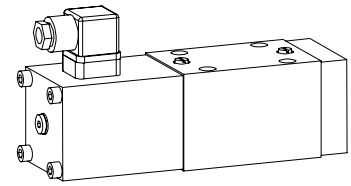


**Solenoid operated spool valve with soft switching**

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

**NG10**  
 ISO 4401-05

**DESCRIPTION**

Spool valve with soft switching, NG10 flange construction in accordance to ISO 4401-05 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 orifice and piston 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 hydraulic 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**

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**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 1.4-40/2							
Standard- nominal voltage $U_N$ :	12 VDC	G12	110 VAC	R110			
	24 VDC	G24	115 VAC	R115			
			230 VAC	R230			
Orifice area:	Ø 0,5		Standard type no remark				
	Ø 0,7	0,7					
	Ø 0,9	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 cap screw M6x65
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...+50°C
Mounting position	any, preferably horizontal
Fastening torque	$M_0 = 9,5 \text{ Nm}$ (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 $\beta_{6...10} \geq 75$ ) refer to data sheet 1.0-50/2
Viscosity range	12 mm <sup>2</sup> /s...320 mm <sup>2</sup> /s
Fluid temperature	-20...+70°C
Working pressure in port P, A, B	$p_{max} = 350 \text{ bar}$
Tank pressure in port T	Medium: $p_{max} = 160 \text{ bar}$ Super: $p_{max} = 200 \text{ bar}$
Max. volume flow	$Q_{max} = 80 \text{ l/min}$ , see characteristics
Leakage volume flow	see characteristics

**ELECTRICAL CONTROL**

Construction Solenoid, wet pin push type, pressure tight  
 Standard-nominal voltage  $U_N = 12 \text{ VDC}, 24 \text{ VDC}$   
 $U_N = 110 \text{ VAC}^*, 115 \text{ VAC}^*, 230 \text{ VAC}^*$   
 $AC = 50 \text{ to } 60 \text{ Hz}$   
 \* Rectifier integrated in the plug, other nominal voltages and nominal performances on request.  
 Voltage tolerance  $\pm 10\%$  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.

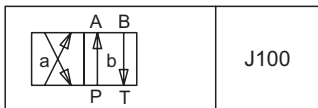
**SOLENOID DESCRIPTION**

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

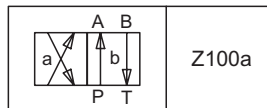
- The solenoid is the most expensive component of the solenoid spool valve.
- For this reason, it is not economical to use the same solenoid for all applications.
- Depending on the application, sales area, and customer, the requirements for solenoid spool valves and solenoids differ very considerably.
- 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**

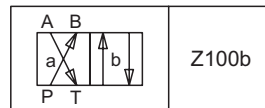
4/2-way valve with 2 solenoids



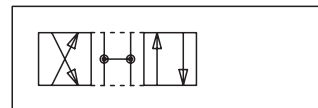
4/2-way valve with spring reset operation A-side



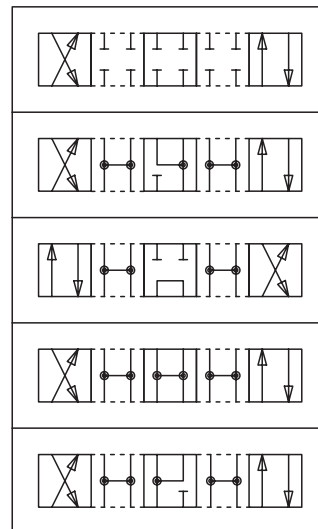
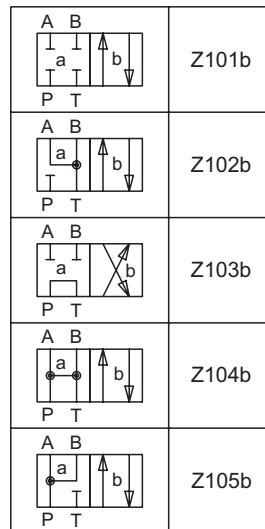
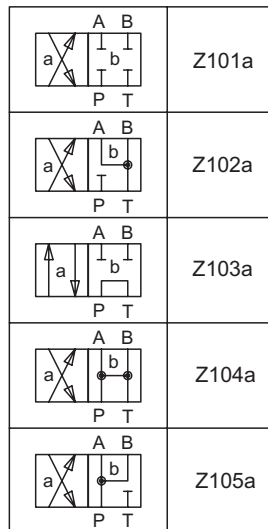
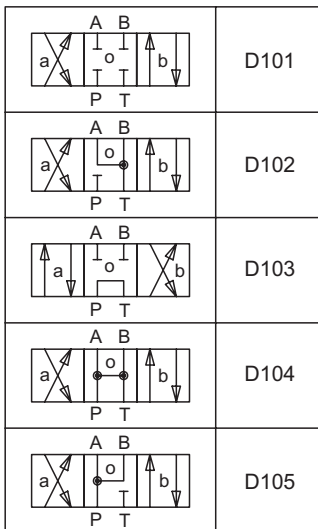
operation B-side

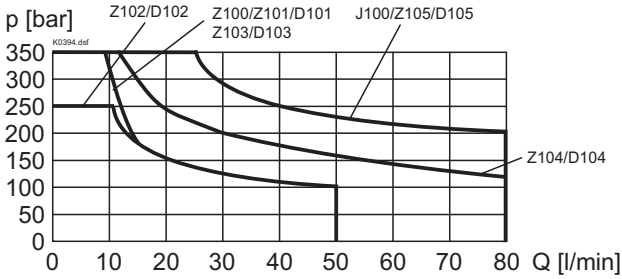


Transitional functions

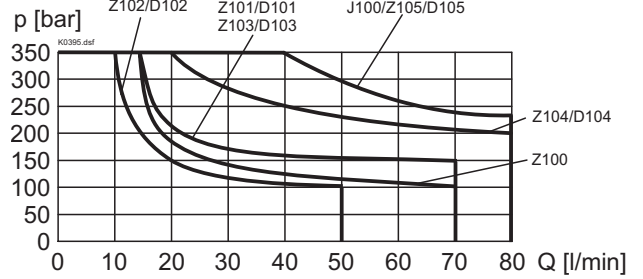
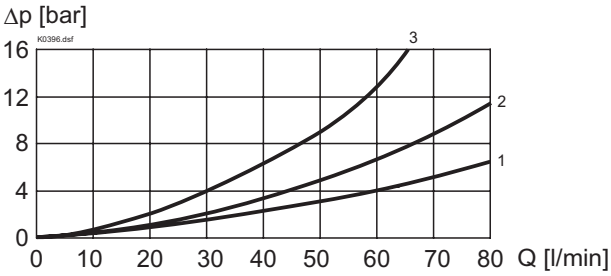


4/3-way valve spring centered

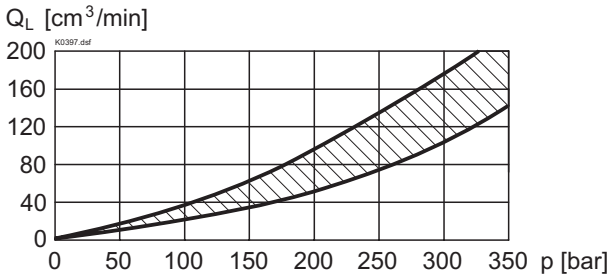


**CHARACTERISTICS** Oil viscosity  $\nu = 30 \text{ mm}^2/\text{s}$ 
 $p = f(Q)$  Performance limits with standard voltage -10%  
 Medium


Super

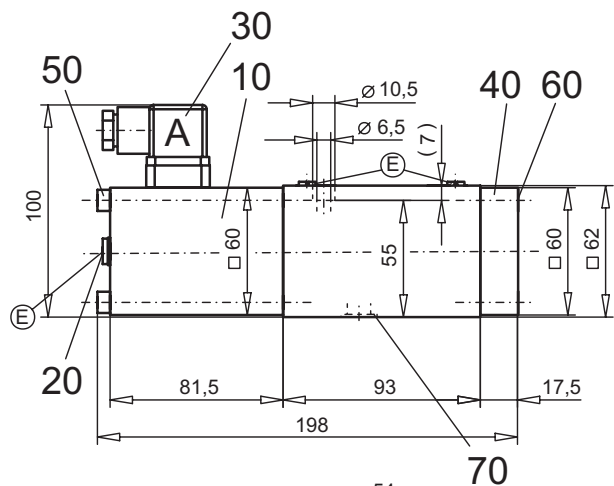
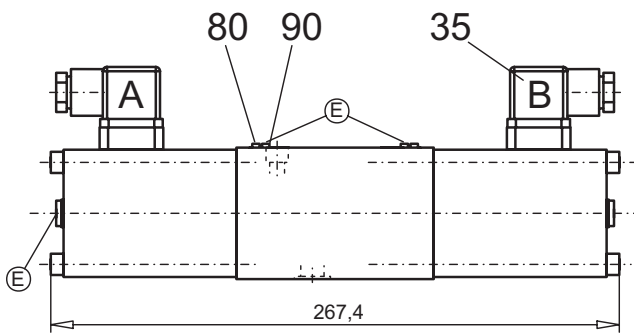

 $\Delta p = f(Q)$  Pressure drop volume flow characteristics


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

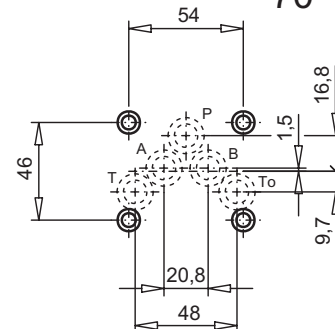
 $Q_L = f(p)$  Leakage volume flow characteristics per control edge

**DIMENSIONS**

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

4/2-way valve (spring reset)

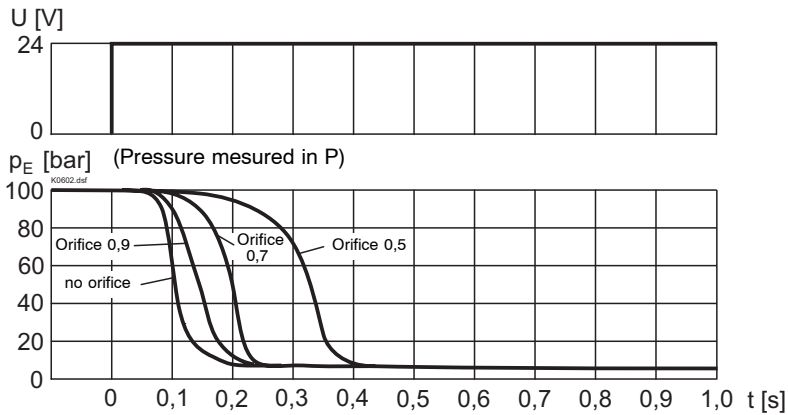


E = air bleed screw

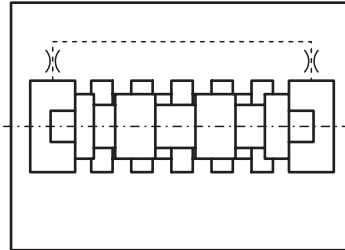


**SHIFTING TIMES** Influence of orifices on shifting  
 Measured with AMW4D61-G24 Flow Q = 7 l/min

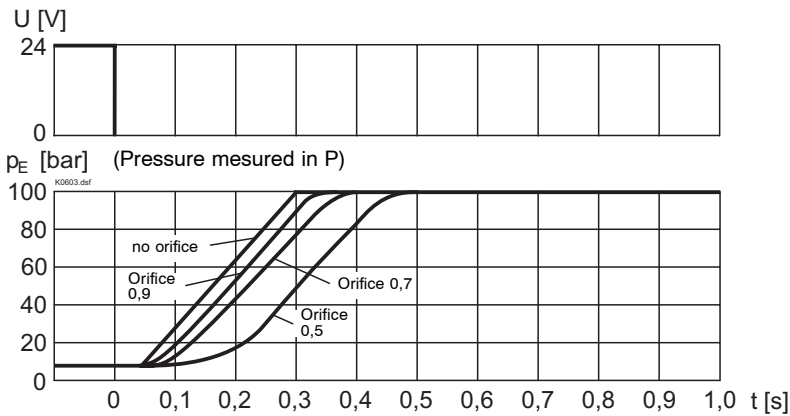
Solenoid energised



Orifices in valve body influence shifting time



Solenoid deenergised


**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 cap screw M6x90 DIN912
60	246.3121	Socket head cap 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 1.0-100E