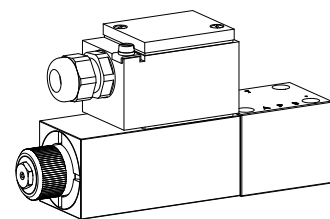


Solenoid operated spool valve intrinsically safe NG6
ATEX and IECEx certified
ISO 4401-03

- 4/2-way impulse valve
- 4/3-way with spring centred mid position
- 4/2-way spring reset
- $Q_{\max} = 10 \text{ l/min}$, $p_{\max} = 350 \text{ bar}$

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

		W	D	Z	F	A06	-		-	2/	-		-		Z546	#	
Spool valve																	
Direct operated																	
Explosion protection version Ex ia																	
Flange construction																	
International standard interface ISO, NG6																	
Description of symbols acc. to table																	
Spool specification	Low leakage																
Coil resistance	100 Ω																
	152 Ω																
Equipment group	II (Surface)																
	I (Mining)																
Sealing material	NBR																
	FKM (Viton)																
Execution																	
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 Nm (quality 8.8) for fixing screws MD = 5 Nm for knurled nut
Masse: 4/2-way impulse	m = 5,3 kg
4/3-way	m = 5,3 kg
4/2-way (1 solenoid)	m = 3,2 kg

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)

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, class 20/18/14 (Required filtration grade β ₁₀ ...16≥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 in port P, A, B	p _{max} = 350 bar
Tank pressure in port T	p _{max} = 200 bar
Max. volume flow	Q _{max} = 10 l/min
Leakage volume flow	see characteristics

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.

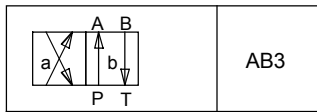
** The minimum drive powers resp. currents have to be adhered to, otherwise the power limit, resp. function cannot be assured.

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

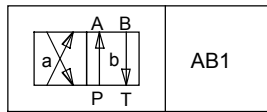
4/2-way valve impulse



AB3

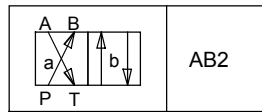
4/2-way valve with spring reset

Operation A-side



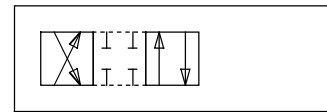
AB1

Operation B-side

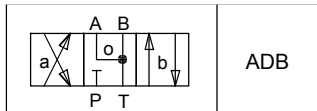


AB2

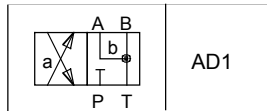
Transitional functions



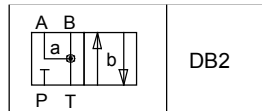
4/3-way valve spring centred



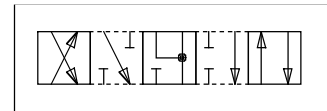
ADB



AD1

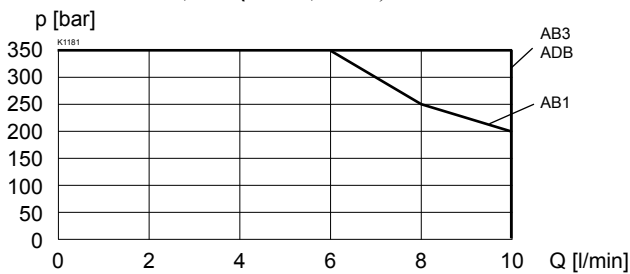


DB2

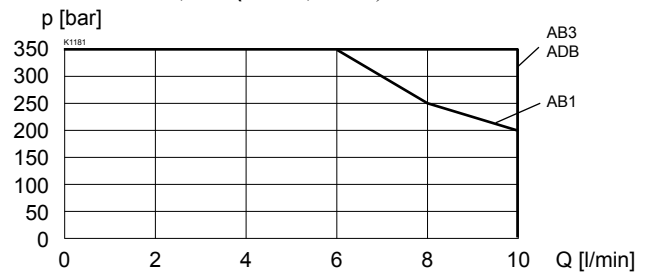


CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

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



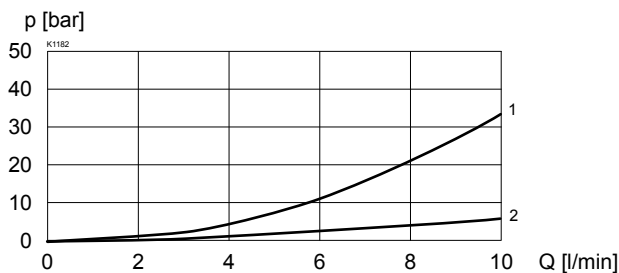
$p = f(Q)$ Performance limit
bei $P \geq 0,62W$ (64 mA, 152 Ω)



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.

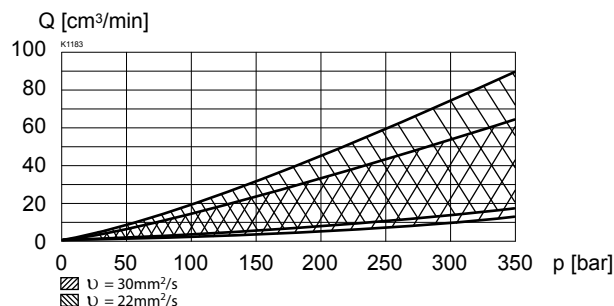
In case of a continuous flow through, the throttle or orifice, depending on the system behaviour, an additional heating-up of the valve is possible. This has to be appropriately taken into account by the user.

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



Symbol	Volume flow direction				
	P - A	P - B	P - T	A - T	B - T
AB1	1	1	-	1	1
AB3	1	1	-	1	1
ADB/AD1/DB2	1	1	-	2	2

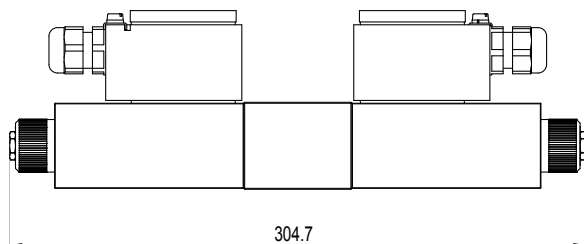
$Q_L = f(p)$ Leakage volume flow characteristics
P \rightarrow T



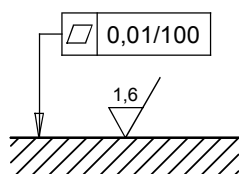
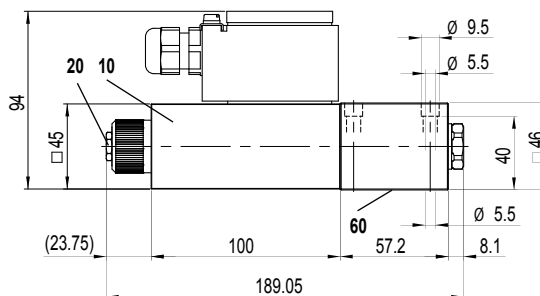
DIMENSIONS

4/3-way valve (spring centred)

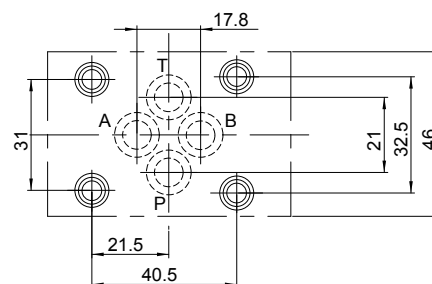
4/2-way valve (impulse)



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
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