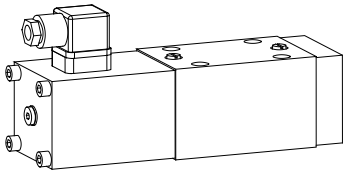
Solenoid operated spool valve with soft switching

- **4/2-way with 2 solenoids**
- **4/3-way with spring centred mid position**
- **4/2-way with spring reset**
- **Q_{max} = 80 l/min, p_{max} = 350 bar**

NG10
ISO 4401-05



DESCRIPTION

Direct operated solenoid valve with 4 ports in 5 chamber design. Spool with spring reset.
The valve's with soft switching characteristic is achieved by means of an optimum combination of removable oriffice and pistion design. Precise spool fit, low leakage, long life time. Spool made from hardened steel, body from high quality cast steel. Wide range of standard and special voltages.
The body made of high grade hydraulic casting for long service life is painted. The solenoid and the cover are zinc coated. The socket head screws are zinc coated.

FUNCTION

• 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.
Important: at the time the valve is taken into service, the valve must be vented under pressure (max. 2 revolutions of screw E).

TYPE CODE

A ☐ W 4 ☐ - ☐ / ☐ # ☐

International mounting interface ISO				
Medium-solenoid	M			
Super-solenoid	S			
Soft switching				
Number of control ports				
Description of symbols acc. to table				
Nominal voltage U_N	12 VDC	G12	110 VAC	R110
	24 VDC	G24	115 VAC	R115
			230 VAC	R230
Orifice area	Ø 0,5 mm (Standard)			
	Ø 0,7 mm	0,7		
	Ø 0,9 mm	0,9		
Design-Index (Subject to change)				

GENERAL SPECIFICATIONS

Description	4/2-, 4/3-way spool valve
Nominal size	NG10 to ISO 4401-05
Construction	Direct operated spool valve
Operations	Solenoid
Mounting	Flange 4 fixing holes for socket head screw M6 x 65
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...+50 °C
Mounting position	any, preferably horizontal
Fastening torque	M_D = 9,5 Nm (screw quality 8.8)
Weight:	
4/2-way (2 solenoid)	m = 6,0 kg
4/3-way	m = 6,0 kg
4/2-way (1 solenoid)	m = 4,5 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	p_{max} = 350 bar
Tank pressure in port T	Medium: p_{max} = 160 bar Super: p_{max} = 200 bar
Max. volume flow	Q_{max} = 80 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 43 650, (2P+E), other connections on request.

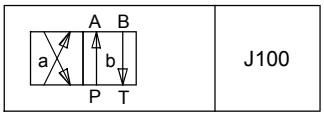
SOLENOID DESCRIPTION

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 NG10 in 2 different versions:
  - Medium SIN60V (data sheet 1.1-145)
  - Super SIS60V (data sheet 1.1-150)

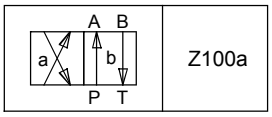
TYPE LIST / DESIGNATION OF SYMBOLS

4/2-way valve with 2 solenoids



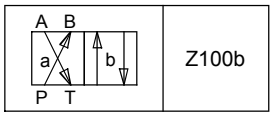
J100

4/2-way valve with spring reset, operation A-side



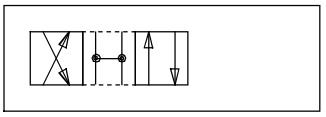
Z100a

operation B-side

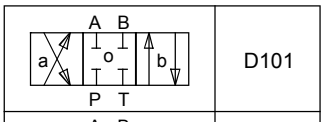
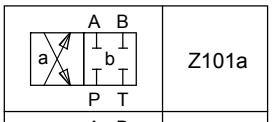
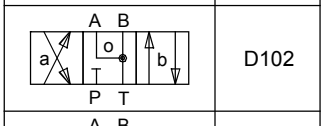
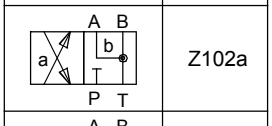
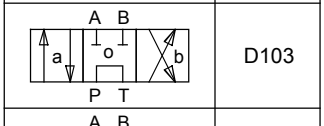
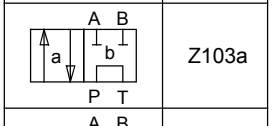
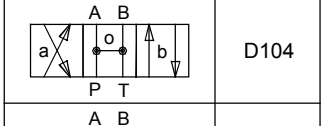
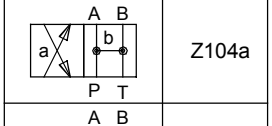
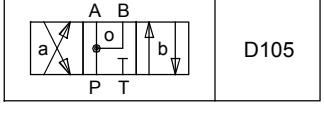
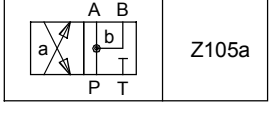


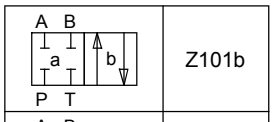
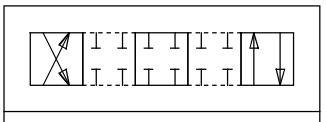
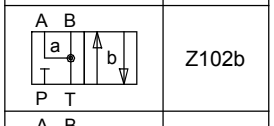
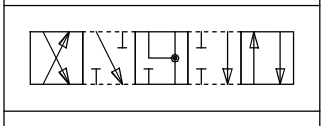
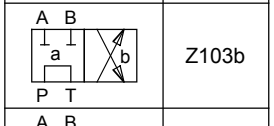
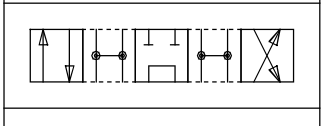
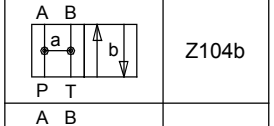
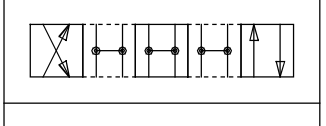
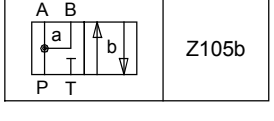
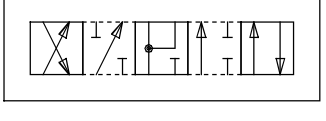
Z100b

Transitional functions



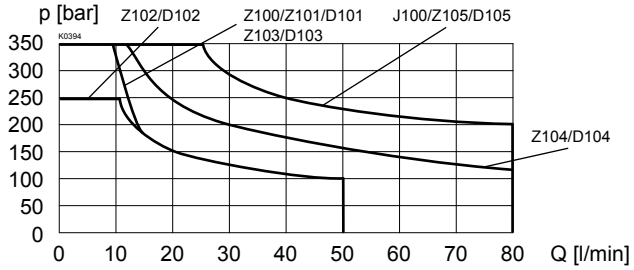
4/3-way valve spring centered

	D101		Z101a
	D102		Z102a
	D103		Z103a
	D104		Z104a
	D105		Z105a

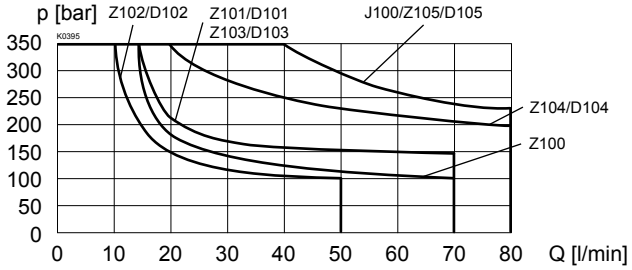
	Z101b		
	Z102b		
	Z103b		
	Z104b		
	Z105b		

CHARACTERISTICS Oil viscosity υ = 30 mm²/s

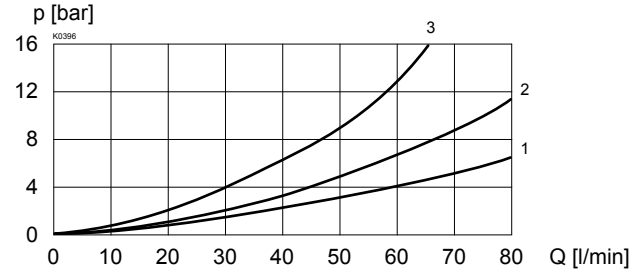
p = f (Q) Performance limits
with standard voltage -10%
Medium



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

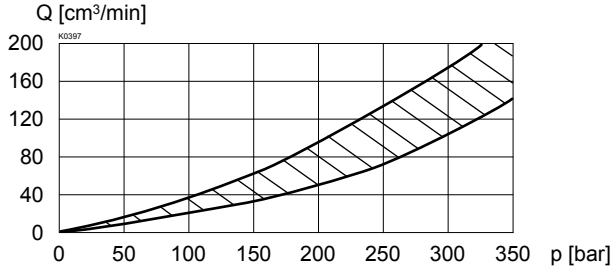


Δp = f (Q) Pressure drop volume flow characteristics

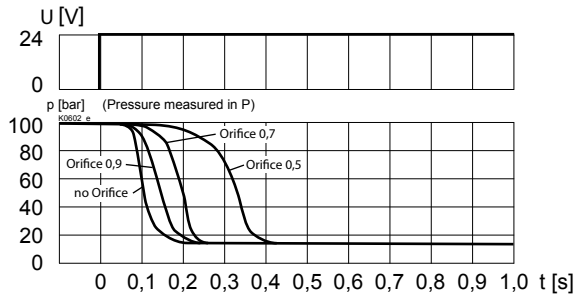


Pressure drop curve no. / Symbol	Volume flow direction P - A	P - B	P - T	A - T	B - T
Z100/J100	2	2	-	2	2
D101/Z101	2	2	-	2	2
D102/Z102	2	2	-	1	1
D103/Z103	3	3	2	3	3
D104/Z104	1	1	-	1	1
D105/Z105	1	1	-	2	2

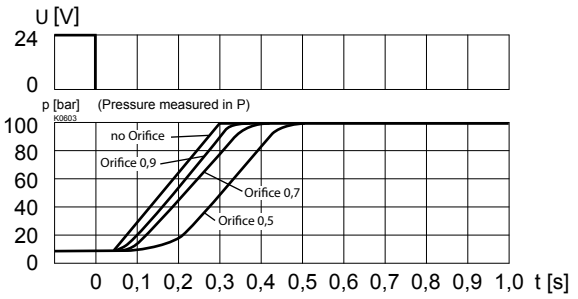
Q_L = f (p) Leakage volume flow characteristics
per control edge



Schifting times, Influence of orifices on shifting
Mesured with AMW4D101-G24, Q = 25 l/min
Solenoid energised

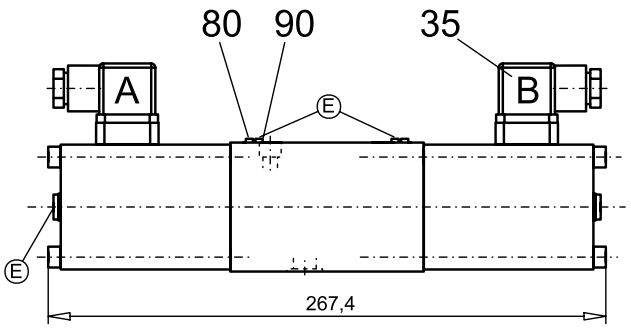


Schifting times, Influence of orifices on shifting
Mesured with AMW4D101-G24, Q = 25 l/min
Solenoid deenergised

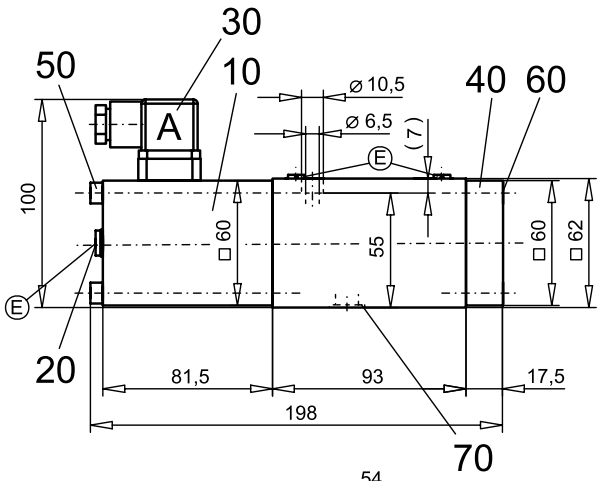


DIMENSIONS

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

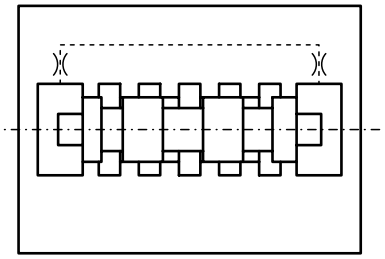


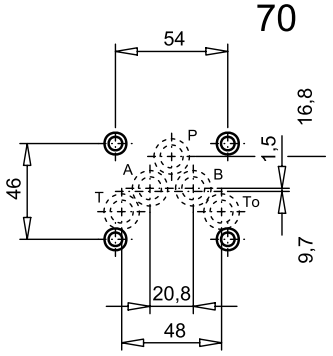
4/2-way valve (spring reset)



E = air bleed screw

Orifices in valve body influence shifting time





PARTS LIST

Position	Article	Description
10	260.8 ... 260.9 ...	Medium-solenoid SIN60V Super-solenoid SIS60V
20	239.2033	Plug HB0 (incl. seal)
30	219.2001	Plug A (grey)
35	219.2002	Plug B (black)
40	059.2201 059.2203	Cover Medium Cover Super
50	246.3190	Socket head screw M6x90 DIN912
60	246.3121	Socket head screw M6x20 DIN912
70	160.2140	O-ring ID 14,00x1,78
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 1.0-100