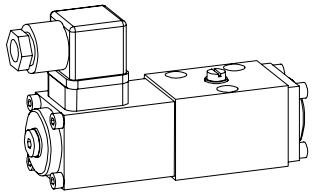
Solenoid operated spool valve with soft switching
- **4/2-way with 2 solenoids**
- **4/3-way with spring centred mid position**
- **4/2-way with spring reset**
- **Q_{max} = 10 l/min, p_{max} = 315 bar**

NG4-Mini®



DESCRIPTION

Spool valve with soft switching, NG4-Mini flange construction in accordance to Wandfluh-standard with 4 connections. Solenoids to norme VDE 0580. Direct solenoid operated spool valve with a 5 annular chamber body design. The valve's with soft switching characteristic is achieved by means of an optimum combination of removable oriffice and pistion design. Solenoid wet pin oil immersed armature type. Precision honed spool for low leakage. Low pressure drop due to the body design and spool profiling. Spool is of hardened steel, body is of high grade hydrau-lic cast iron for long service life. Wide range of standard and special voltages in 2 solenoid versions. The body made of high grade hydraulic casting for long service life is painted. The cover and the solenoid are zinc coated.

FUNCTION

The solenoid shifts the spool into the corresponding position.
• 4/2-way
Two solenoids and 2 switch settings. 100% ED holds the switch setting on the solenoid (no mechanical detente).
• 4/3-way spool valve:
2 solenoids and 3 spool positions, spring centered. With the solenoids deenergised the spool returns to the center position.
• 4/2-way spool valve:
1 solenoid and 2 spool positions, spring offset. With the solenoid deenergised the spool returns to the offset position.

APPLICATION

Normal solenoid spool valves switch very quickly. This can induce shocks in the hydraulic system which can cause mechanical wear and have a negative effect on performance. The soft switching valves slow down and dampen the switching movements. All starting, stopping and oscillating movements are done softly, which benefits the system. Optimum results can be achieved if all ports are connected and the valve is properly bleed of air. Individual settings are available on request.
Important: at the time the valve is taken into service, the valve must be vented under pressure (max. 2 revolutions of screw E).

CONTENT

GENERAL SPECIFICATIONS 1
HYDRAULIC SPECIFICATIONS 1
ELECTRICAL CONTROL 2
SOLENOID DESCRIPTION 2
TYPE LIST/
DESIGNATIONS OF SYMBOLS 2
CHARACTERISTICS 3
DIMENSIONS 3
SHIFTING TIMES 4
PARTS LIST 4
ACCESSORIES 4

TYPE CODE

B ☐ W 4 ☐ - ☐ / ☐ # ☐

Interface				
Economy-solenoid	E			
Medium-solenoid	M			
Soft switching				
Number of control ports				
Description of symbols acc. to table 1.4-11/2				
Standard- nominal voltage U_N:	12 VDC	G12	110 VAC	R110
	24 VDC	G24	115 VAC	R115
			230 VAC	R230
Orifice area:	Ø 0,3	Standard type no remark		
	Ø 0,2	0,2		
Design-Index (Subject to change)				

GENERAL SPECIFICATIONS

Description	4/2-, 4/3-way spool valve
Nominal size	NG4-Mini to Wandfluh-standard
Construction	Direct operated spool valve
Operations	Solenoid
Mounting	Flange 3 fixing holes for socket head cap screw M5x40
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...+50°C
Mounting position	any, preferably horizontal
Fastening torque	M_D= 5,5 Nm (screw quality 8.8)

Weight	Economy	Medium
4/2-way (2 solenoid)	m = 1,2 kg	m = 1,4 kg
4/3-way	m = 1,2 kg	m = 1,4 kg
4/2-way (1 solenoid)	m = 0,83 kg	m = 0,93 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
Fluid temperature	-20...+70°C
Working pressure in port P, A, B	Economy: p_{max} = 250 bar Medium: p_{max} = 315 bar
Tank pressure in port T	p_{max} = 100 bar
Max. volume flow	Q_{max} = 10 l/min, see characteristics
Leakage volume flow	see characteristics

ELECTRICAL CONTROL

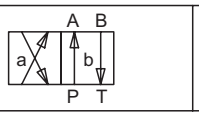
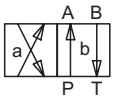
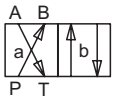
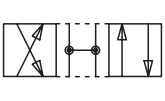
Construction	Solenoid, wet pin push type, pressure tight
Standard-nominal voltage	U_N = 12 VDC, 24 VDC U_N = 110 VAC∗, 115 VAC∗, 230 VAC∗ AC = 50 to 60 Hz ∗ Rectifier integrated in the plug, other nominal voltages and nominal performances on request.
Voltage tolerance	±10% of nominal voltage
Protection class	IP 65 to EN 60 529
Relative duty factor	100% DF (see data sheet 1.1-430)
Switching cycles	Since switching is damped and slow, the switching frequency is of secondary importance.
Operating life	10^7 (number of switching cycles, theoretically)
Connection/Power supply	Over device plug connection to ISO 4400/ DIN 43650, (2P+E), other connections on request.

SOLENOID DESCRIPTION

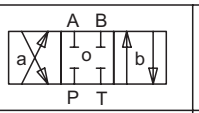
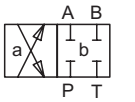
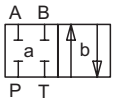
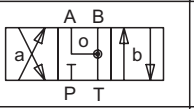
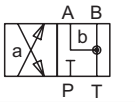
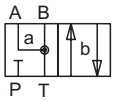
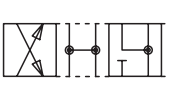
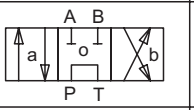
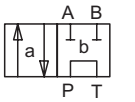
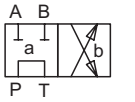
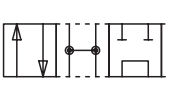
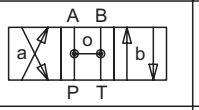
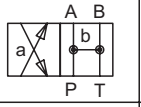
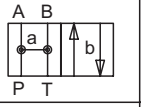
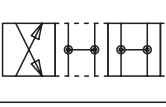
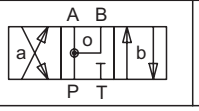
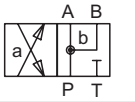
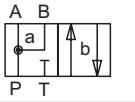
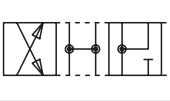
With respect to the selection of the solenoid, the following statements are important:

- The solenoid is the most expensive component of the solenoid spool valve.
- For this reason, it is not economical to use the same solenoid for all applications.
- Depending on the application, sales area, and customer, the requirements for solenoid spool valves and solenoids differ very considerably.
- In order to be able to offer the customer an optimum, we can supply our solenoid spool valves NG4 in 2 different versions:
  - Economy BEIIV (data sheet 1.1-100)
  - Medium SIN35V (data sheet 1.1-105)

TYPE LIST / DESIGNATION OF SYMBOLS

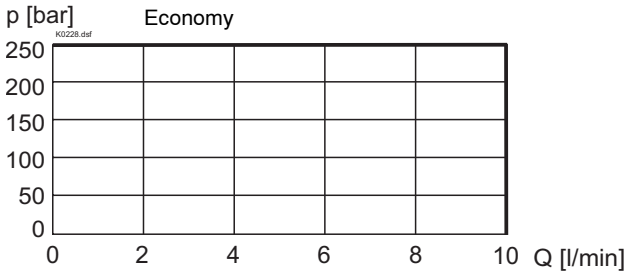
4/2-way valve with 2 solenoids	4/2-way valve with spring reset operation A-side	operation B-side	Transitional functions
 J40	 Z40a	 Z40b	

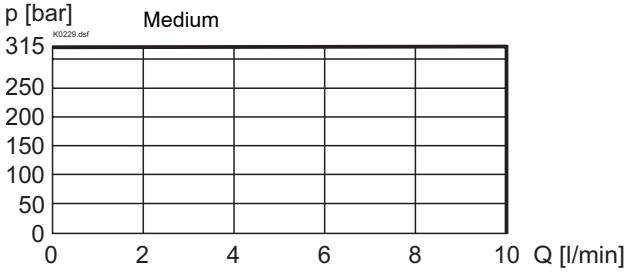
4/3-way valve spring centered

 D41	 Z41a	 Z41b	
 D42	 Z42a	 Z42b	
 D43	 Z43a	 Z43b	
 D44	 Z44a	 Z44b	
 D45	 Z45a	 Z45b	

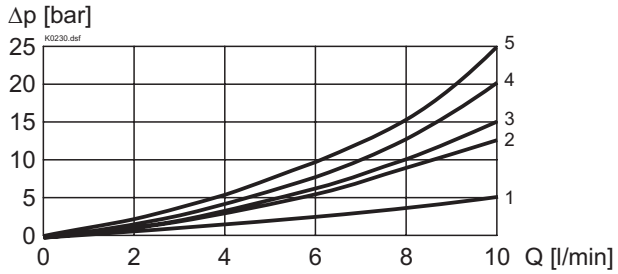
CHARACTERISTICS Oil viscosity υ = 30 mm²/s

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



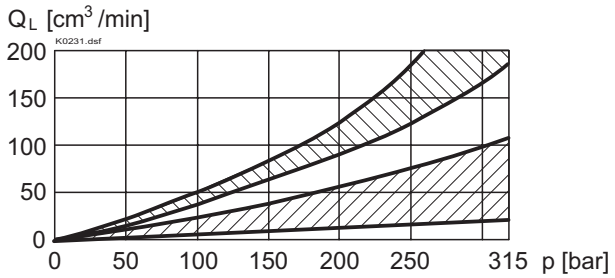


Δp = f (Q) Pressure drop volume flow characteristics



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

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

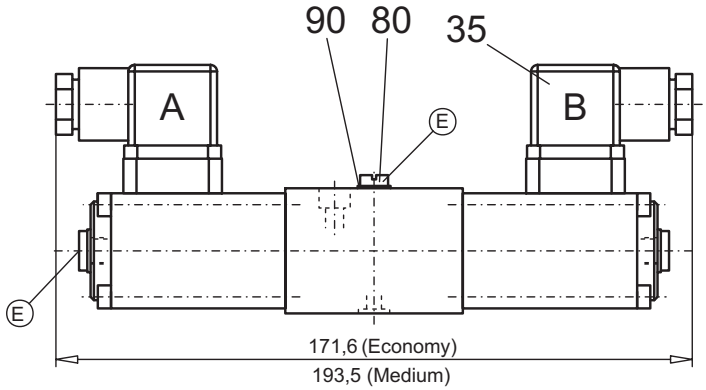


Leakage envelope D43/D44/D45

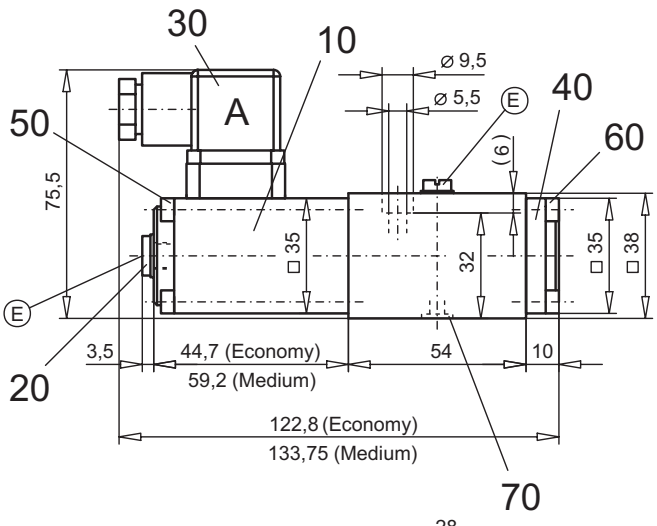
Leakage envelope J40/Z40/D41/D42

DIMENSIONS

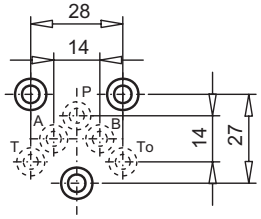
4/3-way valve (spring centered)
4/2-way valve (with 2 solenoids)



4/2-way valve (spring reset)



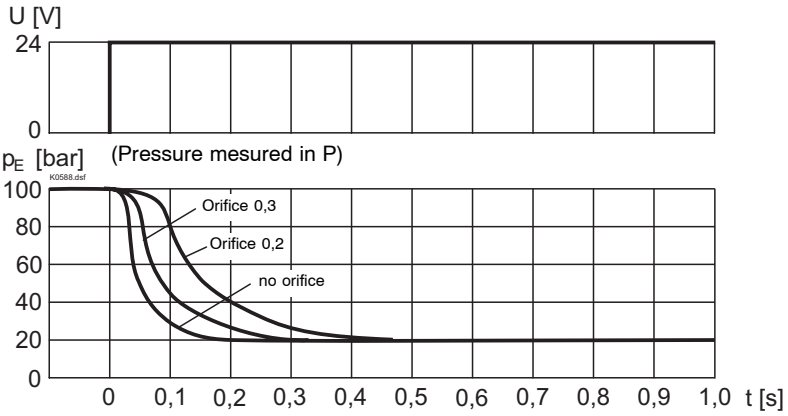
E = air bleed screw



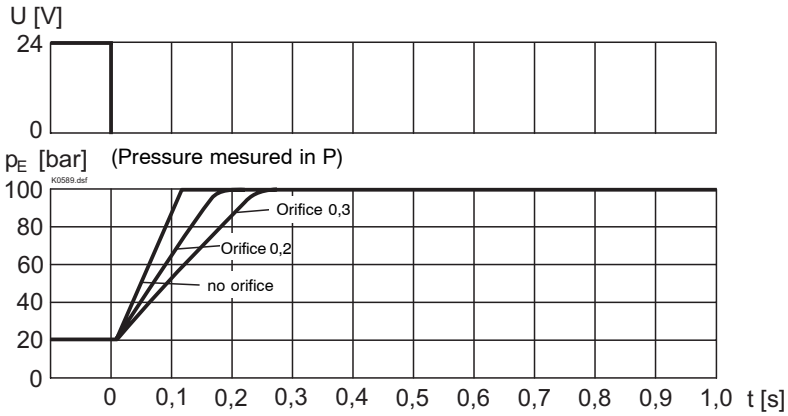
SHIFTING TIMES Influence of orifices on shifting

Mesured with BMW4D41-G24 Flow Q = 5 l/min

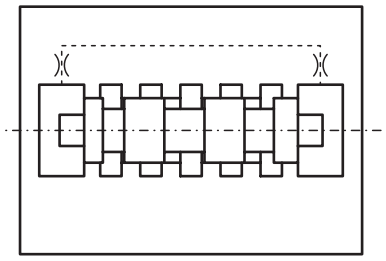
Solenoid energised



Solenoid deenergised



Orifices in valve body influence shifting time



PARTS LIST

Position	Article	Description
10	260.1 ... 260.4 ...	Economy-solenoid BEIIV Medium-solenoid SIN35V
20	239.2033	Plug HB0 (incl. seal)
30	219.2001	Plug A (grey)
35	219.2002	Plug B (black)
40	057.4202	Cover
50	246.1146 246.1161	Screw M4x45 DIN912 (for BEIIV) Screw M4x60 DIN912 (for SIN35V)
60	246.1113	Socket head cap screw M4x12 DIN 912
70	160.2052	O-ring ID 5,28x1,78
80	246.2006	Socket head cap screw M5x6 DIN84 A
90	049.2050	Bonded seal ID 5,7x10x1

ACCESSORIES

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

Technical explanation see data sheet 1.0-100E