HYDAC INTERNATIONAL

2/2, 3/2, 3/3, 3/4, 4/2, 4/3, 4/4 directional poppet valve **WSE 6**

Solenoid operated, direct-acting – 350 bar

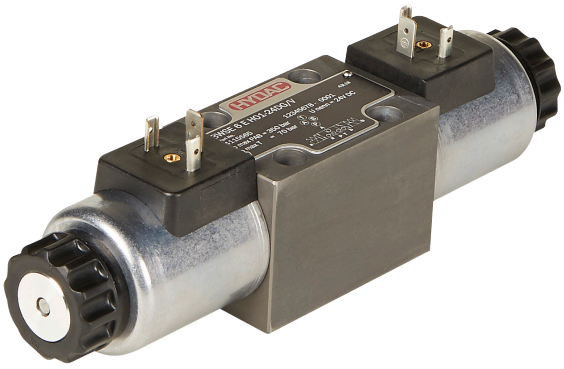
DESCRIPTION

HYDAC 2/2, 3/2, 3/3, 3/4, 4/2, 4/3 and 4/4 directional poppet valves of the WSE 6 series are directional valves for oil hydraulics systems which are used to open and close flow paths.

The valve is operated by solenoids immersed in oil. During the switching process, the solenoid pushes pressure-compensated cone poppet elements into the respective position to obtain the desired flow paths.

CHARACTERISTICS

- Patented functional principle
- Pressure-compensated design
- Leak-tight closure
- Hardened cone poppet elements (spools)
- Interface to DIN 24340 form A6, ISO 4401-03
- Detachable high-performance solenoid coil, can be exchanged without opening the hydraulic system
- Also available in sandwich design (see separate brochure)



Size 6
up to 25 l/min
up to 350 bar

CONTENTS

MODEL CODE

4 WSE 6 E H01 – 24 D G /V / / /

Ports
2, 3 or 4

Designation
Directional poppet valve, direct-acting

Nominal size
6

Spool type / symbol
See page 3

Series
H01 = specified by manufacturer

Rated voltage of the solenoid coil*
24 = 24 V DC

Type of voltage
D = DC voltage

Body and ports (Details see page 9)	Number of pins	Connection	Protection class	Suppressor diode
G = design A acc. to DIN EN 175301-803	3-pole	radial	IP65	
L = two flying leads 0.75 mm² x 457 mm (18")	2-pole	radial	IP65 / IP67	
L02 = two flying leads 0.75 mm² x 457 mm (18")	2-pole	radial	IP65 / IP67	yes
N = DEUTSCH plug connector DT04-2P	2-pole	axial	IP65 / IP67	
N01 = DEUTSCH plug connector DT04-2P	2-pole	axial	IP65 / IP67	yes
O = M12 plug connector	4-pole	radial	IP65	
U = AMP Junior Timer	2-pole	axial	IP65 / IP67	
U01 = AMP Junior Timer	2-pole	axial	IP65 / IP67	yes

Sealing material
V = FKM

Manual override
Omitted = with concealed manual override (standard)
M2 = with covered manual override

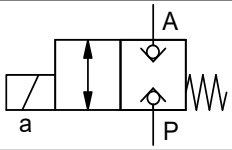
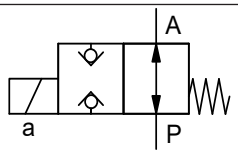
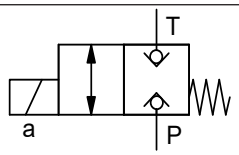
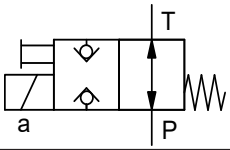
Orifice insert
Omitted = no orifice insert
Y = port P, A, B, T
XX = diameter (e.g. 14 = 1.4 mm)
Preferred series: 0.5 mm; 0.7 mm; 1 mm; 1.4 mm; 2 mm

Check valve
Omitted = no check valve
RV = check valve in port P

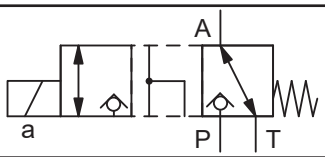
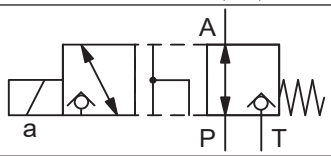
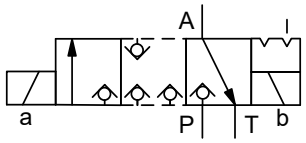
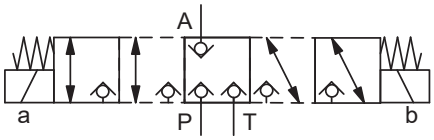
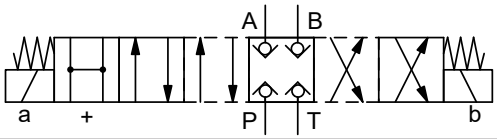
* Further versions on request.

SPOOL TYPES / SYMBOLS

2/2 directional poppet valve

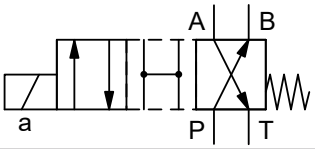
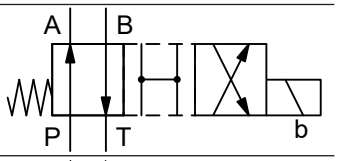
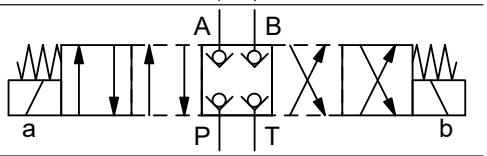
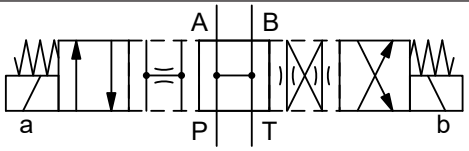
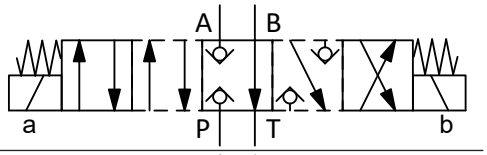
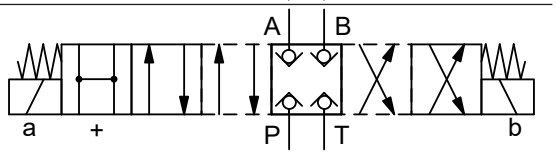
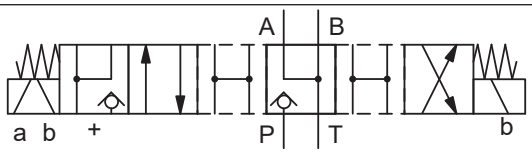
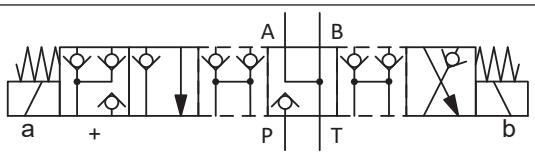
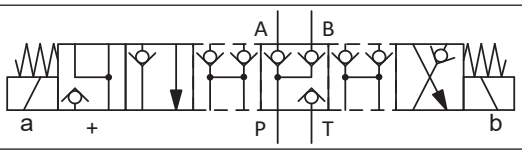
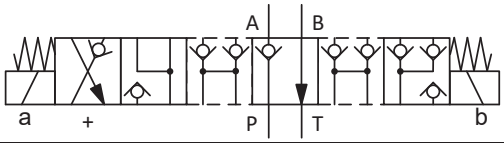
Type	Symbol
E2	
BE2	
E4	
BE4	

3/2, 3/3, 3/4 directional poppet valve

Type	Symbol with intermediate switch position
X	
C	
Y-OF	
E	
E+H	

To achieve the fourth switching position, actuate both solenoids at the same time.

4/4 directional poppet valve

Type	Symbol with intermediate switch position
X	
C	
E	
H	
U	
E+H	
J+M	
J+M-2RV	
M+J-2RV	
Z+X-2RV	

To achieve the fourth switching position, actuate both solenoids at the same time.

FUNCTION

The solenoid operated directional poppet valves of type WSE 6 are used to control a volume flow. The valve design is patented and is made up of a valve casing (1) and, depending on the type, one or more cone poppet elements (2). Depending on the type, the valve is equipped with one or more return springs (3) and one or two pole tubes (4) and solenoid coils (5). The hydraulic control of the valve is achieved by actuating the cone poppet elements by means of solenoids (5).

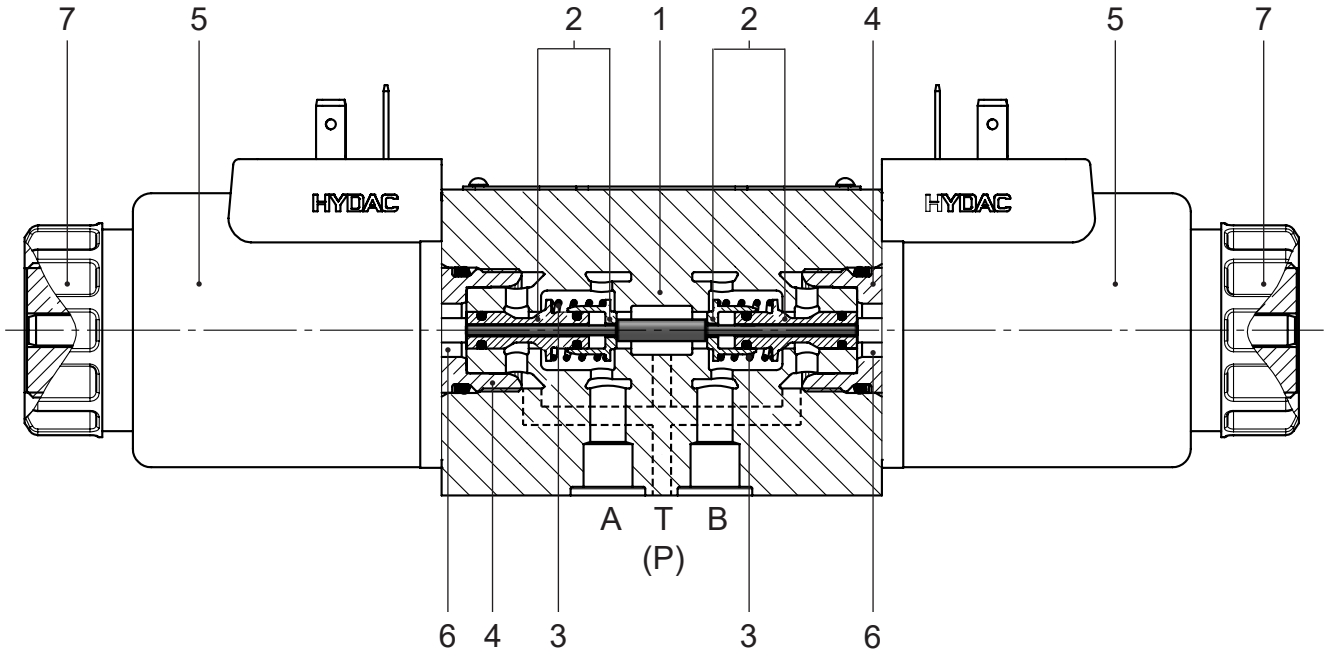
The solenoid is a transformer that transforms electrical energy into mechanical energy. When the solenoid is activated, it generates a linear lifting movement of the magnetic spool that is immersed in oil. The spool moves the cone poppet elements to the desired position by means of the guide rod (6). This releases the flow directions between the individual ports or closes them leak-tight.

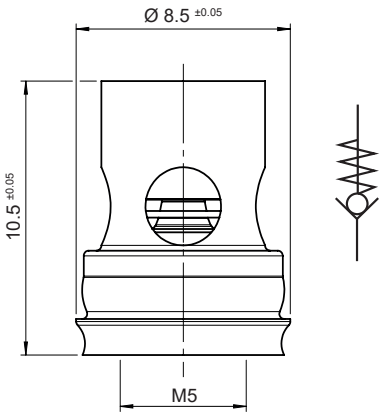
Thanks to the modular principle of the key components, a large number of switching symbols can be realised. This makes the valve a leakage-free alternative to spool valves. The specially ground cone poppet elements are pressure-compensated and therefore double leaktight, i.e. pressure reversals (within the permitted connection pressures) do not cause them to open accidentally.

To achieve optimal switching capacity, the pressure-tight space of the pole tube should always be filled with oil. Thanks to the corresponding return spring, the cone poppet element is pushed back into its initial position when the solenoid is no longer energised.

The manual override (7) enables valve operation without energising the solenoid.

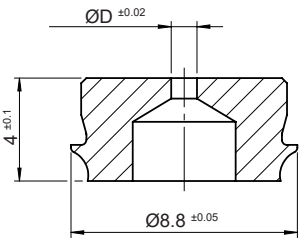
SECTION VIEW

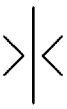




Closes up port P to prevent oil return.
Max. diameter of hole, connecting plate: Ø6.5 | Weight: 2.3 g
Detachable via M5 thread.

Cracking pressure 0.6 bar | Δp = 12 bar @ 25 l/min





Used to throttle excess flow rates beyond the valve's operating limits.
Max. diameter of hole, connecting plate: Ø6.5 | Weight: 1.3 g

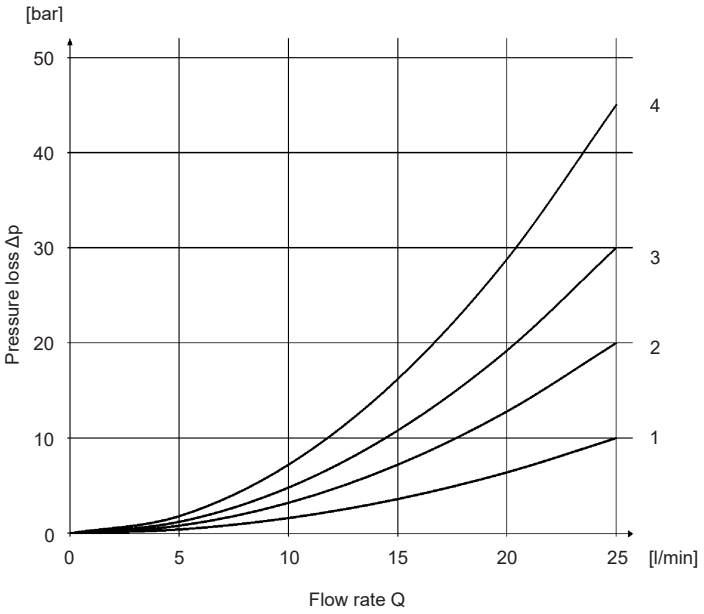
TECHNICAL DATA[1]

General specifications	
$MTTF_D$	150 - 1200 years, assessment according to DIN EN ISO 13849-1:2016; Table C.1, Confirmation of ISO 13849-2:2013; Tables C.1 and C.2
Ambient temperature	-20 °C to +60 °C
Installation position	User-definable
Weight	1.7 kg with one solenoid 2.2 kg with two solenoids
Material	Valve casing: Steel Pole tube: Steel Coil housing: Steel Type label: Aluminium
Surface coating	Valve casing: Phosphate-plated Pole tube: Zn coating Coil housing: ZnNi coating
Hydraulic specifications	
Operating pressure	Port A, B, P: p_{max} = 350 bar Port T: p_{max} = 70 bar
Flow rate	up to 25 l/min
Pressure fluid	Hydraulic oil to DIN 51524 Part 1, 2 and 3
Temperature range of operating fluid	-20 °C to +80 °C
Viscosity range	10 to max. 500 mm²/s
Permitted contamination level of operating fluid	Class 20/18/15 according to ISO 4406 or cleaner
Max. switching frequency	± 3600 1/h
Manual override	up to approx. 50 bar tank pressure possible
Sealing material	FKM
Electric system	
Response time	see table on page 6
Type of voltage	DC voltage
Nominal voltage	24 V
Voltage tolerance	±10%
Rated power	30 W
Duty cycle	100 %
Max. surface temperature of the coil	150 °C
Protection class according to DIN EN 60529	IP65[2] with electrical connection G

[1] See “Conditions and Instructions for Valves” in brochure 53.000.
[2] If installed correctly

TYPICAL PERFORMANCE CURVES

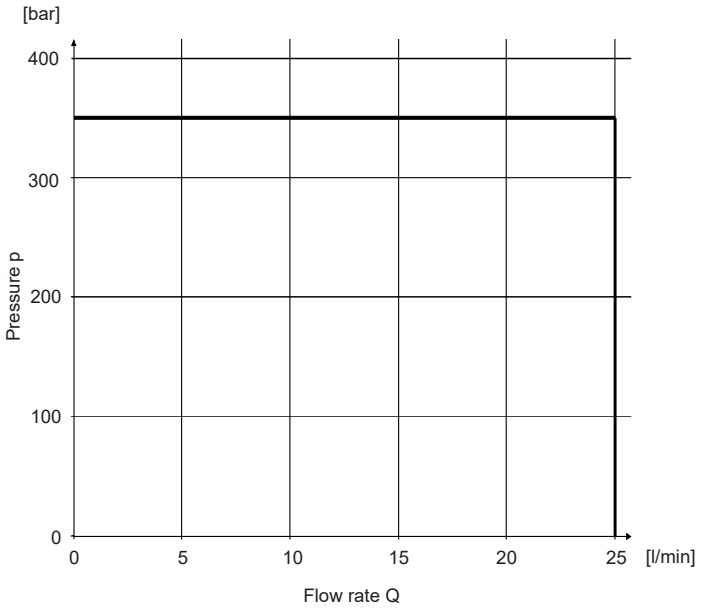
Pressure loss measured at ν = 30 mm²/s, T_{Oil} = 45 °C



Power limit

Switch-on current I_{ON} ≤0.7 x I_N

Switch-off current I_{OFF} ≥0.07 x I_N



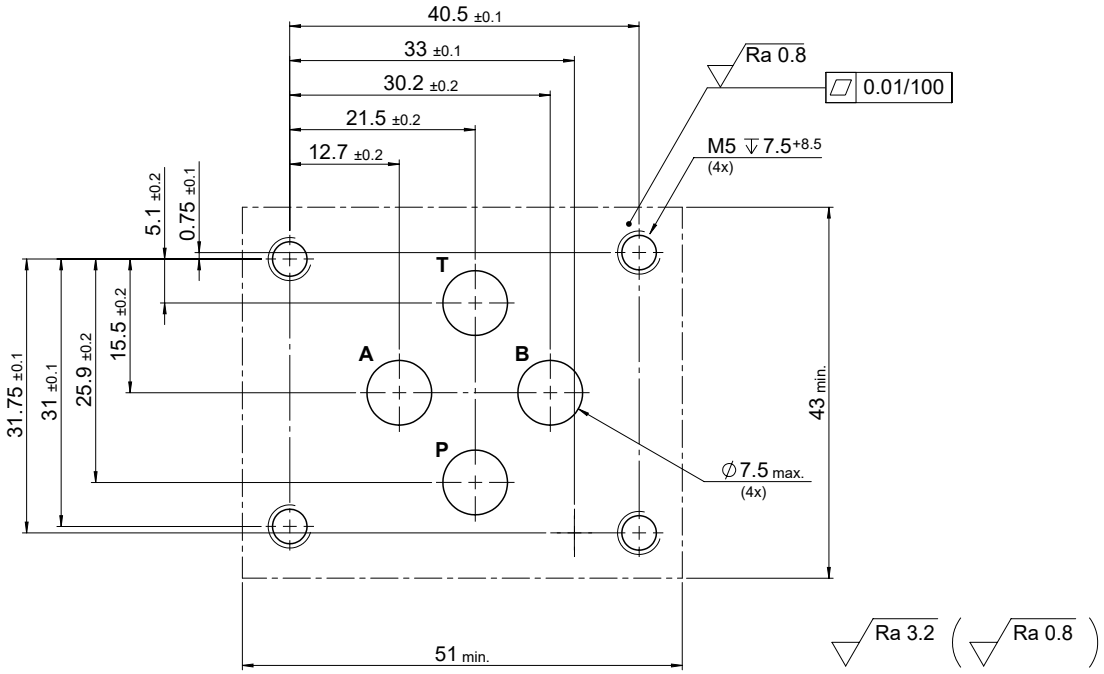
Performance assignment to the associated spools:

Ports	Symbol	Pressure drop												Response times		
		a				b			0 (+)					On [ms]		Off [ms]
		P-A	P-T	A-T	B-T	P-A	P-B	A-T	P-A	P-B	P-T	A-T	B-T	0.7 x I_N	1.0 x I_N	
2	E2	2												110	50	25
2	BE2								1					110	50	25
2	E4		2											60	40	25
2	BE4										1			60	40	25
3	X	2										1		60	40	25
3	C			2					1					110	50	25
3	Y-OF	3						2						60	40	–
3	E	2						1						60	40	25
3	E+H	2						1	(2)		(3)	(1)		60	40	25
4	X	2			1					2		1		110	50	25
4	C						2	1	2				1	110	50	25
4	E	2			1		2	1						90	45	25
4	H	2			1		2	1	3	3	2	3	3	60	40	25
4	U	2			2		4	2					4	110 (a) 90 (b)	50 (a) 45 (b)	25
4	E+H	2			1		2	1	(2)	(2)	(1)	(1)	(1)	90	45	25
4	J+M	2			1		2	1	(2)	(2)		1	1	60	40	25
4	J+M-2RV	4			1		4	1	(4)	(4)		1	1	60	40	25
4	M+J-2RV	4			1		4	1	4	4		(1)	(1)	110	50	25
4	Z+X-2RV			2	1	3	4		3	(4)		(2)	1	110 (a) 60 (b)	50 (a) 40 (b)	25

The switching capacity limits were measures with solenoids at operating temperature and 10% undervoltage. The specified power limits for directional valves are applicable to use with two nominal flow directions. In the case of only one flow direction, the power limits may be lower.

DIMENSIONS

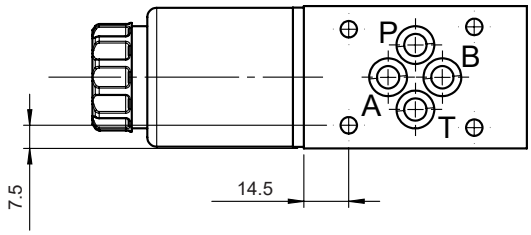
Hole pattern to ISO 4401-03-02-0-05 (CETOP 3)

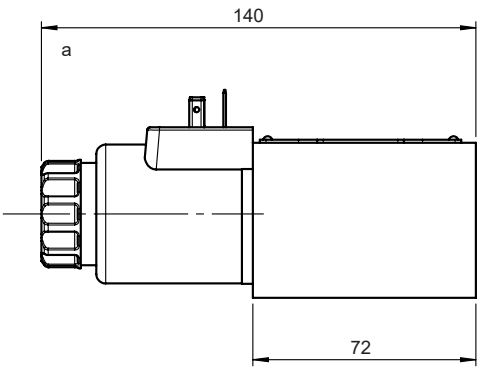


Fastening screws (not included in scope of delivery) | DIN EN ISO 4762 - M5x50 - 10.9
Tightening torque: 7 Nm | Torque tool acc. to DIN EN ISO 6789 | Tool type II class A or B

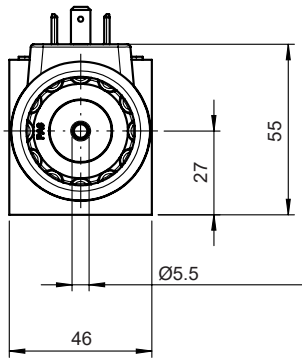
DIMENSIONS

With one solenoid | 2/2, 3/2

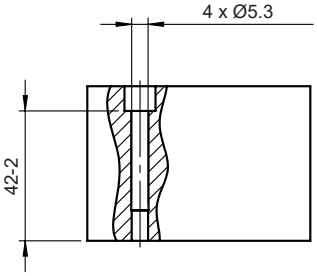




Side view



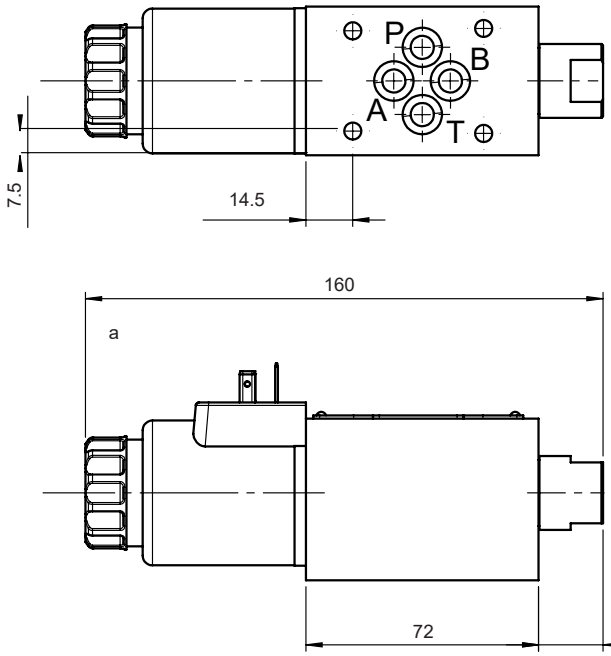
Terminal length acc. to ISO 7790



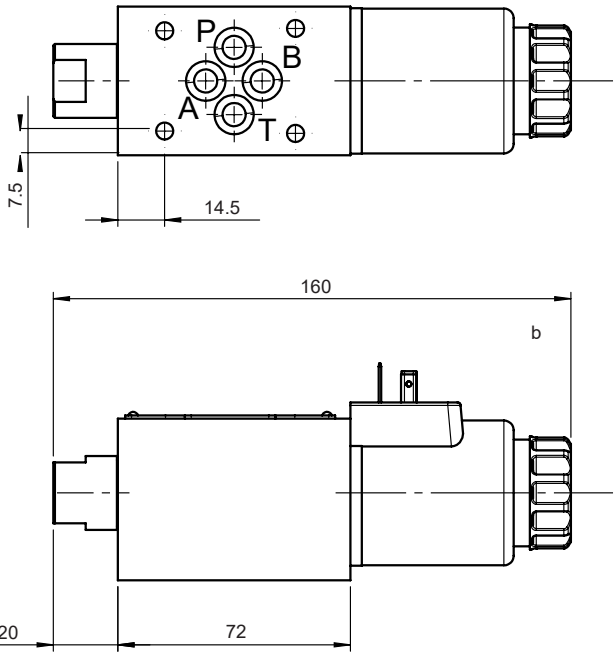
DIMENSIONS

With one solenoid | 4/2

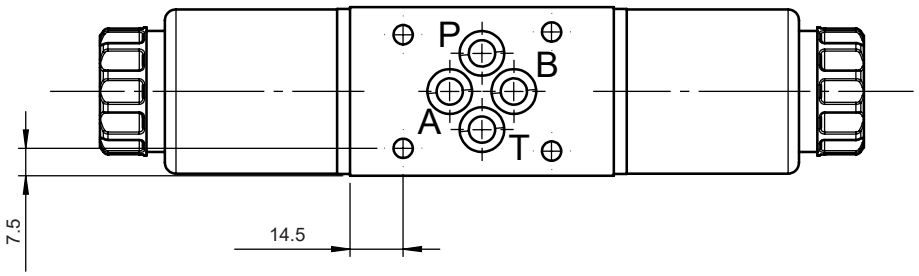
Type 4/2-X

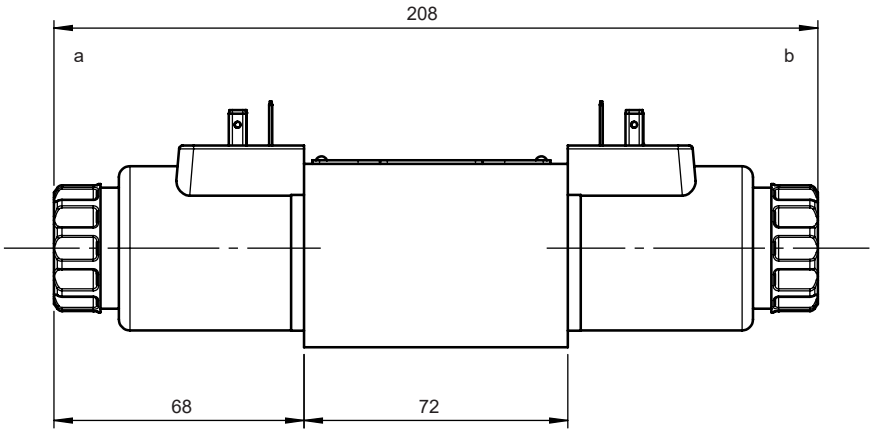


Type 4/2-C

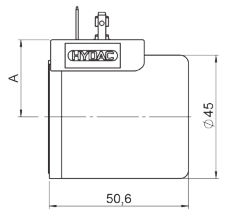
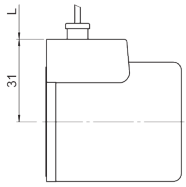
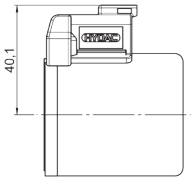
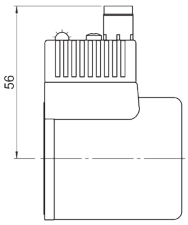
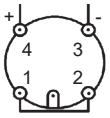
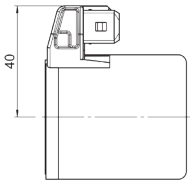


With two solenoids | 3/3, 3/4, 4/3, 4/4



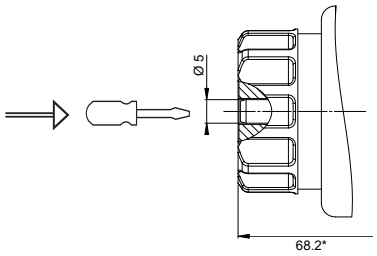
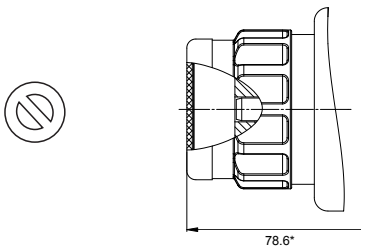


COILS

G Connector plug DIN EN 175301-803 A		● IP65 ● A = 28 mm for direct current (DC)	**L** Two leads		● IP65 ● Standard lead length L = 457 mm ● Optionally with suppressor diode
N Plug connector DEUTSCH (DT04-2P)		● IP65 / IP67 ● Optionally with suppressor diode	**O** Connector plug M12		● IP65 ● With yellow LED as operating indicator ● Pin assignment 
U Plug connector Junior Timer (axial)		● IP65 ● Optionally with suppressor diode			

Further versions on request.

MANUAL OVERRIDE

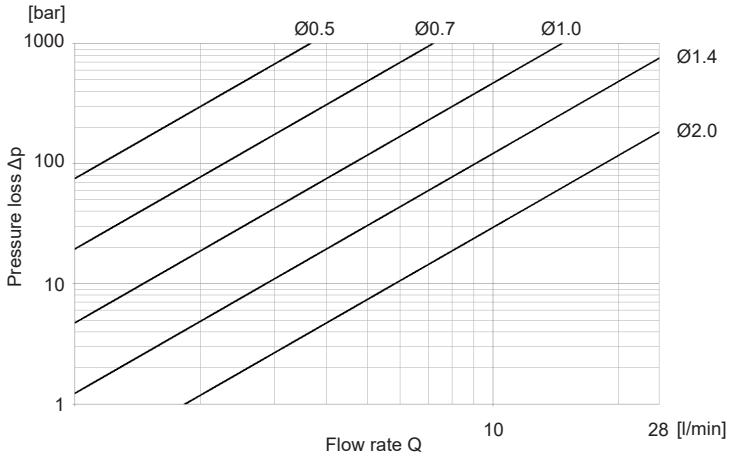
Standard With concealed manual override		Actuation with tool	**M2** With covered manual override		Manual override covered, can only be actuated after cap has been removed

* Dimensions up to valve casing

The valve can also be actuated manually. Various manual override options are available. The tank pressure should not exceed 50 bar. If the tank pressure is higher, the force required to actuate the manual override is correspondingly higher.

For valves with two solenoids, operating both manual overrides at the same time is not permitted (with the exception of valve with four switching positions).

ORIFICE INSERT



Notice:
When used in tank port T, ensure that the Δp total of the orifice (see graphic) and the resistors in reverse flow never exceeds 70 bar.
Exception: 3WSE6C up to 350 bar.

ACCESSORIES

Designation	Material	Code	Part no.
Seal kit (4-part set)	FKM	9.25 x 1.78 80 SH	3120269
Fastening screws, 4 pcs.		ISO 4762 M5 x 50 – 10.9	4312231
Solenoid coils		COIL 24DG -50-2345 -S	4244171
		COIL 24DN -50-2345 -S	4244172
		COIL 24DO -50-2345 -S	4250885
		COIL 24DU -50-2345 -S	4250892
Seal kit, solenoid coil		Nut open, O-ring	4317299
		Nut with cap, O-ring	4317302
Plug connector		Z4 standard 2-pole without PE	394287
		Z4L incl. LED	394285
Orifice insert		Orifice for WSE 6 H01 Ø0.5	3687934
		Orifice for WSE 6 H01 Ø0.7	3687956
		Orifice for WSE 6 H01 Ø1.0	3687961
		Orifice for WSE 6 H01 Ø1.4	3656890
		Orifice for WSE 6 H01 Ø2.0	3687970
Check valve		CV for WSE 6 H01	4269275

COMMENT

The information in this brochure relates to the operating conditions and fields of application described. For applications and operating conditions not described, please contact the relevant technical departments.

Subject to technical modifications.

Documents are only valid if they have been obtained via the website and are up-to-date.

HYDAC FLUIDTECHNIK GMBH
Justus-von-Liebig-Str.
66280 Sulzbach/Saar
Germany
Phone: +49 6897 509-01
E-mail: valves@hydac.com
Internet: www.hydac.com