

Solenoid coil MKY45/18x60
For explosion-hazard zones
Protection class IP65/67

Ex d IIC T6/T4 Gb

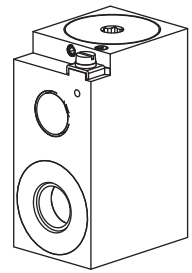
Ex tb IIIC IP65 T80°C/T130°C Db

Ex d I Mb

Ex II 2 G Ex d IIC T6/T4

Ex II 2 D Ex tD A21 IP65 T80°C/T130°C

Ex I M2 Ex d I Mb



DESCRIPTION

For explosion-hazard zones

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.

The steel housing is zinc-/nickel-coated.

FUNCTION

In combination with an armature tube, the function of a switching solenoid or of a proportional solenoid results. Solenoid coils in AC - construction have an integrated rectifier.

All cable threaded joints certified for this explosion protection class with a protection class of at least IP65 can be used.

APPLICATION

The solenoid coil is suitable for use in all explosion-hazard zones, open cast and also in mines.

This signifies, that the coils are certified for applications in zones with explosion-hazard gas-, steam-, vapour-, air- and dust mixtures of the zones 1/21 and 2/22.

Valves for explosion-hazard zones are utilised in:

- the shipping- and offshore industries
- the oil- and gas industries
- the chemical industry
- wood processing
- grain mills
- the mining application

CERTIFICATES

in accordance with	Surface gas and dust	Mining
ATEX	x with option -60°C	x
IECEX	x with option -60°C	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..**

TYPE CODE

M K Y 45 / 18 x 60 - ☐ / ☐ / ☐ - ☐ # ☐

Metal housing type with steel housing ☐

Terminal box without cable ☐

Ex d – Execution ☐

Housing width 45 mm ☐

Coil internal diameter 18 mm ☐

Coil length 60 mm ☐

Standard nominal voltage range U_N : 12 VDC ☐ G 12 230 VDC ☐ G 230
24 VAC ☐ R 24 230 VAC ☐ R 230

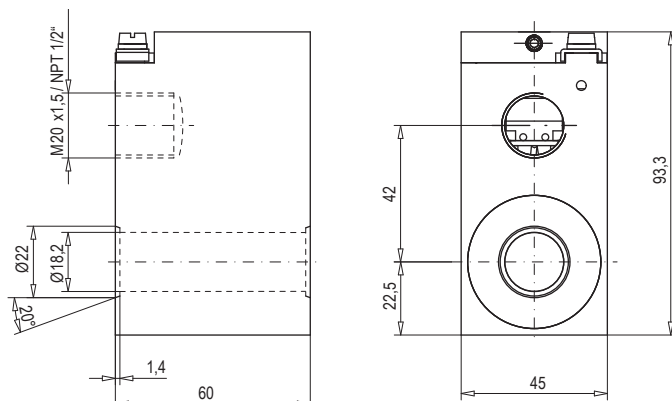
Standard nominal power range P_N : 9 W ☐ L 9 21 W ☐ L 21

Certification ATEX, IECEX, GOST Ex ☐
Australia ☐ AUS Inmetro ☐ IM

Temperature range -25°C to ... ☐
-40°C to ... ☐ M224
-60°C to ... ☐ M238 only ATEX and IECEX /Surface

Design-Index (Subject to change) ☐

DIMENSIONS



CHARACTERISTICS

Coil winding isolation class H

Protection class
in acc. EN 60529

Relative duty factor

Reference temperature

IP65/67, with corresponding cable gland
and correct installation

100 % DF, combined with armature tube
and valve

Execution L9:

-25...+40 °C (operation as T1...T6/T80 °C)

-25...+90 °C (operation as T1...T4/T130 °C)

Execution L15 / L12

Temperature range „-25° to...“

-25...+70 °C (operation as T1...T4/T130 °C)

Temperaturbereich „-40° to ...“

-40...+70 °C (operation as T1...T4/T130 °C)

Temperaturbereich „-60° to ...“

-60...+70 °C (operation as T1...T4/T130 °C)

Execution L 21:

-25...+50 °C (operation as T1...T4/T130 °C)

At $U_N < 20V$ the max. ambient temperature
has to be reduced by 10 °C.

Housing

Relative duty factor

Corrosion protection

Steel housing, zinc-/nickel-coated

max. 95 % (not dew-forming)

Salt spray test in accordance with

EN ISO 9227 > = 800 hours

Maximum operating
voltage

Nominal voltage +10 %

Nominal frequency

in acc. with name plate $\pm 2\%$

Standard

$U_N = 12\text{ VDC}$

nominal voltages

$U_N = 24\text{ VDC}$

$U_N = 115\text{ VAC}$

$U_N = 230\text{ VAC}$

Other nominal voltages in the ranges of

12–230 VDC and 24–230 VAC on request

Standard

$P_N = 9\text{ W}$

nominal powers

$P_N = 15\text{ W}$

$P_N = 21\text{ W}$

Nominal power (W)

12 VDC

9 12 15 21

Nominal resistance (Ω)

16,5 13,5 9,9 7,1

Recommended rated
current for fuse inserts (mA)

1600 2000 2'500 4'000

Limiting current (mA)

610 720 960 1'230

(Proportional function)

24 VDC

9 12 15 21

Nominal power (W)

64 49,2 38,5 27,5

Nominal resistance (Ω)

800 800 1'250 2'000

Recommended rated
current for fuse inserts (mA)

300 370 450 600

Limiting current (mA)

(Proportional function)

115 VAC

9 12 15 21

Nominal power (W)

1'180 869 700 500

Nominal resistance (Ω)

200 200 315 400

Recommended rated
current for fuse inserts (mA)

230 VAC

9 12 15 21

Nominal power (W)

4'750 3'370 2'850 2'050

Nominal resistance (Ω)

100 100 160 200

Recommended rated
current for fuse inserts (mA)

OPERATION SECURITY



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.

A corresponding fuse in accordance with its design current has to be connected in series as short-circuit protection for every solenoid coil.

INSTALLATION

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

ACCESSORIES

– The operating instructions incl. the EC declaration of conformity for solenoid coils of the type MKY45/18x60 is supplied in German, English and French (download under www.wandfluh.com)

– Type test certifications
(download under www.wandfluh.com)

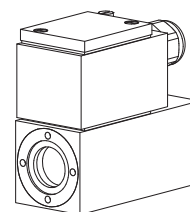
– EC-declaration of conformity
(download under www.wandfluh.com)

– Recognition of production quality assurance
PTB 07 ATEX Q006
(download under www.wandfluh.com)

**Solenoid coil M.Z45
for explosion hazard zones
ATEX und IECEx certified
Protection class IP65**



Ex ia I Ma
Ex ia II C T5/T6 Ga
II 1 G Ex ia II C T6, T5
I M1 Ex ia I Ma



DESCRIPTION

The solenoid coil for explosion hazard areas in the ignition protection type «intrinsically safe» is utilised on solenoid spool valves.

FUNCTION

The winding resistance can be adapted to the intrinsically safe electric power supply utilised, in the range of 20...1000 Ω . With 100 Ω or 152 Ω coil resistance it is adapted to the recommended electric power supplies. Three diodes connected in parallel with the winding serve to render the inductivity ineffective, and a diode connected in series serves as a protection against reverse polarity. The electrical minimum values for a secure operation can be taken from the corresponding data sheet of the valve.

APPLICATION

The solenoid coil is certified as a device of the device groups I+II, category 1. This signifies that the devices are suitable for utilisation in areas with explosive gas -, vapour -, mist - and air mixtures of the zones 0, 1 and 2 as well as in mining applications.

Intrinsically safe valves are used in:
– the shipping- and offshore industries
– the oil- and gas industries
– the chemical industry
– the mining application

CERTIFICATES

in accordance with	Surface	Mining
ATEX	x	x
IECEx	x	x

The certificates can be found on www.wandfluh.com / DOWNLOADS / Accompanying Ex-proof / **M.Z45**

TYPE CODE

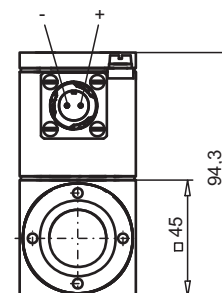
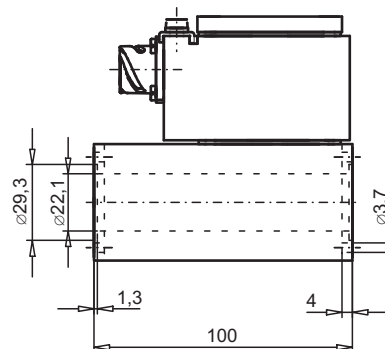
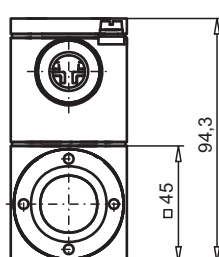
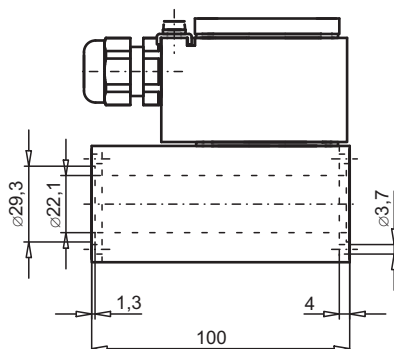
			M		Z	45	-		-		#	
Mobile type with steel housing												
Terminal box with cable screw connection M20x1,5				K								
Bajonet connector (only equipment group II)				B								
Protection type intrinsically safe												
45 mm square housing												
Coil resistance	100 Ω					100						
	152 Ω					152						
Equipment group	II											
	I					M233						
												only in combination with coil resistance 100 Ω

Design-Index (Subject to change)

DIMENSIONS

Type MKZ45

Type MBZ45



SPECIFICATIONS

Insulation material class of the excitation winding	at least H
Protection class	IP65 acc. to EN 60 529
Relative duty factor	100 % DF
Admissible ambient temp.	T1...T6: -20...+45 °C T1...T5: -20...+60 °C
Housing	Steel housing zinc coated
Relative humidity	max. 95 % (non-condensing)
Connection/power supply	MKZ45: Standard for equipment groups I+II • Cable entry for cable Ø 6...12 mm • + external protective terminal MBZ45: (CA 3102E 10 SL4P-B) • Bajonet connector, Cannon • + external protective terminal
Only available for device group II	

Technical safety limit values	Equipment group	I	II
U_i		30 V	30 V
I_i		2,5 A	0,8 A
P_i			3 W
L_i		0mH	0mH
C_i		0nF	0nF

The inductance and capacitance of the solenoid coils are made ineffective.

RECOMMENDED ELECTRIC POWER SUPPLY

Electric power supply					Solenoid
Type	Manufacturer	Number of outputs	I_{max}	Equipment group	Required coil resistance
BXNE3412	Georgin	1	95mA	II	100Ω
BXNE3422	Georgin	2	95mA	II	100Ω
KFD0-SD2-EX2.1245	Pepperl+Fuchs	(1) *	90mA *	I and II	100Ω
BXNE3712	Georgin	1	125mA	II	100Ω
BXNE3722	Georgin	2	125mA	II	100Ω
LB6115/FB6215***	Pepperl+Fuchs	4	80mA	II	152Ω

Further characteristic values refer to data sheet of the power supply manufacturer

* Parallel switching of both outputs

SAFE OPERATION

Intrinsically valves must only driven by a suitable electric power supply (see operating instructions). The selection of the power supply and wiring work must be executed by trained specialists.

ACCESSORIES

– The operating instructions incl. the EC declaration of conformity for solenoid coils of the type M.Z45-... and I.Z45-... is supplied in German, English and French language and provided for downloading under www.wandfluh.com.

– Type test certifications
(download under www.wandfluh.com)

– Declaration of conformity
(download under www.wandfluh.com)

– Recognition of production quality assurance

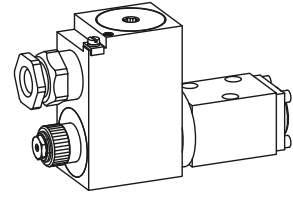
ATEX: PTB 07 ATEX Q006
IECEX: DE/PTB/QAR09.0002/00
(download under www.wandfluh.com)

Solenoid operated spool valve

- 4/2-way impulse version, detented
- 4/3-way with spring centred centre position
- 4/2-way spring reset
- $Q_{\max} = 20 \text{ l/min}$, $p_{\max} = 350 \text{ bar}$

NG4-Mini[®]

- 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

Spool valve flange type NG4-Mini with four connections. Direct operated solenoid spool valve in 5-chamber-system.
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 energised solenoid shifts the spool into the corresponding position.

- 4/2-way impulse spool valve:

Two solenoids and two detented switched positions. With the solenoids de-energised, the spool remains in the corresponding switched position, by the detentsing.

- 4/3-way spool valve:

Two solenoids and three switched positions. With the solenoids de-energised, the spool returns to the centre position by spring force.

- 4/2-way spool valve:

One solenoid and two switched positions. With the solenoid de-energised the spool returns to the offset position by spring force.

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. Solenoid operated spool valves are mainly used to control the direction of movement and to hold hydraulic cylinders and motors. The direction of flow through the valve is determined by the spool symbol. The switching performance and the possible leakage must be taken into consideration when designing a system.

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..

TYPE CODE

		B EXd 4		- / / #	
International mounting interface ISO					
Explosion-proof execution, Ex d					
Number of control ports					
Description of symbols acc. to table					
nominal voltage U_N	12 VDC	G12			
	24 VDC	G24			
	115 VAC	R115			
	230 VAC	R230			
Nominal power P_N	9 W	L9	Ambient temp. by:		
	15 W	L15	40 °C or 90 °C		
			70 °C		
Certificate	ATEX, IECEX, GOST Ex				
	Australia	AU	Inmetro	IM	
Design-Index (Subject to change)					

GENERAL SPECIFICATIONS

Description	4/2-, 4/3-way valve
Nominal size	NG4 acc. to Wandfluh standards
Construction	Direct operated spool valve
Operation	Solenoid operated
Mounting	Flange installation 3 attachment holes for cylinder screws M5x40 or M5x50 with distance plate BDP 4/12
Connections	Screw connection fixing plates In-line flange plates Longitudinal stacking system
Admissible ambient temp.	Execution L9: -20...+40 °C (operation as T1...T6/T80 °C) -20...+90 °C (operation as T1...T4/T130 °C) Execution L15: -20...+70 °C (operation as T1...T4/T130 °C) In case of $U_N < 20 \text{ V}$, the max. ambient temperature has to be reduced by 10 °C.
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8.8) for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight: 4/2-way impulse	$m = 4,4 \text{ kg}$
4/3-way	$m = 4,4 \text{ kg}$
4/2-way (1 solenoid)	$m = 2,6 \text{ kg}$

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, classe 20/18/14 (Required filtration grade $\beta_{10...16} \geq 75$) refer to 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) -20...+70 °C (operation as T1...T4/T130 °C) Execution L15: -20...+70 °C (operation as T1...T4/T130 °C)
Working pressure in port P, A, B	$p_{\max} = 350 \text{ bar}$ ($p_T < 20 \text{ bar}$) $p_{\max} = 315 \text{ bar}$ ($p_T > 20 \text{ bar}$)
Tank pressure in port T	$p_{T\max} = 100 \text{ bar}$
Max. volume flow	$Q_{\max} = 20 \text{ l/min}$
Leakage volume flow	see characteristics



In case of the execution L15 for ambient temperatures of up to 70 °C the characteristic performance values were established at an ambient temperature of 50 °C.

ELECTRICAL CONTROL

Construction	Solenoid, wet pin push type, pressure-proof
Standard-nominal voltage	$U_N = 12 \text{ VDC}, 24 \text{ VDC}, 115 \text{ VAC}, 230 \text{ VAC}$ AC = 50 up to 60 Hz $\pm 2\%$; with built-in two-way rectifier and recovery diode
Voltage tolerance	$\pm 10\%$ of rated voltage
Protection class	IP67 acc. to EN 60 529
Relative duty factor	100% DF
Switching cycles	12000/h
Operating life	10^7 (number of switching cycles, theoretically)
Connection/Power supply	Through cable gland for cable diameter 6,5...14 mm
Temperature class:	(acc. to EN 60079-0)
Execution L9	T1...T6
Execution L15	T1...T4
Nominal power:	
Execution L9	9 W
Execution L15	15 W
For further electrical characteristics, refer to the data sheet of the solenoid coil 1.1-183	

OPERATION SECURITY


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.

TYPE LIST/DESIGNATION OF SYMBOLS

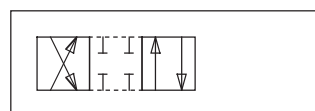
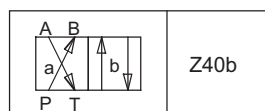
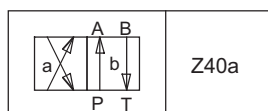
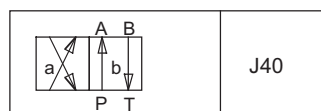
4/2-way valve impulse

4/2-way valve with spring reset

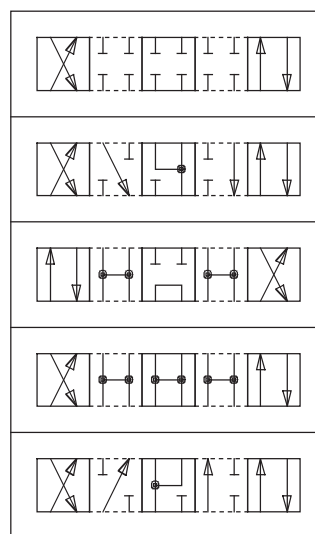
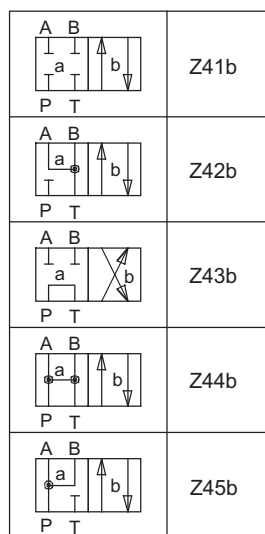
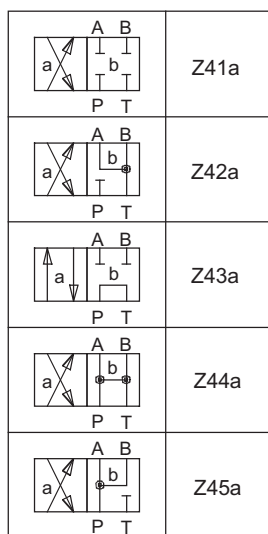
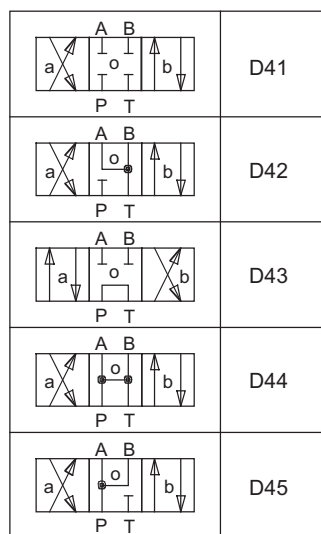
Operation A-side

Operation B-side

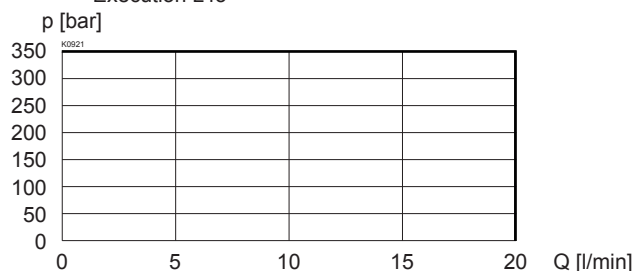
Transitional functions



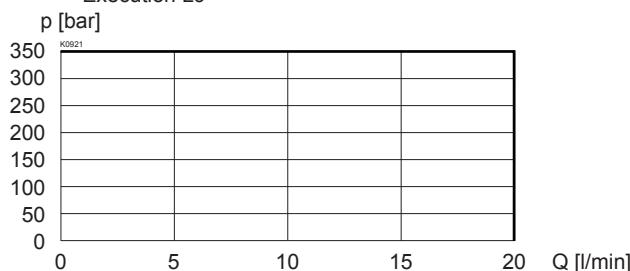
4/3-way valve spring centred


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

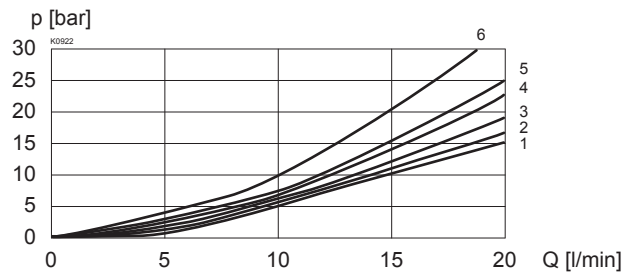
$p = f(Q)$ Power limits
in case of the standard voltage -10 %
measured at 50 °C
Execution L15


Execution L9/90° on request

$p = f(Q)$ Power limits
in case of the standard voltage -10 %
measured at 40 °C
Execution L9

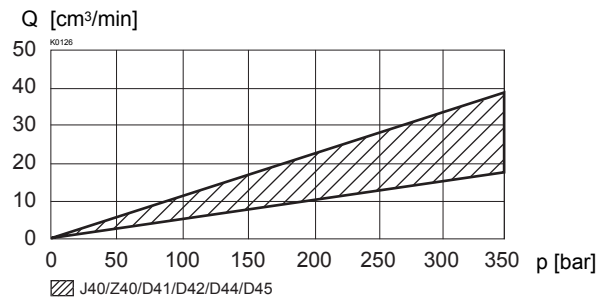


$\Delta p = f(Q)$ Pressure drop volume flow characteristics



Symbol	Pressure loss characteristic curve no.	Volume flow direction				
		P - A	P - B	P - T	A - T	B - T
Z40/J40		5	5	-	2	2
D41/Z41		5	5	-	2	2
D42/Z42		5	5	-	1	1
D43/Z43		4	4	6	2	2
D44/Z44		4	4	3	2	2
D45/Z45		4	4	-	2	2

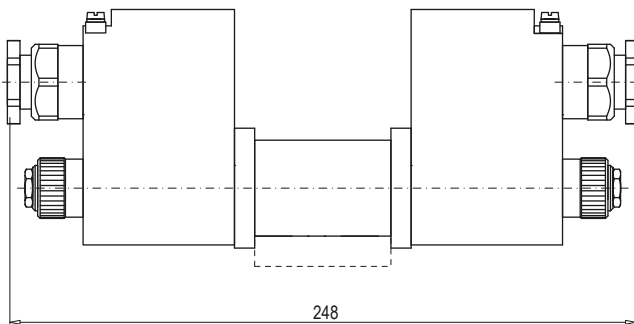
$Q_L = f(p)$ Leakage volume flow characteristics per control edge



DIMENSIONS

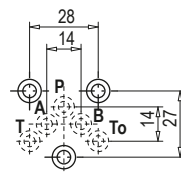
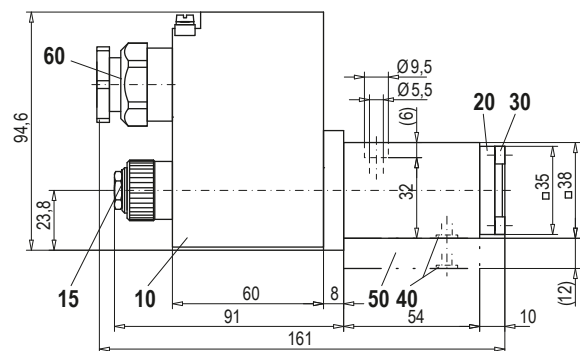
4/3-way valve (spring centred)
4/2-way valve (impulse)

4/2-way valve (spring offset)



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

Order distance plate BDP4/12 separatley



PARTS LIST

Position	Article	Description
10	263.6....	Spool MKY45/18x60-...
15	253.8000	Plug with integrated manual override HB4,5
20	057.4202	Cover
30	246.1113	Socket head cap screw M4x12 DIN 912
40	160.2052	O-Ring ID 5,28x1,78
50	173.1450	Distance plate BDP4/12
60	111.1080	Cable gland brass M20

ACCESSORIES

Threaded connecting plates, Multi-flange subplates and longitudinal stacking system	see reg. 2.9
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Technical explanation see data sheet 1.0-100

Solenoid operated spool valve

- **4/2-way impulse version, detented**
- **4/3-way with spring centred centre position**
- **4/2-way spring reset**
- **$Q_{\max} = 50 \text{ l/min}$, $p_{\max} = 350 \text{ bar}$**

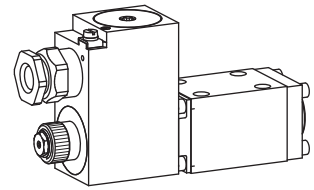
NG6

ISO 4401-03

Ex II 2 G Ex d IIC

Ex II 2 D Ex tD A21 IP65

ε_x | M2 Ex d | Mb



DESCRIPTION

For explosion-hazard zones

Spool valve flange type NG6 with four connections. Direct operated solenoid spool valve in 5-chamber-system.

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 energised solenoid shifts the spool into the corresponding position.

- 4/2-way impulse valve detented:
Two solenoids and two detented positions.
- 4/3-way spool valve:
Two solenoids and three positions.
- 4/2-way spool valve:
One solenoid and two positions.

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. Solenoid operated spool valves are mainly used to control the direction of movement and to hold hydraulic cylinders and motors. The direction of flow through the valve is determined by the spool symbol. The switching performance and the possible leakage must be taken into consideration when designing a system.

CERTIFICATES

in accordance with	Surface gas and dust	Mining
ATEX	x with option -60°C	x
IECEX	x with option -60°C	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...**

TYPE CODE

		A		EXd		4				-				/				/				-				#			
International connection standard ISO																													
Explosion protection version, Ex d																													
Number of control ports																													
Description of symbols acc. to table																													
Nominal voltage U_N		12 VDC		G12																									
		24 VDC		G24																									
		115 VAC		R115																									
		230 VAC		R230																									
Nominal power P_N		9W		L9		Ambient temp. with:																							
		15W		L15		40 °C or 90 °C																							
						70 °C																							
Certification																													
ATEX, IECEx, GOST Ex																													
Australia		AU		Inmetro		IM																							
Temperature range		-25 °C to ...																											
		-40 °C to ...		Z604		only with 15W																							
		-60 °C to ...		Z591		only with 15W / ATEX and IECEx / Surface																							
Design-Index (Subject to change)																													

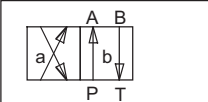
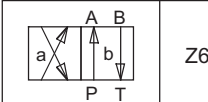
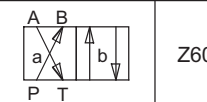
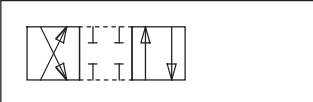
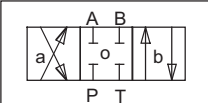
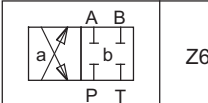
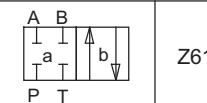
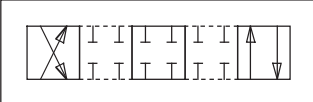
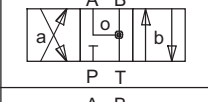
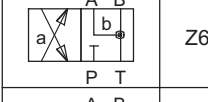
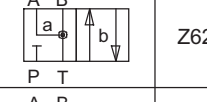
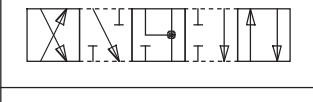
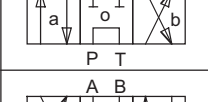
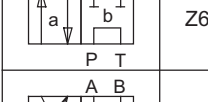
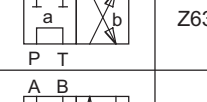
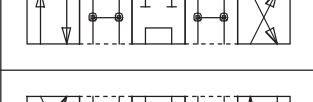
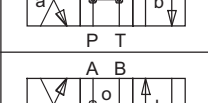
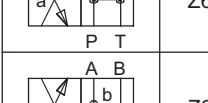
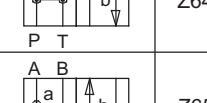
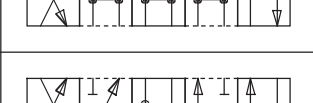
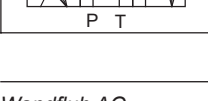
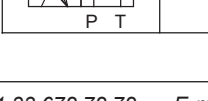
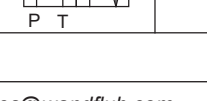
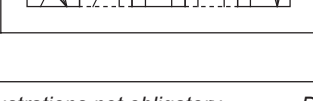
GENERAL SPECIFICATIONS

Description	4/2-, 4/3-way valve
Nominal size	NG6 acc. to ISO 4401-03
Construction	Direct operated spool valve
Operation	Solenoid operated
Mounting	Flange installation 4 attachment holes for cylinder screws M5x45 In case of valves for the temperature range „-60°C to ...“ (Z591) screws of the quality A4 have to be used.
Connections	Screw connection fixing plates In-line flange plates Longitudinal stacking system
Admissible ambient temp.	Execution L9: -25...+40 °C (operation as T1...T6/T80 °C) -25...+90 °C (operation as T1...T4/T130 °C) Execution L15: Temperature range „-25° to ...“ -25...+70 °C (operation as T1...T4/T130 °C) Temperature range „-40° to ...“ -40...+70 °C (operation as T1...T4/T130 °C) Temperature range „-60° to ...“ -60...+70 °C (operation as T1...T4/T130 °C) In case of $U_N < 20V$, the max. ambient temperature has to be reduced by 10 °C.
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8.8) for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight: 4/2-way impulse	$m = 4,6 \text{ kg}$
4/3-way	$m = 4,6 \text{ kg}$
4/2-way (1 solenoid)	$m = 2,8 \text{ kg}$

HYDRAULIC SPECIFICATIONS

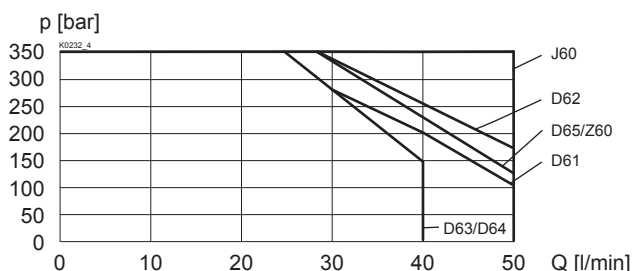
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, classe 20/18/14 (Required filtration grade $\beta_{10...16} \geq 75$) refer to data sheet 1.0-50/2 12 mm ² /s...320 mm ² /s
Viscosity range	Execution L9: -25...+40 °C (operation as T1...T6/T80 °C) -25...+70 °C (operation as T1...T4/T130 °C) Execution L15: Temperature range „-25° to ...“ -25...+70 °C (operation as T1...T4/T130 °C) Temperature range „-40° to ...“ -40...+70 °C (operation as T1...T4/T130 °C) Temperature range „-60° to ...“ -60...+70 °C (Betrieb als T1...T4/T130 °C)
Admissible fluid temp.	$p_{\max} = 350 \text{ bar}$
Working pressure in port P, A, B	$p_{T\max} = 100 \text{ bar}$
Tank pressure in port T	$Q_{\max} = 50 \text{ l/min}$
Max. volume flow	see characteristics
Leakage volume flow	

TYPE LIST / DESIGNATION OF SYMBOLS

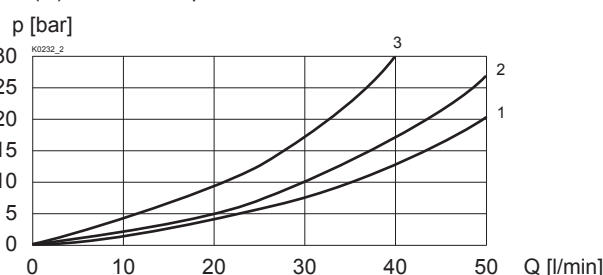
4/2-way valve impulse	4/2-way valve with spring reset Operation A-side	Operation B-side	Transitional functions
 J60	 Z60a	 Z60b	
4/3-way valve spring centred			
 D61	 Z61a	 Z61b	
 D62	 Z62a	 Z62b	
 D63	 Z63a	 Z63b	
 D64	 Z64a	 Z64b	
 D65	 Z65a	 Z65b	

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

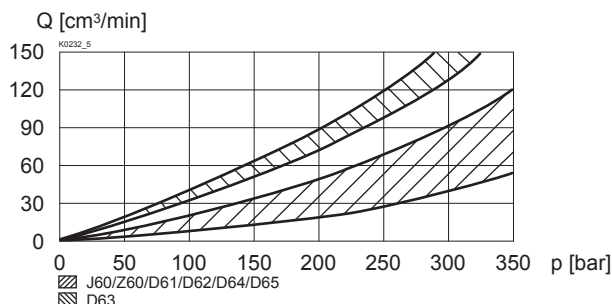
$p = f(Q)$ Power limits
in case of the standard voltage -10 %
measured at 50 °C
Execution L15



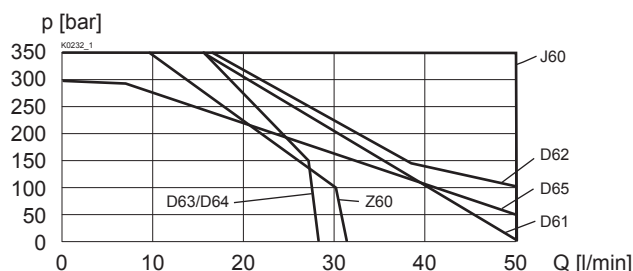
$\Delta p = f(Q)$ Pressure drop volume flow characteristics



$Q_L = f(p)$ Leakage volume flow characteristics
per control edge


Execution L9/90° on request

$p = f(Q)$ Power limits
in case of the standard voltage -10 %
measured at 40 °C
Execution L9



Symbole	Pressure loss characteristic curve no.	Volume flow direction				
		P - A	P - B	P - T	A - T	B - T
Z60/J60	2	2	2	-	2	2
D61/Z61	2	2	2	-	2	2
D62/Z62	2	2	2	-	2	2
D63/Z63	2	2	2	3	2	2
D64/Z64	1	1	1	-	1	1
D65/Z65	1	1	1	-	2	2

ELECTRICAL CONTROL

Construction	Solenoid, wet pin push type, pressure-proof
Standard-nominal voltage	$U_N = 12 \text{ VDC}, 24 \text{ VDC}, 115 \text{ VAC}, 230 \text{ VAC}$ AC = 50 to 60 Hz $\pm 2\%$; with built-in two-way rectifier and recovery diode
Voltage tolerance	$\pm 10\%$ of rated voltage
Protection class	IP67 acc. to EN 60 529
Relative duty factor	100 % DF
Switching cycles	12000/h
Operating life	10^7 (number of switching cycles, theoretically)
Connection/Power supply	Through cable gland for cable diameter 6,5...14 mm (acc. to EN 60079-0)
Temperature class:	
Execution L9	T1...T6
Execution L15	T1...T4
Nominal power:	
Execution L9	9 W
Execution L15	15 W
For further electrical characteristics, refer to the data sheet of the solenoid coil 1.1-183	

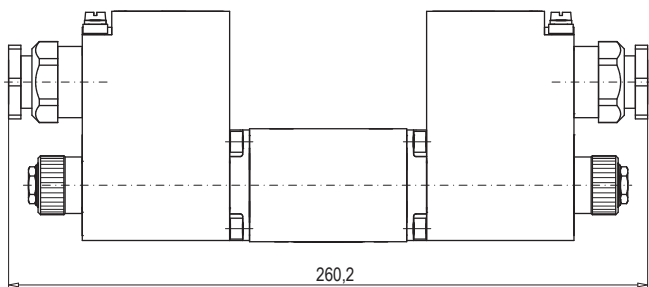


In case of the execution L15 for ambient temperatures of up to 70 °C the characteristic performance values were established at an ambient temperature of 50 °C.

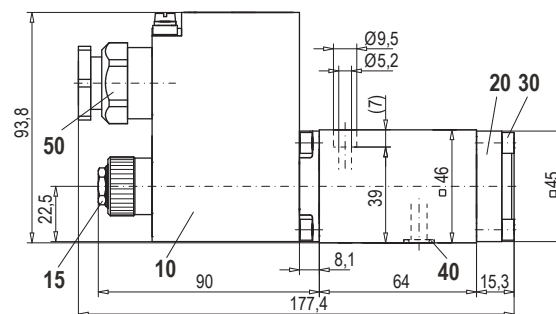
In case of valves for the temperature ranges "-40 °C to ..." (Z604) and "-60 °C to ..." (Z591), the leakage volume flow can be greater up to eight times.

DIMENSIONS

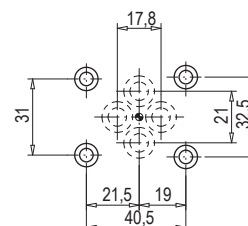
4/3-way valve (spring centred)
4/2-way valve (impulse)



4/2-way valve (spring offset)



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



PARTS LIST

Position	Article	Description
10	263.6 ...	Coil type MKY 45/18x60-.....
5	253.8000	Plug with integrated manual override „-25°C to ...“
	253.8023	HB4,5 „-40°C to ...“
	253.8024	HB4,5-D3 „-60°C to ...“
	253.8024	HB4,5-Z591
40	160.2093	O-ring ID 9,25x1,78 „-25°C to ...“
	160.7092	O-ring ID 9,25x1,78 „-40°C to ...“
	160. 0091	O-ring ID 9,25x1,78 „-60°C to ...“
50	111.1080	Cable entry brass M20x1,5

ACCESSORIES

Threaded connecting plates, Multi-flange subplates and longitudinal stacking system see reg. 2.9

Technical explanation see data sheet 1.0-100

INSTALLATION

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

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.

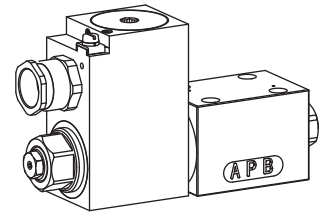
Solenoid operated spool valve

- 4/2-way impulse version, detented
- 4/3-way with spring centred centre position
- 4/2-way spring reset
- $Q_{\max} = 80 \text{ l/min}$, $p_{\max} = 350 \text{ bar}$

NG6

ISO 4401-03

- 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

Spool valve flange type NG6 with four connections. Direct operated solenoid spool valve in 5-chamber-system.

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 energised solenoid shifts the spool into the corresponding position.

- 4/2-way impulse valve detented:
Two solenoids and two detented positions.
- 4/3-way spool valve:
Two solenoids and three positions.
- 4/2-way spool valve:
One solenoid and two positions.

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. Solenoid operated spool valves are mainly used to control the direction of movement and to hold hydraulic cylinders and motors. The direction of flow through the valve is determined by the spool symbol. The switching performance and the possible leakage must be taken into consideration when designing a system.

CERTIFICATES

in accordance with	Surface gas and 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..**

TYPE CODE

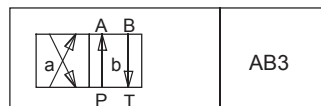
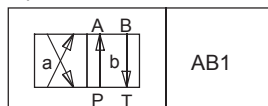
		W D Y F A06 - [] - [] / [] / [] - [] [] # []	
Spool valve direct operated		[]	
Explosion protection version ExdIIC		[]	
Flange construction		[]	
International standard interface ISO nominal size 6		[]	
Description of symbols acc. to table 1.3-34/2		[]	
Standard nominal voltage U_N	12 VDC [G12] 24 VDC [G24] 115 VAC [R115] 230 VAC [R230]	[]	
Nominal power P_N :	9 W [L9] 15 W [L15]	Ambient temp. with: 40 °C or 90 °C 70 °C	[]
Certification	ATEX, IECEX, GOST Ex [] Australia [AU] Inmetro [IM]	[]	
Sealing material	NBR [] FKM (Viton) [D1]	[]	
Temperature range	-25 °C bis ... -40 °C bis ... [Z604] only with 15W	[]	
Design-Index (Subject to change)			

GENERAL SPECIFICATIONS

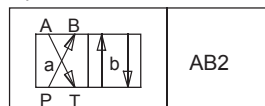
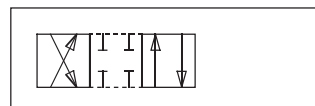
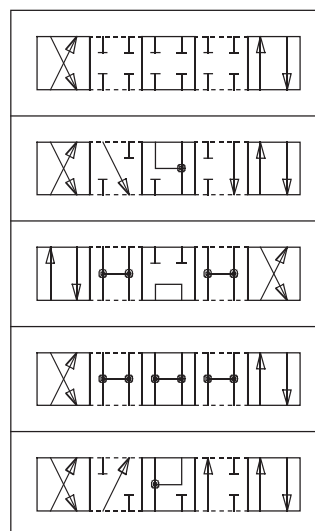
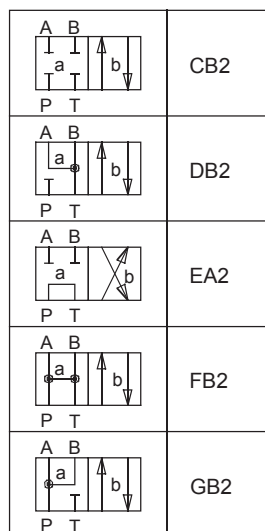
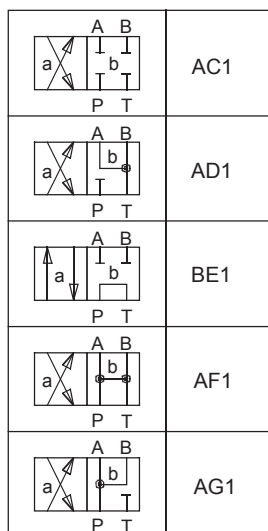
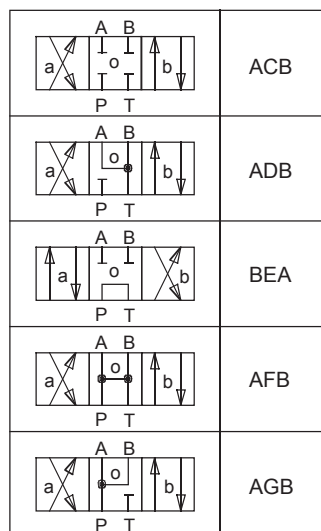
Description	4/2-, 4/3-way valve
Nominal size	NG6 acc. to ISO 4401-03
Construction	Direct operated spool valve
Operation	Solenoid operated
Mounting	Flange installation 4 attachment holes for cylinder screws M5x50 Screw connection fixing plates In-line flange plates Longitudinal stacking system
Connections	
Admissible ambient temp.	Execution L9: -25...+40 °C (operation as T1...T6/T80 °C) -25...+90 °C (operation as T1...T4/T130 °C) Execution L15: Temperature range „-25° to ...“ -25...+70 °C (operation as T1...T4/T130 °C) Temperature range „-40° to ...“ -40...+70 °C (operation as T1...T4/T130 °C) In case of $U_N < 20V$, the max. ambient temperature has to be reduced by 10 °C. any, preferably horizontal
Mounting position	
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8.8) for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight: 4/2-way impulse	$m = 4,6 \text{ kg}$
4/3-way	$m = 4,6 \text{ kg}$
4/2-way (1 solenoid)	$m = 2,8 \text{ kg}$

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, classe 20/18/14 (Required filtration grade $\beta_{10...16} \geq 75$) refer to data sheet 1.0-50/2 12 mm ² /s...320 mm ² /s
Viscosity range	
Admissible fluid temp.	Execution L9: -25...+40 °C (operation as T1...T6/T80 °C) -25...+70 °C (operation as T1...T4/T130 °C) Execution L15: Temperature range „-25° to ...“ -25...+70 °C (operation as T1...T4/T130 °C) Temperature range „-40° to ...“ -40...+70 °C (operation as T1...T4/T130 °C)
Working pressure in port P, A, B	$p_{\max} = 350 \text{ bar}$
Tank pressure in port T	$p_{T\max} = 200 \text{ bar}$
Max. volume flow	$Q_{\max} = 80 \text{ l/min}$
Leakage volume flow	see characteristics

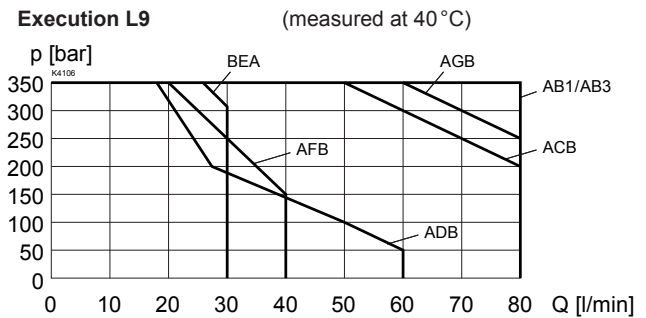
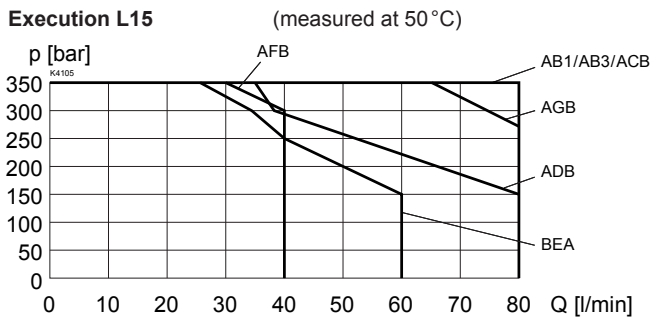
TYPE LIST/DESIGNATION OF SYMBOLS
4/2-way valve impulse

4/2-way valve with spring reset
Operation A-side


Operation B-side

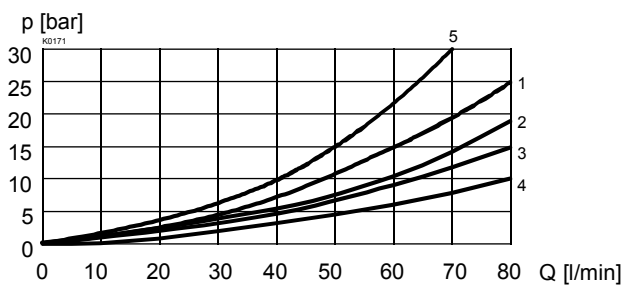

Transitional functions

4/3-way valve spring centred


CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$
 $p = f(Q)$ Performance limits with standard voltage -10 %

Execution L9/90 °C on request

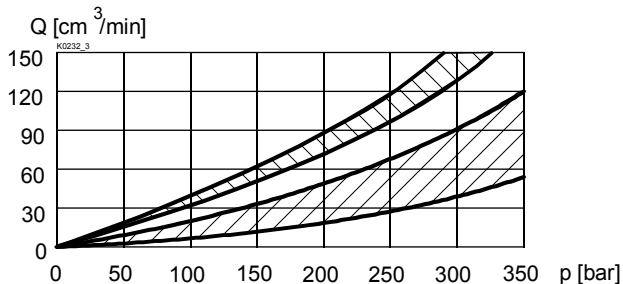


$\Delta p = f(Q)$ Pressure drop volume flow characteristics



Symbol	Pressure loss characteristic curve no.	Volume flow direction				
		P - A	P - B	P - T	A - T	B - T
AB1/AB2/AB3	2	2	2	-	1	1
ACB/AC1/CB2	2	2	2	-	1	1
ADB/AD1/DB2	2	2	2	-	3	3
BEA/BE1/EA2	2	2	2	5	2	2
AFB/AF1/FB2	4	4	4	-	3	3
AGB/AG1/GB2	4	4	4	-	1	1

$Q_L = f(p)$ Leakage volume flow characteristics per control edge



Leakage envelope AB3/AB1/ACB/ADB/AFB/AGB
 Leakage envelope BEA

ELECTRICAL CONTROL

Construction	Solenoid, wet pin push type, pressure-proof
Standard-nominal voltage	$U_N = 12 \text{ VDC}, 24 \text{ VDC}, 115 \text{ VAC}, 230 \text{ VAC}$ $AC = 50 \text{ to } 60 \text{ Hz} \pm 2\%$; with built-in two-way rectifier and recovery diode
Voltage tolerance	$\pm 10\%$ of rated voltage
Protection class	IP67 acc. to EN 60 529
Relative duty factor	100 % DF
Switching cycles	12000/h
Operating life	10^7 (number of switching cycles, theoretically)
Connection/Power supply	Through cable gland for cable diameter 6,5...14 mm (acc. to EN 60079-0)
Temperature class:	
Execution L9	T1...T6
Execution L15	T1...T4
Nominal power:	
Execution L9	9 W
Execution L15	15 W
For further electrical characteristics, refer to the data sheet of the solenoid coil 1.1-183	

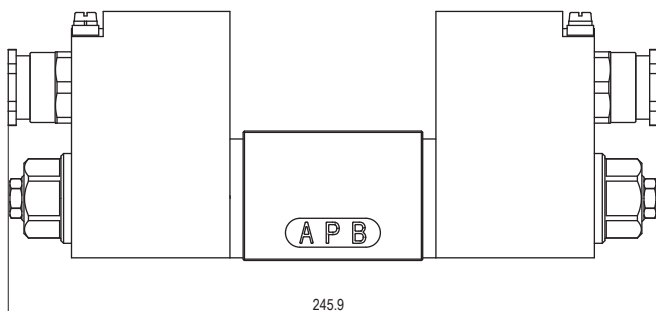


In case of the execution L15 for ambient temperatures of up to 70 °C the characteristic performance values were established at an ambient temperature of 50 °C.

In case of valves for the temperature ranges "-40 °C to ..." (Z604), the leakage volume flow can be greater up to eight times.

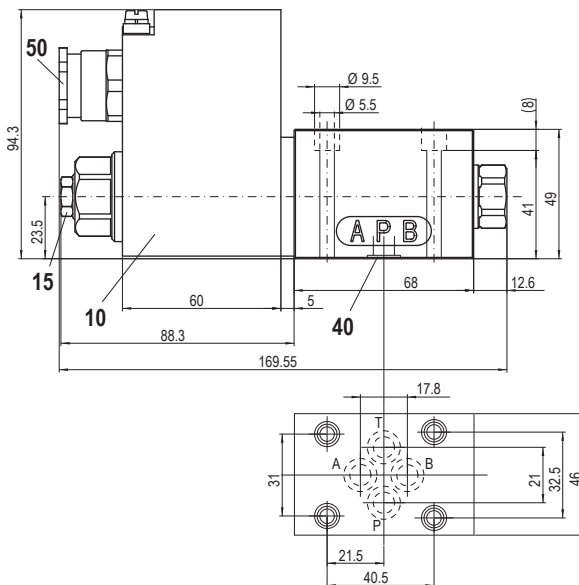
DIMENSIONS

4/3-way valve (spring centred)
4/2-way valve (impulse)



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

4/2-way valve (spring offset)



PARTS LIST

Position	Article	Description
10	263.6 ...	Coil type MKY 45/18x60-.....
15	253.8001	Plug with integrated manual override „-25°C to ...“ HB6
	253.8025	„-40°C to ...“ HB6-Z604
40	160.2093	O-ring ID 9,25x1,78 „-25°C to ...“
	160.7092	O-ring ID 9,25x1,78 „-40°C to ...“
50	111.1080	Cable entry brass M20x1,5

ACCESSORIES

Threaded connecting plates, Multi-flange subplates and longitudinal stacking system see reg. 2.9

Technical explanation see data sheet 1.0-100

INSTALLATION

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

SECURITY OPERATED

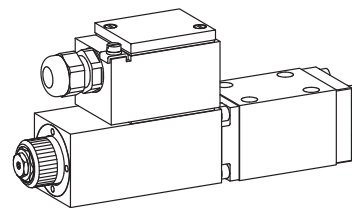


The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.

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

Solenoid operated spool valve intrinsically safe NG6
ATEX and IECEx certified
ISO 4401-03

- 4/2-way impulse valve
- 4/3-way with spring centred mid position
- 4/2-way spring reset
- $Q_{\max} = 20 \text{ l/min}$, $p_{\max} = 300 \text{ bar}$


Ex ia I Ma
Ex ia II C T5/T6 Ga
II 1 G Ex ia II C T6, T5
I M1 Ex ia I Ma

DESCRIPTION

Spool valve NG6, flange type with 4 ports. Direct operated spool in 5 chamber body. Actuated by an explosion-proof solenoid. Intrinsic safety is achieved by limiting the electric energy in the solenoid supply circuit by means of a separate certified intrinsically safe power supply. Spool detented or with spring reset. Wet pin solenoid, precise spool fit, low leak, long service life. Spool made of hardened steel. Valve body made of high grade hydraulic cast iron.

FUNCTION

When energised the solenoid pushes the spool into the corresponding shifted position.

- 4/2-way detented spool valve:
2 solenoids and 2 detented spool positions.
- 4/3-way spool valve:
2 solenoids and 3 spool positions.
- 4/2-way spool valve:
1 solenoid and 2 spool positions.

APPLICATION

Solenoid operated directional spool valves are mainly used to control the direction of movement and holding of hydraulic cylinders and motors. The direction of movement is defined by the symbol. For the layout of the hydraulic system, leakage and valve performance must be taken into consideration. The valves are designed for areas where flammable gases are present continuously or intermittently. The intrinsically safe electric circuit prevents sparking.

Intrinsically safe valves are used in:

- Shipping- and offshore industry
- Oil- and gas industry
- Chemical industry
- the mining application

CERTIFICATES

in accordance with	Surface	Mining
ATEX	x	x
IECEx	x	x

The certificates can be found on www.wandfluh.com / DOWNLOADS / Accompanying Ex-proof / **M.Z45**

TYPE CODE

			A	EXi	4		-			#	
International mounting interface ISO											
Protection type intrinsically safe											
Number of control ports											
Description of symbols acc. to table 1.3-40/2											
Coil resistance	100 Ω	152 Ω									
Equipment group	II (Surface)	I (Mining)									
Design-Index (Subject to change)											

GENERAL SPECIFICATIONS

Designation	4/2-, 4/3-spool valve
Nominal size	NG6 according to ISO 4401-03
Construction	Direct operated spool valve
Operation	Solenoid
Mounting	Flange
	4 fixing holes for socket
	head cap screws M5x45
Connections	Threaded connection plates
	Multi-flange subplates
	Longitudinal stacking system
Admissible ambient temp.	-20...+45 °C (operation as T6)
	-20...+60 °C (operation as T1...T5)
Mounting position	any, preferable horizontal
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8.8)
Masse: 4/2-way impulse	$m = 5,3 \text{ kg}$
4/3-way	$m = 5,3 \text{ kg}$
4/2-way (1 solenoid)	$m = 3,2 \text{ kg}$

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 20/18/14 (Required filtration grade $\beta_{10...16} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Admissible fluid temperature	-20...+45 °C (operation as T6)
	-20...+60 °C (operation as T1...T5)
Working pressure	$p_{\max} = 300 \text{ bar}$
in port P, A, B	
Tank pressure in port T	$p_{\max} = 100 \text{ bar}$
Max. volume flow	$Q_{\max} = 20 \text{ l/min}$
Leakage volume flow	see characteristics

ELECTRICAL CONTROL

Construction	Solenoid, wet pin push type, pressure tight
Coil resistance	100Ω or 152Ω
P_{min} / I_{min}	100Ω: 0,81W / 90mA 152Ω: 0,62W / 64mA
Protection class	IP65 acc. to EN 60 529 (after correct installation)
Duty time	Continuous
Switching cycles	1800/h
Life time	10 ⁷ (cycles per solenoid, theoretically)
Connection/power supply	Cable entry for cable Ø 6...12 mm 2 leads for +/- and 1 for ground
Temperature class	T1...T6 to EN 60 079-0
Slip-on coil	rotatable in steps of 90°, easily exchangeable

Other electrical specifications see data sheet 1.1-185 (M.Z45)

SAFETY RELEVANT DATA

Technical safety
limit values

Device group	I	II
U_i	30 V	30 V
I_i	2,5 A	0,8 A
P_i		3 W
L_i	0mH	0mH
C_i	0nF	0nF

The inductance and capacitance of the solenoid coils are made ineffective.

SAFE OPERATION

Intrinsically safe valves must be operated from suitable, certified power supplies which are located outside the hazardous area (see operating instructions). The selection of the power supply and wiring work must be executed by trained specialists.

RECOMMENDED ELECTRIC POWER SUPPLY

Electric power supply					Valve	
Type	Manufacturer	Number of outputs	I_{max}	Equipment group	Required coil resistance	P_{min} / I_{min}^{**}
BXNE3412	Georgin	1	95mA	II	100Ω	0,81W / 90mA
BXNE3422	Georgin	2	95mA	II	100Ω	0,81W / 90mA
KFD0-SD2-EX2.1245	Pepperl+Fuchs	(1) *	90mA *	I and II	100Ω	0,81W / 90mA
BXNE3712	Georgin	1	125mA	II	100Ω	1,21W / 110mA
BXNE3722	Georgin	2	125mA	II	100Ω	1,21W / 110mA
LB6115/FB6215***	Pepperl+Fuchs	4	80mA	II	152Ω	0,62W / 64mA

Further characteristic values refer to data sheet of the power supply manufacturer

* Parallel switching of both outputs.

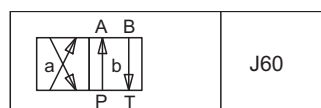
** The minimum drive powers resp. currents have to be adhered to, otherwise the power limit, resp. function cannot be assured.

Attention: The line resistance also has to be taken into account.

*** Maximum line resistance 3Ω (corresponds to 80m line length in case of a 1mm² cross section).

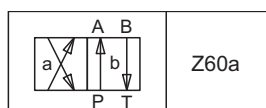
TYPE LIST / DESIGNATION OF SYMBOLS

4/2-way valve impulse



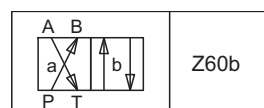
J60

4/2-way valve with spring reset
Operation A-side



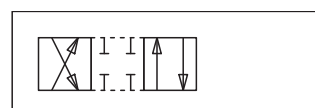
Z60a

Operation B-side

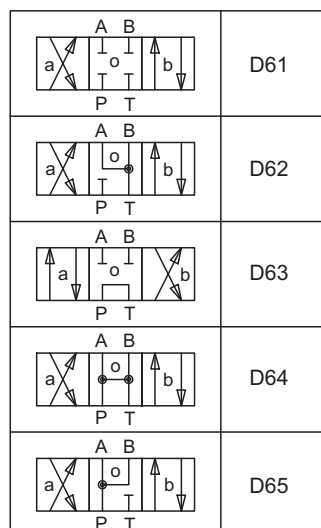


Z60b

Transitional functions



4/3-way valve spring centred



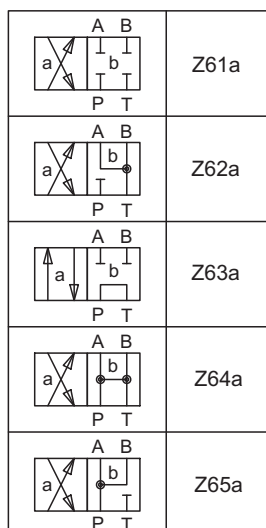
D61

D62

D63

D64

D65



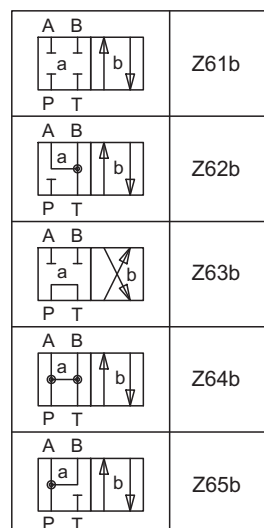
Z61a

Z62a

Z63a

Z64a

Z65a



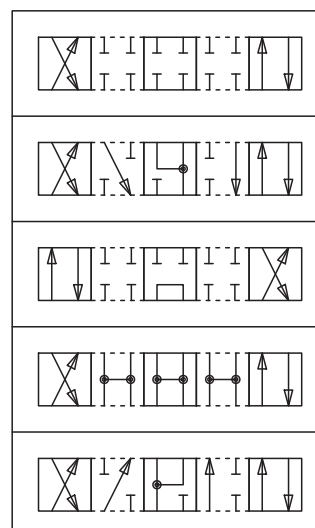
Z61b

Z62b

Z63b

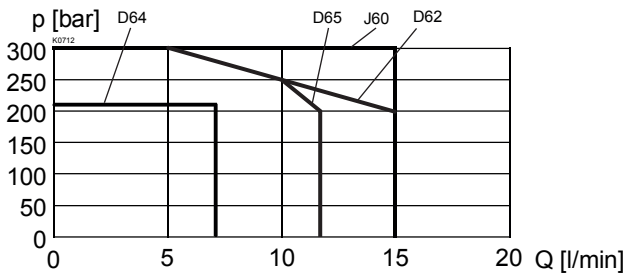
Z64b

Z65b

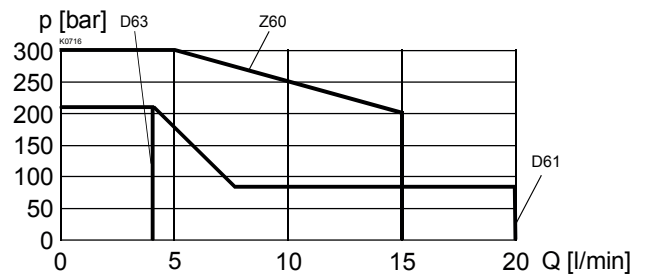


CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

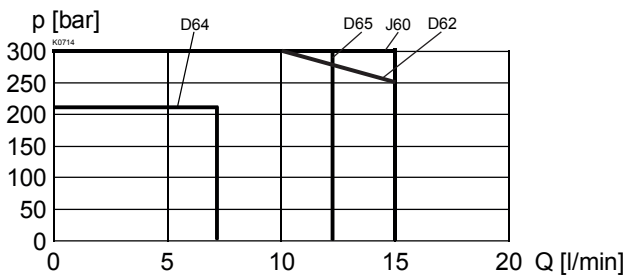
$p = f(Q)$ Performance limit with $P \geq 0,81W$ (90 mA, 100 Ω)



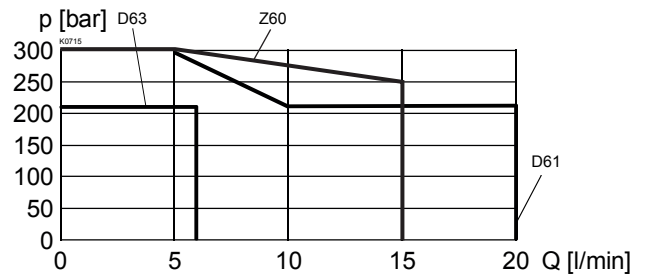
$p = f(Q)$ Performance limit with $P \geq 0,81W$ (90 mA, 100 Ω)



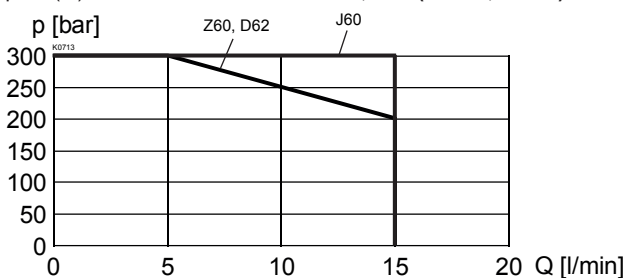
$p = f(Q)$ Performance limit with $P \geq 1,21W$ (110 mA, 100 Ω)



$p = f(Q)$ Performance limit with $P \geq 1,21W$ (110 mA, 100 Ω)

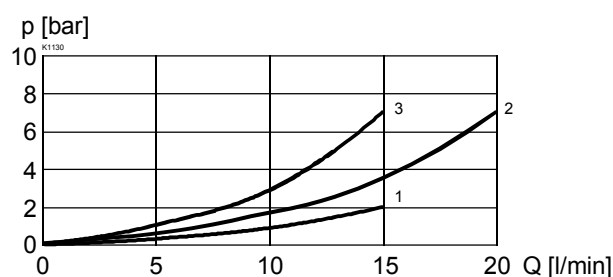


$p = f(Q)$ Performance limit with $P \geq 0,62W$ (64 mA, 152 Ω)



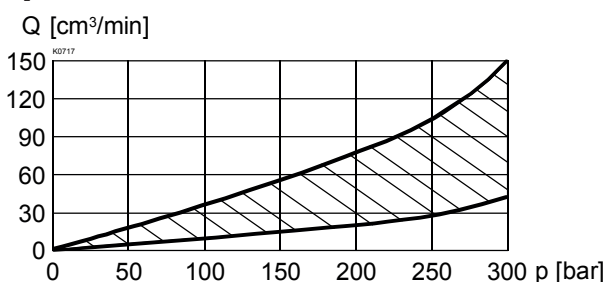
If, because of the given operating conditions, during the switching process volume flows occur which exceed the power limit of the valve, these have to be limited by a throttle or a diaphragm in connection P.

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



Pressure drop curve no.	Volume flow direction				
	P - A	P - B	P - T	A - T	B - T
Z60	3	3	-	3	3
J60	2	2	-	2	2
D61/Z61	2	2	-	2	2
D62/Z62	2	2	-	1	1
D63/Z63	3	3	2	3	3
D64/Z64	1	1	-	1	1
D65/Z65	1	1	-	2	2

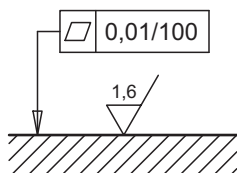
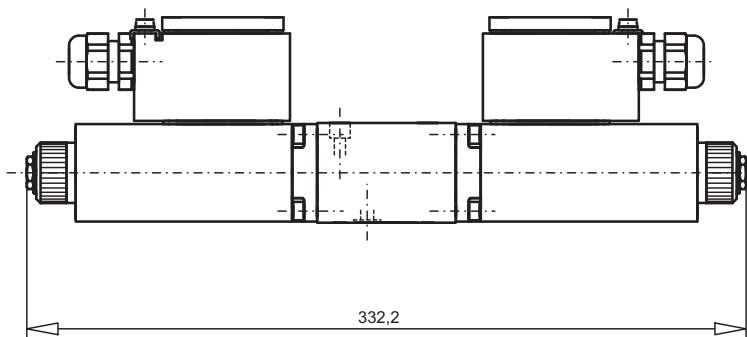
$Q_L = f(p)$ Leakage volume flow characteristics per control edge



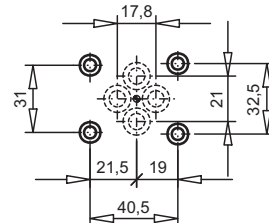
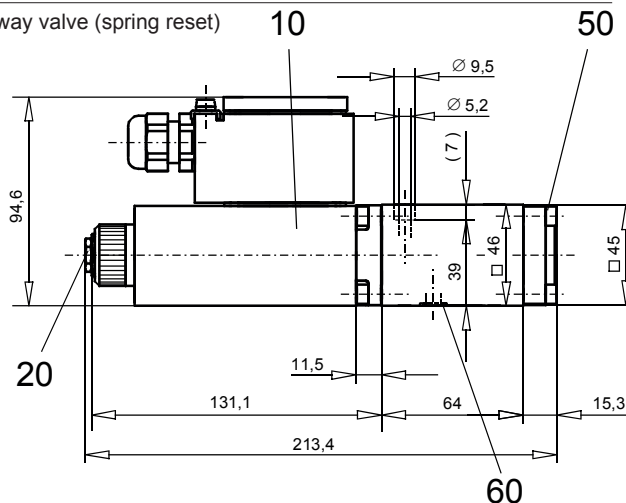
DIMENSIONS

4/3-way valve (spring centred)
4/2-way valve (impulse)

4/2-way valve (spring reset)



Requirements of the flange connection
surface of the counter-piece



PARTS LIST

Position	Article	Description
10	263.6...	Solenoid coil type MKZ45
20	253.8000	plug with integrated manuel override HB4,5
50	246.1117	Socket head cap screw M5x16 DIN 912
60	160.2093	O-ring ID 9,25x1,78

ACCESSORIES

Threaded connecting plates, multi-flange subplates and
longitudinal stacking system see register 2.9

Technical explanation see data sheet 1.0-100

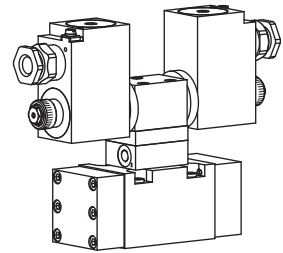
Spool valve pilot operated

- 4/2-way Impulse version detented
- 4/3-way with spring centred mid position
- 4/2-way with spring reset
- $Q_{max} = 100 \text{ l/min}$, $p_{max} = 315 \text{ bar}$

NG10

ISO 4401-05

- 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 spool valve in flange type NG10 with 4 connections. Pilot valve as direct operated spool valve in a 5 chamber system. Spool made from hardened steel, valve body made from high grade hydraulic cast iron. 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

By the actuation of the pilot control valve the spool of the main valve is brought into the corresponding switching position.

- 4/2-way impulse version detented
- 4/3-way with spring-centred mid position
- 4/2-way with spring reset

(See data sheet of pilot valve 1.3-23)

The actuation of the pilot valve can be internal or external, depending on the type of pilot operation.

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. Spool valves are mainly utilised for controlling the direction of movement and for holding hydraulic cylinders and motors. The direction of movement is determined by the symbol. Pilot operated valves are utilised where large volume flows have to be controlled.

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..

TYPE CODE

A Exd VP 4 ☐ - ☐ - ☐ / L9 ☐ # ☐

International connection standard ISO

Pilot valve

Explosion proof version, Ex d

Spool valve, pilot operated

Number of control ports

Description of symbols acc. to table

Pilot control type

Pressure supply (x) and drain (y) internal ☐ ti

Pressure supply (x) and drain (y) external ☐ te

Pressure supply (x) internal drain (y) external ☐ pi

Pressure supply (x) external drain (y) internal ☐ pe

Nominal voltage U_N

12 VDC ☐ G12

24 VDC ☐ G24

115 VAC ☐ R115

230 VAC ☐ R230

Ambient temp. up to: 40 °C or 90 °C

Nominal power P_N 9W ☐ L9

Certificate ATEX, IECEX, GOST Ex ☐

Australia ☐ AU Inmetro ☐ IM

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	4/2-, 4/3-way valve
Nominal size	NG10 to ISO 4401-05
Construction	Pilot operated spool valve
Actuation	Solenoid actuated
Pilot valve	BEXd4.4. Data sheet 1.3-23
Mounting	Flange mounting
Connections	4 holes for socket cap screws M6x65 Threaded connection plates Multi-flange plates Longitudinal stacking system
Admissible ambient temp.	-20...+40 °C (operation as T1...T6/T80 °C) -20...+90 °C (operation as T1...T4/T130 °C) In case of $U_N < 20V$, the max. ambient temperature has to be reduced by 10 °C.
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 9,5 \text{ Nm}$ (quality 8.8) for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight: Main valve	$m = 3,6 \text{ kg}$
Sandwich plate	$m = 0,4 \text{ kg}$
Pilot valve	$m = 2,6...4,4 \text{ kg}$ depending on the valve type

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 20/18/14 (Required filtration grade $\beta_{10...16} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Admissible fluid temp.	-20...+40 °C (operation as T1...T6/T80 °C) -20...+70 °C (operation as T1...T4/T130 °C)
Operating pressure in port P, A, B	$p_{max} = 315 \text{ bar}$
Tank pressure in port T	$p_{Tmax} = 160 \text{ bar}$ at pilot supply te and pi $p_{Tmax} = 100 \text{ bar}$ at pilot supply ti and pe p_{Tmin} minimum 12 bar lower than p_v
Pilot over sandwich plate	$p_{vmin} = 12 \text{ bar}$
Max. volume flow	$p_{vmax} = 315 \text{ bar}$
Leakage volume flow	$Q_{max} = 100 \text{ l/min}$ see characteristics

ELECTRICAL CONTROL

Construction	Solenoid, wet pin push type, pressure-proof
Standard-nominal voltage	$U_N = 12 \text{ VDC}, 24 \text{ VDC}$ $U_N = 115 \text{ VAC}, U_N = 230 \text{ VAC}$ $AC = 50 \text{ to } 60 \text{ Hz} \pm 2\%$; with built-in two-way rectifier and recovery diode
Voltage tolerance	$\pm 10\%$ of rated voltage
Protection class	IP67 acc. to EN 60 529
Relative duty factor	100 % DF
Switching cycles	12000/h
Operating life	10^7 (number of switching cycles, theoretically)
Connection/Power supply	Through cable gland for cable diameter 6,5...14 mm
Temperature class:	T1...T6 (acc. to EN 60079-0)
Nominal power:	9 W
For further electrical characteristics, refer to the data sheet of the solenoid coil 1.1-183	

SECURITY OPERATED

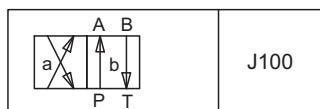

The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.
In case of non-observance, no liability can be assumed.

INSTALLATION

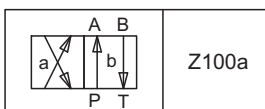
For stack assembly please observe the remarks in the operating instructions.

TYPE LIST/DESIGNATION OF SYMBOLS

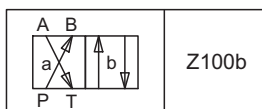
4/2-way-valve
with 2 solenoids



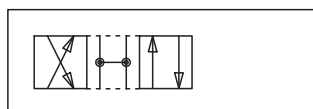
4/2-way-valve with spring reset
actuation A-side



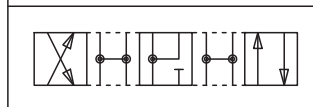
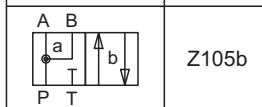
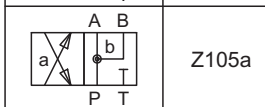
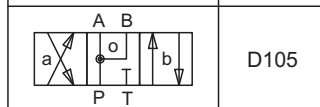
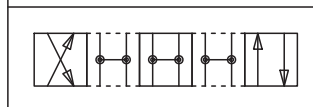
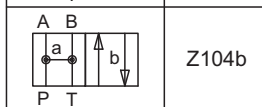
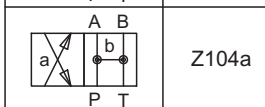
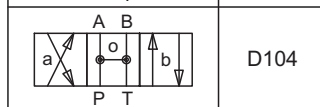
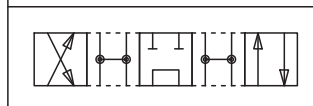
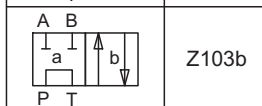
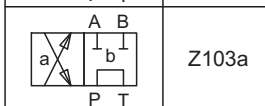
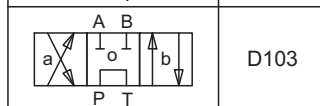
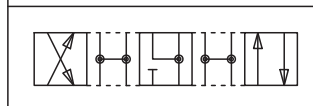
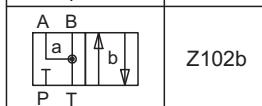
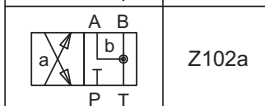
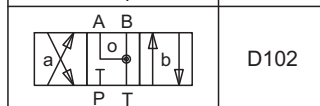
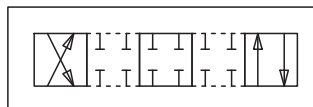
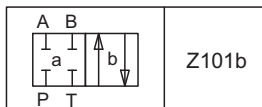
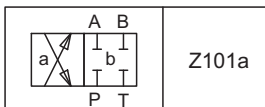
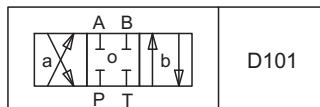
actuation B-side



Transitional functions

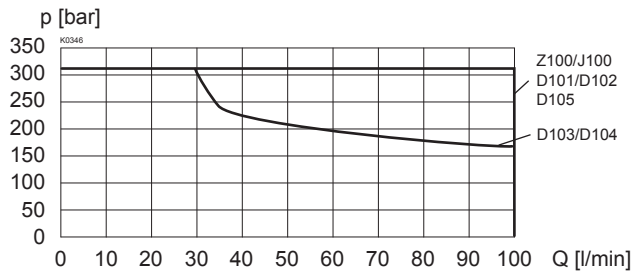


4/3-way-valve spring centered

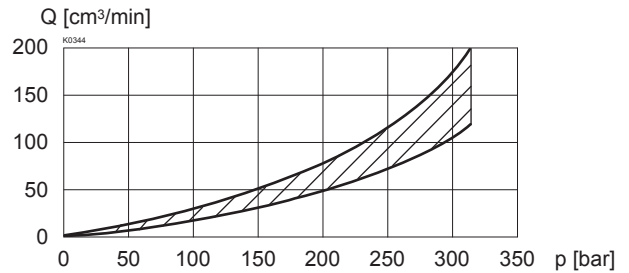


CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

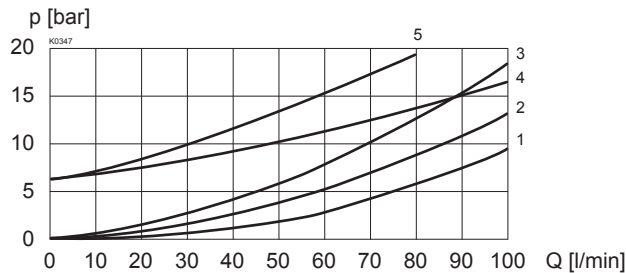
$p = f(Q)$ Performance limits
with standard voltage -10% (Solenoid actuation)



$Q_L = f(p)$ Leakage volume flow characteristics
per control edge



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



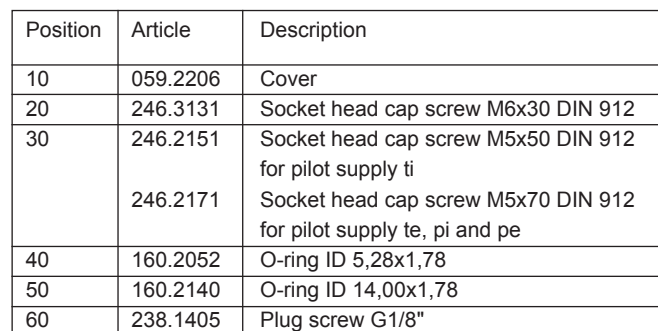
For pilot control types ti and pi

Symbol \ Pressure drop curve no.	Volume flow direction				
	P - A	P - B	P - T	A - T	B - T
Z100/J100	1	1	-	1	2
D101/Z101	1	1	-	1	2
D102/Z102	1	1	-	1	2
D103/Z103	4	4	5	1	2
D104/Z104	4	4	-	1	2
D105/Z105	1	1	-	1	2

For pilot control types te and pe

<div>Pressure drop curve no.</div> <div>Symbol</div>	Volume flow direction				
	P - A	P - B	P - T	A - T	B - T
Z100/J100	1	1	-	1	2
D101/Z101	1	1	-	1	2
D102/Z102	1	1	-	1	2
D103/Z103	1	1	3	1	2
D104/Z104	1	1	-	1	2
D105/Z105	1	1	-	1	2

PARTS LIST



Threaded connecting plates, Multi-flange subplates and Longitudinal stacking system	see Reg. 2.9
---	--------------

Technical explanation see data sheet 1.0-100

To screw the main valve body ($M_D = 9,5 \text{ Nm}$, quality 8.8) to the base plate the pilot valve ($M_D = 5,5 \text{ Nm}$, quality 8.8). must be taken off.

Proportional directional valve
• not pressure compensated

$Q_{\max} = 35 \text{ l/min}$

$Q_{N\max} = 25 \text{ l/min}$

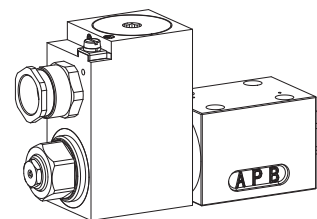
$p_{\max} = 350 \text{ bar}$

NG6

ISO 4401-03

 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

Spool valve flange type NG6 with four connections. Direct operated solenoid spool valve in 5-chamber-system.

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

Proportionally to the solenoid current spool stroke, spool opening and valve volume flow will increase. By means of the special control edge geometries, together with the flow forces, it is achieved that the characteristic curves comprise a limited residual compensation. The optimum spool shape and progressive characteristics curve allow fine motion control. To control the valve Wandfluh proportional amplifiers are available (see register 1.13).

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. Proportional directional spool valves are well suited for demanding applications where high resolution, high volume flow and low hysteresis are requested. The ability to remote control the valve electrically, in association with process control systems, enables economical problem solutions with reproducible process sequences.

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..**

TYPE CODE

WD B F A06 - ☐ - ☐ - ☐ - ☐ / ☐ / ☐ # 1

Proportional Spool valve, direct operated

Proportional explosion proof, execution Ex d IIC

Flange construction

International standard interface ISO, nominal size 6

Description of symbols acc. to table 1.10-88/2

Nominal volume flow Q_N :

5 l/min	<input type="text" value="5"/>
10 l/min	<input type="text" value="10"/>
16 l/min	<input type="text" value="16"/>
25 l/min	<input type="text" value="25"/>

Standard nominal voltage U_N :

12 VDC	<input type="text" value="G12"/>
24 VDC	<input type="text" value="G24"/>

Execution:

15W	<input type="text" value="L15"/>
9W	<input type="text" value="L9"/>

Ambient temp. up to:

70 °C	<input type="text"/>
40 °C or 90 °C	<input type="text"/>

Certificates:

ATEX, IECEX, GOST Ex ☐

Australia

Inmetro

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Nominal size	NG6 acc. to ISO 4401-03/7790
Designation	4/2-, 4/3-way proportional directional valve
Construction	Direct operated spool valve
Mounting	Flange, 4 fixing holes for socket head cap screws M5x50
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8.8) for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Line connection	Connection plates Multiple flange plates Stacking system
Mounting position	Any, preferably horizontal
Admissible ambient temp.	Execution L15: -20...+70 °C (operation as T1...T4 / T130 °C) Execution L9: -20...+40 °C (operation as T1...T6 / T80 °C) -20...+90 °C (operation as T1...T4 / T130 °C)
Weight:	4/2-way m = 2,8 kg 4/3-way m = 4,8 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
Viscosity range	12 mm ² /s...320 mm ² /s
Admissible fluid temp.	Execution L15: -20...+70 °C (operation as T1...T4/T130 °C) Execution L9: -20...+40 °C (operation as T1...T6/T80 °C) -20...+70 °C (operation as T1...T4/T130 °C)
Working pressure	$p_{\max} = 350 \text{ bar}$ (connections P, A, B)
Tank pressure	$p_{\max} = 160 \text{ bar}$ (connection T)
Nominal volume flow	$Q_N = 5 \text{ l/min}$, 10 l/min, 16 l/min, 25 l/min With the version L9 for Ambient temp. up to 90 °C (L6/90 °C), Q_N is not reached see characteristics
Max. volume flow	on request
Leakage volume flow	L15/70 °C: $\leq 10\%$ * L9/40 °C: $\leq 12\%$ * L9/90 °C: $\leq 14\%$ *
Hysteresis	* at optimal dither signal

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
	L15/70 °C: $I_G =$	890 mA	445 mA
	L9/40 °C: $I_G =$	610 mA	305 mA
Voltage tolerance	L9/90 °C: $I_G =$	530 mA	265 mA
	+ 10 % of with respect to nominal voltage		
Relative duty factor	100% DF		
Protection class	IP67 acc. to EN60529		
Connection/Power supply	Through cable gland for cable $\varnothing 6,5...14\text{mm}$		
Temperature class	(nach EN 60079-0)		
Execution L9:	T1...T6		
Execution L15:	T1...T4		
Performance limit	$U_N \cdot I_G$		
For further electrical characteristics, refer to the data sheet of the solenoid coil: 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.

TYPE CHARTS / DESIGNATIONS OF SYMBOLS

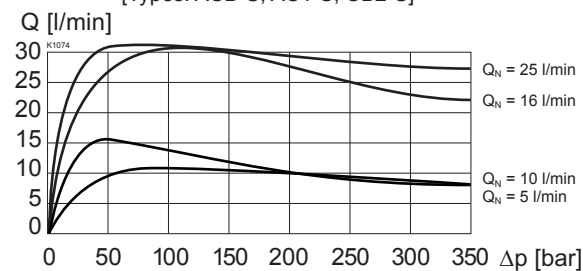
	ACB - S S = Symmetrical control mode
	AC1 - S S = Symmetrical control mode
	CB2 - S S = Symmetrical control mode

	ADB - V V = Meter-in control mode
--	---

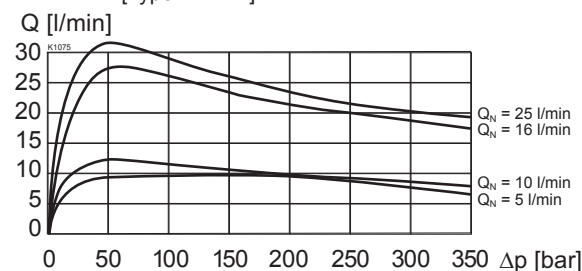
CHARACTERISTICS oil viscosity $\nu = 30\text{ mm}^2/\text{s}$

Execution L15 (measured at 50 °C)

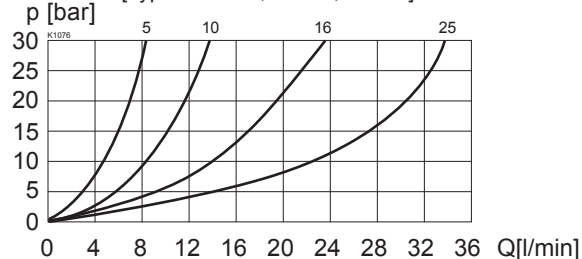
$Q = f(p)$ Volume flow pressure characteristics ($I = I_G$)
[Types: ACB-S, AC1-S, CB2-S]



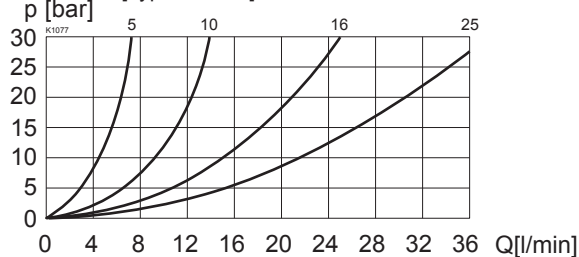
$Q = f(p)$ Volume flow pressure characteristics ($I = I_G$)
[Type: ADB-V]



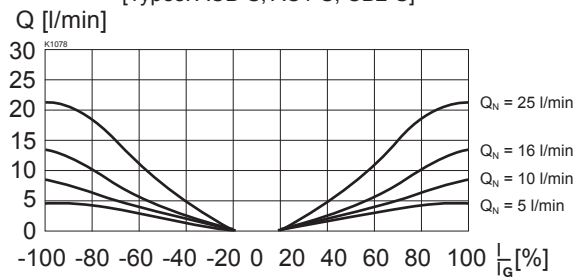
$\Delta p = f(Q)$ Pressure loss/flow characteristics ($I = I_G$)
[Types: ACB-S, AC1-S, CB2-S]



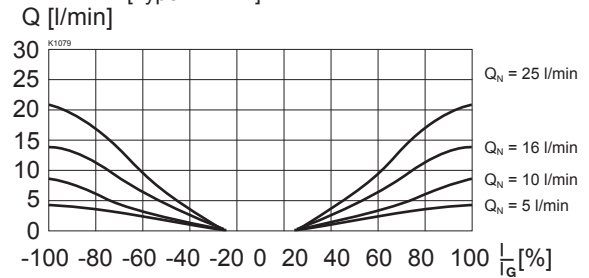
$\Delta p = f(Q)$ Pressure loss/flow characteristics ($I = I_G$)
[Type: ADB-V]



$Q = f(I)$ Volume flow adjustment characteristics ($\Delta p = 10 \text{ bar}$)
[Types: ACB-S, AC1-S, CB2-S]

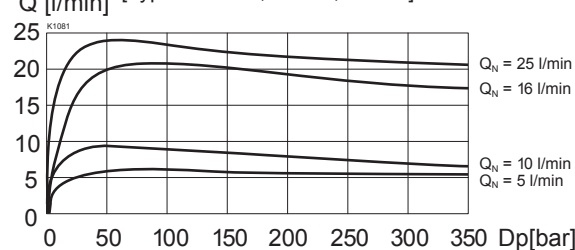


$Q = f(I)$ Volume flow adjustment characteristics ($\Delta p = 10 \text{ bar}$)
[Type: ADB-V]

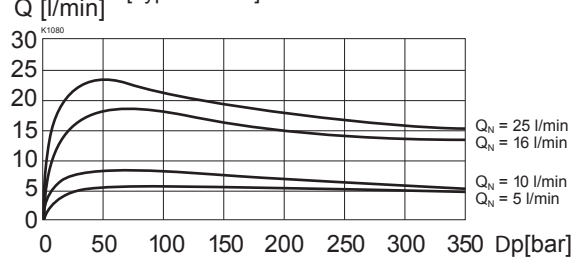


Execution L9/40°C (measured at 50°C)

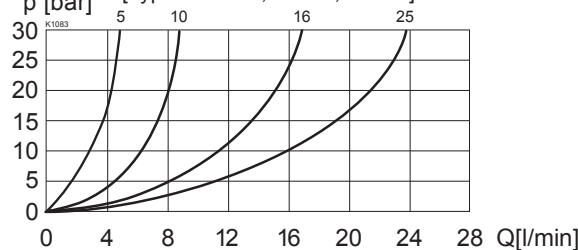
$Q = f(p)$ Volume flow pressure characteristics ($I = I_G$)
[Types: ACB-S, AC1-S, CB2-S]



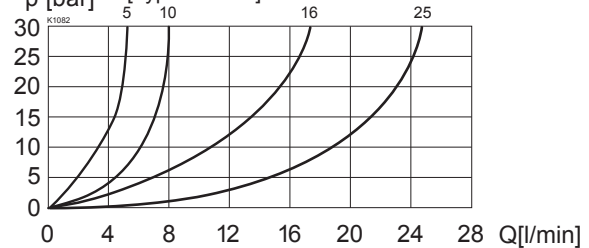
$Q = f(p)$ Volume flow pressure characteristics
[Type: ADB-V]



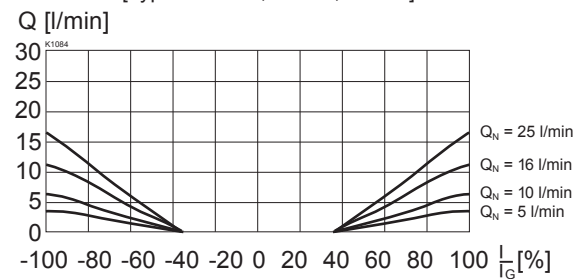
$\Delta p = f(Q)$ Pressure loss/flow characteristics ($I = I_G$)
[Types: ACB-S, AC1-S, CB2-S]



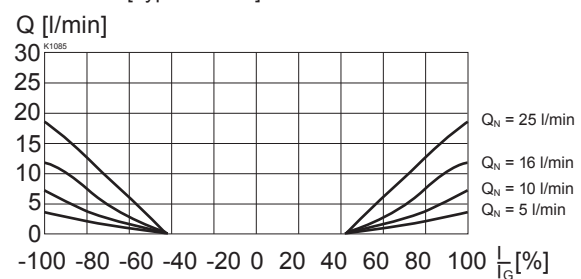
$\Delta p = f(Q)$ Pressure loss/flow characteristics ($I = I_G$)
[Type: ADB-V]



$Q = f(I)$ Volume flow adjustment characteristics ($\Delta p = 10 \text{ bar}$)
[Types: ACB-S, AC1-S, CB2-S]



$Q = f(I)$ Volume flow adjustment characteristics ($\Delta p = 10 \text{ bar}$)
[Type: ADB-V]

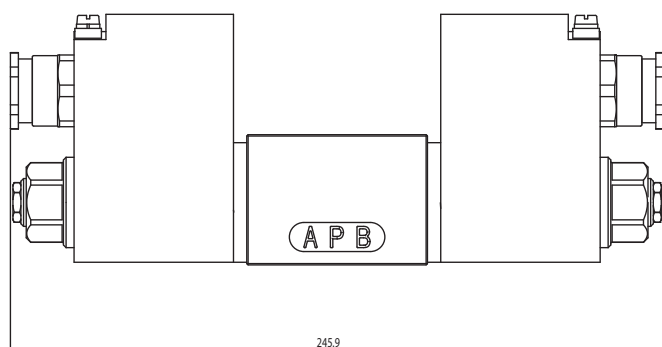


NOTE!

All values were measured over 2 control edges.
The connections A and B were short-circuited.

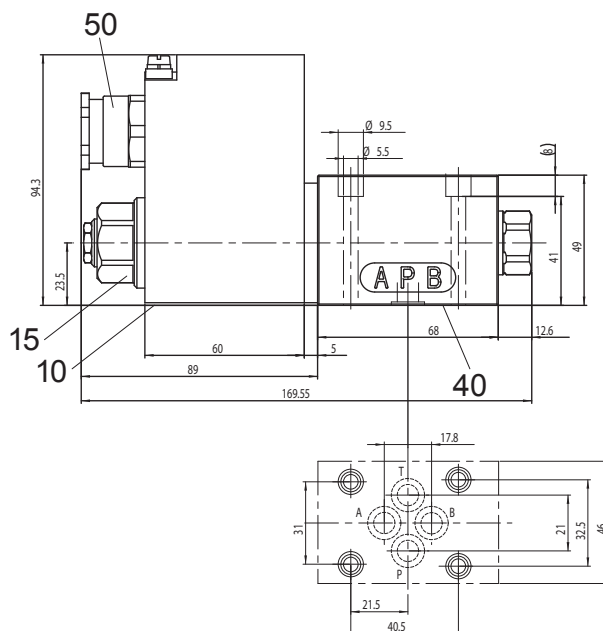
DIMENSIONS

4/3-way valve



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

4/2-way valve



PARTS LIST

Position	Article	Description
10	263.6...	Spool MKY45/18x60-...
15	253.8000	Plug with integrated manual override HB4,5
40	160.2093	O-ring ID 9,25x1,78
50	111.1080	Cable gland brass M20

ACCESSORIES

Sub-plates

Register 2.9

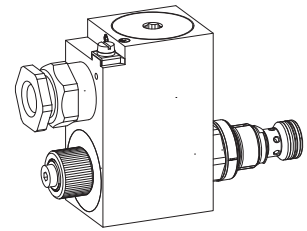
Technical explanation see data sheet 1.0-100

Poppet valve cartridges 2/2- and 3/2-way versions

- direct operated
- $Q_{\max} = 40 \text{ l/min}$
- $p_{\max} = 350 \text{ bar}$

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 2/2-way solenoid poppet valve in screw-in cartridge design with thread M22x1,5 for cavity acc. to ISO 7789.

Activated with Wandfluh explosion proof solenoid.

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.

INSTALLATION

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

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.

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...**

FUNCTION

For the function «normally closed» with de-energised pull-type solenoid, and «normally open» with energised push-type solenoid, the differential area poppet piston is held in closed position by a spring and seals leak free from port 2 to 1. If pull-type solenoid is energised respectively push-type solenoid deenergised, the poppet piston will open flow passage from 2 to 1 after having reached the opening pressure. In the «normally closed» valve with deenergised solenoid respectively the «normally open» valve with energised solenoid flow passage from 1 to 2 is open when the opening pressure has been reached.

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. Wandfluh solenoid operated poppet valves are applied where an absolutely leak free closing of the valve is essential like in load holding-, clamping- or gripping functions. The screw-in cartridges are mainly used in mobile or stationary integrated blocks and in size NG4-Mini and NG6 flange and sandwich bodies. To machine the cavities in steel or aluminium blocks, cavity tools may be supplied (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

S D Y PM22 - / / / #

Poppet valve

Direct operated

Explosion proof solenoid, Ex d

Screw-in cartridge M22x1,5

2/2-way, «normally closed» ☐ BA

2/2-way, «normally open» ☐ AB

3/2-way ☐ FG

Nominal voltage U_N 12 VDC ☐ G12

24 VDC ☐ G24

115 VAC ☐ R115

230 VAC ☐ R230

Nominal power P_N 15 W ☐ L15

21 W ☐ L21

Certificate ATEX, IECEX, GOST Ex ☐

Australia ☐ AU Inmetro ☐ IM

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

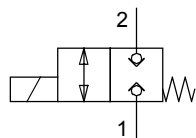
Description	Direct operated 2/2- and 3/2-way solenoid poppet valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operation	Solenoid
Mounting	Screw-in thread M22x1,5
Admissible ambient temperature	Execution L15: -20...+70°C (operation as T1...T4/T130°C) Execution L21: -20...+50°C (operation as T1...T4/T130°C) In case of $U_N < 20V$, the max. ambient temperature has to be reduced by 10°C.
Mounting position	any, preverable horizontal
Fastening torque	$M_D = 50 \text{ Nm}$ for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 2,25 \text{ kg}$ 2/2-way $m = 2,3 \text{ kg}$ 3/2-way
Volume flow	see symbols

HYDRAULIC SPECIFICATIONS

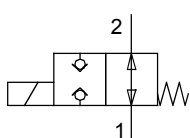
Fluid	Mineral oil, other fluid on request
Contamination	ISO 4406:1999, classe 18/16/13
Verschmutzungsgrad	(Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s bis 320 mm ² /s
Admissible fluid temperature	Execution L15: -20...+70°C (operation as T1...T4/T130°C) Execution L21: -20...+50°C (operation as T1...T4/T130°C)
Working pressure	$p_{\max} = 350 \text{ bar}$
Nominal flow	$Q_N = 20 \text{ l/min}$
Max. volume flow	$Q_{\max} = 40 \text{ l/min}$
Pressure drop	see characteristics
Opening pressure	1,4 bar

SYMBOLS

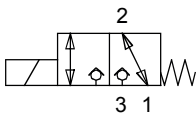
SDYPM22 - BA...



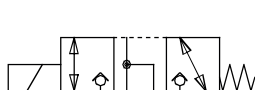
SDYPM22 - AB...



SDYPM22 - FG...



Transitional functions - «FG»...



ELECTRICAL CONTROL

Construction Switching solenoid, wet pin pull- or push

type, pressure tight

Standard-nominal voltage $U_N = 12 \text{ VDC}$, $U_N = 24 \text{ VDC}$

$U_N = 115 \text{ VAC}$, $U_N = 230 \text{ VAC}$

AC = 50 to 60 Hz $\pm 2\%$;

with integrated two way rectifier

and recovery diode

Voltage tolerance $\pm 10\%$ of nominal voltage

Protection class IP 67 acc. to EN 60529

Relative duty cycle 100% ED

Switching cycles 5000/h

Operating life 10^7 (number of switching cycles, theoretically)

Connection/Power supply Through cable entry for cable

diameter $\varnothing 6,5 \dots 14 \text{ mm}$

Temperature class acc. to EN 60079-0

Execution L15/L21: T1...T4

Nominal power

Execution L15: 15W

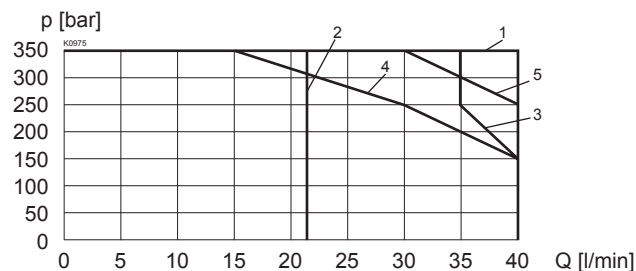
Execution L21: 21W

For further electrical characteristics, refer to the data sheet of the solenoid coil: 1.1-183

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

$p = f(Q)$ Performance limit at -10%

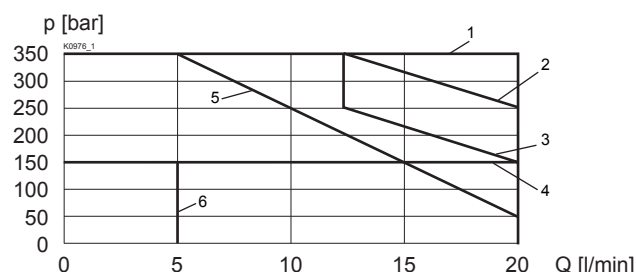
2/2-way type (measured at 50°C)



Version	Flow direction	
	1 → 2	2 → 1
SDYPM22-BA-L21	1	1
SDYPM22-AB-L21	2	1
SDYPM22-BA-L15	4	3
SDYPM22-AB-L15	2	5

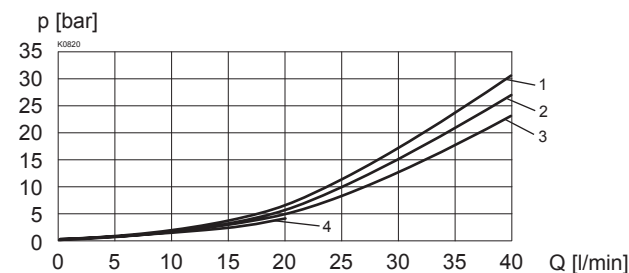
$p = f(Q)$ Performance limit at -10%

3/2-way type [FG] (measured at 50°C)



Version	Flow direction			
	1 → 2	2 → 1	2 → 3	3 → 2
SDYPM22-FG-L21	3	1	1	2
SDYPM22-FG-L15	5	1	4	6

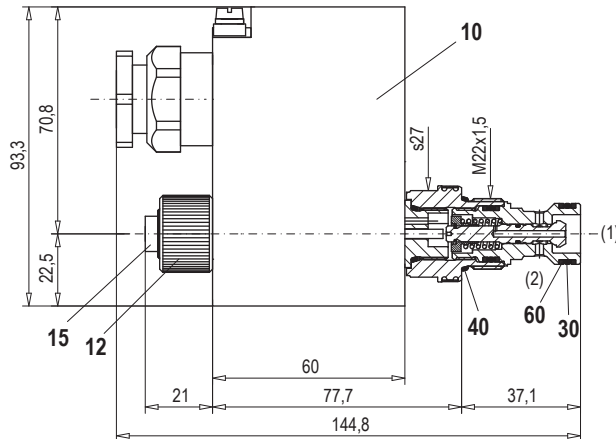
$\Delta p = f(Q)$ Pressure volume flow characteristics



Version	Flow direction			
	1 → 2	2 → 1	2 → 3	3 → 2
SDYPM22-BA-...	1	2	-	-
SDYPM22-AB-...	3	4	-	-
SDYPM22-FG-...	4	4	1	1

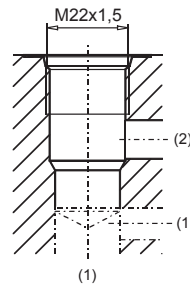
DIMENSIONS / SECTIONAL DRAWING

2/2-way, «normally closed» [BA]



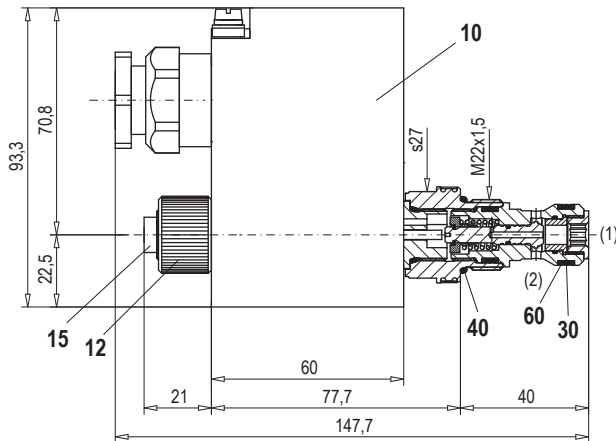
CAVITY

Cavity drawing for 2/2-way version to
ISO 7789-22-01-0-98



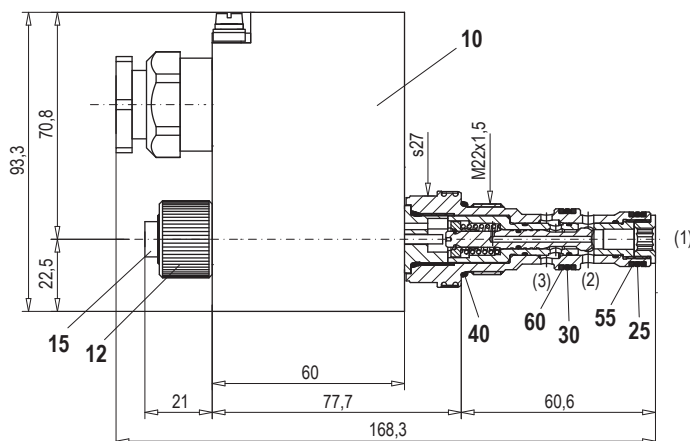
For detailed cavity drawing and cavity tools
see data sheet 2.13-1008

2/2-way, «normally open» [AB]



DIMENSIONS / SECTIONAL DRAWING

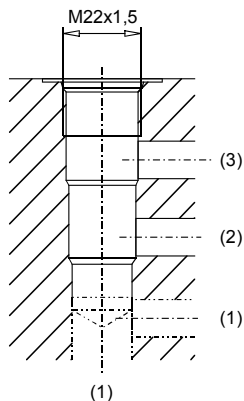
3/2-way version



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

CAVITY

Cavity drawing for 3/2-way version 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...	Coil type MKY 45/18x60...
12	154.2601	Knurled nut M16x1x18
15	239.2033	Plug HB0 (incl. Seal)
25	160.2140	O-ring ID 14,00 x 1,78
30	160.2156	O-ring ID 15,60 x 1,78
40	160.2188	O-ring ID 18,77 x 1,78
55	049.3176	Back-up ring RD 14,1 x 17 x 1,4
60	049.3196	Back-up ring RD 16,1 x 19 x 1,4

ACCESSORIES

Cartridge built-in flange- or sandwich body:

Flange valve

register 1.11

Sandwich valve

register 1.11




Technical explanation see data sheet

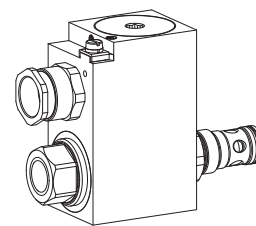
1.0-100

Solenoid poppet valve cartridge
2/2-way version

- Pilot operated
- $Q_{max} = 80 \text{ l/min}$
- $p_{max} = 350 \text{ bar}$

M22x1,5
ISO 7789

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


DESCRIPTION
For explosion-hazard zones

Pilot operated 2/2-way solenoid poppet valve in screw-in cartridge design with thread M22x1,5 for cavity acc. to ISO 7789.

Activated with Wandfluh explosion proof solenoid.

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.

INSTALLATION

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

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.

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...**

FUNCTION

- «Current-free open -CB»

In case of a current-free solenoid, it is possible for the flow to pass through the valve in both directions. In case of a solenoid under current, the valve is blocked from connection 2 to 1. If, however, the pressure in connection 1 rises above the solenoid power, the valve opens.

- «Current-free closed -BC»

In case of a current-free solenoid, the valve is blocked from connection 2 to 1. If, however, the pressure in connection 1 is higher than in connection 2, the valve opens. In case of a solenoid under current, it is possible for the flow to pass through the valve in both directions.

APPLICATION

Wandfluh solenoid operated poppet valves are applied where an absolutely leak free closing of the valve is essential like in load holding, clamping or gripping functions. The solenoid operated screw-in cartridges are mainly used in mobile or stationary integrated blocks. To machine the cavities, cavity tools may be supplied (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

		S V Y PM22 - <input type="text"/> / <input type="text"/> / <input type="text"/> / <input type="text"/> # <input type="text"/>	
Poppet valve	<input type="checkbox"/>		
Direct operated	<input type="checkbox"/>		
Explosion proof solenoid, Ex d	<input type="checkbox"/>		
Screw-in cartridge M22x1,5	<input type="checkbox"/>		
2/2-way, «normally closed»	<input type="checkbox"/> BC		
2/2-way, «normally open»	<input type="checkbox"/> CB		
Nominal voltage U_N	12 VDC <input type="checkbox"/> G12		
	24 VDC <input type="checkbox"/> G24		
	115 VAC <input type="checkbox"/> R115		
	230 VAC <input type="checkbox"/> R230		
Nominal power P_N	15 W <input type="checkbox"/> L15		
	9 W <input type="checkbox"/> L9		
Certificate	ATEX, IECEX, GOST Ex <input type="checkbox"/>		
	Australia <input type="checkbox"/> AU		
	Inmetro <input type="checkbox"/> IM		
Design-Index (Subject to change)			

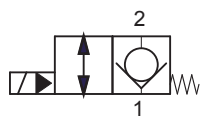
GENERAL SPECIFICATIONS

Description	Pilot operated 2/2-way solenoid poppet valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operation	Solenoid with exchangeable slip-on coil
Mounting	Screw-in thread M22x1,5
Admissible ambient temperature	Execution L15: -20...+70 °C (operation as T1...T4/T130 °C) Execution L9: -20...+40 °C (operation as T1...T6/T80 °C) -20...+90 °C (operation as T1...T4/T130 °C) In case of $U_N < 20V$, the max. ambient temperature has to be reduced by 10 °C.
Mounting position	any, preverable horizontal
Fastening torque	$M_D = 50 \text{ Nm}$ for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 2,25 \text{ kg}$
Volume flow	see symbols

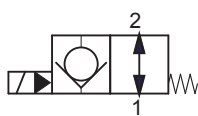
HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination	ISO 4406:1999, classe 18/16/13
efficiency	(Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s bis 320 mm ² /s
Admissible fluid temperature	Execution L15: -20...+70 °C (operation as T1...T4/T130 °C) Execution L9: -20...+40 °C (operation as T1...T6/T80 °C) -20...+70 °C (operation as T1...T4/T130 °C)
Working pressure	$p_{max} = 350 \text{ bar}$
Max. volume flow	$Q_{max} = 80 \text{ l/min}$
Pressure drop	see characteristics
Opening pressure	
Version BC	1 bar
Version CB	2 bar

SYMBOLS



SVYPM22-BC...



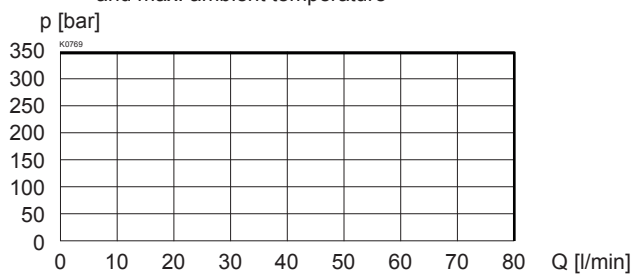
SVYPM22-CB...

ELECTRICAL CONTROL

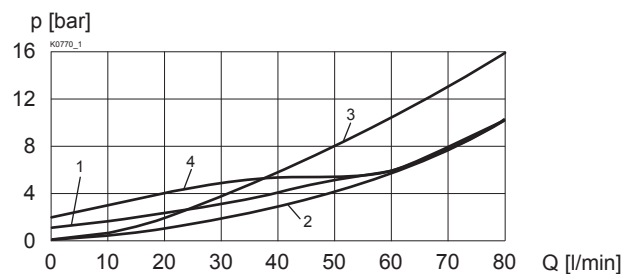
Construction	Switching solenoid, wet pin pull- or push type, pressure tight
Standard-nominal voltage	$U_N = 12 \text{ VDC}$, $U_N = 24 \text{ VDC}$ $U_N = 115 \text{ VAC}$, $U_N = 230 \text{ VAC}$ AC = 50 to 60 Hz $\pm 2\%$; with integrated two way rectifier and recovery diode
Voltage tolerance	$\pm 10\%$ of nominal voltage
Protection class	IP 67 acc. to EN 60529
Relative duty cycle	100% ED
Switching cycles	5000/h
Operating life	10^7 (number of switching cycles, theoretically)
Connection/Power supply	Through cable entry for cable diameter $\varnothing 6,5 \dots 14 \text{ mm}$
Temperature class	acc. to EN 60079-0
Execution L15/L21	T1...T4
Execution L9	T1...T6
Nominal power	
Execution L15	15 W
Execution L9	9 W
For further electrical characteristics, refer to the data sheet of the solenoid coil: 1.1-183	

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

$p = f(Q)$ Performance limits at 10% under voltage and max. ambient temperature



$\Delta p = f(Q)$ Pressure volume flow characteristics



		BC	CB
Current-free	$1 \rightarrow 2$	1	2
Current-free	$2 \rightarrow 1$	—	3
Under current	$1 \rightarrow 2$	2	4
Under current	$2 \rightarrow 1$	3	—

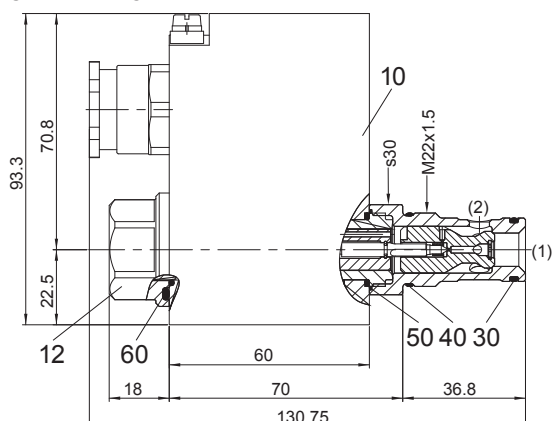
SWITCHING TIME

		Flow direction	Under current	Current-free
SVYPM22	BC	$2 \rightarrow 1$	appr. 30 ms	appr. 120 ms
	CB	$2 \rightarrow 1$	appr. 50 ms	appr. 80 ms

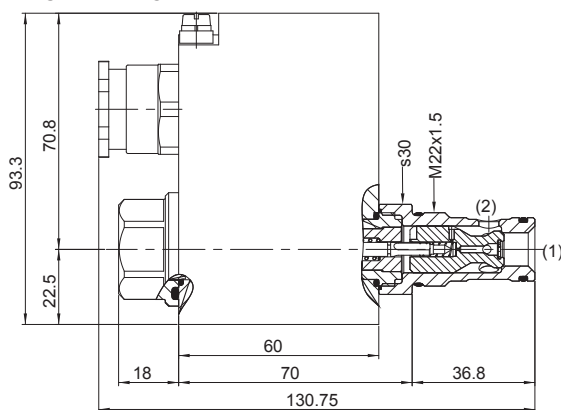
The switching times depend on the volume flow, pressure and viscosity. In case of small volume flows, the switching time can get considerably longer.

DIMENSIONS/SECTIONAL DRAWING

SVYPM22-BC



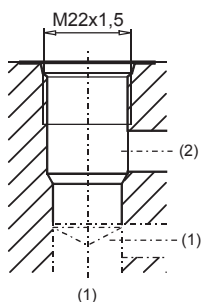
SVYPM22-CB



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

CAVITY

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



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

PARTS LIST

Position	Article	Description
10	263.6...	Coil type MKY 45/18x60...
12	154.2603	Knurled nut M16 x 1 x 18
30	160.0157	O-ring Polyurethan ID 15,60x1,78
40	160.2188 160.8188	O-ring ID 18,77x1,78 (NBR) O-ring ID 18,77x1,78 (FKM)
50	160.1220	O-ring ID 22,00x1,00
60	160.2251	O-ring ID 25,07x2,62

ACCESSORIES

Cartridge built-in flange- or sandwich body:

Flange valve

register 1.11

Sandwich valve

register 1.11

Technical explanation see data sheet

1.0-100

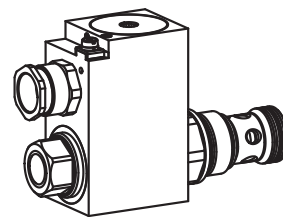
Solenoid poppet valve cartridge 2/2-way version

- Pilot operated
- $Q_{max} = 150 \text{ l/min}$
- $p_{max} = 350 \text{ bar}$

M33x2

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 2/2-way solenoid poppet valve in screw-in cartridge design with thread M33x2 for cavity acc. to ISO 7789.

Activated with Wandfluh explosion proof solenoid.

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.

INSTALLATION

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

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.

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...**

FUNCTION

In case of the version CB, the valve is closed in the flowing condition, in case of the BC in the non-flowing condition. In this, the differential spool is pressed against the seat by means of a spring and the applied pressure, and it closes free of leakage oil from 2 to 1. In the opposite direction of flow, the valve opens after reaching the opening pressure. In case of the version AB, the valve is closed in the flowing condition, in case of the BA in the non-flowing condition. In this, the differential spool is pressed against the seat by means of a spring and the applied pressure, and it closes free of leakage oil in both directions of flow.

APPLICATION

Wandfluh solenoid operated poppet valves are applied where an absolutely leak free closing of the valve is essential like in load holding, clamping or gripping functions. The solenoid operated screw-in cartridges are mainly used in mobile or stationary integrated blocks. To machine the cavities, cavity tools may be supplied (hire or purchase). Please refer to the data sheets in register 2.13.

TYPE CODE

S V Y PM33 - / / / # ☐

Poppet valve ☐

Pilot operated ☐

Explosion proof solenoid, Ex d ☐

Screw-in cartridge M33x2 ☐

Description of symbols acc. to table

Nominal voltage U_N	12 VDC	<input type="checkbox"/> G12
	24 VDC	<input type="checkbox"/> G24
	115 VAC	<input type="checkbox"/> R115
	230 VAC	<input type="checkbox"/> R230

Nominal power P_N

15 W	<input type="checkbox"/> L15
9 W	<input type="checkbox"/> L9

Ambient temp up to:

70 °C	<input type="checkbox"/>
40 °C or 90 °C (only for CB)	<input type="checkbox"/>

Certificate

ATEX, IECEX, GOST Ex	<input type="checkbox"/>
Australia	<input type="checkbox"/> AU
Inmetro	<input type="checkbox"/> IM

Design-Index (Subject to change)

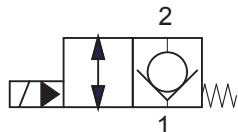
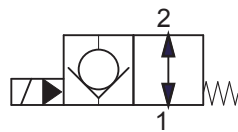
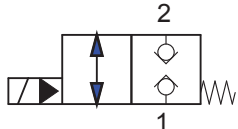
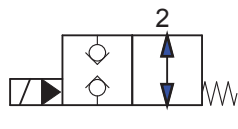
GENERAL SPECIFICATIONS

Description	Pilot operated 2/2-way solenoid poppet valve
Construction	Screw-in cartridge for cavity acc. to ISO 7789
Operation	Solenoid with exchangeable slip-on coil
Mounting	Screw-in thread M33x2
Admissible ambient temperature	Execution L15: -20...+70 °C (operation as T1...T4/T130 °C) Execution L9: -20...+40 °C (operation as T1...T6/T80 °C) -20...+90 °C (operation as T1...T4/T130 °C) In case of $U_N < 20V$, the max. ambient temperature has to be reduced by 10 °C.
Mounting position	any, preverable horizontal
Fastening torque	$M_D = 80 \text{ Nm}$ for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight	$m = 2,45 \text{ kg}$
Volume flow	see symbols

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination	ISO 4406:1999, classe 18/16/13
efficiency	(Required filtration grade $\beta_{6...10} \geq 75$) see data sheet 1.0-50/2
Viscosity range	12 mm ² /s bis 320 mm ² /s
Admissible fluid temperature	Execution L15: -20...+70 °C (operation as T1...T4/T130 °C) Execution L9: -20...+40 °C (operation as T1...T6/T80 °C) -20...+70 °C (operation as T1...T4/T130 °C)
Working pressure	$p_{max} = 350 \text{ bar}$
Max. volume flow	$Q_{max} = 150 \text{ l/min}$
Pressure drop	see characteristics
Opening pressure	
Version CB/BC	2 → 1 = 2 bar / 1 → 2 = 1,5 bar
Version AB/BA	2 → 1 = 3 bar / 1 → 2 = 3 bar

SYMBOLS

SVYPM33 - **BC**...

SVYPM33 - **CB**...

SVYPM33 - **BA**...

SVYPM33 - **AB**...

ELECTRICAL CONTROL

Construction Switching solenoid, wet pin pull- or push

type, pressure tight

Standard-nominal voltage

 $U_N = 12 \text{ VDC}$, $U_N = 24 \text{ VDC}$
 $U_N = 115 \text{ VAC}$, $U_N = 230 \text{ VAC}$

AC = 50 to 60 Hz $\pm 2\%$;

with integrated two way rectifier

and recovery diode

Voltage tolerance

 $\pm 10\%$ of nominal voltage

Protection class

IP 67 acc. to EN 60529

Relative duty cycle

100% ED

Switching cycles

5000/h

Operating life

 10^7 (number of switching cycles, theoretically)

Connection/Power supply

Through cable entry for cable

diameter $\varnothing 6,5 \dots 14 \text{ mm}$

acc. to EN 60079-0

Temperature class

T1...T4

Execution L15/L21

T1...T4

Execution L9

T1...T6

Nominal power

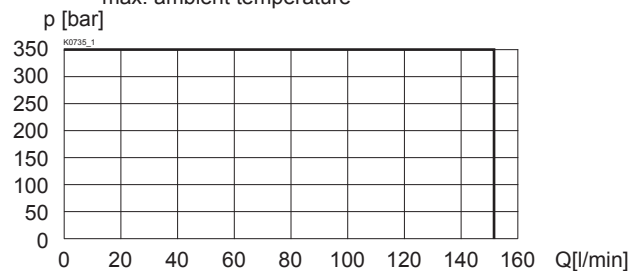
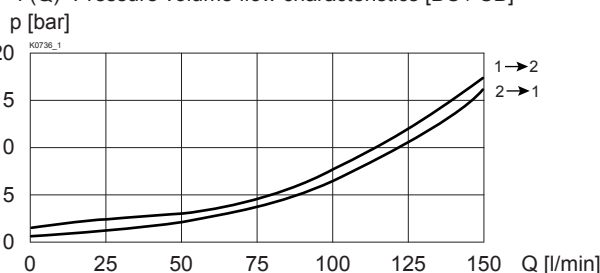
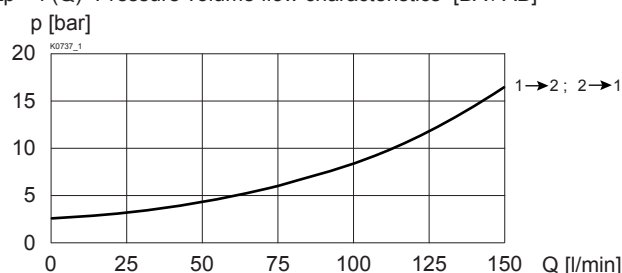
Execution L15

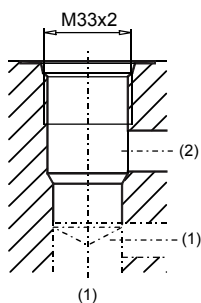
15W

Execution L9

9W

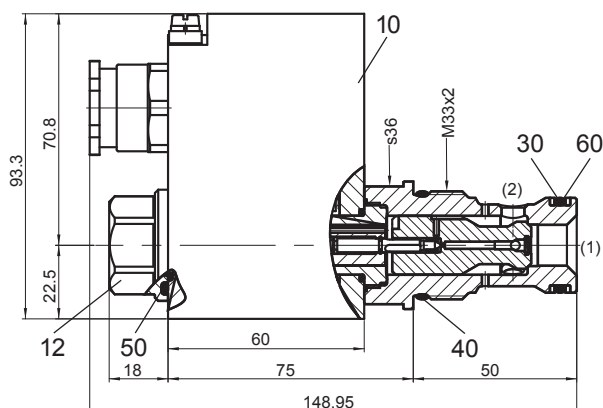
For further electrical characteristics, refer to the data sheet of the solenoid coil: 1.1-183

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$
 $p = f(Q)$ Performance limits at 10% under voltage and max. ambient temperature

 $\Delta p = f(Q)$ Pressure volume flow characteristics [BC / CB]

 $\Delta p = f(Q)$ Pressure volume flow characteristics [BA / AB]

Cavity

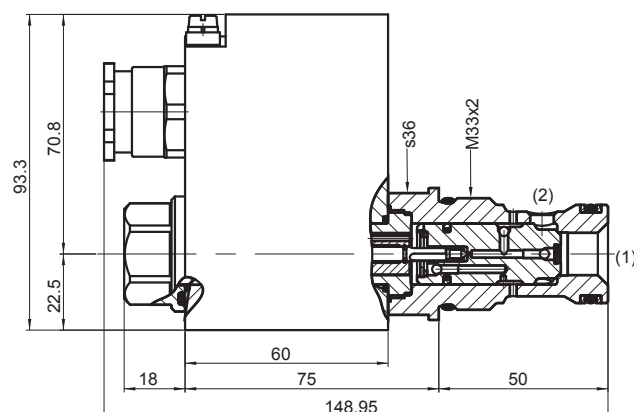
Cavity drawing to
ISO 7789-33-01-0-98

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

DIMENSIONS / SECTIONAL DRAWING

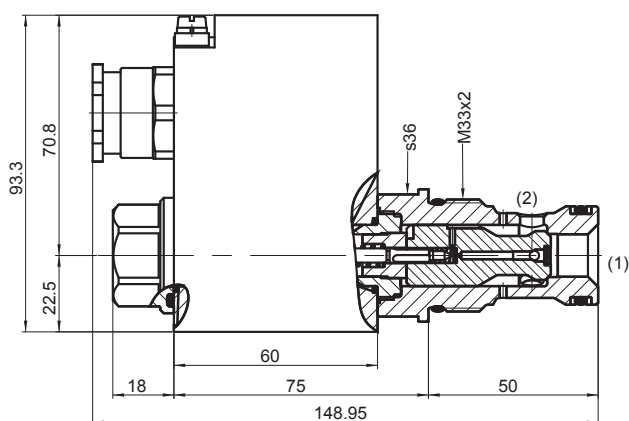
2/2-way version, «normally closed» [BC]



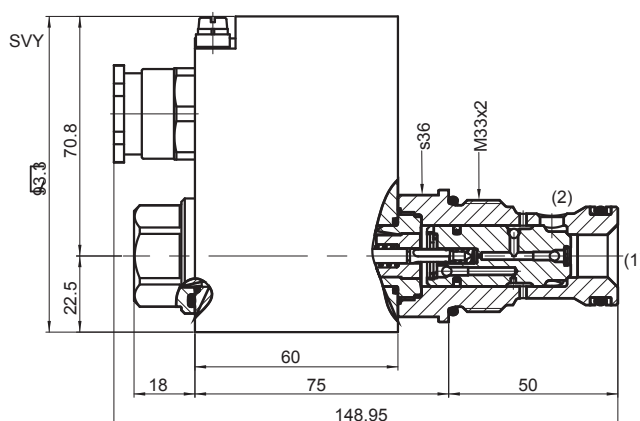
2/2-way version, «normally closed» [BA]



2/2-way version, «normally open» [CB]



2/2-way version, «normally open» [AB]



PARTS LIST

Position	Article	Description
10	263.6...	Coil type MKY 45/18x60...
12	154.2603	Knurled nut M16 x 1 x 18
30	160.2238 160.6238	O-ring ID 23,81x2,6 (NBR) O-ring ID 23,81x2,62 (FMK)
40	160.2298 160.6296	O-ring ID 29,82x2,62 (NBR) O-ring ID 29,82x2,62 (FMK)
50	160.2251	O-ring ID 25,07x2,62
60	049.3297	Back-up ring RD 24,5x29,1,4

ACCESSORIES

Cartridge built-in in flange- or sandwich body:

Flange valve register 1.11
Sandwich valve register 1.11

Technical explanation see data sheet 1.0-100

SWITCHING TIME




		Flow direction	under current	Current-free
SVSPM33	BA	1 → 2	appr. 30 ms	appr. 100 ms
		2 → 1	appr. 30 ms	appr. 100 ms
	AB	1 → 2	appr. 100 ms	appr. 60 ms
		2 → 1	appr. 100 ms	appr. 80 ms
	CB	2 → 1	appr. 60 ms	appr. 70 ms
		2 → 1	appr. 60 ms	appr. 70 ms
	BC	2 → 1	appr. 30 ms	appr. 70 ms
		2 → 1	appr. 30 ms	appr. 70 ms

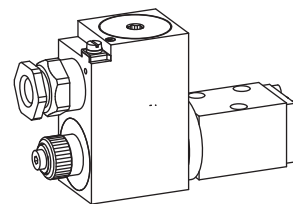
The switching times depend on the volume flow, pressure and viscosity. In case of small volume flows, the switching time can get considerably longer..

Solenoid poppet valve

- 2/2-, 3/2- and 3/4-way type
- $Q_{\max} = 15 \text{ l/min}$
- $p_{\max} = 350 \text{ bar}$

NG4-Mini[®]

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


DESCRIPTION
For explosion-hazard zones

Direct operated poppet valve flange type NG4-Mini. Activated with Wandfluh explosion proof solenoid.

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...**

FUNCTION

The central functioning element of all directly controlled poppet valves is the poppet valve cartridge NG4. The valve is operated by a explosion proof type solenoid which in turn either opens or closes the poppet. The design of the poppet spool, which is equal in surface area on both sides and thus pressure balanced, means there are no undue opening and closing hydraulic forces. Due to this the oil flow through the poppet valve is possible in both directions. The valve is tight in both flow directions.

TYPE CODE

2/2- or 3/2-way construction	B	EXd	<input type="checkbox"/>	2	04	<input type="checkbox"/>	-	<input type="checkbox"/>	/	<input type="checkbox"/>	/	<input type="checkbox"/>	#	<input type="checkbox"/>
3/4-way construction	B	EXd	<input type="checkbox"/>	3	4	04	-	<input type="checkbox"/>	/	<input type="checkbox"/>	/	<input type="checkbox"/>	#	<input type="checkbox"/>
Mounting interface														
Explosion proof solenoid														
2-way (connections)			<input type="checkbox"/>											
3-way (connections)			<input type="checkbox"/>											
2 position														
4 position														
Nominal size 4-Mini														
Normally closed,	solenoid on A-Side		<input type="checkbox"/>											
Normally open,	solenoid on B-Side		<input type="checkbox"/>											
Standard	12 VDC	<input type="checkbox"/>	G12											
nominal voltage U_N	24 VDC	<input type="checkbox"/>	G24											
	115 VAC	<input type="checkbox"/>	R115											
	230 VAC	<input type="checkbox"/>	R230											
Nominal power P_N :	9 W	<input type="checkbox"/>	L9	Ambient temp. by:										
	15 W	<input type="checkbox"/>	L15	40 °C or 90 °C										
				70 °C										
Certificates:	ATEX, IECEX, GOST Ex		<input type="checkbox"/>											
	Australia		<input type="checkbox"/>	Inmetro <input type="checkbox"/>										
Design-Index (Subject to change)														

GENERAL SPECIFICATIONS

Description	2/2-, 3/2- and 3/4-way poppet valve
Nominal size	NG4-Mini acc. to Wandfluh standard
Construction	Direct operated poppet valve
Operations	Solenoid
Mounting	Flange asdfasdf, 3 mounting holes for Cyl. screws M5x40 or M5x60 with distance plate BDP4/12
Connections	Threaded connection plates and Multi-flange subplates, Longitudinal stacking system
Admissible ambient temp	Execution L9 -20...+40 °C (operation as T1...T6/T80 °C) -20...+90 °C (operation as T1...T4/T130 °C) Execution L15 -20...+70 °C (operation as T1...T4/T130 °C) In case of $U_N < 20V$, the max. ambient temperature has to be reduced by 10 °C.
Mounting position	any, preverable horizontal
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8.8) for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight: 2/2-, 3/2-way	$m = 3,2 \text{ kg}$
3/4-way	$m = 5,0 \text{ kg}$
Volume flow direction	any (see characteristics)

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 20/18/14 (Required filtration grade $\beta_{10...16} \geq 75$) refer to data sheet Nr. 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) -20...+70 °C (operation as T1...T4/T130 °C) Execution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Working pressure	$p_{\max} = 350 \text{ bar}$
Max. volume flow	$Q_{\max} = 15 \text{ l/min}$, see characteristics



In case of the execution L15 for ambient temperatures of up to 70 °C the characteristic performance values were established at an ambient temperature of 50 °C.

ELECTRICAL CONTROL

Construction	Solenoid, wet pin push, pressure tight
Standard-nominal voltage	$U_N = 12 \text{ VDC}$, $U_N = 24 \text{ VDC}$ $U_N = 115 \text{ VAC}$, $U_N = 230 \text{ VAC}$ $AC = 50 \text{ to } 60 \text{ Hz} \pm 2\%$; with built-in two-way rectifier and recovery diode
Voltage tolerance	$\pm 10\%$ of nominal voltage
Protection class	IP67 acc. to EN 60 529
Relative duty factor	100% DF
Switching cycles	12 000/h
Operating life	10^7 (number of switching cycles, theoretically)
Connection/Power supply	Through cable gland for cable diameter $\varnothing 6,5 \dots 14 \text{ mm}$
Temperature classe:	(acc. to EN 60079-0)
Execution L9	T1...T6
Execution L15	T1...T4
Nominal power:	
Execution L9	9 W
Execution L15	15 W
For further electrical characteristics, refer to the data sheet of the solenoid coil 1.1-183	

SECURITY OPERATED



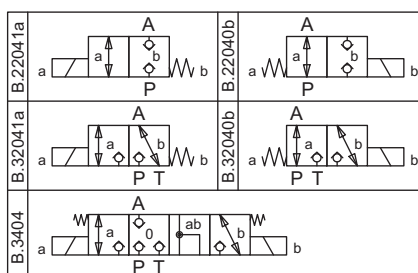
The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.

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

INSTALLATION

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

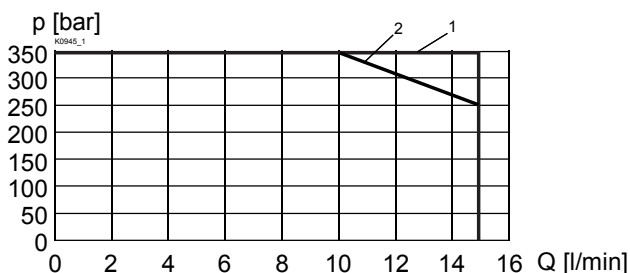
SYMBOLS



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

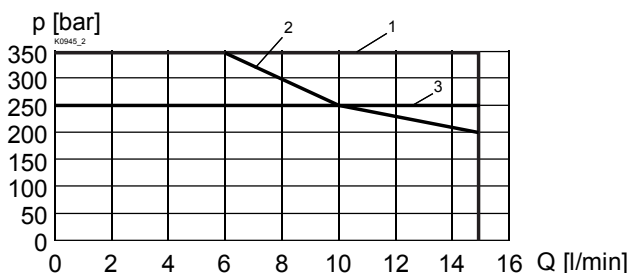
$p = f(Q)$ Performance limits with standard voltage -10%

Execution L15 (measured at 50 °C)



Execution L9/90 °C on request

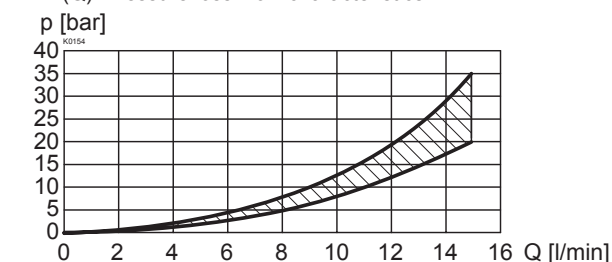
Execution L9 (measured at 40 °C)



Type	Flow direction			
	P - A	A - T	A - P	T - A
BEXd22041a	1	-	1	-
BEXd22040b	1	-	1	-
BEXd32041a	1	1	2	1
BEXd32040b	1	1	1	1
BEXd3404	1	1	1	1

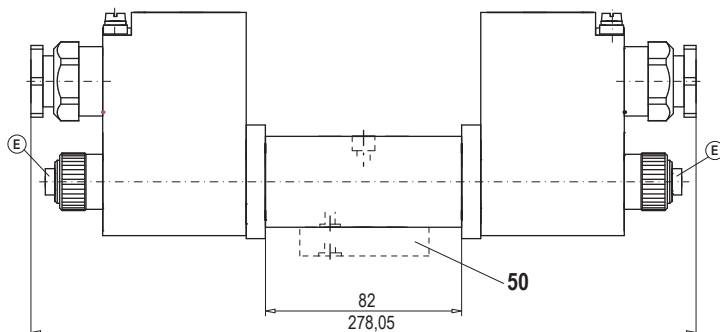
Type	Flow direction			
	P - A	A - T	A - P	T - A
BEXd22041a	1	-	1	-
BEXd22040b	1	-	2	-
BEXd32041a	1	2	1	1
BEXd32040b	1	1	3	1
BEXd3404	1	1	1	1

$\Delta = f(Q)$ Pressure loss/flow characteristics



DIMENSIONS

3/4-way poppet valve



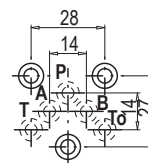
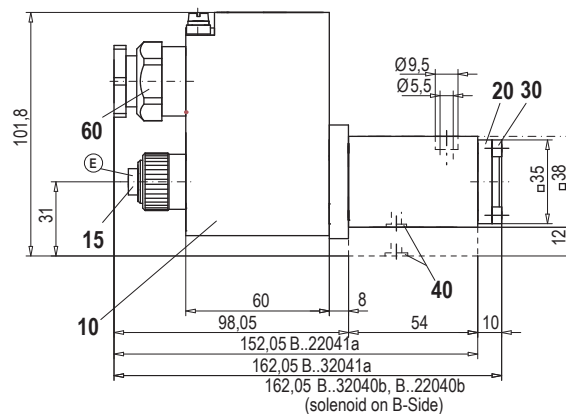
E = air bleed screw

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

Order distance plate BDP4/12 separatley

2/2-way poppet valve

3/2-way poppet valve



PARTS LIST

Position	Article	Description
10	263.6 ...	Sool MKY45/18x60-...
15	239.2033	Plug HB0 (incl. seal)
20	057.4202	Cover
30	246.1113	Socket head cap screw M4x12 DIN 912
40	160.2052	O-ring ID 5,28x1,78
50	173.1450	Distance plate BDP4/12
60	111.1080	Cable gland brass M20

ACCESSORIES

Threaded connecting plates, Multi-flange subplates and Longitudinal stacking system	see Reg. 2.9
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Technical explanation see data sheet 1.0-100

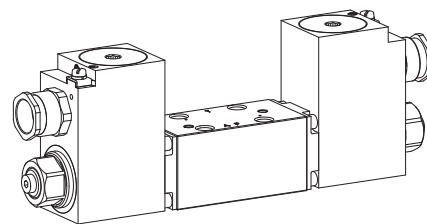
Solenoid poppet valve

- 2/2-, 3/2- and 3/4-way type
- $Q_{max} = 40 \text{ l/min}$
- $p_{max} = 350 \text{ bar}$

NG6

ISO 4401-03

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


DESCRIPTION
For explosion-hazard zones

Direct operated poppet valve flange type NG6. Activated with Wandfluh explosion proof solenoid.

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 central functioning element of all directly controlled poppet valves is the poppet valve cartridge NG6. With the controlling solenoid, resp. with the spring located opposite, the poppet valve spools are either opened or closed. Thanks to the poppet valve spool design with the same surface area on both sides and with pressure balancing, no undesirable hydraulic closing - and opening forces are generated. Therefore, the oil flow through the poppet valve is possible in both directions. The valve seals tightly at all closed seats without any oil leakage.

APPLICATION

These valves are suitable for applications in explosion-hazard zones, open cast and also in mines. Poppet valves from Wandfluh are used wherever absolutely tight sealing closing functions, such as the holding of loads, tensioning and clamping are of decisive importance. Mechanically and functionally, poppet valves may be used fully interchangeably instead of spool valves at any time.

CERTIFICATES

in accordance with	Surface gas and dust	Mining
ATEX	x with option -60°C	x
IECEX	x with option -60°C	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...**

TYPE CODE

2/2- or 3/2-way construction	A	EXd	<input type="checkbox"/>	2	06	<input type="checkbox"/>	-	<input type="checkbox"/>	/	<input type="checkbox"/>	/	<input type="checkbox"/>	-	<input type="checkbox"/>	#	<input type="checkbox"/>	
3/4-way construction	A	EXd	<input type="checkbox"/>	3	4	06	<input type="checkbox"/>	-	<input type="checkbox"/>	/	<input type="checkbox"/>	/	<input type="checkbox"/>	-	<input type="checkbox"/>	#	<input type="checkbox"/>
International connection standard ISO																	
Explosion protection version																	
2-way (connections)			<input type="checkbox"/>														
3-way (connections)			<input type="checkbox"/>														
2 switching positions																	
4 switching positions																	
Nominal size 6																	
Normally closed, solenoid on A-side			<input type="checkbox"/>														
Normally open, solenoid on B-side			<input type="checkbox"/>														
Standard nominal voltage U_N	12 VDC	<input type="checkbox"/>	G12														
	24 VDC	<input type="checkbox"/>	G24														
	115 VAC	<input type="checkbox"/>	R115														
	230 VAC	<input type="checkbox"/>	R230														
Nominal power P_N :	9 W	<input type="checkbox"/>	L9														
	15 W	<input type="checkbox"/>	L15														
				Ambient temp by 40 °C or 90 °C													
				70 °C													
Certification																	
	ATEX, IECEX, GOST Ex		<input type="checkbox"/>														
	Australien		<input type="checkbox"/>														
	Inmetro		<input type="checkbox"/>														
Temperature range	-25°C to ...	<input type="checkbox"/>															
	-40°C to ...	<input type="checkbox"/>	Z604	only with 15W													
	-60°C to ...	<input type="checkbox"/>	Z591	only with 15W / ATEX and IECEX / Surface													
Design-Index (Subject to change)																	

GENERAL SPECIFICATIONS

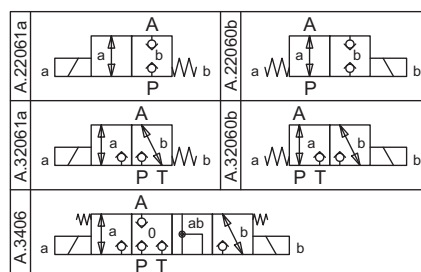
Description	2/2-, 3/2- und 3/4-way poppet valve
Nominal size	NG6 acc. to ISO 4401-03
Construction	Direct operated poppet valve
Operations	Solenoid
Mounting	Flange four mounting holes for cyl. screws, or M5x45 In case of valves for the temperature range „-60°C to ...“ (Z591) screws of the quality A4 have to be used.
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Admissible ambient temp:	Execution L9: -25...+40 °C (operation as T1...T6/T80 °C) -25...+90 °C (operation as T1...T4/T130 °C) Execution L15: Temperature range „-25° to ...“ -25...+70 °C (operation as T1...T4/T130 °C) Temperature range „-40° to ...“ -40...+70 °C (operation as T1...T4/T130 °C) Temperature range „-60° to ...“ -60...+70 °C (operation as T1...T4/T130 °C) In case of $U_N < 20V$, the max. ambient temperature has to be reduced by 10 °C.
Mounting position	any, preverable horizontal
Fastening torque	$M_D = 5,5 \text{ Nm}$ (quality 8,8) for fixing screw $M_D = 5 \text{ Nm}$ for knurled nut
Weight: 2/2-, 3/2-way 3/4-way	$m = 3,3 \text{ kg}$ $m = 5,4 \text{ kg}$
Volume flow direction	any (see characteristics)

ELECTRICAL CONTROL

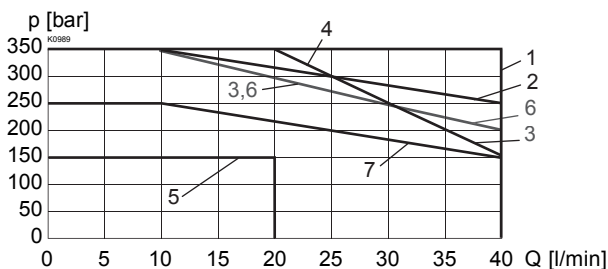
Construction	Solenoid, wet pin push, pressure tight
Standard-nominal voltage	$U_N = 12 \text{ VDC}$, 24 VDC, 115 VAC, 230 VAC AC = 50 to 60 Hz $\pm 2\%$ with built-in two way rectifier and recovery diode
Voltage tolerance	$\pm 10\%$ of nominal voltage
Protection class	IP67 acc. to EN 60 529
Relative duty factor	100% DF
Switching cycles	12 000/h
Operating life	10^7 (number of switching cycles, theoretically)
Connection / Power supply	Through cable entry for cable diameter $\varnothing 6,5 \dots 14 \text{ mm}$ (acc. to EN 60079-0)
Temperature class:	
Execution L9	T1...T6
Execution L15	T1...T4
Nominal power:	
Execution L9	9 W
Execution L15	15 W
For further electrical characteristics, refer to the data sheet of the solenoid coil: 1.1-183	

HYDRAULIC SPECIFICATIONS

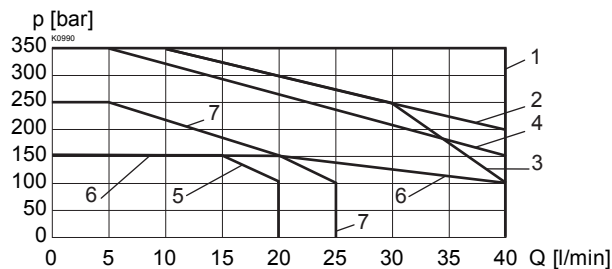
Fluid	Mineral oil, other fluid on request
Contamination efficiency Verschmutzungsgrad	ISO 4406:1999, class 20/18/14 (Required filtration grade $\beta_{10 \dots 16} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	12 mm ² /s...320 mm ² /s
Admissible fluid temp.	Execution L9: -25...+40 °C (operation as T1...T6/T80 °C) -25...+70 °C (operation as T1...T4/T130 °C) Execution L15: Temperature range „-25° to ...“ -25...+70 °C (operation as T1...T4/T130 °C) Temperature range „-40° to ...“ -40...+70 °C (operation as T1...T4/T130 °C) Temperature range „-60° to ...“ -60...+70 °C (operation as T1...T4/T130 °C)
Working pressure	$p_{\max} = 350 \text{ bar}$
Max. volume flow	$Q_{\max} = 40 \text{ l/min}$, see characteristics

SYMBOLS


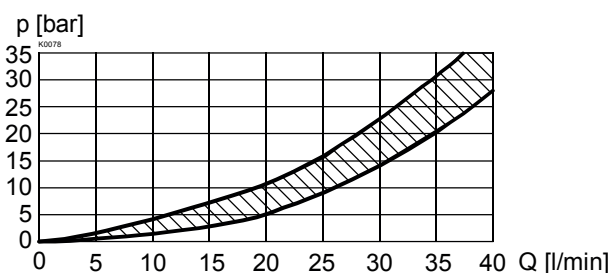
CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$
 $p = f(Q)$ Performance limits with standard voltage -10%

Execution L15 (measured at 50 °C)


Type	Flow direction			
	P - A	A - T	A - P	T - A
AEXd22061a	1	-	6	-
AEXd22060b	1	-	3	-
AEXd32061a	1	2	5	1
AEXd32060b	1	4	7	1
AEXd3406	1	1	6	6

Execution L9/90 °C on request
Execution L9 (measured at 40 °C)


Type	Flow direction			
	P - A	A - T	A - P	T - A
AEXd22061a	1	-	6	-
AEXd22060b	1	-	3	-
AEXd32061a	1	2	5	1
AEXd32060b	1	4	7	1
AEXd3406	1	1	6	6

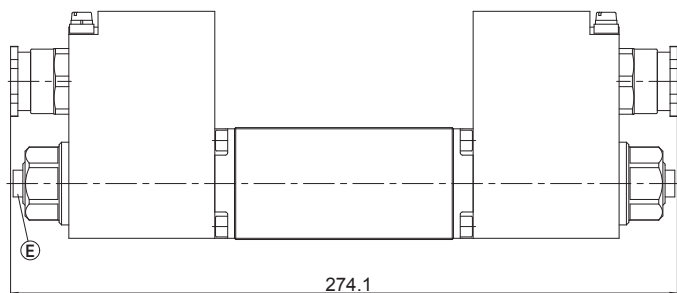
 $\Delta p = f(Q)$ Pressure loss/flow characteristics


In case of the execution L15 for ambient temperatures of up to 70 °C the characteristic performance values were established at an ambient temperature of 50 °C.

DIMENSIONS

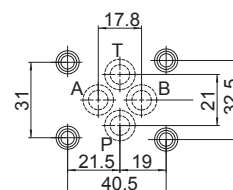
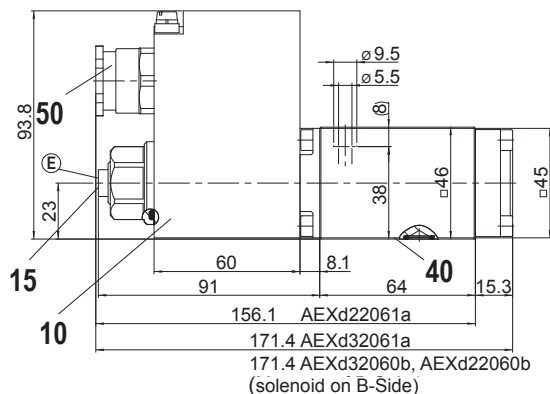
3/4-way poppet valve

2/2-, 3/2-way poppet valve



E = air bleed screw

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



PARTS LIST

Position	Article	Description
10	263.6 ...	Coil type MKY 45/18x60-.....
15	239.2033	Plug HB0 (incl. sealing ring)
	239.2043	„-25°C to ...“ and „-40°C to ...“ Plug HB0-H40-Z591 (incl. sealing ring)
		„-60°C to ...“
40	160.2093	O-ring ID 9,25x1,78 „-25°C to ...“
	160.7092	O-ring ID 9,25x1,78 „-40°C to ...“
	160.0091	O-ring ID 9,25x1,78 „-60°C to ...“
50	111.1080	Cable entry brass M20x1,5

ACCESSOIRES

Threaded connecting plates

see Reg. 2.9

Technical explanation see data sheet 1.0-100

INSTALLATION

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

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.

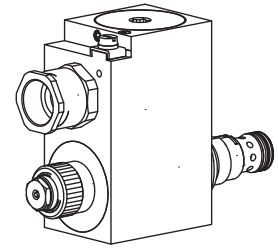
In case of non-observance, no liability can be assumed.

**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.

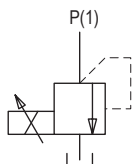
Solenoid coil in acc. with directive 94/9/EC (ATEX) for explosion-hazard zones.

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.

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

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.

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		24 VDC		G12		G24											
Execution:		9W		15W		L9		L15											
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	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.	Excecution L9 -20...+40 °C (operation as T1...T6/T80 °C) Excecution L15 -20...+70 °C (operation as T1...T4/T130 °C)
Peak pressure	$p_{max} = 400$ bar
Nominal pressure ranges	Excecution L9: $p_N = 20$ bar, 50 bar, 80 bar, 160 bar, 220 bar, 280 bar Excecution 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.

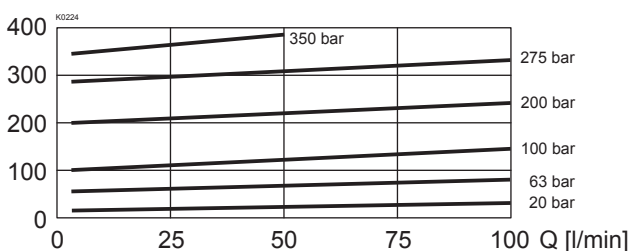
INSTALLATION

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

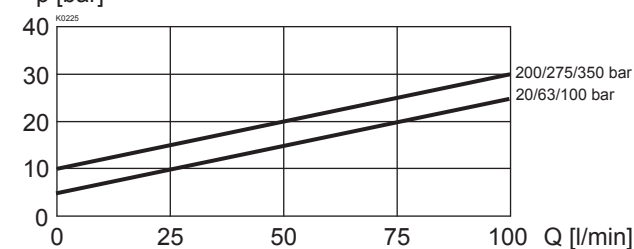
CHARACTERISTICS oil viscosity $\nu = 30$ mm²/s

Excecution L15 (measured at 50 °C)

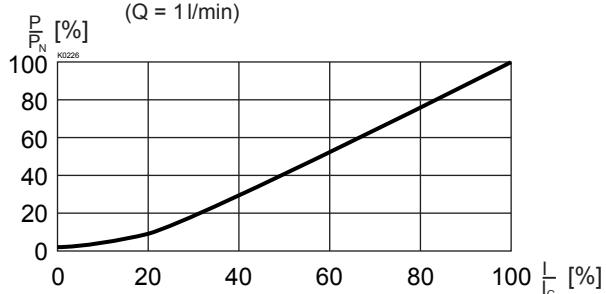
$p_{red} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



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

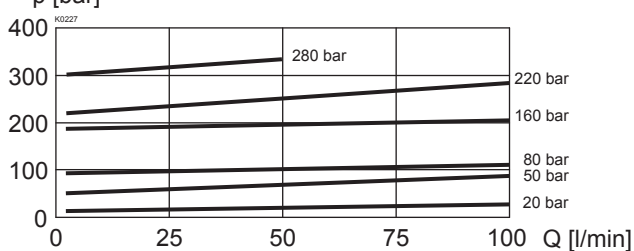


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)

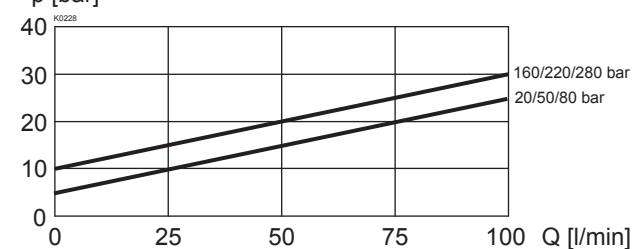


Excecution L9 (measured at 40 °C)

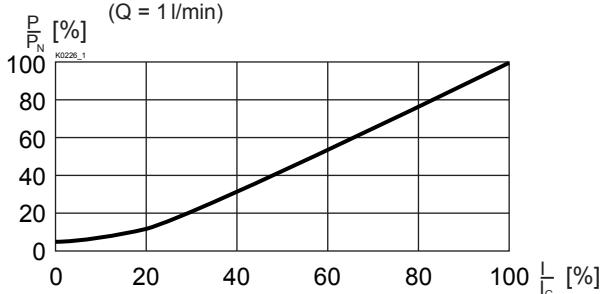
$p_{red} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



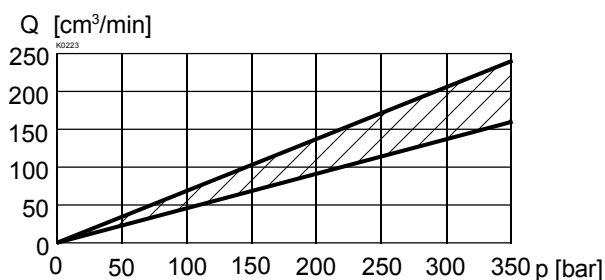
$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)



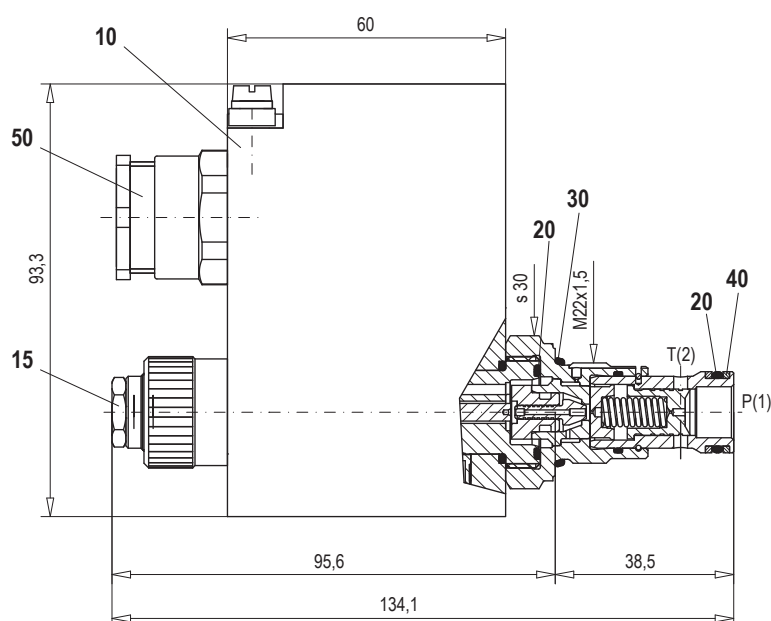
$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)



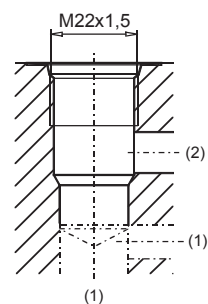
$Q_L = f(p)$ Leakage volume flow characteristics



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

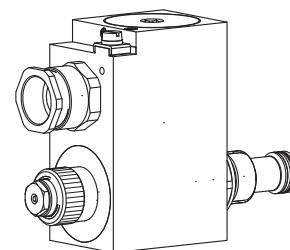
**Proportional pressure relief valve
Screw-in cartridge**

- 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.

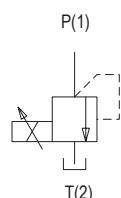
APPLICATION

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.

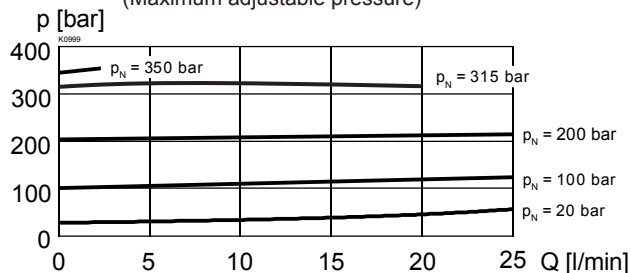
INSTALLATION

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

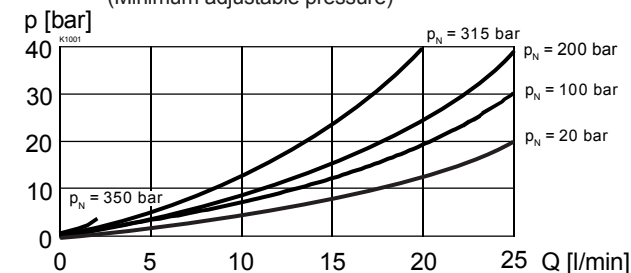
CHARACTERISTICS oil viscosity $\nu = 30$ mm²/s

Execution L15 (measured at 50 °C)

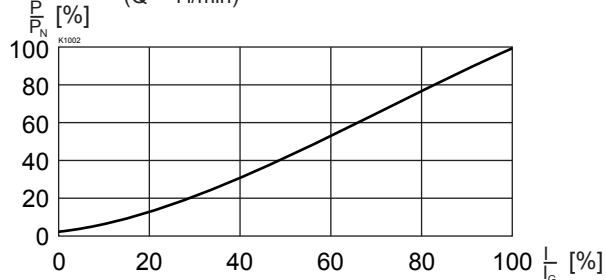
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



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

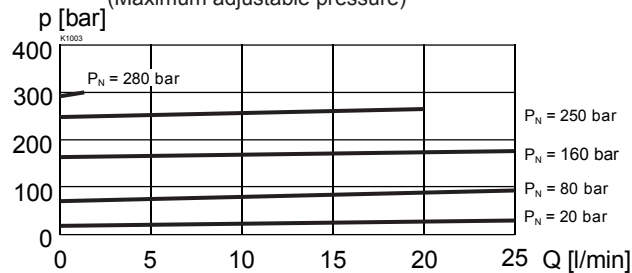


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)

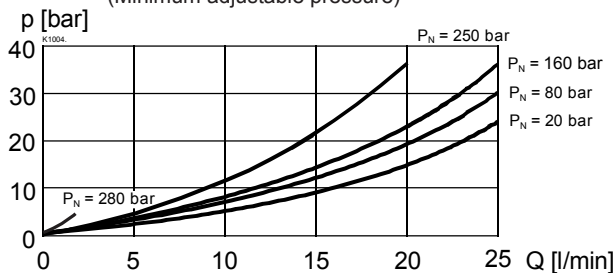


Execution L9 (measured at 40 °C)

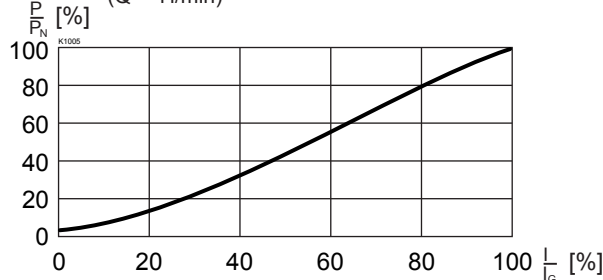
$p = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



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

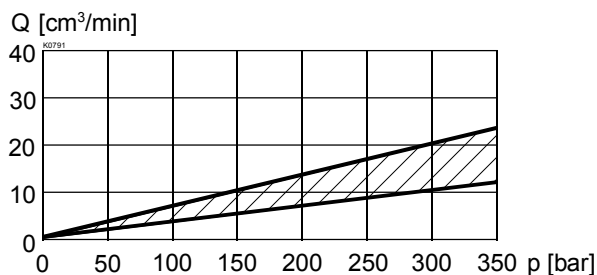


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)

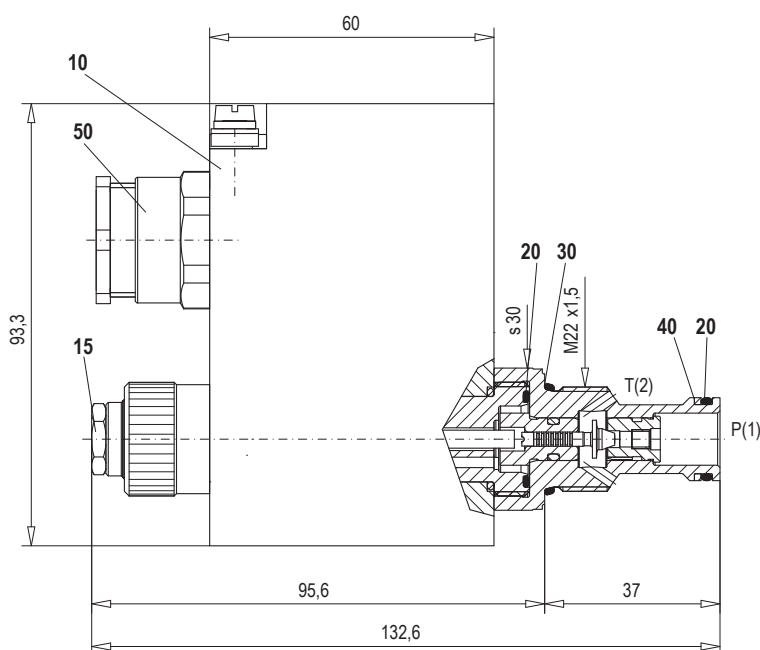


Execution L9/40 °C
L15/70 °C

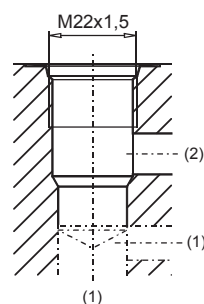
$Q_L = f(p)$ Leakage volume flow characteristics



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 pressure reducing valve
Screw-in cartridge**

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

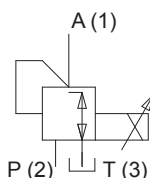
DESCRIPTION
For explosion-hazard zones

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

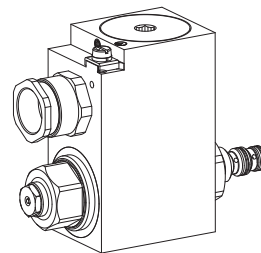
in accordance with	Surface gas + dust	Mining
ATEX	x	x
IECEX	x	x
GOST Ex	x	x
Australia	x	x
Inmetro	x	x

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

SYMBOLS

M16x1,5

Wandfluh standard

-  II 2 G Ex d IIC
-  II 2 D Ex tD A21d IIC
-  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- <input type="text"/> - <input type="text"/> / L15 / <input type="text"/> - <input type="text"/> # <input type="text"/>	
Pressure reducing valves			
Direct operated			
Proportional explosion proof, execution Ex d IIC			
Screw-in cartridge M16x1,5			
Nominal pressure range p_N :	25 bar <input type="text"/>	40 bar <input type="text"/>	
Standard nominal voltage U_N :	12 VDC <input type="text"/>	24 VDC <input type="text"/>	
Execution	15W	Ambient temp. by: 70 °C	
Certificates:	ATEX, IECEX, GOST Ex <input type="text"/>	Australia <input type="text"/>	Inmetro <input type="text"/>
Sealing material	NBR <input type="text"/>	FKM (Viton) <input type="text"/>	
System pressure	max. 210 bar <input type="text"/>		
System pressure	max. 350 bar <input type="text"/>		
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	$U_N = 12 \text{ VDC}, 24 \text{ VDC}$
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	$\leq 1\%$ *
Repeatability	$\leq 4\%$ *
Hysteresis	* at optimal dither signal

SECURITY OPERATED



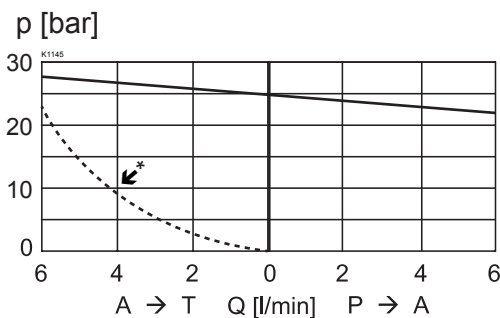
The solenoid coil must only be put into operation, if the requirements of the operating instructions supplied are observed to their full extent.
In case of non-observance, no liability can be assumed.

INSTALLATION

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

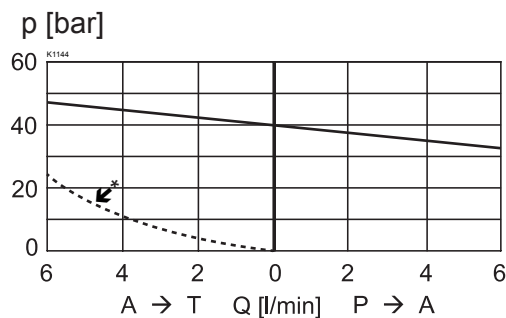
CHARACTERISTICS Oil viscosity $\nu = 30$ mm²/s

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

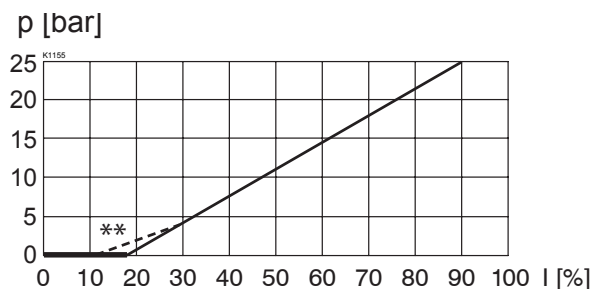


* Limits of the working range

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

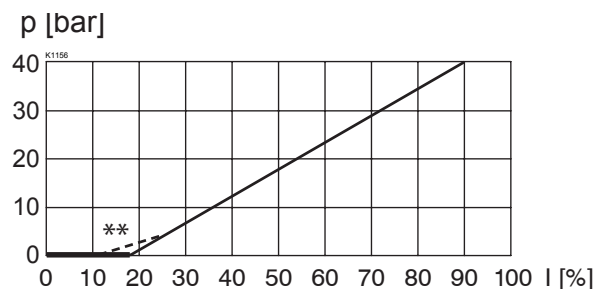


$p_{red} = f(I)$ Pressure adjustment characteristics
[at $Q = 0$ l/min (static)]
25 bar version

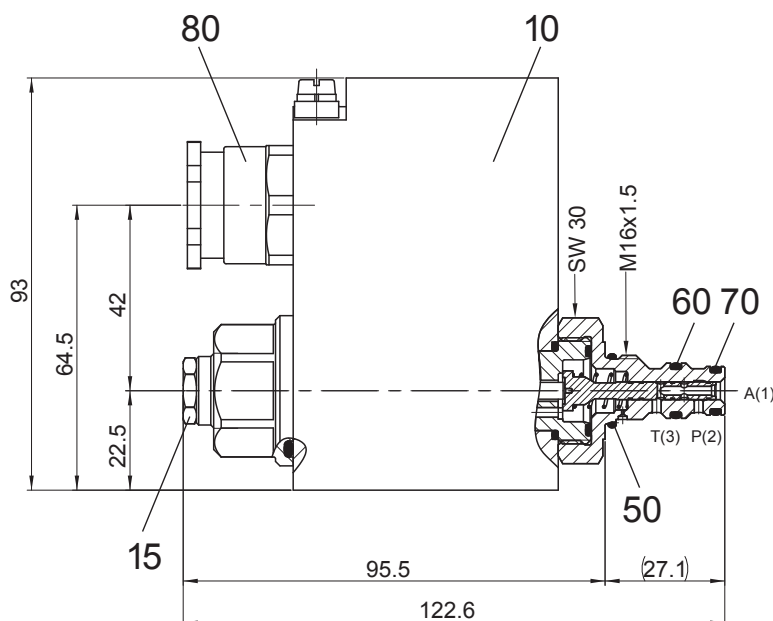


** Slightly higher hysteresis

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

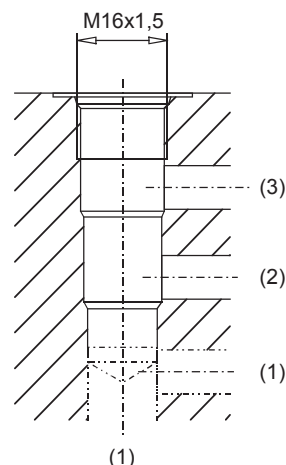


DIMENSIONS/SECTIONAL DRAWING



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

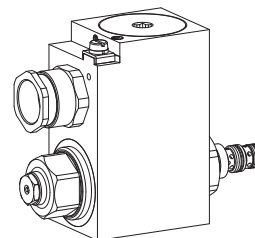
Technical explanation see data sheet 1.0-100

Proportional 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

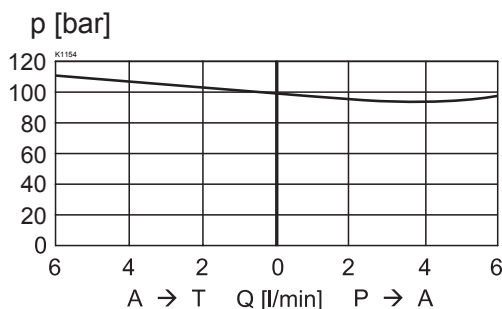
Construction	Proportional solenoid, wet pin push type, pressure tight		
Standard nominal voltage	$U_N = 12\text{ VDC}, 24\text{ VDC}$		
		12VDC	24VDC
Limiting current	L15/50 °C	$I_G = 950\text{ mA}$	450 mA
	L15/70 °C	$I_G = 910\text{ mA}$	420 mA
Voltage tolerance	+ 10% of rated voltage		
Relative duty 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

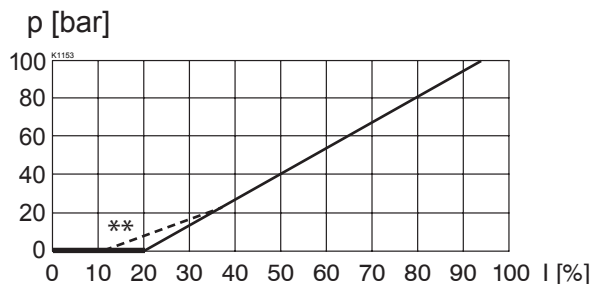
Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406: 1999, class 18/16/13 (Required filtration grade $\beta_{6 \dots 10} \geq 75$) refer to data sheet 1.0-50/2
Viscosity range	$12\text{ mm}^2/\text{s} \dots 320\text{ mm}^2/\text{s}$
Fluid temperature	$-20 \dots +70\text{ °C}$
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	
$p_{\text{sys}} = 160\text{ bar}$	$p_{\text{red}} = 0\text{ bar}: < 15\text{ ml/min}$ $p_{\text{red}} = 0,5\text{ } p_{N\text{ red}}: < 60\text{ ml/min}$
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

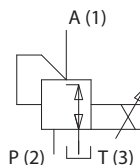
SECURITY OPERATED

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

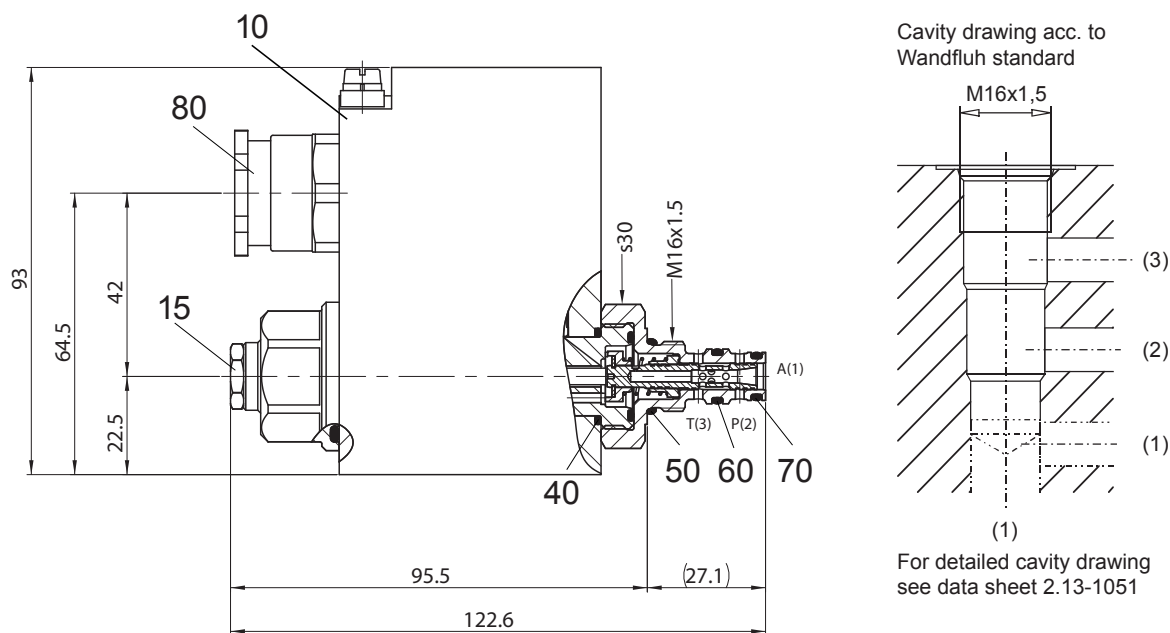
In case of non-observance, no liability can be assumed.


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

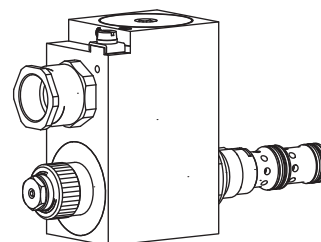
Technical explanation see data sheet 1.0-100

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

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

M22x1,5
ISO 7789

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

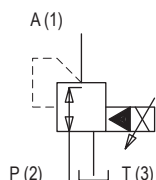

DESCRIPTION
For explosion-hazard zones

Pilot operated proportional pressure reducing valve as a screw-in cartridge with a thread 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.wandfluh.com / DOWNLOADS / Accompanying Ex-proof / **MKY45/18-..-L..**

SYMBOLS

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 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

Pressure reducing valve		M 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		AU		Inmetro		IM					
		Australia											
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 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	$M_D = 50 \text{ Nm}$ 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
Execution L15:	
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.

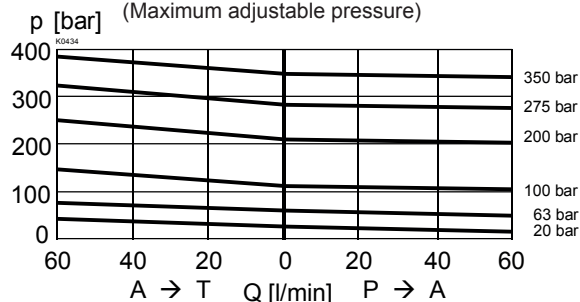
INSTALLATION

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

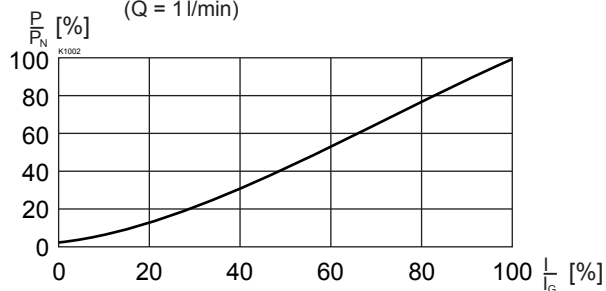
CHARACTERISTICS oil viscosity $\nu = 30$ mm²/s

Execution L15 (measured at 50 °C)

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

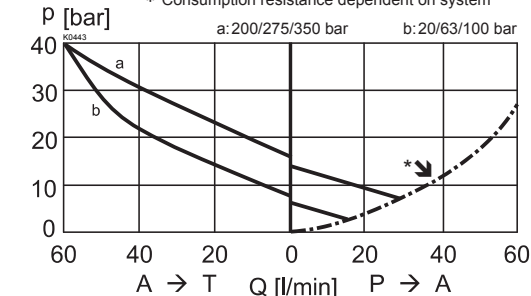


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)



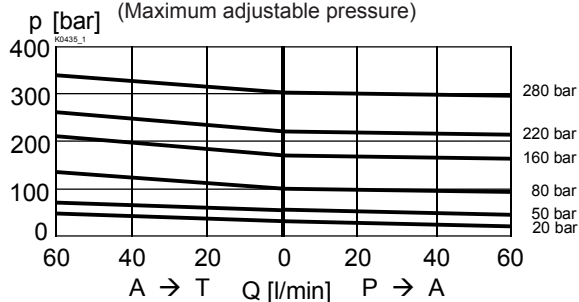
$p_{red} = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

* Consumption resistance dependent on system

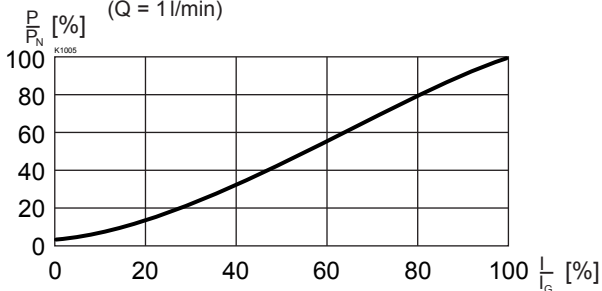


Execution L9 (measured at 40 °C)

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

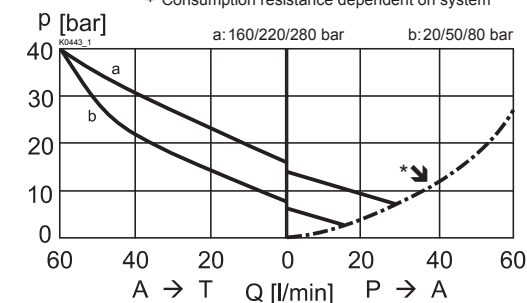


$p = f(I)$ Pressure signal characteristics
($Q = 1$ l/min)

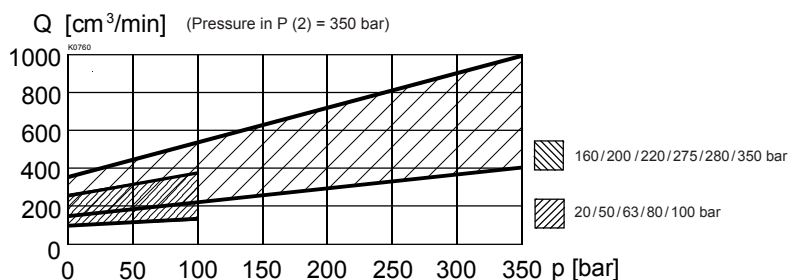


$p_{red} = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)

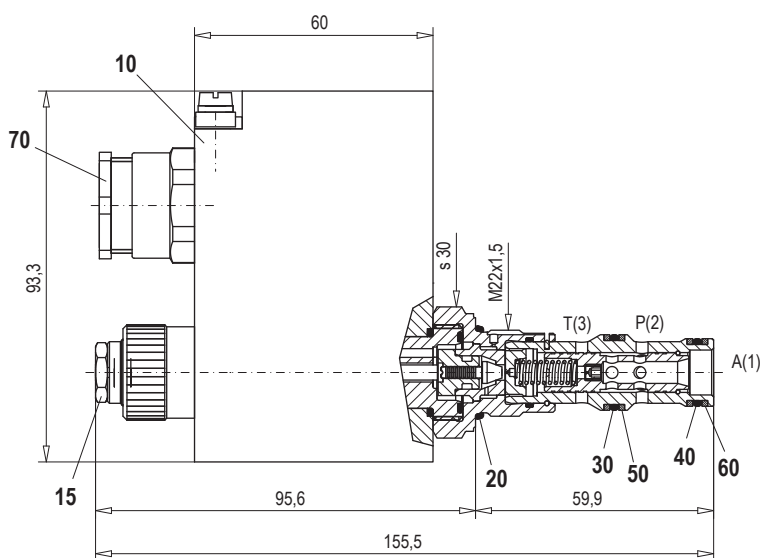
* Consumption resistance dependent on system



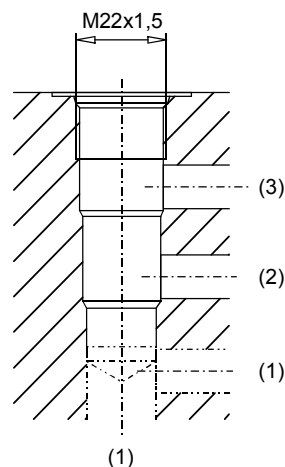
$Q_{st+L} = f(p_{red})$ Pilot- and leakage volume flow characteristic [A (1) → T (3)]



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

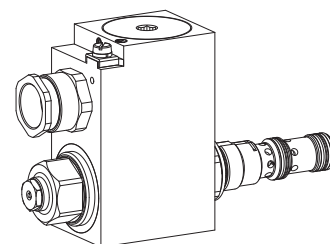
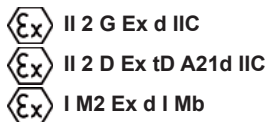
Flange-/sandwich plate NG4-Mini	Data sheet 2.3-820
Flange-/sandwich plate NG6	Data sheet 2.3-840
Flange-/sandwich plate NG10	Data sheet 2.3-860
Line mount body	Data sheet 2.9-210

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 $p_{N \text{ red}}$	<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	12 VDC 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	NBR 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

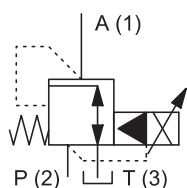
The certificates can be found on www.wandfluh.com / DOWNLOADS / Accompanying Ex-proof / **MKY45/18-...-L...**

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.

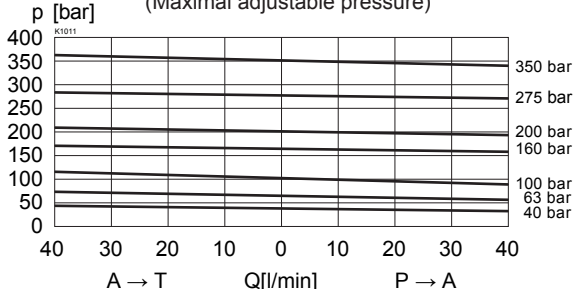
In case of non-observance, no liability can be assumed.

INSTALLATION

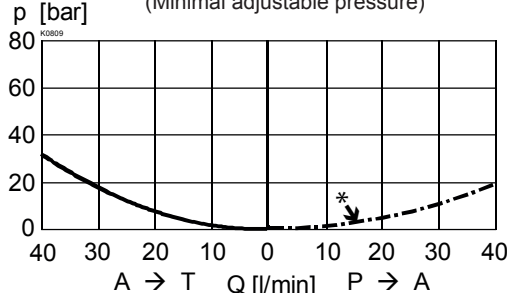
For stack assembly please observe the remarks in the operating instructions.

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

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

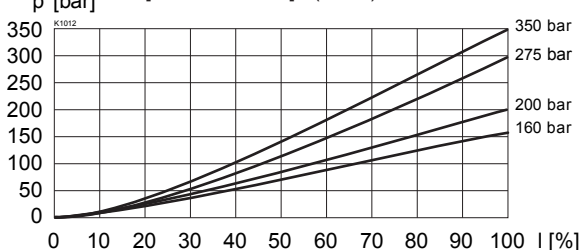


$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Minimal adjustable pressure)

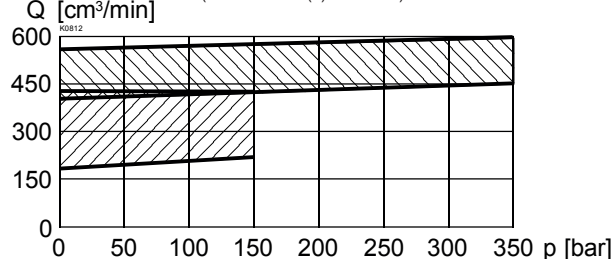


* Consumption resistance dependent on system

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



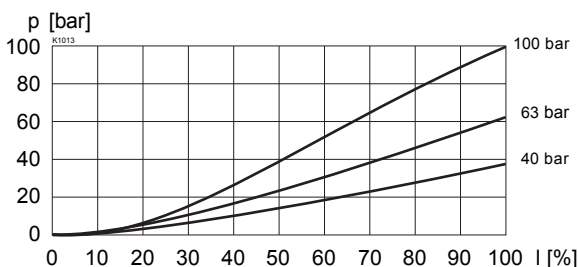
$Q_{\text{st}+L} = f(p_{\text{red}})$ Pilot- and leakage volume flow characteristic [P (2) → T (3)]
(Pressure in P (2) = 350 bar)



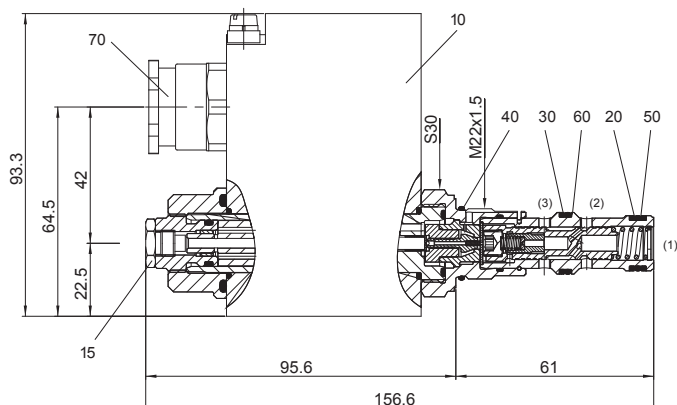
Pressure ranges: 200 / 275 / 350 bar



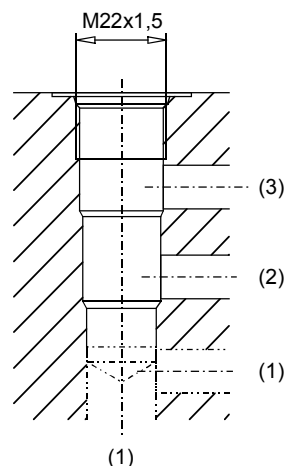
Pressure ranges: 40 / 63 / 100 / 160 bar



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

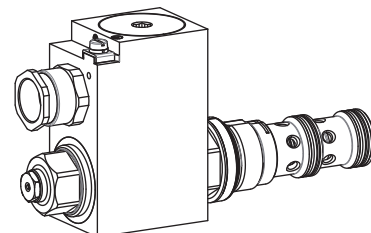
Technical explanation see data sheet 1.0-100

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 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. 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.

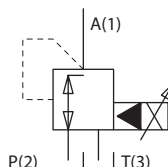
APPLICATION

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

Pressure reducing valve	M	V	B	PM33	-		-		/		/		-		#	
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														
	15W	L15														
Ambient temp. with:		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 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} = 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.

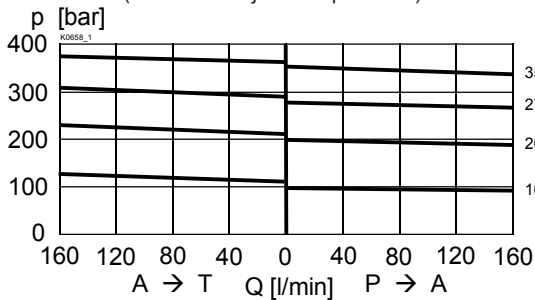
INSTALLATION

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

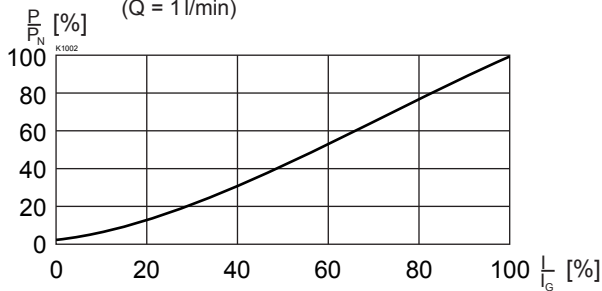
CHARACTERISTICS oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

Execution L15 (measured at 50 °C)

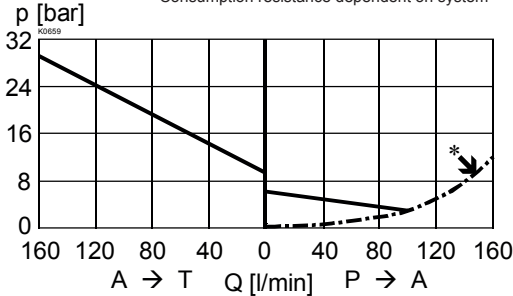
$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Maximum adjustable pressure)



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

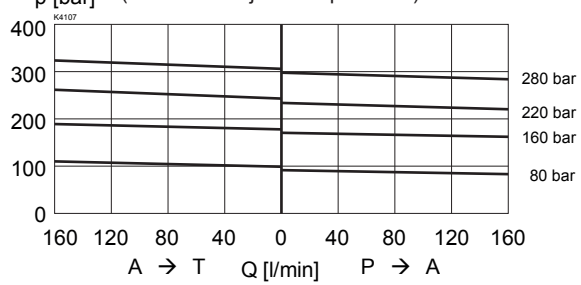


$p_{\text{red}} = f(Q)$ Pressure volume flow characteristics
(Minimum adjustable pressure)
* Consumption resistance dependent on system

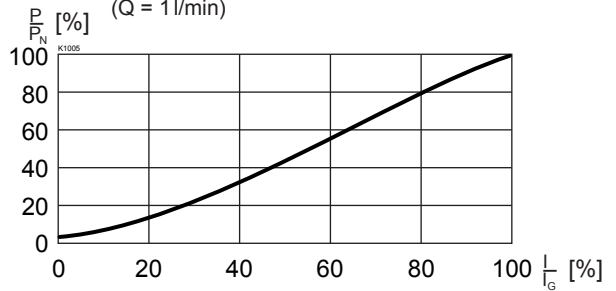


Execution L9 (measured at 40 °C)

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

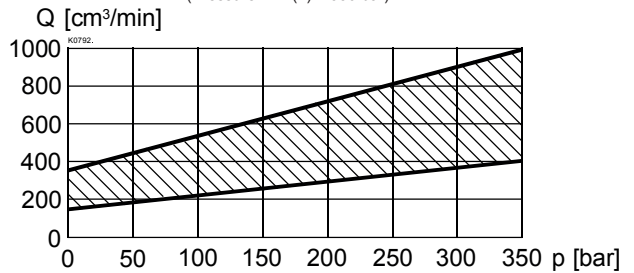


$p = f(I)$ Pressure signal characteristics
($Q = 1 \text{ l/min}$)

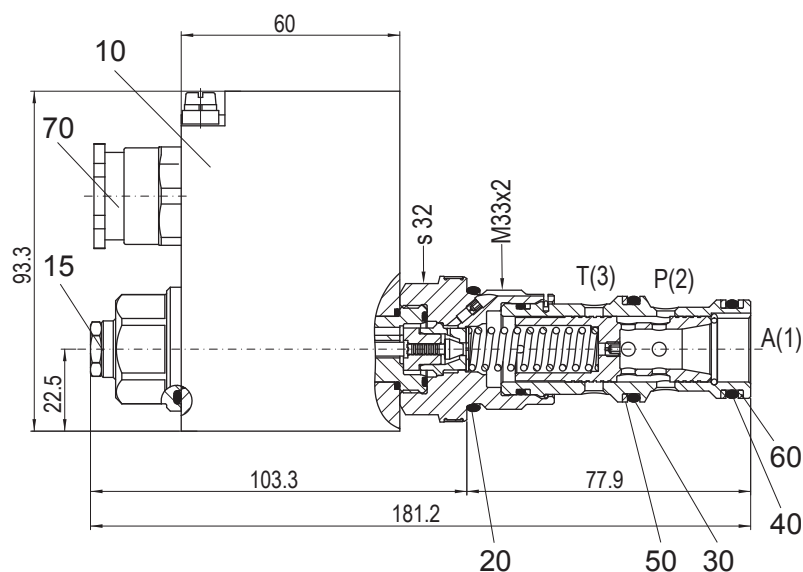


$Q_{\text{st}+L} = f(p_{\text{red}})$ Pilot- and leakage volume flow [A (1) → T (3)]

(Pressure in P (2) = 350 bar)

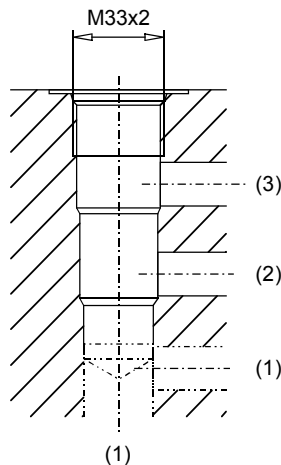


DIMENSIONS / SECTIONAL DRAWINGS



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