




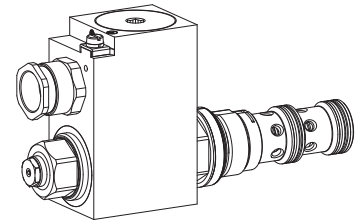
**Proportional pressure reducing valve
Screw-in cartridge**

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

M33 x 2

ISO 7789

-  II 2 G Ex db IIC
 -  II 2 D Ex tD A21 IP65
 -  I M2 Ex db I Mb
- Class I Division 1
Class I Zone 1**


DESCRIPTION
For explosion-hazard zones

Pilot operated proportional pressure reducing valve as a screw-in cartridge with a thread M33x12 for cavity according to ISO 7789. Activated with Wandfluh-explosion-proof-solenoid. The cartridge body made of steel is zinc coated for corrosion protection. The flameproof enclosure 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

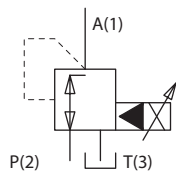
The proportional pressure regulating valve controls the pressure in port A (1). Proportionally to the solenoid current solenoid force and pressure in port A (1) rise. The valve functions practically independently of pressure in port P (2). A pressure rise in Port A (1) above the set pressure, e.g. due to an active oil consumer, will be prevented by relieving excess volume flow to tank via port T (3). With deneergised 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.

TYPENSCHLÜSSEL

Pressure reducing valve	M	V	B	PM33	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	#	<input type="text"/>
Pilot operated																
Proportional, explosion proof execution Ex d																
Screw-in cartridge M33x2																
Nominal power P_N :	15W/L15	9W/L9														
Nominal pressure range p_N [bar]	<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"/>														
Nominal voltage U_N	12 VDC															
	24 VDC															
Nominal power P_N	9W															
	15W															
Certification	ATEX, IECEx, EAC															
	Australia	<input type="text"/>														
Sealing material	NBR															
	FKM (Viton)															
Design-Index (Subject to change)																

SYMBOLS

CERTIFICATES

	Surface	Mining	Standard -25 °C to...	M248 Electronic
ATEX	x	x	x	x
IECEx	x	x	x	x
EAC	x	x	x	x
Australia	x	x	x	
Inmetro	x	x	x	x
NEPSI	x		x	
MA		x	x	x
UL/CSA	x		x	

 The certificates can be found on www.wandfluh.com

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 $\beta_{6...10} \geq 75$) refer to data sheet 1.0-50/2 12 mm ² /s...320 mm ² /s
Viscosity range	
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 Q = 0...160 l/min
Volume flow range	
Pilot- and leakage volume flow	see characteristics
Repeatability	≤ 2% *
Hysteresis	≤ 5% *
	* 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 60 529	
Connection/Power supply	Through cable gland for cable \varnothing 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.

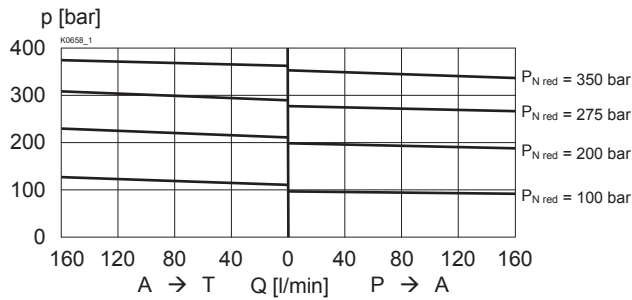
STANDARDS

Cartridge cavity	ISO 7789
Explosion protection	Directive 2014/34/EU (ATEX)
Flameproof enclosure	EN/IEC/UL 60079-1,31
Cable entry	EN 60079-0, 1, 7, 15, 31
Protection class	EN 60 529
Contamination efficiency	ISO 4406

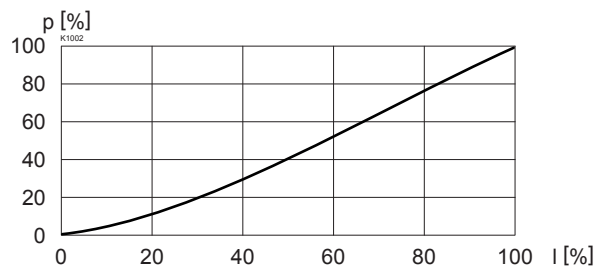
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

Execution L15 (measured at 50 °C)

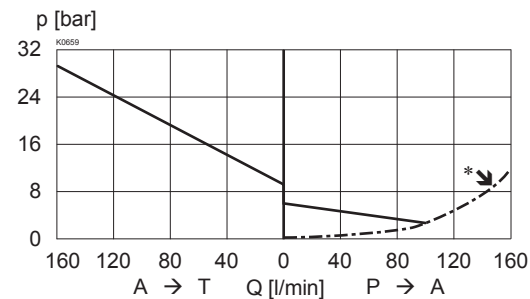
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



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

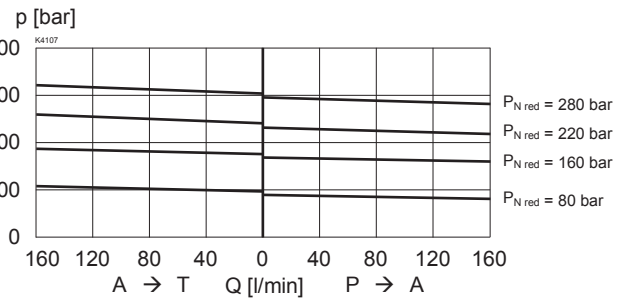


$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)
* Consumption resistance dependent on system

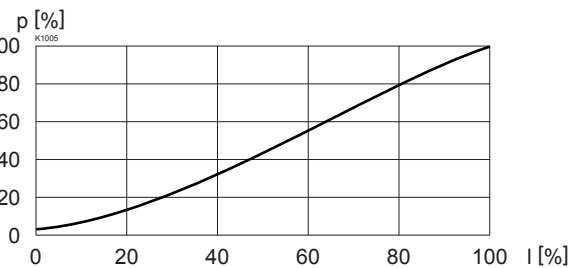


Execution L9 (measured at 40 °C)

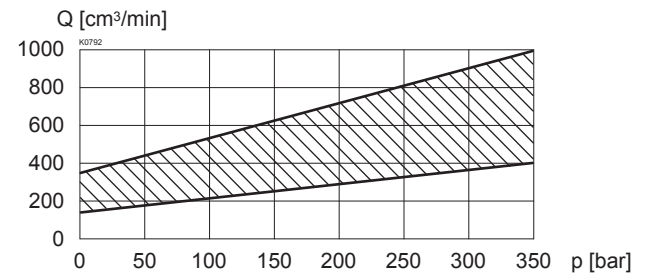
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)

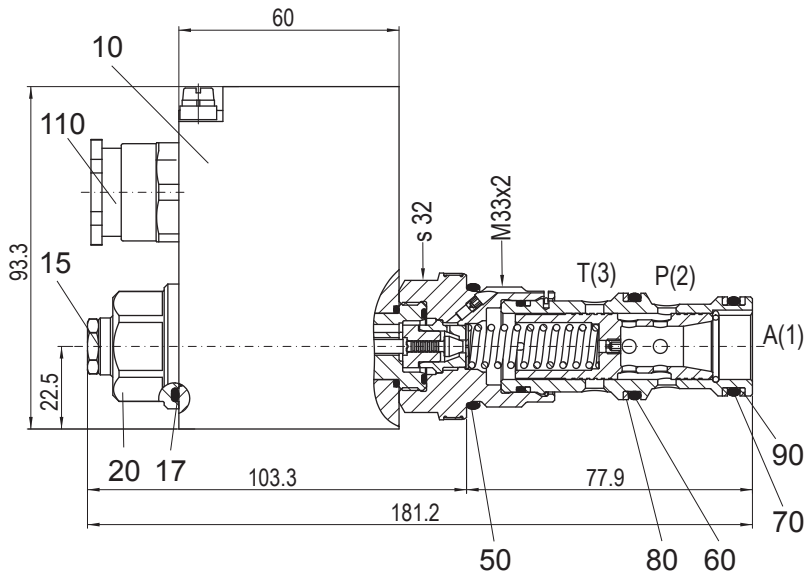
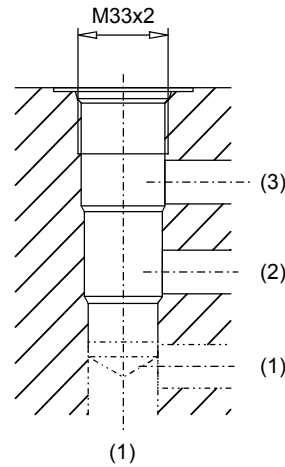


$p = f(I)$ Pressure signal characteristics
($Q = 1 \text{ l/min}$)



$Q_{\text{st+L}} = f(p_{\text{red}})$ Pilot- and leakage volume flow [A (1) → T (3)]
(Pressure in P (2) = 350 bar)



DIMENSIONS / SECTIONAL DRAWINGS

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

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

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
17	160.2251	O-ring ID 25,07 x 2,62 (NBR)
20	154.2603	Knurled nut M16 x 1 x 18
50	160.2298	O-ring ID 29,82x2,62 (NBR)
	160.6296	O-ring ID 29,82x2,62 (FKM)
60	160.2235	O-ring ID 23,47x2,62 (NBR)
	160.6235	O-ring ID 23,47x2,62 (FKM)
70	160.2219	O-ring ID 21,89x2,62 (NBR)
	160.6216	O-ring ID 21,89x2,62 (FKM)
80	049.3297	Backup ring RD 24,5x29x1,4
90	049.3277	Backup ring RD 22,5x27x1,4
110	111.1080	Cable gland brass M20

ACCESSORIES

 Line mount body Data sheet 2.9-210

Technical explanation see data sheet 1.0-100