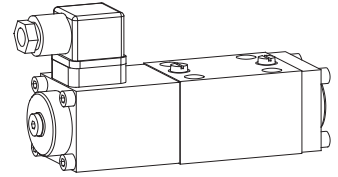


Solenoid operated spool valve with soft switching

- 4/2-way with 2 solenoids
- 4/3-way with spring centred mid position
- 4/2-way with spring reset
- $Q_{max} = 30 \text{ l/min}$, $p_{max} = 350 \text{ bar}$

NG6
ISO 4401-03



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 orifice and piston 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	<input type="checkbox"/> G12	110 VAC	<input type="checkbox"/> R110
	24 VDC	<input type="checkbox"/> G24	115 VAC	<input type="checkbox"/> R115
			230 VAC	<input type="checkbox"/> R230

Orifice area $\varnothing 0,3 \text{ mm}$ (Stand)
 $\varnothing 0,5 \text{ mm}$ 0,5

Design-Index (Subject to change)

GENERAL SPECIFICATIONS

Description	4/2-, 4/3-way spool valve
Nominal size	NG6 to ISO 4401-03
Construction	Direct operated spool valve
Operations	Solenoid
Mounting	Flange 4 fixing holes for socket head cap screw M5x45
Connections	Threaded connection plates Multi-flange subplates Longitudinal stacking system
Ambient temperature	-20...+50 °C
Mounting position	any, preferably horizontal
Fastening torque	$M_D = 5,5 \text{ Nm}$ (screw quality 8.8)
Weight:	
4/2-way (2 solenoid)	$m = 2,4 \text{ kg}$
4/3-way	$m = 2,4 \text{ kg}$
4/2-way (1 solenoid)	$m = 1,8 \text{ kg}$

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 ² /s...320 mm ² /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	$Q_{max} = 30 \text{ l/min}$, 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 60529
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.

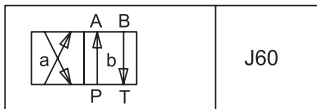
SOLENOID DESCRIPTION

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 NG6 in 2 different versions:
 - Medium SIN45V (data sheet 1.1-120)
 - Super SIS45V (data sheet 1.1-125)

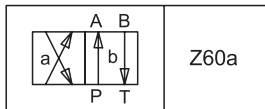
TYPE LIST / DESIGNATION OF SYMBOLS

4/2-way valve with 2 solenoids



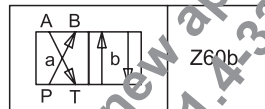
J60

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



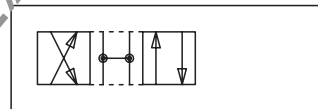
Z60a

operation B-side

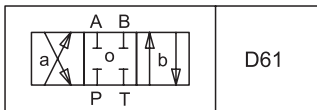


Z60b

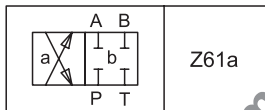
Transitional functions



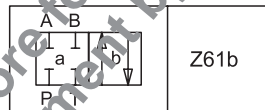
4/3-way valve spring centered



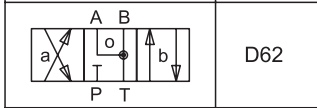
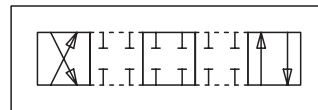
D61



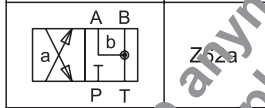
Z61a



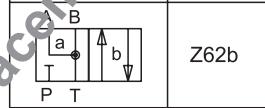
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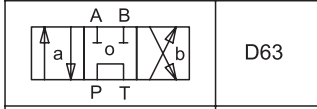
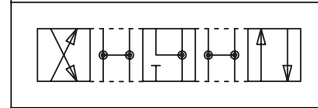
D62



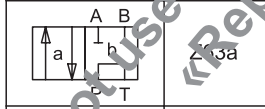
Z62a



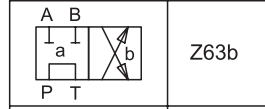
Z62b



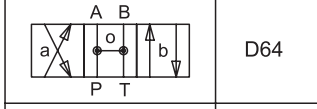
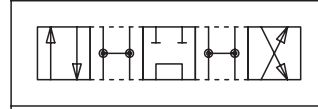
D63



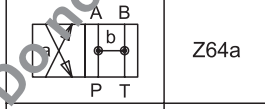
Z63a



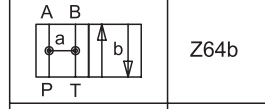
Z63b



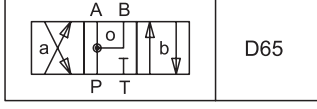
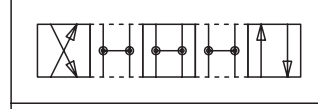
D64



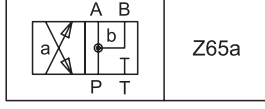
Z64a



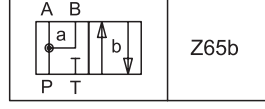
Z64b



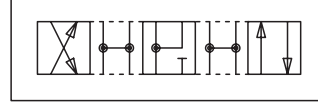
D65



Z65a

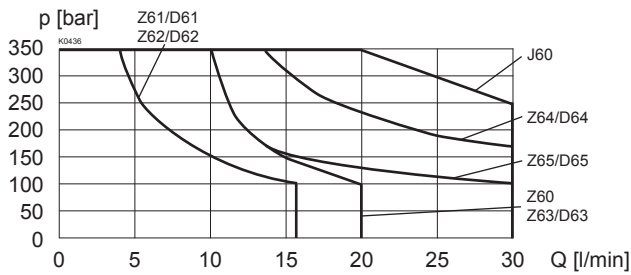


Z65b

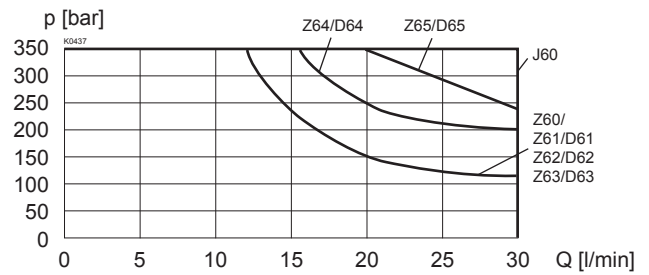


CHARACTERISTICS Oil viscosity $\nu = 30 \text{ mm}^2/\text{s}$

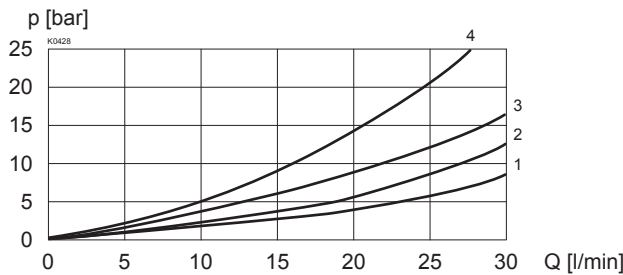
$p = f(Q)$ Performance limits
with standard voltage -10%
Medium



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

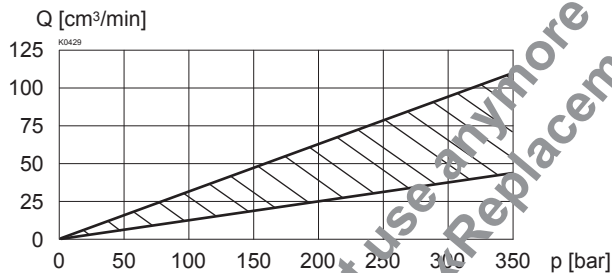


$\Delta p = f(Q)$ Pressure drop volume flow characteristics

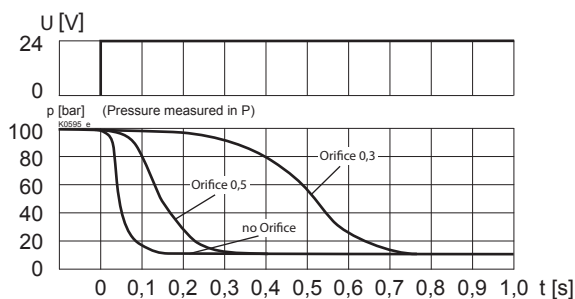


Symbol	Pressure drop curve no.	Volume flow direction				
		P - A	P - B	P - T	A - T	B - T
Z60/J60	2	2	2	-	2	2
D61/Z61	2	2	2	-	2	2
D62/Z62	2	2	-	1	1	1
D63/Z63	4	4	3	4	4	4
D64/Z64	1	1	-	1	1	1
D65/Z65	1	1	-	2	2	2

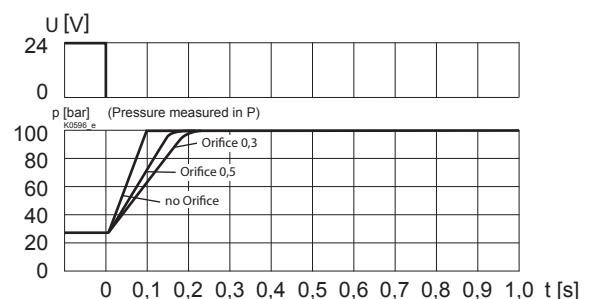
$Q_L = f(p)$ Leakage volume flow characteristics
per control edge



Shifting times, Influence of orifices on shifting
Measured with AMW4D61-G24, $Q = 7 \text{ l/min}$
Solenoid energised



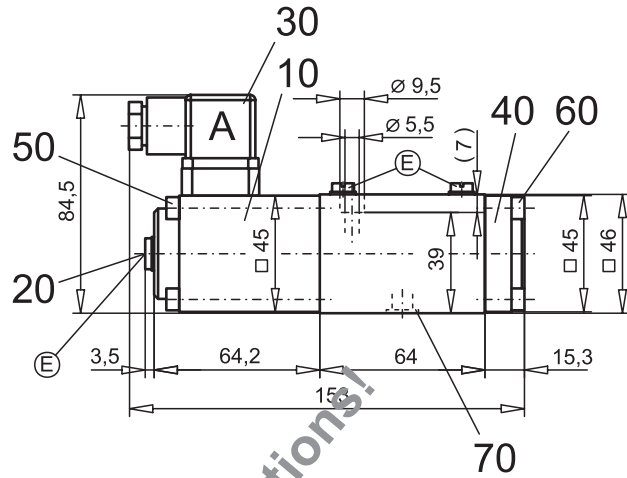
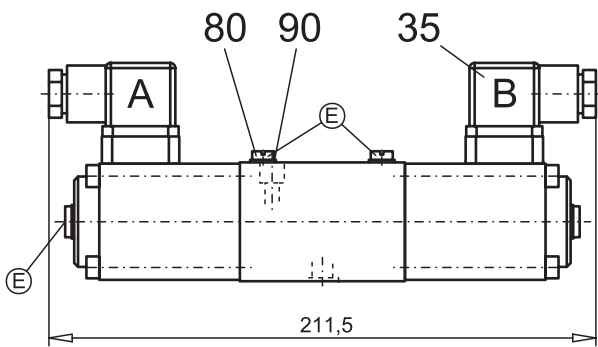
Shifting times, Influence of orifices on shifting
Measured with AMW4D61-G24, $Q = 7 \text{ l/min}$
Solenoid deenergised



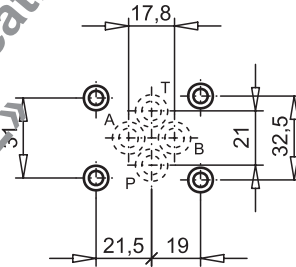
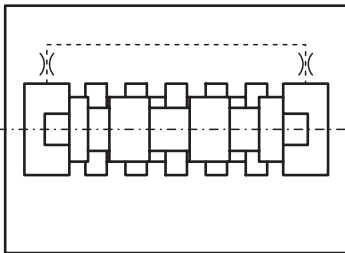
DIMENSIONS

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

4/2-way valve (spring reset)



Orifices in valve body influence shifting time



PARTS LIST

Position	Article	Description
10	260.6 ... 260.7 ...	Medium-solenoid SIN45V Super-solenoid SIS45V
20	239.2033	Plug HB0 (incl. seal)
30	219.2001	Plug A (grey)
35	219.2002	Plug B (black)
40	058.4211	Cover
50	246.2160	Socket head cap screw M5x60 DIN 912
60	246.2117	Socket head cap screw M5x16 DIN 912
70	160.2093	O-ring ID 9,25x1,78
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