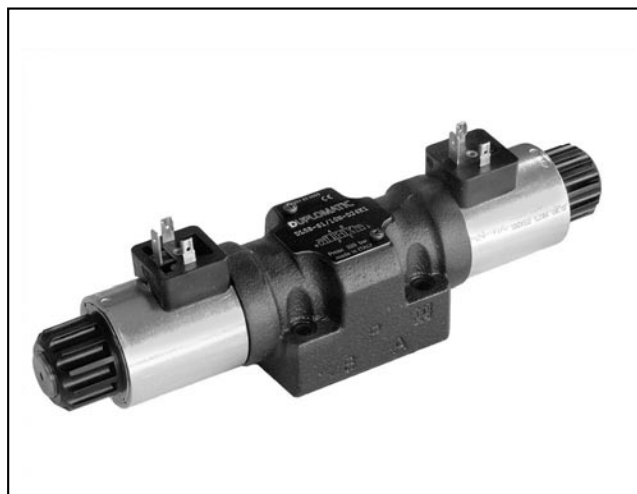


# DL5B

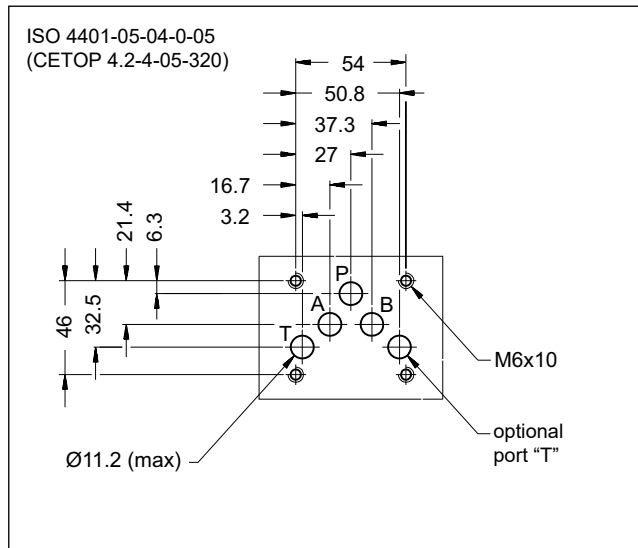
## SOLENOID OPERATED DIRECTIONAL VALVE COMPACT VERSION SERIES 10



### SUBPLATE MOUNTING ISO 4401-05

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

### MOUNTING INTERFACE

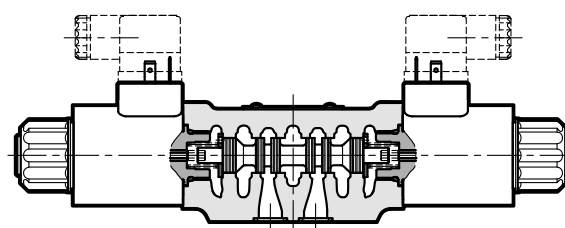


### PERFORMANCES

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

|                                                              |                                              |            |
|--------------------------------------------------------------|----------------------------------------------|------------|
| Maximum operating pressure:<br>- ports P - A - B<br>- port T | bar                                          | 320<br>210 |
| Maximum flow rate                                            | l/min                                        | 125        |
| Pressure drop $\Delta p_Q$                                   | see point 4                                  |            |
| Operating limits                                             | see point 6                                  |            |
| Electrical features                                          | see point 7                                  |            |
| Electrical connections                                       | see point 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<br>class 20/18/15 |            |
| Recommended viscosity                                        | cSt                                          | 25         |
| Mass: single solenoid valve<br>double solenoid valve         | kg                                           | 2.1<br>2.7 |

### OPERATING PRINCIPLE



- Direct acting, directional control valve for subplate mounting, with mounting surface according to ISO 4401 standards.
- Compact design with reduced solenoid dimensions, suitable for mini-power packs and mobile and agricultural applications.
- The valve is supplied with 3 or 4 way designs, and several types of spools.
- 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 point 7).
- The valve is available with DC current solenoids only.
- Versions with UL Recognized coils are available for the North American markets.
- The valve can be supplied with zinc-nickel surface treatment, suitable for 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

|          |          |          |          |          |  |          |           |  |          |  |  |  |          |  |  |
|----------|----------|----------|----------|----------|--|----------|-----------|--|----------|--|--|--|----------|--|--|
| <b>D</b> | <b>L</b> | <b>5</b> | <b>B</b> | <b>-</b> |  | <b>/</b> | <b>10</b> |  | <b>-</b> |  |  |  | <b>/</b> |  |  |
|----------|----------|----------|----------|----------|--|----------|-----------|--|----------|--|--|--|----------|--|--|

Directional valve, solenoid operated

Compact version

ISO 4401-05 size

Spool type (see point 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

DC power supply \_\_\_\_\_  
**D12** = 12 V  
**D24** = 24 V  
**D26** = 26.4 V  
**D00** = valve without coils, with locking rings and O-rings

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

Manual override (see point 12):  
Omit for override integrated in the tube (**standard**)  
**CM** = manual override, boot protected  
**CP** = push manual override  
**CK1** = turning knob override  
**CPK** = push manual override with mechanical retention

Coil electrical connection (see point 10):  
**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 8)  
**ULW** = UL Recognized, corrosion-protected (points 7.2 and 8)

**NOTE: The valve protection level against atmospheric agents depends on the combination of the fitted components (configuration). See point 8 for further details.**

**AVAILABILITY**

| voltage  | electr. conn. | coil version |   |     |
|----------|---------------|--------------|---|-----|
|          |               | std          | W | ULW |
| D12, D24 | K1            | ■            | ■ | ■   |
|          | K2            | -            | - | ■   |
|          | K7            | -            | - | ■   |
|          | K7D           | -            | ■ | -   |
| D26      | K1            | -            | ■ | ■   |
|          | K7            | -            | - | ■   |

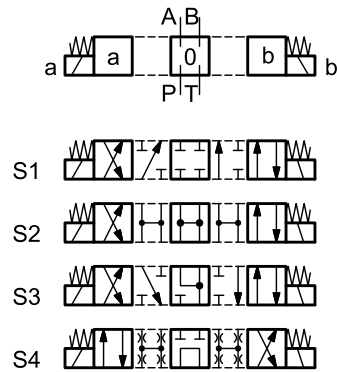
## 2 - HYDRAULIC FLUIDS

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.

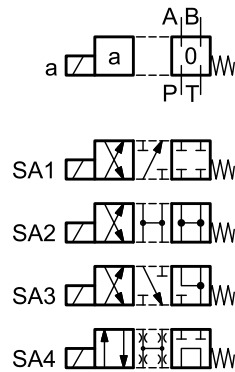
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

## 3 - SPOOL TYPE

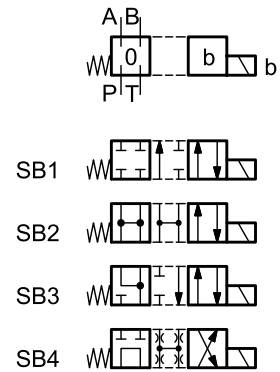
Type **S\***:  
2 solenoids - 3 positions  
with spring centering



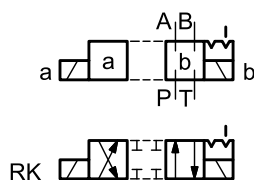
Type **SA\***:  
1 solenoid side A  
2 positions (central + external)  
with spring return



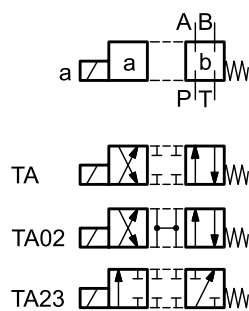
Type **SB\***:  
1 solenoid side B  
2 positions (central + external)  
with spring return



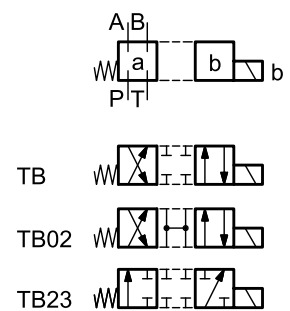
Type **RK**:  
2 solenoids - 2 positions  
with mechanical retention



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



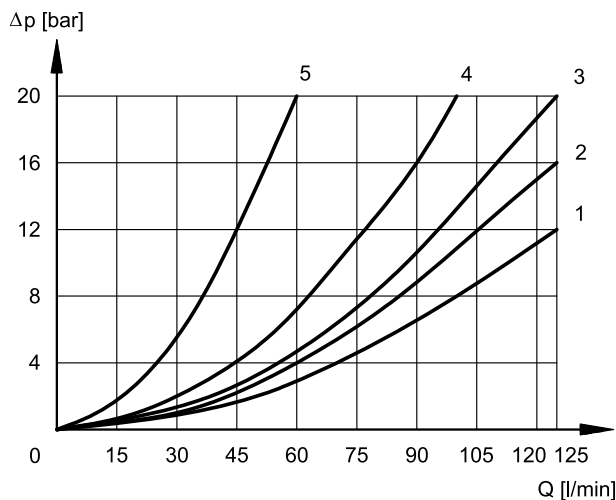
Type **TB**:  
1 solenoid side B  
2 external positions  
with spring return



**NOTE:** Further 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   |
| 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

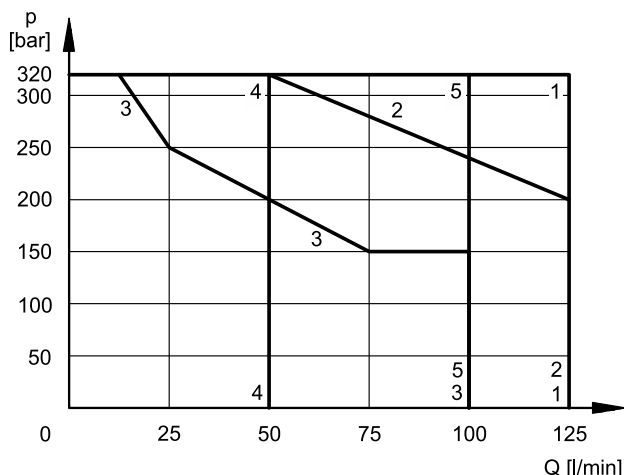
The values indicated are obtained with spool S1, according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

| 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.

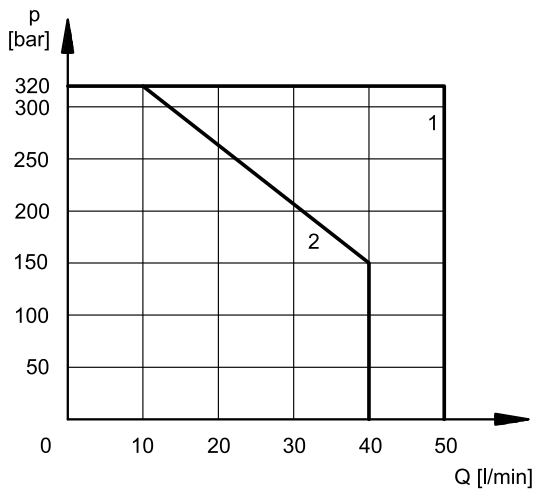
Limits of TA02 and TA spools refer to the 4-port operation. The operating limits of a 4-port valve that operates as 3-port valve, or with port A or B plugged or without flow, are shown in the chart on the next page.



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

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

Operating limits of a 4-port valve in 3-port 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, and can be rotated freely, to suit the available space.

### 7.2 - 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.

|                                                                          |                               |
|--------------------------------------------------------------------------|-------------------------------|
| <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)</b>                               | In compliance with 2014/30/EU |
| <b>LOW VOLTAGE (NOTE)</b>                                                | In compliance with 2014/35/EU |
| <b>CLASS OF PROTECTION</b><br>Coil insulation (VDE 0580)<br>Impregnation | class H<br>class F            |

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

### 7.3. - DC solenoid valve - current and power consumption

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

Using connectors type '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.

#### 7.3.1 - 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] |
|---------------------|---------------------|------------------------|-----------------------|---------------------|
| <b>D12</b>          | 12                  | 4.5                    | 2.68                  | 32.2                |
| <b>D24 (std, W)</b> | 24                  | 18.6                   | 1.29                  | 31                  |
| <b>D24 (ULW)</b>    | 24                  | 16.6                   | 1.45                  | 34.7                |
| <b>D26</b>          | 26.4                | 20.6                   | 1.28                  | 33.9                |

## 8 - 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.

### 8.1 - 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                         | <b>K1</b>                  | IP65                  | IP65                  |
| W, ULW                           | <b>K1</b>                  | IP66                  | IP65                  |
|                                  | <b>K2</b>                  | IP65/IP67             |                       |
|                                  | <b>K7</b>                  | IP66/IP68/IP69 IP69K* |                       |
|                                  | <b>K7D</b>                 | IP66/IP68/IP69 IP69K* |                       |
| W, ULW + manual override type C* | <b>K1</b>                  | IP66                  | IP66                  |
|                                  | <b>K2</b>                  | IP65/IP67             | IP65/IP67             |
|                                  | <b>K7</b>                  | IP66/IP68/IP69 IP69K* | IP66/IP68/IP69 IP69K* |
|                                  | <b>K7D</b>                 | IP66/IP68/IP69 IP69K* | IP66/IP68/IP69 IP69K* |

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

### 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.

### 8.2 - 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.

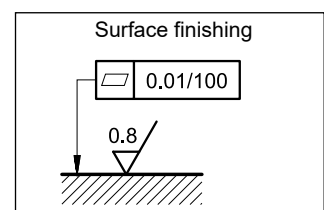
The availability of the various protection levels depends on the combination of design options selected and may vary according to supply voltage, electrical connection type and manual override selected (see availability table, point 1).

| 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      |

## 9 - INSTALLATION

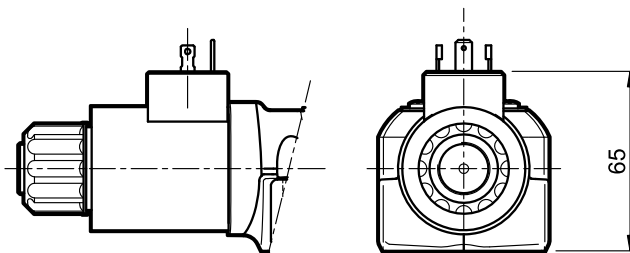
The configuration with centring and return springs can be mounted in any position.

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.

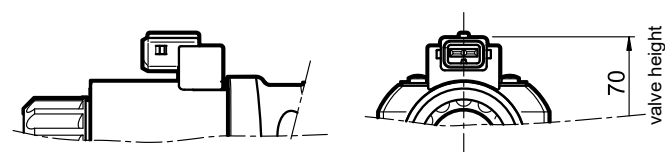


## 10 - ELECTRIC CONNECTIONS

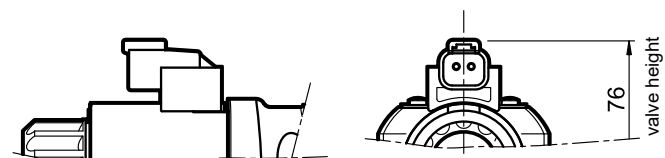
connection for EN 175301-803  
(ex DIN 43650) connector  
code **K1**  
code **WK1**  
code **ULWK1**



connection for  
AMP JUNIOR connector  
code **ULWK2**



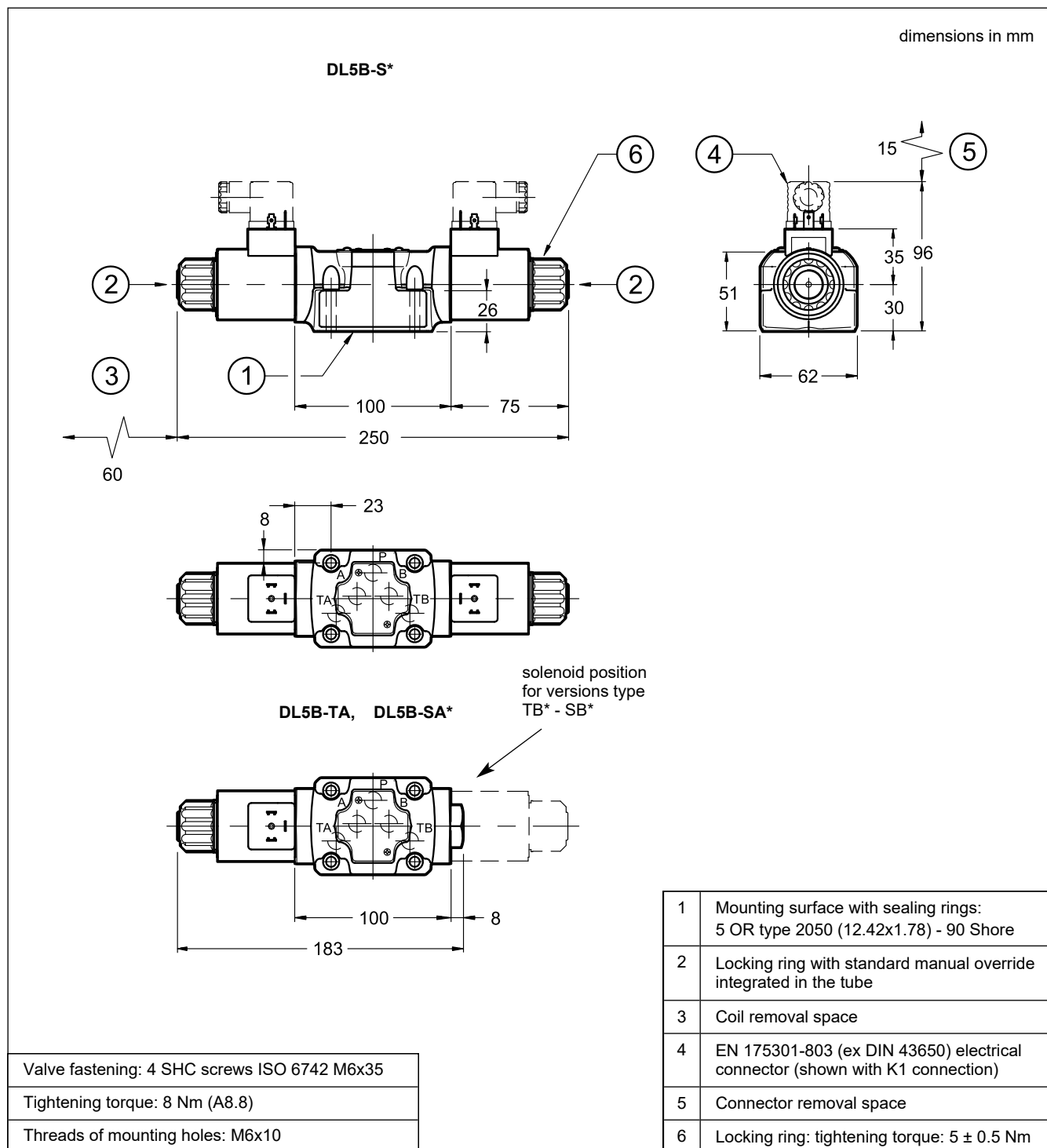
connection for  
DEUTSCH DT06-2S male connector  
code **ULWK7**  
code **WK7D** (with diode)



## 11 - ELECTRICAL CONNECTORS

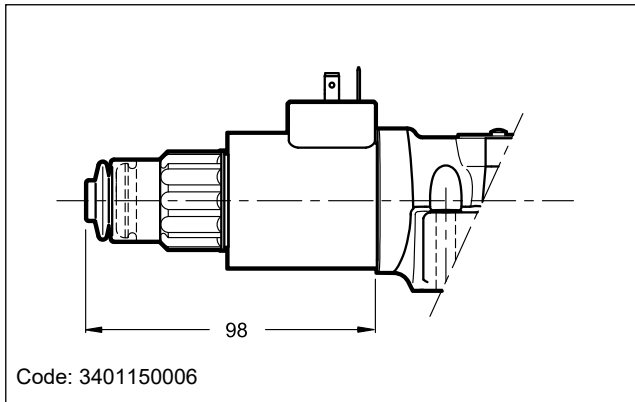
Solenoid operated valves are delivered without connectors. Connectors type EN 175301-803 (ex DIN 43650) for K1 connections can be ordered separately. See catalogue 49 000.

## 12 - OVERALL AND MOUNTING DIMENSIONS

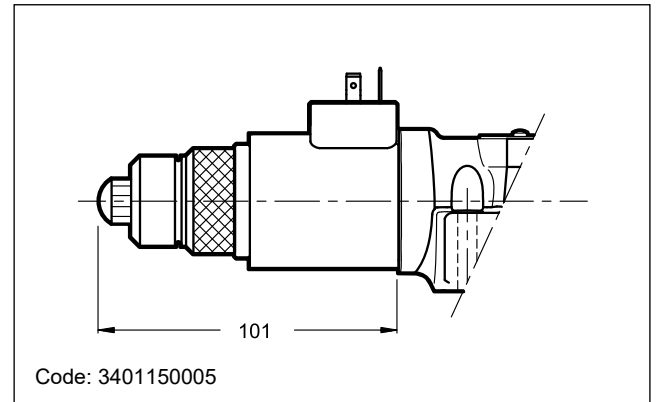


## 13 - MANUAL OVERRIDES

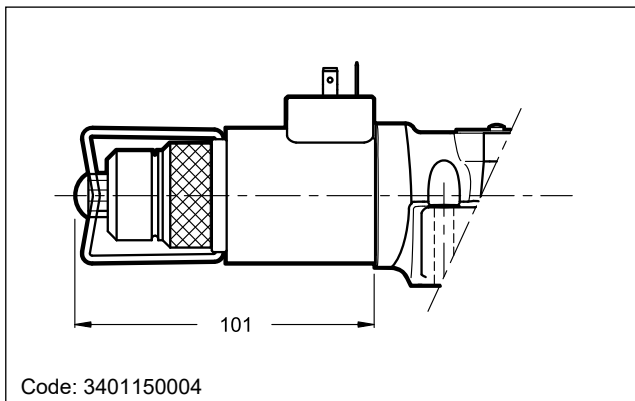
### 13.1 - CM Manual override, boot protected



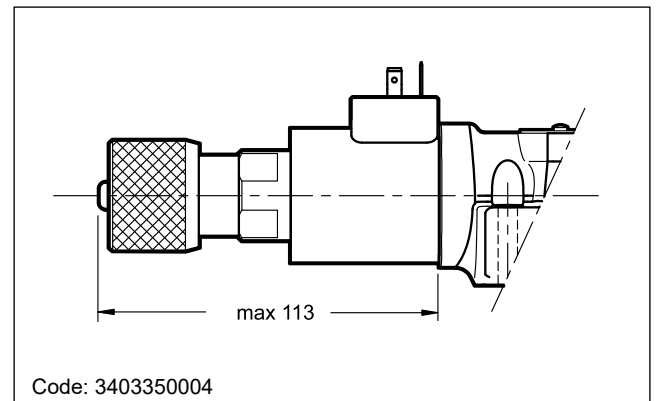
### 13.2 - CP Push manual override



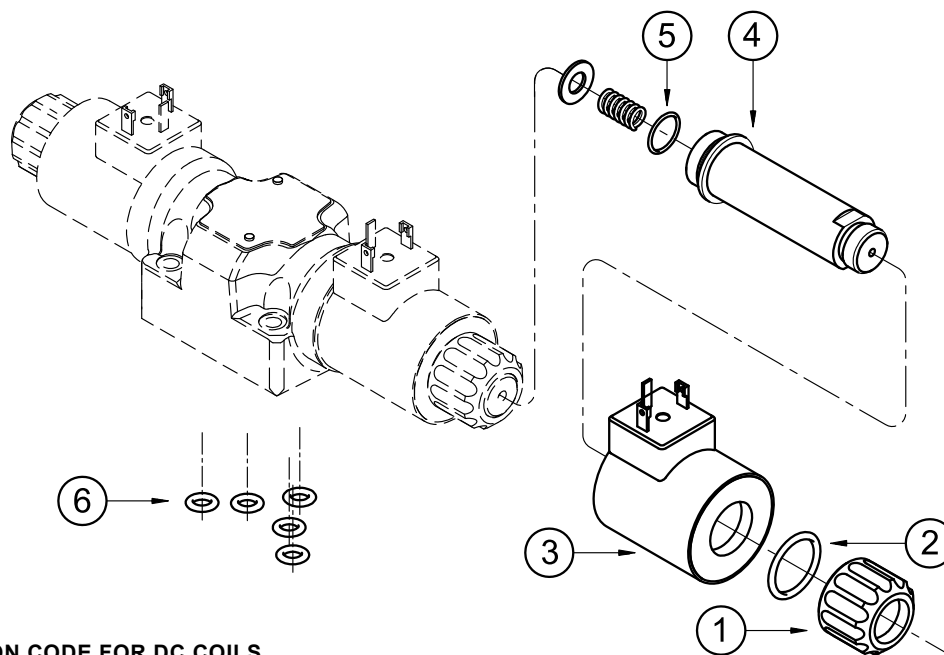
### 13.3 - CPK Push manual override with mechanical retention



### 13.4 - CK1 Turning knob override



## 14 - SPARE PARTS



### IDENTIFICATION CODE FOR DC COILS

**C 22S3 - /**

Supply voltage

**D12** = 12 V  
**D24** = 24 V  
**D26** = 26.4 V

Only for ULW coils:  
**A** = internal code

Series no.:  
**11** = for D12 and D24 K1 standard  
**20** = for W and ULW coils types

Coil electrical connection (see point 12):

**K1** = plug for connector EN 175301-803 (ex DIN 43650)  
**K2** = plug for connector 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 on page 2):  
 Omit for standard zinc-plated version  
**W** = corrosion-protected  
**ULW** = UL Recognized and corrosion-protected

|   |                                                                                                |
|---|------------------------------------------------------------------------------------------------|
| 1 | Coil locking ring - code 0119412<br>tightening torque: 5 ±0.5 Nm                               |
| 2 | ORM-0220-20 - 70 shore                                                                         |
| 3 | Coil (see identification code)                                                                 |
| 4 | Solenoid tube:<br>TDM22-DL5/10N (NBR seals)<br>TDM22-DL5/10V (FPM seals)<br>(OR n° 5 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, 6 and 7.

**Cod. 1985461** NBR seals

**Cod. 1985462** FPM seals

## 15 - SUBPLATES

(See catalogue 51 000)

Type PMD4-AL4G with rear ports 3/4" BSP

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

**DUPLOMATIC**  
 MOTION SOLUTIONS  
 a member of **DAIKIN** group

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duplomaticmotionsolutions.com