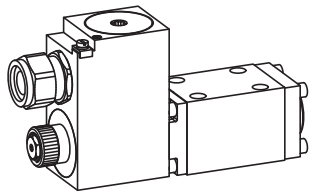
Solenoid operated spool valve
- **4/2-way impulse version, detented**
- **4/3-way with spring centred centre position**
- **4/2-way spring reset**
- **Q_{max} = 50 l/min, p_{max} = 350 bar**

NG6
ISO 4401-03

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 fit, low leak, long service life time. Spool made of hardened steel. Valve body made of high grade hydraulic cast iron. The solenoid coil 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 valve detented:
Two solenoids and two detented positions. With the solenoid de-energised, the spool remains in the last switched position.
• 4/3-way spool valve:
Two solenoids and three positions, spring centred. With the solenoids de-energised, the spool returns to the centre position by spring force.
• 4/2-way spool valve:
One solenoid and two 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

A EXd 4 ☐ - ☐ / ☐ # ☐

International mounting interface ISO			
Explosion-proof solenoid			
Number of control ports			
Description of symbols acc. to table 1.3-33/2			
Standard nominal voltage U_N	12 VDC	G12	
	24 VDC	G24	
	115 VAC	R115	
	230 VAC	R230	
			Ambient temp. by:
Nominal power P_N:	9W	L9	40 °C or 90 °C
	15W	L15	70 °C
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
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 Nm (quality 8.8)
Weight: 4/2-way impulse	m = 4,6 kg
4/3-way	m = 4,6 kg
4/2-way (1 solenoid)	m = 2,8 kg

HYDRAULIC SPECIFICATIONS

Fluid	Mineral oil, other fluid on request
Contamination efficiency	ISO 4406:1999, classe 20/18/14 (Required filtration grade ß10...16≥75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s...320 mm²/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 bar
Tank pressure in port T	p_{Tmax} = 100 bar
Max. volume flow	Q_{max} = 50 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 VDC, 24 VDC, 115 VAC, 230 VAC AC = 50 to 60 Hz ±2%; with built-in two-way rectifier and recovery diode
Voltage tolerance	±10% of rated voltage
Protection class	IP65 / 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 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

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

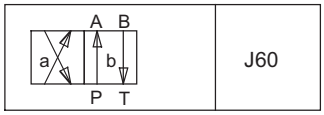
Tightening torque of the coil fixing nut M_D = 15 Nm. For stack assembly please observe the remarks in the operating instructions.

DESIGNATION

Execution L9:	II 2 G Ex d IIC T6	Ta = -25...40 °C
	II 2 D Ex tD A21 IP65 T80 °C	
	II 2 G Ex d IIC T4	Ta = -25...90 °C
	II 2 D Ex tD A21 IP65 T130 °C	
Execution L15:	II 2 G Ex d IIC T4	Ta = -25...70 °C
	II 2 D Ex tD A21 IP65 T130 °C	

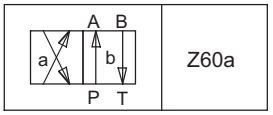
TYPE LIST / DESIGNATION OF SYMBOLS

4/2-way valve impulse



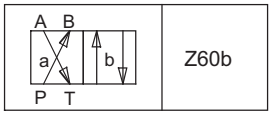
J60

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



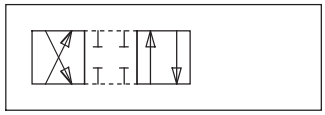
Z60a

Operation B-side

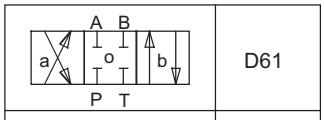
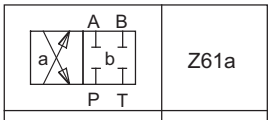
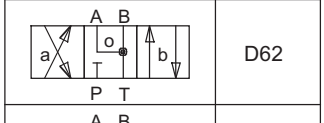
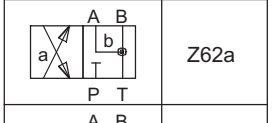
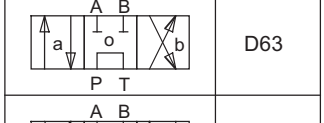
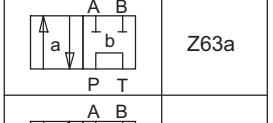
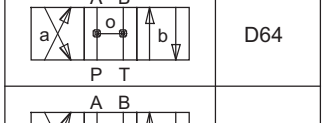
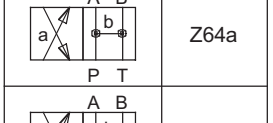
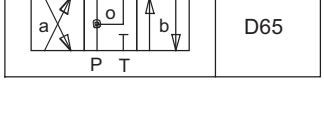
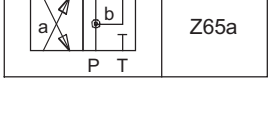


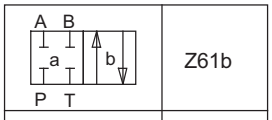
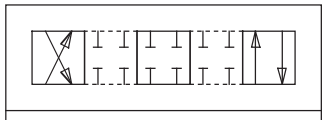
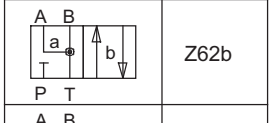
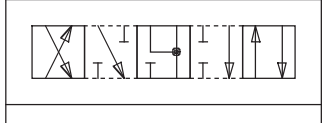
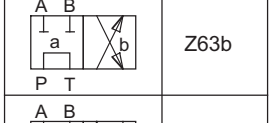
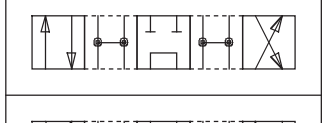
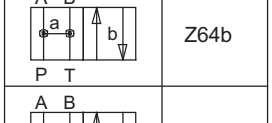
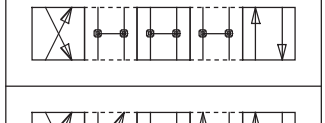
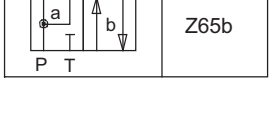
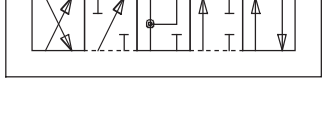
Z60b

Transitional functions



4/3-way valve spring centred

	D61		Z61a
	D62		Z62a
	D63		Z63a
	D64		Z64a
	D65		Z65a

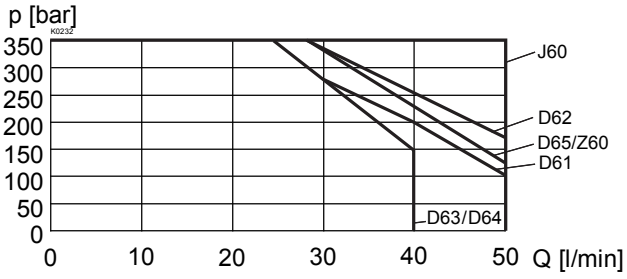
	Z61b	
	Z62b	
	Z63b	
	Z64b	
	Z65b	

CHARACTERISTICS Oil viscosity υ = 30 mm²/s

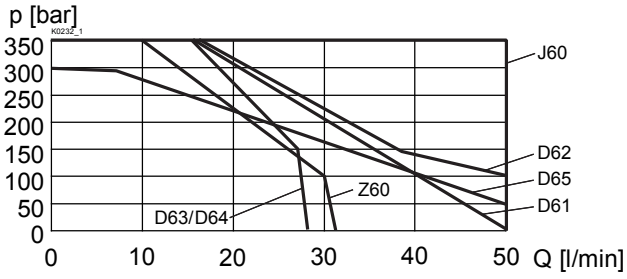
Execution L9/90 °C on request

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

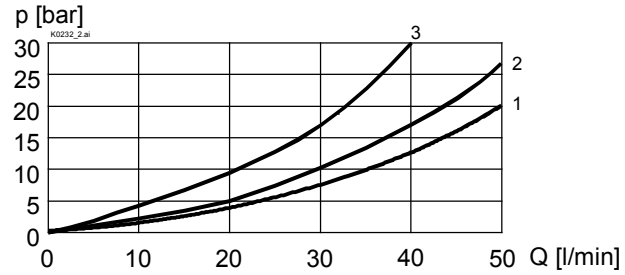
Execution L15 (measured at 50 °C)



Execution L9 (measured at 40 °C)

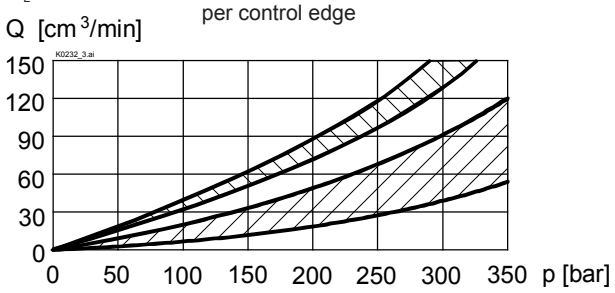


Δp = f (Q) Pressure drop volume flow characteristics



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
D61/Z61	2	2	-	2	2
D62/Z62	2	2	-	2	2
D63/Z63	2	2	3	2	2
D64/Z64	1	1	-	1	1
D65/Z65	1	1	-	2	2

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

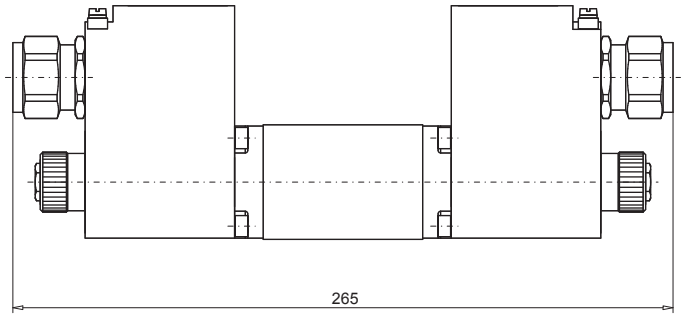


Leakage envelope J60 / Z60 / D61 / D62 / D64 / D65

Leakage envelope D63

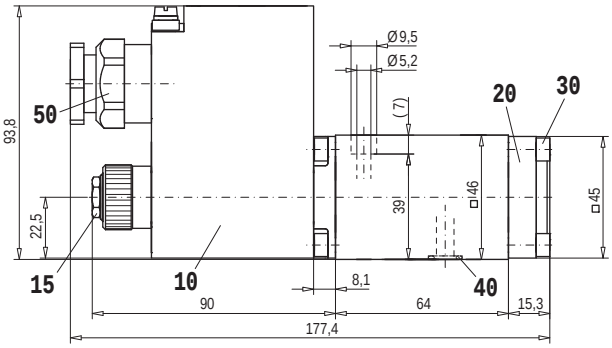
DIMENSIONS

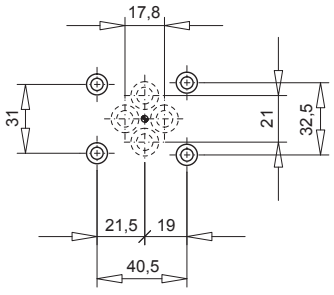
4/3-way valve (spring centred)
4/2-way valve (impulse)



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....	Spool MKY45/18 x 60-...
15	253.8000	Plug with integrated manual override HB4,5
20	058.4200	Cover
30	246.2117	Socket head cap screw M5x16 DIN 912
40	160.2093	O-ring ID 9,25x1,78
50	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