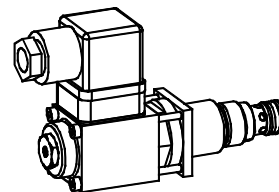


**Proportional pressure relief valve
Screw-in cartridge**

- Pilot operated
- $Q_{\max} = 25 \text{ l/min}$
- $p_{\max} = 350 \text{ bar}$
- $p_{N \max} = 315 \text{ bar}$

M18x1,5
ISO 7789

DESCRIPTION

Pilot operated proportional pressure relief valve as a screw-in cartridge with a thread M18x1,5 for cavity according to ISO 7789. 4 standard pressure levels are available: 20, 100, 200 and 315 bar. Adjustment by a Wandfluh proportional solenoid (VDE standard 0580). The cartridge and the solenoid made of steel are zinc coated and therefore rust-protected.

FUNCTION

When the operating pressure set by the proportional solenoid is reached, the main spool opens and connects the protected line with the return line to the tank. The back pressure in T (2) influences the pressure in P (1). This pilot operated proportional pressure relief valve can be adjusted very sensitively. To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for remote control and signal processing from process control systems enable elegant, comfortable solutions to problems. 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 NG3-Mini types. (Please note the separate data sheets in register 2.3). 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

			B	V	P	PM18	-		-		#	
Pressure relief valve												
Pilot operated												
Proportional												
Screw-in cartridge M18x1,5												
Nominal pressure range p_N	20 bar											
	100 bar											
	200 bar											
	315 bar											
Nominal voltage U_N	12 VDC											
	24 VDC											
Design-Index (Subject to change)												

GENERAL SPECIFICATIONS

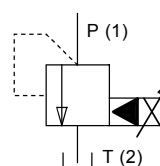
Description	Pilot operated proportional pressure relief valve
Construction	Screw-in cartridge for cavity to ISO 7789
Operations	Proportional solenoid
Mounting	Screw-in thread M18x1,5
Ambient temperature	-20...50 °C
Mounting position	any
Fastening torque	$M_D = 30 \text{ Nm}$ for screw-in cartridge $M_D = 1,2 \text{ Nm}$ (qual. 8.8) for solenoid screws
Weight	$m = 0,36 \text{ kg}$

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight.	
Standard-Nominal voltage	$U_N = 12 \text{ VDC}$	$U_N = 24 \text{ VDC}$
Limiting current	$I_G = 1080 \text{ mA}$	$I_G = 540 \text{ mA}$
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)	

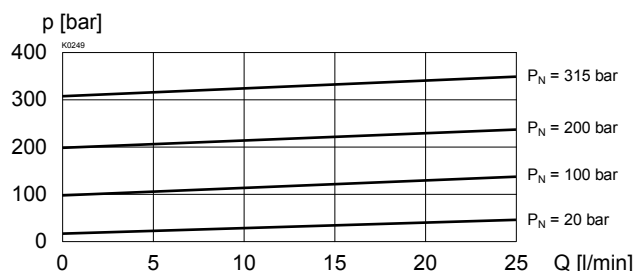
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 350 \text{ bar}$ $p_{T\max} = p_p + 80 \text{ bar}$
Nominal pressure ranges	$p_N = 20 \text{ bar}$, $p_N = 100 \text{ bar}$, $p_N = 200 \text{ bar}$, $p_N = 315 \text{ bar}$
Volume flow	$Q = 0,3...25 \text{ l/min}$
Leakage volume flow	see characteristics
Repeatability	$\leq 1\%$ *
Hysteresis	$\leq 2\%$ *
	* at optimal dither signal

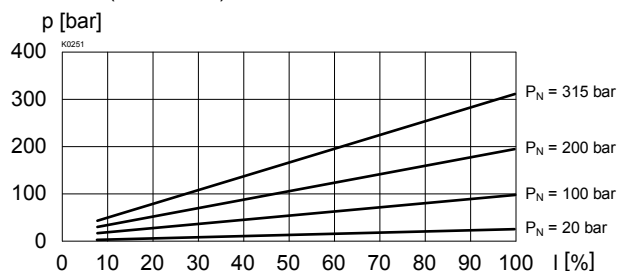
SYMBOL


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

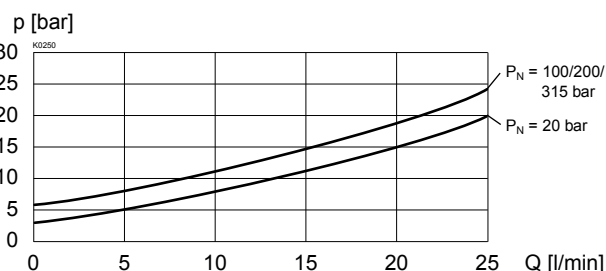
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



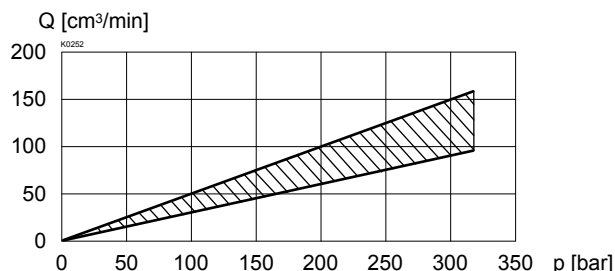
$p = f(I)$ Pressure adjustment characteristics
($Q = 1 \text{ l/min}$)



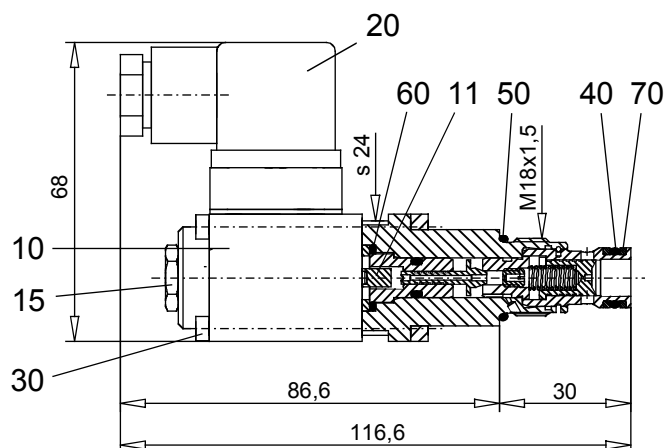
$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)



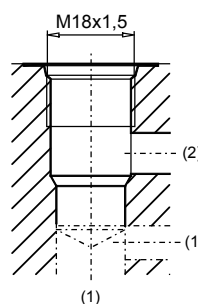
$Q_L = f(p)$ Leakage volume flow characteristics



DIMENSIONS / SECTIONAL DRAWINGS



Cavity drawing according to
ISO 7789-18-02-0-98



For detailed cavity drawing
and cavity tools see data
sheet 2.13-1001

PARTS LIST

Position	Article	Description
10	256.2453 256.2418	Proportional solenoid PI29V-G24 Proportional solenoid PI29V-G12
11	034.0111	Pin RD 4x10,1
15	253.8000	Mounted screw with integrated manual override HB4,5
20	219.2002	Plug (black)
30	246.0151	Socket head cap screw M3x50 DIN912
40	160.2093	O-ring ID 9,25x1,78
50	160.2156	O-ring ID 15,60x1,78
60	160.2120	O-ring ID 12,42x1,78
70	49.3137	Back up ring RD 10,6x13,5x1,4

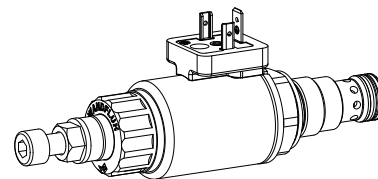
ACCESSORIES

Flange-/sandwich plate NG3-Mini	Data sheet 2.3-700
Line mount body	Data sheet 2.9-200
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article Nr. 219.2002

Technical explanation see data sheet 1.0-100

Proportional inverse pressure relief valve
Screw-in cartridge

- Pilot operated
- Nominal pressure adjustable -20 % / +30 %
- $Q_{\max} = 100 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

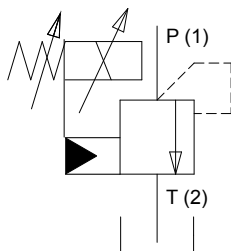
Pilot operated proportional pressure relief valve with inverse function. Thread M22x1,5 and cavity according to ISO 7789. The adjustment takes place by means of a Wandfluh proportional solenoid (VDE-standard 0580). The cartridge body made of steel is zinc coated and therefore rust-protected. The solenoid coil is zinc-/nickel-coated.

FUNCTION

When the operating pressure set by the proportional solenoid is reached, the main spool opens and connects the protected line with the return line to the tank. The back pressure in T (2) influences the pressure in P (1). This pilot operated proportional pressure relief valve can be adjusted very sensitively and is suitable for large volume flows and high pressures. To control the valve, Wandfluh proportional amplifiers are available (see register 1.13).

APPLICATION

The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. By means of the inverse function, the maximum system pressure is maintained if the electric valve control fails (safety function). In such cases, e.g., the descending of a load is prevented, or cooling ventilators with hydraulic motor drives are kept in operation. 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, NG6 and NG10 types. (Please note the separate data sheets in register 2.3). 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.

SYMBOLS

TYPE CODE

			B V I PM22 - <div></div> - <div></div> / <div></div> <div></div> - <div></div> # <div></div>									
Pressure relief valve												
Pilot operated												
Proportional, inverse												
Screw-in cartridge M22x1,5												
Nominal pressure range p _N		20 bar	<div>20</div>									
		63 bar	<div>63</div>									
		100 bar	<div>100</div>									
		160 bar	<div>160</div>									
		200 bar	<div>200</div>									
		275 bar	<div>275</div>									
		350 bar	<div>350</div>									
Nominal voltage U _N		12 VDC	<div>G12</div>									
		24 VDC	<div>G24</div>									
		without coil	<div>X5</div>									
Slip-on coil		Metal housing round	<div>W</div>									
		Metal housing square	<div>M*</div>									
Connection execution		Connector socket EN 175301-803 / ISO 4400	<div>D</div>									
		Connector socket AMP Junior-Timer	<div>J</div>									
		Connector Deutsch DT04-2P	<div>G</div>									
Sealing material		NBR	<div></div>									
		FKM (Viton)	<div>D1</div>									
Design-Index (Subject to change)												

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

GENERAL SPECIFICATIONS

Description	Pilot operated proportional pressure relief valve with inverse function
Construction	Screw-in cartridge for cavity to ISO 7789
Actuation	Proportional solenoid with spring
Mounting	Screw-in thread M22x1,5
Ambient temperature	-25...+70 °C
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 50 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 0,7 \text{ kg}$

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin pull type, pressure tight	
Standard-Nominal voltage	$U_N = 12 \text{ VDC}$	$U_N = 24 \text{ VDC}$
Limiting current	$I_G = 1320 \text{ mA}$	$I_G = 660 \text{ mA}$
Relative duty factor	100 % DF (see data sheet 1.1-430)	
Protection class	Connection version	
acc. EN 60529	D: IP 65 J: IP 66 G: IP 67 and IP 69K	

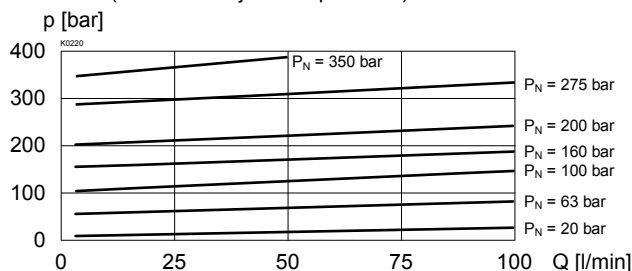
For further electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

HYDRAULIC SPECIFICATIONS

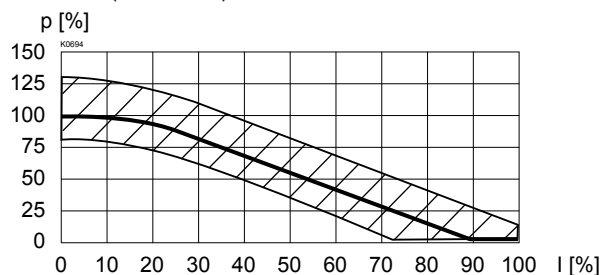
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-25...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{T\max} = p_p + 20 \text{ bar}$
Nominal pressure ranges	$p_N = 20 \text{ bar}, 63 \text{ bar}, 100 \text{ bar}, 160 \text{ bar}, 200 \text{ bar}, 275 \text{ bar}, 350 \text{ bar}$
Volume flow	$Q = 5...100 \text{ l/min}$
Leakage volume flow	see characteristics
Repeatability	$\leq 3 \% *$
Hysteresis	$\leq 4 \% *$ * at optimal dither signal


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

$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)

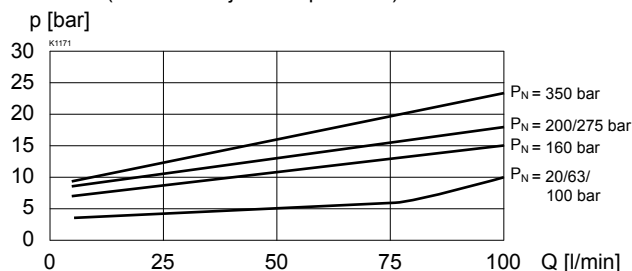


$p = f(I)$ Pressure adjustment characteristics
($Q = 1 \text{ l/min}$)

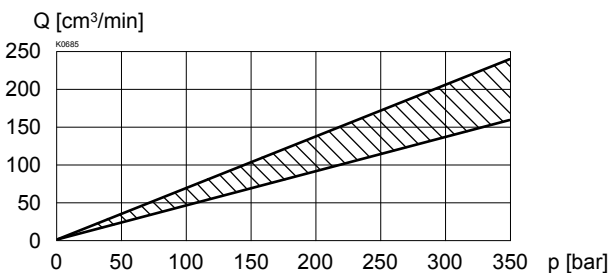


 Adjustable range of nominal pressure, adjusted with set screw..

$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

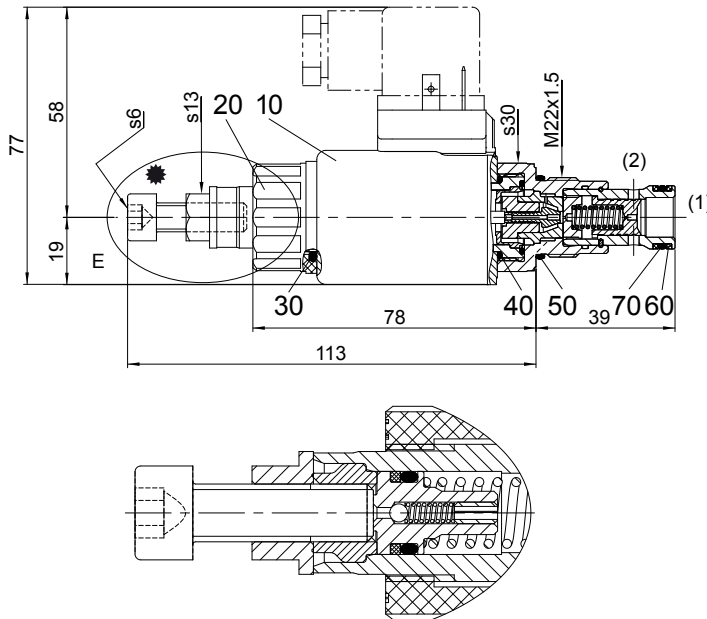


$Q_L = f(p)$ Leakage volume flow characteristics

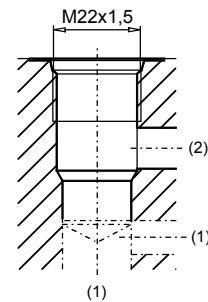


DIMENSIONS / SECTIONAL DRAWINGS

✱ Adjusting screw for setting the nominal pressure (-20 % / +30 %)



Cavity drawing according to
ISO 7789-22-02-0-98



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1003

E: Venting

- Release locknut
- Remove screw
- Press check-valve (with a pin or with allen key < 1,3 mm)
- Screw the screw back in
- Set the required pressure and tighten the lock nut



Under pressure oil shoot out!
Cover with a cloth.

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

PARTS LIST

Position	Article	Description
10	206.2201	EN 175301 Solenoid coil WDS37/19x50-G24
	206.2200	Solenoid coil WDS37/19x50-G12
		Junior-Timer
	206.2203	Solenoid coil WJS37/19x50-G24
	206.2202	Solenoid coil WJS37/19x50-G12
		Deutsch
	206.2205	Solenoid coil WGS37/19x50-G24
	206.2204	Solenoid coil WGS37/19x50-G12
20	154.2700	Knurled nut
30	160.2187	O-ring ID 18,72x2,62 (NBR)
	160.6187	O-ring ID 18,72x2,62 (FKM)
40	160.2170	O-ring ID 17,17x1,78 (NBR)
	160.6172	O-ring ID 17,17x1,78 (FKM)
50	160.2188	O-ring ID 18,77x1,78 (NBR)
	160.6188	O-ring ID 18,77x1,78 (FKM)
60	160.2140	O-ring ID 14,00x1,78 (NBR)
	160.6141	O-ring ID 14,00x1,78 (FKM)
70	049.3177	Backup ring RD 14,6x17,5x1,4

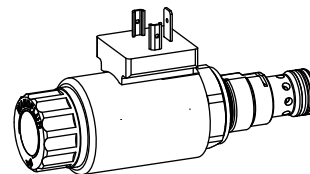
ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.3-720
Flange-/sandwich plate NG6	Data sheet 2.3-740
Flange-/sandwich plate NG10	Data sheet 2.3-760
Line mount body	Data sheet 2.9-200
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

**Proportional pressure relief valve
Screw-in cartridge**

- Pilot operated
- $Q_{\max} = 100 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

Pilot operated proportional pressure relief valve as a screw-in cartridge with a thread M22x1,5 for cavity according to ISO 7789. 7 standard pressure levels are available. The adjustment takes place by means of 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

When the operating pressure set by the proportional solenoid is reached, the main spool opens and connects the protected line with the return line to the tank. The back pressure in T (2) influences the pressure in P (1). This pilot operated proportional pressure relief valve can be adjusted very sensitively and is suitable for large volume flows and high pressures. To control the valve, Wandfluh proportional amplifiers are available (see register 1.13).

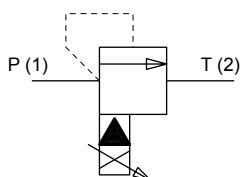
APPLICATION

The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. 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, NG6 and NG10 types. (Please note the separate data sheets in register 2.3). 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

		B		V		P		PM22 -		-		/				-				#			
Pressure relief valve																							
Pilot operated																							
Proportional																							
Screw-in cartridge M22x1,5																							
Nominal pressure range p_N	20 bar		20			200 bar		200															
	63 bar		63			275 bar		275															
	100 bar		100			350 bar		350															
	160 bar		160																				
Nominal voltage U_N	12 VDC		G12			24 VDC		G24															
	without solenoid 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

GENERAL SPECIFICATIONS

Description	Pilot operated proportional pressure relief valve
Construction	Screw-in cartridge for cavity to ISO 7789
Actuation	Proportional solenoid
Mounting	Screw-in thread M22x1,5
Ambient temperature	-20...+70 °C
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 50 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 0,5 \text{ kg}$

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard-Nominal voltage	$U_N = 12 \text{ VDC}$	$U_N = 24 \text{ VDC}$
Limiting current	$I_G = 1320 \text{ mA}$	$I_G = 660 \text{ mA}$
Relative duty factor	100 % DF (see data sheet 1.1-430)	
Protection class	Connection version	
acc. EN 60529	D: IP 65	
	J: IP 66	
	G: IP 67 and 69K	

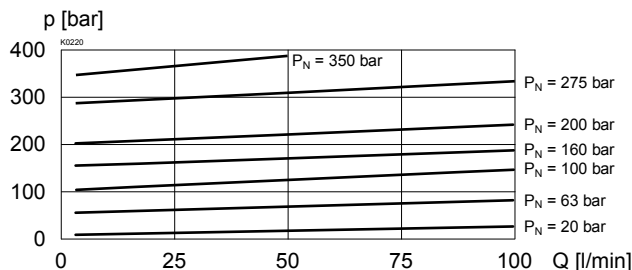
For further electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

HYDRAULIC SPECIFICATIONS

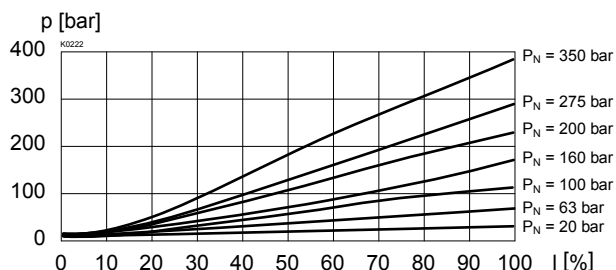
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{T\max} = p_p + 20 \text{ bar}$
Nominal pressure ranges	$p_N = 20 \text{ bar}, 63 \text{ bar}, 100 \text{ bar}, 160 \text{ bar}, 200 \text{ bar}, 275 \text{ bar}, 350 \text{ bar}$ $Q = 0,3...100 \text{ l/min}$
Volume flow	see characteristics
Leakage volume flow	$\leq 2 \% *$
Repeatability	$\leq 4 \% *$
Hysteresis	$\leq 4 \% *$ * at optimal dither signal

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

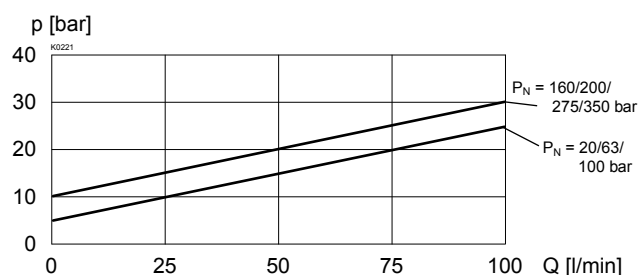
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



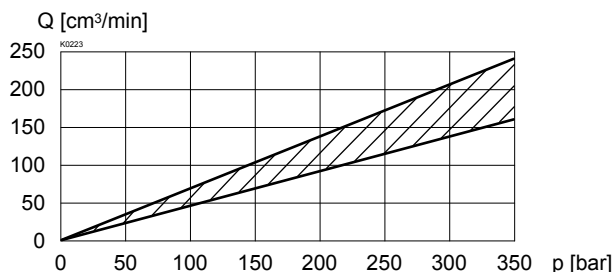
$p = f(I)$ Pressure adjustment characteristics
($Q = 10 \text{ l/min}$)

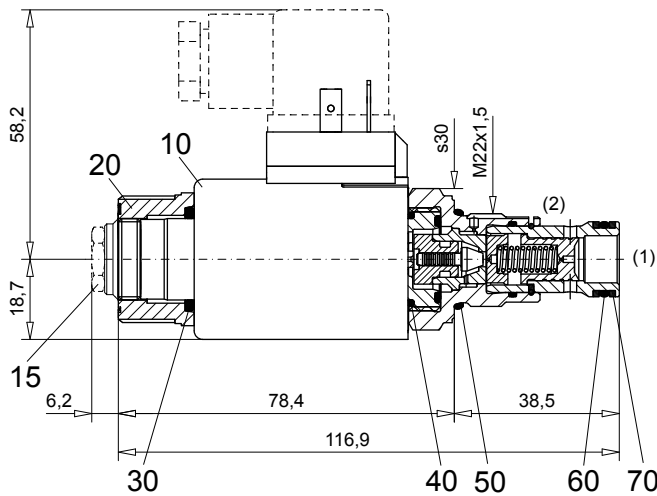


$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

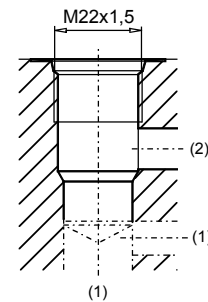


$Q_L = f(p)$ Leakage volume flow characteristics



DIMENSIONS / SECTIONAL DRAWINGS


Cavity drawing according to
ISO 7789-22-02-0-98



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1003

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

PARTS LIST

Position	Article	Description
10	206.2201	EN 175301 Solenoid coil WDS37/19x50-G24
	206.2200	Solenoid coil WDS37/19x50-G12 Junior-Timer
	206.2203	Solenoid coil WJS37/19x50-G24
	206.2202	Solenoid coil WJS37/19x50-G12
	206.2205	Deutsch Solenoid coil WGS37/19x50-G24
	206.2204	Solenoid coil WGS37/19x50-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 18,72x2,62 (NBR)
	160.6187	O-ring ID 18,72x2,62 (FKM)
40	160.2170	O-ring ID 17,17x1,78 (NBR)
	160.6172	O-ring ID 17,17x1,78 (FKM)
50	160.2188	O-ring ID 18,77x1,78 (NBR)
	160.6188	O-ring ID 18,77x1,78 (FKM)
60	160.2140	O-ring ID 14,00x1,78 (NBR)
	160.6141	O-ring ID 14,00x1,78 (FKM)
70	049.3177	Backup ring RD 14,6x17,5x1,4

ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.3-720
Flange-/sandwich plate NG6	Data sheet 2.3-740
Flange-/sandwich plate NG10	Data sheet 2.3-760
Line mount body	Data sheet 2.9-200
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article Nr. 219.2002

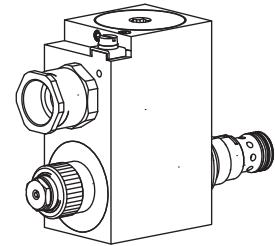
Technical explanation see data sheet 1.0-100

**Proportional pressure relief valve
Screw-in cartridge**

- Pilot operated
- $Q_{max} = 100 \text{ l/min}$
- $p_{max} = 400 \text{ bar}$
- $p_{N max} = 350 \text{ bar}$

M22x1,5
ISO 7789

- Ex II 2 G Ex d IIC
- Ex II 2 D Ex tD A21 IP65
- Ex I M2 Ex d I Mb


DESCRIPTION
For explosion-hazard zones

Pilot operated proportional pressure relief valve as a screw-in cartridge with a thread M22x1,5 for cavity according to ISO 7789. Activated with Wandfluh-explosion-proof-solenoid. The cartridge body made of steel is zinc coated for corrosion protection.

Solenoid coil in acc. with directive 94/9/EC (ATEX) for explosion-hazard zones.

The flameproof enclosures (acc. to EN/IEC 60079-1/31 and EN/IEC 61241-1) prevents an explosion in the interior from getting outside.

The design prevents a surface temperature capable of igniting.

FUNCTION

When the operating pressure set by the proportional solenoid is reached, the main spool opens and connects the protected line with the return line to the tank. The back pressure in T (2) influences the pressure in P (1). This pilot operated proportional pressure relief valve can be adjusted very sensitively and is suitable for large volume flows and high pressures.

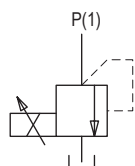
APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. 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, NG6 and NG10 types. (Please note the separate data sheets in register 2.3). 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.

CERTIFICATES

in accordance with	Surface gas + dust	Mining
ATEX	x	x
IECEX	x	x
GOST Ex	x	x
Australia	x	x
Inmetro	x	x

The certificates can be found on www.wandfluh.com / DOWNLOADS / Accompanying Ex-proof / MKY45/18-...-L...

SYMBOLS

TYPE CODE

Pressure relief valve		B V B PM22 -		-		/		/		-		#	
Pilot operated													
Proportional explosion proof, execution Ex d IIC													
Screw-in cartridge M22x1,5													
Execution:		L15		L9									
Nominal pressure range p_N :		20		200		20		160					
[bar]		63		275		50		220					
		100		350		80		280					
Standard nominal voltage U_N :		12 VDC		G12									
		24 VDC		G24									
Execution:		9W		L9		Ambient temp. by:							
		15W		L15		40 °C							
						70 °C							
Certificates:		ATEX, IECEX, GOST Ex											
		Australia		AU		Inmetro		IM					
Sealing material		NBR											
		FKM (Viton)				D1							
Design-Index (Subject to change)													

GENERAL SPECIFICATIONS

Description	Pilot operated proportional pressure relief valve
Construction	Screw-in cartridge for cavity according to ISO 7789
Operations	Proportional solenoid
Mounting	Screw-in thread M22x1,5
Admissible ambient temp.	Execution L9 -20...+40 °C (operation as T1...T6/T80 °C) Execution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 50 \text{ Nm}$ for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 2,2 \text{ kg}$

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight
Standard nominal voltage	$U_N = 12 \text{ VDC}, 24 \text{ VDC}$
Limiting current	12VDC 24VDC L15/50 °C $I_G = 950 \text{ mA}$ 450 mA L15/70 °C $I_G = 910 \text{ mA}$ 420 mA L9/40 °C $I_G = 625 \text{ mA}$ 305 mA
Voltage tolerance	+ 10% of rated voltage
Relative duty factor	100% ED
Protection class	IP67 acc. to EN 60 529
Connection/Power supply	Through cable gland for cable $\varnothing 6,5...14 \text{ mm}$ (acc. to EN 60079-0)
Temperature class:	T1...T6
Execution L9:	T1...T4
Nominal power:	
Execution L9	9W
Execution L15	15W
For further electrical characteristics, refer to the data sheet of the solenoid coil: 1.1-183	

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Admissible fluid temp.	Execution L9 -20...+40 °C (operation as T1...T6/T80 °C) Execution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Peak pressure	$p_{max} = 400$ bar
Nominal pressure ranges	Execution L9: $p_N = 20$ bar, 50 bar, 80 bar, 160 bar, 220 bar, 280 bar Execution L15: $p_N = 20$ bar, 63 bar, 100 bar, 200 bar, 275 bar, 350 bar $Q = 0,3...100$ l/min
Volume flow range	
Pilot- and leakage volume flow	see characteristics
Repeatability	$\leq 3\%$ **
Hysteresis	$\leq 4\%$ ** ** at optimal dither signal

SECURITY OPERATED



The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.
In case of non-observance, no liability can be assumed.

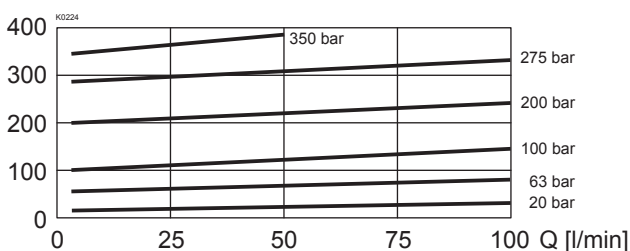
INSTALLATION

For stack assembly please observe the remarks in the operating instructions.

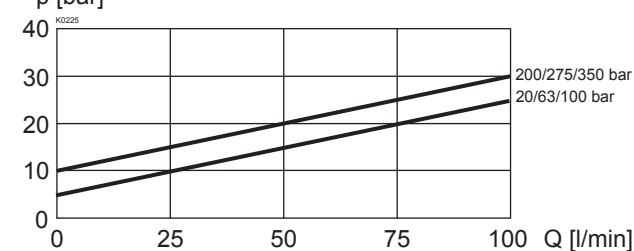
CHARACTERISTICS oil viscosity $\nu = 30$ mm²/s

Execution L15 (measured at 50 °C)

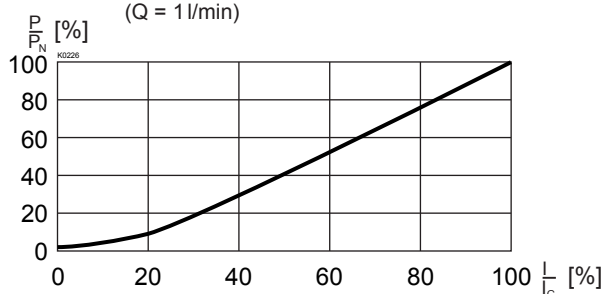
$p_{red} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)

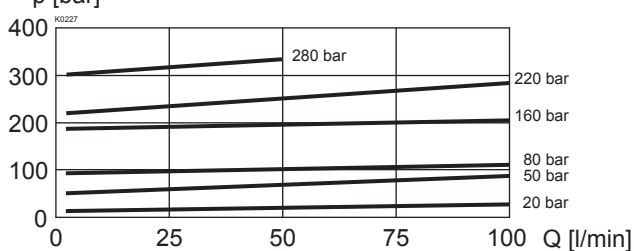


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)

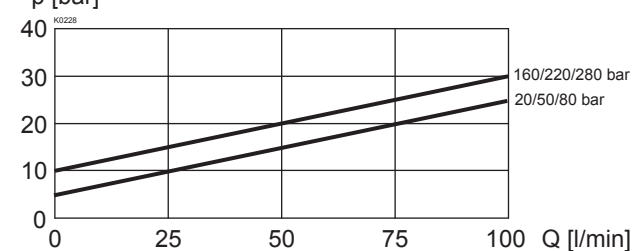


Execution L9 (measured at 40 °C)

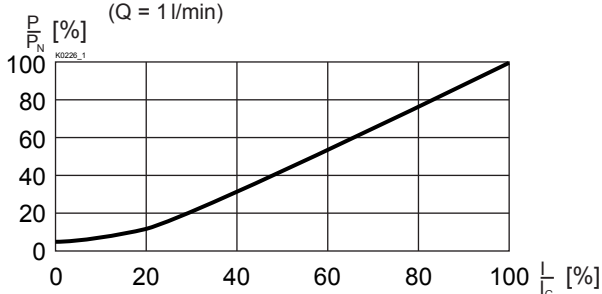
$p_{red} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



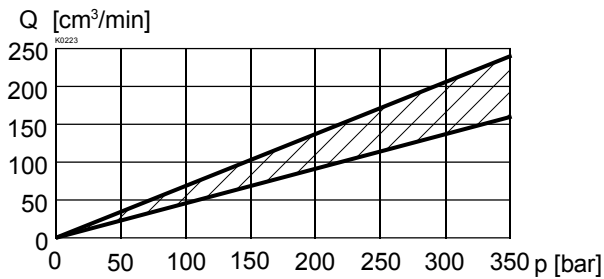
$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)



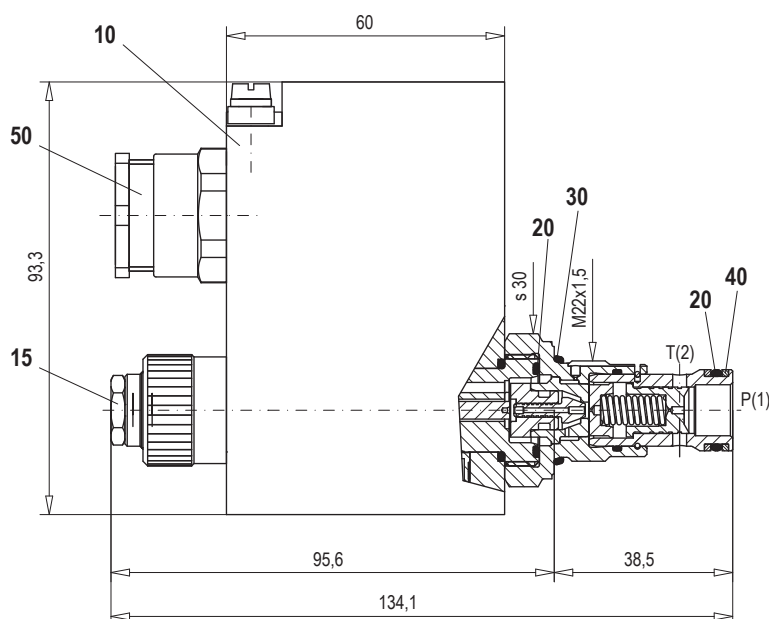
$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)



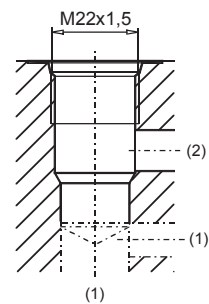
$Q_L = f(p)$ Leakage volume flow characteristics



DIMENSIONS/SECTIONAL DRAWING



Cavity drawing acc. to
ISO 7789-22-02-0-98



For detailed cavity drawing and
cavity tools see data sheet 2.13-1003

Dimensions of the solenoid coil refer to data sheet 1.1-183

PARTS LIST

Position	Article	Description
10	263.6...	Slip-on coil MKY45/18x60-...
15	253.8000	Plug with integrated manual override HB4,5
20	160.2140 160.8140	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
30	160.2188 160.8188	O-ring ID 18,77x1,78 (NBR) O-ring ID 18,77x1,78 (FKM)
40	049.3177	Back-up ring RD 14,6x17,5x1,4
50	111.1080	Cable gland brass M20

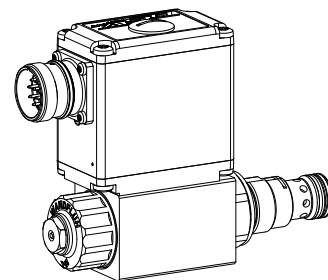
ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.3-720
Flange-/sandwich plate NG6	Data sheet 2.3-740
Flange-/sandwich plate NG10	Data sheet 2.3-760
Line mount body	Data sheet 2.9-200

Technical explanation see data sheet 1.0-100

Proportional pressure relief valve
Screw-in cartridge

- Integrated amplifier or controller electronics
- Pilot operated
- $Q_{\max} = 100 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

Pilot operated proportional pressure relief valve with integrated electronics as a screw-in cartridge. Thread M22x1,5 for cavity according 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. 7 standard pressure levels are available. Adjustment 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 electronics is made of aluminium.

Optionally these valves are available with integrated controller. As feedback value generator sensors with voltage or current output can be directly connected. The available controller structures are optimised for the utilisation with hydraulic drives.

FUNCTION

When the operating pressure set by the proportional solenoid is reached, the main spool opens and connects the protected line with the return line to the tank. The back pressure in T (2) influences the pressure in P (1). 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 pressure relief valves with integrated electronics are well suited for demanding applications, in which the pressure frequently has to be changed. 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 integrated controller relieves the machine control system and operates the pressure control in a closed control circuit. The proportional pressure relief cartridge is very suitable for mounting in control blocks, flange bodies and sandwich plates of the size NG4-Mini NG6 and NG10. (Please note the separate data sheets in register 2.3). 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

		B	V	P	PM22	-	-	/	M	E	-	-	#	
Pressure relief valve														
Pilot operated														
Proportional														
Screw-in cartridge M22x1,5														
Nominal pressure range p_N	20 bar													
	63 bar													
	100 bar													
	160 bar													
Nominal voltage U_N	12 VDC													
	24 VDC													
Slip-on coil	Metal housing, square													
Execution connection	Integrated electronics													
Hardware configuration														
With analog signal (0...+10 V factory set)														
With CANopen acc. to DSP-408														
With Profibus DP in accordance Fluid Power Technology														
With CAN J1939 (on request)														
Function														
Amplifier														
Controller with current feedback signal (0...20 mA / 4...20 mA)														
Controller with voltage feedback signal (0...10 V)														
Sealing material	NBR													
	FKM (Vitron)													
Manual override	Armature tube closed (standard)													
	Screwed sealing plug													
	Manual emergency actuation													
Design-Index (Subject to change)														

GENERAL SPECIFICATIONS

Description	Pilot operated proportional pressure relief 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».)
Einbaulage	any, preferably horizontal
Anzugsdrehmoment	$M_D = 50 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Masse	$m = 1,0 \text{ kg}$

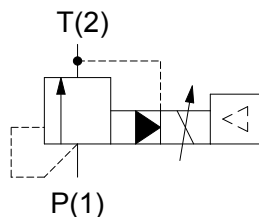
ELECTRICAL SPECIFICATIONS

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

Feedback signal interface (Sensor):

(controller only)	
Device receptacle (female) M12, 5-poles	
Mating connector	Plug (male), M12, 5-poles (not incl. in delivery)
Feedback signal::	Voltage / current state when ordering

SCHALTZEICHEN



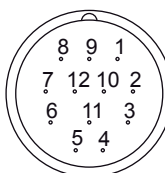
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 20 \text{ bar}$ $p_N = 20 \text{ bar}, p_N = 63 \text{ bar}$ $p_N = 100 \text{ bar}, p_N = 160 \text{ bar}$ $p_N = 200 \text{ bar}, p_N = 250 \text{ bar}$ $p_N = 350 \text{ bar}$
Nominal pressure ranges	$Q = 0,3...100 \text{ l/min}$
Volume flow	see characteristics
Leakage volume flow	≤ 2 %
Repeatability	≤ 4 %
Hysteresis	

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)

CANopen interface:

Device receptacle supply (male) X1



MAIN

- 1 = Supply voltage +
- 2 = Reserved for extensions
- 3 = Supply voltage 0 VDC
- 4 = Chassis

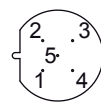
Device receptacle CANopen (male) X3



CAN

- 1 = not connected
- 2 = not connected
- 3 = CAN Gnd
- 4 = CAN High
- 5 = CAN Low

Device receptacle Profibus (female) X3



PROFIBUS

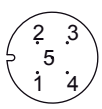
- 1 = VP
- 2 = RxD/TxD - N
- 3 = DGND
- 4 = RxD/TxD - P
- 5 = Shield

Parameterisation interface (USB, Mini B) X2

Under the closing screw of the housing cover

Feedback signal interface (Sensor)

Device receptacle (female) X4 (only controller)



- 1 = Supply voltage (output) +
- 2 = Feedback signal +
- 3 = Supply voltage 0 VDC
- 4 = not connected
- 5 = stab. output voltage


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».

Controllers are supplied configured as amplifiers. The setting of the mode of control and the setting of the controller are done by the customer by software setting (USB interface, Mini B).

Additional information can be found on our website:

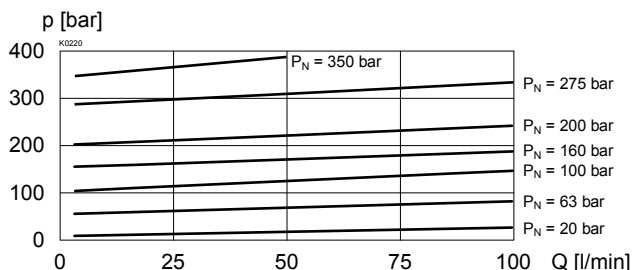
«www.wandfluh.com»


NOTE!

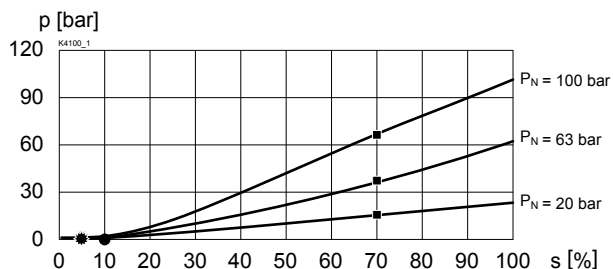
The mating connectors and the cable to adjust are settings is not part of the delivery. Refer to chapter «Accessories».

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

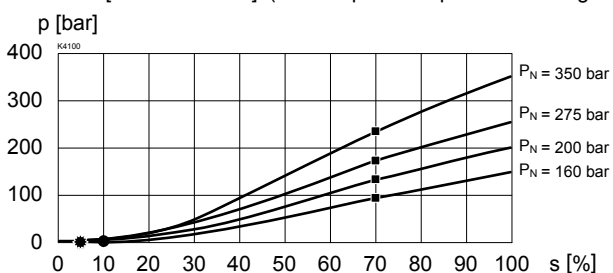
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



$p_{\text{red}} = f(I)$ Pressure adjustment characteristics
[at $Q = 10 \text{ l/min}$] / (s corresponds to preset value signal)



$p_{\text{red}} = f(I)$ Pressure adjustment characteristics
[at $Q = 10 \text{ l/min}$] / (s corresponds to preset value signal)

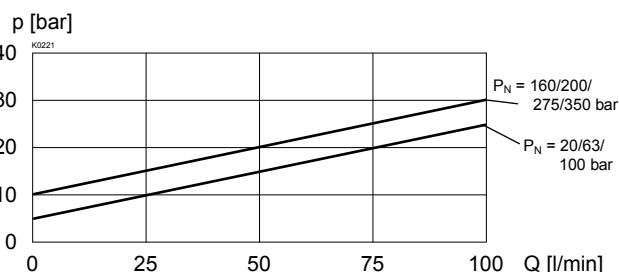

Factory settings:

Dither set for optimal hysteresis

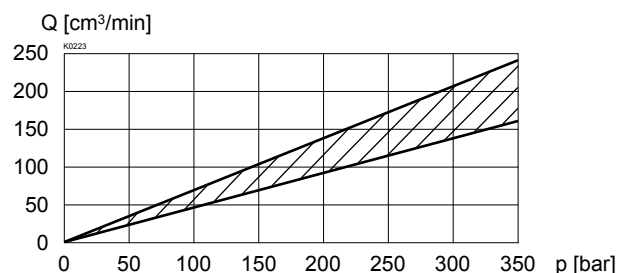
● = Deadband: Solenoid switched off
with command preset value signal < 5%

■ = Limited pressure in port P (1) at 70 % of preset value signal:
248 bar with pressure range 350 bar
192 bar with pressure range 275 bar
144 bar with pressure range 200 bar
114 bar with pressure range 160 bar
72 bar with pressure range 100 bar
46 bar with pressure range 63 bar
16 bar with pressure range 20 bar

$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

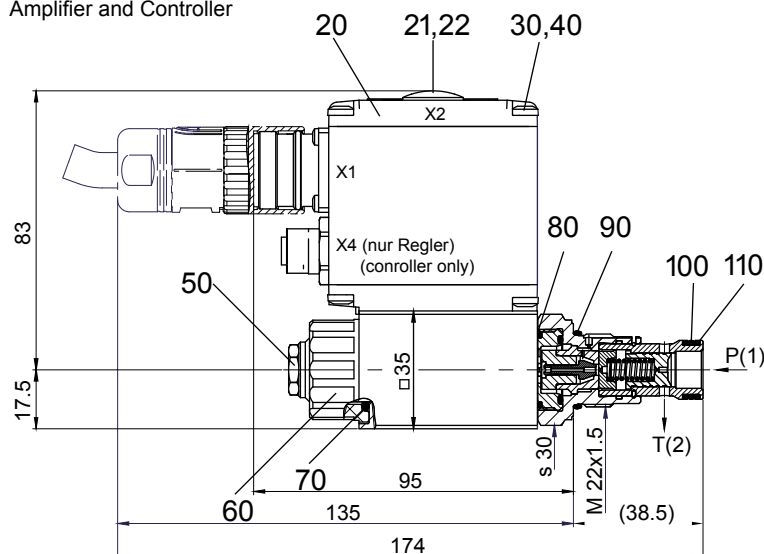


$Q_L = f(p)$ Leakage volume flow characteristics

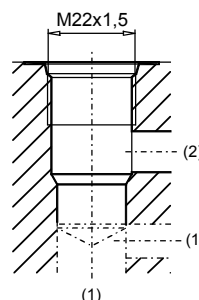


DIMENSIONS / SECTIONAL DRAWINGS

With analog interface
Amplifier and Controller

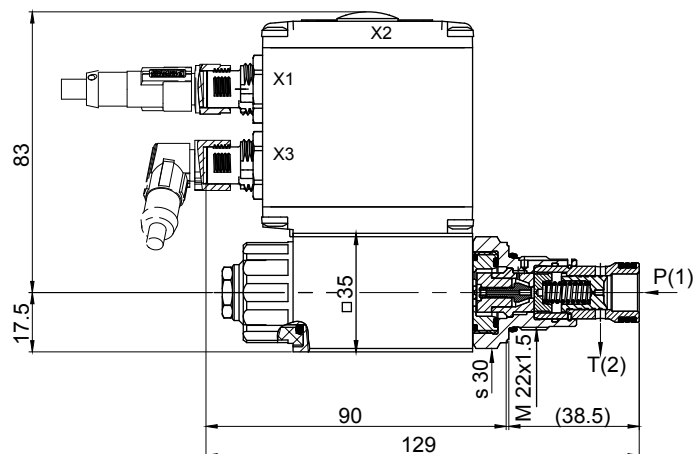


Cavity drawing according to
ISO 7789-22-02-0-98

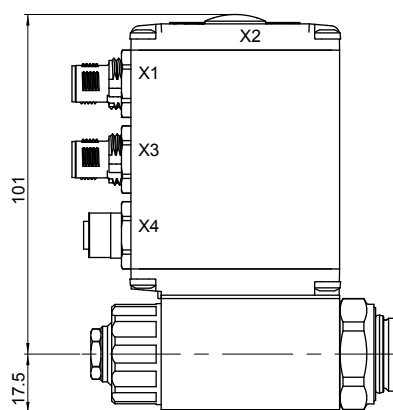


For detailed cavity drawing
and cavity tools see data
sheet 2.13-1003

With fieldbus interface
Amplifier



With fieldbus interface
Controller



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	160.2140 160.6141	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
110	049.3177	Back-up ring RD 14,6x17,5x1,4

ACCESSOIRES

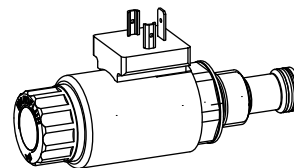
Flange-/sandwich plate NG4-Mini	Data sheet 2.3-720
Flange-/sandwich plate NG6	Data sheet 2.3-740
Flange-/sandwich plate NG10	Data sheet 2.3-760
Line mount body	Data sheet 2.9-200

- 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
 - 90°, 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 pressure relief valve
Screw-in cartridge**

- Direct operated
- $Q_{\max} = 25 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

Direct operated proportional pressure relief valve as a screw-in cartridge with a thread M22x1,5 for cavity according to ISO 7789. Five standard pressure ranges are available: 20, 100, 200, 315 and 350 bar. Good flow performance thanks to the differential area principle. The guide of the tapered spool has a lower leakage rate. The adjustment takes place by means of 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

The valve limits the pressure in port P (1) and relieves the volume flow to tank port T (2). The back pressure in T influences the pressure in P (1). When the operating pressure set by the proportional solenoid is reached, the poppet spool opens and connects the protected line to the tank T (2). These pressure relief valves are built according to the differential spool principle and are therefore very sensitive adjustable over the whole pressure range and also suitable for systems with extremely low minimum pressures. Wandfluh proportional amplifiers are available to control the proportional pressure relief valve (register 1.13).

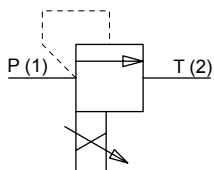
APPLICATION

The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. 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. (Please note the separate data sheets in register 2.3). 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

		B D P PM22 - <input type="text"/> - <input type="text"/> / <input type="text"/> <input type="text"/> - <input type="text"/> <input type="text"/> # <input type="text"/>									
Pressure relief valve											
Direct operated											
Proportional											
Screw-in cartridge M22x1,5											
Nominal pressure range p_N	20 bar <input type="text"/> 20 100 bar <input type="text"/> 100 200 bar <input type="text"/> 200 315 bar <input type="text"/> 315 350 bar <input type="text"/> 350										
Nominal voltage U_N	12 VDC <input type="text"/> G12 24 VDC <input type="text"/> G24 without coil <input type="text"/> X5										
Slip-on coil	Metal housing, round <input type="text"/> W Metal housing, square <input type="text"/> M*										
Connection execution	Connector socket EN 175301-803 / ISO 4400 <input type="text"/> D Connector socket AMP Junior-Timer <input type="text"/> J Connector Deutsch DT04-2P <input type="text"/> G										
Sealing material	NBR <input type="text"/> FKM (Viton) <input type="text"/> D1										
Manual override	Armature tube closed (standard) <input type="text"/> With screwed sealing plug <input type="text"/> HB0 With manual emergency actuation <input type="text"/> 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

GENERAL SPECIFICATIONS

Description	Direct operated proportional pressure relief valve
Construction	Screw-in cartridge for cavity to ISO 7789
Actuation	Proportional solenoid
Mounting	Screw-in thread M22x1,5
Ambient temperature	-20...+70 °C
Mounting position	any
Fastening torque	$M_D = 50 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 0,6 \text{ kg}$

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	$U_N = 12 \text{ VDC}$	$U_N = 24 \text{ VDC}$
Limiting current	$I_G = 1320 \text{ mA}$	$I_G = 660 \text{ mA}$
Relative duty factor	100% ED/DF (see data sheet 1.1-430)	
Protection class	Connection version	
acc. to EN 60529	D: IP 65	
	J: IP 66	
	G: IP 67 and 69K	

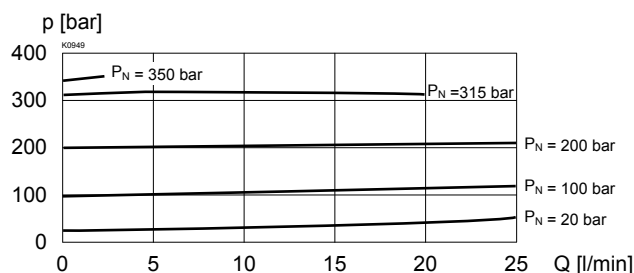
For further electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

HYDRAULIC SPECIFICATIONS

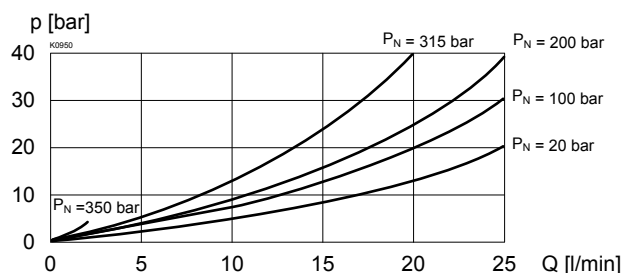
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pressure ranges	$p_N = 20 \text{ bar}, 100 \text{ bar}, 200 \text{ bar}, 315 \text{ bar}, 350 \text{ bar}$
Min. volume flow	$Q_{\min} = 0,1 \text{ l/min}$
Max. volume flow	$Q_{\max} = 25 \text{ l/min}$ for $p_N = 20/100/200 \text{ bar}$ $Q_{\max} = 20 \text{ l/min}$ for $p_N = 315 \text{ bar}$ $Q_{\max} = 2 \text{ l/min}$ for $p_N = 350 \text{ bar}$ see characteristics
Leakage volume flow	see characteristics
Repeatability	$\leq 1\% *$
Hysteresis	$\leq 4\% *$ * at optimal dither signal

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

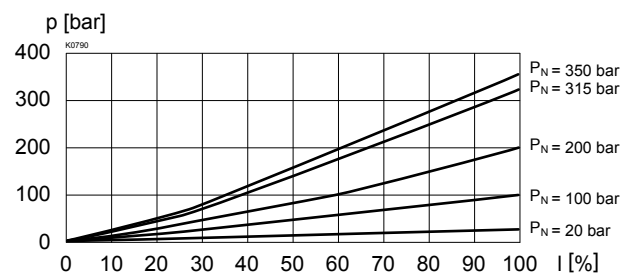
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



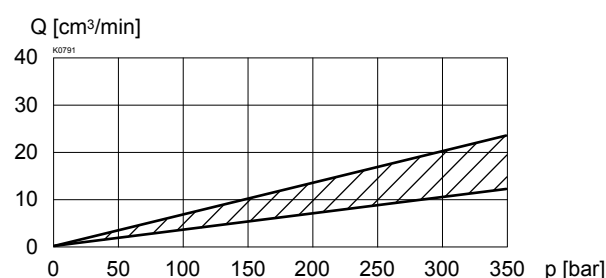
$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)



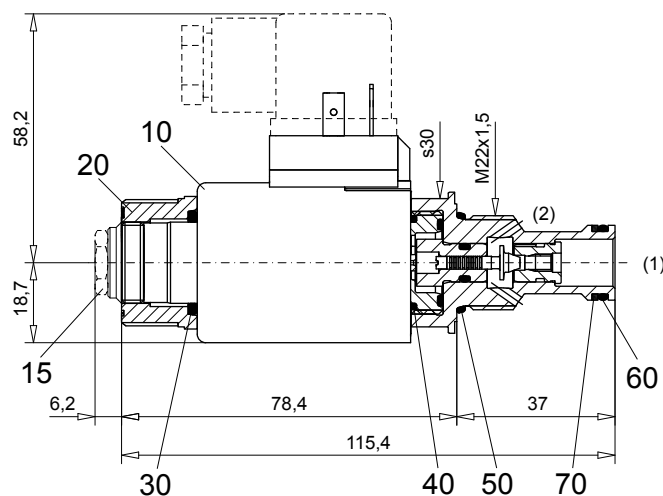
$p = f(I)$ Pressure adjustment characteristics
($Q = 1 \text{ l/min}$)



$Q_L = f(p)$ Leakage volume flow characteristics

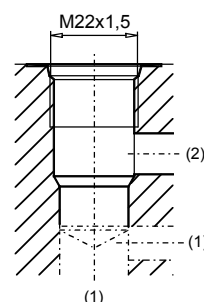


DIMENSIONS / SECTIONAL DRAWINGS



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

Cavity drawing acc. to
ISO 7789-22-02-0-98



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1003

PARTS LIST

Position	Article	Description
10	206.2201 206.2200 206.2203 206.2202 206.2205 206.2204	EN 175301 Solenoid coil WDS37/19x50-G24 Solenoid coil WDS37/19x50-G12 Junior-Timer Solenoid coil WJS37/19x50-G24 Solenoid coil WJS37/19x50-G12 Deutsch Solenoid coil WGS37/19x50-G24 Solenoid coil WGS37/19x50-G12
15	253.8000 239.2033	HB 4,5 Manual override (data sheet 1.1-300) HB 0 Plug screw (data sheet 1.1-300)
20	154.2700	Knurled nut
30	160.2187 160.6187	O-ring ID 18,72x2,62 (NBR) O-ring ID 18,72x2,62 (FKM)
40	160.2170 160.6172	O-ring ID 17,17x1,78 (NBR) O-ring ID 17,17x1,78 (FKM)
50	160.2188 160.6188	O-ring ID 18,77x1,78 (NBR) O-ring ID 18,77x1,78 (FKM)
60	160.2140 160.6141	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
70	049.3177	Backup ring RD 14,6x17,5x1,4

ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.3-720
Flange-/sandwich plate NG6	Data sheet 2.3-740
Flange-/sandwich plate NG10	Data sheet 2.3-760
Line mount body	Data sheet 2.9-200
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article Nr. 219.2002

Technical explanation see data sheet 1.0-100

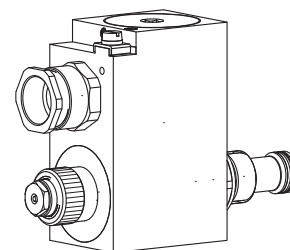
**Proportional pressure relief valve
Screw-in cartridge**

- Direct operated
- $Q_{\max} = 25 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M22x1,5

ISO 7789

- Ex II 2 G Ex d IIC
- Ex II 2 D Ex tD A21 IP65
- Ex I M2 Ex d I Mb


DESCRIPTION
For explosion-hazard zones

Direct operated proportional pressure relief valve as a screw-in cartridge with a thread M22x1,5 for cavity according to ISO 7789. Activated with Wandfluh-explosion-proof-solenoid. The cartridge body made of steel is zinc coated for corrosion protection. Solenoid coil in acc. with directive 94/9/EC (ATEX) for explosion-hazard zones. The flameproof enclosures (acc. to EN/IEC 60079-1/31 and EN/IEC 61241-1) prevents an explosion in the interior from getting outside. The design prevents a surface temperature capable of igniting.

FUNCTION

The valve limits the pressure in port P (1) and relieves the volume flow to tank port T (2). The back pressure in T (2) influences the pressure in P (1). When the operating pressure set by the proportional solenoid is reached, the poppet spool opens and connects the protected line to the tank T (2). These pressure relief valves are built according to the differential spool principle and are therefore very sensitive adjustable over the whole pressure range and also suitable for systems with extremely low minimum pressures.

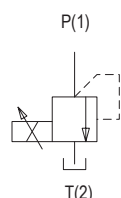
APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for remote control and signal processing from process control systems enable elegant, comfortable solutions to problems. 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, NG6 and NG10 types. (Please note the separate data sheets in register 2.3). 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.

CERTIFICATES

in accordance with	Surface gas + dust	Mining
ATEX	x	x
IECEX	x	x
GOST Ex	x	x
Australia	x	x
Inmetro	x	x

The certificates can be found on www.wandfluh.com / DOWNLOADS / Accompanying Ex-proof / MKY45/18-...-L...

SYMBOLS

TYPE CODE

Pressure relief valve		B D B PM22 -		-		/		/		-		#	
Direct operated													
Proportional explosion proof, execution Ex d IIC													
Screw-in cartridge M22x1,5													
Execution:		L15		L9									
Nominal pressure range p_N :		20		200		20		160					
[bar]		63		275		50		220					
		100		350		80		280					
Standard nominal voltage U_N :		12 VDC		G12									
		24 VDC		G24									
Execution:		9W		L9		Ambient temp. by:							
		15W		L15		40 °C							
						70 °C							
Certificates:		ATEX, IECEX, GOST Ex		AU		Inmetro		IM					
		Australia											
Sealing material		NBR											
		FKM (Viton)				D1							
Design-Index (Subject to change)													

GENERAL SPECIFICATIONS

Description	Direct operated proportional pressure relief valve
Construction	Screw-in cartridge for cavity according to ISO 7789
Operations	Proportional solenoid
Mounting	Screw-in thread M22x1,5
Admissible ambient temp.	Execution L9 -20...+40 °C (operation as T1...T6/T80 °C) Execution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 50 \text{ Nm}$ for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 2,2 \text{ kg}$

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight
Standard nominal voltage	$U_N = 12 \text{ VDC}, 24 \text{ VDC}$
Limiting current	L9/40 °C $I_G = 625 \text{ mA}$ 305 mA L15/50 °C $I_G = 950 \text{ mA}$ 450 mA L15/70 °C $I_G = 910 \text{ mA}$ 420 mA
Voltage tolerance	+ 10% of rated voltage
Relative duty factor	100% ED
Schutzart	IP67 acc. to EN 60 529
Connection/Power supply	Through cable gland for cable $\varnothing 6,5...14 \text{ mm}$ (acc. to EN 60079-0)
Temperature class:	T1...T6
Execution L9:	T1...T4
Execution L15:	
Nominal power:	
Execution L9	9W
Execution L15	15W
For further electrical characteristics, refer to the data sheet of the solenoid coil: 1.1-183	

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Admissible fluid temp.	Execution L9 -20...+40 °C (operation as T1...T6/T80 °C) Execution L15 -20...+70 °C operation as T1...T4/T130 °C)
Peak pressure	$p_{max} = 400$ bar
Nominal pressure ranges	Execution L9 $p_N = 20$ bar, 80 bar, 160 bar, 250 bar, 280 bar Execution L15 $p_N = 20$ bar, 100 bar, 200 bar, 315 bar, 350 bar
Min. volume flow	$Q_{min} = 0,1$ l/min
Max. volume flow	see characteristics
Leakage volume flow	see characteristics
Hysteresis	L15 $\leq 5\%$ * * at optimal dither signal

SECURITY OPERATED



The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.
In case of non-observance, no liability can be assumed.

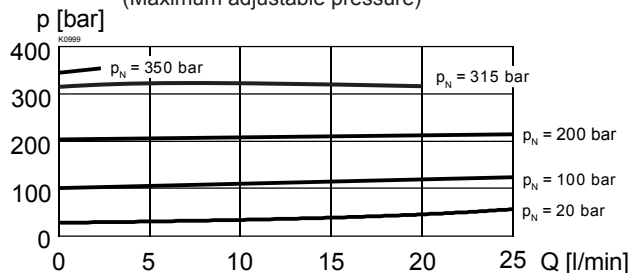
INSTALLATION

For stack assembly please observe the remarks in the operating instructions.

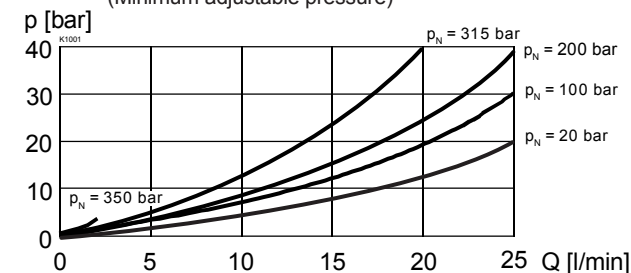
CHARACTERISTICS oil viscosity $\nu = 30$ mm²/s

Execution L15 (measured at 50 °C)

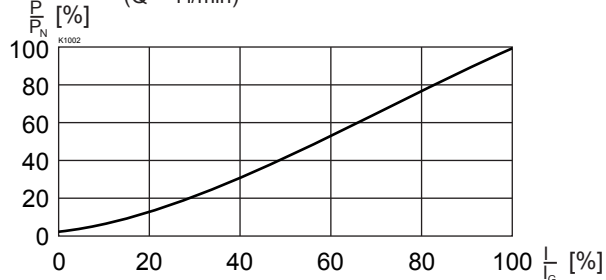
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

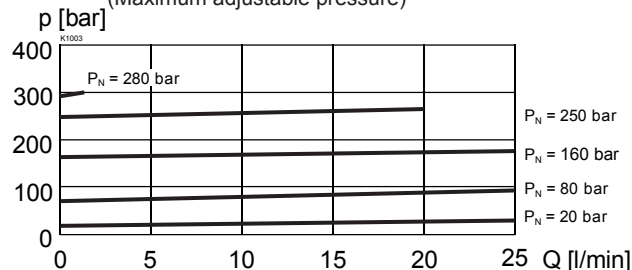


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)

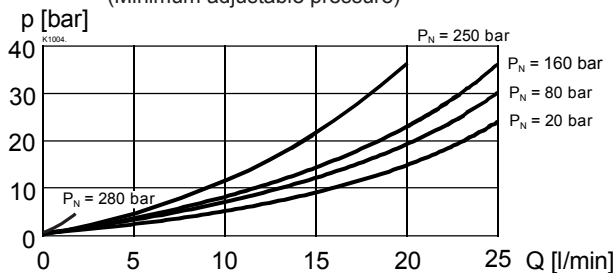


Execution L9 (measured at 40 °C)

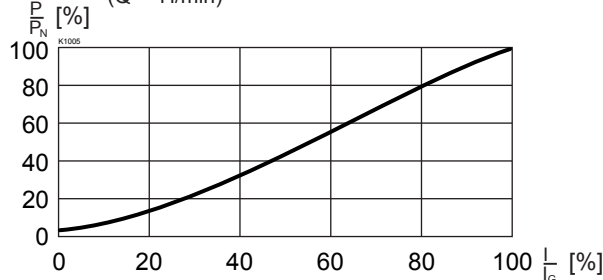
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

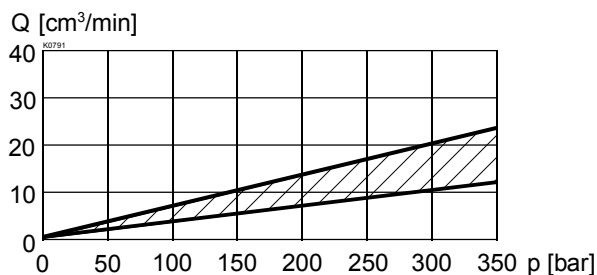


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)

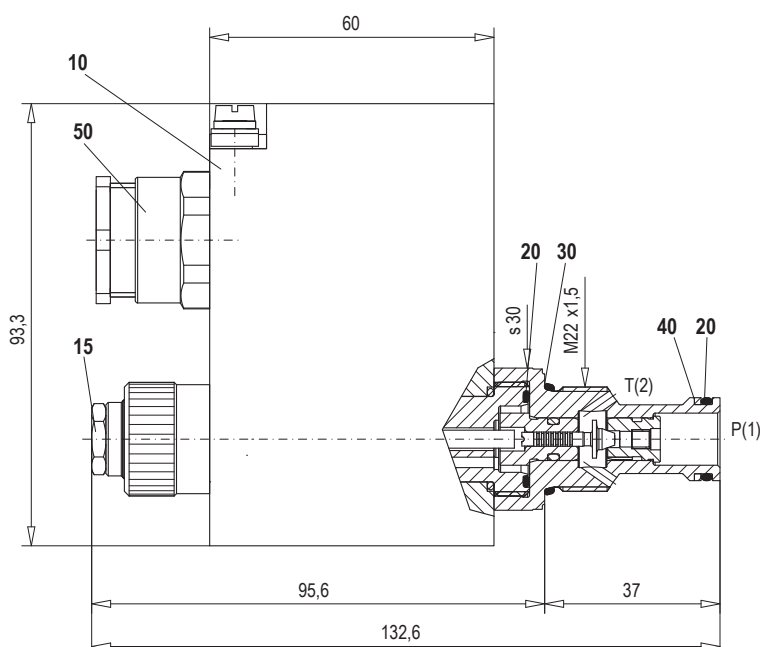


Execution L9/40 °C
L15/70 °C

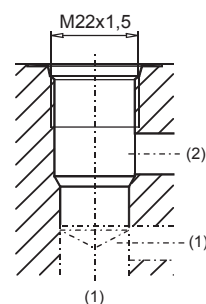
$Q_L = f(p)$ Leakage volume flow characteristics



DIMENSIONS/SECTIONAL DRAWING



Cavity drawing acc. to
ISO 7789-22-02-0-98



For detailed cavity drawing and
cavity tools see data sheet 2.13-1003

Dimensions of the solenoid coil refer to data sheet 1.1-183

PARTS LIST

Position	Article	Description
10	263.6...	Slip-on coil MKY45/18x60-...
15	253.8000	Plug with integrated manual override HB4,5
20	160.2140 160.8140	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
30	160.2188 160.8188	O-ring ID 18,77x1,78 (NBR) O-ring ID 18,77x1,78 (FKM)
40	049.3177	Back-up ring RD 14,6x17,5x1,4
50	111.1080	Cable gland brass M20

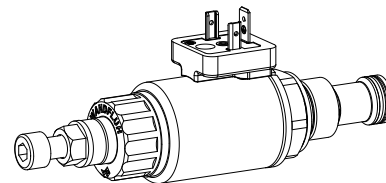
ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.3-720
Flange-/sandwich plate NG6	Data sheet 2.3-740
Flange-/sandwich plate NG10	Data sheet 2.3-760
Line mount body	Data sheet 2.9-200

Technical explanation see data sheet 1.0-100

Proportional inverse pressure relief valve
Screw-in cartridge

- **Direct operated**
- **Nominal pressure adjustable -20 % / +30 %**
- **Q_{max} = 25 l/min**
- **p_{max} = 400 bar**
- **p_{N max} = 350 bar**

M22x1,5
ISO 7789

DESCRIPTION

Direct operated proportional pressure relief valve with inverse function. Thread M22x1,5 for cavity according to ISO 7789. As standard versions, 6 pressure ranges are available: 20, 100, 160, 200, 315, 350 bar. Good flow performance due to the differential area principle. Small leak along the poppet guide. Adjust-mend by a Wandfluh proportional solenoid. The cartridge body made of steel is zinc coated and therefore rust-protected. The solenoid coil is zinc-/nickel-coated. Wandfluh proportional amplifiers are needed to control the proportional pressure relief valve (register 1.13).

FUNCTION

The valve limits the pressure in the port P (1) and relieves the volume flow to tank port T (2). The back pressure in T (2) influences the pressure in P (1). A spring, which is adjustable from the outside within a limited range, presses the poppet against the seat and hereby adjusts the maximum operating pressure. The force of the proportional solenoid counteracts the spring force. For this reason, the operating pressure declines with the increasing solenoid current (inverse function). When the solenoid is currentless, the maximum operating pressure is present. The pressure on the guided poppet acts on a differential area between the seat diameter and poppet guide diameter. The good flow characteristics are achieved through large seat diameters.

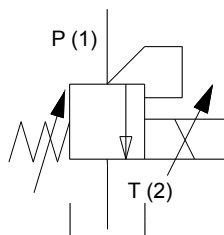
APPLICATION

The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for remote control and signal processing from process control systems enable elegant, comfortable solutions to problems. By means of the inverse function, the maximum system pressure is maintained if the electric valve control fails (safety function). In such cases, e.g., the descending of a load is prevented, or cooling ventilators with hydraulic motor drives are kept in operation. 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, NG6 and NG10 types. (Please note the separate data sheets in register 2.3).

TYPE CODE

		B D I PM22 -		-		/		-		#	
Pressure relief valve											
Direct operated											
Proportional, invers											
Screw-in cartridge M22x1,5											
Nominal pressure range p _N	20 bar <input type="text" value="20"/> 100 bar <input type="text" value="100"/> 160 bar <input type="text" value="160"/> 200 bar <input type="text" value="200"/> 315 bar <input type="text" value="315"/> 350 bar <input type="text" value="350"/>										
Nominal voltage U _N	12 VDC <input type="text" value="G12"/> 24 VDC <input type="text" value="G24"/> without coil <input type="text" value="X5"/>										
Slip-on coil	Metal housing, round <input type="text" value="W"/> Metal housing, square <input type="text" value="M*"/>										
Connection execution	Connector socket EN 175301-803 / ISO 4400 <input type="text" value="D"/> Connector socket AMP Junior-Timer <input type="text" value="J"/> Connector Deutsch DT04-2P <input type="text" value="G"/>										
Sealing material	NBR <input type="text" value=""/> FKM (Viton) <input type="text" value="D1"/>										
Design-Index (Subject to change)											

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

SYMBOL


GENERAL SPECIFICATIONS

Description	Direct operated proportional pressure relief valve with inverse function
Construction	Screw-in cartridge for cavity to ISO 7789
Operations	Proportional solenoid with spring
Mounting	Screw-in thread M22x1,5
Ambient temperature	-20...+70 °C
Mounting position	any
Fastening torque	$M_D = 50 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for Knurled nut
Weight	$m = 0,6 \text{ kg}$

ELECTRICAL SPECIFICATIONS

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

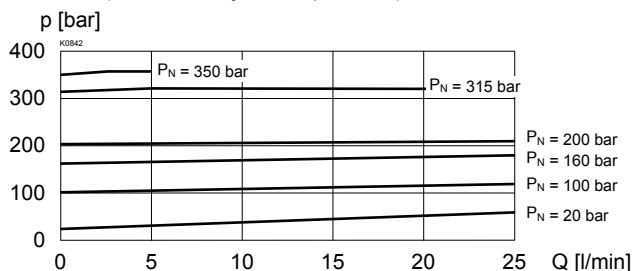
Other electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

HYDRAULIC SPECIFICATIONS

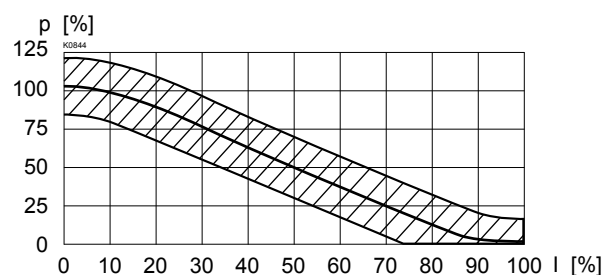
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pres. ranges	see type code
Min. volume flow	$Q_{\min} = 0,2 \text{ l/min}$
Max. volume flow	$Q_{\max} = 25 \text{ l/min}$ for $p_N = 20/40/100/160/200 \text{ bar}$ $Q_{\max} = 15 \text{ l/min}$ for $p_N = 315/350 \text{ bar}$ $Q_{\max} = 5 \text{ l/min}$
Leakage volume flow	see characteristics
Repeatability	$\leq 2 \% *$
Hysteresis	$\leq 4 \% *$ * at optimal dither signal


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

$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)

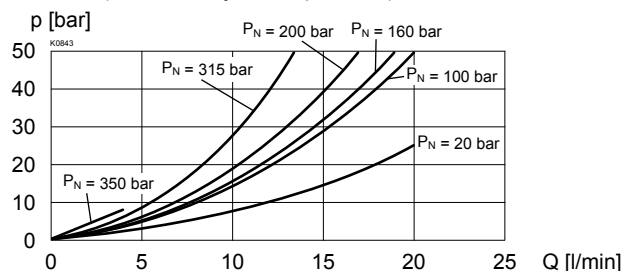


$p = f(I)$ Pressure adjustment characteristics
($Q = 1 \text{ l/min}$)

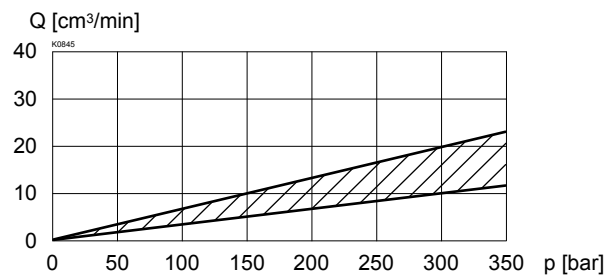


 Adjustable range of nominal pressure, adjusted with set screw.

$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

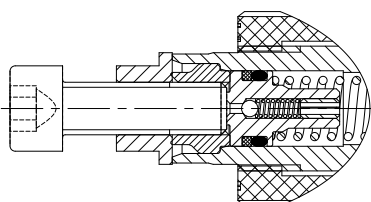
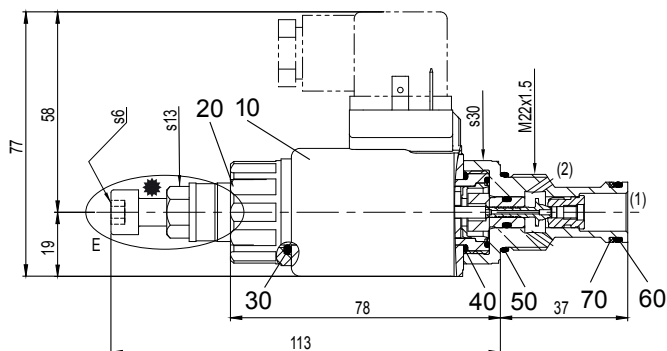


$Q_L = f(p)$ Leakage volume flow characteristics

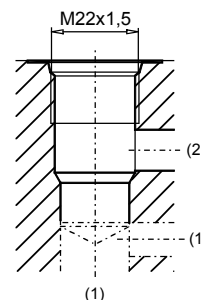


DIMENSIONS / SECTIONAL DRAWINGS

✱ Adjusting screw for setting the nominal pressure (-20 % / +30 %)



Cavity drawing acc. to
ISO 7789-22-02-0-98



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1003

E: Venting

- Release locknut
- Remove screw
- Press check-valve (with a pin or with allen key < 1,3 mm)
- Screw the screw back in
- Set the required pressure and tighten the lock nut



Under pressure oil shoot out!
Cover with a cloth.

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

PARTS LIST

Position	Article	Description
10	206.2201	EN 175301 Solenoid coil WDS37/19x50-G24
	206.2200	Solenoid coil WDS37/19x50-G12
		Junior-Timer
	206.2203	Solenoid coil WJS37/19x50-G24
	206.2202	Solenoid coil WJS37/19x50-G12
		Deutsch
20	206.2205	Solenoid coil WGS37/19x50-G24
	206.2204	Solenoid coil WGS37/19x50-G12
20	154.2700	Knurled nut
30	160.2187	O-ring ID 18,72x2,62 (NBR)
	160.6187	O-ring ID 18,72x2,62 (FKM)
40	160.2170	O-ring ID 17,17x1,78 (NBR)
	160.6172	O-ring ID 17,17x1,78 (FKM)
50	160.2188	O-ring ID 18,77x1,78 (NBR)
	160.6188	O-ring ID 18,77x1,78 (FKM)
60	160.2140	O-ring ID 14,00x1,78 (NBR)
	160.6141	O-ring ID 14,00x1,78 (FKM)
70	049.3177	Backup ring RD 14,6x17,5x1,4

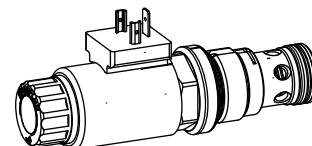
ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.3-720
Flange-/sandwich plate NG6	Data sheet 2.3-740
Flange-/sandwich plate NG10	Data sheet 2.3-760
Line mount body	Data sheet 2.9-200
Proportional amplifier	Register 1.13
Mating connector EN 175301-803	Article Nr. 219.2002

Technical explanation see data sheet 1.0-100

**Proportional pressure relief valve
Screw-in cartridge**

- Pilot operated
- $Q_{\max} = 230 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M33x2
ISO 7789

DESCRIPTION

Pilot operated, proportional pressure relief valve, as screw-in cartridge with a thread M33x2 for cavity according to ISO 7789. 4 standard pressure levels are available: 100 bar, 200 bar, 275 bar and 350 bar. The adjustment takes place by means of 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

When the operating pressure set by the proportional solenoid is reached, the main spool opens and connects the protected line with the return line to the tank. The back pressure in T influences the pressure in P (1). This pilot operated proportional pressure relief valve can be adjusted very sensitively and is suitable for large volume flows and high pressures. To control the valve, Wandfluh proportional amplifiers are available (see register 1.13).

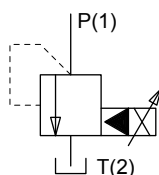
APPLICATION

The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. Installation of the screw-in cartridge in control blocks. Cavity tools are available for machining cavities in steel and aluminium (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

		B V P PM33 - <input type="text"/> - <input type="text"/> / <input type="text"/> <input type="text"/> - <input type="text"/> <input type="text"/> # <input type="text"/>									
Pressure relief valve											
Pilot operated											
Proportional											
Screw-in cartridge M33x2											
Nominal pressure range p_N	100 bar <input type="text" value="100"/> 200 bar <input type="text" value="200"/> 275 bar <input type="text" value="275"/> 350 bar <input type="text" value="350"/>										
Nominal voltage U_N	12 VDC <input type="text" value="G12"/> 24 VDC <input type="text" value="G24"/> without coil <input type="text" value="X5"/>										
Slip-on coil	Metal housing, round <input type="text" value="W"/> Metal housing, square <input type="text" value="M*"/>										
Connection execution	Connector socket EN 175301-803 / ISO 4400 <input type="text" value="D"/> Connector socket AMP Junior-Timer <input type="text" value="J"/> Connector Deutsch DT04-2P <input type="text" value="G"/>										
Sealing material	NBR <input type="text"/> FKM (Viton) <input type="text" value="D1"/>										
Manual override	Armature tube closed (standard) <input type="text"/> With screwed sealing plug <input type="text" value="HB0"/> With manual emergency actuation <input type="text" value="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

GENERAL SPECIFICATIONS

Description	Pilot operated pressure relief valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Actuation	Proportional solenoid
Mounting	Screw-in thread M33x2
Ambient temperature	-20...+70 °C
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 80 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 0,7 \text{ kg}$

ELECTRICAL SPECIFICATIONS

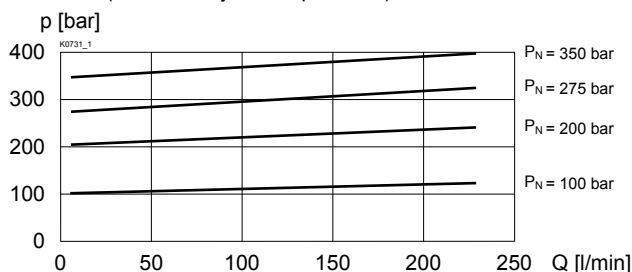
Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	U _N = 12 VDC	U _N = 24 VDC
Limiting current	I _G = 1320 mA	I _G = 660 mA
Relative duty factor	100 % ED/DF (see data sheet 1.1-430)	
Protection class acc. to EN 60529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	
Other electrical specifications	see data sheet 1.1-173 (W) 1.1-174 (M)	

HYDRAULIC SPECIFICATIONS

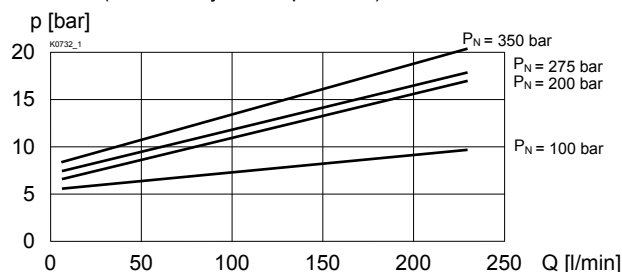
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406: 1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{T\max} = p_p + 15 \text{ bar}$
Nominal pressure ranges	$p_N = 100 \text{ bar}, 200 \text{ bar}, 275 \text{ bar}, 350 \text{ bar}$
Volume flow	$Q = 5...230 \text{ l/min}$
Leakage volume flow	see characteristics
Repeatability	$\leq 2\%$ *
Hysteresis	$\leq 4\%$ *
	* at optimal dither signal

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

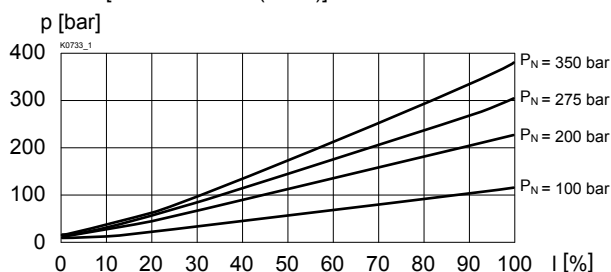
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



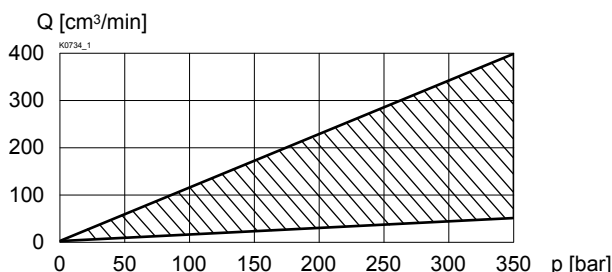
$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



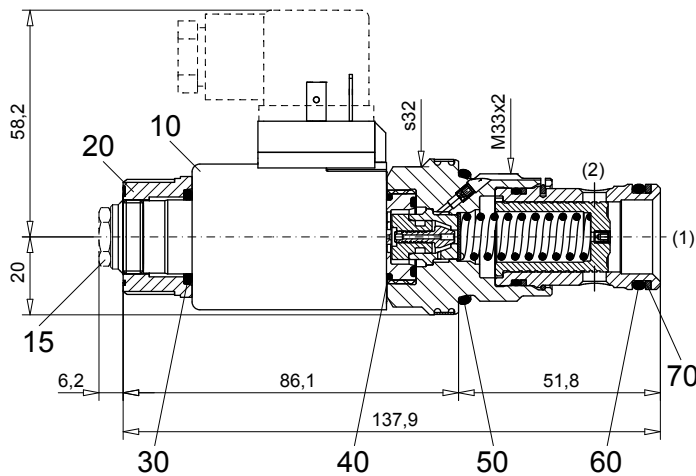
$p = f(I)$ Pressure adjustment characteristics
[at $Q = 30 \text{ l/min}$ (static)]



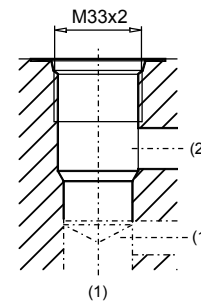
$Q_L = f(p)$ Leakage volume flow characteristics



DIMENSIONS / SECTIONAL DRAWING



Cavity drawing acc. to
ISO 7789-33-02-0-98



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1041

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

PARTS LISTE

Position	Article	Description
10	206.2201	EN 175301 Solenoid coil WDS37/19x50-G24
	206.2200	Solenoid coil WDS37/19x50-G12 Junior-Timer
	206.2203	Solenoid coil WJS37/19x50-G24
	206.2202	Solenoid coil WJS37/19x50-G12
	206.2205	Deutsch Solenoid coil WGS37/19x50-G24
	206.2204	Solenoid coil WGS37/19x50-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 18,72x2,62 (NBR)
	160.6187	O-ring ID 18,72x2,62 (FKM)
40	160.2170	O-ring ID 17,17x1,78 (NBR)
	160.6172	O-ring ID 17,17x1,78 (FKM)
50	160.2298	O-ring ID 29,82x2,62 (NBR)
	160.6296	O-ring ID 29,82x2,62 (FKM)
60	160.2219	O-ring ID 21,89x2,62 (NBR)
	160.6216	O-ring ID 21,89x2,62 (FKM)
70	049.3277	Backup ring RD 22,5x27x1,4

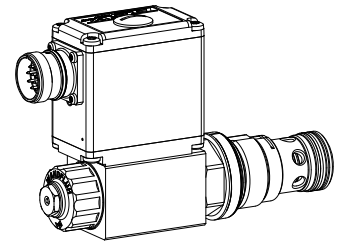
ACCESSORIES

Line mount body	Data sheet 2.9-200
Proportional amplifier	register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

**Proportional pressure relief valve
Screw-in cartridge**

- Integrated amplifier electronics
- Pilot operated
- $Q_{\max} = 230 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 315 \text{ bar}$

M33x2
ISO 7789

DESCRIPTION

Pilot operated proportional pressure relief 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 electronics with protection class IP67 for harsh environment. Four standard pressure levels are available: 100, 200, 275 and 315 bar. Adjustment by a Wandfluh proportional solenoid (VDE standard 0580). The cartridge and the solenoid made of steel are zinc coated and therefore rustprotected.

FUNCTION

When the operating pressure set by the proportional solenoid is reached, the main spool opens and connects the protected line with the return line to the tank. The back pressure in T (2) influences the pressure in P (1). 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 pressure relief valves with integrated electronics are well suited for demanding applications, in which the pressure frequently has to be changed. 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 pressure relief cartridge is very suitable for mounting in control blocks. 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.

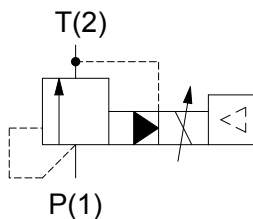
TYPE CODE

		B	V	P	PM33 -		-		/ M	E		-		#
Pressure relief valve														
Pilot operated														
Proportional														
Screw-in thread M33x2														
Nominal pressure range p_N	100 bar													
	200 bar													
	275 bar													
	350 bar													
Nominal voltage U_N	12 VDC													
	24 VDC													
Slip-on coil	Metal housing, square													
Connection execution	Integrated electronics													
Hardware configuration														
With analog signal (0...+10 V voreingestellt)														
With CANopen acc. to DSP-408														
With Profibus DP in accordance with Fluid Power Technology														
With CAN J1939 (on request)														
Sealing material	NBR													
	FKM (Vitron)													
Manual override	Armature tube closed (standard)													
	Screwed sealing plug													
	Manual emergency actuation													
Design-Index (Subject to change)														

GENERAL SPECIFICATIONS

Description	Pilot operated proportional pressure relief valve with integrated electronics
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operations	Proportional solenoid wet pin push type, pressure tight
Mounting	Screw-in thread M33x2
Ambient temperature	-20...+65°C (typical) (The upper temperature limit is a guideline value for typical applications, in individual cases it may also be higher or lower. The electronics of the valve limit the power in case of a too high electronics temperature. More detailed information can be obtained from the operating instructions «DSV».)
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 80 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Masse	$m = 1,25 \text{ kg}$

SYMBOL



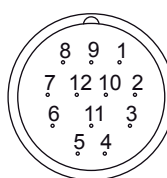
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{max} = 400 \text{ bar}$ $p_{Tmax} = p_p + 15 \text{ bar}$
Nominal pressure ranges	$p_N = 100 \text{ bar}, 200 \text{ bar}$ and 315 bar
Volume flow	$Q = 5...230 \text{ l/min}$
Leakage volume flow	see characteristics
Repeatability	$\leq 3\%$
Hysteresis	$\leq 5\%$

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...+10V), (PIN 4/5)

ELECTRICAL SPECIFICATIONS

Protection class	IP 67 acc. to EN 60 529 with suitable connector and closed electronic 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

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».

INBETRIEBNAHME

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



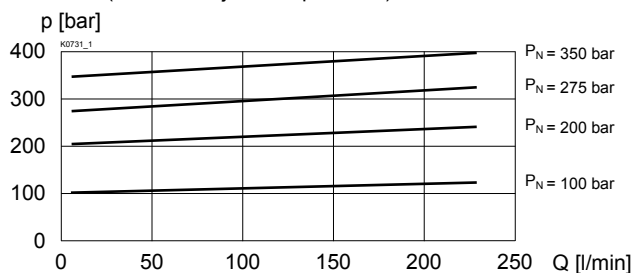
NOTE!

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

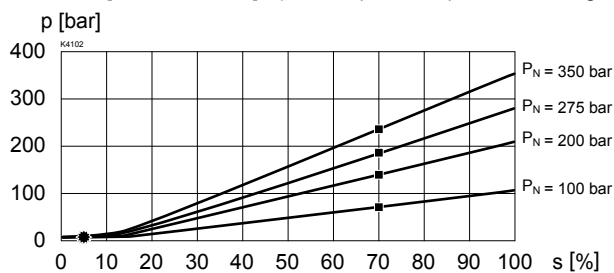
Additional information can be found on our website:
«www.wandfluh.com»

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

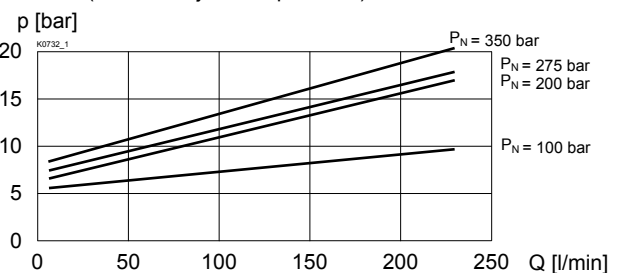
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



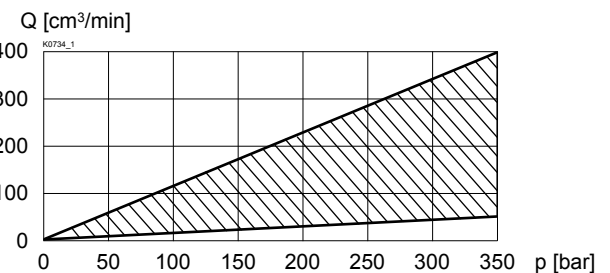
$p = f(I)$ Pressure adjustment characteristics
[at $Q = 30 \text{ l/min}$] / (s corresponds to preset value signal)



$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



$Q_L = f(p)$ Leakage volume flow characteristics



Factory settings:

Dither set for optimal hysteresis

✱ = Deadband: Solenoid switched off with command preset value signal < 5 %

■ = Limited pressure in port P (1) at 70 % of preset value signal:

72 bar with pressure range 100 bar

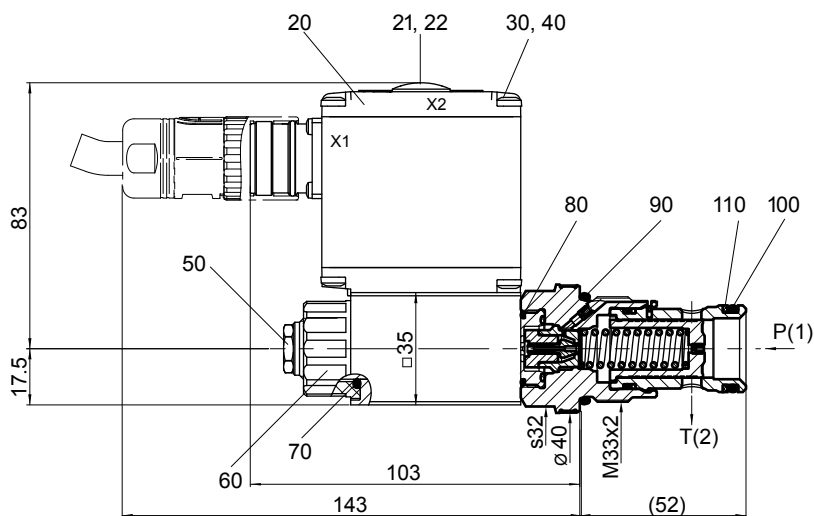
143 bar with pressure range 200 bar

192 bar with pressure range 275 bar

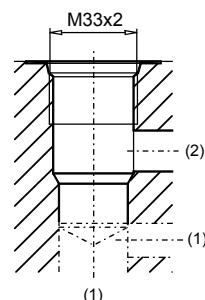
233 bar with pressure range 350 bar

DIMENSIONS / SECTIONAL DRAWINGS

With analogue interface

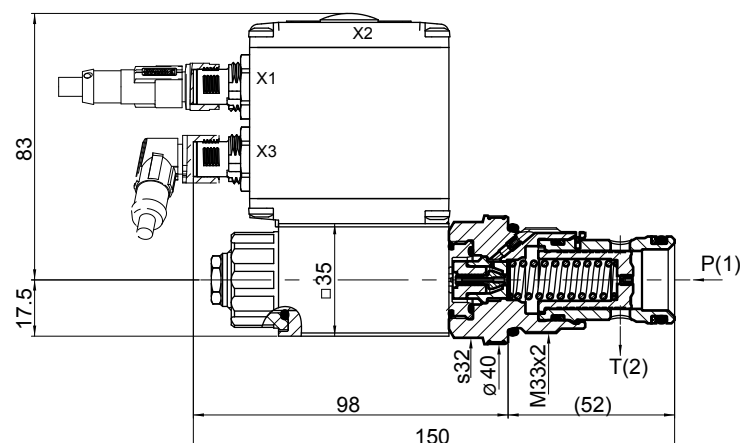


Cavity drawing according to
ISO 7789-33-02-0-98



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1041

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 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 18,72x2,62 (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	160.2298 160.6296	O-ring ID 29,82x2,62 (NBR) O-ring ID 29,82x2,62 (FKM)
100	160.2219 160.6216	O-ring ID 21,89x2,62 (NBR) O-ring ID 21,89x2,62 (FKM)
110	049.3277	Back-up ring RD22,5x27x1,4

ACCESSORIES

Line mount body Data sheet 2.9-200

- 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:
 - streight, soldering contact article no. 219.2330
 - 90°, 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

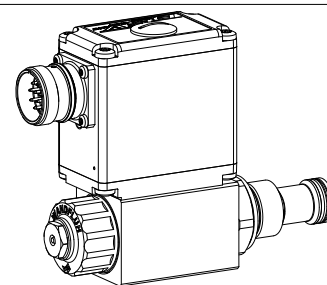
**Proportional pressure relief valve
Screw-in cartridge**

- Integrated amplifier or controller electronics
- Pilot operated

- $Q_{max} = 25 \text{ l/min}$
- $p_{max} = 400 \text{ bar}$
- $p_{N \text{ max}} = 350 \text{ bar}$

M22x1,5

ISO 7789


DESCRIPTION

Direct operated proportional pressure relief valve with integrated electronics as a screw-in cartridge. Thread M22x1,5 for cavity according 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. Five standard pressure levels are available: 20, 100, 200, 315 and 350 bar. Adjustment by a Wandfluh proportional solenoid (VDE standard 0580). The cartridge and the solenoid made of steel are zinc coated and therefore rust-protected.

Optionally these valves are available with integrated controller. As feedback value generator sensors with voltage or current output can be directly connected. The available controller structures are optimised for the utilisation with hydraulic drives.

FUNCTION

The valve limits the pressure in port P (1) and relieves the volume flow to tank port T (2). The back pressure in T (2) influences the pressure in P (1). When the operating pressure set by is reached, the poppet spool opens and connects the protected line to the tank T (2). 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 pressure relief valves with integrated electronics are well suited for demanding applications, in which the pressure frequently has to be changed. 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 integrated controller relieves the machine control system and operates the pressure control in a closed control circuit. The proportional pressure relief cartridge is very suitable for mounting in control blocks, flange bodies and sandwich plates size NG4-Mini and NG6. (Please note the separate data sheets in register 2.3). 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

		B	D	P	PM22	-		/	M	E		-		#	
Pressure relief valve															
Direct operated															
Proportional															
Screw-in cartridge M22x1,5															
Nominal pressure range p_N	20 bar														
	100 bar														
Nominal voltage U_N	12 VDC														
	24 VDC														
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													
Function															
Amplifier															
Controller with current feedback signal (0...20 mA / 4...20 mA)		R1													
Controller with voltage feedback signal (0...10 V)		R2													
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 pressure relief 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 = 2,6 Nm (Qual. 8.8) for solenoid screws
Weight	m = 0,9 kg

ELECTRICAL SPECIFICATIONS

Protection class	IP 67 acc. to EN 60 529 with suitable connector and closed electronic 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)

Analogue 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.

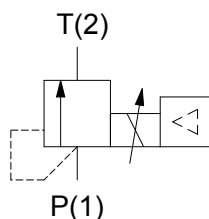
Fieldbus interface:

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 DRP303-1)
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

Feedback signal interface (Sensor):

(controller only)	
Device receptacle (female)	M12, 5-poles
Mating connector	Plug (male), M12, 5-poles (not incl. in delivery)
Feedback signal::	Voltage / current state when ordering

SYMBOL



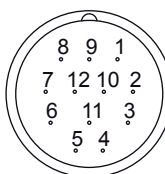
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade β 6...10≥75) 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} = 400 bar
Nominal pressure ranges	p _N = 20 bar, p _N = 100 bar, p _N = 200 bar, p _N = 315 bar
Min. volume flow	Q _{min} = 0,1 l/min
Max. volume flow	Q _{max} = 25 l/min for p _N = 20/100/200 bar Q _{max} = 20 l/min for p _N = 315 bar see characteristics
Leakage volume flow	
Repeatability	≤ 1 %
Hysteresis	≤ 4 %

CONNECTOR WIRING DIAGRAM

Analog interface:

Device receptacle (male) X1



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

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

Fieldbus interface:

Device receptacle supply (male) X1

MAIN



- 1 = Supply voltage +
- 2 = Reserved for extensions
- 3 = Supply voltage 0 VDC
- 4 = Chassis

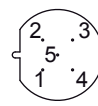
Device receptacle CANopen (male) X3



CAN

- 1 = not connected
- 2 = not connected
- 3 = CAN Gnd
- 4 = CAN High
- 5 = CAN Low

Device receptacle Profibus (female) X3



PROFIBUS

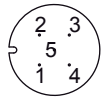
- 1 = VP
- 2 = Rx/D/TxD - N
- 3 = DGND
- 4 = Rx/D/TxD - P
- 5 = Shield

Parameterisation interface (USB, Mini B) X2

Under the closing screw of the housing cover

Feedback signal interface (Sensor)

Device receptacle (female) X4 (only controller)



- 1 = Supply voltage (output) +
- 2 = Feedback signal +
- 3 = Supply voltage 0 VDC
- 4 = not connected
- 5 = stab. output voltage



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

Normally there is no need to adjust settings by the customer. The connector has to be wired according to the chapter «Connector wiring diagram».

Controllers are supplied configured as amplifiers. The setting of the mode of control and the setting of the controller are done by the customer by software setting (USB interface, Mini B).

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

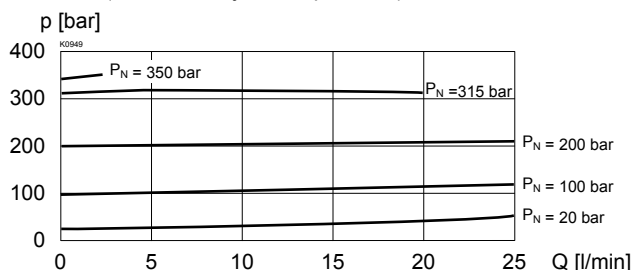


NOTE!

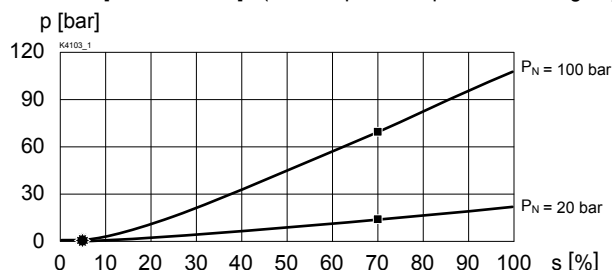
The mating connectors and the cable to adjust the settings are not part of the delivery. Refer to chapter «Accessories».

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

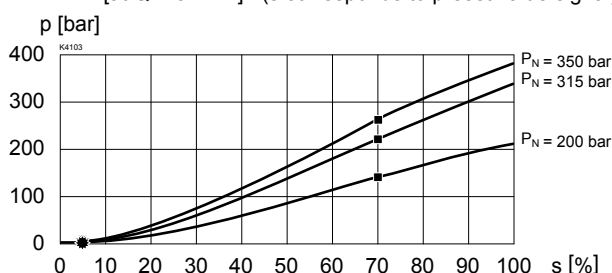
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



$p = f(I)$ Pressure adjustment characteristics
[at $Q = 5 \text{ l/min}$] / (s corresponds to preset value signal)



$p = f(I)$ Pressure adjustment characteristics
[at $Q = 5 \text{ l/min}$] / (s corresponds to preset value signal)



Factory settings:

Dither set for optimal hysteresis

• = Deadband: Solenoid switched off with command preset value signal < 5 %

■ = Limited pressure in port P (1) at 70 % of preset value signal:

250 bar with pressure range 350 bar

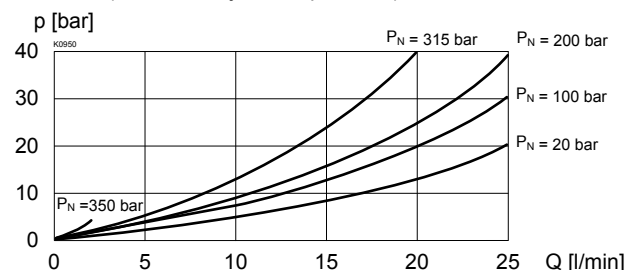
225 bar with pressure range 315 bar

143 bar with pressure range 200 bar

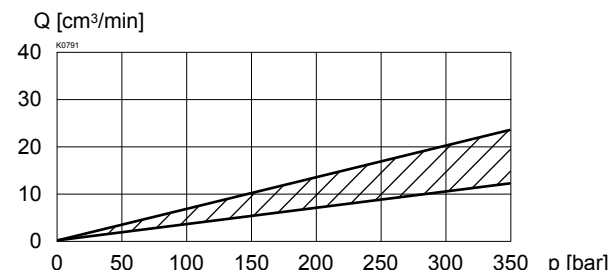
72 bar with pressure range 100 bar

14,5 bar with pressure range 20 bar

$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)



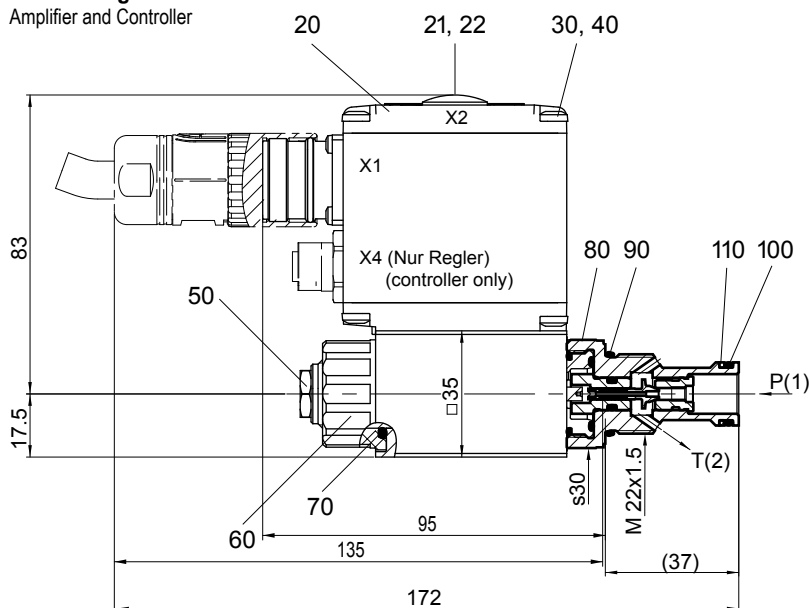
$Q_L = f(p)$ Leakage volume flow characteristics



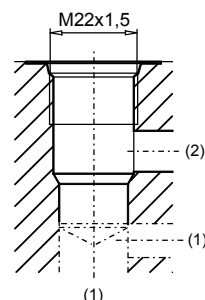
DIMENSIONS / SECTIONAL DRAWINGS

With analog interface

Amplifier and Controller



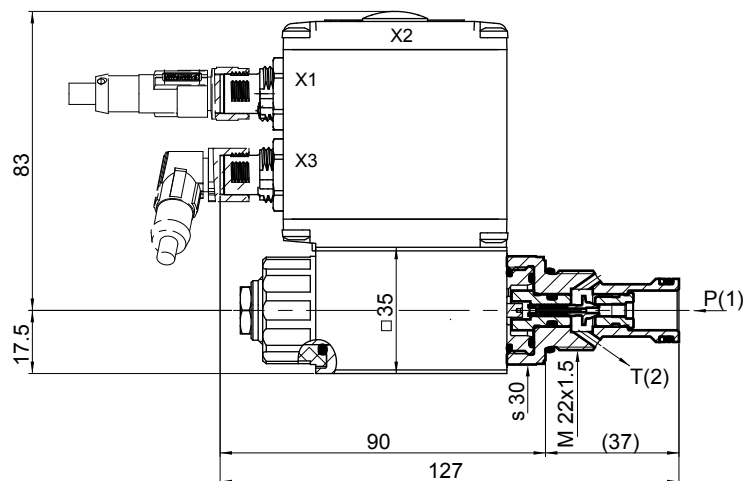
Cavity drawing according to
ISO 7789-22-02-0-98



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1003

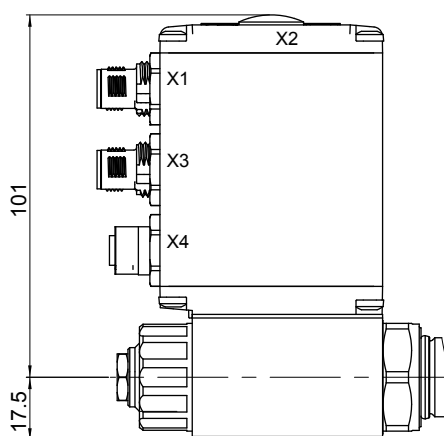
With fieldbus interface

Amplifier



With fieldbus interface

Controller



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	160.2140 160.6141	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
110	049.3177	Back-up ring RD 14,6x17,5x1,4

ACCESSOIRES

- Flange-/sandwich plate NG4-Mini Data sheet 2.3-720
- Flange-/sandwich plate NG6 Data sheet 2.3-740
- Flange-/sandwich plate NG10 Data sheet 2.3-760
- Line mount body Data sheet 2.9-200
- 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
 - 90°, 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)

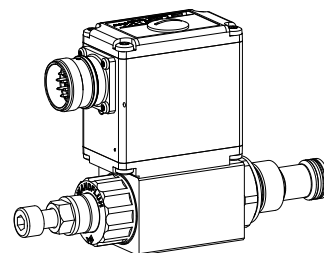
Technical explanation see data sheet 1.0-100

Proportional pressure relief valve inverse
Screw-in cartridge

- Integrated amplifier or controller electronics
- Direct operated
- $Q_{\max} = 20$ and 25 l/min
- $p_{\max} = 400$ bar
- $p_{N \max} = 350$ bar

M22x1,5

ISO 7789


DESCRIPTION

Direct operated proportional pressure relief valve with integrated electronics and inverse function. Thread M22x1,5 for cavity according 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. As standard versions, 6 pressure ranges are available: 20, 40, 63, 100, 160, 200, 315 and 350 bar. Good flow performance due to the differential area principle. Small leakage along the poppet guide. Adjustment by a Wandfluh (VDE-Norm 0580) proportional solenoid. The cartridge and the solenoid made of steel are zinc coated and therefore rust-protected.

FUNCTION

The valve limits the pressure in the port P (1) and relieves the volume flow to tank port T (2). The back pressure in T (2) influences the pressure in P (1). The relieved pressure drops with rising solenoid current (inverse function), and the with deenergised solenoid, a maximum pressure is present. The control connection is provided by an analog interface or a fieldbus interface (CANopen or Profibus DP). Parameter setting and diagnosis with the free-of-charge software «PASO» or via fieldbus interface. After taking off the cover of the electronic housing, the serial interface to adjust the settings is accessible. The menu controlled Windows program «PASO» allows easy adjustment of all variable settings. Data are stored in a non-volatile memory. Even after an electric power failure settings can easily be reproduced and transmitted.

APPLICATION

Proportional pressure relief valves with integrated electronics are well suited for demanding applications, in which the pressure frequently has to be changed. 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 pressure relief cartridge is very suitable for mounting in control blocks, flange bodies and sandwich plates size NG4-Mini and NG6. (Please note the separate data sheets in register 2.3). 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

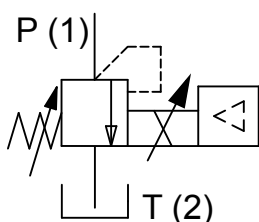
		B	D	I	PM22	-		/	M	E		-		#	
Pressure relief valve															
Direct operated															
Proportional, inverse															
Screw-in cartridge M22x1,5															
Nominal pressure rang p_N	20 bar						20								
	100 bar						100								
	160 bar						160								
Nominal voltage U_N	12 VDC														
	24 VDC														
Slip-on coil	Metal housing, square														
Execution connection	Integrated electronics														
Hardware configuration															
With analog signal (0...+10 V factory set)															
With CANopen acc. to DSP-408															
With Profibus DP in accordance Fluid Power Technology															
With CAN J1939 (on request)															
Function															
Amplifier															
Controller with current feedback signal (0...20 mA / 4...20 mA)															
Controller with voltage feedback signal (0...10 V)															
Sealing material															
NBR															
FKM (Vitron)															
Design-Index (Subject to change)															

GENERAL SPECIFICATIONS

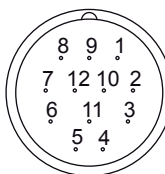
Description	Direct operated proportional pressure relief valve with integrated electronics inverse function
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operations	Proportional solenoid wet pin push type, pressure tight
Mounting	Screw-in thread M22x1,5
Ambient temperature	-20...+65°C (typical) (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».)
Einbaulage	any, preferably horizontal
Anzugsdrehmoment	$M_D = 50 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Masse	$m = 1,0 \text{ kg}$

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)
Analogue 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
Feedback signal interface (Sensor):	
(controller only)	
Device receptacle (female) M12, 5-poles	
Mating connector	Plug (male), M12, 5-poles (not incl. in delivery)
Feedback signal::	Voltage / current state when ordering

SYMBOL

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluids on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70°C
Peak pressure	$p_{max} = 400 \text{ bar}$
Nominal pres. ranges	$p_N = 20 \text{ bar}, 100 \text{ bar}, 160 \text{ bar}, 200 \text{ bar}, 315 \text{ bar}, 350 \text{ bar}$
Min. volume flow	$Q_{min} = 0,1 \text{ l/min}$
Max. volume flow	$Q_{max} = 25 \text{ bar for } p_N = 20 \text{ bar} / 100 \text{ bar} / 160 \text{ bar} / 200 \text{ bar}$ $Q_{max} = 20 \text{ l/min for } p_N = 315 \text{ bar}$ $Q_{max} = 5 \text{ l/min for } p_N = 350 \text{ bar}$ see characteristics
Leakage volume flow	
Repeatability	$\leq 3\%$
Hysteresis	$\leq 5\%$

CONNECTOR WIRING DIAGRAM
Analogue 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...+10V), (PIN 4/5)

CANopen interface:
Device receptacle supply (male) X1


- MAIN**
- 1 = Supply voltage +
 - 2 = Reserved for extensions
 - 3 = Supply voltage 0 VDC
 - 4 = Chassis

Device receptacle CANopen (male) X3

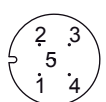

- CAN**
- 1 = not connected
 - 2 = not connected
 - 3 = CAN Gnd
 - 4 = CAN High
 - 5 = CAN Low

Device receptacle Profibus (female) X3


- PROFIBUS**
- 1 = VP
 - 2 = RxD/TxD - N
 - 3 = DGND
 - 4 = RxD/TxD - P
 - 5 = Shield

Parameterisation interface (USB, Mini B) X2

Under the closing screw of the housing cover

Feedback signal interface (Sensor)
Device receptacle (female) X4 (only controller)


- 1 = Supply voltage (output) +
- 2 = Feedback signal +
- 3 = Supply voltage 0 VDC
- 4 = not connected
- 5 = stab. output voltage


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».

Controllers are supplied configured as amplifiers. The setting of the mode of control and the setting of the controller are done by the customer by software setting (USB interface, Mini B).

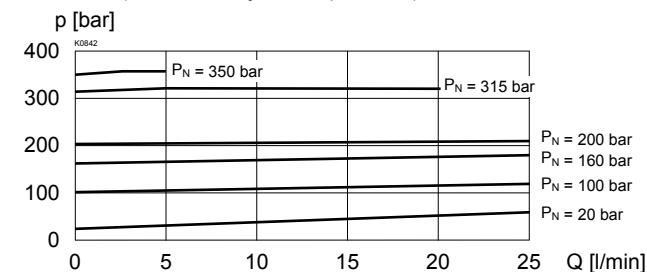
Additional information can be found on our website:
«www.wandfluh.com»


NOTE!

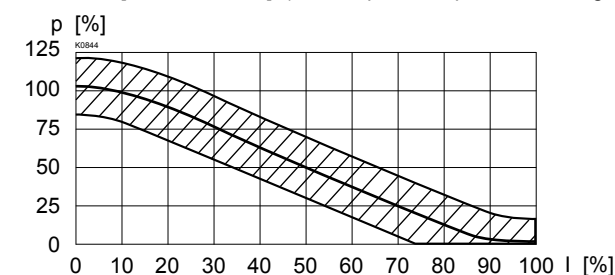
The mating connectors and the cable to adjust are settings is not part of the delivery. Refer to chapter «Accessories».

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

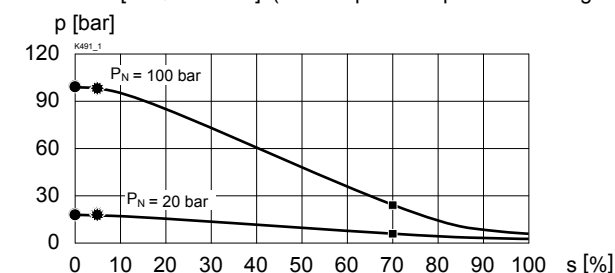
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



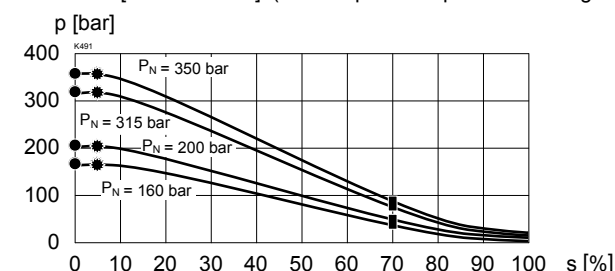
$p_{\text{red}} = f(I)$ Pressure adjustment characteristics
[at $Q = 10 \text{ l/min}$] / (s corresponds to preset value signal)



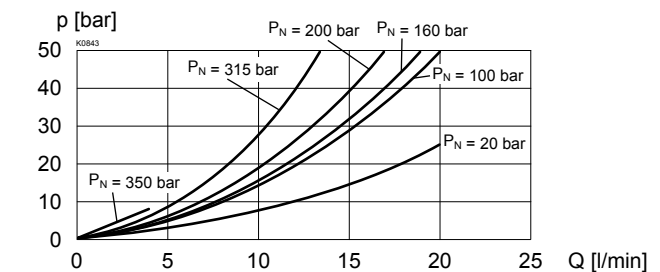
$p = f(I)$ Pressure adjustment characteristics
[at $Q = 5 \text{ l/min}$] / (s corresponds to preset value signal)



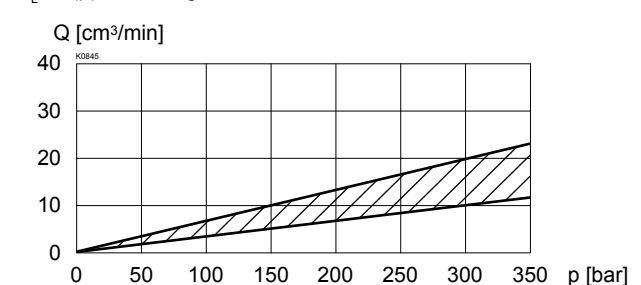
$p = f(I)$ Pressure adjustment characteristics
[at $Q = 5 \text{ l/min}$] / (s corresponds to preset value signal)



$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)



$Q_L = f(p)$ Leakage volume flow characteristics


Factory settings:

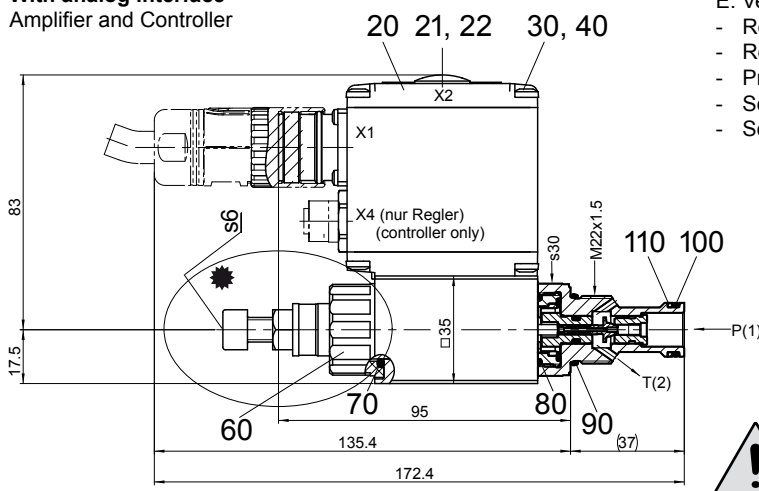
Dither set for optimal hysteresis

- = Deadband: Solenoid switched off with command preset value signal <5 %
- = p_N mechanically pre-set at $Q = 5 \text{ l/min}$
- = Limited pressure in port P (1) at 70 % of preset value signal:
95 bar with pressure range 350 bar
65 bar with pressure range 315 bar
56 bar with pressure range 200 bar
32 bar with pressure range 160 bar
25 bar with pressure range 100 bar
4 bar with pressure range 20 bar

DIMENSIONS / SECTIONAL DRAWINGS

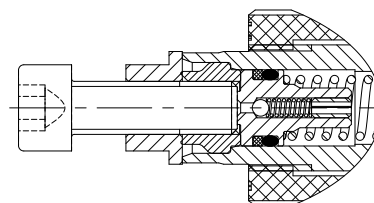
*Adjusting screw for setting the nominal pressure (-20 % / +30 %)

With analog interface
Amplifier and Controller

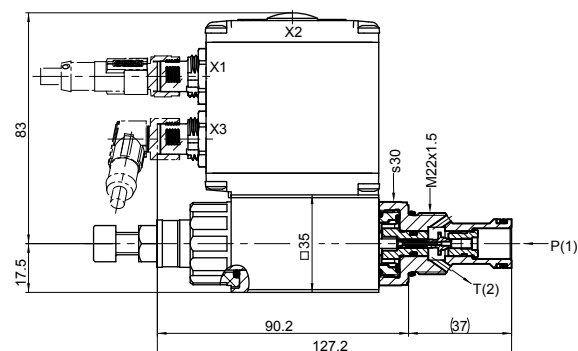


E: Venting

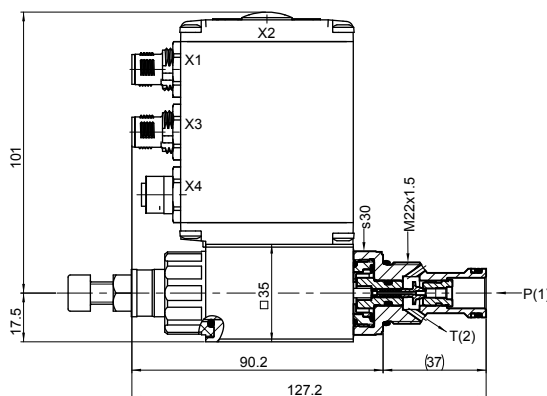
- Release locknut
- Remove screw
- Press check-valve (with a pin or with allen key < 1,3 mm)
- Screw the screw back in
- Set the required pressure and tighten the lock nut



With fieldbus interface
Amplifier

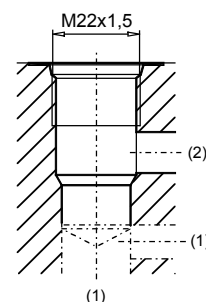


With fieldbus interface
Controller



Cavity drawing according to
ISO 7789-22-02-0-98

For detailed cavity drawing
and cavity tools
see data sheet 2.13-1003



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	160.2140 160.6141	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
110	049.3177	Back-up ring RD 14,6x17,5x1,4

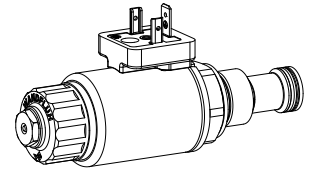
ACCESSORIES

- Cartridge built in:
flange and sandwich bodies see register 2.3
 - Set-up software see start-up
 - Cable to adjust the settings through interface USB
(from plug type A to Mini B, 3 m) article no. 219.2896
 - Cable connector for analog interface:
– straight, soldering contact article no. 219.2330
– 90°, 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 pressure relief valve
Screw-in cartridge**

- Direct operated, leak free
- $Q_{\max} = 2 \text{ l/min}$
- $p_{\max} = 500 \text{ bar}$
- $p_{N \max} = 450 \text{ bar}$

M22x1,5
ISO 7789

DESCRIPTION

Direct operated proportional pressure relief valve as a screw-in cartridge with a thread M22x1,5 for cavity according to ISO 7789. The valve is leak free. The adjustment takes place by means of 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

The valve limits the pressure in port P (1) and relieves the volume flow to tank port T (2). The back pressure in T influences the pressure in P (1). When the operating pressure set by the proportional solenoid is reached, the poppet spool opens and connects the protected line to the tank T (2). Wandfluh proportional amplifiers are available to control the proportional pressure relief valve (register 1.13).

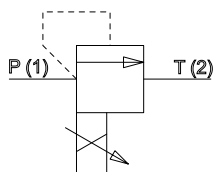
APPLICATION

The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. Installation of the screw-in cartridge in control blocks, which are designed for the indicated maximum pressure. 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

		B S P PM22 - 450 - <input type="text"/> / <input type="text"/> <input type="text"/> - <input type="text"/> <input type="text"/> # <input type="text"/>									
Pressure relief valve											
Direct operated, leak free											
Proportional											
Screw-in cartridge M22x1,5											
Nominal pressure range p_N	450 bar										
Nominal voltage U_N	12 VDC	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	24 VDC	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	without coil	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Slip-on coil	Metal housing, round	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Metal housing, square	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Connection execution	Connector socket EN 175301-803 / ISO 4400	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Connector socket AMP Junior-Timer	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Connector Deutsch DT04-2P	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sealing material	NBR	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	FKM (Viton)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Manual override	Screwed sealing plug	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Manual emergency actuation	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Design-Index (Subject to change)											

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

SYMBOLS

GENERAL SPECIFICATIONS

Description	Direct operated proportional pressure relief valve
Construction	Screw-in cartridge for cavity to ISO 7789
Actuation	Proportional solenoid
Mounting	Screw-in thread M22x1,5
Ambient temperature	-25...+70 °C
Mounting position	any
Fastening torque	$M_D = 50 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 0,6 \text{ kg}$

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	$U_N = 12 \text{ VDC}$	$U_N = 24 \text{ VDC}$
Limiting current	$I_G = 1360 \text{ mA}$	$I_G = 680 \text{ mA}$
Relative duty factor	100% ED/DF (see data sheet 1.1-430)	
Protection class acc. to EN 60529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	

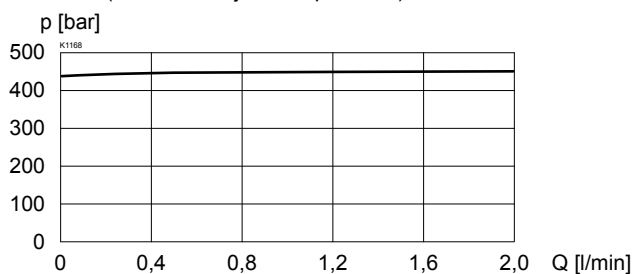
For further electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

HYDRAULIC SPECIFICATIONS

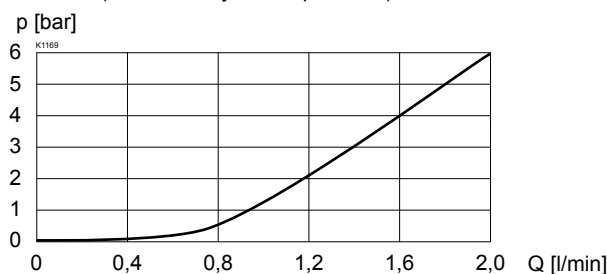
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-25...+70 °C
Peak pressure	$p_{\max} = 500 \text{ bar}$
Nominal pressure ranges	$p_N = 450 \text{ bar}$
Min. volume flow	$Q_{\min} = 0,1 \text{ l/min}$
Max. volume flow	$Q_{\max} = 2 \text{ l/min}$
Leakage volume flow	Leckagefrei
Repeatability	$\leq 1,5 \% *$
Hysteresis	$\leq 3 \% *$
	* at optimal dither signal

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

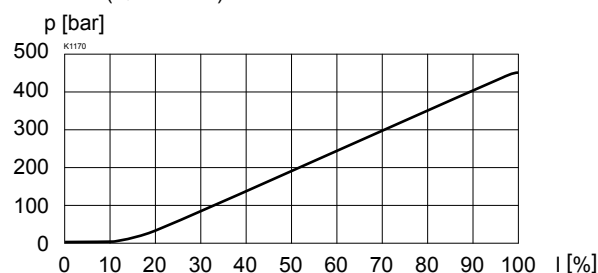
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



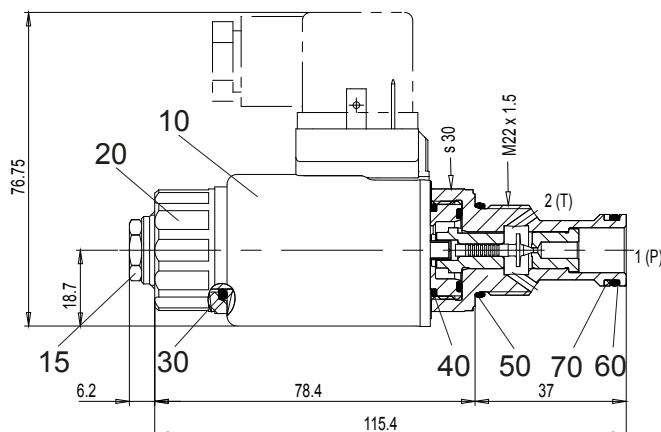
$p = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)



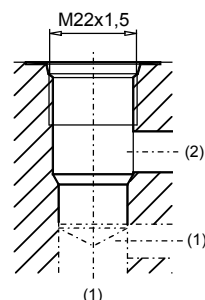
$p = f(I)$ Pressure adjustment characteristics
($Q = 1 \text{ l/min}$)



DIMENSIONS / SECTIONAL DRAWINGS



Cavity drawing acc. to
ISO 7789-22-02-0-98



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1003

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

PARTS LIST

Position	Article	Description
10	206.2201	EN 175301 Solenoid coil WDS37/19x50-G24
	206.2200	Solenoid coil WDS37/19x50-G12
		Junior-Timer
	206.2203	Solenoid coil WJS37/19x50-G24
	206.2202	Solenoid coil WJS37/19x50-G12
		Deutsch
15	206.2205	Solenoid coil WGS37/19x50-G24
	206.2204	Solenoid coil WGS37/19x50-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 18,72x2,62 (NBR)
	160.6187	O-ring ID 18,72x2,62 (FKM)
40	160.2170	O-ring ID 17,17x1,78 (NBR)
	160.6172	O-ring ID 17,17x1,78 (FKM)
50	160.2188	O-ring ID 18,77x1,78 (NBR)
	160.6188	O-ring ID 18,77x1,78 (FKM)
60	160.2140	O-ring ID 14,00x1,78 (NBR)
	160.6141	O-ring ID 14,00x1,78 (FKM)
70	049.3177	Backup ring RD 14,6x17,5x1,4

ACCESSORIES

Proportional amplifier

Register 1.13

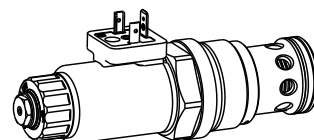
Mating connector EN 175301-803

Article Nr. 219.2002

Technical explanation see data sheet 1.0-100

**Proportional pressure relief valve
Screw-in cartridge**

- Pilot operated
- $Q_{\max} = 400 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \max} = 350 \text{ bar}$

M42x2
ISO 7789

DESCRIPTION

Pilot operated, proportional pressure relief valve, as screw-in cartridge with a thread M42x2 for cavity according to ISO 7789. 4 standard pressure levels are available: 100 bar, 200 bar, 275 bar and 350 bar. The adjustment takes place by means of 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

When the operating pressure set by the proportional solenoid is reached, the main spool opens and connects the protected line with the return line to the tank. The back pressure in T influences the pressure in P (1). This pilot operated proportional pressure relief valve can be adjusted very sensitively and is suitable for large volume flows and high pressures. To control the valve, Wandfluh proportional amplifiers are available (see register 1.13).

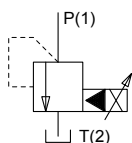
APPLICATION

The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences.

TYPE CODE

		B V P PM42 - <input type="text"/> - <input type="text"/> / <input type="text"/> - <input type="text"/> <input type="text"/> <input type="text"/> # <input type="text"/>									
Pressure relief valve											
Pilot operated											
Proportional											
Screw-in cartridge M42x2											
Nominal pressure range p_N	100 bar <input type="text"/> 100 200 bar <input type="text"/> 200 275 bar <input type="text"/> 275 350 bar <input type="text"/> 350										
Nominal voltage U_N	12 VDC <input type="text"/> G12 24 VDC <input type="text"/> G24 without coil <input type="text"/> X5										
Slip-on coil	Metal housing, round <input type="text"/> W Metal housing, square <input type="text"/> M*										
Connection execution	Connector socket EN 175301-803 / ISO 4400 <input type="text"/> D Connector socket AMP Junior-Timer <input type="text"/> J Connector Deutsch DT04-2P <input type="text"/> G										
Sealing material	NBR <input type="text"/> FKM (Viton) <input type="text"/> D1										
Manual override	Armature tube closed (standard) <input type="text"/> Screwed sealing plug <input type="text"/> HB0 Manual emergency actuation <input type="text"/> 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

GENERAL SPECIFICATIONS

Description	Pilot operated pressure relief valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Actuation	Proportional solenoid
Mounting	Screw-in thread M42x2
Ambient temperature	-20...+70 °C
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 100 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 0,9 \text{ kg}$

ELECTRICAL SPECIFICATIONS

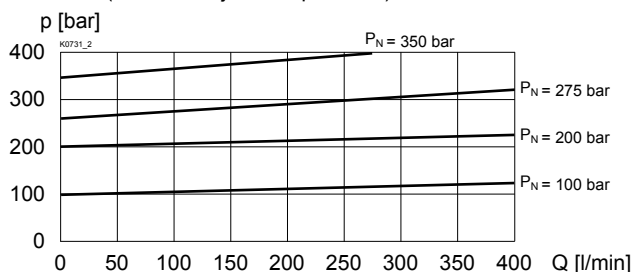
Construction	Proportional solenoid, wet pin push type, pressure tight	
Standard nominal voltage	$U_N = 12 \text{ VDC}$	$U_N = 24 \text{ VDC}$
Limiting current	$I_G = 1320 \text{ mA}$	$I_G = 660 \text{ mA}$
Relative duty factor	100 % ED/DF (see data sheet 1.1-430)	
Protection class acc. to EN 60529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	
Other electrical specifications	see data sheet 1.1-173 (W) 1.1-174 (M)	

HYDRAULIC SPECIFICATIONS

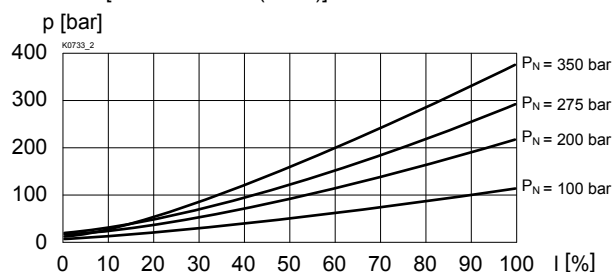
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406: 1999, class 18/16/13 (Required filtration grade $\beta_{6 \dots 10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{\max} = 400 \text{ bar}$ $p_{T\max} = p_p + 15 \text{ bar}$
Nominal pressure ranges	$p_N = 100 \text{ bar}, 200 \text{ bar}, 275 \text{ bar}, 350 \text{ bar}$
Volume flow	$Q = 5 \dots 400 \text{ l/min}$
Leakage volume flow	see characteristics
Repeatability	$\leq 2\%$ *
Hysteresis	$\leq 5\%$ *
	* at optimal dither signal

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

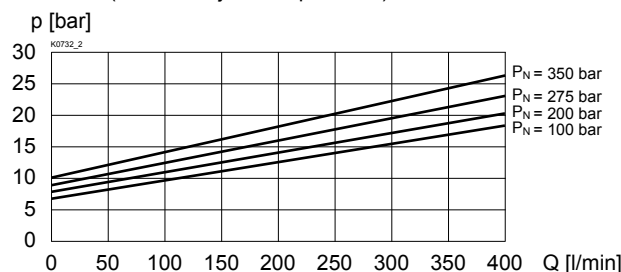
$p = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



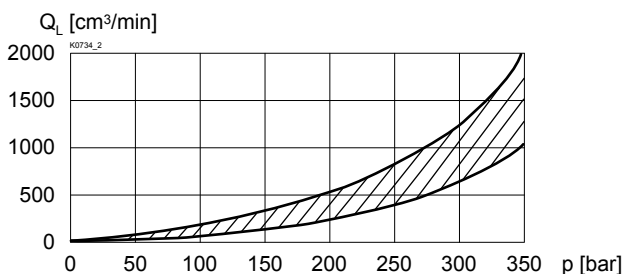
$p = f(I)$ Pressure adjustment characteristics
[at $Q = 30 \text{ l/min}$ (static)]



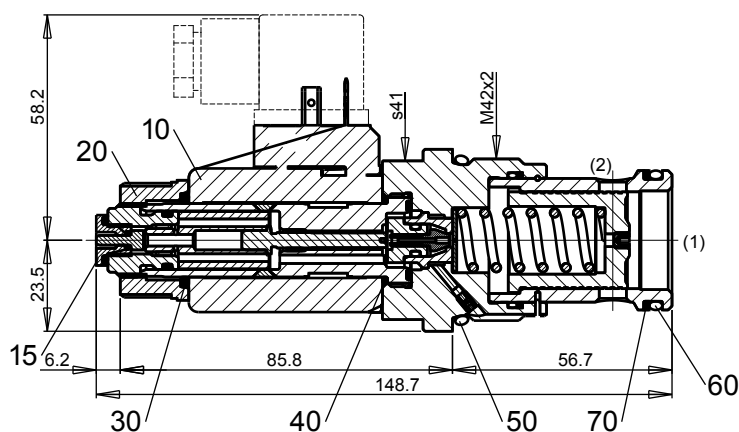
$p = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)



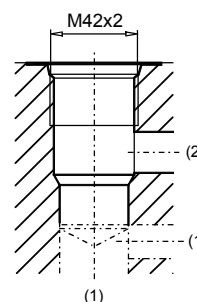
$Q_L = f(p)$ Leakage volume flow characteristics



DIMENSIONS / SECTIONAL DRAWING



Cavity drawing acc. to
ISO 7789-42-02-0-07



For detailed cavity drawing
and cavity tools
see data sheet 2.13-1048

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

PARTS LISTE

Position	Article	Description
10	206.2201	EN 175301 Solenoid coil WDS37/19x50-G24
	206.2200	Solenoid coil WDS37/19x50-G12 Junior-Timer
	206.2203	Solenoid coil WJS37/19x50-G24
	206.2202	Solenoid coil WJS37/19x50-G12
	206.2205	Deutsch Solenoid coil WGS37/19x50-G24
	206.2204	Solenoid coil WGS37/19x50-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	160.6187	O-ring ID 18,72x2,62 (FKM)
40	160.6172	O-ring ID 17,17x1,78 (FKM)
50	160.2377	O-ring ID 37,77x2,62 (NBR)
	160.8378	O-ring ID 37,77x2,62 (FKM)
60	160.2314	O-ring ID 31,42x2,62 (NBR)
	160.6315	O-ring ID 31,42x2,62 (FKM)
70	049.3364	Backup ring RD 31,5x36x1,4

ACCESSORIES

Line mount body	Data sheet 2.9-200
Proportional amplifier	register 1.13
Mating connector EN 175301-803	Article no. 219.2002

Technical explanation see data sheet 1.0-100

Proportional pressure reducing valve Screw-in cartridge

- **Direct operated**
- $Q_{\max} = 6 \text{ l/min}$
- $p_{\max} = 210 \text{ bar (350 bar)}$
- $p_{N \text{ red max}} = 40 \text{ bar}$

DESCRIPTION

For explosion-hazard zones

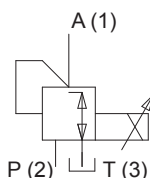
Direct operated proportional pressure relief valve as a screw-in cartridge with a thread M16x1,5 for cavity according to ISO 7789. Activated with Wandfluh-explosion-proof-solenoid. The cartridge body made of steel is zinc coated for corrosion protection. Solenoid coil in acc. with directive 94/9/EC (ATEX) for explosion-hazard zones. The flameproof enclosures (acc. to EN/IEC 60079-1/31 and EN/IEC 61241-1) prevents an explosion in the interior from getting outside. The design prevents a surface temperature capable of igniting.

CERTIFICATES

in accordance with	Surface gas + dust	Mining
ATEX	x	x
IECEX	x	x
GOST Ex	x	x
Australia	x	x
Inmetro	x	x

The certificates can be found on **www.wandfluh.com** / DOWNLOADS / Accompanying Ex-proof / **MKY45/18--L..**

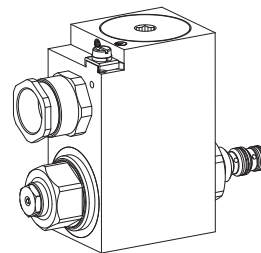
SYMBOLS



M16x1,5

Wandfluh standard

- Ex II 2 G Ex d IIC
- Ex II 2 D Ex tD A21d IIC
- Ex I M2 Ex d I Mb



FUNCTION

The proportional pressure regulating valve controls the pressure in port A (1). Proportionally to the solenoid current solenoid force and pressure in port A (1) rise. The valve functions practically independently of pressure in port P (2). A pressure rise in Port A (1) above the set pressure, e.g. due to an active oil consumer, will be prevented by relieving excess volume flow to tank via port T (3). With the solenoid deenergised the consumer port A is connected with the port T. To control the valve, proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. Installation of the screw-in cartridge in control blocks.

TYPE CODE

M D B PM16- - / L15 / - #

Pressure reducing valves

Direct operated

Proportional explosion proof, execution Ex d IIC

Screw-in cartridge M16x1,5

Nominal pressure range p_N : 25 bar 25
40 bar 40

Standard nominal voltage U_N : 12 VDC G12
24 VDC G24

Execution 15W

Certificates: ATEX, IECEX, GOST Ex
Australia AU Inmetro IM

Sealing material NBR
FKM (Viton) D1

System pressure max. 210 bar
System pressure max. 350 bar Z406

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	Direct operated proportional pressure reducing valve
Construction	Screw-in cartridge for cavity according to Wandfluh standards
Operations	Proportional solenoid
Mounting	Screw-in thread M16x1,5
Admissible ambient temp.	Execution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 30 \text{ Nm}$ for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 2,2 \text{ kg}$

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight
Standard nominal voltage	$U_N = 12 \text{ VDC}, 24 \text{ VDC}$ 12VDC 24VDC
Limiting current	L15/50 °C $I_G = 950 \text{ mA}$ 450 mA L15/70 °C $I_G = 910 \text{ mA}$ 420 mA
Voltage tolerance	+ 10% of rated voltage
Relative duty factor	100% ED
Schutzart	IP67 acc. to EN 60 529
Connection/Power supply	Through cable gland for cable $\varnothing 6,5...14 \text{ mm}$
Temperature class:	T1...T4
(acc. to EN 60079-0)	
Nominal power:	15 W
For further electrical characteristics, refer to the data sheet of the solenoid coil:	1.1-183

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406: 1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	$p_{max} = 210$ bar (350 bar)
Minimum adjustable pressure	< 0,5 bar
Nominal pressure range	$p_{N\ red} = 40$ bar
Volume flow range	$Q = 0...6$ l/min
Leakage volume flow	25 bar version $p_{red} = 0$ bar: < 10 ml/min. $p_{red} = 25$ bar: < 50 ml/min. 40 bar version $p_{red} = 0$ bar: < 10 ml/min. $p_{red} = 40$ bar: < 40 ml/min.
$p_{sys} = 210$ bar	
Repeatability	$\leq 1\%$ *
Hysteresis	$\leq 4\%$ *
	* at optimal dither signal

SECURITY OPERATED



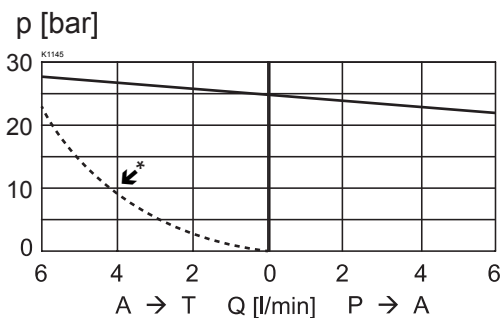
The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.
In case of non-observance, no liability can be assumed.

INSTALLATION

For stack assembly please observe the remarks in the operating instructions.

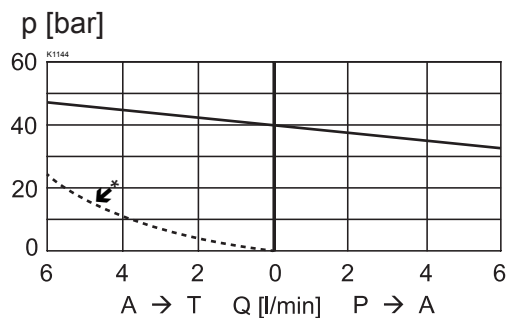
CHARACTERISTICS Oil viscosity $\nu = 30$ mm²/s

$p_{red} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)
25 bar version

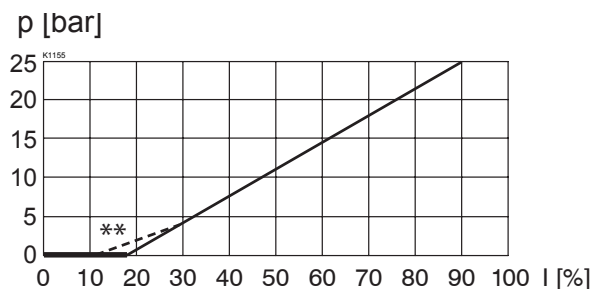


* Limits of the working range

$p_{red} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)
40 bar version

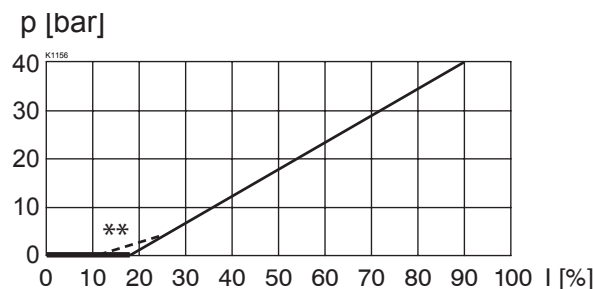


$p_{red} = f(I)$ Pressure adjustment characteristics
[at $Q = 0$ l/min (static)]
25 bar version

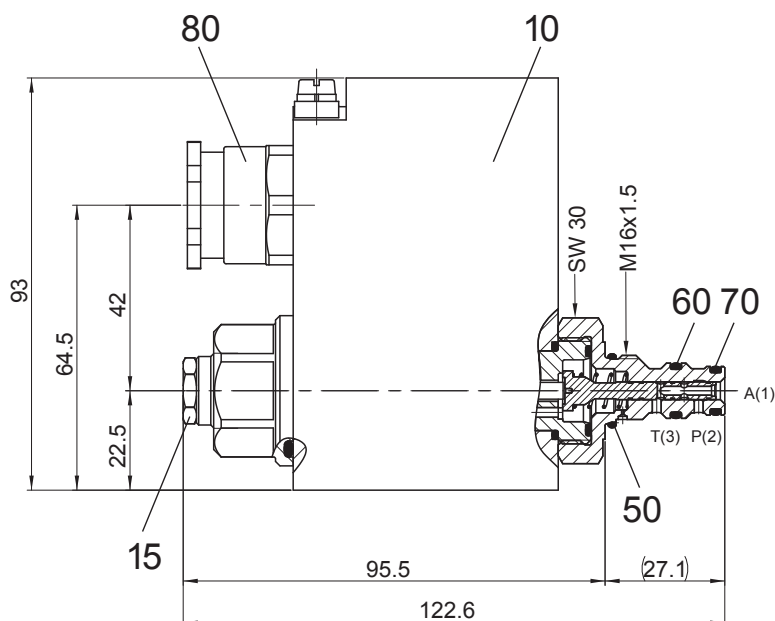


** Slightly higher hysteresis

$p_{red} = f(I)$ Pressure adjustment characteristics
[at $Q = 0$ l/min (static)]
40 bar version

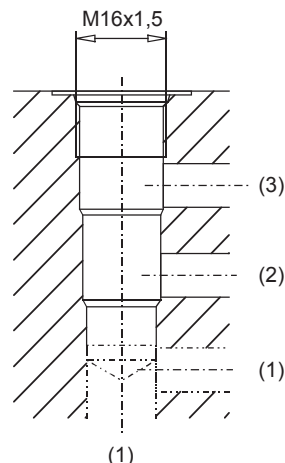


DIMENSIONS/SECTIONAL DRAWING



Dimensions of the solenoid coil refer to data sheet 1.1-183

Cavity drawing acc. to
Wandfluh standard



For detailed cavity drawing
see data sheet 2.13-1051

PARTS LIST

Position	Article	Description
10	263.6...	Slip-on coil MKY45/18x60-...
15	253.8000	Plug with integrated manual override HB4,5
50	160.2140 160.8140	O-ring ID 14,00 x 1,78 (NBR) O-ring ID 14,00 x 1,78 (FKM)
60	160.2093 160.8092	O-ring ID 9,25 x 1,78 (NBR) O-ring ID 9,25 x 1,78 (FKM)
70	160.2076 160.8076	O-ring ID 7,65 x 1,78 (NBR) O-ring ID 7,65 x 1,78 (FKM)
80	111.1080	Cable gland brass M20

ACCESSOIRES

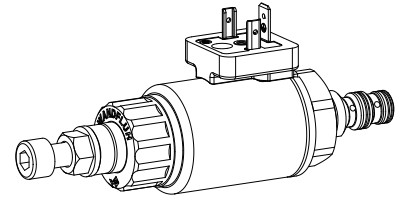
Proportional amplifier

register 1.13

Technical explanation see data sheet 1.0-100

Proportional inverse pressure reducing valve
Screw-in cartridge

- **Direct operated**
- **Nominal pressure adjustable -20 % / +30 %** Wandfluh standard
- **Q_{max} = 6 l/min**
- **p_{max} = 210 bar (350 bar)**
- **p_{N red max} = 40 bar**

M16x1,5

DESCRIPTION

Direct operated proportional pressure reducing valve with inverse function as a screw-in cartridge with a thread M16x1,5. The adjustment takes place by means of a Wandfluh proportional solenoid (VDE-standard 0580). The cartridge body made of steel. The special surface coating protects the external parts against corrosion and reduces friction of the control spool. The solenoid coil is zinc-/nickel-coated.

FUNCTION

The proportional pressure regulating valve controls the pressure in port A (1). Proportionally to the solenoid current, solenoid force and pressure in port A (1) decrease. The valve functions practically independently of pressure in port P (2). A pressure rise in Port A (1) above the set pressure, e.g. due to an active oil consumer, will be prevented by relieving excess volume flow to tank via port T (3). To control the valve, proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

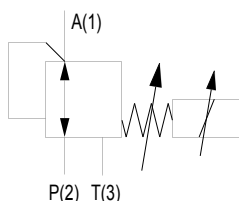
The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. Installation of the screw-in cartridge in control blocks.

TYPE CODE

		M D I PM16 -		-		/		-		#	
Pressure reducing valve											
Direct operated											
Proportional, inverse											
Screw-in thread M16x1,5											
Nominal pressure range p _{N red}	25 bar 40 bar			25 40							
Nominal voltage U _N	12 VDC 24 VDC without coil			G12 G24 X5							
Slip-on coil	Metal housing round Metal housing square			W M*							
Connection execution	Connector socket EN 175301-803 / ISO 4400 Connector socket AMP Junior-Timer Connector Deutsch DT04-2P			D J G							
Sealing material	NBR FKM (Viton)			 D1							
	System pressure max. 210 bar System pressure max. 350 bar			 Z406							

Design-Index (Subject to change)

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

SYMBOLS

GENERAL SPECIFICATIONS

Denomination	Direct operated proportional pressure reducing valve with inverse function
Construction	Screw-in cartridge for cavity acc. to Wandfluh standard
Actuation	Proportional solenoid
Mounting	Screw in thread M16x1,5
Ambient temperature	-20...70 °C
Mounting position	any, preferably horizontal
Fastening torque	M _D = 30 Nm for screw-in cartridge M _D = 5 Nm for knurled nut
Weight	m = 0,45 kg

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin pull type, pressure tight	
Standard nominal voltage	$U_N = 12 \text{ VDC}$	$U_N = 24 \text{ VDC}$
Limiting current	$I_G = 1360 \text{ mA}$	$I_G = 680 \text{ mA}$
Relative duty factor	100% ED/DF (see data sheet 1.1-430)	
Protection class acc. to EN 60529	Connection version D: IP 65 J: IP 66 G: IP 67 and 69K	

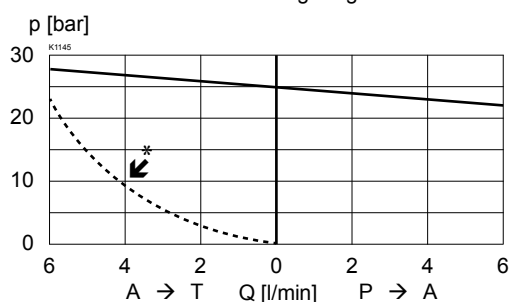
For further electrical specifications see data sheet 1.1-173 (W)
1.1-174 (M)

HYDRAULIC SPECIFICATIONS

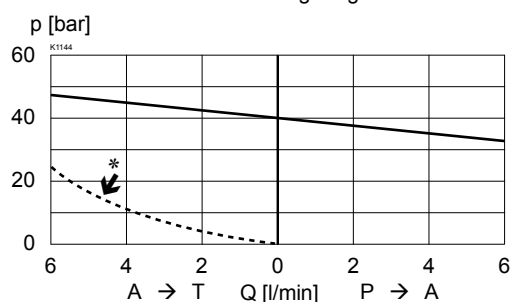
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406: 1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-25...+70 °C
Peak pressure	$p_{\max} = 210 \text{ bar}$ (350 bar)
Minimum adjustable pressure	< 0,5 bar
Nominal pressure range	$p_{N \text{ red}} = 40 \text{ bar}$
Volume flow range	$Q = 0...6 \text{ l/min}$
Leakage volume flow	25 bar version $p_{\text{red}} = 0 \text{ bar}$: < 10 ml/min. $p_{\text{red}} = 25 \text{ bar}$: < 50 ml/min. 40 bar version $p_{\text{red}} = 0 \text{ bar}$: < 10 ml/min. $p_{\text{red}} = 40 \text{ bar}$: < 40 ml/min.
$p_{\text{sys}} = 210 \text{ bar}$	$\leq 1\% *$
Repeatability	$\leq 4\% *$
Hysteresis	* at optimal dither signal

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

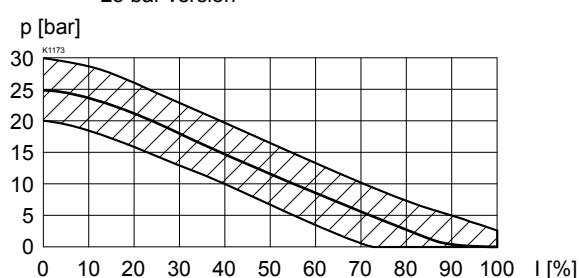
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)
25 bar version
* Limits of the working range



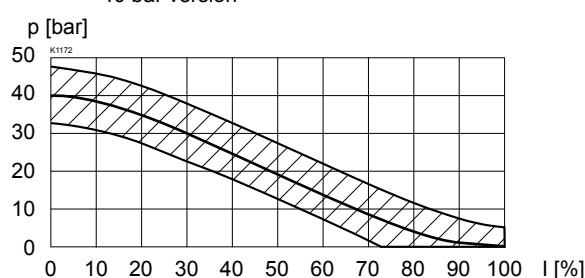
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)
40 bar version
* Limits of the working range




$p_{\text{red}} = f(I)$ Pressure adjustment characteristics
[at $Q = 0 \text{ l/min}$ (static)]
25 bar version



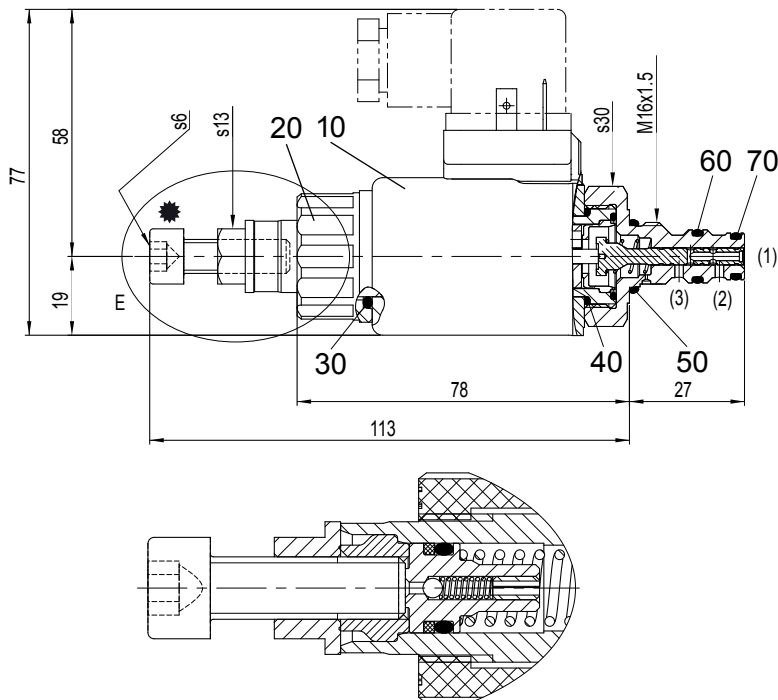
$p_{\text{red}} = f(I)$ Pressure adjustment characteristics
[at $Q = 0 \text{ l/min}$ (static)]
40 bar version



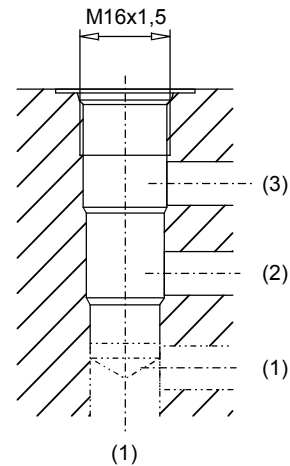
 Adjustable range of nominal pressure, adjusted with set screw.

DIMENSIONS / SECTIONAL DRAWINGS

✱ Adjusting screw for setting the nominal pressure (-20 % / +30 %)



Cavity drawing acc. to Wandfluh standard



For detailed cavity drawing see data sheet 2.13-1051

E: Venting

- Release locknut
- Remove screw
- Press check-valve (with a pin or with allen key < 1,3 mm)
- Screw the screw back in
- Set the required pressure and tighten the lock nut



Under pressure oil shoot out!
Cover with a cloth.

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

PARTS LIST

Position	Article	Description
10	206.2201	EN 175301 Solenoid coil WDS37/19x50-G24
	206.2200	Solenoid coil WDS37/19x50-G12
		Junior-Timer
	206.2203	Solenoid coil WJS37/19x50-G24
	206.2202	Solenoid coil WJS37/19x50-G12
		Deutsch
	206.2205	Solenoid coil WGS37/19x50-G24
	206.2204	Solenoid coil WGS37/19x50-G12
20	154.2700	Knurled nut
30	160.2187	O-ring ID 18,72x2,62 (NBR)
	160.6187	O-ring ID 18,72x2,62 (FKM)
40	160.2170	O-ring ID 17,17x1,78 (NBR)
	160.6172	O-ring ID 17,17x1,78 (FKM)
50	160.2140	O-ring ID 14,00x1,78 (NBR)
	160.8140	O-ring ID 14,00x1,78 (FKM)
60	160.2093	O-ring ID 9,25x1,78 (NBR)
	160.8092	O-ring ID 9,25x1,78 (FKM)
70	160.2076	O-ring ID 7,65x1,78 (NBR)
	160.8076	O-ring ID 7,65x1,78 (FKM)

ACCESSOIRES

Proportional amplifier
Mating connector EN 175301-803

register 1.13
Article no. 219.2002

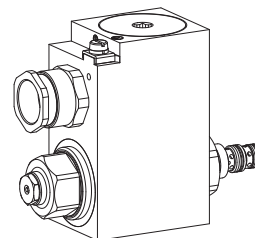
Technical explanation see data sheet 1.0-100

Proportional pressure reducing valve Screw-in cartridge

- **Direct operated**
- $Q_{\max} = 6 \text{ l/min}$
- $p_{\max} = 210 \text{ bar (350 bar)}$
- $p_{N \text{ red max}} = 100 \text{ bar}$

M16x1,5 Wandfluh standard

- Ex II 2 G Ex d IIC
- Ex II 2 D Ex tD A21 IP65
- Ex I M2 Ex d I Mb



DESCRIPTION

For explosion-hazard zones

Direct operated proportional pressure reducing valve as a screw-in cartridge with a thread M16x1,5. Activated with Wandfluh-explosion-proof-solenoid. The cartridge body made of steel. The special surface coating protects the external parts against corrosion and reduces friction of the control spool.

Solenoid coil in acc. with directive 94/9/EC (ATEX) for explosion-hazard zones.

The flameproof enclosures (acc. to EN/IEC 60079-1/31 and EN/IEC 61241-1) prevents an explosion in the interior from getting outside.

The design prevents a surface temperature capable of igniting.

FUNCTION

The proportional pressure regulating valve controls the pressure in port A (1). Proportionally to the solenoid current solenoid force and pressure in port A (1) rise. The valve functions practically independently of pressure in port P (2). A pressure rise in Port A (1) above the set pressure, e.g. due to an active oil consumer, will be prevented by relieving excess volume flow to tank via port T (3). With the solenoid deenergised the consumer port A is connected with the port T. To control the valve, proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for remote control and signal processing from process control systems enable elegant, comfortable solutions to problems. Installation of the screw-in cartridge in control blocks.

TYPE CODE

		M G B PM16 - 100 - <input type="text"/> / L15 / <input type="text"/> - <input type="text"/> # <input type="text"/>	
Pressure reducing valve			
Direct operated			
Proportional explosion proof, execution Exd IIC			
Screw-in thread M16x1,5			
Standard nominal pressure range $p_{N \text{ red}}$	100 bar		
Standard nominal voltage U_N	12 VDC	<input type="text"/> G12	
	24 VDC	<input type="text"/> G24	
Execution:	<input type="text"/> 15W	Ambient temp. by: 70 °C	
Certificates:	ATEX, IECEx, GOST Ex <input type="text"/>	Australia <input type="text"/> AU	Inmetro <input type="text"/> IM
Sealing material	NBR <input type="text"/>	<input type="text"/>	
	FKM (Viton) <input type="text"/>	<input type="text"/> D1	
	System pressure max. 210 bar	<input type="text"/>	
	System pressure max. 350 bar	<input type="text"/> Z406	
Design-Index (Subject to change)			

GENERAL SPECIFICATIONS

Denomination	Direct operated proportional pressure reducing valve
Construction	Screw-in cartridge for cavity acc. to Wandfluh standard
Actuation	Proportional solenoid
Mounting	Screw in thread M16x1,5
Admissible ambient temp.	-20...+70 °C (operation as T1...T4/T130 °C)
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 30 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 2,2 \text{ kg}$

CERTIFICATES

in accordance with	Surface gas + dust	Mining
ATEX	x	x
IECEx	x	x
GOST Ex	x	x
Australia	x	x
Inmetro	x	x

The certificates can be found on www.wandfluh.com / DOWNLOADS / Accompanying Ex-proof / **MKY45/18-...-L...**

ELECTRICAL SPECIFICATIONS

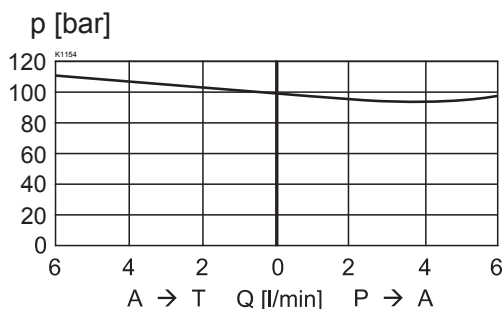
Construction	Proportional solenoid, wet pin push type, pressure tight		
Standard nominal voltage	$U_N = 12\text{ VDC}, 24\text{ VDC}$		
		12VDC	24VDC
Limiting current	L15/50 °C	$I_G = 950\text{ mA}$	450 mA
	L15/70 °C	$I_G = 910\text{ mA}$	420 mA
Voltage tolerance	+ 10% of rated voltage		
Relative duty factor	100% ED		
Schutzart	IP67 acc. to EN 60 529		
Connection/Power supply	Through cable gland for cable $\varnothing 6,5...14\text{ mm}$		
Temperature class: (acc. to EN 60079-0)	T1...T4		
Nominal power:	15W		
For further electrical characteristics, refer to the data sheet of the solenoid coil: 1.1-183			

HYDRAULIC SPECIFICATIONS

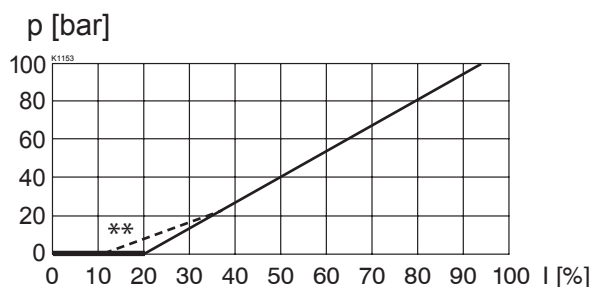
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406: 1999, class 18/16/13 (Required filtration grade $\beta_{6 \dots 10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	$12\text{ mm}^2/\text{s} \dots 320\text{ mm}^2/\text{s}$
Fluid temperature	$-20 \dots +70\text{ °C}$
Peak pressure	$p_{\max} = 210\text{ bar}$ (350 bar)
Minimum adjustable pressure	$< 0,5\text{ bar}$
Nominal pressure range	$p_{N\text{ red}} = 100\text{ bar}$
Volume flow range	$Q = 0 \dots 6\text{ l/min}$
Leakage volumen flow	
$p_{\text{sys}} = 160\text{ bar}$	$p_{\text{red}} = 0\text{ bar}: < 15\text{ ml/min}$ $p_{\text{red}} = 0,5\text{ bar}: < 60\text{ ml/min}$
Repeatability	$\leq 1\% *$
Hysteresis	$\leq 4\% *$ * at optimal dither signal

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

$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)



$p_{\text{red}} = f(I)$ Pressure adjustment characteristics
[at $Q = 0\text{ l/min}$ (static)]



** Slightly higher hysteresis

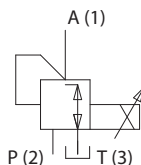
SECURITY OPERATED

The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.

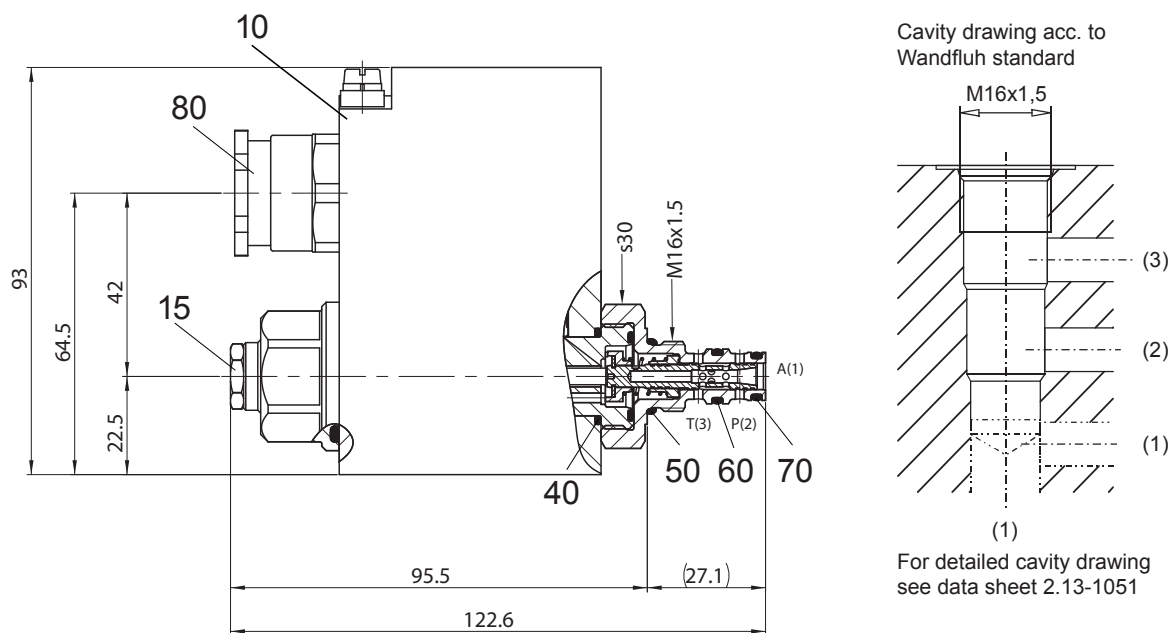
In case of non-observance, no liability can be assumed.


INSTALLATION

For stack assembly please observe the remarks in the operating instructions.

SYMBOLS


DIMENSIONS / SECTIONAL DRAWINGS



Dimensions of the solenoid coil refer to data sheet 1.1-183

PARTS LIST

Position	Article	Description
10	263.6...	Slip-on coil MKY45/18x60-...
15	253.8000	Plug with integrated manual override HB4,5
40	160.2170 160.6172	O-ring ID 17,17x1,78 (NBR) O-ring ID 17,17x1,78 (FKM)
50	160.2140 160.8140	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
60	160.2093 160.8092	O-ring ID 9,25x1,78 (NBR) O-ring ID 9,25x1,78 (FKM)
70	160.2076 160.8076	O-ring ID 7,65x1,78 (NBR) O-ring ID 7,65x1,78 (FKM)
80	111.1080	Cable gland brass M20

ACCESSOIRES

Proportional amplifier register 1.13

Technical explanation see data sheet 1.0-100

Proportional pressure reducing valve Screw-in cartridge

- Pilot operated
- $Q_{\max} = 60 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \text{ red max}} = 350 \text{ bar}$

DESCRIPTION

For explosion-hazard zones

Pilot operated proportional pressure reducing valve as a screw-in cartridge with a thread M22x1,5 for cavity according to ISO 7789. Activated with Wandfluh-explosion-proof-solenoid. The cartridge body made of steel is zinc coated for corrosion protection.

Solenoid coil in acc. with directive 94/9/EC (ATEX) for explosion-hazard zones.

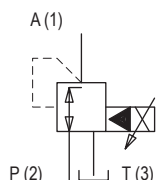
The flameproof enclosures (acc. to EN/IEC 60079-1/31 and EN/IEC 61241-1) prevents an explosion in the interior from getting outside. The design prevents a surface temperature capable of igniting.

CERTIFICATES

in accordance with	Surface gas + dust	Mining
ATEX	x	x
IECEX	x	x
GOST Ex	x	x
Australia	x	x
Inmetro	x	x

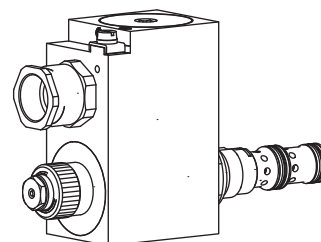
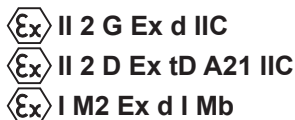
The certificates can be found on **www.wand-fluh.com** / DOWNLOADS / Accompanying Ex-proof / **MKY45/18-...-L...**

SYMBOLS



M22x1,5

ISO 7789



FUNCTION

The proportional pressure regulating valve controls the pressure in port A (1). Proportionally to the solenoid current solenoid force and pressure in port A (1) rise. The valve functions practically independently of pressure in port P (2). A pressure rise in Port A (1) above the set pressure, e.g. due to an active oil consumer, will be prevented by relieving excess volume flow to tank via port T (3). With deenergised solenoid the volume flow passes freely from port P to the consumer port A. Thereby, because of the system, a minimum adjustable pressure in accordance with the characteristic curve cannot be fallen short of.

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. 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 NG4-Mini, NG6 and NG10 types. (Please note the separate data sheets in register 2.3). 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

Pressure reducing valve		M V B PM22-		<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	#	<input type="text"/>
Pilot operated														
Proportional explosion proof, execution Exd II C														
Screw-in cartridge M22x1,5														
Execution:		L15		L9										
Nominal pressure range p_N : [bar]		<input type="text" value="20"/>	<input type="text" value="200"/>	<input type="text" value="20"/>	<input type="text" value="160"/>									
		<input type="text" value="63"/>	<input type="text" value="275"/>	<input type="text" value="50"/>	<input type="text" value="220"/>									
		<input type="text" value="100"/>	<input type="text" value="350"/>	<input type="text" value="80"/>	<input type="text" value="280"/>									
Standard nominal voltage U_N :		12 VDC		<input type="text" value="G 12"/>										
		24 VDC		<input type="text" value="G 24"/>										
Execution:		9W		<input type="text" value="L 9"/>		40°C		Ambient temp. by:						
		15W		<input type="text" value="L 15"/>		70°C								
Certificates:		ATEX, IECEx, GOST Ex		<input type="text" value="AU"/>		Inmetro		<input type="text" value="IM"/>						
		Australia												
Sealing material		NBR		<input type="text" value="D1"/>										
		FKM (Viton)												
Design-Index (Subject to change)														

GENERAL SPECIFICATIONS

Denomination	Pilot operated proportional pressure reducing valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Actuation	Proportional solenoid
Mounting	Screw in thread M22x1,5
Ambient temperature	Execution L9 -20...+40 °C (operation as T1...T6/T80 °C) Execution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Mounting position	any, preferably horizontal
Fastening torque	M _D = 50 Nm for fixing screw M _b = 5 Nm for knurled nut
Weight	m = 2,2 kg

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight		
Standard nominal voltage	$U_N = 12\text{ VDC}$, 24 VDC		
Limiting current		12VDC	24VDC
	L15/50 °C	$I_G = 950\text{ mA}$	450 mA
	L15/70 °C	$I_G = 910\text{ mA}$	420 mA
	L9/40 °C	$I_G = 625\text{ mA}$	305 mA
Voltage tolerance	+ 10% of rated voltage		
Relative duty factor	100% ED		
Protection class	IP67 acc. to EN 60 529		
Connection/Power supply	Through cable gland for cable $\varnothing 6,5...14\text{ mm}$		
Temperature class:	(acc. to EN 60079-0)		
Execution L9:	T1...T6		
Execution L15:	T1...T4		
Nominal power:			
Execution L9	9W		
Execution L15	15W		
For further electrical specifications see data sheet: 1.1-183			

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406: 1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	Execution L9 -20...+40 °C (operation as T1...T6/T80 °C) Execution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Peak pressure	$p_{max} = 350$ bar
Nominal pressure range:	Execution L9 $p_{Nred} = 20$ bar, 50 bar, 80 bar, 160 bar, 220 bar, 280 bar Execution L15 $p_{Nred} = 20$ bar, 63 bar, 100 bar, 200 bar, 275 bar, 350 bar $Q = 0...60$ l/min
Volume flow range	
Pilot- and leakage volume flow	see characteristics
Repeatability	$\leq 3\%$ **
Hysteresis	$\leq 4\%$ ** ** at optimal dither signal

SECURITY OPERATED



The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.
In case of non-observance, no liability can be assumed.

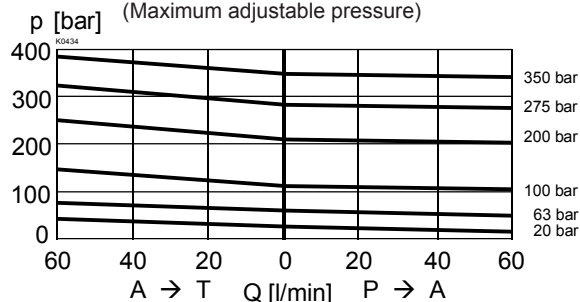
INSTALLATION

For stack assembly please observe the remarks in the operating instructions.

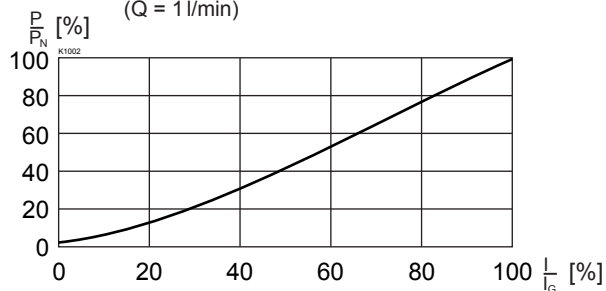
CHARACTERISTICS oil viscosity $\nu = 30$ mm²/s

Execution L15 (measured at 50 °C)

$p_{red} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)

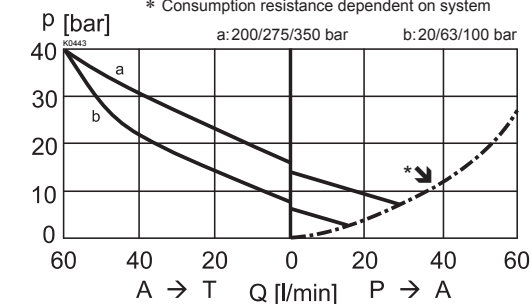


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)



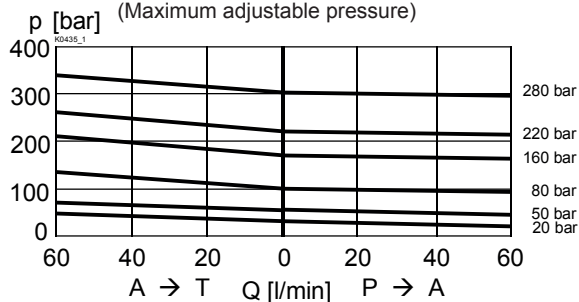
$p_{red} = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

* Consumption resistance dependent on system

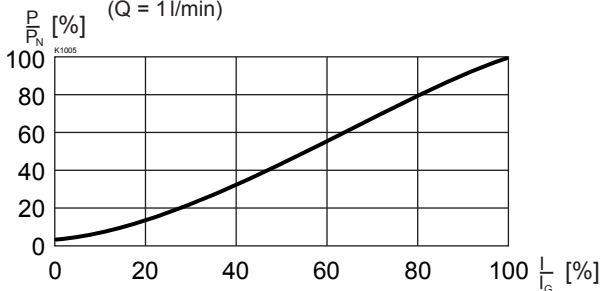


Execution L9 (measured at 40 °C)

$p_{red} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)

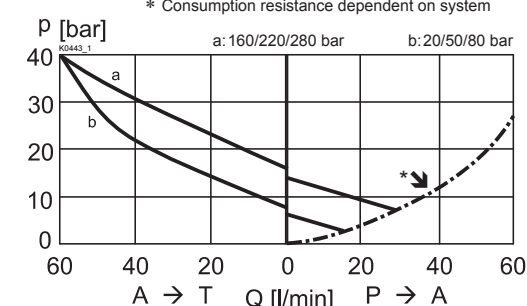


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)

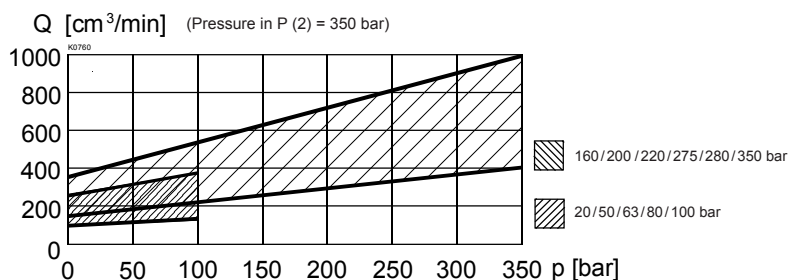


$p_{red} = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

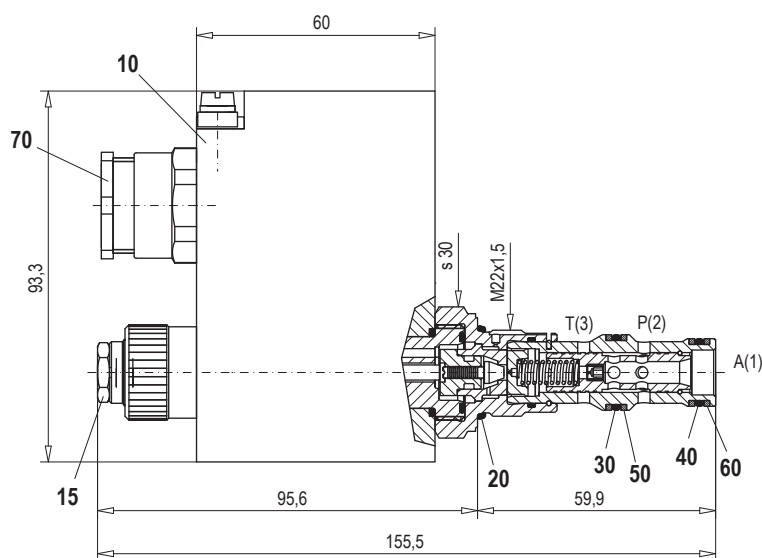
* Consumption resistance dependent on system



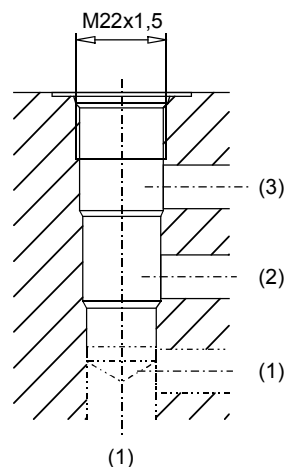
$Q_{st+L} = f(p_{red})$ Pilot- and leakage volume flow characteristic [A (1) → T (3)]



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

Dimensions of the other connection versions see data sheet 1.1-183

PARTS LIST

Position	Article	Description
10	263.6...	Slip-on-coil MKY45/18x60-...
15	253.8000	Plug with integrated manual override HB4,5
20	160.2188 160.8188	O-ring ID 18,77x1,78 (NBR) O-ring ID 18,77x1,78 (FKM)
30	160.2156 160.8156	O-ring ID 15,60x1,78 (NBR) O-ring ID 15,60x1,78 (FKM)
40	160.2140 160.8140	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
50	049.3196	Backup ring RD 16,1x19x1,4
60	049.3176	Backup ring RD 14,1x17,1,4
70	111.1080	Cable gland brass M20

ACCESSORIES

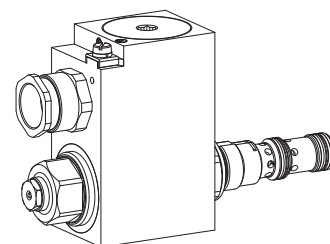
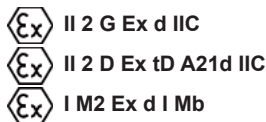
Flange-/sandwich plate NG4-Mini	Data sheet 2.3-820
Flange-/sandwich plate NG6	Data sheet 2.3-840
Flange-/sandwich plate NG10	Data sheet 2.3-860
Line mount body	Data sheet 2.9-210

Technical explanation see data sheet 1.0-100

Proportional pressure reducing valve Screw-in cartridge

- Pilot operated
- Statically controllable under 1 bar
- $Q_{\max} = 40 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$, $p_{N \text{ red max}} = 350 \text{ bar}$

M22x1,5
ISO 7789



DESCRIPTION

For explosion-hazard zones

Pilot operated proportional pressure reducing valve as a screw-in cartridge with a thread M22x1,5 for cavity according to ISO 7789. Activated with Wandfluh-explosion-proof-solenoid. The cartridge body made of steel is zinc coated for corrosion protection. Solenoid coil in acc. with directive 94/9/EC (ATEX) for explosion-hazard zones. The flameproof enclosures (acc. to EN/IEC 60079-1/31 and EN/IEC 61241-1) prevents an explosion in the interior from getting outside. The design prevents a surface temperature capable of igniting.

FUNCTION

The proportional pressure regulating valve controls the pressure in port A (1). Proportionally to the solenoid current solenoid force and pressure in port A (1) rise. The valve functions practically independently of pressure in port P (2). A pressure rise in Port A (1) above the set pressure, e.g. due to an active oil consumer, will be prevented by relieving excess volume flow to tank via port T (3). With the solenoid de-energised, the oil flows freely from consumer port A to tank T. To control the valve, proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. 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, NG6 and NG10 types. (Please note the separate data sheets in register 2.3). 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

		M Q B PM22 - <input type="checkbox"/> - <input type="checkbox"/> / L15 / <input type="checkbox"/> - <input type="checkbox"/> # <input type="checkbox"/>	
Pressure reducing valve			
Pilot operated (from connection P)			
Proportional explosion proof, execution Ex d IIC			
Screw-in cartridge M22x1,5			
Nominal pressure range $p_{N \text{ red}}$ [bar]	<input type="checkbox"/> 40 <input type="checkbox"/> 100 <input type="checkbox"/> 200 <input type="checkbox"/> 350	<input type="checkbox"/> 63 <input type="checkbox"/> 160 <input type="checkbox"/> 275	
Standard nominal voltage U_N	<input type="checkbox"/> 12 VDC <input type="checkbox"/> 24 VDC	<input type="checkbox"/> G12 <input type="checkbox"/> G24	
Execution:	15W	Ambient temp. by:	70 °C
Certificates: ATEX, IECEx, GOST Ex	<input type="checkbox"/> Australia <input type="checkbox"/> AU	Inmetro	<input type="checkbox"/> IM
Sealing material	<input type="checkbox"/> NBR <input type="checkbox"/> FKM (Viton)	<input type="checkbox"/>	<input type="checkbox"/> D1
Design-Index (Subject to change)			

GENERAL SPECIFICATIONS

Description	Pilot operated proportional pressure reducing valve
Construction	Screw-in cartridge for cavity to ISO 7789
Operations	Proportional solenoid
Mounting	Screw-in thread M22x1,5
Admissible ambient temperature	-20...+70 °C (operation as T1...T4/T130 °C)
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 50 \text{ Nm}$ for screw-in cartridge $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 2,2 \text{ kg}$

CERTIFICATES

in accordance with	Surface gas + dust	Mining
ATEX	x	x
IECEx	x	x
GOST Ex	x	x
Australia	x	x
Inmetro	x	x

The certificates can be found on www.wandfluh.com / DOWNLOADS / Accompanying Ex-proof / **MKY45/18-...-L...**

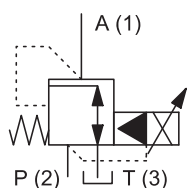
ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight
Standard nominal voltage	$U_N = 12 \text{ VDC}, 24 \text{ VDC}$
	12VDC 24VDC
Limiting current	L15/50 °C $I_G = 950 \text{ mA}$ 450 mA
	L15/70 °C $I_G = 910 \text{ mA}$ 420 mA
Voltage tolerance	+ 10 % of rated voltage
Relative duty factor	100 % ED
Protection class	IP67 acc. to EN 60 529
Connection/Power supply	Through cable gland for cable $\varnothing 6,5 \dots 14 \text{ mm}$
Temperature class: (acc. to EN 60079-0)	T1...T4
Nominal power	15W
For further electrical specifications see data sheet:	1.1-183

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406 : 1999, class 18/16/13 Required filtration grade ($\beta_{6 \dots 10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Admissible fluid temperature	-20...+70 °C (operation as T1...T4/T130 °C)
Peak pressure	$p_{\max} = 400 \text{ bar}$
Nominal pressure range	$p_{N \text{ red}} = 40, 63, 100, 160, 200, 275, 350 \text{ bar}$
Supply pressure	$p_p \geq p_{\text{red}} + 10 \text{ bar}$ (statically) $p_p \geq p_{\text{red}} + 80 \text{ bar}$ (at 40 l/min) $Q = 0 \dots 40 \text{ l/min}$
Volume flow range	see characteristics
Pilot- and leakage volume flow	
Repeatability	$\leq 3 \% \text{ **}$
Hysteresis	$\leq 5 \% \text{ **}$ ** at optimal dither signal

SYMBOL



SECURITY OPERATED



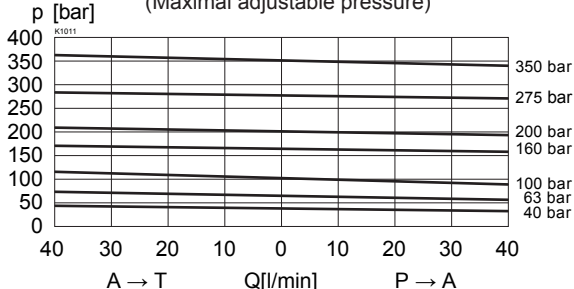
The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.
In case of non-observance, no liability can be assumed.

INSTALLATION

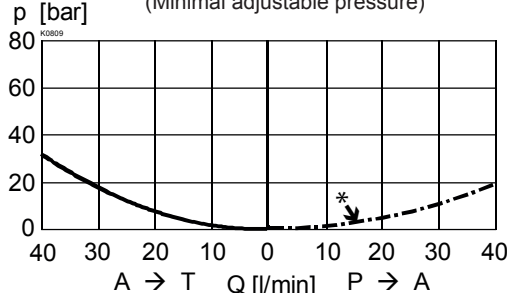
For stack assembly please observe the remarks in the operating instructions.

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

$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximal adjustable pressure)

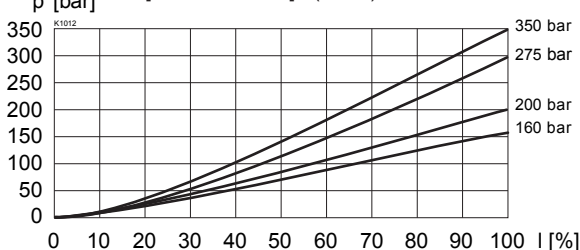


$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)

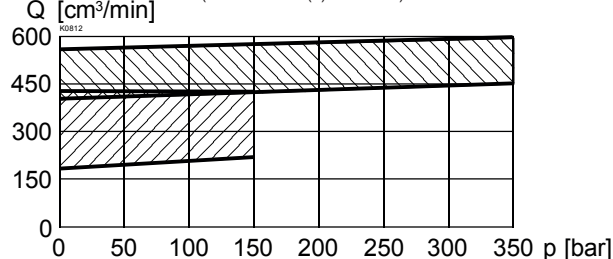


* Consumption resistance dependent on system

$p_{\text{red}} = f(I)$ Pressure adjustment characteristics
[bei $Q = 0 \text{ l/min}$] / (static)



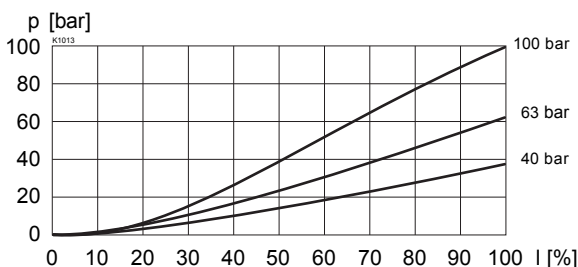
$Q_{\text{st}+L} = f(p_{\text{red}})$ Pilot- and leakage volume flow characteristic [P (2) → T (3)]
(Pressure in P (2) = 350 bar)



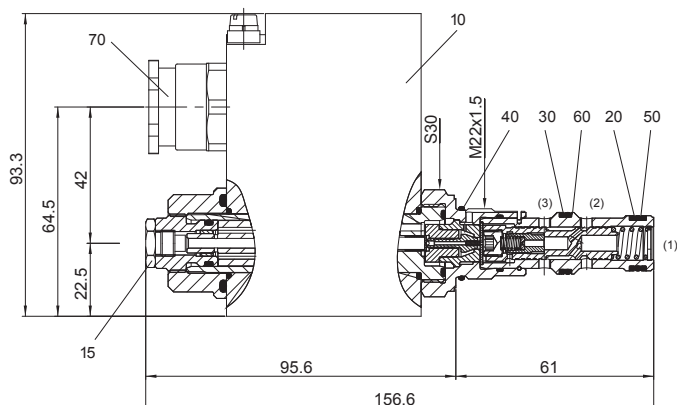
Pressure ranges: 200 / 275 / 350 bar



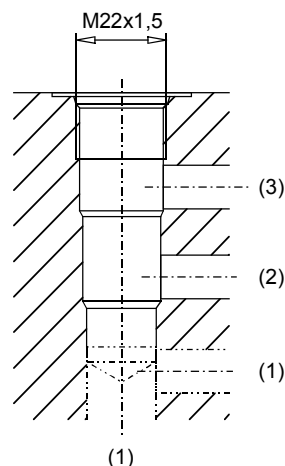
Pressure ranges: 40 / 63 / 100 / 160 bar



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	263.6...	Slip-on-coil MKY45/18x60-...
15	253.8000	HB 4,5 Plug with integrated manual over-ride (Data sheet 1.1-300)
20	160.2140 160.6141	O-ring ID 14,00x1,78 (NBR) O-ring ID 14,00x1,78 (FKM)
30	160.2156 160.6156	O-ring ID 15,60x1,78 (NBR) O-ring ID 15,60x1,78 (FKM)
40	160.2188 160.6188	O-ring ID 18,77x1,78 (NBR) O-ring ID 18,77x1,78 (FKM)
50	049.3176	Backup ring RD 14,1x17x1,4
60	049.3196	Backup ring RD 16,1x19x1,4
70	111.1080	Cable gland brass M20

ACCESSORIES

Flange-/sandwich plate NG4-Mini	Data sheet 2.3-820
Flange-/sandwich plate NG6	Data sheet 2.3-840
Flange-/sandwich plate NG10	Data sheet 2.3-860
Line mount body	Data sheet 2.9-210
Proportional amplifier	register 1.13

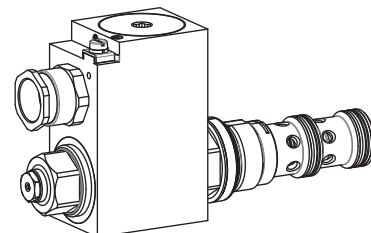
Technical explanation see data sheet 1.0-100

Proportional pressure reducing valve Screw-in cartridge

- Pilot operated
- $Q_{\max} = 160 \text{ l/min}$
- $p_{\max} = 400 \text{ bar}$
- $p_{N \text{ red max}} = 350 \text{ bar}$

M33x2
ISO 7789

- Ex II 2 G Ex d IIC
- Ex II 2 D Ex tD A21 IIC
- Ex I M2 Ex d I Mb



DESCRIPTION

For explosion-hazard zones

Pilot operated proportional pressure reducing valve as a screw-in cartridge with a thread M33x2 for cavity according to ISO 7789. Activated with Wandfluh-explosion-proof-solenoid. The cartridge body made of steel is zinc coated for corrosion protection. Solenoid coil in acc. with directive 94/9/EC (ATEX) for explosion-hazard zones. The flameproof enclosures (acc. to EN/IEC 60079-1/31 and EN/IEC 61241-1) prevents an explosion in the interior from getting outside. The design prevents a surface temperature capable of igniting. Details of the solenoid coil: refer to data sheet 1.1-183.

FUNCTION

The proportional pressure regulating valve controls the pressure in port A (1). Proportionally to the solenoid current solenoid force and pressure in port A (1) rise. The valve functions practically independently of pressure in port P (2). A pressure rise in Port A (1) above the set pressure, e.g. due to an active oil consumer, will be prevented by relieving excess volume flow to tank via port T (3). With deneenergised solenoid the volume flow passes freely from port P to the consumer port A. Thereby, because of the system, a minimum adjustable pressure in accordance with the characteristic curve cannot be fallen short of.

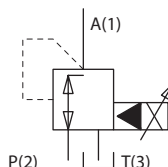
APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. The valve has its application in hydraulic systems, in which the pressure frequently has to be changed. The facility for electric remote controlling of the valve in conjunction with process control systems enables economic problem solutions with repeatable sequences. Installation of the screw-in cartridge in control blocks. 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.

CERTIFICATES

in accordance with	Surface Gas and Staub	Mining
ATEX	x	x
IECEX	x	x
GOST Ex	x	x
Australia	x	x
Inmetro	x	x

SYMBOLS



The certificates can be found on www.wandfluh.com / DOWNLOADS / Accompanying Ex-proof / **MKY45/18--L..**

TYPENSCHLÜSSEL

		M	V	B	PM33	-		-		/		/		-		#	
Pressure reducing valve																	
Pilot operated																	
Proportional explosion proof, execution Ex d IIC																	
Screw-in cartridge M33x2																	
Execution:		L15		L9													
Nominal pressure range p_N [bar]:		100		80													
		200		160													
		275		220													
		350		280													
Standard nominal voltage U_N :		12 VDC		G12													
		24 VDC		G24													
Execution:		9W		L9		Ambient temp. with:											
		15W		L15		40 °C											
						70 °C											
Certification																	
ATEX, IECEX, GOST Ex																	
Australia		AU		Inmetro													
				IM													
Sealing material		NBR															
		FKM (Viton)		D1													
Design-Index (Subject to change)																	

GENERAL SPECIFICATIONS

Denomination	Pilot operated proportional pressure reducing valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Actuation	Proportional solenoid
Mounting	Screw in thread M33x2
Ambient temperature	Execution L9 -20...+40 °C (operation as T1...T6/T80 °C) Execution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Mounting position	any, preferably horizontal
Fastening torque	M _D = 80 Nm for fixing screw M _D = 9 Nm for knurled nut
Weight	m = 2,4 kg

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	Execution L9 -20...+40 °C (operation as T1...T6/T80 °C) Execution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Peak pressure	p _{max} = 350 bar
Nominal pressure range:	Execution L9 p _{Nred} = 80 bar, 160 bar, 220 bar, 280 bar Execution L15 p _{Nred} = 100 bar, 200 bar, 275 bar, 350 bar
Volume flow range	Q = 0...160 l/min
Pilot- and leakage volume flow	see characteristics
Repeatability	≤ 3 % **
Hysteresis	≤ 4 % ** ** at optimal dither signal

ELECTRICAL SPECIFICATIONS

Construction	Proportional solenoid, wet pin push type, pressure tight
Standard nominal voltage	U _N = 12 VDC, 24 VDC 12VDC 24VDC
Limiting current	L15/50 °C I _G = 950 mA 450 mA L15/70 °C I _G = 910 mA 420 mA L9/40 °C I _G = 625 mA 305 mA
Voltage tolerance	+ 10 % of rated voltage
Relative duty factor	100 % ED
Protection class	IP67 acc. to EN 60529
Connection / Power supply	Through cable gland for cable Ø 6,5...14 mm (acc. to EN 60079-0)
Temperature class:	
Execution L9:	T1...T6
Execution L15:	T1...T4
Nominal power:	
Execution L9	9W
Execution L15	15W
For further electrical specifications see data sheet: 1.1-183	

SECURITY OPERATED


The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.

In case of non-observance, no liability can be assumed.

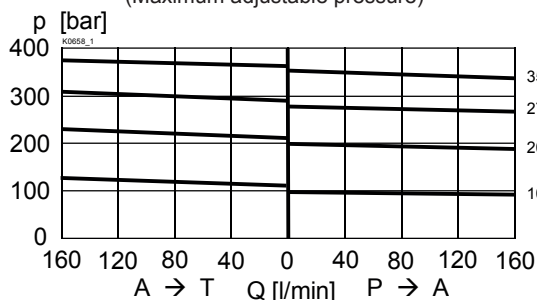
INSTALLATION

For stack assembly please observe the remarks in the operating instructions.

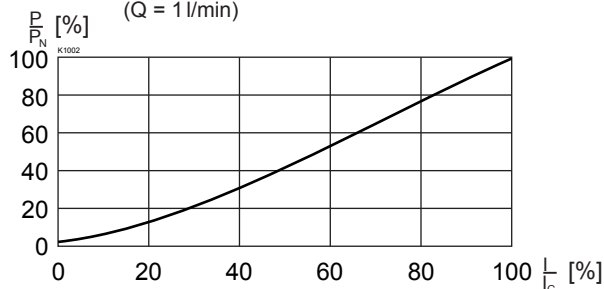
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

Execution L15 (measured at 50 °C)

$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)

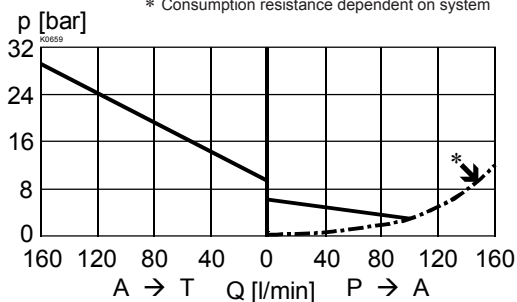


$p = f(I)$ Pressure signal characteristics
($Q = 1 \text{ l/min}$)



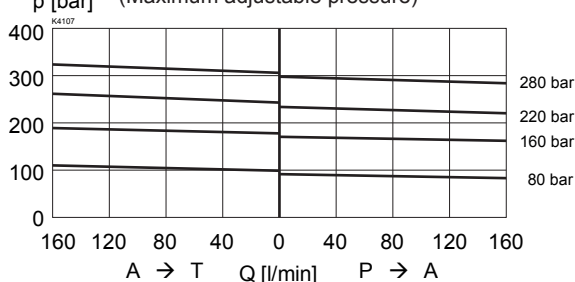
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

* Consumption resistance dependent on system

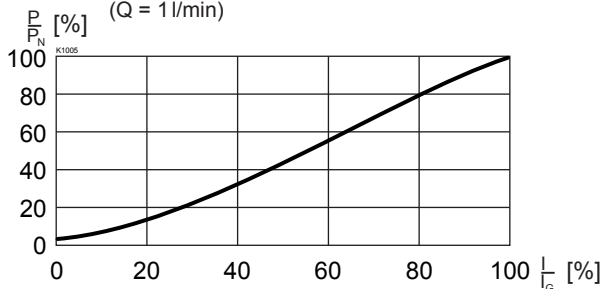


Execution L9 (measured at 40 °C)

$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)

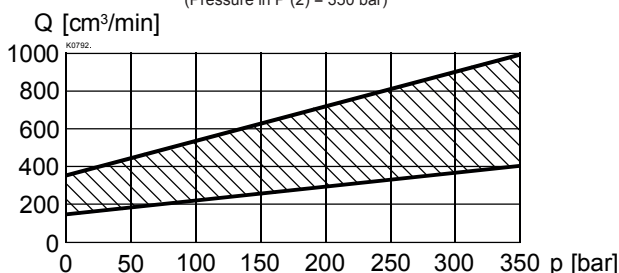


$p = f(I)$ Pressure signal characteristics
($Q = 1 \text{ l/min}$)

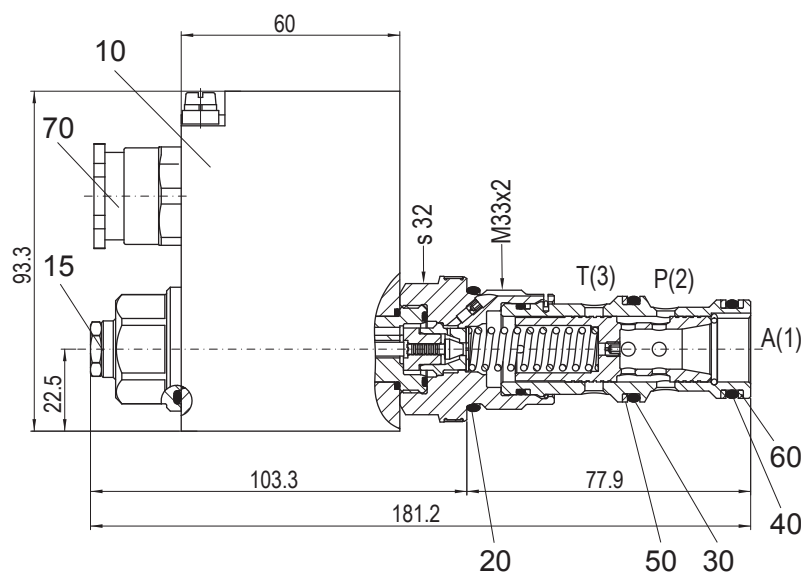


$Q_{\text{st+L}} = f(p_{\text{red}})$ Pilot- and leakage volume flow [A (1) → T (3)]

(Pressure in P (2) = 350 bar)

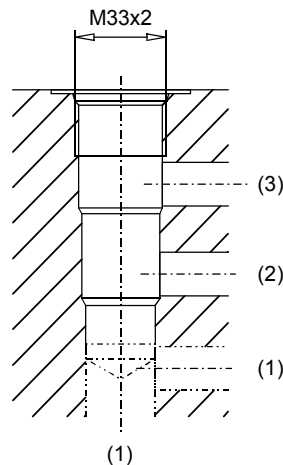


DIMENSIONS / SECTIONAL DRAWINGS



Dimensions of the other connection versions see data sheet 1.1-183

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



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

PARTS LIST

Position	Article	Description
10	263.6...	Slip-on-coil MKY45/18x60-...
15	253.8000	Plug with integrated manual override HB4,5
20	160.2298 160.6296	O-ring ID 29,82x2,62 (NBR) O-ring ID 29,82x2,62 (FKM)
30	160.2235 160.6235	O-ring ID 23,47x2,62 (NBR) O-ring ID 23,47x2,62 (FKM)
40	160.2219 160.6216	O-ring ID 21,89x2,62 (NBR) O-ring ID 21,89x2,62 (FKM)
50	049.3297	Backup ring RD 24,5x29x1,4
60	049.3277	Backup ring RD 22,5x27x1,4
70	111.1080	Cable gland brass M20

ACCESSORIES

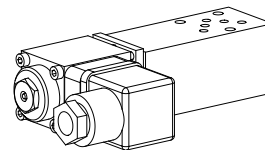
Line mount body

Data sheet 2.9-210

Technical explanation see data sheet 1.0-100

**Proportional pressure relief valve
Flange and sandwich construction**

- Pilot and direct operated
- $Q_{\max} = 8 \text{ l/min}$
- $p_{\max} = 350 \text{ bar}$
- $p_{N \max} = 315 \text{ bar}$

NG3-Mini[®]

DESCRIPTION

Pilot and direct operated proportional pressure relief valves NG3-Mini. Flange and sandwich construction according to Wandfluh standard with 4 ports. Incorporated are proportional pressure relief cartridges size M18x1,5 according to ISO 7789. The flange body and sandwich plates are made of aluminium.

FUNCTION

By adjusting the electric current to the proportional solenoid the operating pressure in hydraulic systems is limited by relieving the fluid from the protected lines P, A, B or A and B to the return / tank line T. Back pressure in T influences the pressure in the relieved pressure lines. This proportional pressure relief valves are adjustable very sensitively. To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

The valves have their applications in hydraulic systems in which the pressure frequently has to be changed. The facility for remote control and signal processing from process control systems enable economical solutions to problems with repeatable sequences. NG3-Mini valves are used where both, reduced dimensions and weight are important.

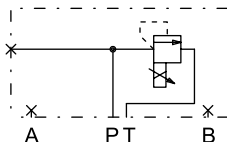
TYPE CODE

		B <input type="checkbox"/> P <input type="checkbox"/> A03 - <input type="checkbox"/> - <input type="checkbox"/> - <input type="checkbox"/> # <input type="checkbox"/>	
Pressure relief valve			
Pilot operated	<input type="checkbox"/> V		
Direct operated	<input type="checkbox"/> D		
Proportional			
Flange construction	<input type="checkbox"/> F		
Sandwich construction	<input type="checkbox"/> S		
Mounting interface acc. to Wandfluh standard, NG3-Mini			
Type list / Function	<i>flange construction</i> in P <input type="checkbox"/> P	<i>sandwich construction</i> in P <input type="checkbox"/> P in A <input type="checkbox"/> A in B <input type="checkbox"/> B in A and B <input type="checkbox"/> AB	
Nominal pressure range p_N	<i>pilot operated</i> 20 bar <input type="checkbox"/> 20 100 bar <input type="checkbox"/> 100 200 bar <input type="checkbox"/> 200 315 bar <input type="checkbox"/> 315	<i>direct operated</i> 20 bar <input type="checkbox"/> 20 100 bar <input type="checkbox"/> 100 200 bar <input type="checkbox"/> 200 315 bar <input type="checkbox"/> 315	
Nominal voltage U_N	12 VDC <input type="checkbox"/> G12 24 VDC <input type="checkbox"/> G24		
Design-Index (Subject to change)			

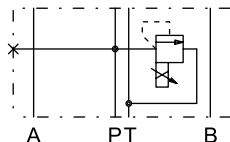
TYPE LIST / FUNCTION

Flange construction:

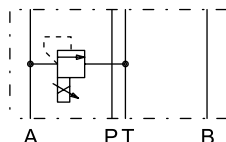
Sandwich construction:



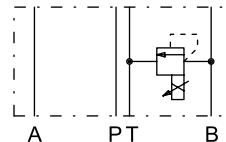
B..FA03-P



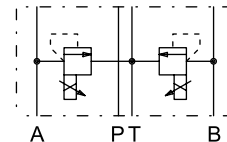
B..SA03-P



B..SA03-A



B..SA03-B



B..SA03-AB

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.
BVPPM18	Pressure relief valve • pilot operated, proportional	2.3-510
BDPPM18	Pressure relief valve • direct operated, proportional	2.3-520

GENERAL SPECIFICATIONS

Description	Pilot and direct operated proportional pressure relief valve
Nominal size	NG3-Mini according to Wandfluh standard
Constructions	Flange or sandwich
Operations	Proportional solenoid
Mounting	3 fixing holes for socket head cap screws M4 or studs M4
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...50 °C
Mounting position	any
Weight:	• Flange type m = 0,13 kg
(without screw-in cartridge)	• Sandwich type P, A, B m = 0,15 kg
	• Sandwich type AB m = 0,19 kg

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 18/16/13 (Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Fluid temperature	-20...+70 °C
Peak pressure	p _{max} = 350 bar
Volume flow range	Q = 0,1...8 l/min



REMARK!

Detailed performance data and additional hydraulic and electric specifications may be drawn from the data sheets of the corresponding installed pressure relief cartridge.

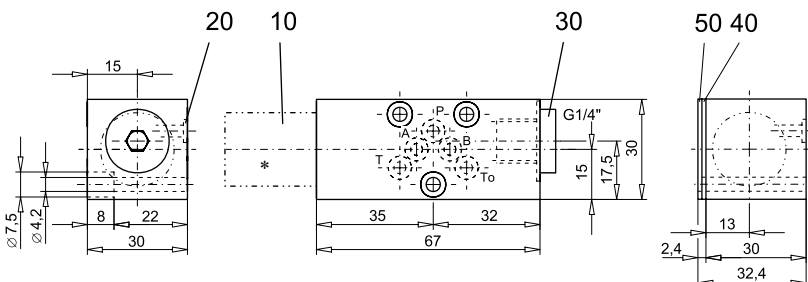


CAUTION!

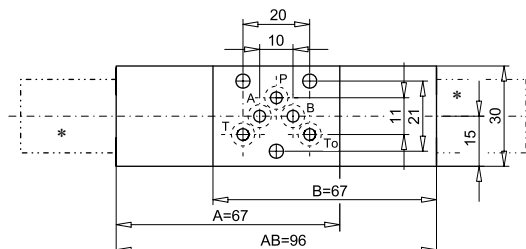
The performance data especially the „**pressure-flow-characteristic**„ on the data sheets of the screw-in cartridges refer to the screw-in cartridges only. The additional pressure drop of the flange body respectively sandwich body must be taken into consideration.

DIMENSIONS

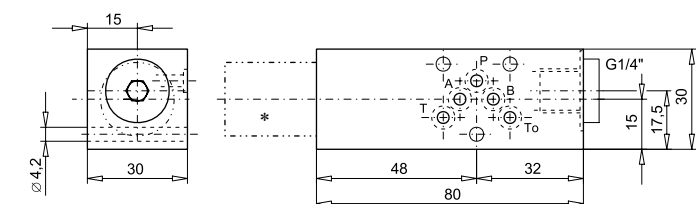
Flange construction



Sandwich construction in A, B or AB



Sandwich construction in P



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

PARTS LIST

Position	Article	Description
10	609.1 ...	Screw-in cartridge
20	160.2045	O-ring ID 4,5x1,5
30	238.2406	Plug VSTI G1/4"-ED (only flange and sandwich type in P)
40	173.0650	Sealing plate PDSA03
50	173.0700	Intermediate plate PZSA03

ACCESSORIES

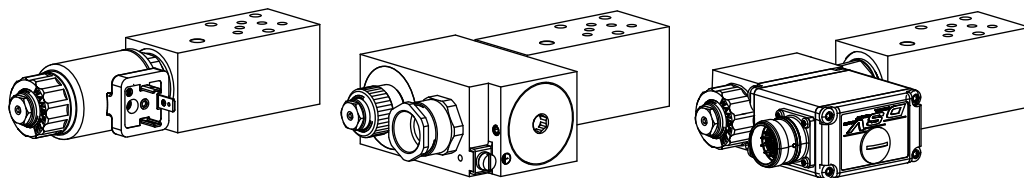
Proportional amplifier	register 1.13
------------------------	---------------

Technical explanation see data sheet 1.0-100

**Proportional pressure relief valve
Flange and sandwich construction**

NG4-Mini[®]

- $p_{max} = 400 \text{ bar}$



DESCRIPTION

Pilot and direct operated proportional pressure relief valves NG4-Mini. Flange and sandwich construction according to Wandfluh standard with 4 ports. Incorporated are proportional pressure relief cartridges size M22x1,5 according to ISO 7789. The flange and sandwich bodies made of steel are phosphatized.

FUNCTION

By adjusting the electric current to the proportional solenoid the operating pressure in hydraulic systems is limited by relieving the fluid from the protected lines P, A, B or A and B to the return / tank line T. Back pressure in T influences the pressure in the relieved pressure lines. This proportional pressure relief valves are adjustable very sensitively. To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

The valves have their applications in hydraulic systems in which the pressure frequently has to be changed. The facility for remote control and signal processing from process control systems enable economical solutions to problems with repeatable sequences. NG4-Mini valves are used where both, reduced dimensions and weight are important.

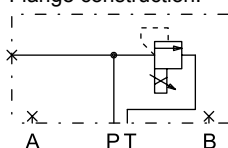
TYPE CODE

Pressure relief valve		B <input type="text"/> <input type="checkbox"/> A04 - <input type="text"/> - <input type="text"/> # <input type="checkbox"/>	
2nd and 3rd digit position of the designation of the built-in cartridge			
Flange construction	<input type="checkbox"/> F		
Sandwich construction	<input type="checkbox"/> S		
Mounting interface acc. to Wandfluh standard, NG4-Mini			
Type list / Function	flange construction	sandwich construction	
	in P <input type="checkbox"/> P	in P <input type="checkbox"/> P	
		in A <input type="checkbox"/> A	
		in B <input type="checkbox"/> B	
		in A and B <input type="checkbox"/> AB	
Nominal pressure range, nominal voltage, etc., of the built-in cartridge			
Design-Index (Subject to change)			

Examples: B ☐ V ☐ P ☐ F A04-P-20-G24 / WD-HB4,5
 B ☐ D ☐ B ☐ S A04-A-100-G12 / L15
 B ☐ N ☐ I ☐ S A04-B-200-G24 / KD-D1
 B ☐ V ☐ P ☐ S A04-AB-350-G12 / ME A1 R1

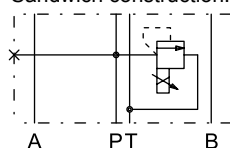
TYPE LIST / FUNCTION

Flange construction:

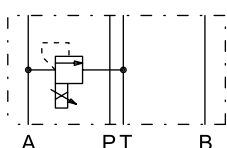


B..FA04-P

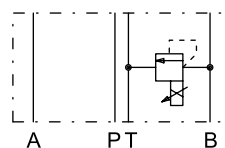
Sandwich construction:



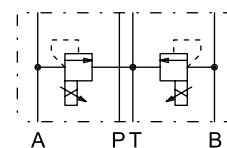
B..SA04 - P



B..SA04 - A



B..SA04 - B



B..SA04 - AB

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} *
BVPPM22	pilot operated	2.3-529	20 l/min
BNIPM22	pilot operated, inverse	2.3-533	20 l/min
BVBPM22	pilot operated, explosion proof Ex d	2.3-536	20 l/min
BVPPM22-../ME	pilot operated, with integrated electronics	2.3-537	20 l/min
BDPPM22	direct operated	2.3-539	20 l/min
BDIPM22	direct operated, inverse	2.3-548	20 l/min
BDBPM22	direct operated, explosion proof Ex d	2.3-547	20 l/min
BDPPM22-../ME	direct operated, with integrated electronics	2.3-561	20 l/min
BDIPM22-../ME	direct operated, inverse, with integrated electronics	2.3-562	20 l/min

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

GENERAL SPECIFICATIONS

Description	Pilot and direct operated proportional pressure relief valve		
Nominal size	NG4-Mini according to Wandfluh <i>standard</i>		
Constructions	Flange or sandwich		
Operations	Proportional solenoid		
Mounting	3 fixing holes for socket head cap screws		
M5 or studs M5			
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system		
Weight:	• Flange type	m = 1,15 kg	
(without screw-in cartridge)	• Sandwich type P, A, B	m = 0,96 kg	
	• Sandwich type AB	m = 1,24 kg	



REMARK!

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

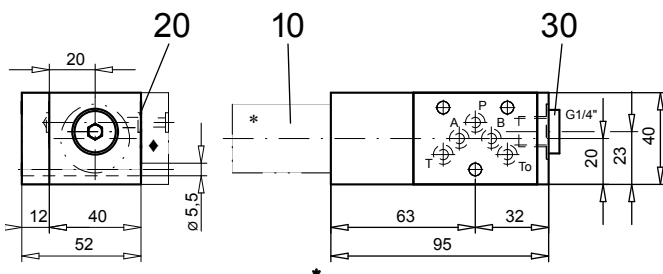


CAUTION!

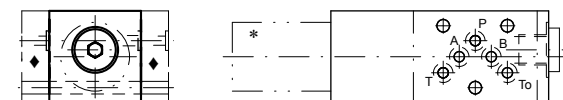
The performance data especially the „**pressure-flow-characteristic**„ on the data sheets of the screw-in cartridges refer to the screw-in cartridges only. The additional pressure drop of the flange body respectively sandwich body must be taken into consideration.

DIMENSIONS

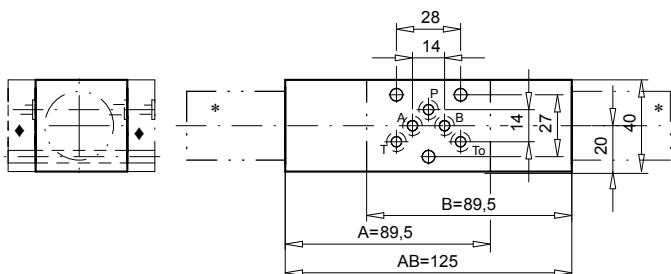
Flange construction



Sandwich construction in P



Sandwich construction in A, B or AB



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

♦ Distance plate BDP4/... must be ordered separately.

PARTS LIST

Position	Article	Description
10	609.3 ...	Screw-in cartridge
20	160.2052	O-ring ID 5,28x1,78
30	238.2406	Plug VSTI G1/4"-ED (only flange and sandwich type in P)

ACCESSORIES

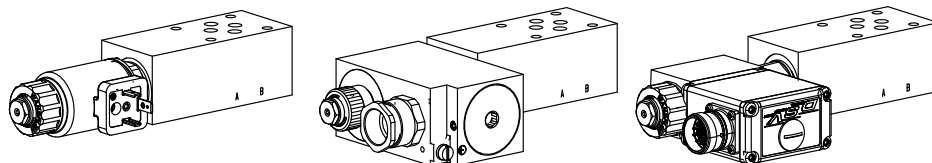
Proportional amplifier	register 1.13
Distance plate BDP4/12 (12 mm)	art. no. 173.1450
Distance plate BDP4/20 (20 mm)	art. no. 173.1451
Distance plate BDP4/30 (30 mm)	art. no. 173.1452

Technical explanation see data sheet 1.0-100

**Proportional pressure relief valve
Flange and sandwich construction**

• $p_{max} = 400 \text{ bar}$

NG6
ISO 4401-03



DESCRIPTION

Pilot and direct operated proportional pressure relief valves NG6. Flange and sandwich construction according to ISO 4401-03 with 4 ports. Incorporated are proportional pressure relief cartridges size M22x1,5 according to ISO 7789. The flange and sandwich bodies made of steel are phosphatized.

FUNCTION

By adjusting the electric current to the proportional solenoid the operating pressure in hydraulic systems is limited by relieving the fluid from the protected lines P, A, B or A and B to the return / tank line T. Back pressure in T influences the pressure in the relieved pressure lines. This proportional pressure relief valves are adjustable very sensitively. To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

The valves have their applications in hydraulic systems in which the pressure frequently has to be changed. The facility for remote control and signal processing from process control systems enable economical solutions to problems with repeatable sequences.

TYPE CODE

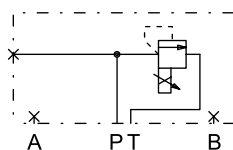
Pressure relief valve		B <input type="checkbox"/> <input type="checkbox"/> A06 - <input type="checkbox"/> - <input type="checkbox"/> # <input type="checkbox"/>	
2nd and 3rd digit position of the designation of the built-in cartridge			
Flange construction	<input type="checkbox"/> F		
Sandwich construction	<input type="checkbox"/> S		
International standard interface ISO, NG6			
Type list / Function	flange construction in P <input type="checkbox"/> P	sandwich construction in P <input type="checkbox"/> P in A <input type="checkbox"/> A in B <input type="checkbox"/> B in A and B <input type="checkbox"/> AB	
Nominal pressure range, nominal voltage, etc., of the built-in cartridge			
Design-Index (Subject to change)			

Examples: B ☐ V ☐ P ☐ F A06 - P - ☐ 20 - G24 / WD - HB4,5
 B ☐ D ☐ B ☐ S A06 - A - ☐ 100 - G12 / L15
 B ☐ N ☐ I ☐ S A06 - B - ☐ 200 - G24 / KD - D1
 B ☐ V ☐ P ☐ S A06 - AB - ☐ 350 - G12 / ME A1 R1

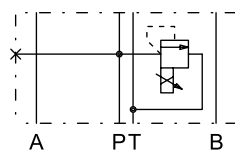
TYPE LIST / FUNCTION

Flange construction:

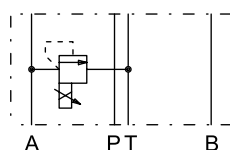
Sandwich construction:



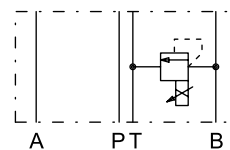
B..FA06-P



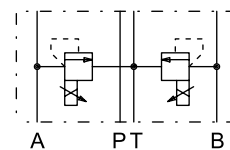
B..SA06 - P



B..SA06 - A



B..SA06 - B



B..SA06 - AB

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} *
BVPPM22	pilot operated	2.3-529	60 l/min
BNIPM22	pilot operated, inverse	2.3-533	60 l/min
BVBPM22	pilot operated, explosion proof Ex d	2.3-536	60 l/min
BVPPM22-../ME	pilot operated, with integrated electronics	2.3-537	60 l/min
BDPPM22	direct operated	2.3-539	25 l/min
BDIPM22	direct operated, inverse	2.3-548	20 l/min
BDBPM22	direct operated, explosion proof Ex d	2.3-547	25 l/min
BDPPM22-../ME	direct operated, with integrated electronics	2.3-561	25 l/min
BDIPM22-../ME	direct operated, inverse, with integrated electronics	2.3-562	20 l/min

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

GENERAL SPECIFICATIONS

Description	Pilot and direct operated proportional pressure relief valve		
Nominal size	NG6 according to ISO 4401-03		
Constructions	Flange or sandwich		
Operations	Proportional solenoid		
Mounting	4 fixing holes for socket head cap screws M5 or studs M5		
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system		
Weight:	• Flange type	m = 1,43 kg	
(without screw-in cartridge)	• Sandwich type P, A, B	m = 1,18 kg	
	• Sandwich type AB	m = 1,58 kg	



REMARK!

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

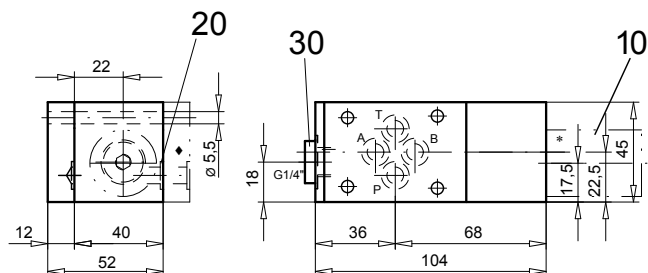


CAUTION!

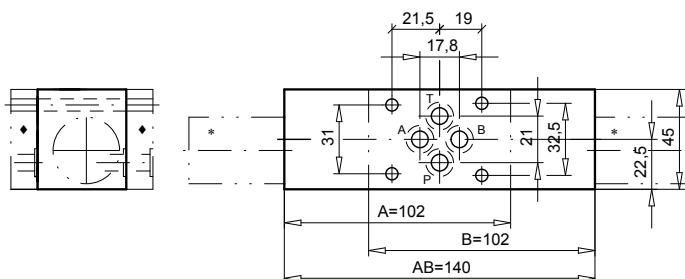
The performance data especially the „**pressure-flow-characteristic**„ on the data sheets of the screw-in cartridges refer to the screw-in cartridges only. The additional pressure drop of the flange body respectively sandwich body must be taken into consideration.

DIMENSIONS

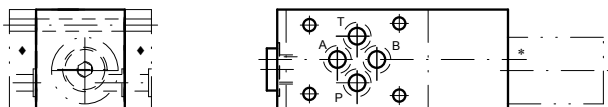
Flange construction



Sandwich construction in A, B or AB



Sandwich construction in P



PARTS LIST

Position	Article	Description
10	609.3 ...	Screw-in cartridge
20	160.2093	O-ring ID 9,25x1,78
30	238.2406	Plug VSTI G1/4"-ED (only flange and sandwich type in P)

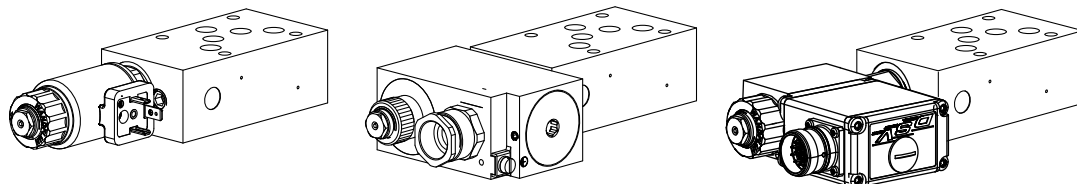
ACCESSORIES

Proportional amplifier register 1.13

Distance plate ADP6/12 (12 mm)	art. no. 173.3451
Distance plate ADP6/30 (30 mm)	art. no. 173.3453
Distance plate ADP6/46 (46 mm)	art. no. 173.3454
Distance plate ADP6/87 (87 mm)	art. no. 173.3461

Technical explanation see data sheet 1.0-100

**Proportional pressure relief valve
Flange and sandwich construction**

• $p_{\max} = 400 \text{ bar}$
NG10
ISO 4401-05

DESCRIPTION

Pilot operated proportional pressure relief valves NG10. Flange and sandwich construction according to ISO 4401-05 with 4 ports. Incorporated are proportional pressure relief cartridges size M22x1,5 according to ISO 7789. The flange and sandwich bodies made of steel are phosphatized.

FUNCTION

By adjusting the electric current to the proportional solenoid the operating pressure in hydraulic systems is limited by relieving the fluid from the protected lines P, A, B or A and B to the return / tank line T. Back pressure in T influences the pressure in the relieved pressure lines. This proportional pressure relief valves are adjustable very sensitively. To control the valve proportional amplifiers are available from Wandfluh (see register 1.13).

APPLICATION

The valves have their applications in hydraulic systems in which the pressure frequently has to be changed. The facility for remote control and signal processing from process control systems enable economical solutions to problems with repeatable sequences.

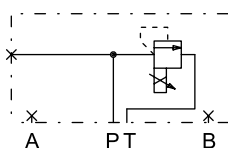
TYPE CODE

Pressure relief valve		B <input type="text"/> <input type="checkbox"/> A10 - <input type="text"/> - <input type="text"/> # <input type="checkbox"/>	
2nd and 3rd digit position of the designation of the built-in cartridge			
Flange construction	<input type="checkbox"/> F		
Sandwich construction	<input type="checkbox"/> S		
International standard interface ISO, NG10			
Type list / Function	flange construction in P <input type="checkbox"/> P	sandwich construction in P <input type="checkbox"/> P in A <input type="checkbox"/> A in B <input type="checkbox"/> B in A and B <input type="checkbox"/> AB	
Nominal pressure range, nominal voltage, etc., of the built-in cartridge			
Design-Index (Subject to change)			

Examples: B ☐ V ☐ P ☐ F A10 - P - 20 - G24 / WD - HB4,5
B ☐ D ☐ B ☐ S A10 - A - 100 - G12 / L15
B ☐ N ☐ I ☐ S A10 - B - 200 - G24 / KD - D1
B ☐ V ☐ P ☐ S A10 - AB - 350 - G12 / ME A1 R1

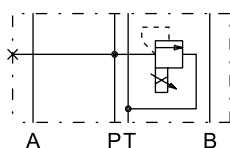
TYPE LIST / FUNCTION

Flange construction:

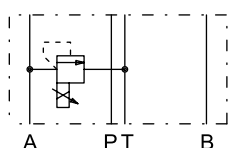


BV.FA10-P

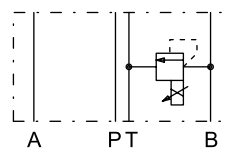
Sandwich construction:



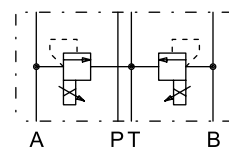
BV.SA10 - P



BV.SA10 - A



BV.SA10 - B



BV.SA10 - AB

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}^*
BVPPM22	pilot operated	2.3-529	100 l/min
BNIPM22	pilot operated, inverse	2.3-533	100 l/min
BVBPM22	pilot operated, explosion proof Ex d	2.3-536	100 l/min
BVPPM22-../ME	pilot operated, with integrated electronics	2.3-537	100 l/min
BDPPM22	direct operated	2.3-539	25 l/min
BDIPM22	direct operated, inverse	2.3-548	20 l/min
BDBPM22	direct operated, explosion proof Ex d	2.3-547	25 l/min
BDPPM22-../ME	direct operated, with integrated electronics	2.3-561	25 l/min
BDIPM22-../ME	direct operated, inverse, with integrated electronics	2.3-562	20 l/min

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

GENERAL SPECIFICATIONS

Description	Pilot operated proportional pressure relief valve	
Nominal size	NG10 according to ISO 4401-05	
Constructions	Flange or sandwich	
Operations	Proportional solenoid	
Mounting	4 fixing holes for socket head cap screws M6 or studs M6	
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system	
Weight:	• Flange type	m = 2,34 kg
(without screw-in cartridge)	• Sandwich type P, A, B	m = 1,70 kg
	• Sandwich type AB	m = 1,94 kg



REMARK!

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

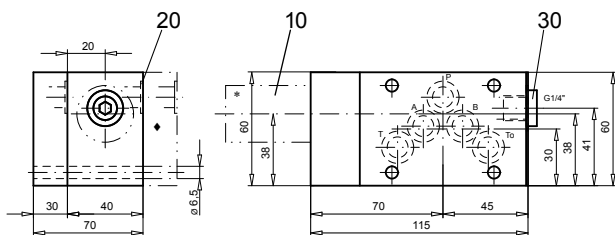


CAUTION!

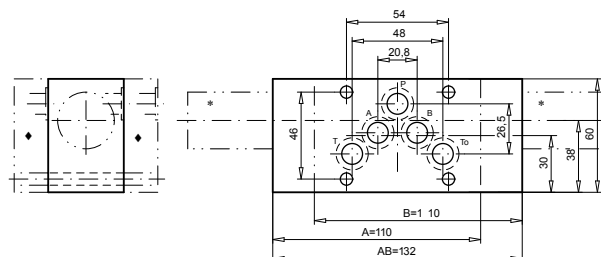
The performance data especially the „**pressure-flow-characteristic**„, on the data sheets of the screw-in cartridges refer to the screw-in cartridges only. The additional pressure drop of the flange body respectively sandwich body must be taken into consideration.

DIMENSIONS

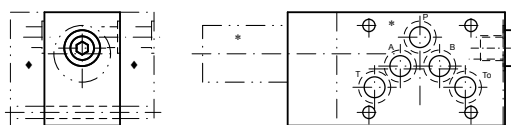
Flange construction



Sandwich construction in A, B or AB



Sandwich construction in P



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

- ◆ Distance plate ADP10/... must be ordered separatly.

PARTS LIST

Position	Article	Description
10	609.3 ...	Screw-in cartridge
20	160.2140	O-ring ID 14,00x1,78
30	238.2406	Plug VSTI G1/4"-ED (only flange and sandwich type in P)

ACCESSORIES

Proportional amplifier	register 1.13
Distance plate ADP10/18 (18 mm)	art. no. 173.4450

Technical explanation see data sheet 1.0-100