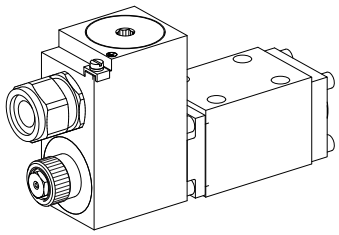
Proportional directional valve
- **not pressure compensated**
- **Q_{max} = 35 l/min**
- **$Q_{N\,max}$ = 25 l/min**
- **p_{max} = 350 bar**

NG6
ISO 4401-03

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



DESCRIPTION
Direct operated proportional spool valve in flange design NG6 acc. to ISO 4401-03 / 7790 with 4 ports. The spool valve is designed to the 5 chamber principle. The volume flow is adjusted by an explosion proof proportional solenoid of Wandfluh. Low pressure drop due to the body design and spool profiling. The spool is made of hardened steel. The valve body made of a high quality casting for hydraulic systems is spray-coated with a two-component varnish.
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
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
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. These valves are suitable for hazardeous areas in off-shore and ship-building applications as well as in chemical, oil and gas industry.

TYPE CODE
WD B F A06 - ☐ - ☐ - ☐ - ☐ - ☐ # ☐

- Proportional Spool valve, direct operated
- Proportional explosion proof, execution Ex d II C
- Flange construction
- International standard interface ISO, nominal size 6
- Description of symbols acc. to table 1.10-77/2

Nominal volume flow Q_N:	5 l/min	5	
	10 l/min	10	
	16 l/min	16	
	25 l/min	25	
Standard nominal voltage U_N:	12 VDC	G12	
	24 VDC	G24	
Execution:	15W	L15	Ambient temp. up to 70 °C
	9W	L9	40 °C or 90 °C

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 Nm (screw qual. 8.8)
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 ß 6…10≥75) refer to data sheet 1.0-50/2
Viscosity range	12 mm²/s…320 mm²/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 bar (connections P, A, B)
Tank pressure	p_{max} = 160 bar (connection T)
Nominal volume flow at 20 bar valve pressure drop	Q_N = 5 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
Max. volume flow	see characteristics
Leakage volume flow	on request
Hysteresis	L15/70 °C: ≤ 10% ∗ L9/40 °C: ≤ 12% ∗ L9/90 °C: ≤ 14% ∗ ∗ 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	L15/70 °C: I_G =	890 mA	445 mA
	L9/40 °C: I_G =	610 mA	305 mA
	L9/90 °C: I_G =	530 mA	265 mA
Voltage tolerance	+ 10 % of with respect to nominal voltage		
Relative duty factor	100% DF		
Protection class	IP65 / IP67 acc. to EN 60 529		
Connection / Power supply	Through cable gland for cable ∅ 11…14 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.

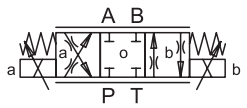
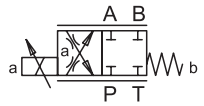
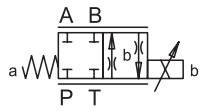
INSTALLATION

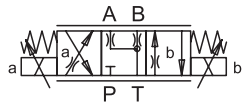
Tightening torque of the coil fixing nut M_D = 15 Nm. For stack assembly please observe the remarks in the operating instructions.

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 CHARTS / DESIGNATIONS OF SYMBOLS

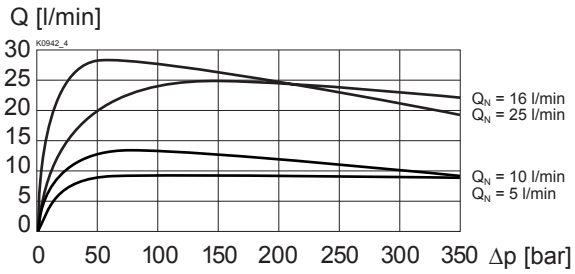
	ACB - S S = Symmetrical control mode
	AC1 - S S = Symmetrical control mode
	CB2 - S S = Symmetrical control mode

	ADB - V V = Meter-in control mode

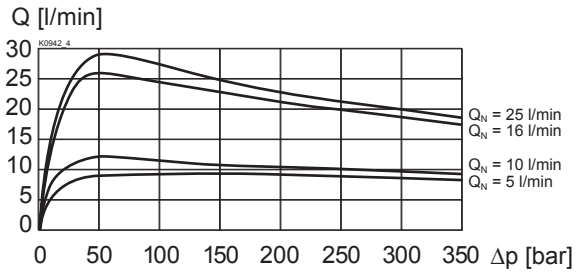
CHARACTERISTICS oil viscosity υ = 30 mm²/s

Execution L15 (measured at 50 °C)

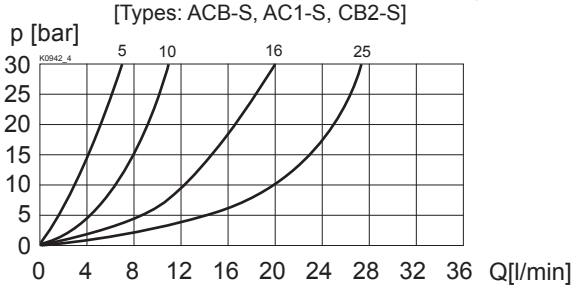
Q = f (p) Volume flow pressure characteristics ($I = I_G$)
[Types: ACB-S, AC1-S, CB2-S]



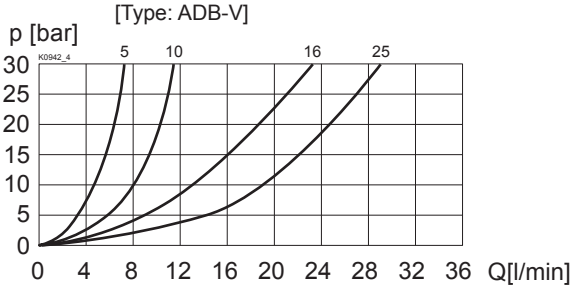
Q = f (p) Volume flow pressure characteristics ($I = I_G$)
[Type: ADB-V]



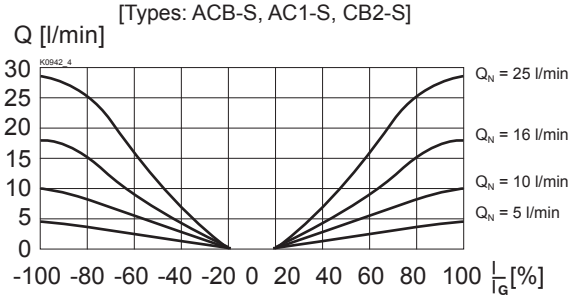
Δp = f (Q) Pressure loss / flow characteristics ($I = I_G$)
[Types: ACB-S, AC1-S, CB2-S]



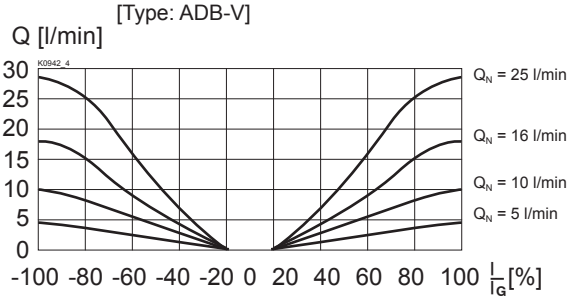
Δp = f (Q) Pressure loss / flow characteristics ($I = I_G$)
[Type: ADB-V]



Q = f (I) Volume flow adjustment characteristics (Δp = 10 bar)
[Types: ACB-S, AC1-S, CB2-S]

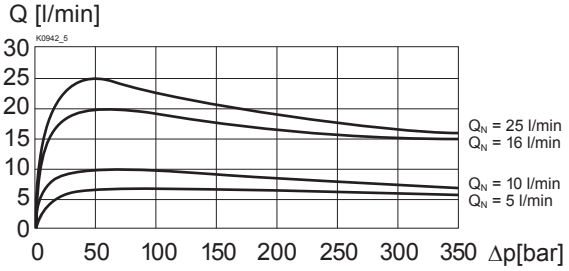


Q = f (I) Volume flow adjustment characteristics (Δp = 10 bar)
[Type: ADB-V]

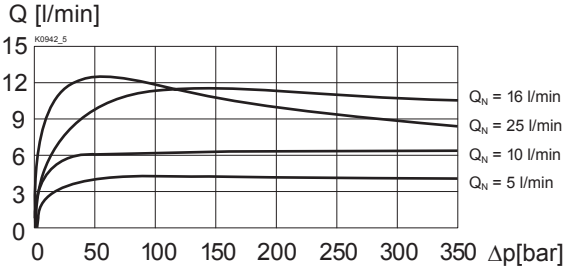


Execution L9/40°C (measured at 40 °C)

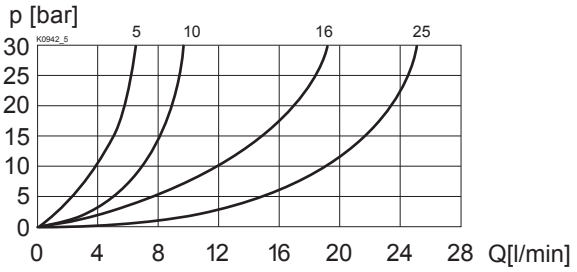
Q = f (p) Volume flow pressure characteristics (I = I_G)
[Types: ACB-S, AC1-S, CB2-S]



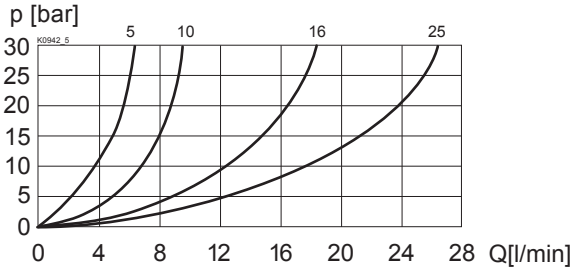
Q = f (p) Volume flow pressure characteristics
[Type: ADB-V]



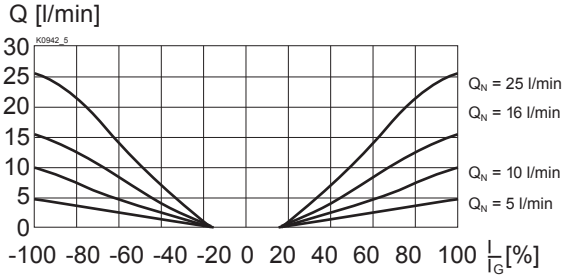
Δp = f (Q) Pressure loss / flow characteristics (I = I_G)
[Types: ACB-S, AC1-S, CB2-S]



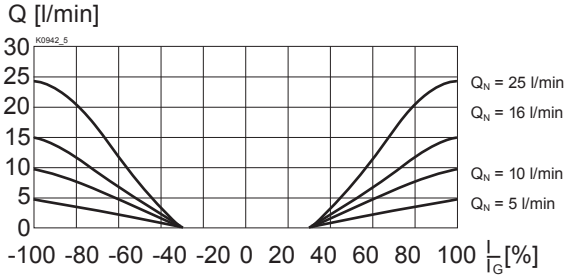
Δp = f (Q) Pressure loss / flow characteristics (I = I_G)
[Type: ADB-V]



Q = f (I) Volume flow adjustment characteristics (Δp = 10 bar)
[Types: ACB-S, AC1-S, CB2-S]



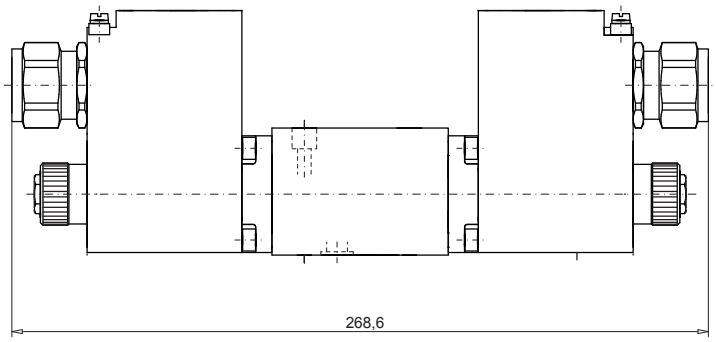
Q = f (I) Volume flow adjustment characteristics (Δp = 10 bar)
[Type: ADB-V]



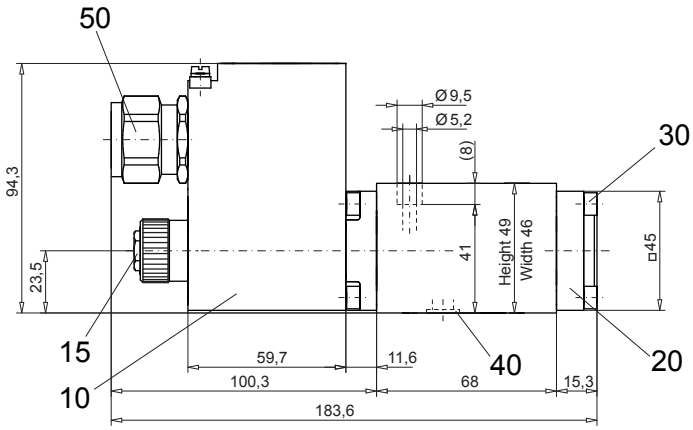
NOTE!
All values were measured over 2 control edges.
The connections A and B were short-circuited.

DIMENSIONS

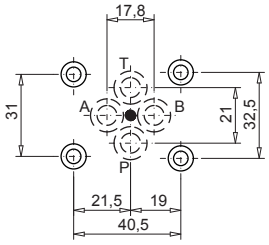
4/3-way valve



4/2-way valve



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



PARTS LIST

Position	Article	Description
10	263.6...	Spool MKY45/18x60-...
15	253.8000	Plug with integrated manual override HB4,5
20	058.4211	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

Sub-plates	Register 2.9
Proportional-amplifier	Register 1.13

Technical explanation see data sheet 1.0-100