HYDAC INTERNATIONAL

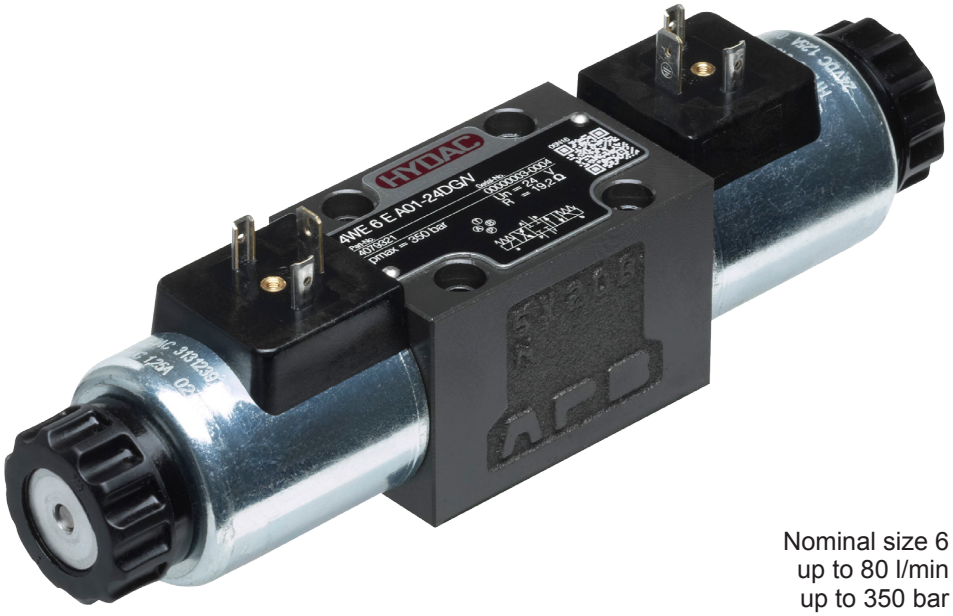
4/2- and 4/3-directional spool valve solenoid-operated, direct-acting 4WE 6

DESCRIPTION

HYDAC 4/2- and 4/3- directional spool valves of the 4WE 6 series are directional valves for oil hydraulic systems which are used to open and close flow paths. The valve operates by oil-immersed solenoid. During this process, the solenoid pushes the valve's control spool into the respective position to obtain the desired flow path.

FEATURES

- Direct-acting, solenoid-operated directional valve
- Interface according to DIN 24340 Form A6, ISO 4401-03
- Removable high-performance solenoid coil, no need to open the hydraulic system during replacement
- Coil rotatable by 360° allows flexible installation
- Electrical connection in several versions available
- With concealed manual override, additional versions available



Nominal size 6
up to 80 l/min
up to 350 bar

CONTENTS

MODEL CODE

4WE 6 D - OF A01-24 D G /V _ _

Type
Solenoid-operated directional valve with 4 main ports, direct-acting

Nominal size
6

Spool symbol
See page 3

Version
Not specified = with return spring
-OF = without return spring, with detent (with D symbol only)[1)]

Series
A01 = specified by the manufacturer

Rated voltage of the solenoid coil [1)]
12 = 12 VDC
24 = 24 VDC
96 = 96 VDC*
205 = 205 VDC*
110 = 110 VAC*
230 = 230 VAC*
* only in combination with the electrical connection G

Type of voltage
D = DC voltage
A = AC voltage (only in combination with electrical connection G)

Electrical connection (for details, see page 7)
G = device connector, DIN EN 175301-803 A
L = single leads
L02 = single leads with suppressor diode
N = device connector, Deutsch
N01 = device connector, Deutsch with suppressor diode
O = device connector, M12
U = device connector, Junior Timer
U01 = device connector, Junior Timer with suppressor diode

Sealing material [1)]
/N = NBR
/V = FKM (standard)

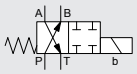
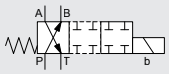
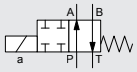
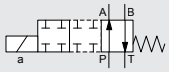
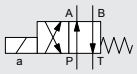
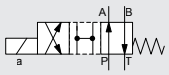
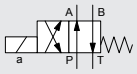
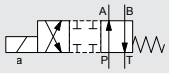
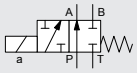
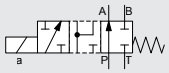
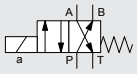
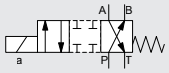
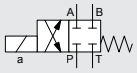
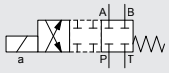
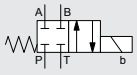
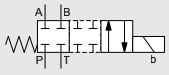
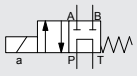
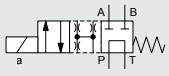
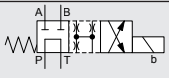
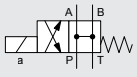
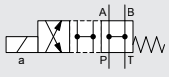
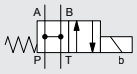
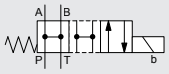
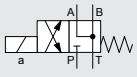
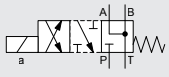
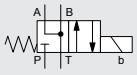
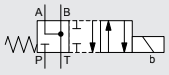
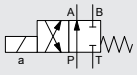
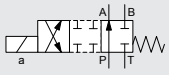
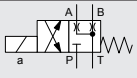
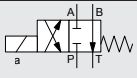
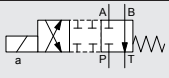
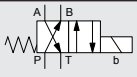
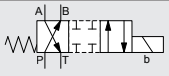
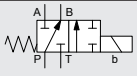
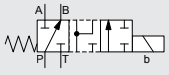
Manual override (for details, see page 7)
Not specified = with concealed manual override (standard)
/M1 = with manual override
/M2 = with covered manual override
/M4 = with knurled nut
/M5 = with mushroom head

Orifice insert [1)]
Not specified = no orifice insert
/YXX = Y = connection P, A, B, T
XX = diameter (e.g. 12 = 1.2 mm); preferred series: 0.8 mm; 1.0 mm; 1.2 mm

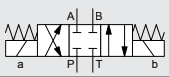
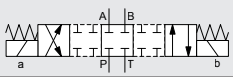
[1)] Other models on request

SPOOL TYPES / SYMBOLS

4/2-DIRECTIONAL SPOOL VALVES

Type	Basic symbol	With intermediate position
AE		
BE		
C		
D		
DT		
DB		
EA		
EB		
GA		
GB		
HA		
HB		
JA		
JB		
KA		
QA		
UA		
Y		
YT		

4/3-DIRECTIONAL SPOOL VALVES

Type	Basic symbol	With intermediate position
E		
F		
G		
H		
J		
JR		
K		
L		
M		
P		
Q		
R		
U		

With return spring

With detent (…-OF)

FUNCTION

The solenoid-operated directional spool valves of the 4WE 6 type are used to direct nominal flow and consist of one valve housing (1) with an associated valve spool (2). Depending on the type, the valve is equipped with at least two return springs (3) and with one or two pole tubes (4) and solenoid coils (5) each.

The hydraulic control of the valve is carried out through the actuation of the valve spool by the use of solenoids (5). A solenoid is a converter which converts electrical energy into mechanical energy. The energised solenoid causes the oil-immersed magnetic piston to make a linear stroke movement. It uses the guide rod (6) to move the valve spool into the desired position. This causes the nominal flow directions between the respective ports to be released or closed. To obtain the valves' optimum switching capacity, the pressure-tight chamber of the pole tube should always be filled with oil.

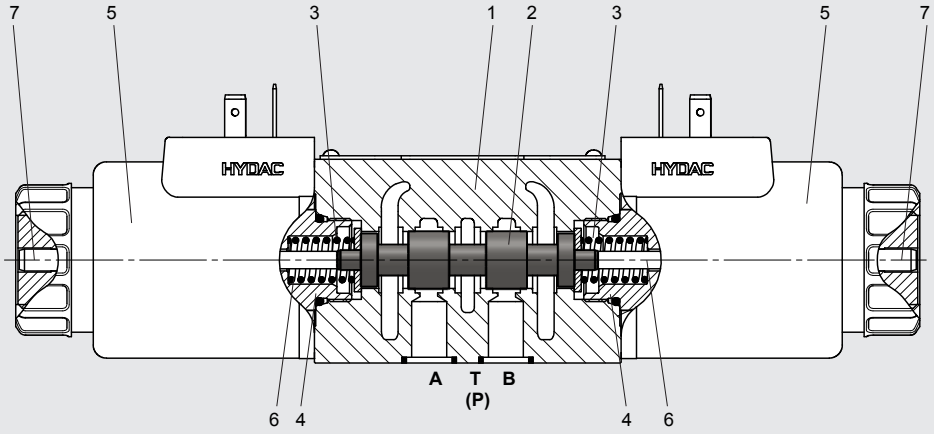
The valve spool is pushed back into the starting position by the appropriate return spring after de-energization of solenoid.

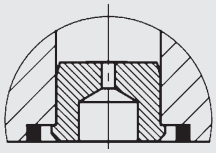
The manual override (7) enables valve operation without energising the solenoid.

Without return spring with detent "OF"

This alternative describes the so-called impulse valve. This is a 4/2-directional valve with 2 solenoids and detent. The detents are used to lock the valve spool in the respective switching position. There is no need to permanently energise the solenoid, which consequently contributes to energy-saving operation.

SECTION VIEW





Orifice insert
Used to reduce nominal flows that are too high and outside of the valve's operating limits.

TECHNICAL DATA

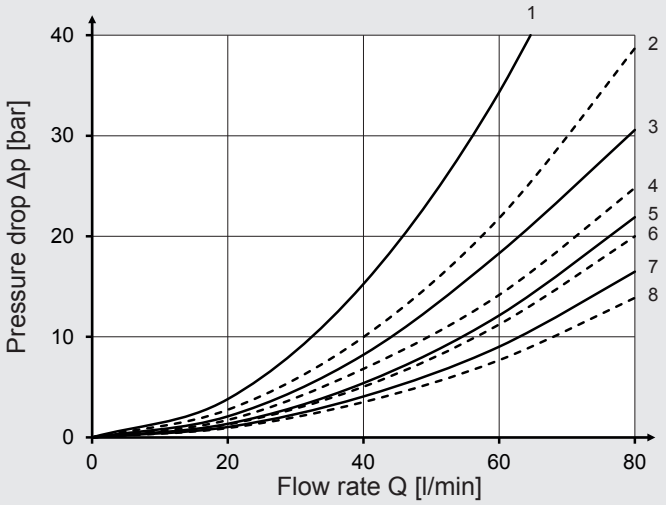
General specifications			
$MTTF_d$:		According to EN ISO 13849-1:2015 Tables C1 & C2	
Ambient temperature range:	[°C]	-20 to +60	
Installation position:		No orientation restrictions	
Weight:	[kg]	1.5 with one solenoid; 2.0 with two solenoids	
Material:		Valve casing:	Cast iron
		Pole tube:	Steel
		Coil casing:	Steel
		Name plate:	Aluminium
Surface coating:		Valve casing:	Phosphate plated
		Pole tube:	Zn-coating
		Coil casing:	ZnNi-coating
Hydraulic specifications			
Operating pressure:	[bar]	Connection A, B, P:	p_{max} = 350
		Connection T:	p_{max} = 210
Nominal flow:	[l/min]	See performance limits on page 5	
Operating fluid:		Hydraulic oil to DIN 51524 Part 1, 2 and 3	
Media operating temperature range:	[°C]	-20 to +80 (for standard sealing)	
Viscosity range:	[mm²/s]	10 to 500	
Permitted contamination level of operating fluid:		Class 20/18/15 according to ISO 4406	
Max. switching frequency:	[1/h]	15,000	
Manual override:		Possible up to approx. 50 bar tank pressure	
Sealing material:		FKM (standard), NBR	
Electrical specifications			
Switching time:	[ms]	Energised: approx. 20 – 70 De-energised: approx. 10 – 60	
Type of voltage:		DC	AC
Rated voltage:	[V]	12, 24, 96, 205	110, 230
Voltage tolerance:	[%]	±10	
Nominal power:	[W]	30	
Duty cycle:	[%]	100	
Max. surface temperature of the coil:	[°C]	150	
Protection class according to DIN EN 60529:		With electrical connection "G"	IP65 *
		With electrical connection "L"	IP65 *
		With electrical connection "N"	IP65 / IP67 *
		With electrical connection "O"	IP65*
		With electrical connection "U"	IP65 *

* if installed correctly

PERFORMANCE

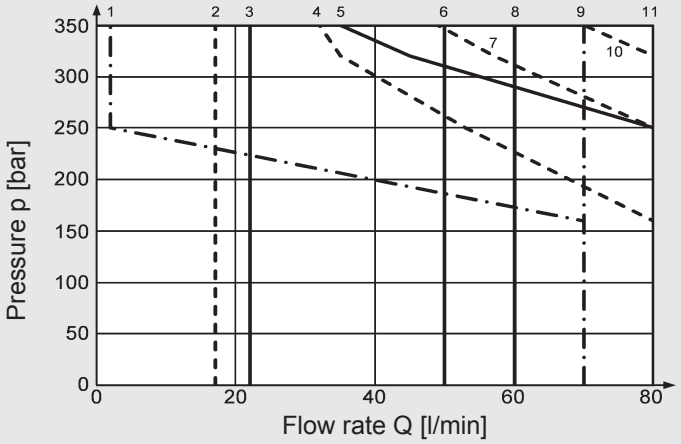
Pressure drop

measured at ν = 35 mm²/s, T= 45 °C



Performance limits

measured at ν = 30 mm²/s, T= 50 °C



Performance assignment to the associated spools:

Spool	Pressure drop					Performance limits
	P→A	B→T	P→B	A→T	P→T	
AE	–	–	7	7	–	1
BE	7	7	–	–	–	1
C	8	8	8	8	–	10
D	8	7	8	7	–	9
DB	3	6	3	6	–	2
D–OF	8	7	8	7	–	11
DT	8	–	7	–	–	–
E, EA, EB	7	7	7	7	–	11
F	6	6	6	6	–	3
G, GA, GB	1	1	1	1	4	6
H, HA, HB	8	8	8	8	4	11
J, JA, JB	7	7	7	7	–	5
JR	–	–	2	8	–	4
K, KA	8	7	7	7	–	11
L	7	7	7	8	–	11
M	8	5	8	5	–	11
P	6	6	6	6	–	3
Q, QA	7	7	7	7	–	8
R	–	–	3	6	–	7
U, UA	7	8	7	7	–	11
Y	7	8	7	8	–	9
YT	7	–	8	–	–	–

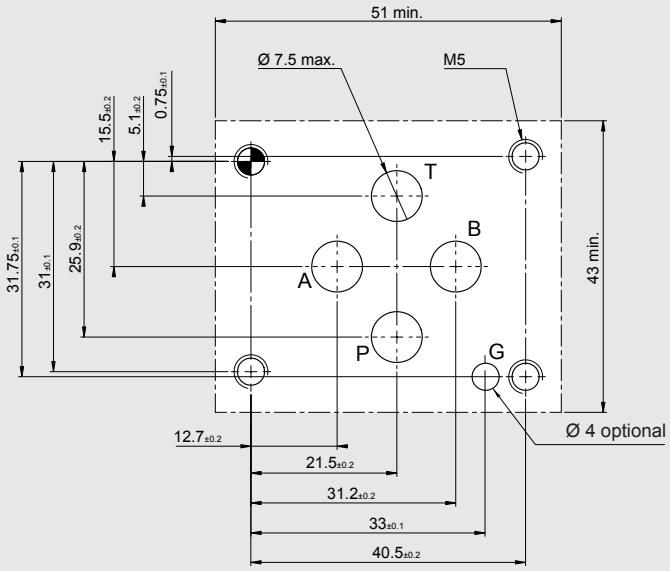
The performance limits were determined with solenoids at operating temperature and 10 % low voltage.

The specified performance limits are applicable for operation with two directions of flow. The performance capacies may be lower when there is only one flow direction.

Restricted switching capacity for G96/G205 coils:
The max. permitted nominal flow specified in the diagram must be reduced by 10%. The switching times are extended.

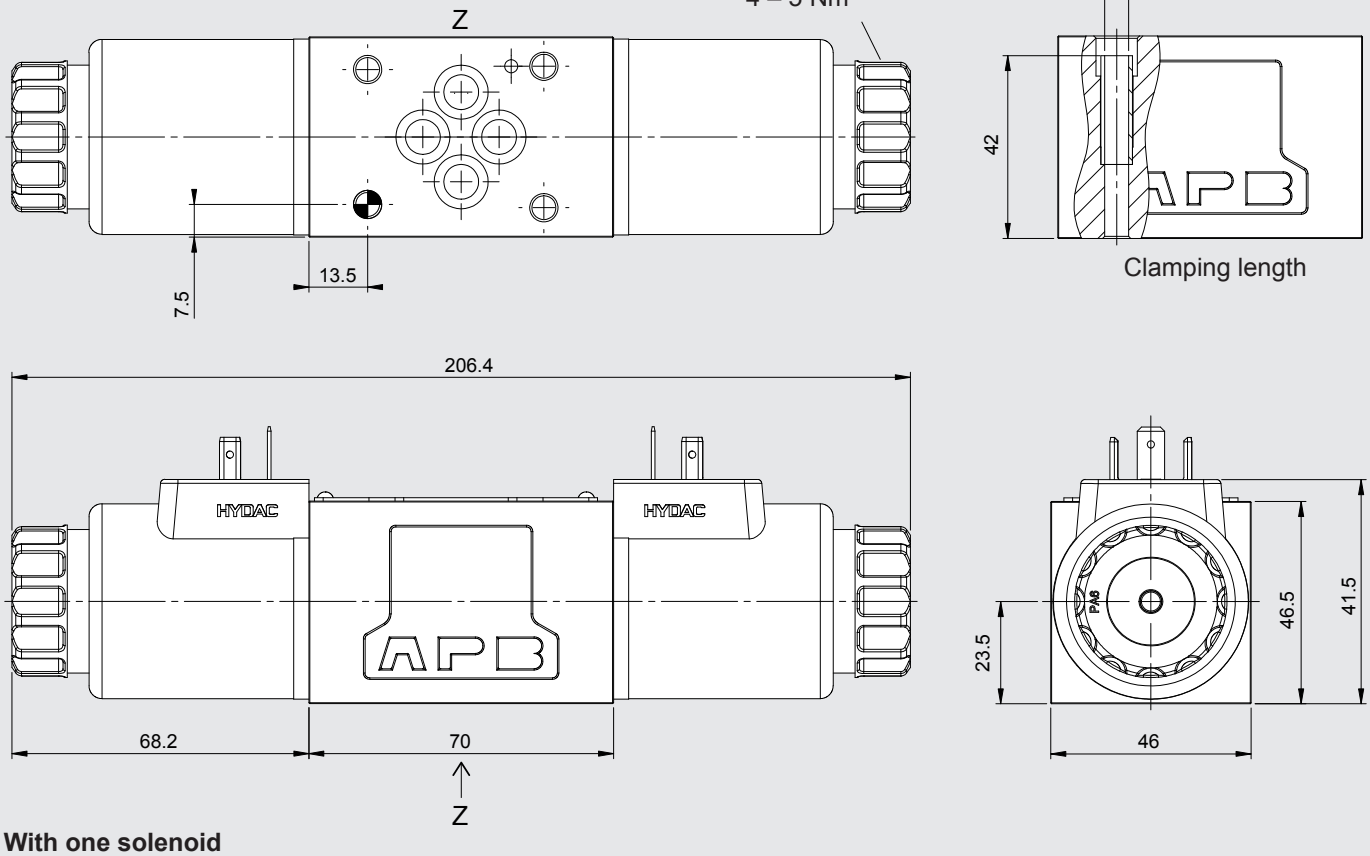
DIMENSIONS

Interface according to ISO 4401-03-02-0-05

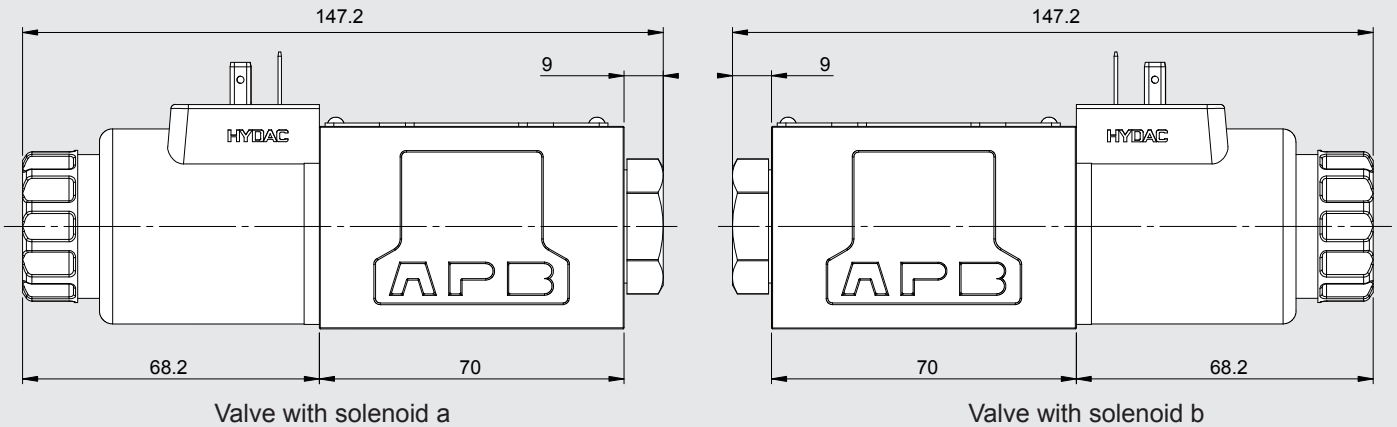


Mounting screws:
(not included in delivery)
DIN EN ISO 4762 – M5 x 50 – 10.9
Tightening torque: 7 Nm

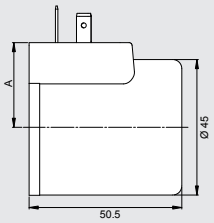
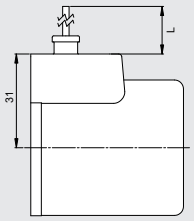
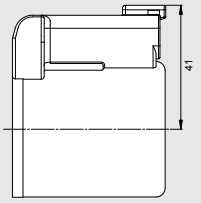
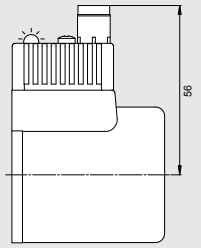
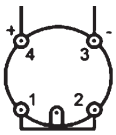
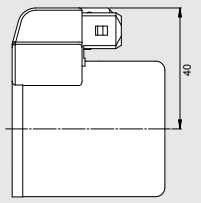
With two solenoids



With one solenoid

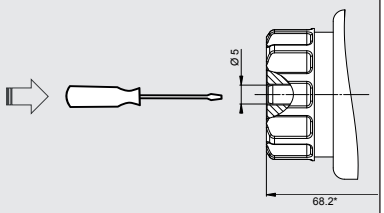
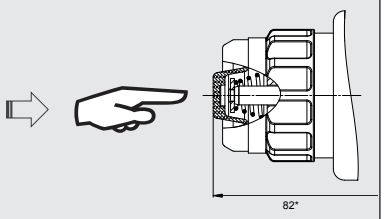
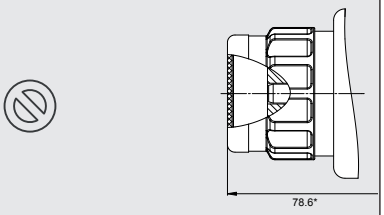
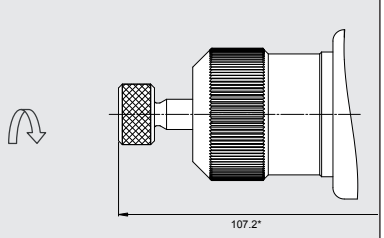
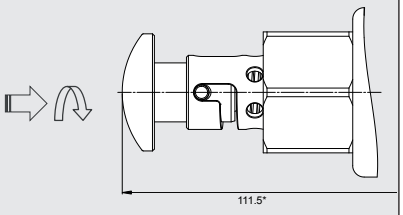


ELECTRICAL CONNECTIONS

G Device connector DIN EN 175301-803 A		● IP65 ● A = 28 mm for DC (DG) ● A = 30.7 mm for AC (AG)
L 2 strands		● IP65 ● Standard strands length L = 457 mm ● Optional with suppressor diode
N Device connector, Deutsch (DT04-2P)		● IP65 / IP67 ● Optional with suppressor diode
O Device connector M12	 	● IP65 ● With yellow LED as operation indicator ● Pin assignment
U Device connector Junior Timer (axial)		● IP65 ● Optional with suppressor diode

Other models on request

MANUAL OVERRIDES

Standard with concealed manual override		Operation with tool
M1 with manual override		Operation without tool with spring return
M2 with covered manual override		Manual override covered, operation only possible after disassembly of cap
M4 with knurled-head screw		Operation by turning the knurled-head screw
M5 with mushroom head		Operation by pressing, locking by subsequently turning the mushroom button

* Dimensions up to valve housing

In case of emergency, the valve can also be operated manually. There are different forms of manual override available.

The tank pressure should not exceed 50 bar. If the tank pressure is higher, the force required to operate the manual override increases accordingly.

For valves with two solenoids, simultaneous operation of both manual overrides is not permitted.

ACCESSORIES

	Designation	Part no.
Seal kits (4-part set)	9.25 x 1.78 80 Sh NBR	3492432
	9.25 x 1.78 80 Sh FKM	3120269
Mounting screws (4 pcs)	DIN EN ISO 4762 - M5 x 50 - 10.9	4312231
Solenoid coils	COIL 12DG -50-2345 -S	4244169
	COIL 12DN -50-2345 -S	4244170
	COIL 12DO -50-2345 -S	4250874
	COIL 24DG -50-2345 -S	4244171
	COIL 24DN -50-2345 -S	4244172
	COIL 24DO -50-2345 -S	4250885
	COIL 96DG -50-2345 -S	4244173
	COIL 110AG -50-2345 -S	4244174
	COIL 205DG -50-2345 -S	4244275
	COIL 230AG -50-2345 -S	4244276
Seal kit for solenoid coil	Nut open, O-ring	4317299
	Nut with folding cap, O-ring	4317301
	Nut with cap, O-ring	4317302
Connector	Z4 standard 2-pole without PE	394287
	ZW4 incl. rectifier	394293
	Z4L incl. LED	394285
Manual overrides	M4 with knurled-head screw	3671165
	M5 with mushroom manual override	3506914

NOTE

The information in this brochure relates to the operating conditions and applications described. For applications not described, please contact the relevant technical department.
All technical details are subject to change without notice.

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