
ACCESSORIES

Flange-/sandwich plate	Data sheet 2.6-860
Line mount body	Data sheet 2.9-205
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional 2-way flow control valve
Screw-in cartridge
- **Integrated amplifier electronics**
- **Direct operated, pressure compensated**
- **Q_{max} = 63 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 63 l/min**

M33x2
ISO 7789



DESCRIPTION

Direct operated, pressure compensated proportional flow control valve with integrated electronics as a screw-in cartridge. Thread M33x2 for cavity according to ISO 7789. These plug & play valves are factory set and adjusted. High valve-to-valve reproducibility. Housing for electronic with protection class IP67 for harsh environment. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Allmost linear flow increase and low hysteresis are typical for this valve. The cartridge body made of steel is special surface coated for corrosion rust protection and low friction of control- and throttle spools. The cartridge and the solenoid made of steel are zinc coated and therefore rustprotected. The housing for the elctronics is made of aluminium.

FUNCTION

The 2-way flow control valve is designed to keep the oil flow to any actuator constant irrespective of the load. The throttle opening, and therefore the flow volume changes proportionally to the current absorption of the proportional solenoid. If the pressure in the system changes, the pressure compensator will change the diameter of the oil passage to keep the pressure drop over the restrictor constant. 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 with integrated electronics are well suited for precise feed control systems where the supply volume flow has 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 proportional flow control catridge is very suitable for mounting in control blocks, flange bodies and sandwich plates of the size NG10. Cavity tools are available for machining the cavities in steel and alumini-um (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

Q N P PM33 - [ ] - [ ] / M E [ ] - [ ] [ ] # [ ]

Flow control valve			
Normally closed			
Proportional			
Screw-in thread M33x2			
Nominal volume flow rate Q_N		32 l/min	32
		63 l/min	63
Nominal voltage U_N	12 VDC		G12
	24 VDC		G24
Slip-on coil	Metal housing, square		
Connection execution	Integrated electronics		
Hardware configuration			
With analog signal (0…+10 V factory set)			A1
With CANopen acc. to DSP-408			C1
With Profibus DP in accordance with Fluid Power Technology			P1
With CAN J1939 (on request)			J1
Dichtungswerkstoff	NBR		
	FKM (Vitron)		D1
Manual override	Armature tube closed (standard)		
	Screwed sealing plug		HB0
	Manual emergency actuation		HB4.5
Design-Index (Subject to change)			

GENERAL SPECIFICATIONS

Description	Proportional 2-way 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 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 1,5 kg
Volume flow direction	1 → 2

HYDRAULIC SPECIFICATIONS

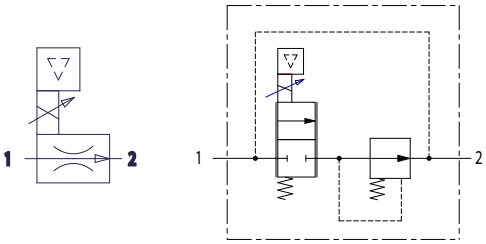
Fluid	Mineral oil, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade ß 6…10≥75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow	Q_N = 32 l/min, 63 l/min
Max. volume flow	Q_{max} = 63 l/min
Min. volume flow	Q_{min} = 0,2 l/min
Leakage volume flow	see characteristics
Repeatability	≤ 2 %
Hysteresis	≤ 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	via fieldbus or USB
Interface	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

SYMBOLS

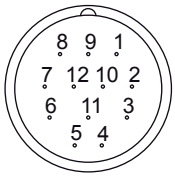
simplified detailed



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:

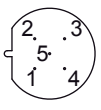
Device receptacle supply (male) X1

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 = 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

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».

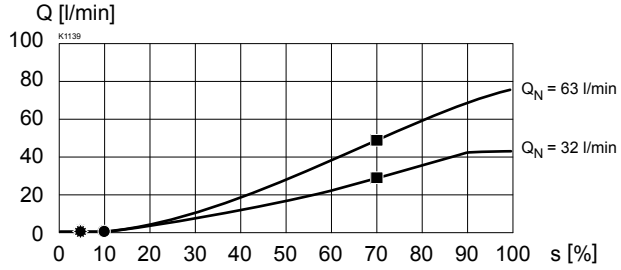
.

Additional information can be found on our website:
«www.wandfluh.com»

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

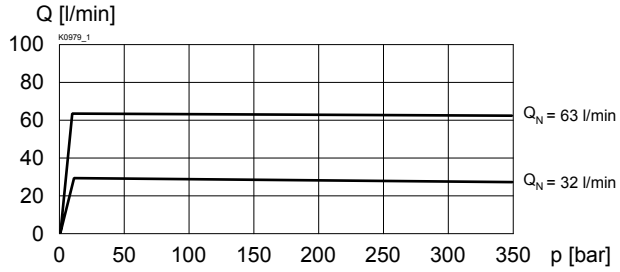
CHARACTERISTICS Oil viscosity υ = 30mm²/s

Q = f (I) Volume flow adjustment characteristics
[at 50 bar difference of pressure]
(s corresponds to preset value signal)

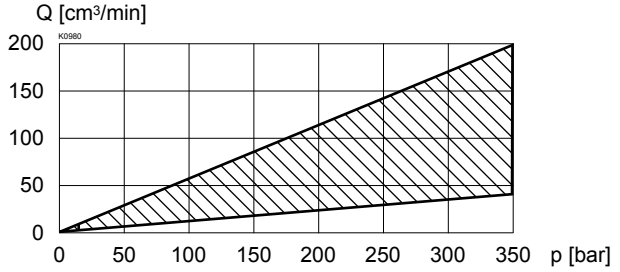


Factory settings:
Dither set for optimal hysteresis
- ✹ = Deadband: Solenoid switched off
  with command preset value signal < 5 %
- ● = Beginning of control: at 10 % of preset vale signal
- ■ = Regulated volume flow at 70 % of preset value signal:
  29,0 l/min with Q_N = 32 l/min
  47,5 l/min with Q_N = 63 l/min

Q = f (p) Volume flow pressure characteristics

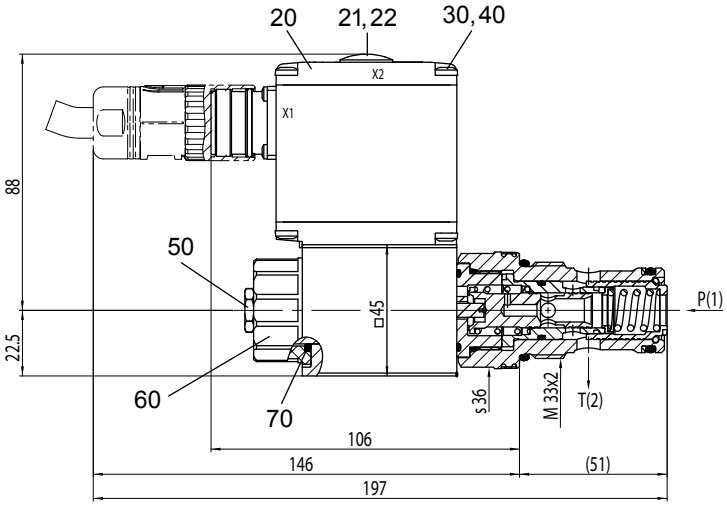


Q_L = f (p) Leakage volume flow characteristics

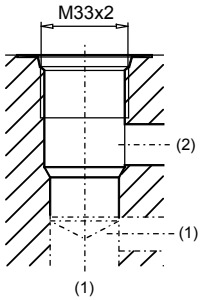


DIMENSIONS / SECTIONAL DRAWINGS

With analog interface

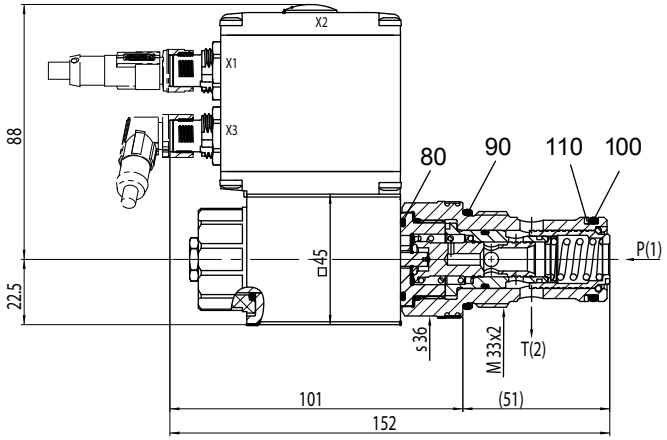


Cavity drawing acc. to
ISO 7789–33–01–0–98



For detailed cavity drawing and cavity tools see data sheet 2.13-1005.

With fieldbus interface



PARTS LIST

Position	Article	Description
20	062.0102	Cover square
21	223.1317	Dummy plug M16x1,5
22	160.6131	O-ring ID 13,00x1,5
30	072.0021	Gasket 33,2x59,9x2
40	208.0100	Socket head cap screw M4x10
50	253.8000 239.2033	HB 4,5 Manual override (data sheet 1.1-300) HB 0 Plug screw (data sheet 1.1-300)
60	154.2700	Knurled nut
70	160.2187 160.6187	O-ring ID 18,72x2,62 (NBR) O-ring ID 18,72x2,62 (FKM)
80	160.6218	O-ring ID 21,95x1,78 (FKM)
90	160.2298 160.6296	O-ring ID 29,82x2,62 (NBR) O-ring ID 29,82x2,62 (FKM)
100	160.2238 160.6238	O-ring ID 23,81x2,62 (NBR) O-ring ID 23,81x2,62 (FKM)
110	049.3297	Back up ring RD 24,5x29x1,4

ACCESSORIES

Flange-/sandwich plate — Data sheet 2.6-860
Line mount body — Data sheet 2.9-205

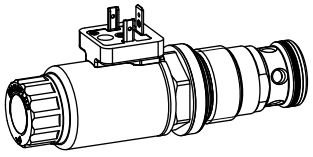
- Set-up software — see start-up
- Cable to adjust the settings through interface USB (from plug type A to Mini B, 3 m) — article no. 219.2896
- Mating connector (plug female) for the analogue interface:
  – straight, soldering contact — article no. 219.2330
  – soldering contact — article no. 219.2331
  Recommended cable size:
  – Outer diameter 9…10,5 mm
  – Single wire max. 1 mm²
  – Recommended wire size:
  0…25 m = 0,75 mm² (AWG18)
  25…50 m = 1 mm² (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».

Proportional flow control valve
Screw-in cardridge
- **Tight seating**
- **Pilot operated**
- **Q_{max} = 100 l/min**
- **P_{max} = 350 bar**

M33x2
ISO 7789



DESCRIPTION

Pilot operated proportional flow control valve with seating function in currentlessly closed switching position. Thread M33x2 for cavity in accordance with ISO 7789. The regulation takes place through a Wandfluh proportional solenoid (VDE-standard 0580). The cartridge body made of steel is zinc coated and therefore rust-protected. The solenoid coil is zinc-/nickel-coated.

FUNCTION

In case of a non-actuated proportional solenoid, the control spool 2 closes seat-tight towards 1. In reverse direction from 1 to 2 the control spool opens like a non-return valve. The proportional solenoid running in oil acts on a small pressure compensating spool, which is pressed onto its seat by a spring. With increasing solenoid current the pilot operation volume flow is increased independent of the load pressure. For the preset pilot operation volume flow to be able to flow, the control spool has to be opened to such an extent, that the small control section areas at the back of the spool allow the corresponding volume to flow through. In case of an equal pilot operation volume flow and a greater load pressure, the control spool carries out a closing movement, so that the control section area becomes smaller and the volume flow remains practically constant.

APPLICATION

The valve is used in hydraulic systems, in which the positioning of loads and the simultaneous controlling of the lowering of these loads are demanded. The insensitivity to load changes and the very small leakage are a great advantage for this purpose. They are ideally used in the bypass to the pump. The sensitive opening - and closing characteristics make possible the smooth controlling of movement sequences in stationary or mobile installations, such as vertical elevators or fork-lift trucks. Cavity tools are available for machining the cavities (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

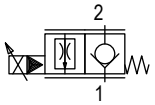
Q S P PM33 - 80 - [ ] / [ ] [ ] - [ ] [ ] # [ ]

Flow control valve			
Poppet spool construction			
Proportional			
Screw-in cartridge M33x2			
Nominal volume flow rate Q_N	80 l/min		
Nominal voltage U_N	12 VDC	G12	
	24 VDC	G24	
	without coil	X5	
Slip-on coil	Metal housing, round	W	
	Metal housing, square	M*	
Electric connection	Connector socket EN 175301-803 / ISO 4400		D
	Connector socket AMP Junior-Timer		J
	Connector Deutsch DT04-2P		G
Sealing material	NBR		
	FKM (Viton)	D1	
Manual override	Armature tube closed (standard)		
	Screwed sealing plug		HB0
	Manual emergency actuation		HB4.5
Design-Index (Subject to change)			

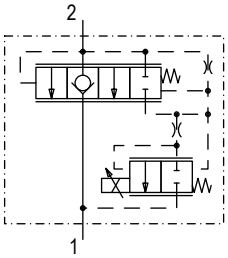
* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-174)

SYMBOLS

simplyfied



detailed



GENERAL SPECIFICATIONS

Description	Pilot proportional operated flow control valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operation	Proportional solenoid
Mounting	Screw-in thread M33x2
Ambient temperature	-20…70 °C
Mounting position	any, preferably horizontal
Fastening torque	M_D = 80 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 0,71 kg
Flow directio	2 → 1

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1320 mA	I_G = 660 mA
Relative duty factor	100 % ED / DF (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	

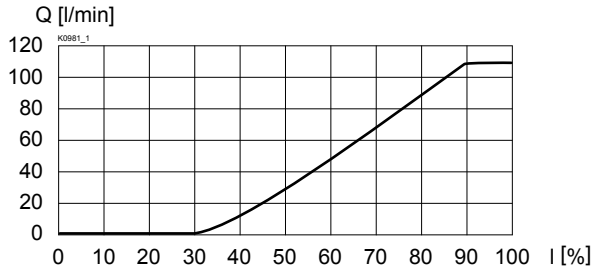
For further electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

HYDRAULIC SPECIFICATIONS

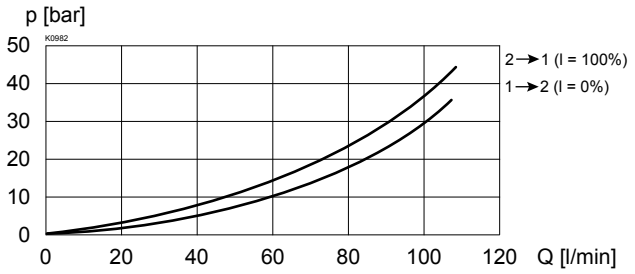
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 80 l/min
Max. Volume flow	see characteristics
Min. pressure drop	see characteristics
Leakage volume flow	see characteristics
Hysteresis	≤ 5% * bei 100 bar * bei optimalem Dithersignal

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

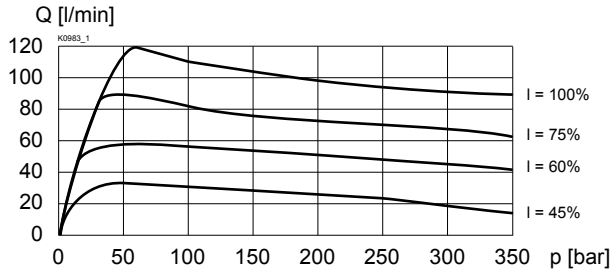
Q = f (I) Volume flow adjustment characteristics (Δp =100 bar)



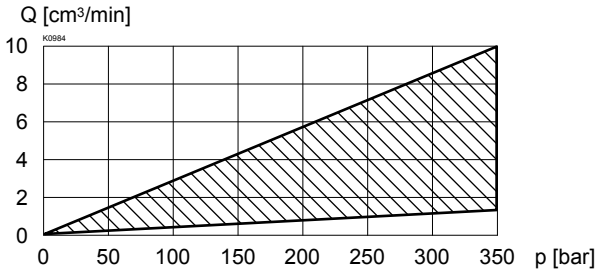
Δp = f (Q) Pressure drop-volume flow curve



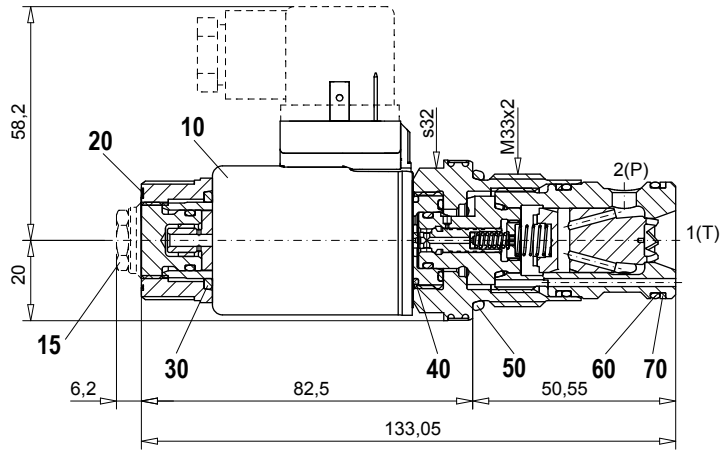
Q = f (p) Pressure drop-volume flow characteristics



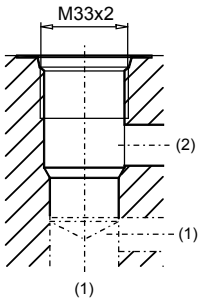
Q_L = f (p) Leakage volume flow curve



DIMENSIONS / SECTIONAL DRAWINGS



Cavity drawing acc. to
ISO 7789–33–01–0–98



For detailed cavity drawing and
cavity tools see data sheet 2.13-1005

Dimensions of the other connection versions see data sheet 1.1-173

PARTS LIST

Position	Article	Description
10		EN 175301
	206.2201	Solenoid coil WD37 / 19 x 50-G24
	206.2200	Solenoid coil WD37 / 19 x 50-G12
		Junior-Timer
	206.2203	Solenoid coil WJ37 / 19 x 50-G24
	206.2202	Solenoid coil WJ37 / 19 x 50-G12
		Deutsch
	206.2205	Solenoid coil WG37 / 19 x 50-G24
	206.2204	Solenoid coil WG37 / 19 x 50-G12
15	253.8000	HB 4,5 Manual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	154.2700	Knurled nut
30	160.2187	O-ring ID 18,72 x 2,62 (NBR)
	160.6187	O-ring ID 18,72 x 2,62 (FKM)
40	160.2170	O-ring ID 17,17 x 1,78 (NBR)
	160.6172	O-ring ID 17,17 x 1,78 (FKM)
50	160.2298	O-ring ID 29,82 x 2,62 (NBR)
	160.8298	O-ring ID 29,82 x 2,62 (FKM)
60	160.2252	O-ring ID 25,12 x 1,78 (NBR)
	160.8252	O-ring ID 25,12 x 1,78 (FKM)
70	049.3296	Backup ring RD 26,1 x 29 x 1,4

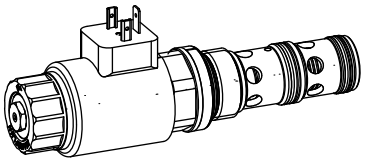
ACCESSORIES

Line mount body	Data sheet 2.9-205
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional 3-way flow control valve
Screw-in cartridge
- **Direct operated, pressure compensated**
- **Q_{max} = 100 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 63 l/min**

M33 x 2
ISO 7789



DESCRIPTION
Direct operated, pressure compensated proportional flow control valve as a screw-in cartridge with a thread M33 x 2 for cavity acc. to ISO 7789. Two flow ranges are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). The cartridge body is made of steel. A special surface treatment guarantees a good protection against corrosion and wear as well as very good low-friction characteristics of the pressure compensating- and throttle spool. The solenoid coil is zinc-/nickel-coated.

FUNCTION
The 3-way flow control valve serves for maintaining the speed of a consumer constant independent of the load. Superfluous pump output flow is fed into the return flow system in a cost saving manner, and as a result, prevents an overheating of the hydraulic system. The power controlled, proportional solenoid running in oil acts directly on the throttle spool, which opens the throttle segments in the cartridge body. Proportional to the current demand of the proportional solenoid, the throttle aperture changes, and with this the volume flow. In case of a current-free solenoid, the throttle spool is held in closed position by a spring. For driving the valve, Wandfluh proportional amplifiers are available (see Register 1.13).

APPLICATION
Proportional flow control valves are suitable for feed control systems, where the consumer flow has to be maintained constant with a changing load. The screw-in cartridge is suitable for installation in control blocs as well as in flange- and sandwich valves of the size NG10. Cavity tools are available for machining the cartridge cavities in steel and aluminium (for hire or for purchase). Please refer to the data sheets in Reg. 2.13 of our documentation.

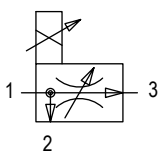
TYPE CODE

Q D P PM33 - [ ] - [ ] / [ ] [ ] - [ ] [ ] # [ ]

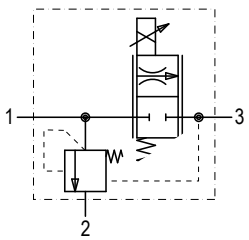
Flow control valve				
3-way				
Proportional				
Screw-in cartridge M33 x 2				
Nominal volume flow rates Q_N	32 l/min	32		
	63 l/min	63		
Nominal voltage U_N	12 VDC	G12		
	24 VDC	G24		
	without coil	X5		
Slip-on coil	Metal housing, round	W		
	Metal housing, square	M*		
Connection execution	Connector socket EN 175301-803 / ISO 4400		D	
	Connector socket AMP Junior-Timer		J	
	Connector Deutsch DT04-2P		G	
Sealing material	NBR			
	FKM (Viton)	D1		
Manual override	Armature tube closed (standard)			
	Screwed sealing plug		HB0	
	Manual emergency actuation		HB4.5	
Design-Index (Subject to change)				

* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-181)

SYMBOLS
simplified



detailed



GENERAL SPECIFICATIONS

Description	3-way proportional flow control valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operation	Proportional solenoid
Mounting	Screw-in thread M33 x 2
Ambient temperature	-20…50 °C
Mounting position	any
Fastening torque	M_D = 80 Nm for screw-in cartridge M_D = 7 Nm for knurled nut
Weight	m = 1,00 kg
Flow direction	see symbol

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1560 mA	I_G = 780 mA
Relative duty factor	100 % ED / DF (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	

For further electrical specifications see data sheet 1.1-180 (W)
1.1-181 (M)

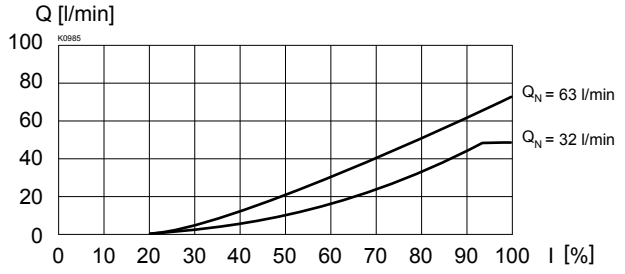
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 32 l/min, 63 l/min
Max. volume flow	Q_{max} = 100 l/min (1 → 2)
Min. volume flow	Q_{min} = 0,4 l/min
Hysteresis	≤ 5 % *

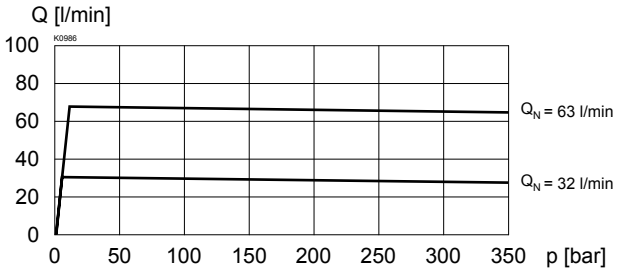
* at optimal dither signal

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

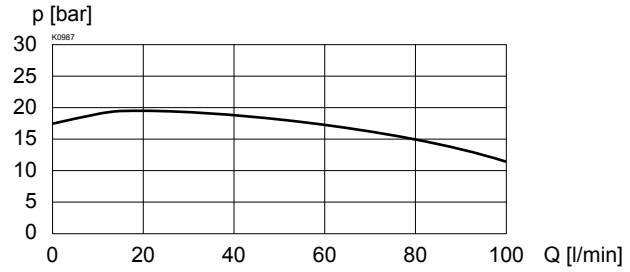
Q = f (I) Volume flow adjustment characteristics 1 → 3 (p_3 = 100 bar)



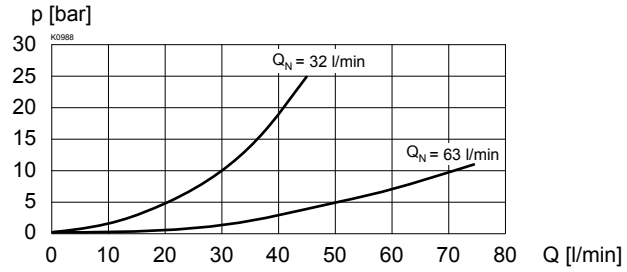
Q = f (p) Volume flow pressure characteristics (I = I_G)



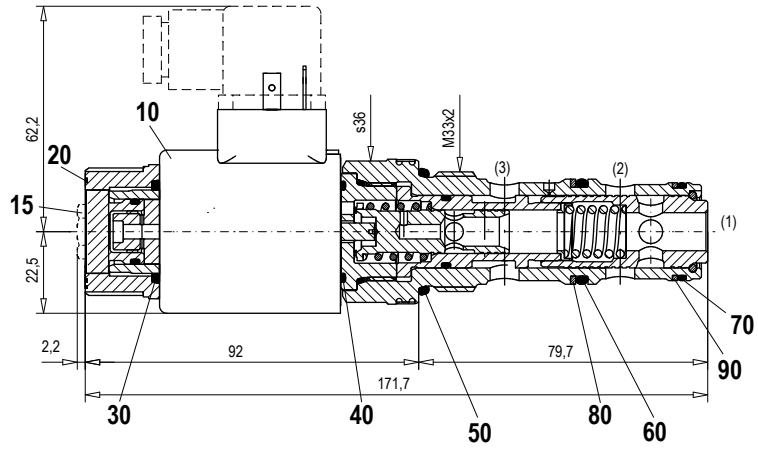
Δp = f (Q) Pressure drop-volume flow characteristics 1 → 2 (I = 0 mA)



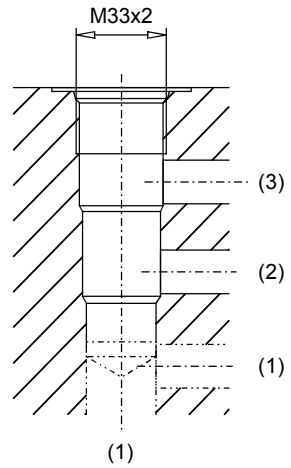
Δp = f (Q) Pressure drop-volume flow characteristics 1 → 3 (I = I_G)



DIMENSIONS / SECTIONAL DRAWINGS



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



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

PARTS LIST

Position	Article	Description
10		EN 175301
	206.1200	Solenoid coil WDS45/23x50-G24
	206.1203	Solenoid coil WDS45/23x50-G12
		Junior-Timer
	206.1201	Solenoid coil WJS45/23x50-G24
	206.1204	Solenoid coil WJS45/23x50-G12
		Deutsch
	206.1202	Solenoid coil WGS45/23x50-G24
	206.1205	Solenoid coil WGS45/23x50-G12
15	253.8000	HB 4,5 anual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	154.2701	Knurled nut
30	160.2222	O-ring ID 22,22x2,62 (NBR)
	160.6222	O-ring ID 22,22x2,62 (FKM)
40	160.6218	O-ring ID 21,95x1,78 (FKM)
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

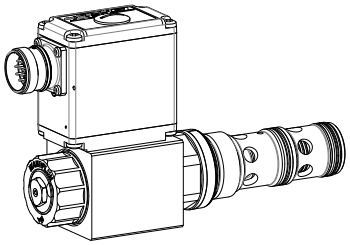
ACCESSORIES

Flange and sandwich bodies	Data sheet 2.6-862
Line mount body	Data sheet 2.9-210
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional 3-way flow control valve
Screw-in cartridge
- **Integrated amplifier electronics**
- **Direct operated, pressure compensated**
- **Q_{max} = 100 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 63 l/min**

M33x2
ISO 7789



DESCRIPTION

Direct operated, pressure compensated proportional flow control valvewith 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). Allmost linear flow increase and low hysteresis are typical for this valve. The cartridge and the solenoid made of steel are zinc coated and therefore rustprotected. The housing for the elctronics 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 ☐ - ☐ ☐ # ☐

Flow control valve			
3-way			
Proportional			
Screw-in thread M33x2			
Nominal volume flow rate Q_N		32 l/min	32
		63 l/min	63
Nominal voltage U_N	12 VDC		G12
	24 VDC		G24
Slip-on coil	Metal housing, square		
Connection execution	Metal housing, square		
Hardware configuration			
With analog signal (0…+10 V factory set)			A1
With CANopen acc. to DSP-408			C1
With Profibus DP in accordance with Fluid Power Technology			P1
With CAN J1939 (on request)			J1
Sealing material	NBR		
	FKM (Vitron)		D1
Manual override	Armature tube closed (standard)		
	Screwed sealing plug		HB0
	Manual emergency actuation		HB4.5
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 Nm for screw-in cartridge M_D = 5 Nm for knurled nut
Weight	m = 1,6 kg
Flow direction	see symbol

HYDRAULIC SPECIFICATIONS

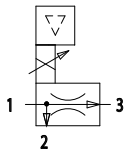
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 32 l/min, 63 l/min
Max. volume flow	Q_{max} = 100 l/min (1 → 2)
Min. volume flow	Q_{min} = 0,2 l/min
Hysteresis	≤ 5 %

ELECTRICAL SPECIFICATIONS

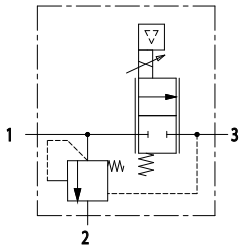
Protection class	IP 67 acc. to EN 60 529 with suitable connector and closed electronics housing
Supply voltage	12 VDC or 24 VDC
Ramps	adjustable
Parameterisation	via fieldbus or USB
Interface	USB (Mini B) for parameterisation with «PASO» under the closing screw of the housing cover, Preset ex-works
Analog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

SYMBOLS

simplified



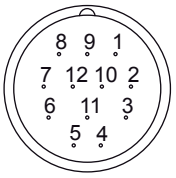
detailed



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:

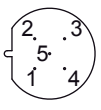
Device receptacle supply (male) X1

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 = 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

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».

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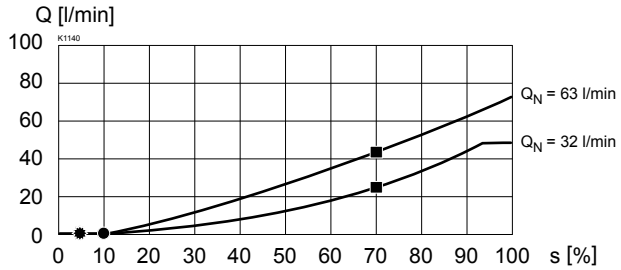
Additional information can be found on our website:
«www.wandfluh.com»

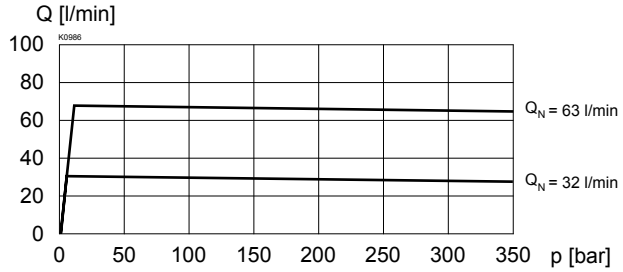
NOTE!
The mating connectors and the cable to adjust the settings are not part of the delivery. Refer to chapter «Accessories».

CHARACTERISTICS Oil viscosity υ = 30mm²/s

Q = f (I) Volume flow adjustment characteristics
[at p=50 bar]
(s corresponds to preset value signal)

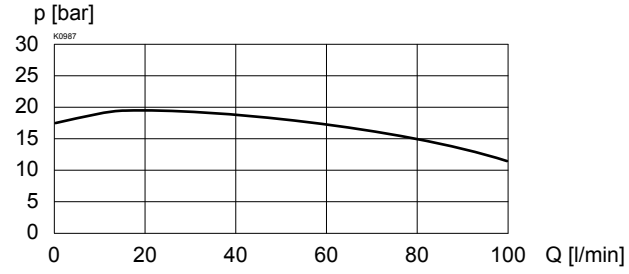


Q = f (p) Volume flow pressure characteristics

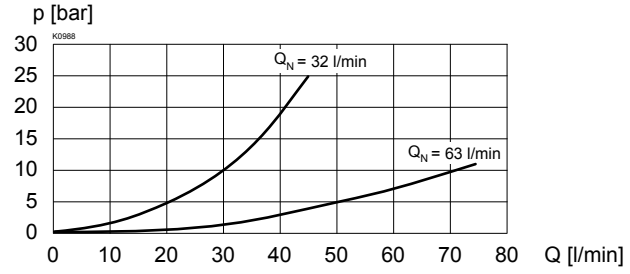


Factory settings:
Dither set for optimal hysteresis
✹ = Deadband: Solenoid switched off with command signal <5%
● = Opening point: at 50%
■ = Flow p = 50 bar with 70 % value signal
42 l/min with Q_N = 25 l/min (Q in interface 1 = 80 l/min)
21 l/min with Q_N = 10 l/min (Q in interface 1 = 40 l/min)

Δp = f (Q) Pressure drop volume flow characteristics 1 → 2

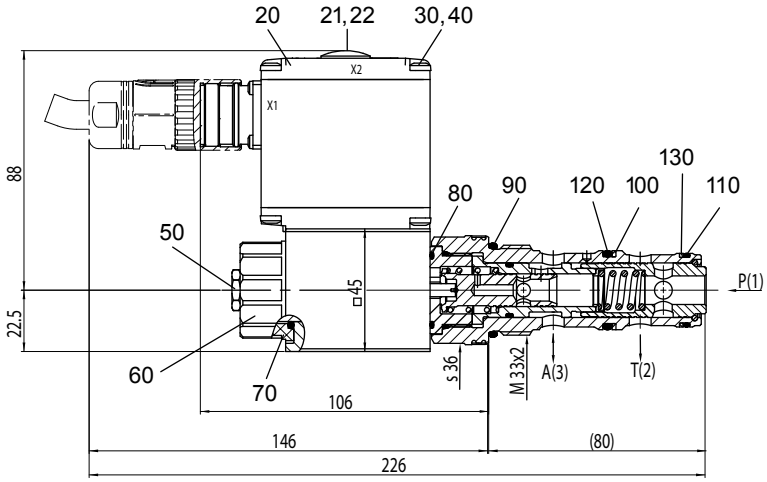


Δp = f (Q) Pressure drop volume flow characteristics 1 → 3

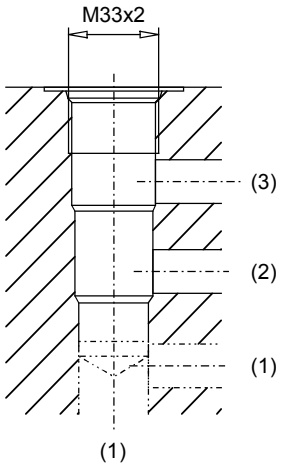


DIMENSIONS / SECTIONAL DRAWINGS

With analog interface

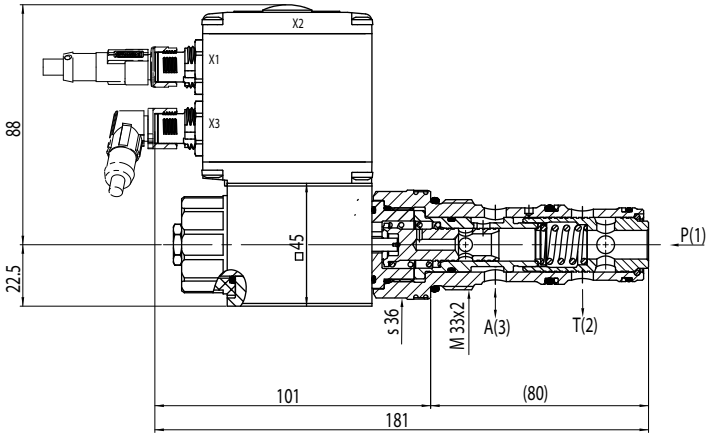


Cavity drawing acc. to
ISO 7789–33–04–0–98



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

With fieldbus interface



PARTS LIST

Position	Article	Description
20	062.0102	Cover square
21	223.1317	Dummy plug M16 x 1,5
22	160.6131	O-ring ID 13,00 x 1,5
30	072.0021	Gasket 33,2 x 59,9 x 2
40	208.0100	Socket head cap screw M4 x 10
50	253.8000 239.2033	HB 4,5 Manual override (data sheet 1.1-300) HB 0 Plug screw (data sheet 1.1-300)
60	154.2700	Knurled nut
70	160.2187 160.6187	O-ring ID 18,72 x 2,62 (NBR) O-ring ID 18,72 x 2,62 (FKM)
80	160.6218	O-ring ID 21,95 x 1,78 (FKM)
90	160.2298 160.6296	O-ring ID 29,82 x 2,62 (NBR) O-ring ID 29,82 x 2,62 (FKM)
100	160.2238 160.6238	O-ring ID 23,81 x 2,62 (NBR) O-ring ID 23,81 x 2,62 (FKM)
110	160.2236 160.6236	O-ring ID 23,52 x 1,78 (NBR) O-ring ID 23,52 x 1,78 (FKM)
120	049.3297	Backup ring RD 24,5 x 29 x 1,4
130	049.3276	Backup ring RD 24,1 x 27 x 1,4

ACCESSORIES

Flange and sandwich bodies — Data sheet 2.6-862
Line mount body — Data sheet 2.9-210

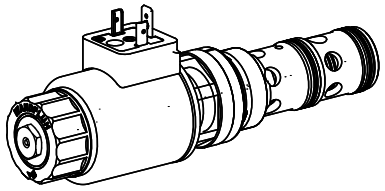
- Set-up software — see start-up
- Cable to adjust the settings through interface USB (from plug type A to Mini B, 3 m) — article no. 219.2896
- Mating connector (plug female) for the analogue interface:
  – straight, soldering contact — article no. 219.2330
  – soldering contact — article no. 219.2331
  Recommended cable size:
  – Outer diameter 9…10,5 mm
  – Single wire max. 1 mm²
  – Recommended wire size:
  0…25 m = 0,75 mm² (AWG18)
  25…50 m = 1 mm² (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».

Proportional 3-way flow control valve
Screw-in cartridge
- **Direct operated, pressure compensated**
- **Q_{max} = 100 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 63 l/min**

$1^5/_{16}$"-12 UN
Wandfluh standard



DESCRIPTION
Direct operated, pressure compensated proportional flow control valve as a screw-in cartridge with a thread $1^5/_{16}$"-12 UN for cavity acc. to Wandfluh standard. Two flow ranges are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). The cartridge body is made of steel. A special surface treatment guarantees a good protection against corrosion and wear as well as very good low-friction characteristics of the pressure compensating- and throttle spool. The solenoid coil is zinc-/nickel-coated.

FUNCTION
The 3-way flow control valve serves for maintaining the speed of a consumer constant independent of the load. Superfluous pump output flow is fed into the return flow system in a cost saving manner, and as a result, prevents an overheating of the hydraulic system. The power controlled, proportional solenoid running in oil acts directly on the throttle spool, which opens the throttle segments in the cartridge body. Proportional to the current demand of the proportional solenoid, the throttle aperture changes, and with this the volume flow. In case of a current-free solenoid, the throttle spool is held in closed position by a spring. For driving the valve, Wandfluh proportional amplifiers are available (see Register 1.13).

APPLICATION
Proportional flow control valves are suitable for feed control systems, where the consumer flow has to be maintained constant with a changing load. The screw-in cartridge is suitable for installation in control blocs.

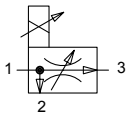
TYPE CODE

Q D P PU16 - ☐ - ☐ / ☐ ☐ - ☐ ☐ # ☐

Flow control valve			
3-way			
Proportional			
Screw-in cartridge $1^5/_{16}$"-12 UN			
Nominal volume flow rate Q_N	32 l/min	32	
	63 l/min	63	
Nominal voltage U_N	12 VDC	G12	
	24 VDC	G24	
	without coil	X5	
Slip-on coil	Metal housing, round	W	
	Metal housing, square	M*	
Connection execution	Connector socket EN 175301-803 / ISO 4400		D
	Connector socket AMP Junior-Timer		J
	Connector Deutsch DT04-2P		G
Sealing material	NBR		
	FKM (Viton)	D1	
Manual override	Armature tube closed (standard)		
	Screwed sealing plug		HB0
	Manual emergency actuation		HB4.5
Design-Index (Subject to change)			

* Only available in conjunction with other nominal voltages and connection versions. (See data sheet 1.1-181)

SYMBOLS
simplified



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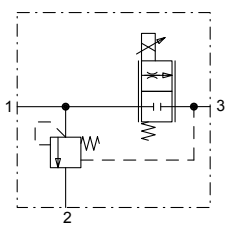


GENERAL SPECIFICATIONS

Description	3-way proportional flow control valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operation	Proportional solenoid
Mounting	Screw-in thread $1^5/_{16}$"-12 UN
Ambient temperature	-20…50 °C
Mounting position	any
Fastening torque	M_D = 80 Nm for screw-in cartridge M_D = 7 Nm for knurled nut
Weight	m = 1,00 kg
Flow direction	see symbol

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1560 mA	I_G = 780 mA
Relative duty factor	100 % ED / DF (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	

For further electrical specifications see data sheet 1.1-180 (W)
1.1-181 (M)

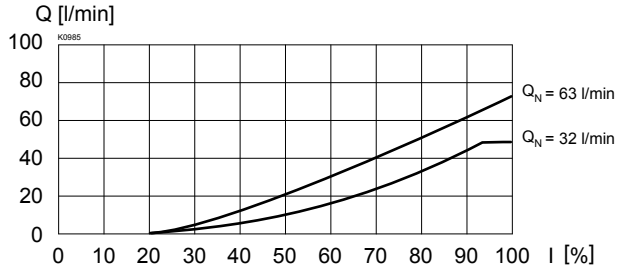
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 32 l/min, 63 l/min
Max. volume flow	Q_{max} = 100 l/min (1 → 2)
Min. volume flow	Q_{min} = 0,4 l/min
Hysteresis	≤ 5 % *

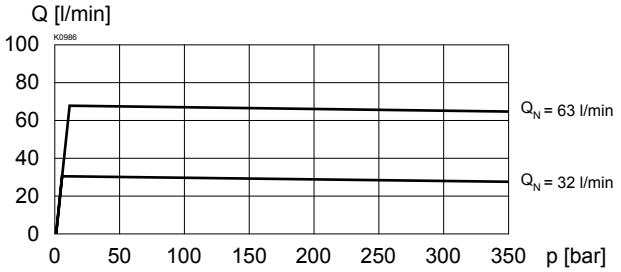
* at optimal dither signal

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

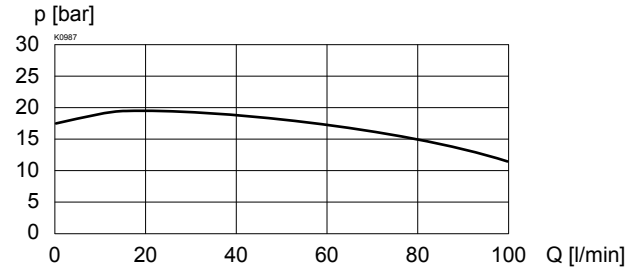
Q = f (I) Volume flow adjustment characteristics 1 → 3 (p_3 = 100 bar)



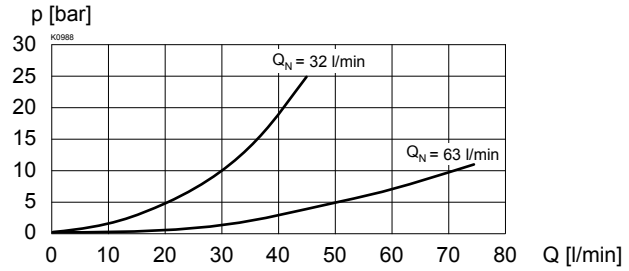
Q = f (p) Volume flow pressure characteristics (I = I_G)



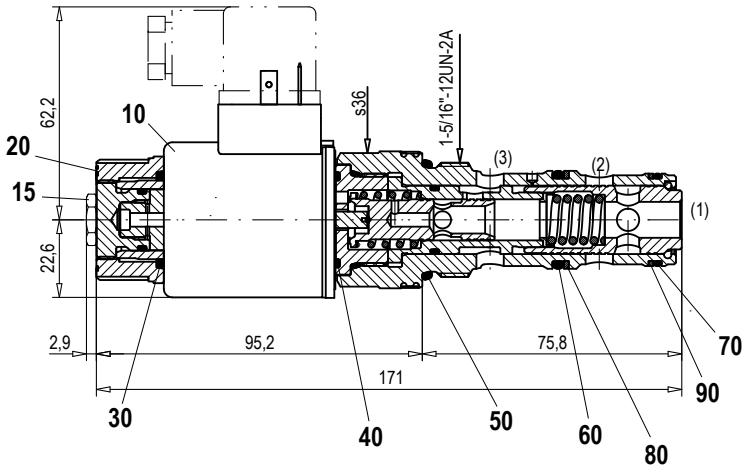
Δp = f (Q) Pressure drop-volume flow characteristics 1 → 2 (I = 0 mA)



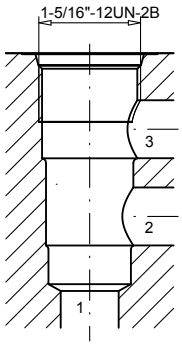
Δp = f (Q) Pressure drop-volume flow characteristics 1 → 3 (I = I_G)



DIMENSIONS / SECTIONAL DRAWINGS



Cavity drawing acc. to
Wandfluh standard



For detailed cavity drawing
see data sheet 2.13-1046

PARTS LIST

Position	Article	Description
10		EN 175301
	206.1200	Solenoid coil WD45/23x50-G24
	206.1203	Solenoid coil WD45/23x50-G12
		Junior-Timer
	206.1201	Solenoid coil WJ45/23x50-G24
	206.1204	Solenoid coil WJ45/23x50-G12
		Deutsch
	206.1202	Solenoid coil WG45/23x50-G24
	206.1205	Solenoid coil WG45/23x50-G12
15	253.8000	HB 4,5 anual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	154.2701	Knurled nut
30	160.6222	O-ring ID 22,22x2,62 (FKM)
40	160.6218	O-ring ID 21,95x1,78 (FKM)
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

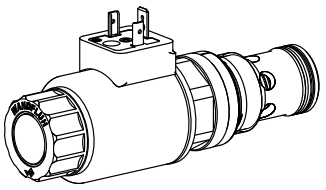
ACCESSORIES

Proportional amplifier — Register 1.13
Mating connector EN 175301-803 — Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional 2-way flow control valve
Screw-in cartridge
- **Direct operated, pressure compensated**
- **Q_{max} = 80 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 80 l/min**

$1^{5}/_{16}$"-12 UN
Wandfluh standard



DESCRIPTION
Direct operated, pressure compensated proportional flow control valve, as a screw-in cartridge with a thread $1^{5}/_{16}$"-12 UN for cavity acc. to Wandfluh standard. Three flow ranges are available. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Allmost linear flow increase and low hysteresis are typical for this valve. The cartridge body made of steel is special surface coated for corrosion rust protection and low friction of control- and throttle spools. The solenoid coil is zinc-/nickel-coated.

FUNCTION
The 2-way flow control valve is designed to keep the oil flow to any actuator constant irrespective of the load. The force controlled proportional solenoid running in the fluid acts directly on the restrictor spool wich opens the throttling notches in the cartridge body. The throttle opening, and therefore the flow volume changes proportionally to the current absorption of the proportional solenoid. If pressure in the system changes the pressure compensator will change the area of the oil passage to an extend as to keep the pressure drop over the restrictor constant. When the solenoid is with-out courrent, the restrictor spool is held in the closed position by a spring. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

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. The screw-in cartridge is very suitable for mounting in control blocks.

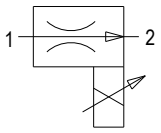
TYPE CODE

Q N P PU16-☐☐/☐☐-☐☐#☐

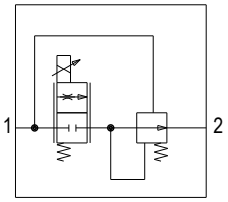
Flow control valve				
Normally closed				
Proportional				
Screw-in cartridge $1^{5}/_{16}$"-12 UN				
Nominal volume flow rate Q_N	32 l/min	32		
	63 l/min	63		
	80 l/min	80		
Nominal voltage U_N	12 VDC		G12	
	24 VDC		G24	
	without coil		X5	
Slip-on coil	Metal housing, round		W	
	Metal housing, square		M*	
Electric connection	Connector socket EN 175301-803 / ISO 4400			D
	Connector socket AMP Junior-Timer			J
	Connector Deutsch DT04-2P			G
Sealing material	NBR			
	FKM (Viton)			D1
Manual override	Armature tube closed (standard)			
	Screwed sealing plug			HB0
	Manual emergency actuation			HB4.5
Design-Index (Subject to change)				

* Only available in conjunction with other nominal voltages and connection versions. (see data sheet 1.1-181)

SYMBOLS



simplified



detailed

GENERAL SPECIFICATIONS

Description	2-way proportional flow control valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operations	Proportional solenoid
Mounting	Screw-in thread $1^{5}/_{16}$"-12 UN
Ambient temperature	-20…50 °C
Mounting position	any
Fastening torque	M_D = 80 Nm for screw-in cartridge M_D = 7 Nm for knurled nut
Weight	m = 0,90 kg
Volume flow direction	1 → 2

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1560 mA	I_G = 780 mA
Relative duty factor	100 % ED / DF (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP65 J: IP66 G: IP67 and 69K	

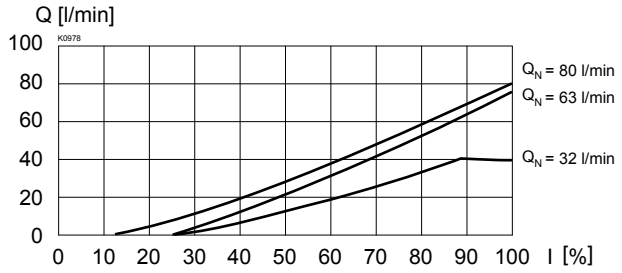
For further electrical specifications see data sheet 1.1-180 (W)
1.1-181 (M)

HYDRAULIC SPECIFICATIONS

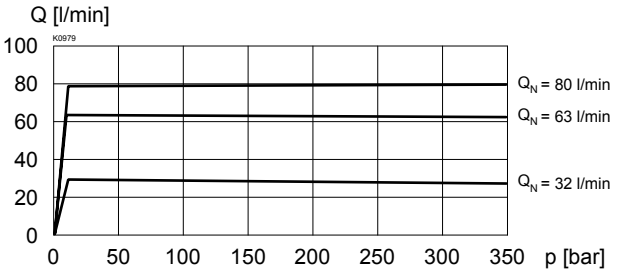
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade ß 6...10 ≥ 75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 32 / 63 / 80 l/min
Max. volume flow	Q_{max} = 80 l/min
Min. volume flow	Q_{min} = 0,2 l/min
Leakage volume flow	see characteristics
Repeatability	≤ 2 %*
Hysterese	≤ 5 %*
	* at optimal dither signal

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

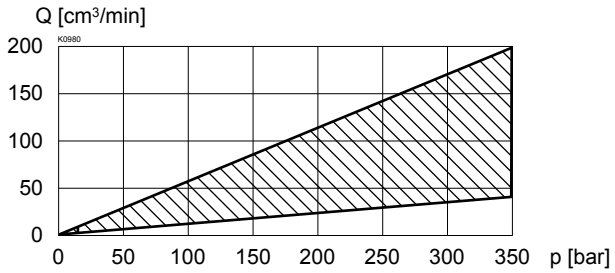
Q = f (I) Volume flow adjustment characteristics



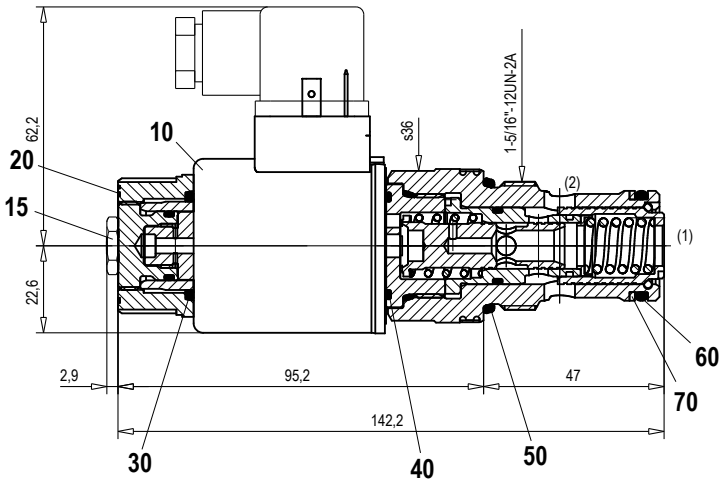
Q = f (p) Volume flow pressure characteristics



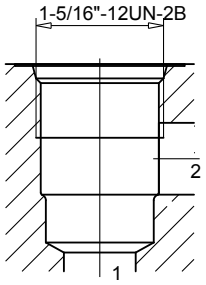
Q_L = f (p) Leakage volume flow characteristics



DIMENSIONS / SECTIONAL DRAWINGS



Cavity drawing accorging to Wandfluh standard



For detailed cavity drawing see data sheet 2.13-1049

PARTS LIST

Position	Article	Description
10		EN 175301
	206.1200	Solenoid coil WD45/23x50-G24
	206.1203	Solenoid coil WD45/23x50-G12
		Junior-Timer
	206.1201	Solenoid coil WJ45/23x50-G24
	206.1204	Solenoid coil WJ45/23x50-G12
		Deutsch
	206.1202	Solenoid coil WG45/23x50-G24
	206.1205	Solenoid coil WG45/23x50-G12
15	253.8000	HB 4,5 Manual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	154.2701	Knurled nut
30	160.6222	O-ring ID 22,22x2,62 (FKM)
40	160.6218	O-ring ID 21,95x1,78 (FKM)
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	049.3297	Back up ring RD 24,5x29x1,4

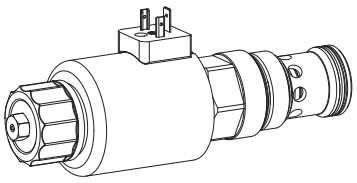
ACCESSORIES

Proportional amplifier — Register 1.13
Mating connector EN 175301-803 — Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional 2-way flow control valve
Screw-in cartridge
- **Direct operated, pressure compensated**
- **Q_{max} = 170 l/min, p_{max} = 350 bar**
- **$Q_{N\ max}$ = 160 l/min**

M42x2
ISO 7789



DESCRIPTION
Direct operated, pressure compensated proportional flow control valve, as a screw-in cartridge with a thread M42x2 for cavity acc. to ISO 7789. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). Allmost linear flow increase and low hysteresis are typical for this valve. The cartridge body made of steel is special surface coated for corrosion rust protection and low friction of control- and throttle spools. The solenoid coil is zinc coated.

FUNCTION
The 2-way flow control valve is designed to keep the oil flow to any actuator constant irrespective of the load. The force controlled proportional solenoid running in the fluid acts directly on the restrictor spool wich opens the throttling notches in the cartridge body. The throttle opening, and therefore the flow volume changes proportionally to the current absorption of the proportional solenoid. If pressure in the system changes the pressure compensator will change the area of the oil passage to an extend as to keep the pressure drop over the restrictor constant. When the solenoid is with-out courrent, the restrictor spool is held in the closed position by a spring. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

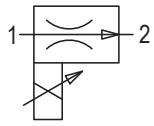
APPLICATION
Proportional flow control valves are suitable for precise feed control system where the supply volume flow needs to be kept constant even when the load fluctuates. The screw-in cartridge is very suitable for mounting in control blocks.

TYPE CODE

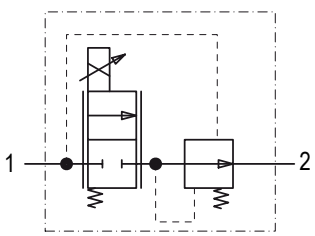
Q N P PM42 - 160 - ☐ / W ☐ - ☐ ☐ # ☐

Flow control valve		
Normally closed		
Proportional		
Screw-in cartridge M42x2		
Nominal volume flow rates Q_N	160 l/min	
Standard nominal voltage U_N	12 VDC	G12
	24 VDC	G24
	without solenoid coil	X5
Slip-on coil	Metal housing, round	
Electric connection	Connector socket EN 175301-803 / ISO 4400	D
	Connector Deutsch DT04-2P	G
Sealing material	NBR	
	FKM (Viton)	D1
Manual override	With screwed sealing plug	HB0
	With manual emergency actuation	HC8.5
Design-Index (Subject to change)		

SYMBOLS
simplified



detailed



GENERAL SPECIFICATIONS

Description	2-way proportional flow control valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operations	Proportional solenoid
Mounting	Screw-in thread M42x2
Ambient temperature	-20…+70 °C
Mounting position	beliebig
Fastening torque	M_D = 100 Nm for screw-in cartridge
	M_D = 5 Nm for knurled nut
Weight	m = 2,26 kg
Volume flow direction	1 → 2

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 2510 mA	I_G = 1250 mA
Relative duty factor	100 % ED/DF (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP65 G: IP67 and 69K	

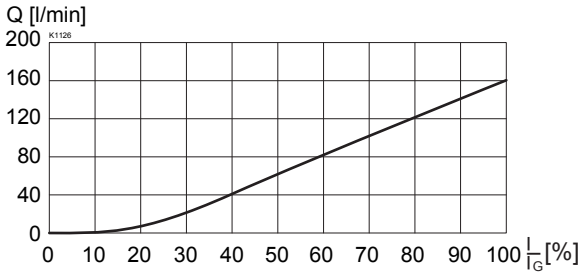
For further electrical specifications see data sheet 1.1-191

HYDRAULIC SPECIFICATIONS

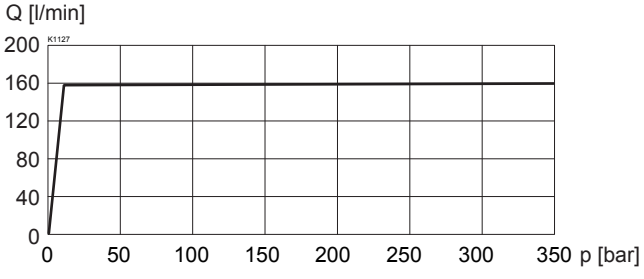
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade ß 6...10 ≥ 75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 160 l/min
Max. volume flow	Q_{max} = 170 l/min
Min. volume flow	Q_{min} = 0,5 l/min
Leakage volume flow	see characteristics
Repeatability	≤ 2 %*
Hysterese	≤ 5 %*
	* at optimal dither signal

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

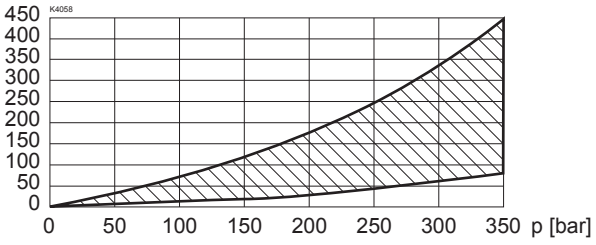
Q = f (I) Volume flow adjustment characteristics



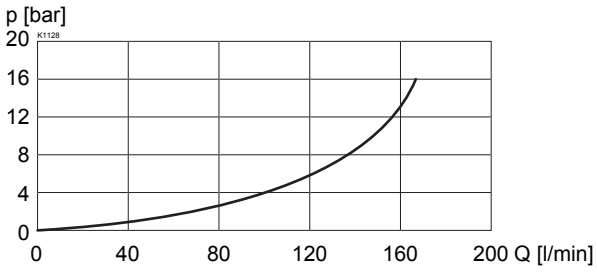
Q = f (p) Volume flow pressure characteristics



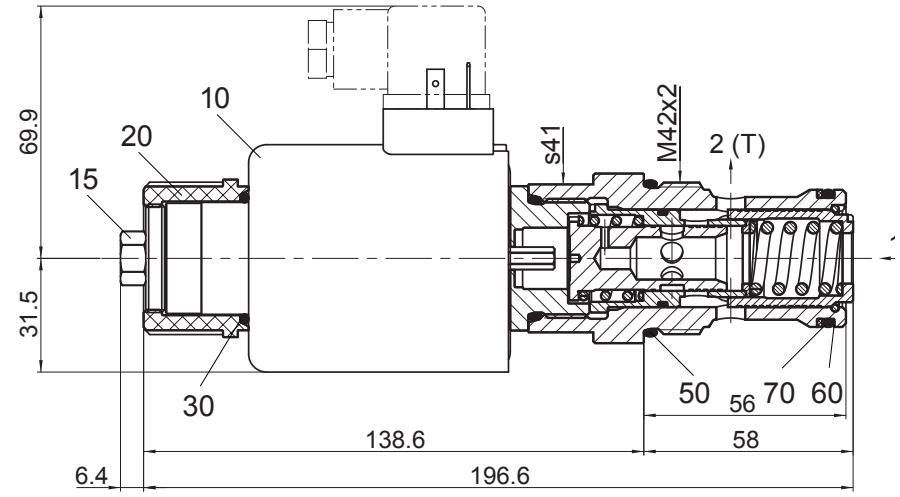
Q_L = f (p) Leakage volume flow characteristics



Δp = f (Q) Pressure drop volume flow characteristics

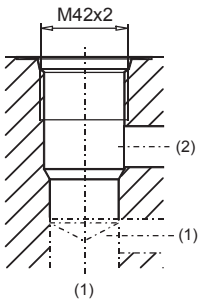


DIMENSIONS / SECTIONAL DRAWINGS



Dimensions of the other connection versions see data sheet 1.1-191

Cavity drawing accorging to
ISO 7789–42–01–0–07



For detailed cavity drawing
see data sheet 2.13-1050

PARTS LIST

Position	Article	Description
10		EN 175301
	206.3209	Solenoid coil WDS63/31x72-G24
	206.3208	Solenoid coil WDS63/31x72-G12
		Deutsch
	206.3211	Solenoid coil WGS63/31x72-G24
	206.3210	Solenoid coil WGS63/31x72-G12
15	253.8022	HC 8,5 Manual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	153.0803	Knurled nut
30	160.8310	O-ring ID 31,00x2,50 (FKM)
50	160.2377	O-ring ID 37,77x2,62 (NBR)
	160.8378	O-ring ID 37,77x2,62 (FKM)
60	160.2329	O-ring ID 32,99x2,62 (NBR)
	160.6325	O-ring ID 32,99x2,62 (FKM)
70	049.3384	Back up ring RD 33,5x38x1,4

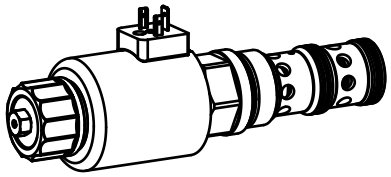
ACCESSORIES

Line mount body Data sheet	2.9-205
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional 3-way flow control valve
Screw-in cartridge
- **Direct operated, pressure compensated**
- **Q_{max} = 200 l/min, p_{max} = 350 bar**
- **$Q_{N\,max}$ = 160 l/min**

M42 x 2
ISO 7789



DESCRIPTION
Direct operated, pressure compensated proportional flow control valve as a screw-in cartridge with a thread M42 x 2 for cavity acc. to ISO 7789. The volume flow is adjusted by a Wandfluh proportional solenoid (VDE standard 0580). The cartridge body is made of steel. A special surface treatment guarantees a good protection against corrosion and wear as well as very good low-friction characteristics of the pressure compensating- and throttle spool. The solenoid coil is zinc-coated.

FUNCTION
The 3-way flow control valve serves for maintaining the speed of a consumer constant independent of the load. Superfluous pump output flow is fed into the return flow system in a cost saving manner, and as a result, prevents an overheating of the hydraulic system. The power controlled, proportional solenoid running in oil acts directly on the throttle spool, which opens the throttle segments in the cartridge body. Proportional to the current demand of the proportional solenoid, the throttle aperture changes, and with this the volume flow. In case of a current-free solenoid, the throttle spool is held in closed position by a spring. For driving the valve, Wandfluh proportional amplifiers are available (see Register 1.13).

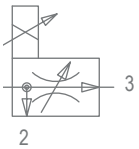
APPLICATION
Proportional flow control valves are suitable for feed control systems, where the consumer flow has to be maintained constant with a changing load. The screw-in cartridge is suitable for installation in control blocs.

TYPE CODE

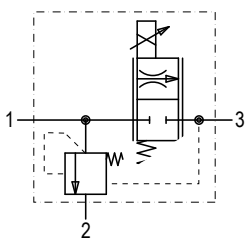
Q D P PM42 - 160 - ☐ / W ☐ - ☐ ☐ # ☐

Flow control valve			
3-way			
Proportional			
Screw-in cartridge M42 x 2			
Nominal volume flow rate Q_N	160 l/min		
Nominal voltage U_N	12 VDC	G12	
	24 VDC	G24	
	without coil	X5	
Slip-on coil	Metal housing, round		
Connection execution	Connector socket EN 175301-803 / ISO 4400	D	
	Connector Deutsch DT04-2P	G	
Sealing material	NBR		
	FKM (Viton)	D1	
Manual override	Screwed sealing plug		HB0
	Manual emergency actuation		HC8.5
Design-Index (Subject to change)			

SYMBOLS
simplified



detailed



GENERAL SPECIFICATIONS

Description	3-way proportional flow control valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operation	Proportional solenoid
Mounting	Screw-in thread M42 x 2
Ambient temperature	-20…70 °C
Mounting position	any
Fastening torque	M_D = 100 Nm for screw-in cartridge
	M_D = 5 Nm for knurled nut
Weight	m = 2,34 kg
Flow direction	see symbol

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 2510 mA	I_G = 1250 mA
Relative duty factor	100 % ED / DF (see data sheet 1.1-430)	
Protection class acc. to EN 60 529	Connection version D: IP 65 G: IP 67 and 69K	

For further electrical specifications see data sheet 1.1-191

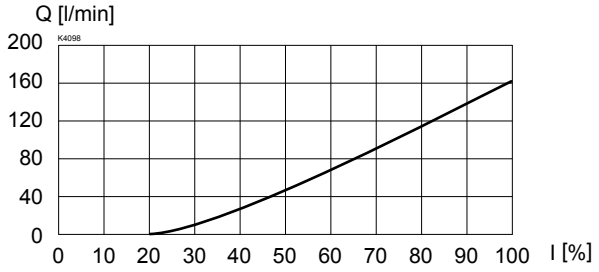
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6…10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/s
Fluid temperature	-20…+70 °C
Peak pressure	p_{max} = 350 bar
Nominal volume flow rates	Q_N = 160 l/min
Max. volume flow	Q_{max} = 200 l/min (1 → 2)
Min. volume flow	Q_{min} = 0,5 l/min
Hysteresis	≤ 5 % *

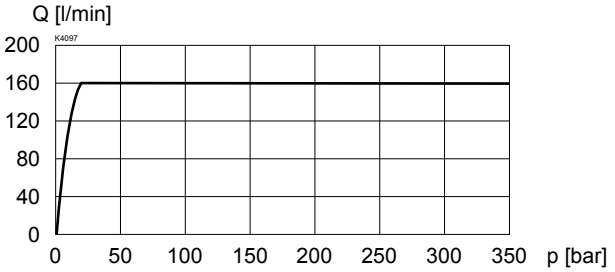
* at optimal dither signal

CHARACTERISTICS Oil viscosity ν = 30 mm²/s

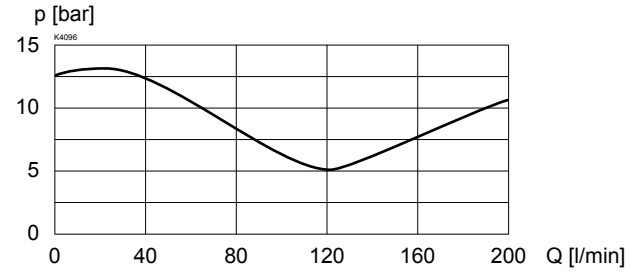
Q = f (I) Volume flow adjustment characteristics 1 → 3 (p_3 = 100 bar)



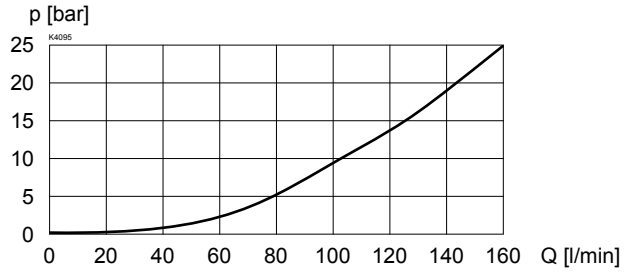
Q = f (p) Volume flow pressure characteristics (I = I_G)



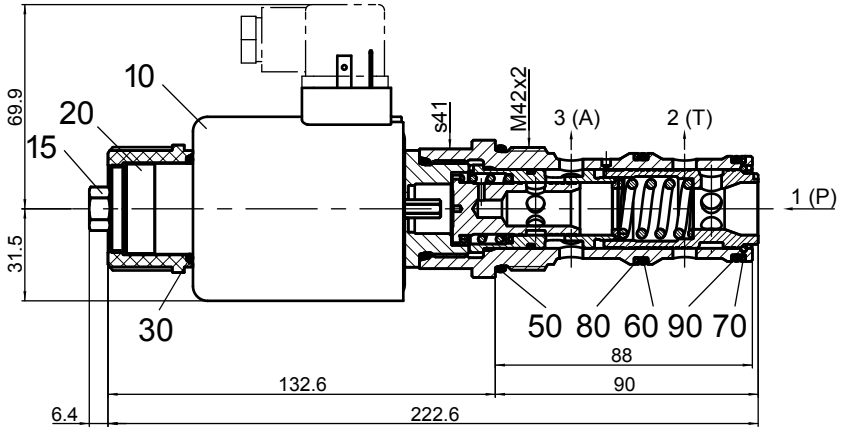
Δp = f (Q) Pressure drop-volume flow characteristics 1 → 2 (I = 0 mA)



Δp = f (Q) Pressure drop-volume flow characteristics 1 → 3 (I = I_G)

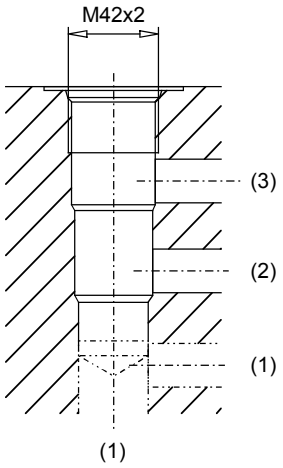


DIMENSIONS / SECTIONAL DRAWINGS



Dimensions of the other connection versions see data sheet 1.1-191

Cavity drawing acc. to
ISO 7789–42–04–0–07



For detailed cavity drawing see data sheet 2.13-1047

PARTS LIST

Position	Article	Description
10		EN 175301
	206.3209	Solenoid coil WDS63/31x72-G24
	206.3208	Solenoid coil WDS63/31x72-G12
		Deutsch
	206.3211	Solenoid coil WGS63/31x72-G24
	206.3210	Solenoid coil WGS63/31x72-G12
15	253.8022	HC 8,5 anual override (data sheet 1.1-300)
	239.2033	HB 0 Plug screw (data sheet 1.1-300)
20	153.0803	Knurled nut
30	160.8310	O-ring ID 31,00x2,50 (FKM)
50	160.2377	O-ring ID 37,77x2,62 (NBR)
	160.8378	O-ring ID 37,77x2,62 (FKM)
60	160.2329	O-ring ID 32,99x2,62 (NBR)
	160.6325	O-ring ID 32.99x2,62 (FKM)
70	160.2314	O-ring ID 31,42x2,62 (NBR)
	160.6315	O-ring ID 31,42x2,62 (FKM)
80	049.3384	Backup ring RD 33,5x38x1,4
90	049.3364	Backup ring RD 31,5x36x1,4

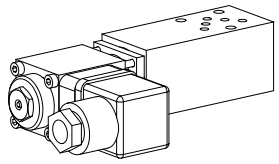
ACCESSORIES

Line mount body Data sheet	2.9-210
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional throttle valve
Flange and sandwich construction
- **Direct operated, not pressure compensated**
- **Throttle in one flow direction**
- **Q_{max} = 12 l/min, p_{max} = 250 bar**
- **$Q_{N\ max}$ = 6,3 l/min**

NG3-Mini®



DESCRIPTION
Directly operated proportional throttle valve in flange or sandwich construction. Screw-in cartridge M18x1,5 in accordance with ISO 7789. Function optional „normally closed“ or „normally open“. In sandwich types for A and B line, a by-pass check valve for reversed free flow is in corporated. Two flow ranges are available. The volume flow is adjusted by a proportional solenoid (VDE standard 0580). The valve bodies are in aluminium and the solenoid is zinc coated.

FUNCTION
The force controlled proportional solenoid running in the fluid acts directly on the control spool which opens or closes the triangular shaped throttling notches in the cartridge body. The throttle opening, and therefore the flow volume, changes proportionally to the current absorption of the proportional solenoid. When the solenoid is without current, the control spool is held in the closed position by a spring.
To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION
Proportional throttle valves are suitable for precise feed control systems. An extremely sensitive opening and closing response allows a smooth control of movements in stationary or mobile installations, e.g. machine tools, public vehicles. Mini-3 proportional throttle valves are used where hydraulic systems have to be both ligth and compact.

TYPE CODE

D ☐ P ☐ A03 - ☐ - ☐ - ☐ # ☐

Throttle valve					
Normally closed					N
Normally open					O
Proportional					
Flange construction					F
Sandwich construction					S
Mounting interface acc. to Wandfluh standard, NG3-Mini					
Type list / Function					
Flange construction	Sandwich construction				
A → B	A/B	in P	P	in A	A
		in T	T	in B	B
				in A and B	AB
Nominal volume flow rates Q_N				4 l/min	4
				6,3 l/min	6,3
Nominal voltage U_N		12 VDC	G12	24 VDC	G24
Design-Index (Subject to change)					

GENERAL SPECIFICATIONS

Description	Proportional throttle valve
Nominal size	NG3-Mini acc. to Wandfluh standard
Construction	Flange and sandwich
Operations	Proportional solenoid
Mounting	3 mounting holes for. cyl.screws M4 or double ended screws M4
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...50 °C
Mounting position	any
Fastening torque	M_D = 2,8 Nm (Qual. 8.8), fastening screws M_D = 30 Nm for screw-in cartridge
Weight	Depending on the type m = 0,4...0,7 kg

ELEKTRICAL SPECIFIACATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight.	
Standard-Nominal volt.	U = 12 VDC	U = 24 VDC
Limiting current	I_G = 1080 mA	I_G = 540 mA
Relative duty factor	100% ED (see data sheet 1.1-430)	
Protection class	IP 65 to EN 60 529	
Connection/Power supply	Over device plug connection to ISO 4400/ DIN 43650 (2P+E)	

Other electrical specifications see data sheet 1.1-90 (PI29V)

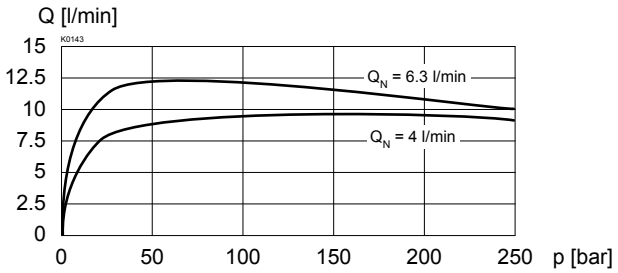
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade ß 6...10 ≥ 75) see data sheet 1.0-50/2
Viscosity range	12 mm²/s...320 mm²/s
Fluid temperature	-20...+70 °C
Peak pressure	p_{max} = 250 bar
Nominal volume flow rates	Q_N= 4 l/min, Q_N= 6,3 l/min at 10 bar pressure drop
Max. Volume flow	Q_{max} = 8 l/min
Leakage volume flow	see data sheet 2.6-510
Resolution	1 mA
Repeatability	≤ 1 % *
Hysteresis	≤ 2 % * * at optimal dithersignal

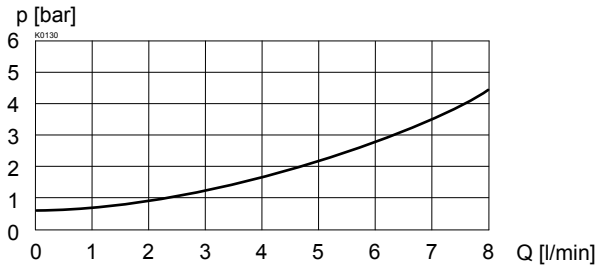
For futher hydraulic specifications see data sheet 2.6-510

CHARACTERISTICS Oil viscosityt υ = 30mm²/s

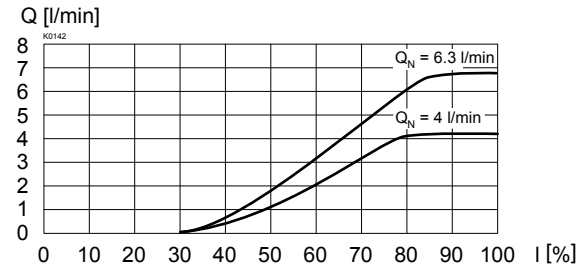
Q = f (p) Volume flow pressure characteristics



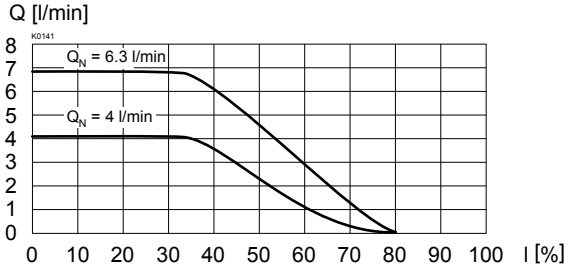
Δp = f (Q) Pressure loss/flow characteristic over non-return valve



Q = f (I) Volume flow adjustment characteristics DNP.A03

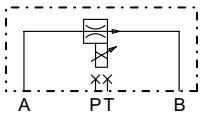


Q = f (I) Volume flow adjustment characteristics DOP.A03

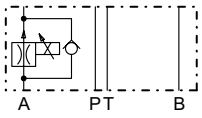


SYMBOLS / DIMENSIONS

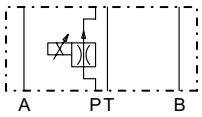
D.PFA03-A/B



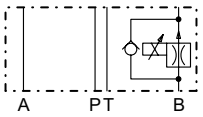
D.PSA03-A



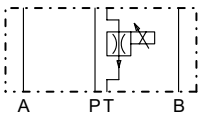
D.PSA03-P



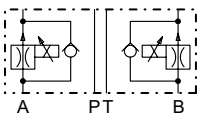
D.PSA03-B



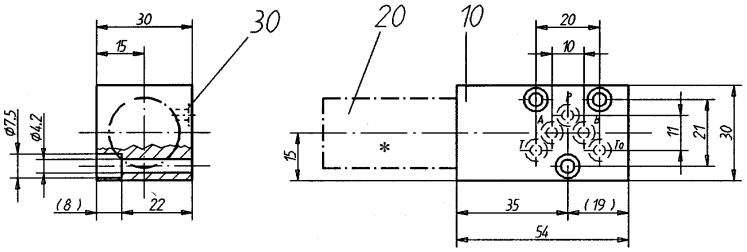
D.PSA03-T



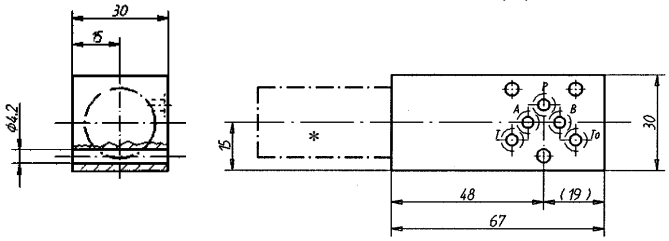
D.PSA03-AB



Flange construction D.PFA03-A/B

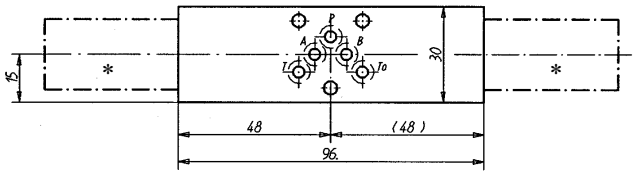


Sandwich construction D.PSA03-P, T, A



On sandwich type D.PSA03-B cartridge is located on B-side

Sandwich construction D.PSA03-AB



* The total lenghts depends on the cartridge type, see data sheet 2.6-510

PARTS LIST

Position	Article	Description
10	128.5201 128.5601 128.5603 128.6601 128.6602 128.6600	Flange plate Sandwich pate P Sandwich pate T Sandwich pate A Sandwich pate B Sandwich pate AB
20	642.1 . . .	Proportional-throttle valve cartridge M18x1,5 see data sheett 2.6-510
30	160.2045	O-ring ID 4,5x1,5

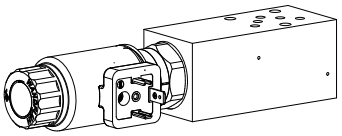
ACCESSORIES

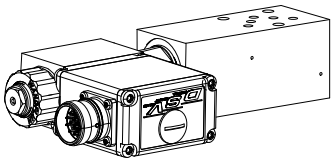
Proportional amplifier Register 1.13

Technical explanation see data sheet 1.0-100

NG4-Mini®

Proportional throttle valve
Flange and sandwich construction
- **Direct operated, not pressure compensated**
- **p_{max} = 350 bar**





DESCRIPTION

Directly operated proportional throttle valve in sandwich construction. Screw-in cartridge M22x1,5 in accordance with ISO 7789. In sandwich types for A and B line, a by-pass check valve for reversed free flow is incorporated. The flange body is painted, the sandwich plates are phosphatised.

FUNCTION

The force controlled proportional solenoid running in the fluid acts directly on the control spool which opens or closes the triangular shaped throttling notches in the cartridge body. The throttle opening, and therefore the flow volume, changes proportionally to the current absorption of the proportional solenoid. When the solenoid is without current, the control spool is held in the closed position by a spring. To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

Proportional throttle valves are suitable for precise feed control systems. An extremely sensitive opening and closing response allows a smooth control of movements in stationary or mobile installations, e.g. machine tools, public vehicles. Mini-4 proportional throttle valves are used where hydraulic systems have to be both ligth and compact.

TYPE CODE

D N P ☐ A04 - ☐ - ☐ # ☐

Throttle valve
Normally closed
Proportional

Flange construction F
Sandwich construction S

Mounting interface acc. to Wandfluh standard, NG4-Mini

Type list / Function

Flange construction		Sandwich construction			
A → B	A/B	in P	P	in A	A
		in T	T	in B	B
				in A and B	AB

Nominal volume flow level, nominal voltage, etc. of the built-in screw-in cartridge

Examples: DNPFA04 - A/B - 6,3 - G24/WD - HBO
DNPSA04 - P - 10 - G12/ME-A1D1

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	Proportional throttle valve
Nominal size	NG4-Mini acc. to Wandfluh standard
Construction	Flange and sandwich
Operations	Proportional solenoid
Mounting	3 mounting holes for. cyl.screws M5 or double ended screws M5
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Weight	Depending on the type m = 0,95...1,2 kg

SCREW-IN CARTRIDGES INSTALLED

The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	*Designation*	*Data sheet no.*	*Q_{max} **
DNPPM22	normally closed	2.6-531	32 l/min
DNPPM22-../ME	normally closed, with integrated electronics	2.6-541	32 l/min

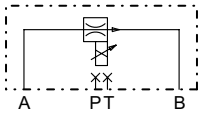
* Can deviate from the values on the data sheets of the screw-in cartridges.

REMARK!
Detailed performance data and additional hydraulic and electric specifications may by drawn from the data sheets of the corresponding installed screw-in cartridge.

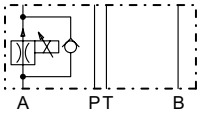
CAUTION!
The performace data, especially the **„pressure-flow-characteristic„** on the data sheets of the screw-in catridges, refer to the screw-in cartridges only. The additional pressure drop of the flange body, resp. sandwich body must be taken into consideration.

SYMBOLS / DIMENSIONS

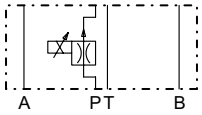
DN.FA04-A/B



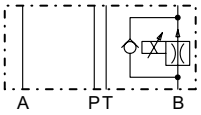
DN.SA04-A



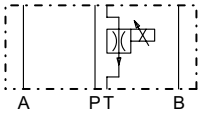
DN.SA04-P



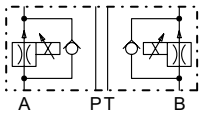
DN.SA04-B

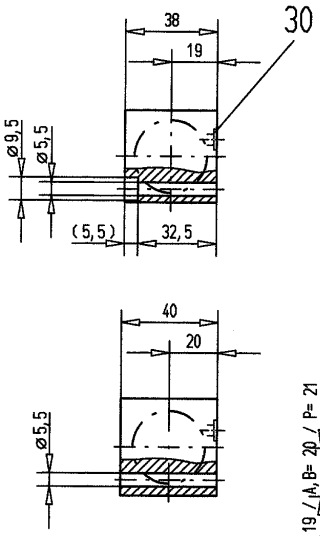


DN.SA04-T

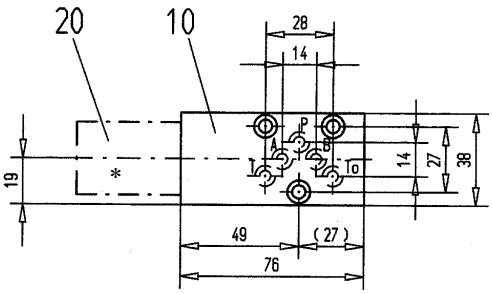


DN.SA04-AB

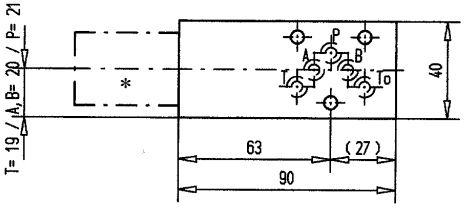




Flange construction DN.FA04-A/B

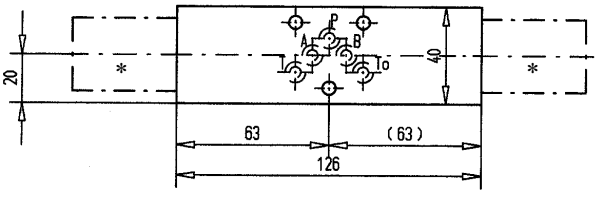


Sandwich construction DN.SA04-P, T, A



On sandwich type DN.SA04-B cartridge is located on B-side

Sandwich construction DN.SA04-AB



* The envelop dimensions of the screw-in cartridge are show on their corresponding data sheets.

PARTS LIST

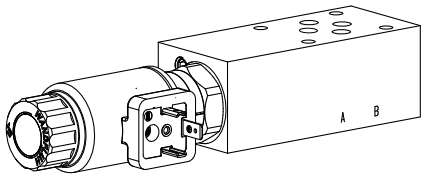
Position	Article	Description
10	130.5200	Flange body
	130.5617	Sandwich plate P
	130.5624	Sandwich plate T
	130.6617	Sandwich plate A
	130.6618	Sandwich plate B
	130.6614	Sandwich plate AB
20	642.3 . . .	Screw-in cartridge
30	160.2052	O-ring ID 5,28x1,78

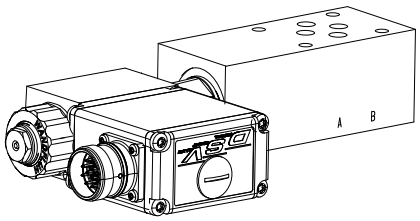
ACCESSORIES

Proportional amplifier Register 1.13
Technical explanation see data sheet 1.0-100

Proportional throttle valve
Flange and sandwich construction
- **Direct operated, not pressure compensated**
- **p_{max} = 350 bar**

NG6
ISO 4401-03





DESCRIPTION
Directly operated proportional throttle valve in sandwich construction. Screw-in cartridge M22x1,5 in accordance with ISO 7789. In sandwich types for A and B line, a by-pass check valve for reversed free flow is in-corporated. Three flow ranges are available. The volume flow is adjusted by a proportional solenoid (VDE standard 0580). The flange body is painted, the sandwich plates are phosphatised.

FUNCTION
The force controlled proportional solenoid running in the fluid acts directly on the control spool which opens or closes the triangular shaped throttling notches in the cartridge body. The throttle opening, and therefore the flow volume, changes proportionally to the current absorption of the proportional solenoid. When the solenoid is without current, the control spool is held in the closed position by a spring.
To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION
Proportional throttle valves are suitable for precise feed control systems. An extremely sensitive opening and closing response allows a smooth control of movements in stationary or mobile installations, e.g. machine tools, public vehicles.

TYPE CODE

D N P ☐ A06 - ☐ - ☐ # ☐

Throttle valve					
Normally closed					
Proportional					
Flange construction					F
Sandwich construction					S
International standard interface ISO, NG6					
Type list / Function					
Flange construction	Sandwich construction				
A → B	A/B	in P	P	in A	A
		in T	T	in B	B
				in A and B	AB

Nominal volume flow level, nominal voltage, etc. of the built-in screw-in cartridge

Examples:
DNPFA06 - A/B - 10 - G24/WD - HB0
DNPSA06 - P - 25 - G12/ME-A1D1

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	Proportional throttle valve
Nominal size	NG6 acc. to ISO 4401-03
Construction	Flange and sandwich
Operations	Proportional solenoid
Mounting	4 mounting holes for. cyl. screws M5 or double ended screws M5
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Weight	Depending on the type m = 1,05...1,65 kg

SCREW-IN CARTRIDGES INSTALLED

The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	*Designation*	*Data sheet no.*	*Q_{max} **
DNPPM22	normally closed	2.6-531	32 l/min
DNPPM22-../ME	normally closed, with integrated electronics	2.6-541	32 l/min

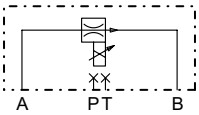
* Can deviate from the values on the data sheets of the screw-in cartridges..

REMARK!
Detailed performance data and additional hydraulic and electric specifications may by drawn from the data sheets of the corresponding installed screw-in cartridge.

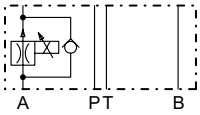
CAUTION!
The performace data, especially the **„pressure-flow-characteristic„** on the data sheets of the screw-in catridges, refer to the screw-in cartridges only. The additional pressure drop of the flange body, resp. sandwich body must be taken into consideration.

SYMBOLS / DIMENSIONS

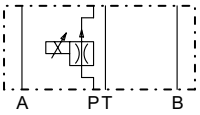
DN.FA06-A/B



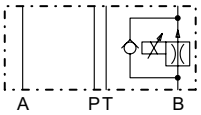
DN.SA06-A



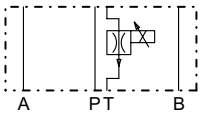
DN.SA06-P



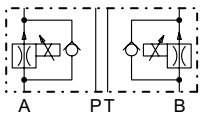
DN.SA06-B



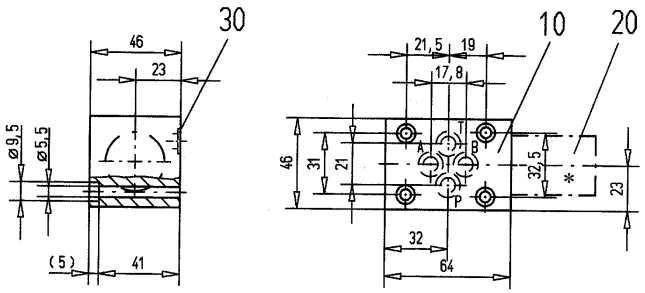
DN.SA06-T



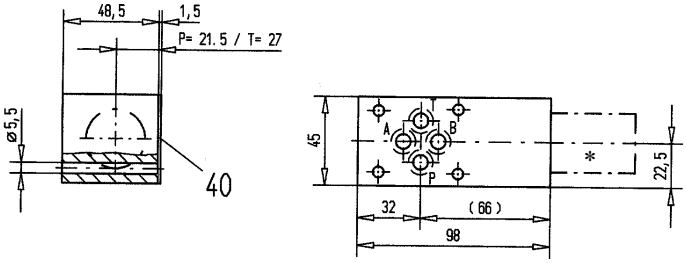
DN.SA06-AB



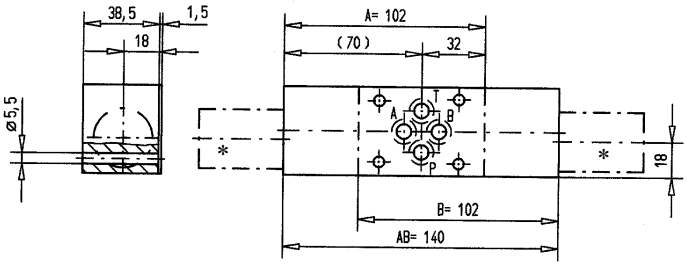
Flange construction DN.FA06-A/B



Sandwich construction DN.SA06-P, T



Sandwich construction DN.SA06-A, B, AB



* The envelop dimensions of the screw-in cartridge are shown on their corresponding data sheets.

PARTS LIST

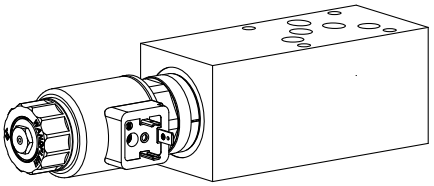
Position	Article	Description
10	134.5202	Flange body
	134.5630	Sandwich pate P, T
	134.6634	Sandwich pate A
	134.6635	Sandwich pate B
	134.6633	Sandwich pate AB
20	642.3 . . .	Screw-in cartridge
30	160.2093	O-ring ID 9,25x1,78
40	173.3650	Sealing plate ADB6

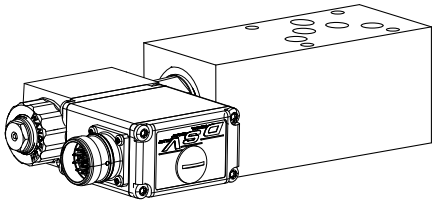
ACCESSORIES

Proportional amplifier Register 1.13
Technical explanation see data sheet 1.0-100

Proportional throttle valve
Flange and sandwich construction
- **Direct operated, not pressure compensated**
- **p_{max} = 350 bar**

NG10
ISO 4401-05





DESCRIPTION
Directly operated proportional throttle valve in sandwich construction. Screw-in cartridge M33x2 in accordance with ISO 7789. In sandwich types for A and B line, a by-pass check valve for reversed free flow is incorporated. The flange body is painted, the sandwich plates are phosphatised.

FUNCTION
The force controlled proportional solenoid running in the fluid acts directly on the control spool which opens or closes the triangular shaped throttling notches in the cartridge body. The throttle opening, and therefore the flow volume, changes proportionally to the current absorption of the proportional solenoid. When the solenoid is without current, the control spool is held in the closed position by a spring.
To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION
Proportional throttle valves are suitable for precise feed control systems. An extremely sensitive opening and closing response allows a smooth control of movements in stationary or mobile installations, e.g. machine tools, public vehicles.

TYPE CODE

D N P ☐ A10 - ☐ - ☐ # ☐

Throttle valve					
Normally closed					
Proportional					
Flange construction	F				
Sandwich construction	S				
International standard interface ISO, NG10					
Type list / Function					
Flange construction		Sandwich construction			
A → B	A/B	in P	P	in A	A
		in T	T	in B	B
				in A and B	AB
Nominal volume flow level, nominal voltage, etc. of the built-in screw-in cartridge					
Examples:		DNPFA10 - A/B -		32 - G24/WD - HB0	
		DNPSA10 - P -		63 - G12/ME-A1D1	
Design-Index (Subject to change)					

GENERAL SPECIFICATIONS

Description	Proportional throttle valve
Nominal size	NG10 acc. to ISO 4401-05
Construction	Flange and sandwich
Operations	Proportional solenoid
Mounting	4 mounting holes for. zyl.screws M6 or double ended screws M6
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Weight	Depending on the type m = 3,0...6,0 kg

SCREW-IN CARTRIDGES INSTALLED

The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	*Designation*	*Data sheet no.*	Q_{max}*
DNPPM33	normally closed	2.6-551	65 l/min
DNPPM33	normally closed, with integrated electronics	2.6-561	65 l/min

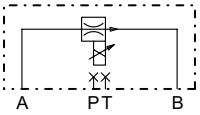
* Can devialte from the values on the data sheets of the screw-in cartridges..

REMARK!
Detailed performance data and additional hydraulic and electric specifications may by drawn from the data sheets of the corresponding installed screw-in cartridge.

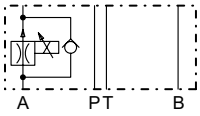
CAUTION!
The performace data, especially the **„pressure-flow-characteristic„** on the data sheets of the screw-in catridges, refer to the screw-in cartridges only. The additional pressure drop of the flange body, resp. sandwich body must be taken into consideration.

SYMBOLS / DIMENSIONS

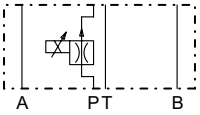
DN.FA10-A/B



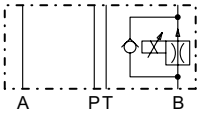
DN.SA10-A



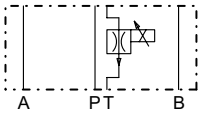
DN.SA10-P



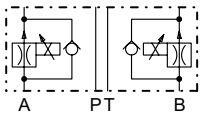
DN.SA10-B



DN.SA10-T

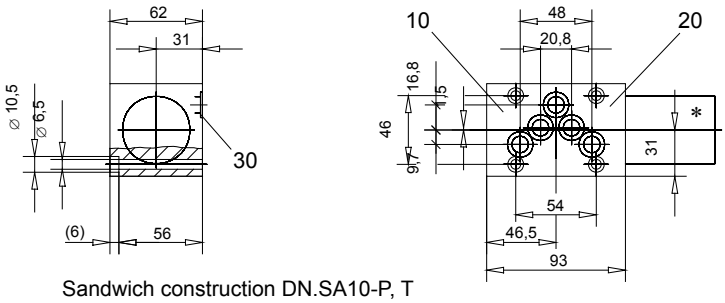


DN.SA10-AB

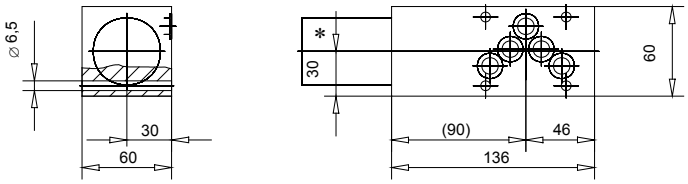


* The envelop dimensions of the screw-in cartridge are shown on their corresponding data sheets.

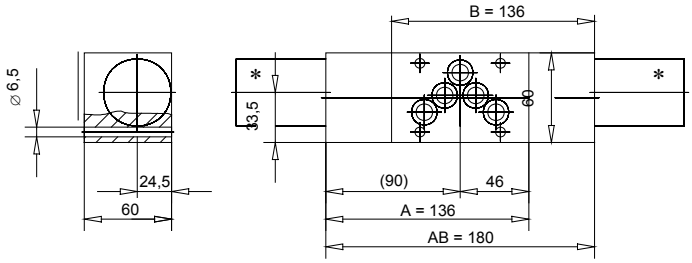
Flange construction DN.FA10-A/B



Sandwich construction DN.SA10-P, T



Sandwich construction DN.SA10-A, B, AB



PARTS LIST

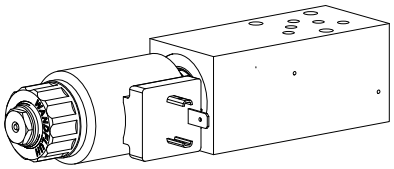
Position	Article	Description
10	136.5201	Flange body
	136.5621	Sandwich pate P
	136.5624	Sandwich pate T
	136.6633	Sandwich pate A
	136.6634	Sandwich pate B
	136.6631	Sandwich pate AB
20	642.8 . . .	Screw-in cartridge
30	160.2140	sandwich construction P, T
30	160.2120	O-Ring ID 12,42x1,78 for sandwich construction A, B, AB
	160.2132	O-Ring ID 13,10x2,62 in line with RV

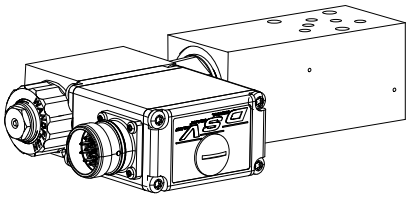
ACCESSORIES

Proportional amplifier Register 1.13
Technical explanation see data sheet 1.0-100

Proportional 2-way flow control valve
Flange- and sandwich construction
- **Direct operated, pressure compensated**
- **p_{max} = 350 bar**

NG4-Mini®





DESCRIPTION

Direct operated, pressure compensated proportional flow control valve in flange- and sandwich construction. Proportional flow control screw-in cartridges M22x1,5 acc. to ISO 7789 are installed. In the sandwich plates for A, B and AB line, a bypass check valve for reversed free flow is installed. A bypass non-return valve plate for the flange valve, for free flow from B to A, can be ordered separately. The flange body is painted, the sandwich plates are phosphatized.

FUNCTION

The 2-way flow control valve with series connected pressure balance (primary controller) serves to maintain the speed of a consumer constant independent of the load.

APPLICATION

Proportional flow control valves in flange- and sandwich construction are suitable for precise feed control systems, where the supply flow has to be maintained constant with a changing load. Depending on the application, a distinction is made between controlling the forward flow or the return flow. Mini-4 proportional flow control valves are used where hydraulic systems have to be both light and compact.

TYPE CODE

Q N P ☐ A04 - ☐ - ☐ # ☐

Flow control valve

Normally closed

Proporional

Flange construction F
Sandwich construction S

Mounting interface acc. to Wandfluh standard, NG4-Mini

Type list / Function

Flange construction		Sandwich construction		Sandwich construction Meter-out flow control		Sandwich construction Meter-in flow control	
A → B	A/B	in P	P	in A	A	in A	AV
		in T	T	in B	B	in B	BV
				in A und B	AB	in A und B	ABV

Nominal volume flow level, nominal voltage, etc. of the built-in screw-in cartridge

Examples: QNPFA04 - A/B - 8 - G24/WD - D1
QNPSA04 - A - 18 - G12/ME - A1

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	Direct operated proportional 2-way flow control valve	
Nominal size	NG4-Mini according to Wandfluh standard	
Construction	Flange- and sandwich construction	
Operation	Proportional solenoid	
Mounting	3 holes for socket cap screws M5 or studs screws M5	
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system	
Weight (without screw-in cartridge)	• Flange type	m = 0,46 kg
	• Sandwich type P,T,A,B	m = 0,95 kg
	• Sandwich type AB	m = 1,22 kg

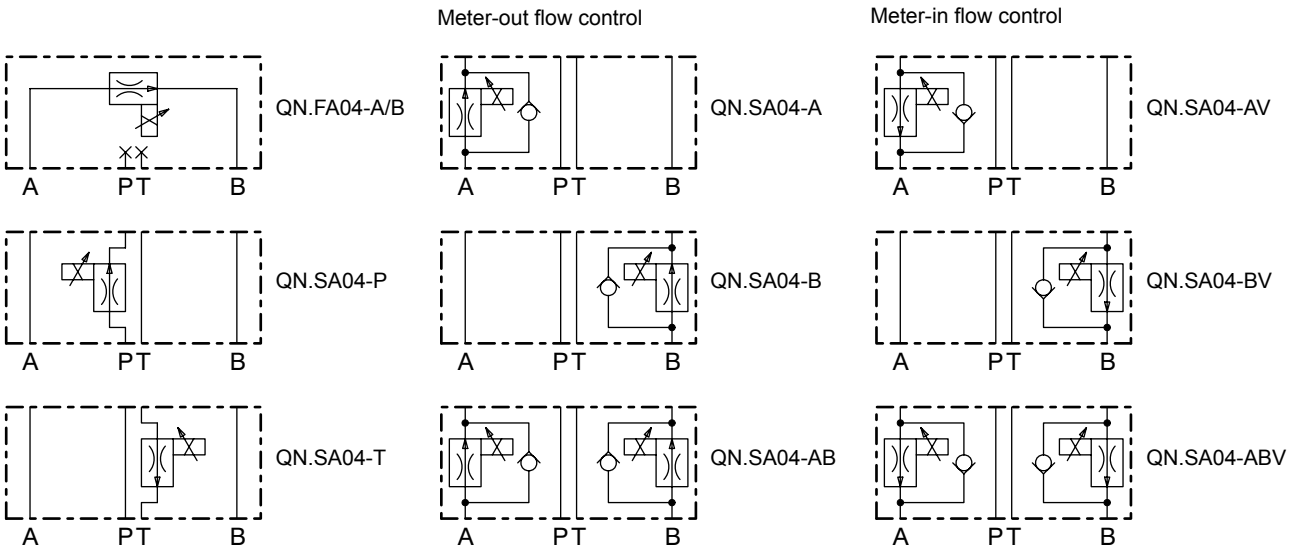
SCREW-IN CARTRIDGES INSTALLED

The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	*Designation*	*Data sheet no.*	Qmax*
QNPPM22	normally closed	2.6-631	25 l/min
QNPPM22-../ME	normally closed, with integrated electronics	2.6-633	25 l/min

* Can deviate from the values on the data sheets of the screw-in cartridges.

TYPE CHARTS



By turning around valves with meter-out function, meter-in function can be achieved:

A turns into BV
B turns into AV
AB turns into ABV

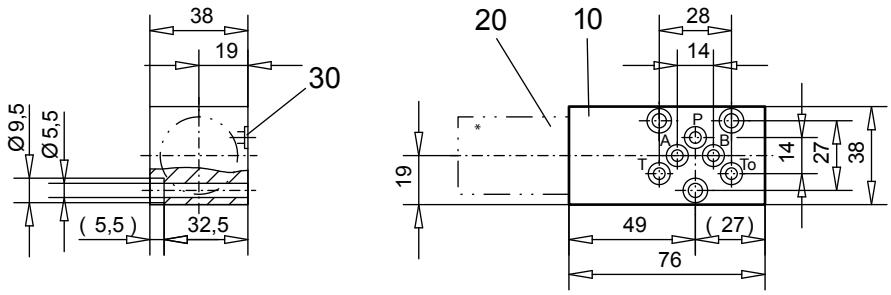
Valves for flow control are supplied respectively with a sealing plate and an intermediate plate.

REMARK!
Detailed performance data and additional hydraulic and electric specifications may by drawn from the data sheets of the corresponding installed screw-in cartridge.

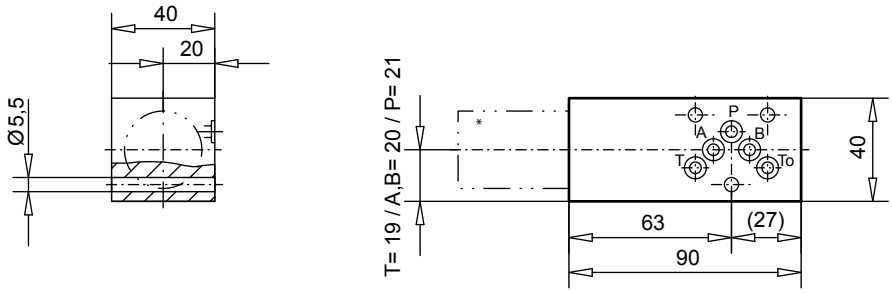
CAUTION!
The performace data, especially the **„pressure-flow-characteristic„** on the data sheets of the screw-in catridges, refer to the screw-in cartridges only. The additional pressure drop of the flange body, resp. sandwich body must be taken into consideration.

DIMENSIONS

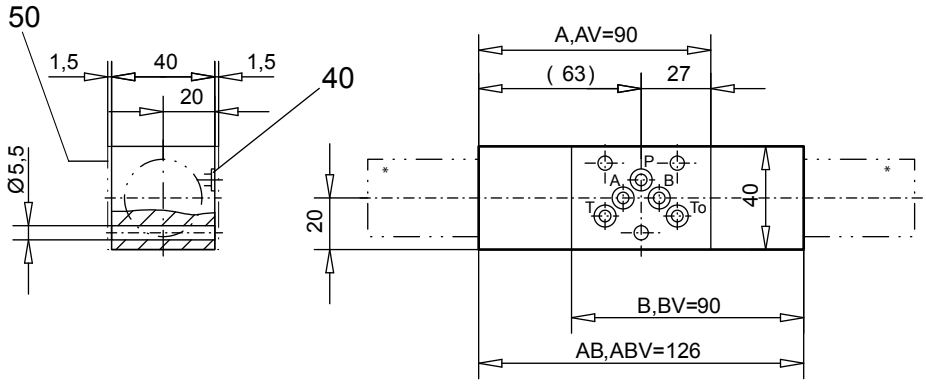
Flange construction QN.FA04 - A/B



Sandwich construction QN.SA04 - P, T



Sandwich construction QN.SA04 - A, B, AB, AV, BV, ABV



* The envelop dimensions of the screw-in cartridge are shown on their corresponding data sheets.

PARTS LIST

Position	Article	Description
10	130.5200 130.5617 130.5624 130.6617 130.6618 130.6614	Flange body Sandwich plate P Sandwich plate T Sandwich plate A Sandwich plate B Sandwich plate AB
20	650.3 . . .	Screw-in cartridge
30	160.2052	O-ring ID 5,28x1,78
40	173.1700	Intermediate plate BZB4
50	173.1650	Sealing plate BDB4

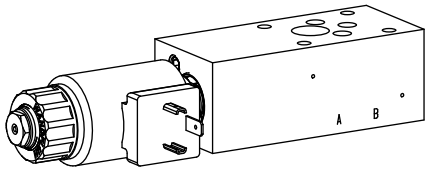
ACCESSORIES

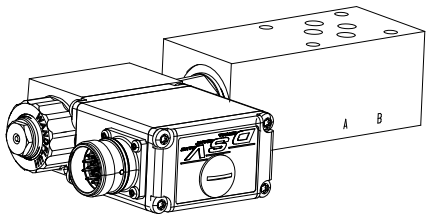
Proportional amplifier register 1.13

Technical explanation see data sheet 1.0-100

Proportional 2-way flow control valve
Flange- and sandwich construction
- **Direct operated, pressure compensated**
- **p_{max} = 350 bar**

NG6
ISO 4401-03





DESCRIPTION
Direct operated, pressure compensated proportional flow control valve in flange- and sandwich construction. Proportional flow control screw-in cartridges M22x1,5 acc. to ISO 7789 are installed. In the sandwich plates for A, B and AB line, a bypass check valve for reversed free flow is installed. A bypass non-return valve plate for the flange valve, for free flow from B to A, can be ordered separately. The flange body is painted, the sandwich plates are phosphatized.

FUNCTION
The 2-way flow control valve with series connected pressure balance (primary controller) serves to maintain the speed of a consumer constant independent of the load.

APPLICATION
Proportional flow control valves in flange- and sandwich construction are suitable for precice feed control systems, where the supply flow has to be maintained constant with a changing load. used where the supply volume flow has to be kept constant even when the load fluctuates. Depending on the application, a distinction is made between controlling the forward flow or the return flow.

TYPE CODE

Q N P ☐ A06 - ☐ - ☐ # ☐

Flow control valve

Normally closed

Proporional

Flange construction F
Sandwich construction S

International standard interface ISO, NG6

Type list / Function

Flange construction		Sandwich construction		Sandwich construction Meter-out flow control		Sandwich construction Meter-in flow control	
A → B	A/B	in P	P	in A	A	in A	AV
		in T	T	in B	B	in B	BV
				in A und B	AB	in A und B	ABV

Nominal volume flow level, nominal voltage, etc. of the built-in screw-in cartridge

Examples: QNPFA06 - A/B - 8 - G24/WD - D1
QNPSA06 - A - 18 - G12/ME - A1

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	Direct operated proportional 2-way flow control valve	
Nominal size	NG6, according to ISO 4401-03.	
Construction	Flange- and sandwich construction	
Operation	Proportional solenoid	
Mounting	4 holes for socket cap screws M5 or studs screws M5	
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system	
Weight (without screw-in cartridge)	• Flange type	m = 0,81 kg
	• Sandwich type A,B	m = 1,15 kg
	• Sandwich type P,T, AB	m = 1,45 kg

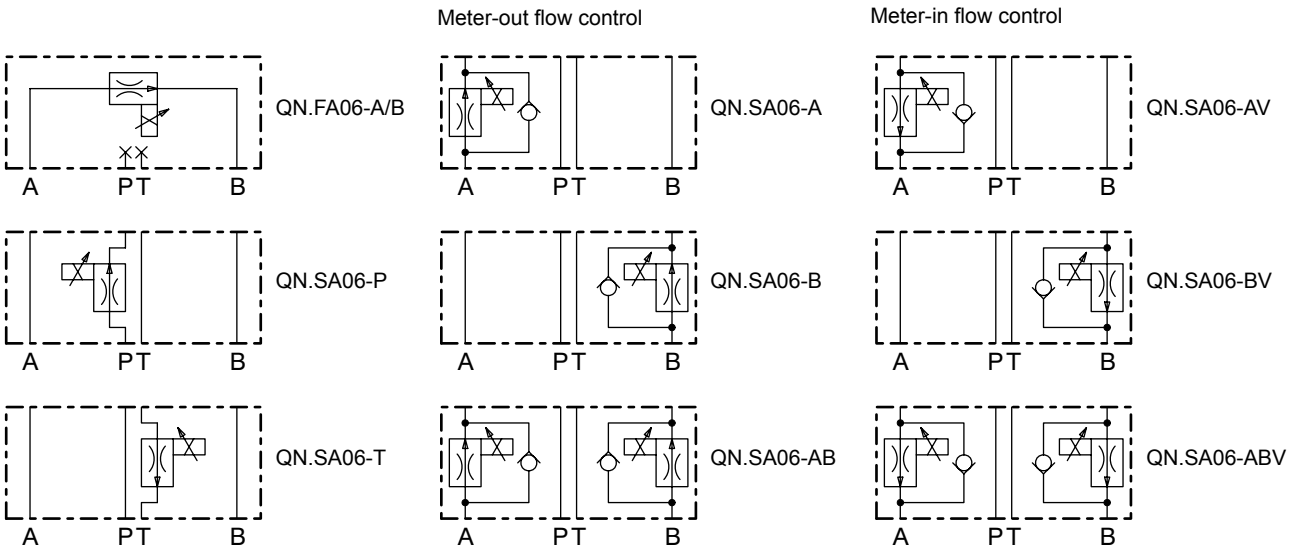
SCREW-IN CARTRIDGES INSTALLED

The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	*Designation*	*Data sheet no.*	**Qmax***
QNPPM22	normally closed	2.6-631	25 l/min
QNPPM22-../ME	normally closed, with integrated electronics	2.6-633	25 l/min

* Can deviate from the values on the data sheets of the screw-in cartridges.

TYPE CHARTS



By turning around valves with meter-out function, meter-in function can be achieved:

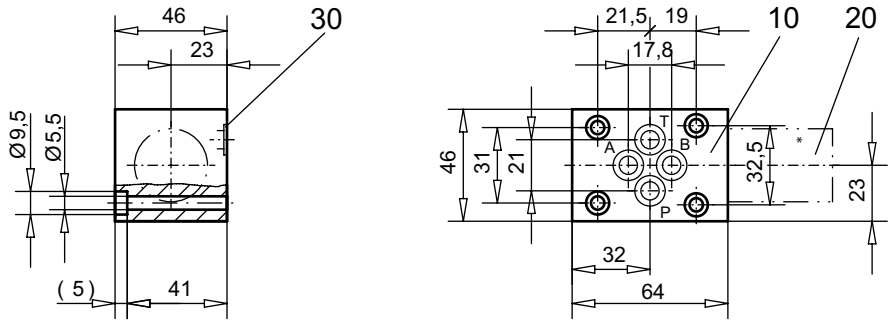
A	turns into AV
B	turns into BV
AB	turns into ABV

REMARK!
Detailed performance data and additional hydraulic and electric specifications may by drawn from the data sheets of the corresponding installed screw-in cartridge.

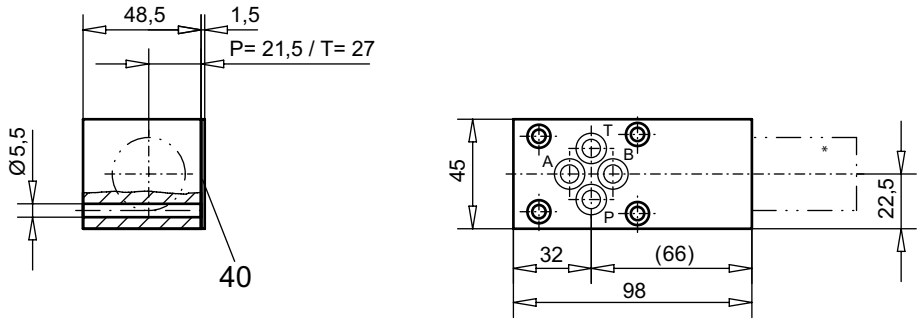
CAUTION!
The performace data, especially the **„pressure-flow-characteristic„** on the data sheets of the screw-in catridges, refer to the screw-in cartridges only. The additional pressure drop of the flange body, resp. sandwich body must be taken into consideration.

DIMENSIONS

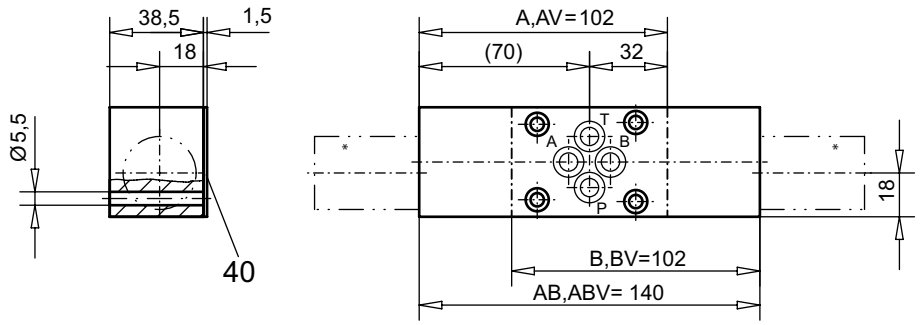
Flange construction QN.FA06 - A/B



Sandwich construction QN.SA06 - P, T



Sandwich construction QN.SA06 - A, B, AB, AV, BV, ABV



* The envelop dimensions of the screw-in cartridge are shown on their corresponding data sheets.

PARTS LIST

Position	Article	Description
10	134.5202 134.5630 134.6634 134.6635 134.6633	Flange body Sandwich plate P, T Sandwich plate A Sandwich plate B Sandwich plate AB
20	650.3 . . .	Screw-in cartridge
30	160.2093	O-ring ID 9,25x1,78
40	173.3650	Sealing plate ADB6

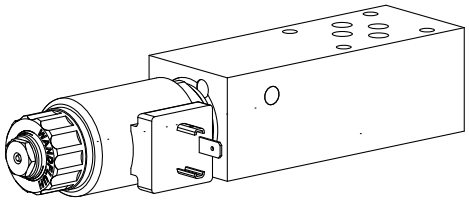
ACCESSORIES

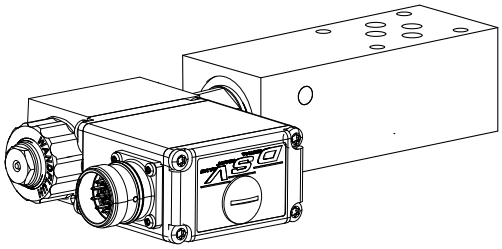
Proportional amplifier register 1.13

Technical explanation see data sheet 1.0-100E

Proportional 3-way flow control valve
Flange- and sandwich construction
- **Direct operated, pressure compensated**
- **p_{max} = 350 bar**

NG6
ISO 4401-03





DESCRIPTION
Direct operated, pressure compensated proportional flow control valve in flange- and sandwich construction. Proportional flow control screw-in cartridges M22x1,5 acc. to ISO 7789 are installed. The flange body is painted, the sandwich plates are phosphatised.

FUNCTION
The 3-way flow control valve is designed to keep the oil flow to any actuator constant irrespectiv of the load.

APPLICATION
Proportional 3-way flow control valves are used where the supply volume flow has to be kept constant even when the load fluctuates. Depending on the application, a distinction is made between restricting the forward flow or the return flow.

TYPENSCHLÜSSEL

Q D P ☐ A06 - ☐ - ☐ # ☐

Flow control valve

3-way

Proportional

Flange construction F
Sandwich construction S

International mounting interface ISO, NG6

Type list / Function

Flange construction A → B: A/B
Sandwich construction in P: P

Nominal volume flow level, nominal voltage, etc. of the built-in screw-in cartridge

Examples: QDPFA06 - A/B - 16 - G12/WD - HB0
QDPSA06 - P - 25 - G24/ME-P1

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	Proportional 3-way flow control valve
Nominal size	NG6 acc. to ISO 4401-03
Construction	Flange- and sandwich construction
Operations	Proportional solenoid
Mounting	4 holes for socket cap screws M5 or studs screws M5
Connection	Threaded connection plates Multi-flange subplate Longitudinal stacking system
Weight (without screw-in cartridge)	• Flange type m = 1,10 kg • Sandwich type m = 1,30 kg

SCREW-IN CARTRIDGES INSTALLED

The following screw-in cartridges are used in either the flange body or the sandwich body:

Typ	*Bezeichnung*	*Datenblatt Nr.*	Qmax*
QDPPM22	3-way-construction	2.6-644	40 l/min
QDPPM22-../ME	3-way-construction, with integrated electronics	2.6-647	40 l/min

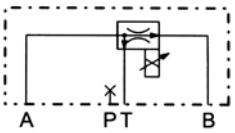
* Can deviate from the values on the data sheets of the screw-in cartridges.

REMARK!
Detailed performance data and additional hydraulic and electric specifications may by drawn from the data sheets of the corresponding installed screw-in cartridge.

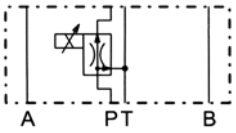
CAUTION!
The performace data especially the **„pressure-flow-characteristic„** on the data sheets of the screw-in catridges refere to the screw-in cartridges only. The additional pressure drop of the flange body respectivly sandwich body must be taken into consideration.

TYPE CHARTS

QD.FA06-A/B

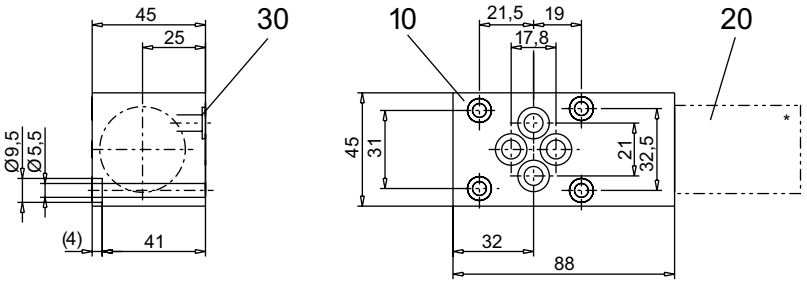


QD.SA06-P

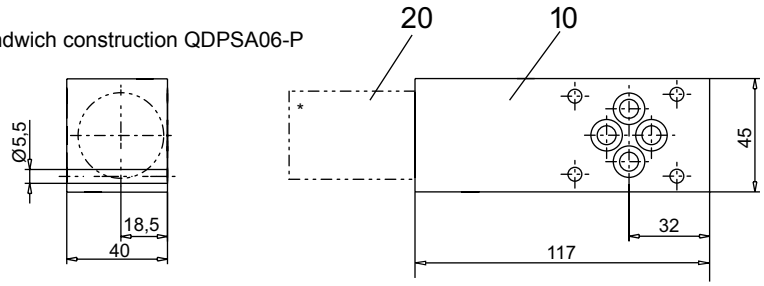


DIMENSIONS

Flange construction QD.FA06-A/B



Sandwich construction QDPSA06-P



* The envelop dimensions of the screw-in cartridge are shown on their corresponding data sheets.

PARTS LIST

Position	Article	Description
10	134.6208	Flange body
	134.6645	Sandwich plate P
20	650.3...	Screw-in cartridge
30	160.2093	O-ring ID 9,25x1,78

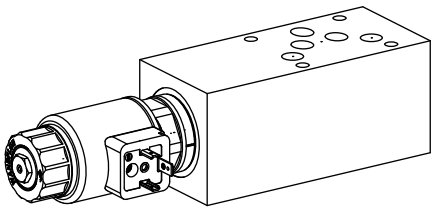
ACCESSORIES

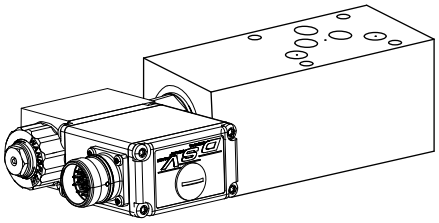
Proportional amplifier register 1.13

Technical explanation see data sheet 1.0-100

Proportional 2-way flow control valve
Flange- and sandwich construction
- **Direct operated, pressure compensated**
- **p_{max} = 350 bar**

NG10
ISO 4401-05





DESCRIPTION
Direct operated, pressure compensated proportional flow control valve in flange- and sandwich construction. Proportional flow control screw-in cartridges M33x2 acc. to ISO 7789 are installed. In the sandwich plates for A, B and AB line, a bypass check valve for reversed free flow is installed. A bypass non-return valve plate for the flange valve, for free flow from B to A, can be ordered separately. Two flow ranges are available. The flange body is painted and the sandwich plates are phosphatized.

FUNCTION
The 2-way flow control valve with series connected pressure balance (primary controller) serves to maintain the speed of a consumer constant independent of the load.

APPLICATION
Proportional flow control valves in flange- and sandwich construction are suitable for precice feed control systems, where the supply flow has to be maintained constant with a changing load. used where the supply volume flow has to be kept constant even when the load fluctuates. Depending on the application, a distinction is made between controlling the forward flow or the return flow.

TYPE CODE

Q N P ☐ A10 - ☐ - ☐ # ☐

Flow control valve

Normally closed

Proporional

Flange construction F
Sandwich construction S

International standard interface ISO, NG10

Type list / Function:

Flange construction		Sandwich construction		Sandwich construction meter-out flow control		Sandwich construction meter-in flow control	
A → B	A/B	in P	P	in A	A	in A	AV
		in T	T	in B	B	in B	BV
				in A and B	AB	in A and B	ABV

Nominal volume flow level, nominal voltage, etc. of the built-in screw-in cartridge

Examples: QNPFA10 - A/B - 32 - G24/WD - D1
QNPSA10 - A - 63 - G12/ME - A1

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	Direct operated proportional 2-way flow control valve	
Nominal size	NG10 acc. to ISO 4401-05	
Construction	Flange- and sandwich construction	
Operation	Proportional solenoid	
Mounting	4 holes for socket cap screws M6 or studs screws M6	
Connection	Threaded connection plates Multi-flange subplates Longitudinal stacking system	
Weight (without screw-in cartridge)	• Flange type	m = 2,20 kg
	• Sandwich type P,T,A,B	m = 3,10 kg
	• Sandwich type AB	m = 3,75 kg

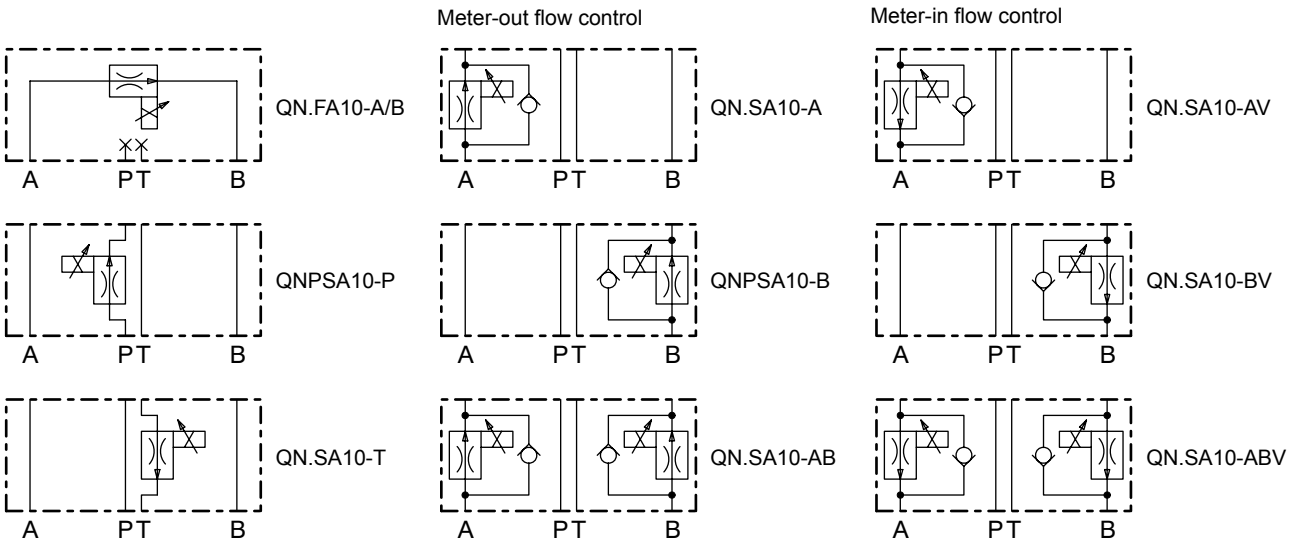
SCREW-IN CARTRIDGES INSTALLED

The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	*Designation*	*Data sheet no.*	Qmax*
QNPPM33	normally closed	2.6-651	80 l/min
QNPPM33-./ME	normally closed, with integrated electronics	2.6-659	63 l/min

* Can deviate from the values on the data sheets of the screw-in cartridges.
** Do not use anymore for new applications.

TYPE CHARTS



By turning around valves with meter-out function, meter-in function can be achieved:

A turns into BV
B turns into AV
AB turns into ABV

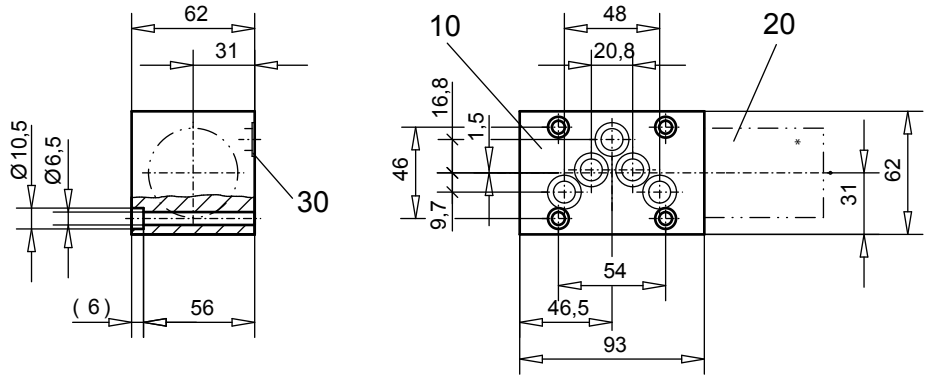
Valves for flow control are supplied respectively with a sealing plate and an intermediate plate.

REMARK!
Detailed performance data and additional hydraulic and electric specifications may by drawn from the data sheets of the corresponding installed screw-in cartridge.

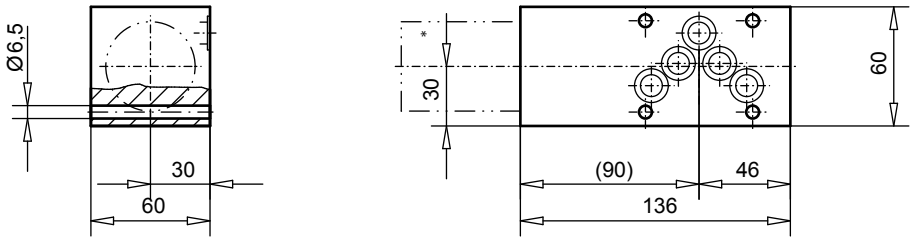
CAUTION!
The performace data, especially the **„pressure-flow-characteristic„** on the data sheets of the screw-in cartridges, refer to the screw-in cartridges only. The additional pressure drop of the flange body, resp. sandwich body must be taken into consideration.

DIMENSIONS

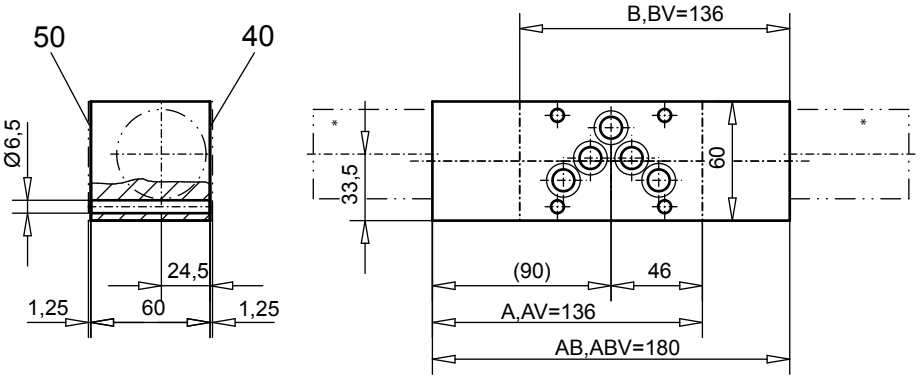
Flange construction QN.FA10 - A/B



Sandwich construction QN.SA10 - P, T



Sandwich construction QN.SA10 - A, B, AB, AV, BV, ABV



* The envelop dimensions of the screw-in cartridge are shown on their corresponding data sheets.

PARTS LIST

Position	Article	Description
10	136.5201 136.5621 136.5624 136.6633 136.6634 136.6631	Flange body Sandwich plate P Sandwich plate T Sandwich plate A Sandwich plate B Sandwich plate AB
20	650.8 . . .	Screw-in cartridge
30	160.2140 160.2120 160.2132	O-ring ID 14,00x1,78 for flange and sandwich construction O-Ring ID 12,42x1,78 for sandwich construction A, B, AB, VA, VB, VAB O-Ring ID 13,10x2,62 in line with RV
40	173.4700	Intermediate plate AZB10
50	173.4650	Sealing plate ADB10

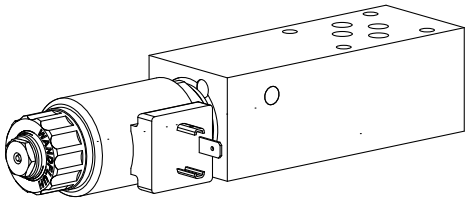
ACCESSORIES

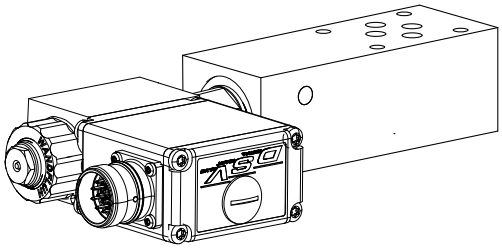
Proportional amplifier register 1.13

Technical explanation see data sheet 1.0-100

Proportional 3-way flow control valve
Flange- and sandwich construction
- **Direct operated, pressure compensated**
- **p_{max} = 350 bar**

NG10
ISO 4401-05





DESCRIPTION
Direct operated, pressure compensated proportional flow control valve in flange- and sandwich construction. Proportional flow control screw-in cartridges M33x2 acc. to ISO 7789 are installed. The flange body is painted, the sandwich plates are phosphatised.

FUNCTION
The 3-way flow control valve is designed to keep the oil flow to any actuator constant irrespectiv of the load.

APPLICATION
Proportional 3-way flow control valves are used where the supply volume flow has to be kept constant even when the load fluctuates. Depending on the application, a distinction is made between restricting the forward flow or the return flow.

TYPE CODE

Q D P ☐ A10 - ☐ - ☐ # ☐

Flow control valve

3-way

Proportional

Flange construction F
Sandwich construction S

International mounting interface ISO, NG10

Type list / Function

Flange construction A → B: A/B
Sandwich construction in P: P

Nominal volume flow level, nominal voltage, etc. of the built-in screw-in cartridge

Examples: QDPFA10 - A/B - 32 - G12/WD - HBO
QDPSA10 - P - 63 - G24/ME-P1

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	Proportional 3-way flow control valve	
Nominal size	NG10 acc. to ISO 4401-05	
Construction	Flange- and sandwich construction	
Operations	Proportional solenoid	
Mounting	4 holes for socket cap screws M6 or studs screws M6	
Connection	Threaded connection plates Multi-flange subplate Longitudinal stacking system	
Weight (without screw-in cartridge)	• Flange type • Sandwich type	m = 2,40 kg m = 3,75 kg

SCREW-IN CARTRIDGES INSTALLED

The following screw-in cartridges are used in either the flange body or the sandwich body:

Type	*Description*	*Data sheet no.*	Qmax*
QDPPM33	3-way-construction	2.6-666	100 l/min
QDPPM33-../ME	3-way-construction, with integrated electronics	2.6-668	100 l/min

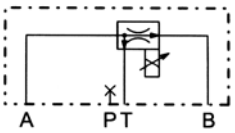
* Can deviate from the values on the data sheets of the screw-in cartridges.

REMARK!
Detailed performance data and additional hydraulic and electric specifications may by drawn from the data sheets of the corresponding installed screw-in cartridge.

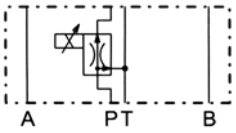
CAUTION!
The performace data especially the **„pressure-flow-characteristic„** on the data sheets of the screw-in catridges refere to the screw-in cartridges only. The additional pressure drop of the flange body respectivly sandwich body must be taken into consideration.

TYPE CHARTS

QD.FA10-A/B

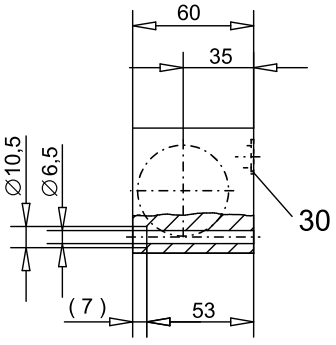


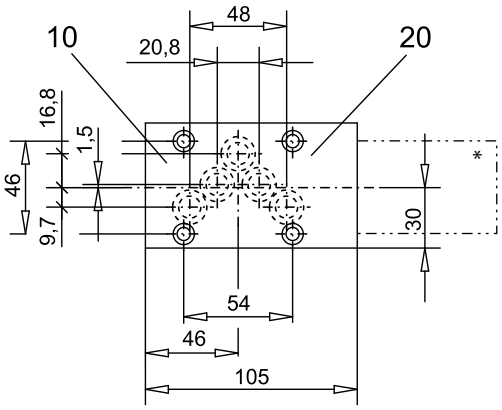
QD.SA10-P



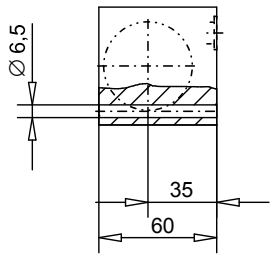
DIMENSIONS

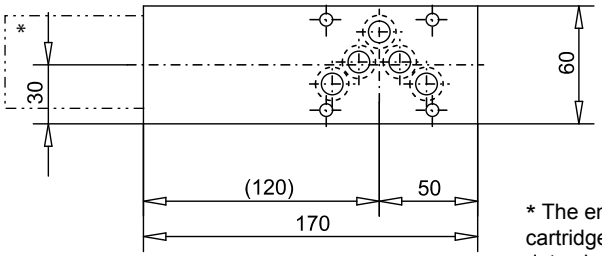
Flange construction QD.FA10-A/B





Sandwich construction QD.SA10-P





***** The envelop dimensions of the screw-in cartridge are shown on their corresponding data sheets.

PARTS LIST

Position	Article	Description
10	136.6204	Flange body
	136.6639	Sandwich plate P
20	650.8...	Screw-in cartridge
30	160.2140	O-ring ID 14,00x1,78

ACCESSORIES

Proportional amplifier register 1.13

Technical explanation see data sheet 1.0-100