

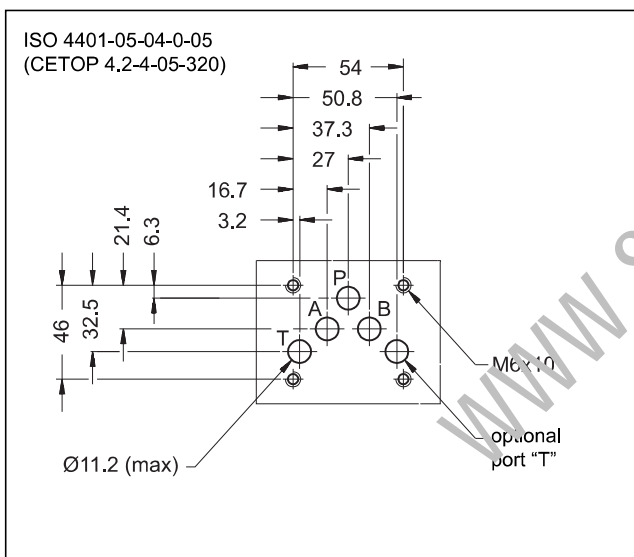
# DL5B

## SOLENOID OPERATED DIRECTIONAL CONTROL VALVE COMPACT VERSION SERIES 10

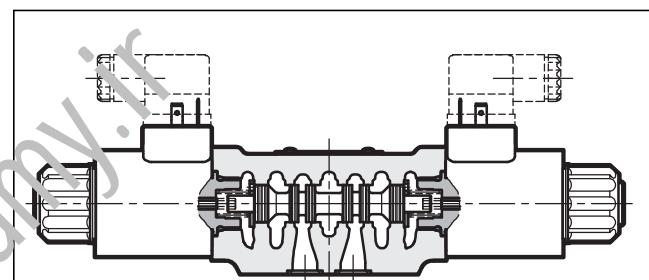
**SUBPLATE MOUNTING**  
**ISO 4401-05 (CETOP 05)**

**p** max **320** bar  
**Q** max **125** l/min

### MOUNTING SURFACE



### OPERATING PRINCIPLE



- Direct acting, subplate mounting directional control valve, with mounting surface according to ISO 4401 (CETOP RP 121H) standards.
- The valve is suitable for special applications, guaranteed by the reduced solenoid dimensions.
- The valve body is made with high strength iron castings provided with wide internal passages in order to minimize the flow pressure drop. Wet armature solenoids with interchangeable coils are used (for further information on solenoids see paragraph 7).

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

Maximum operating pressure: - ports P - A - B - port T	bar	320 210
Maximum flow rate	l/min	125
Pressure drop $\Delta p-Q$	see paragraph 4	
Operating limits	see paragraph 6	
Electrical features	see paragraph 7	
Electrical connections	see paragraph 9	
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
Masse: single solenoid valve	kg	2,4

- The valve is supplied with 3 or 4 way designs and with several interchangeable spools with different porting arrangements.
- The valve is available with DC current solenoids only.
- The valve is also available with zinc-nickel coating that ensures a salt spray resistance up to 600 hours.
- Alternative to the standard manual override there are push, boot, knob and mechanical detent devices.



## 1 - IDENTIFICATION CODE

### 1.1 - Standard version

<b>D</b>	<b>L</b>	<b>5</b>	<b>B</b>	<b>-</b>	<b>/</b>	<b>10</b>	<b>-</b>		<b>/</b>	
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Solenoid operated directional control valve

Compact version

ISO 4401-05 (CETOP 05) size

Spool type (see paragraph 3):

**S\***      **TA\***  
**SA\***      **TB\***  
**SB\***      **RK**

Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

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

**NOTE:** The standard valve is supplied with surface treatment of phosphating black.  
The zinc-nickel finishing on the valve body makes the valve suitable to ensure a salt spray resistance up to 240 hours.  
For a salt spray resistance up to 600 hours order the high corrosion resistance version.

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

Manual override:  
Omit for override integrated in the tube (**standard**)  
**CM** = manual override, boot protected  
**CP** = push manual override  
**CK** = knob manual override  
**CPK** = push manual override with mechanical retention

Coil electrical connection (see par. 9):  
**K1** = plug for connector type DIN 43650 (**standard**)  
**K2** = plug for connector type AMP JUNIOR (available on **D12** and **D24** coils only)  
**K7** = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S (available on **D12** and **D24** coils only)

DC power supply  
**D12** = 12 V  
**D24** = 24 V  
**D28** = 28 V  
**D00** = valve without coils (coils locking ring and related OR are supplied together with the valves.)

### 1.2 - High corrosion resistance version

This version features the zinc-nickel coating on all exposed metal parts of the valve, making it resistant to exposure to the salt spray for **600 hours** (test performed according to UNI EN ISO 9227 and assessment test performed according to UNI EN ISO 10289).

The coil are specific for this version, featuring a zinc-nickel surface treatment. The coil for DEUTSCH connector has a diode inside. Electrical features at paragraph 7.2

The boot manual override (CM) is installed as standard in order to protect the solenoid tube.

Follow the identification code below to order it

<b>D</b>	<b>L</b>	<b>5</b>	<b>B</b>	<b>-</b>	<b>/</b>	<b>10</b>	<b>-</b>		<b>/</b>		<b>/</b>	<b>W7</b>
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Choices as in standard identification code

DC power supply  
**D12** = 12 V  
**D24** = 24 V

Coil electrical connection  
**WK1** = plug for connector type DIN 43650  
**WK7D** = plug DEUTSCH DT04-2P, for male connector type DEUTSCH DT06-2S.  
Coil with diode.

Manual override:  
**CM** = manual override, boot protected (**standard**)  
**CP** = push manual override  
**CK** = knob manual override  
**CPK** = push manual override with mechanical retention

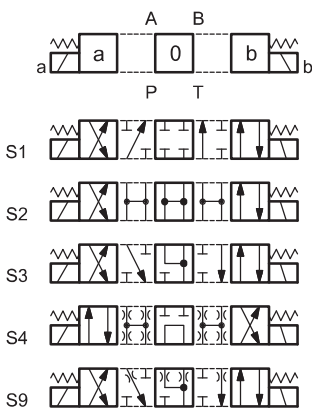
## 2 - HYDRAULIC FLUIDS

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 fluid types such as HFA, HFB, HFC, please consult our technical department.

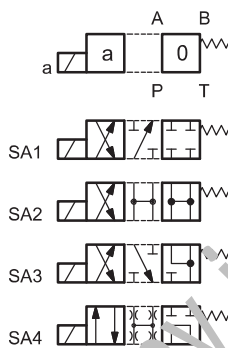
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

## 3 - SPOOL TYPE

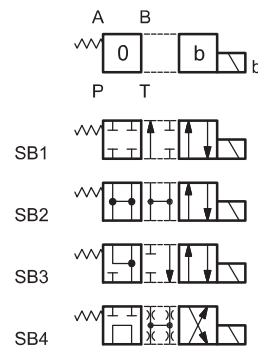
**Type S\*:**  
2 solenoids - 3 positions  
with spring centering



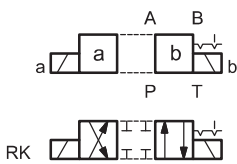
**Type SA\*:**  
1 solenoid side A  
2 positions (central + external)  
with spring centering



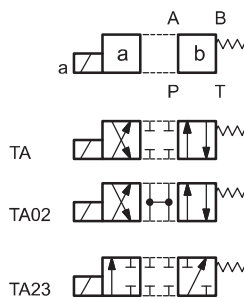
**Type SB\*:**  
1 solenoid side B  
2 positions (central + external)  
with spring centering



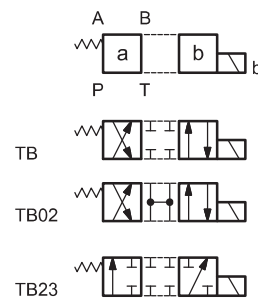
**Type RK:**  
2 solenoids - 2 positions  
with mechanical retention



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



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

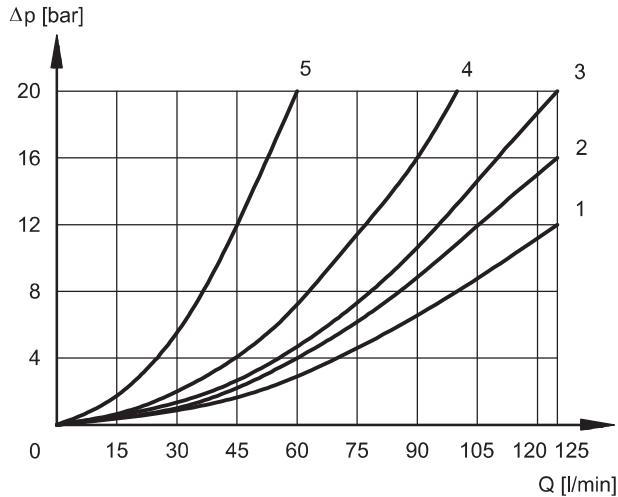


**NOTE:** Others spools available on request only.



### 4 - PRESSURE DROPS $\Delta P-Q$

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



### ENERGIZED VALVE

SPOOL	FLOW DIRECTIONS			
	P→A	P→B	A→T	B→T
	CURVES ON GRAPHS			
S1	1	1	2	2
S2	1	1	1	1
S3	1	1	1	1
S4	4	4	4	4
S9	1	1	1	1
RK	2	2	2	2
TA	2	2	3	3
TA02	2	2	1	1
TA23	3	3	-	-

### DE-ENERGIZED VALVE

SPOOL	FLOW DIRECTIONS		
	A→T	B→T	P→T
	CURVES ON GRAPHS		
S2	-	-	1
S3	5	5	-
S4	-	-	1

### 5 - SWITCHING TIMES

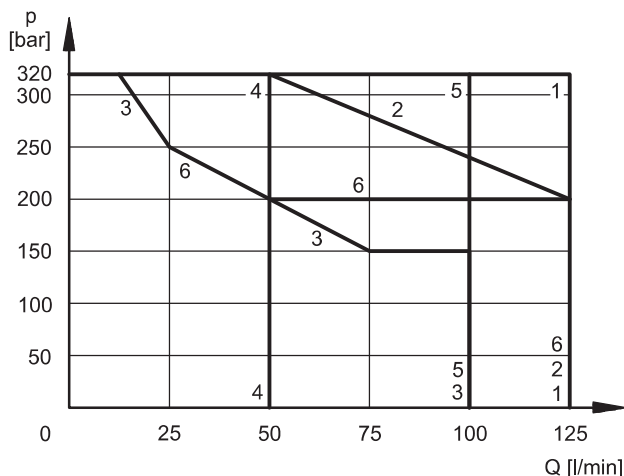
The values indicated are obtained with spool S1, according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50 °C.

SUPPLY	TIMES ( $\pm 10\%$ ) [ms]	
	ENERGIZING	DE-ENERGIZING
DC	70 ÷ 100	15 ÷ 20

### 6 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. 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 value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

The limits for TA02 and TA spools refer to the 4-way operation. The operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow are shown in the chart on the next page.

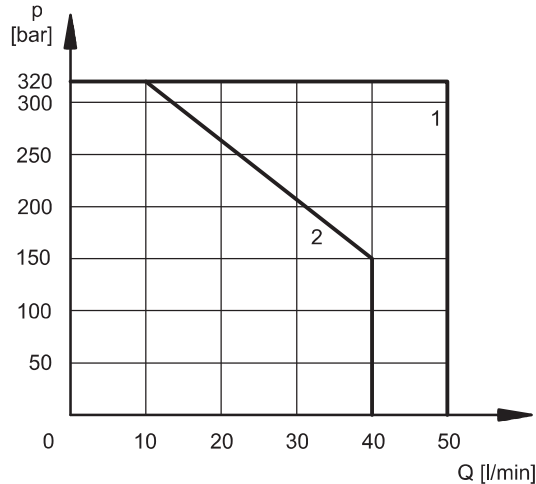


SPOOL	CURVE
S1, S2, RK	1
TA02	2
S3	3
S4	4
TA, TA23	5
S9	6



### 6.1 - 4-way valve in 3-way operation

Operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow.



SPOOL	CURVE
TA	1
TA02	2

## 7 - ELECTRICAL FEATURES

### 7.1 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. The coils are interchangeable.

### Protection from atmospheric agents EN 60529

Plug-in type	IP 65	IP 67	IP 69K
K1 DIN 43650	x (*)		
K2 AMP JUNIOR	x	x (*)	
K7 DEUTSCH DT04 male	x	x	x (*)

(\*) The protection degree is guaranteed only with the connector correctly connected and installed

**NOTE:** In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

<b>SUPPLY VOLTAGE FLUCTUATION</b>	± 10% Vnom
<b>MAX SWITCH ON FREQUENCY</b>	10.000 ins/hr
<b>DUTY CYCLE</b>	100%
<b>ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE)</b>	In compliance with 2004/108/EC
<b>LOW VOLTAGE</b>	In compliance with 2006/95/EC
<b>CLASS OF PROTECTION :</b> Coil insulation (VDE 0580) Impregnation:	class H class F

### 7.2 Coils - current and power consumption

In direct current energizing, current consumption stays at fairly constant values, essentially determined by Ohm's law:  $V = R \times I$

The WK1 and WK7D are coils specific for the high corrosion resistance version of the valve.

The WK7D coil includes a suppressor diode of pulses for protection from voltage peaks during switching. During the switching the diode significantly reduces the energy released by the winding, by limiting the voltage to 31.4V in the D12 coil and to 58.9 V in the D24 coil.

(values ±10%)

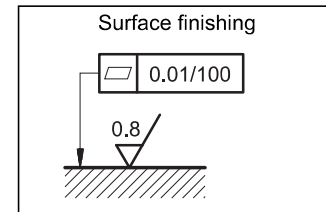
	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumption [A]	Power consumption [W]	Coil code				
					K1	WK1	K2	K7	WK7D
<b>D12</b>	12	4,4	2,72	32,7	1903080	1903050	1903100	1902940	1903400
<b>D24</b>	24	18,6	1,29	31	1903081	1903051	1903101	1902941	1903401
<b>D28</b>	28	26	1,11	31	1903082			-	



## 8 - INSTALLATION

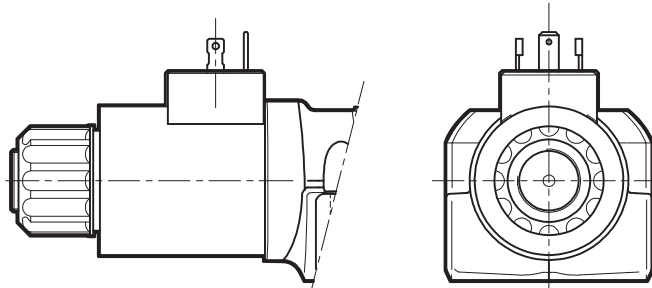
The configuration with centering and return springs can be mounted in any position.

Valve fitting takes place by means of screws or tie rods, fixing 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.



## 9 - ELECTRIC CONNECTIONS

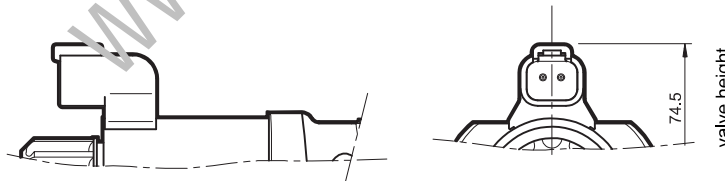
connection for DIN 43650  
connector  
code **K1 (standard)**  
code **WK1** (W7 version only)



connection for AMP JUNIOR  
connector  
code **K2**



connection for  
DEUTSCH DT06-2S male connector  
code **K7**



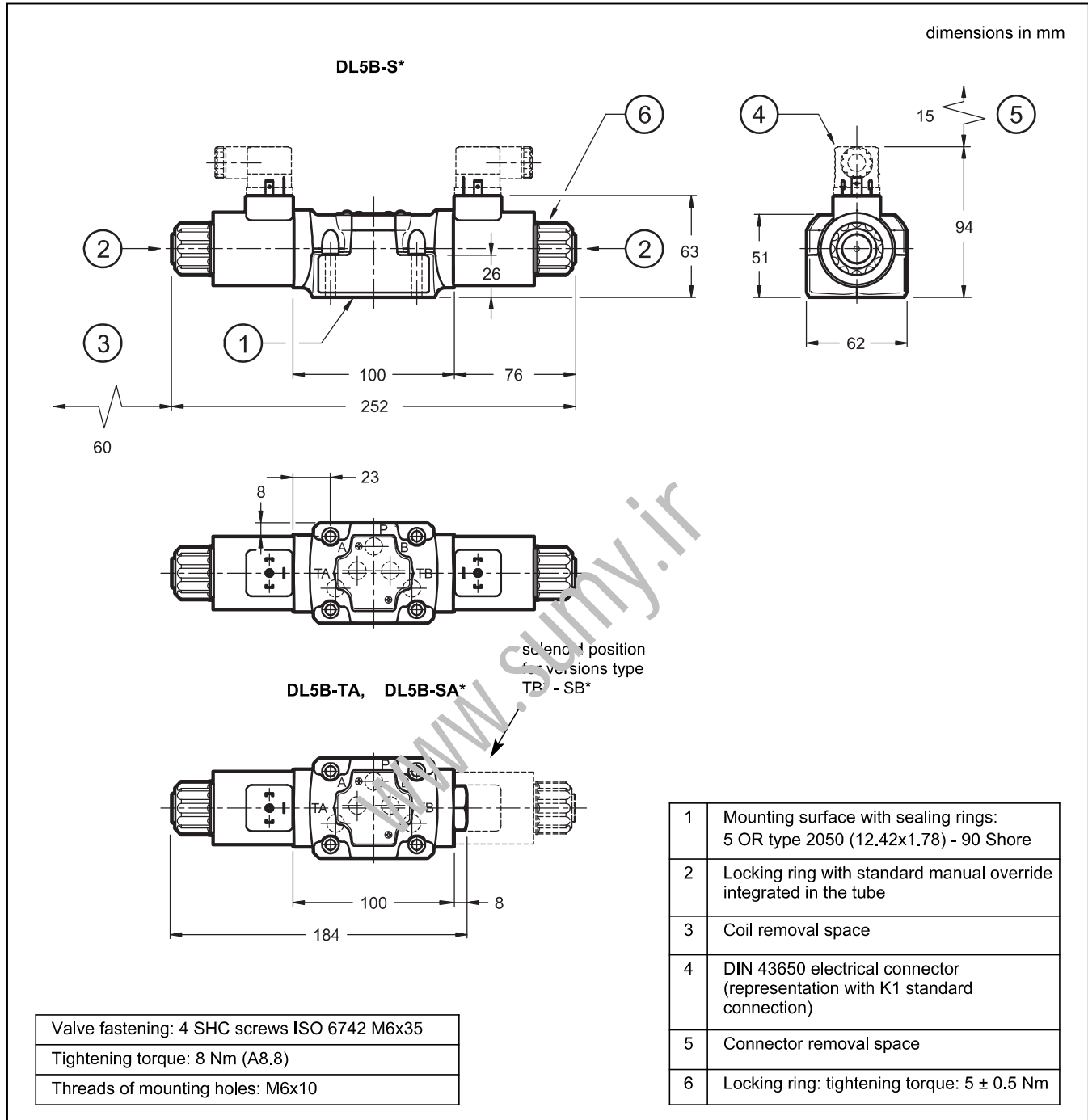
connection for  
DEUTSCH DT06-2S male  
connector - coil with diode  
code **WK7D** (W7 version only)



## 10 - ELECTRIC CONNECTORS

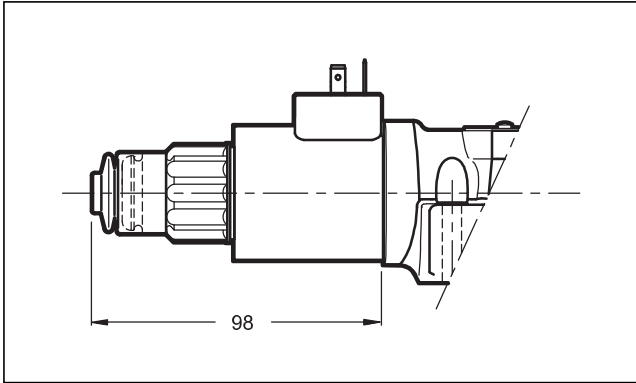
The valves are delivered without connector. Connectors for K1 connections (DIN 43650) can be ordered separately. See catalogue 49 000.

## 11 - DL5B OVERALL AND MOUNTING DIMENSIONS

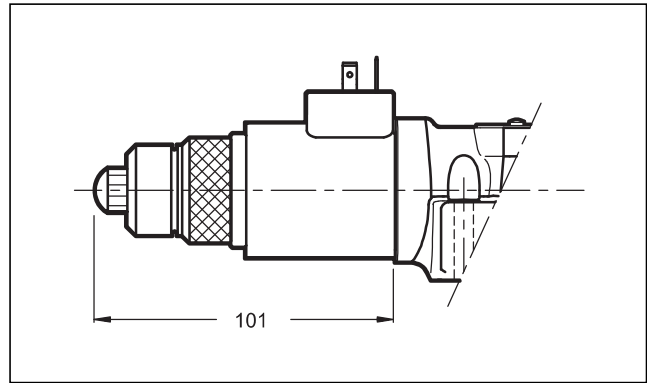


## 12 - MANUAL OVERRIDES

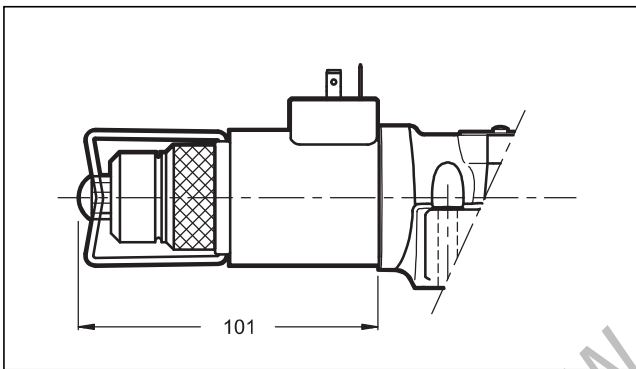
### 12.1 - CM manual override, boot protected



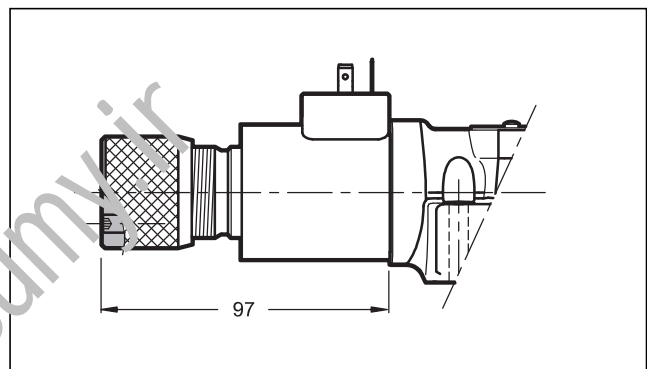
### 12.2 - CP Push manual override



### 12.3 - CPK Push manual override with mechanical retention



### 12.4 - CK Knob manual override

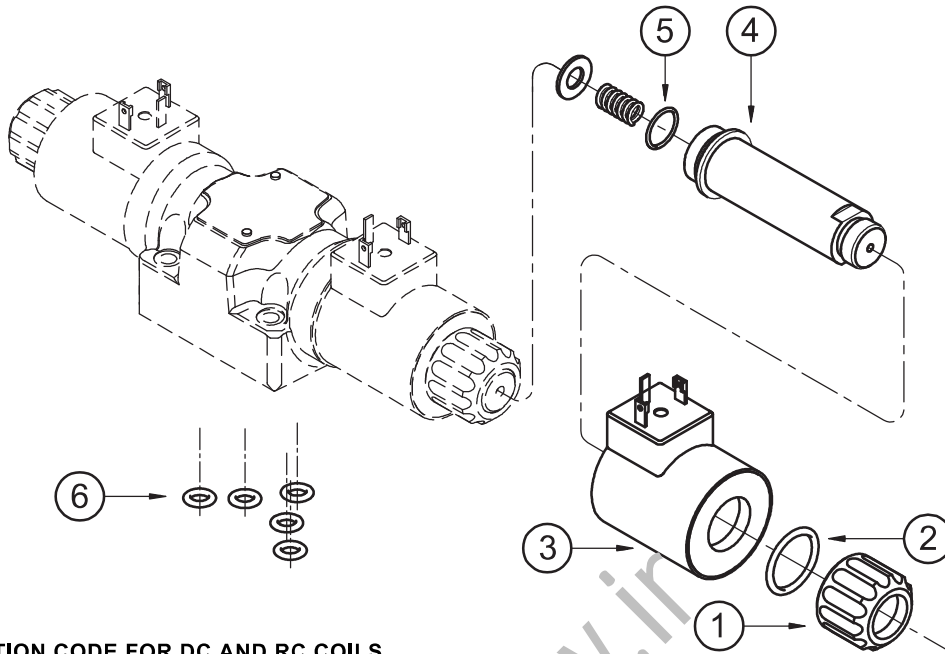


When the set screw is screwed and its point is aligned with the edge of the knob, tighten the knob till it touches the spool: in this position the override is not engaged and the valve is de-energized. After adjusting the override, tighten the set screw in order to avoid the knob loosening.

Spanner: 3 mm



## 13 - SPARE PARTS FOR DC SOLENOID VALVE



### IDENTIFICATION CODE FOR DC AND RC COILS

**C 22 S3 - /**

Supply voltage

**D12** = 12 V  
**D24** = 24 V  
**D28** = 28 V

Series no.:

**10** = for K7  
**11** = for K1, WK1, K2 and WK7D  
 (the overall and mounting dimensions remain unchanged from 10 to 11)

Coil electrical connection (see par. 9):

**K1** = plug for connector DIN 43650  
**K2** = plug for connector AMP JUNIOR  
 (available on **D12** and **D24** coils only)  
**K7** = plug DEUTSCH DT04-2P for male connector DEUTSCH DT06-2S  
 (available on **D12** and **D24** coils only)

**For W7 version only (D12 and D24 only)**

**WK1** = plug for connector DIN 43650  
**WK7D** = plug DEUTSCH DT04-2P, for male connector type DEUTSCH DT06-2S.  
 Coil with diode.

1	Coil locking ring - code 0119412 tightening torque: 5 ±0.5 Nm
2	ORM-0220-20 - 70 shore
3	Coil (see identification code)
4	Solenoid tube: TD22-DL5/10N (NBR seals) TD22-DL5/10V (FPM seals) (OR n° 6 included)
5	OR type 3.910 (19.18x2.46) - 70 shore
6	N. 5 OR type 2050 (12.42x1.78) - 90 Shore

### SEAL KIT

The codes included the OR n° 2, 5, and 6.

**Cod. 1985461** NBR seals  
**Cod. 1985462** FPM seals

## 14 - SUBPLATES

(See catalogue 51 000)

Type PMD4-AI4G with rear ports - threading: 3/4" BSP

Type PMD4-AL4G with side ports - threading: 1/2" BSP



# DL5B

SERIES 10

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