



DSP7

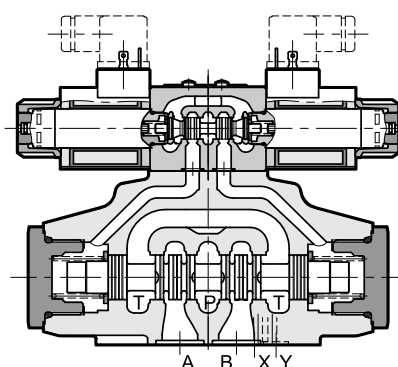
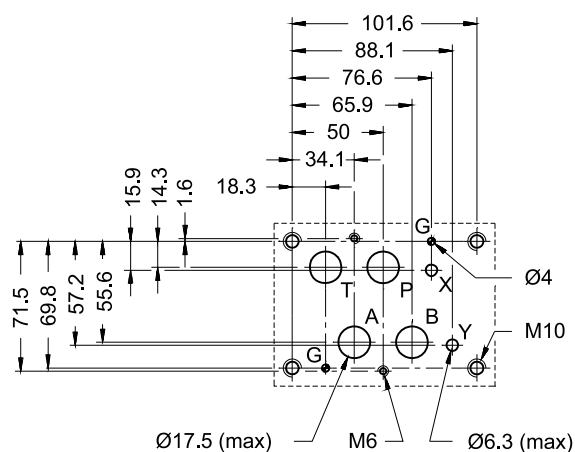
DIRECTIONAL VALVES PILOT OPERATED, SOLENOID OR HYDRAULIC (DSC7) ACTUATED

SUBPLATE MOUNTING ISO 4401-07

p max **350** bar
Q max **300** l/min

MOUNTING SURFACE

ISO 4401-07-07-0-05
(CETOP 4.2-4-07-350)



- The DSP7 pilot operated valve is made up of a 4-way hydro-piloted distributor with mounting surface according to ISO 4401-07 standards, operated by an ISO 4401-03 solenoid directional valve.
- It is available with different spool types (see p. 2), with some options for the opening control.
- It is available with both the solenoid and the hydraulic control from the X and Y ways.
- A version for high pressures (H) is available.
- Versions with UL Recognized DC coils are available for the North American markets.

PERFORMANCES

(obtained with mineral oil of viscosity of 36 cSt at 50°C)

		DSP7	DSP7H
Maximum operating pressure			
- ports P - A - B		350	420
- port T (external drainage)	bar	250	350
- port T (internal drainage)		210 (DC) / 160 (AC)	210 (DC) / 160 (AC)
Maximum flow rate from port P to A - B - T	l/min	300	
Ambient temperature range	°C	-20 / +50	
Fluid temperature range	°C	-20 / +80	
Fluid viscosity range	cSt	10 ÷ 400	
Fluid contamination degree		according to ISO 4406:1999 class 20/18/15	
Recommended viscosity	cSt	25	
Mass:			
DSP7-S, RK		8.6	
DSP7-T*, SA*, SB*	kg	8.0	
DSC7		6.6	

1 - IDENTIFICATION CODE FOR DSP7 SOLENOID ACTUATED DIRECTIONAL VALVES

D	S	P	7	-	/	20	-	/	/	/	/
---	---	---	---	---	---	----	---	---	---	---	---

Directional valve,
solenoid actuated,
pilot operated

Size: ISO 4401-07 _____

Option:
(omit for standard version)
H = high pressure version
 $p_{max} = 420 \text{ bar}$

Spool type (see point 2) _____

S*	TA
SA*	TB
SB*	RK

Series: (the overall and mounting dimensions remain unchanged from 20 to 29)

Seals:

N = NBR seals for mineral oil (**standard**)

V = FPM seals for special fluids

Pilot supply (see point 9) _____

For spool types S2 - S4 - S7 - S8 - TA02 - TB02 - RK02 - S*2 - S*4, the available pilot supply versions are E, C and CZ. For all other spool types, the available versions are E, I and Z.

E = external

I = internal

Z = internal pilot supply with 30 bar pressure reducing valve, fixed adjustment (see point 8)

C = internal pilot supply with backpressure valve in P port

CZ = internal pilot supply with 30 bar pressure reducing valve, fixed adjustment, and with backpressure valve in P Port

Drain (see point 9): _____

E = external I = internal

Options (see point 10): _____

C = Maximum flow adjustment

D = Switching time adjustment

P08 = Switching damping by pilot pressure reduction

S2 = Pilot line unloading with the valve in the normal position (available only with pilot supply E)

Option combinations are available (e.g. **C-D**, **C-P08**). Please contact our Technical Support to verify the feasibility of the requested combination.

Power supply: _____

direct current

D12 = 12 V	D48 = 48 V
D24 = 24 V	D110 = 110 V
D26 = 26.4 V	D220 = 220 V

D00 = valve without coils,
with locking rings and O-rings

alternate current

A24 = 24 V - 50 Hz

A48 = 48 V - 50 Hz

A110 = 110 V - 50 Hz / 120 V - 60 Hz

A230 = 230 V - 50 Hz / 240 V - 60 Hz

A00 = valve without coils, with locking rings and O-rings

F110 = 110 V - 60 Hz

F220 = 220 V - 60 Hz

Option:
/ W7 = Zinc-nickel surface treatment (see **NOTE**)
Not available for AC valves.
Omit if not required (standard treatment: black phosphating)

Manual override:
omit for override integrated in the tube (standard)
CM = manual override, boot protected (see point 18)

Coil electrical connection (see point 16):

K1 = plug for connector type EN 175301-803 (ex DIN 43650)

K2 = plug for connector type AMP JUNIOR

K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S

K7D = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S, with diode

Coil version (see availability table):
Omit for standard zinc-plated version

W = corrosion-protected (point 12)

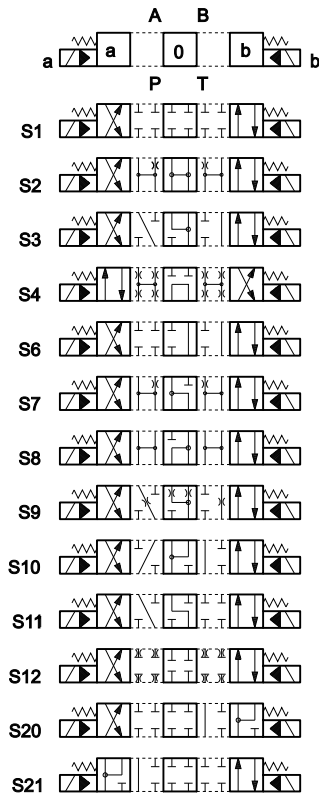
ULW = UL Recognized, corrosion-protected (points 11.2 and 12)

NOTE: The valve protection level against atmospheric agents depends on the combination of the fitted components (configuration). See point 12 for further details.

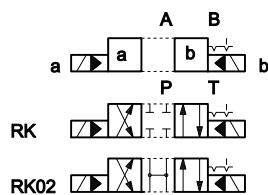
Availability				
Voltage	electr. conn.	coil version		
		std	W	ULW
D12, D24	K1	■	■	■
	K2	-	-	■
	K7	-	-	■
	K7D	-	■	-
D26	K1	-	■	■
	K7	-	-	■
D48, D110, D220	K1	-	-	■
A*, F*	K1	■	-	-

2 - DSP7 SPOOL TYPES

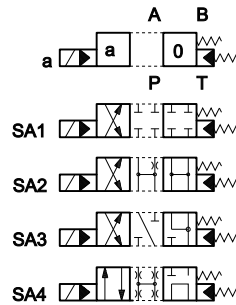
Type S*:
2 solenoids - 3 positions
with spring centring



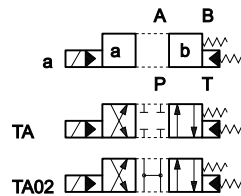
Type RK:
2 solenoids - 2 positions
with mechanical retention



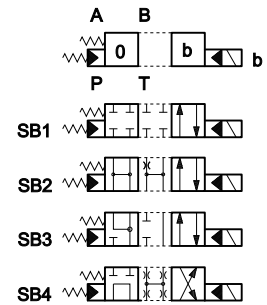
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centring



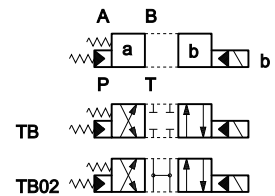
Type TA:
1 solenoid side A
2 external positions
with return spring



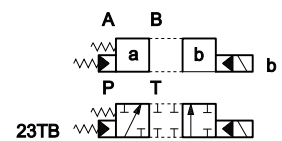
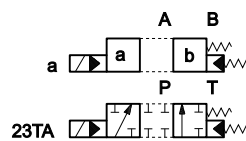
Type SB*:
1 solenoid side B
2 positions (central + external)
with spring centring



Type TB:
1 solenoid side B
2 external positions
with return spring



Type 23TA / 23TB
three-way valve - 1 solenoid - 2 external positions, return spring



Besides the diagrams shown, special versions are available: consult our technical dept. for their identification, feasibility and operating limits.

3 - IDENTIFICATION CODE FOR DSC7 HYDRAULIC ACTUATED DIRECTIONAL VALVE

D	S	C	7		-		/	10		-	E	E	
----------	----------	----------	----------	--	----------	--	----------	-----------	--	----------	----------	----------	--

Pilot operated directional valve, hydraulic actuated

Size: ISO 4401-07

Option:
(omit for standard version)
H = high pressure version
 $p_{max} = 420 \text{ bar}$

Spool type (see point 2 and below)

S* **TA**
SA* **TB**
SB* **R**

Option:
/ **W7** = Zinc-nickel surface treatment (see **NOTE**)
Omit if not required

External drain (see p. 9)

External pilot (see p. 9)

Seals:
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

Series: (the overall and mounting dimensions remain unchanged from 10 to 19)

Spool types

The distributor is delivered with short-circuit subplate. The X and Y ports are used for the hydraulic control of the valve.

S*

SA*

SB*

TA

TB

NOTE: The standard valve is supplied with surface treatment of phosphating black.

The zinc-nickel finishing makes the valve suitable to ensure a salt spray resistance up to **600** hours. (test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

4 - HYDRAULIC FLUIDS

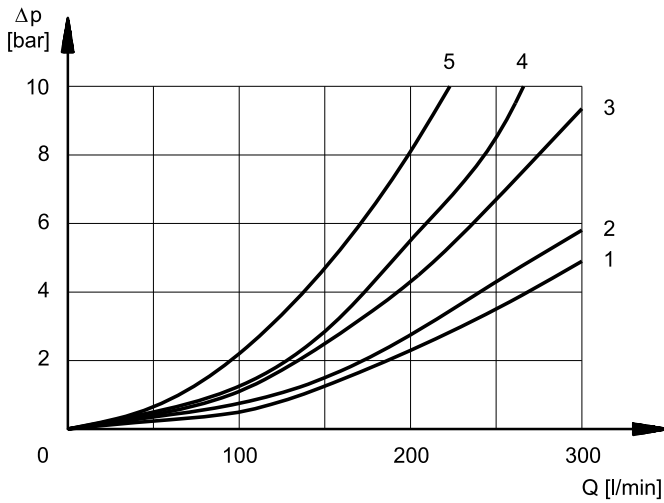
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V).

For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics.

The fluid must be preserved in its physical and chemical characteristics.

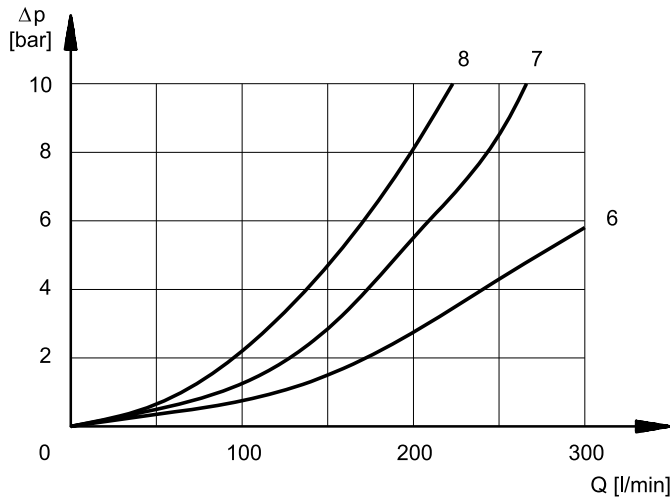
5 - PRESSURE DROPS ΔP -Q

(values obtained with viscosity 36 cSt at 50 °C)



PRESSURE DROPS WITH VALVE ENERGIZED

SPOOL TYPE	FLOW DIRECTION			
	P-A	P-B	A-T	B-T
	CURVES ON GRAPH			
S1, SA1, SB1	1	1	3	4
S2, SA2, SB2	1	1	4	4
S3, SA3, SB3	1	1	4	4
S4, SA4, SB4	2	2	4	5
S6	1	1	3	4
S7	1	1	4	4
S8	1	1	3	4
S9	1	1	3	4
S10	1	1	3	4
S11	1	1	3	4
S12	1	1	3	4
S20	1	1	3	4
S21	1	1	4	4
TA, TB	1	1	3	4
TA02, TB 02	1	1	4	4
RK	1	1	3	4



PRESSURE DROPS WITH VALVE IN DE-ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION				
	P-A	P-B	A-T	B-T	P-T
	CURVES ON GRAPH				
S2, SA2, SB2					6
S3, SA3, SB3			7	7	
S4, SA4, SB4					7
S6				7	
S7					8
S8					8
S10			7	7	
S11			7		

6 - SWITCHING TIMES

The values indicated refer to a solenoid valve working with piloting pressure of 100 bar, with mineral oil at a temperature of 50°C, at viscosity of 36 cSt and with PA and BT connections.

The energizing and de-energizing times are obtained at the pressure variation which occurs on the lines.

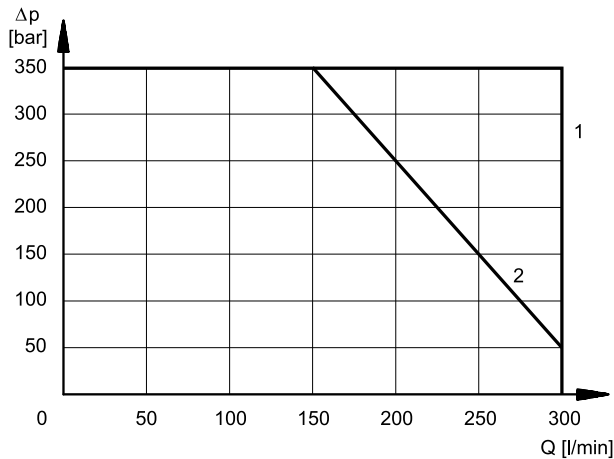
TIMES (± 10%) [ms]	ENERGIZED		DE-ENERGIZED	
	2 Pos.	3 Pos.	2 Pos.	3 Pos.
AC solenoid	45	30	45	30
DC solenoid	75	60	60	45

7 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure for the different spool types.

The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage.

The values have been obtained with mineral oil, viscosity 36 cSt at 50 °C, and filtration ISO 4406:1999 class 18/16/13.



SPOOL	CURVE	
	P→A	P→B
S1,SA1,SB1	1	1
S2, SA2, SB2	1	1
S3, SA3, SB3	1	1
S4, SA4, SB4	2	2
S6	1	1
S7	2	2
S8	2	2
S9	1	1
S10	1	1
S11	1	1
S12	1	1
S20	1	1
S21	1	1

SPOOL	CURVE	
	P→A	P→B
TA, TB	1	1
TA02, TB02	1	1
23TA, 23TB	1	1
RK	1	1

8 - PERFORMANCE CHARACTERISTICS

PRESSURES [bar]	DSP7	DSP7H	DSC7	DSC7H
Max pressure in P, A, B ports	350	420	350	420
Max pressure in T line with external drainage	250	350	250	350
Max pressure in T line with internal drainage	210 (DC) 160 (AC)	210 (DC) 160 (AC)	-	-
Max pressure in Y line with external drainage	210 (DC) 160 (AC)	210 (DC) 160 (AC)	-	-
Min piloting pressure (NOTE 1)	5 ÷ 12			
Max piloting pressure (NOTE 2)	210	350	210	420

NOTE 1: The minimum piloting pressure can be the lower range value at low flow rates, but with higher flow rates the higher value is needed.

NOTE 2: If the working pressure is higher than these rated limits, then provide an external pilot line with p_{max} within the rated limits and purchase the valve with E type pilot supply.

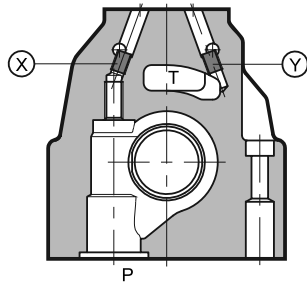
For DSP7 and DSP7H valves, if the external pilot line is not possible, you must opt for the version with Z type pilot supply (see point 9.2), providing max 350 bar at inlet pressure P.

9 - PILOT AND DRAIN

Valves with electro-hydraulic actuation (DSP) are available with both pilot supply and drain internal or external type. The version with external drain allows a higher back pressure on the return line.

The valves with hydraulic actuation (DSC) are available with both pilot supply and pilot return external only.

NOTE: The pilot supply and drainage configuration must be chosen when ordering. Subsequent modification is only permitted by authorized experienced operators or at the factory.



X: plug M5x6 for external pilot
Y: plug M5x6 for external drain

TYPE OF VALVE		Plug assembly	
		X	Y
IE	internal pilot and external drain	NO	YES
II	internal pilot and internal drain	NO	NO
EE	external pilot and external drain	YES	YES
EI	external pilot and internal drain	YES	NO

9.1 - C type pilot supply: internal pilot supply with backpressure valve in P port

DSP7 valves are available with incorporated backpressure valve in the P port.

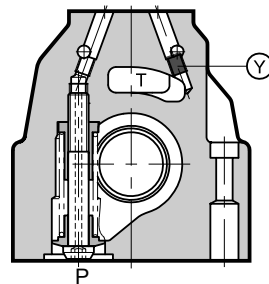
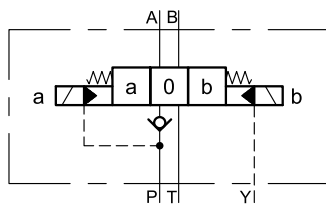
This is in order to reach the minimum pilot supply pressure at normal position in valves in which the inlet port (P) and the return port (T) are connected (spools S2, S4, S7, S8, S*2, S*4, TA02, TB02, RK02).

The pressure differential of the backpressure valve is to be added to that of the main valve, showed at page 5.

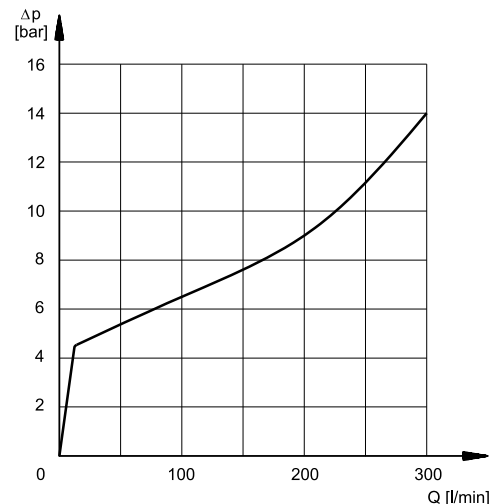
The cracking pressure is approx 5 bar at 15 l/min.

NOTE: The backpressure valve doesn't assure the seal so it has not be intended as a check valve.

The backpressure valve can be also delivered separately and it can be easily mounted on line P of the main control valve. Specify the code **0266577** to order the backpressure valve separately.



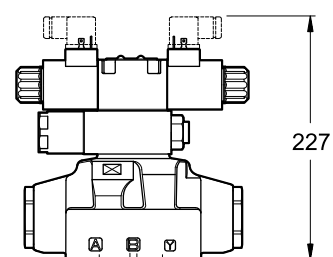
pilot supply always internal
Y: plug M5x6 for external drain



9.2 - Z type pilot supply: internal pilot supply with pressure reducing valve

The Z type pilot supply consists of an arrangement with internal pilot and 30 bar supply pressure to the pilot stage by means of a fixed adjustment pressure reducing valve placed between the main stage and the pilot valve.

DSP7-*/Z*



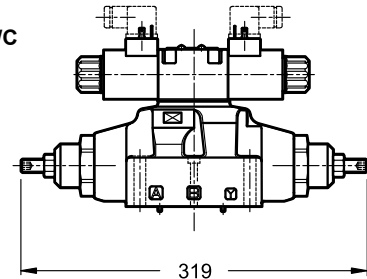
10 - OPTIONS

10.1 - C - Maximum flow adjustment

This option allows the adjustment of the flow rate from the pump to the actuator and from the actuator to the outlet, providing adjustable dual control of the actuator. Adjustment is achieved by means of stroke limiters installed on the side covers of the main stage, which limit the maximum spool opening.

Add **C** in the identification code to order this version (see point 1).

DSP7-S*/C

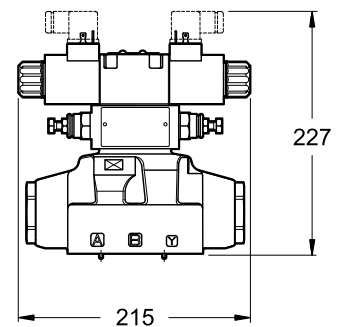


10.2 - D - Switching time adjustment

This option allows adjustment of the main spool switching times, reducing the movement speed and adapting the valve response to the application requirements. Adjustment is achieved by means of a flow control valve (QTM3 type), installed between the pilot solenoid valve and the main stage.

Add **D** in the identification code to order this version (see point 1).

DSP7-S*/D

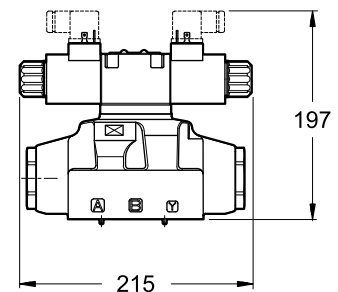


10.3 - P08- Switching damping by pilot pressure reduction

This option reduces the pilot pressure, providing a damping effect during switching and ensuring smoother, more controlled spool movement. The function is achieved by installing a subplate fitted with a Ø0.8 calibrated restrictor in the P line between the pilot solenoid valve and the main stage. Subplate thickness: 10 mm.

Add **P08** in the identification code to order this version (see point 1).

DSP7-S*/P08



10.4 - S2 - Pilot line unloading with the valve in the normal position

This option allows the pilot line to be unloaded when the valve is in the normal position, ensuring that the hydraulic control signal is fully relieved, as required in certain applications. The function is achieved by using an S2-type pilot stage spool. External pilot supply (E) is required.

Add **S2** to the identification code to order this option (see point 1).

10.5 - Combination of multiple options

The valve can be configured with a combination of functional options to provide a solution tailored to the specific application requirements. For example, the maximum flow adjustment (option C) can be combined with the switching time adjustment (option D), as well as with other available options (e.g. C-D, C-P08).

The feasibility of the requested combinations shall be verified with our Technical Support.

11 - ELECTRICAL FEATURES

11.1 - Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation. The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

11.2 - UL Recognized coils

ULW type coils are UL Recognized Components (cUR@us marking) intended for installation within end-use equipment that is subject to evaluation in accordance with the applicable UL and CSA standards.

SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	10,000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE)	In compliance with 2014/30/EU
LOW VOLTAGE	In compliance with 2014/35/EU
CLASS OF PROTECTION Coil insulation (VDE 0580) Impregnation: DC valve AC valve	class H class F class H

NOTE: To further reduce emissions, when using a DC power supply, type H connectors are recommended. These prevent overvoltage peaks when the coil supply circuit is opened (see catalogue 49 000).

11.3. - DC solenoid valve - current and power consumption

The table shows current and power consumption values of the DC coils.

Using connectors type 'D' or 'D1' (see cat. 49 000) with embedded bridge rectifier it is possible to feed DC coils with alternating current (50 or 60 Hz), considering a reduction of the operating limits.

11.3.1 - DC coils with diode

K7D coils incorporate a suppression diode providing protection against voltage peaks. During switching, the diode limits the voltage generated by the coil winding to 33 V for the D12 coil and 62 V for the D24 coil.

(values ± 10%)

	nominal voltage [V]	resistance at 20°C [Ω]	current consumpt [A]	power consumpt [W]
D12	12	4.5	2.68	32.2
D24 (std, W)	24	18.6	1.29	31
D24 (ULW)	24	16.6	1.45	34.7
D26	26.4	20.6	1.28	33.9
D48	48	77.7	0.62	29.7
D110	110	419.8	0.26	28.8
D220	220	1670	0.13	29

11.4 - AC solenoid valve - current and power consumption

The table shows current and power consumption values at inrush and at holding, for AC coils.

(values ± 5%)

	Nominal Voltage [V]	Freq. [Hz]	Resistance at 20°C [Ω]	Current consumption at inrush [A]	Current consumption at holding [A]	Power consumption at inrush [VA]	Power consumption at holding [VA]
A24	24	50	1.69	5.81	1.32	139	32
A48	48		6.02	3.78	0.86	182	41
A110	110V-50Hz 120V-60Hz	50/60	33	1.76	0.40	194	44
				1.54	0.35	185	42
A230	230V-50Hz 240V-60Hz		135	0.92	0.21	213	48
				0.79	0.18	190	43
F110	110	60	28.5	1.45	0.33	160	36
F220	220		103	0.92	0.21	203	46

12 - PROTECTION AGAINST ENVIRONMENTAL CONDITIONS

The valve protection against environmental conditions depends on the combination of its individual components (valve body, coils, electrical connection and manual override). This determines both the corrosion resistance level and the IP degree of protection.

12.1 - IP degree of protection

The IP degree of protection is defined according to IEC 60529 and indicates the level of protection against the ingress of solid objects and liquids.

The actual IP degree of protection of the valve depends on the type of electrical connection, the solenoid tube protection and the design solutions adopted. The stated IP degree of protection is guaranteed only when a connector with an equivalent degree of protection is correctly wired and installed.

coil version	electrical connection type	IP rating	
		electrical conn.	valve
standard	K1	IP65	IP65
W, ULW	K1	IP66	IP65
	K2	IP65/IP67	
	K7	IP66/IP68/IP69 IP69K*	
	K7D	IP66/IP68/IP69 IP69K*	
W, ULW + manual override type C*	K1	IP66	IP66
	K2	IP65/IP67	IP65/IP67
	K7	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*
	K7D	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*

IP Ratings: Selection Guide

The IP rating indicates protection against solid objects (first digit) and liquids (second digit). For solid objects, rating 6 is the highest level and provides complete dust protection. Our solenoid valves fall into this category.

For liquids, three types are distinguished:

- degree 1 to 6: protection against water jets;
- degree 7 and 8: protection against immersion;
- degree 9: protection against high-pressure, high-temperature water jets.

IP ratings are neither equivalent nor cumulative: IP66 covers lower ratings; IP68 covers IP67 only, not IP66, IP65 or lower ratings; IP69 does not cover any other rating.

Where a component complies with more than one type of protection, all applicable IP ratings shall be stated.

Example: equipment protected against powerful water jets and continuous immersion is marked IP66/IP68.

(*) The IP69K degree of protection is not covered by IEC 60529 but is defined in ISO 20653.

12.2 - Corrosion resistance

The valve body in the standard version is treated with a black phosphate coating, providing basic corrosion protection.

For applications requiring higher corrosion resistance, a zinc-nickel finish is available for the valve body (option /W7, point 1). When combined with standard coils, the zinc-nickel plated valve body provides corrosion resistance of up to 240 h in salt spray testing.

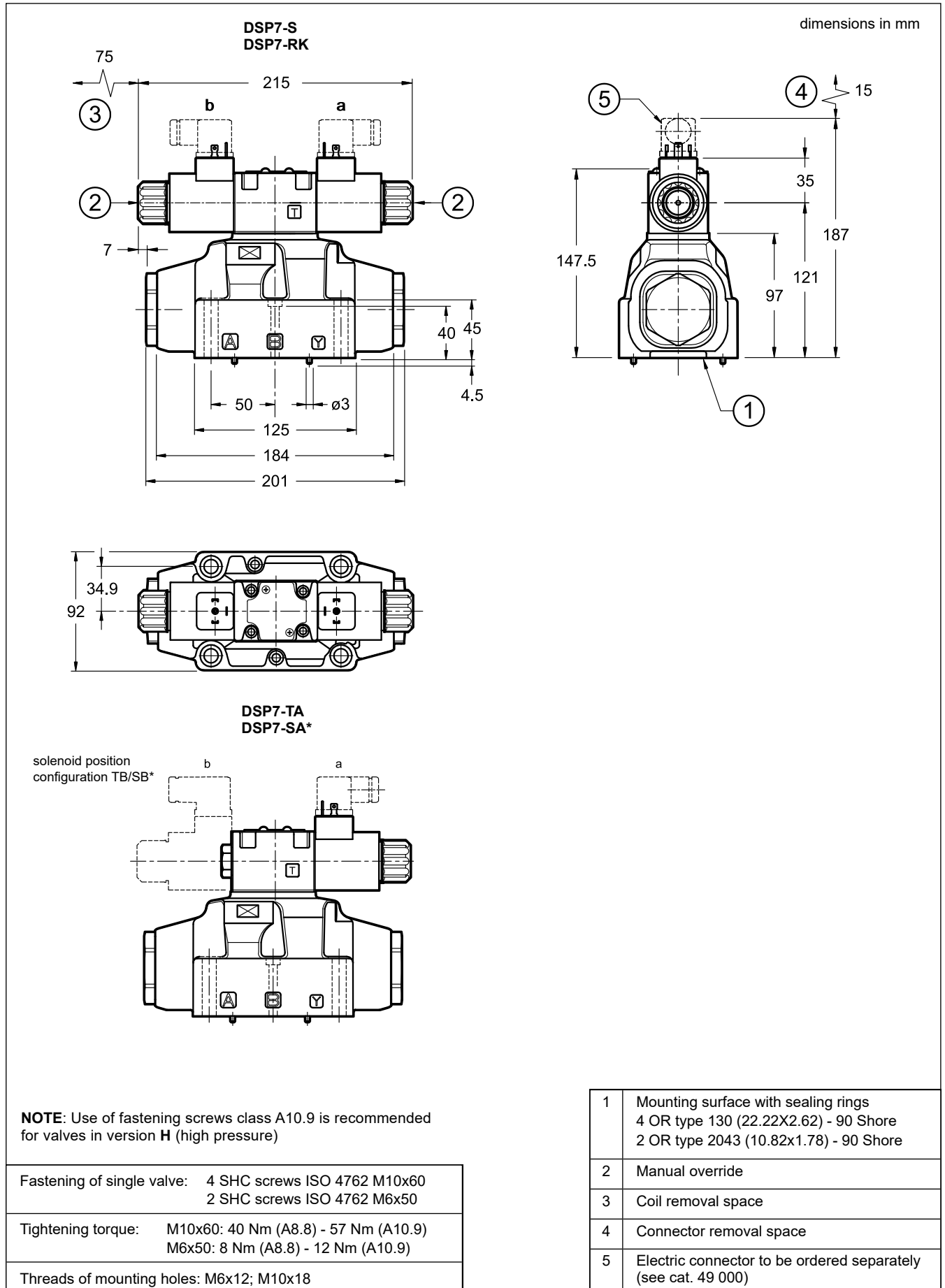
Complete valve configurations with a zinc-nickel finish on valve body, type W or ULW coils, and a type C* manual override providing solenoid tube protection provide corrosion resistance of up to 600 h in salt spray testing.

Salt spray tests are carried out in accordance with UNI EN ISO 9227, with results evaluated according to UNI EN ISO 10289.

The availability of the various protection levels depends on the combination of design options selected and may vary according to supply voltage, electrical connection type and manual override selected (see availability table, point 1).

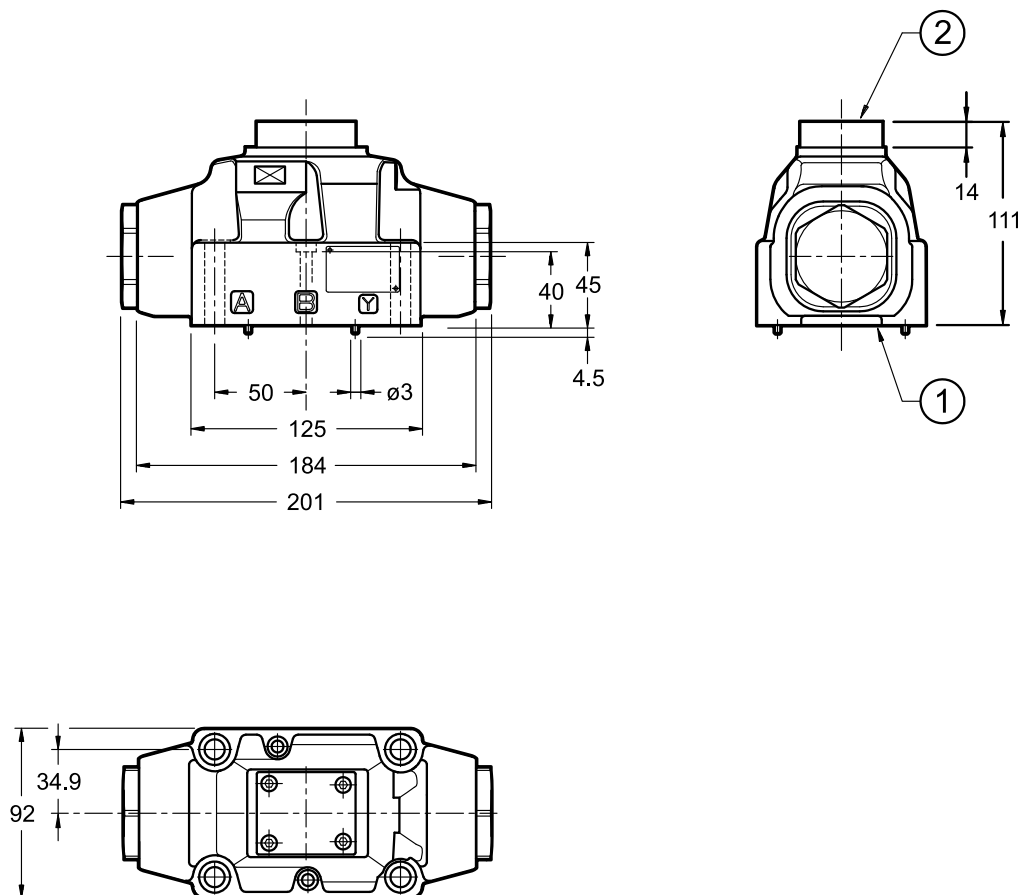
body type	configurations	resistance
standard (black phosphated)	Any configuration	-
W7 (zinc-nickel finish)	+ standard coil (zinc-plated)	240 h
	+ W or ULW coil	240 h
	+ W or ULW coil + type C* manual override	600 h

13 - DSP7 - OVERALL AND MOUNTING DIMENSIONS FOR SOLENOID DISTRIBUTOR



14 - DSC7 - OVERALL AND MOUNTING DIMENSIONS FOR HYDRAULIC DISTRIBUTOR

dimensions in mm



NOTE: Use of fastening screws class A10.9 is recommended for valves in version **H** (high pressure)

Fastening of single valve: 4 SHC screws ISO 4762 M10x60
2 SHC screws ISO 4762 M6x50

Tightening torque: M10x60: 40 Nm (A8.8) - 57 Nm (A10.9)
M6x50: 8 Nm (A8.8) - 12 Nm (A10.9)

Threads of mounting holes: M6x12; M10x18

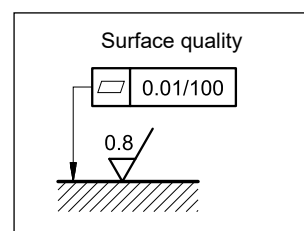
1	Mounting surface with sealing rings: 4 OR type 130 (22.22X2.62) - 90 Shore 2 OR type 2043 (10.82x1.78) - 90 Shore
2	Short-circuit subplate

15 - INSTALLATION

Configurations with centring and recall springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal.

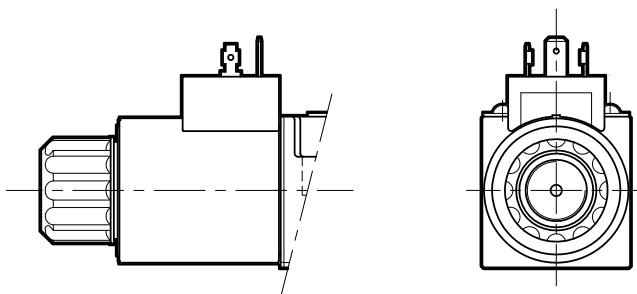
Valve fastening takes place by means of screws or tie rods, laying the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

NOTE: Use of fastening screws class 10.9 is recommended for valves in version **H** (high pressure).

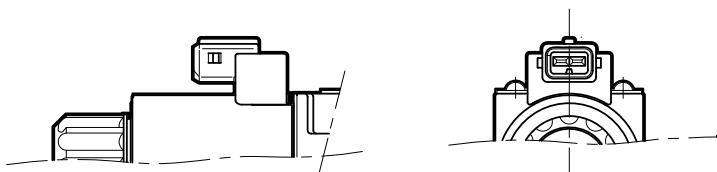


16 - ELECTRIC CONNECTIONS

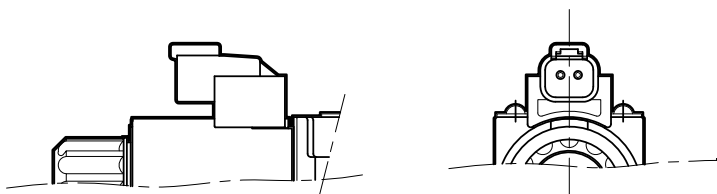
connection for EN 175301-803
(ex DIN 43650) connector
code **K1**
code **WK1**
code **ULWK1**



connection for
AMP JUNIOR connector
code **ULWK2**



connection for
DEUTSCH DT06-2S male connector
code **ULWK7**
code **WK7D** (with diode)



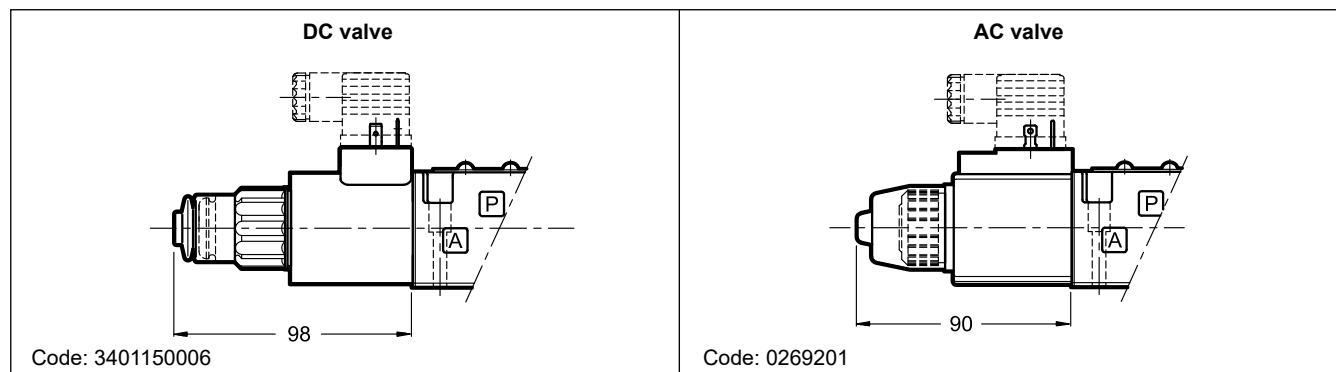
17 - ELECTRIC CONNECTORS

Solenoid valves are delivered without connectors. Connectors type EN 175301-803 (ex DIN 43650) for K1 connections can be ordered separately. See catalogue 49 000.

18 - MANUAL OVERRIDE

Whenever the solenoid valve installation may involve exposure to atmospheric agents or use in tropical climates, a boot protected manual override is recommended.

Add **/CM** at the end of the identification code to order this version (see point 1).





18 - SUBPLATES

(see catalogue 51 000)

These subplates are not suitable for DS*7H high pressure valves.

Type with rear ports	PME07-AI6G
Type with side ports	PME07-AL6G
P, T, A, B, port dimensions X, Y, L port dimensions	1" BSP 1/4" BSP