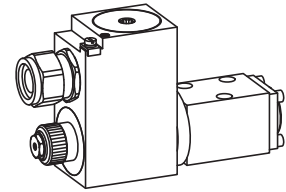


Solenoid operated spool valve

- 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®

II 2 G Ex d II C
II 2 D Ex tD A21 IP65

DESCRIPTION

Spool valve flange type NG6 with four connections. Direct operated solenoid spool valve in 5-chamber-system. Activated with explosion-proof solenoid. Spool detented or with spring reset. Wet pin solenoid precise spool adaptation, low leak, long service life time. Spool made of hardened steel valve body made of high grade hydraulic cast iron. The solenoid spool is zinc-/nickel-coated.

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

Ex: In accordance with European standards EN 60079-0, EN 60079-1 (gas)

EN 61241-0, EN 61241-1 (dust)

d: Flameproof enclosures

tD: Protection by enclosure

Device group II:

For all explosion-hazard zones, except mining

Gas group IIC: Gas groups IIA + IIB included

Device category 2G: For zones 1 and 2 (gas)

Device category 2D:

For zones 21 and 22 (dust)

Zones: 1/21 and 2/22

EC-type examination certificate:

PTB 07 ATEX 1023

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 detentings.

• 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

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. These valves are suitable for explosion-hazard areas in off-shore and ship-building applications as well as in the chemical-, oil- and gas industry.

TYPE CODE

International mounting interface ISO	B	EXd	4		-		-		#	
Explosion-proof execution										
Number of control ports										
Description of symbols acc. to table 1.3-23/2										
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								
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 M5 x 40 or M5 x 50 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 $U_N < 20V$, 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)
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	$p_{Tmax} = 100 \text{ bar}$
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	IP65/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 11...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

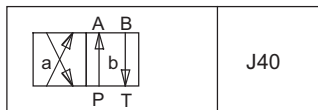
Tightening torque of the coil fixing nut $M_0 = 15 \text{ Nm}$. For stack assembly please observe the remarks in the operating instructions.

DESIGNATION

Execution L9:	II 2 G Ex d IIC T6	$T_a = -25...40^\circ\text{C}$
	II 2 D Ex tD A21 IP65 T80 °C	
	II 2 G Ex d IIC T4	$T_a = -25...90^\circ\text{C}$
	II 2 D Ex tD A21 IP65 T130 °C	
Execution L15:	II 2 G Ex d IIC T4	$T_a = -25...70^\circ\text{C}$
	II 2 D Ex tD A21 IP65 T130 °C	

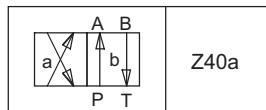
TYPE LIST/DESIGNATION OF SYMBOLS

4/2-way valve impulse

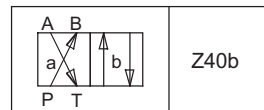


4/2-way valve with spring reset

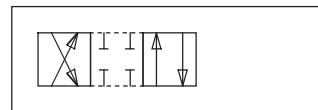
Operation A-side



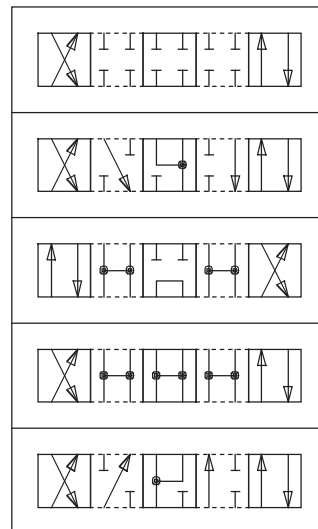
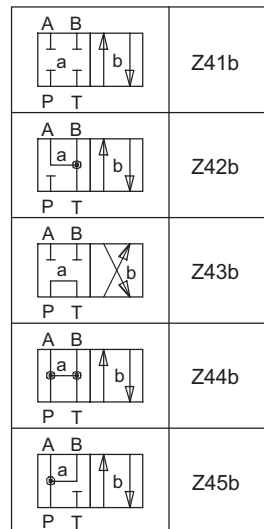
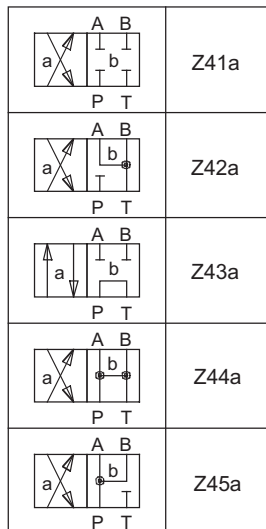
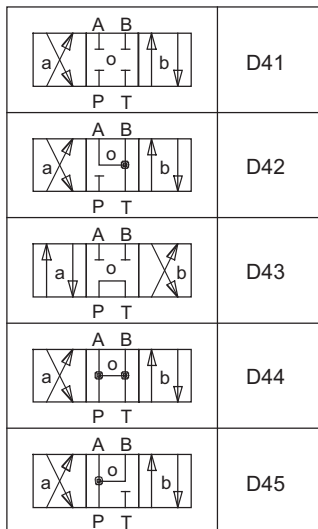
Operation B-side



Transitional functions

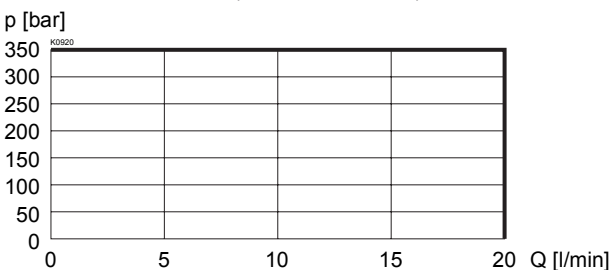


4/3-way valve spring centred

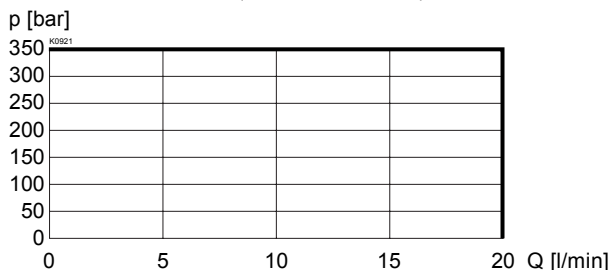

CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$
 $p = f(Q)$ Power limits in case of the standard voltage -10 %

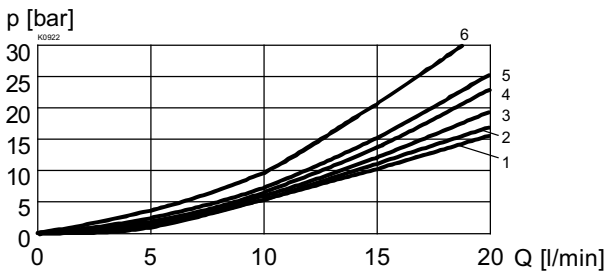
Execution L9/90° on request
Execution L15

(measured at 50 °C)

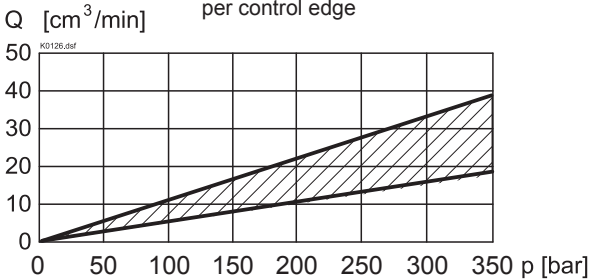


Execution L9

(measured at 40 °C)

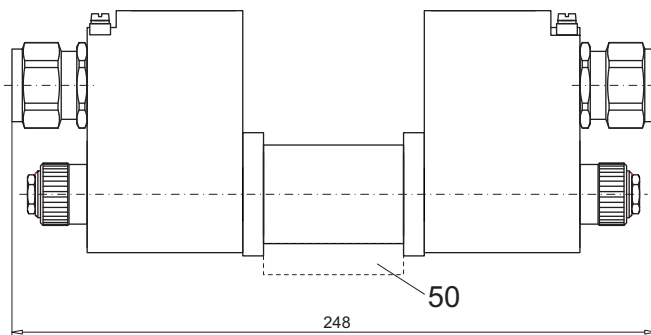


$\Delta p = f(Q)$ Pressure drop volume flow characteristics


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

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

 Enveloping curve for spool J40/Z40/D41/D42/D44/D45

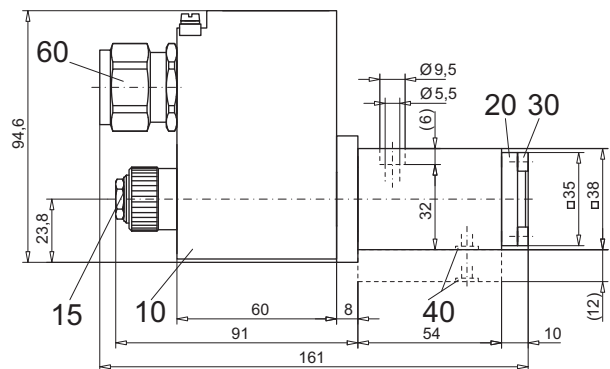
DIMENSIONS

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


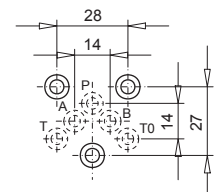
Dimensions of the solenoid coil, refer to data sheet 1.1-183

Order distance plate BDP4/12 separately

4/2-way valve (spring offset)


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

Technical explanation see data sheet 1.0-100