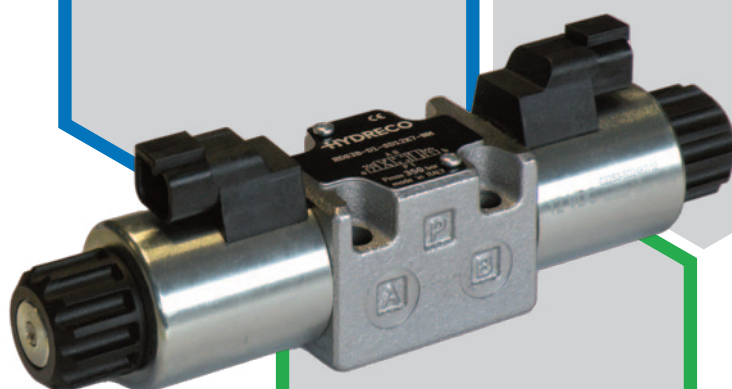




# HDS3B

DIRECTIONAL  
SOLENOID VALVE

350 bar 60 l/min



## TECHNICAL CATALOGUE

## INTRODUCTION

The HDS3B valves are solenoid directional valves, direct operated, with porting pattern compliant to ISO 4401-03 standards.

These valves are supplied with a zinc-nickel plating making them the perfect choice for mobile and environmental applications that require better protection.  
Salt spray resistance up to 120 hours (test according to UNI EN ISO 9227 and UNI EN ISO 10289 tests and standards).

The valve body is made with high strength iron castings with internal passages designed to minimize pressure drop.

## FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. 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.

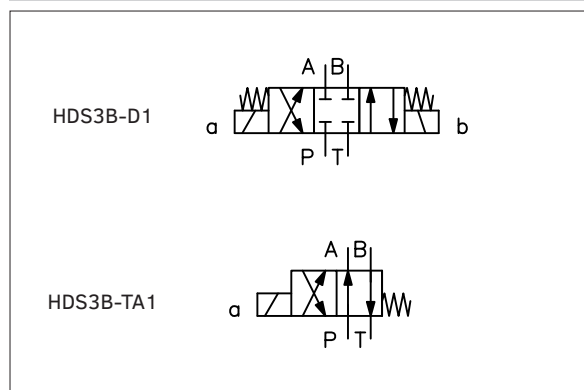
Using fluids at temperatures higher than 80 °C (180 °F) causes the accelerated degradation of seals as well as the fluid physical and chemical properties.

From a safety standpoint, temperatures above 55 °C (130 °F) are not recommended.

## OPERATING PARAMETERS

|                                   |                 |                                 |               |
|-----------------------------------|-----------------|---------------------------------|---------------|
| <b>MAXIMUM OPERATING PRESSURE</b> | P - A - B ports | 350 bar                         | 5000 psi      |
|                                   | T port          | 210 bar                         | 3000 psi      |
| <b>FLOW RATE</b>                  |                 | 60 l/min                        | 15.9 gpm      |
| <b>MOUNTING SURFACE</b>           |                 | ISO 4401-03-02-0-05<br>NFPA D03 |               |
| <b>STEP RESPONSE</b>              | 0 → 100%        | 25 ÷ 75 ms                      |               |
|                                   | 100 → 0%        | 15 ÷ 25 ms                      |               |
| <b>WEIGHT</b>                     | single solenoid | 1.4 kg                          | 3.0 lbs       |
|                                   | double solenoid | 2 kg                            | 4.4 lbs       |
| <b>RANGE TEMPERATURES</b>         | ambient         | -20 to +54 °C                   | -4 to +130 °F |
|                                   | fluid           | -20 to +82 °C                   | -4 to +180 °F |
| <b>FLUID VISCOSITY</b>            | range           | 10 - 400 cSt                    | 60 - 1900 SUS |
|                                   | recommended     | 25 cSt                          | 120 SUS       |
| <b>FLUID CONTAMINATION</b>        |                 | ISO 4406:1999<br>class 20/18/15 |               |

## HYDRAULIC SYMBOLS (TYPICAL)





design mark

| VOLTAGE     |                  |
|-------------|------------------|
| <b>SD12</b> | 12 V DC solenoid |
| <b>SD24</b> | 24 V DC solenoid |
| <b>SD28</b> | 28 V DC solenoid |
| <b>SD00</b> | without coils    |

| COIL |                   |
|------|-------------------|
| K1   | DIN 43650         |
| K2   | AMP Junior        |
| K7   | DT04-2P 'deutsch' |

| MANUAL OVERRIDE |                                                    |
|-----------------|----------------------------------------------------|
| <b>M</b>        | built-in with the tube,<br>pin ( <b>standard</b> ) |
| <b>B</b>        | built-in with the tube,<br>boot protected          |
| <b>L</b>        | hand lever                                         |

|               |
|---------------|
| <b>SPOOL</b>  |
| See next page |

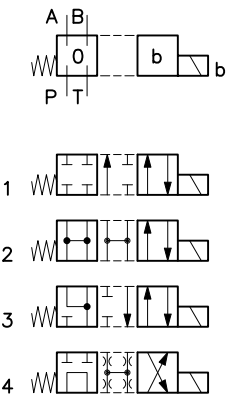
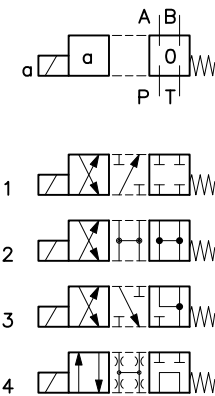
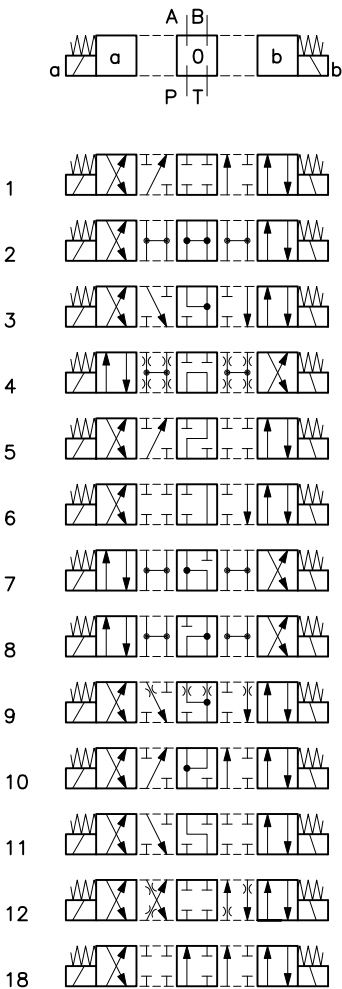
| SEAL |                |
|------|----------------|
| N    | NBR (standard) |
| V    | Viton          |

HDS3B - D1 - SD12K7 - NM - 1

FUNCTION D

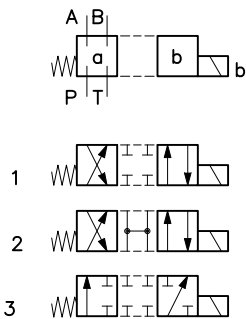
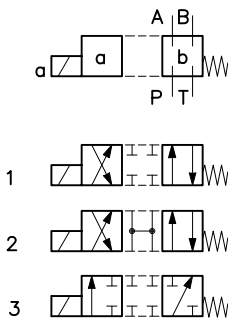
FUNCTION A

FUNCTION B

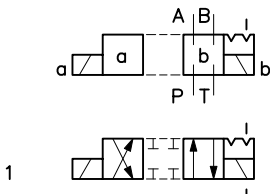


FUNCTION TA

FUNCTION TB

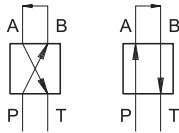


FUNCTION K

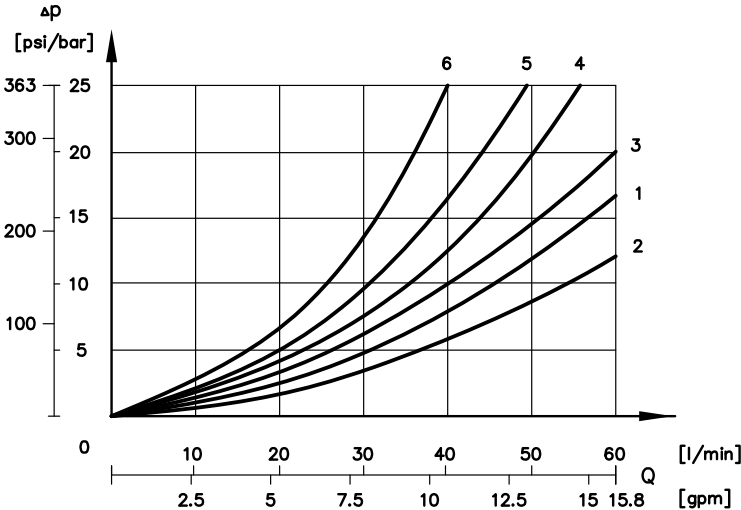


Flow characteristic curves obtained with mineral oil with viscosity of 36 cSt (170 sus) at 50 °C (122 °F) and 24V DC valve; the  $\Delta p$  values are measured between P and T (full loop) valve ports.

The operating limits can be considerably reduced if a 4-port valve is used as 3-port valve with port A or B plugged or without flow.



PRESSURE DROPS  $\Delta p$ -Q



ENERGIZED POSITION

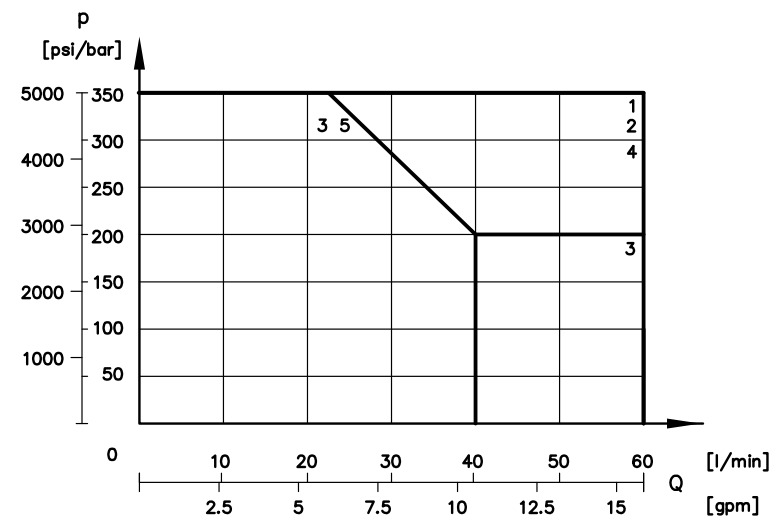
| TYPE       | FLOW DIRECTION  |     |     |     |
|------------|-----------------|-----|-----|-----|
|            | P→A             | P→B | A→T | B→T |
|            | CURVES ON GRAPH |     |     |     |
| D1, A1, B1 | 1               | 1   | 3   | 3   |
| D2, A2, B2 | 2               | 2   | 3   | 3   |
| D3, A3, B3 | 3               | 3   | 2   | 2   |
| D4, A4, B4 | 4               | 4   | 4   | 4   |
| D5         | 1               | 2   | 3   | 3   |
| D6         | 1               | 1   | 3   | 2   |
| D7, D8     | 5               | 4   | 4   | 4   |
| D9         | 1               | 1   | 3   | 3   |
| D10        | 2               | 3   | 2   | 3   |
| D11        | 1               | 1   | 2   | 3   |
| D12        | 1               | 1   | 3   | 3   |
| D18        | 2               | 1   | 3   | 3   |
| TA1, TB1   | 3               | 3   | 3   | 3   |
| TA2, TB2   | 1               | 1   | 1   | 1   |
| TA3, TB3   | 3               | 3   |     |     |
| K1         | 1               | 1   | 1   | 1   |

Please refer to curve no. 4 for pressure drops between A and B lines of the S10 spool when used in regenerative circuits.

DE-ENERGIZED POSITION

| SPOOL TYPE | FLOW DIRECTION  |     |     |     |     |
|------------|-----------------|-----|-----|-----|-----|
|            | P→A             | P→B | A→T | B→T | P→T |
|            | CURVES ON GRAPH |     |     |     |     |
| D2, A2, B2 |                 |     |     |     | 1   |
| D3, A3, B3 |                 |     | 3   | 3   |     |
| D4, A4, B4 |                 |     |     |     | 3   |
| D5         |                 | 5   |     |     |     |
| D6         |                 |     |     | 3   |     |
| D7, D8     |                 |     | 6   | 6   | 3   |
| D10        | 3               | 3   |     |     |     |
| D11        |                 |     | 3   |     |     |
| D18        | 5               |     |     |     |     |

PERFORMANCE CURVES



| SPOOL      | CURVE |     |
|------------|-------|-----|
|            | P→A   | P→B |
| D1, A1, B1 | 1     | 1   |
| D2, A2, B2 | 2     | 2   |
| D3, A3, B3 | 3     | 3   |
| D4, A4, B4 | 4     | 4   |
| D5         | 1     | 1   |
| D6         | 1     | 5   |
| D7         | 1     | 1   |
| D8         | 1     | 1   |
| D9         | 1     | 1   |
| D10        | 1     | 1   |
| D11        | 1     | 5   |
| D12        | 1     | 1   |
| D18        | 1     | 1   |

| SPOOL    | CURVE |     |
|----------|-------|-----|
|          | P→A   | P→B |
| TA1, TB1 | 1     | 1   |
| TA2, TB2 | 1     | 1   |
| TA3, TB3 | 1     | 1   |
| K1       | 1     | 1   |

ELECTRICAL DATA

Solenoids are 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 retainer, and can be indexed 360°, to suit the clearance space.

Use coil codes in the table below to order spare parts.

|                                     |             |                  |
|-------------------------------------|-------------|------------------|
| DUTY CYCLE                          |             | 100%             |
| MAXIMUM SWITCH ON FREQUENCY         |             | 10,000 cycles/hr |
| SUPPLY VOLTAGE FLUCTUATION          |             | ± 10% Vnom       |
| ELECTROMAGNETIC COMPATIBILITY (EMC) |             | 2014/30/EU       |
| LOW VOLTAGE                         |             | 2014/35/EU       |
| PROTECTION CLASS FOR INSULATION     | copper wire | class H (180 °C) |
|                                     | coil        | class F (155 °C) |

(values ± 10%)

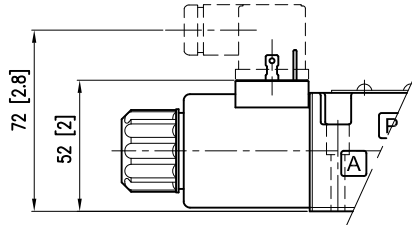
|      | Nominal voltage [V] | Resistance at 20°C [Ω] | Current consumpt. [A] | Power consumpt. [W] | Coil code |         |         |
|------|---------------------|------------------------|-----------------------|---------------------|-----------|---------|---------|
|      |                     |                        |                       |                     | K1        | K2      | K7      |
| SD12 | 12                  | 4.5                    | 2.67                  | 32                  | 1903780   | 1904190 | 1904050 |
| SD24 | 24                  | 18.6                   | 1.29                  | 31                  | 1903781   | 1904191 | 1904051 |
| SD28 | 28                  | 25.3                   | 1.07                  | 31                  | 1903782   | -       | 1903762 |

## HDS3B - Electrical Connection and IP Rating

Declared IP ratings are intended according to EMC 2014/30/EU, only for both valve and connectors of an equivalent IP rating, installed properly.

Mating connectors are not included in solenoid valves delivery. Connectors for K1 coils can be ordered separately.

## K1

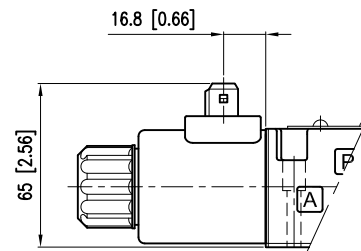
**DIN 43650 (EN 175301-803)**

Mating connectors type ISO 4400 / DIN 43650 (EN 175301-803).

IP rating of electrical connection: IP65

IP rating of whole valve: IP65

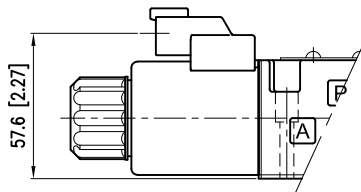
## K2

**AMP Junior**

IP rating of electrical connection: IP65

IP rating of whole valve: IP65

## K7

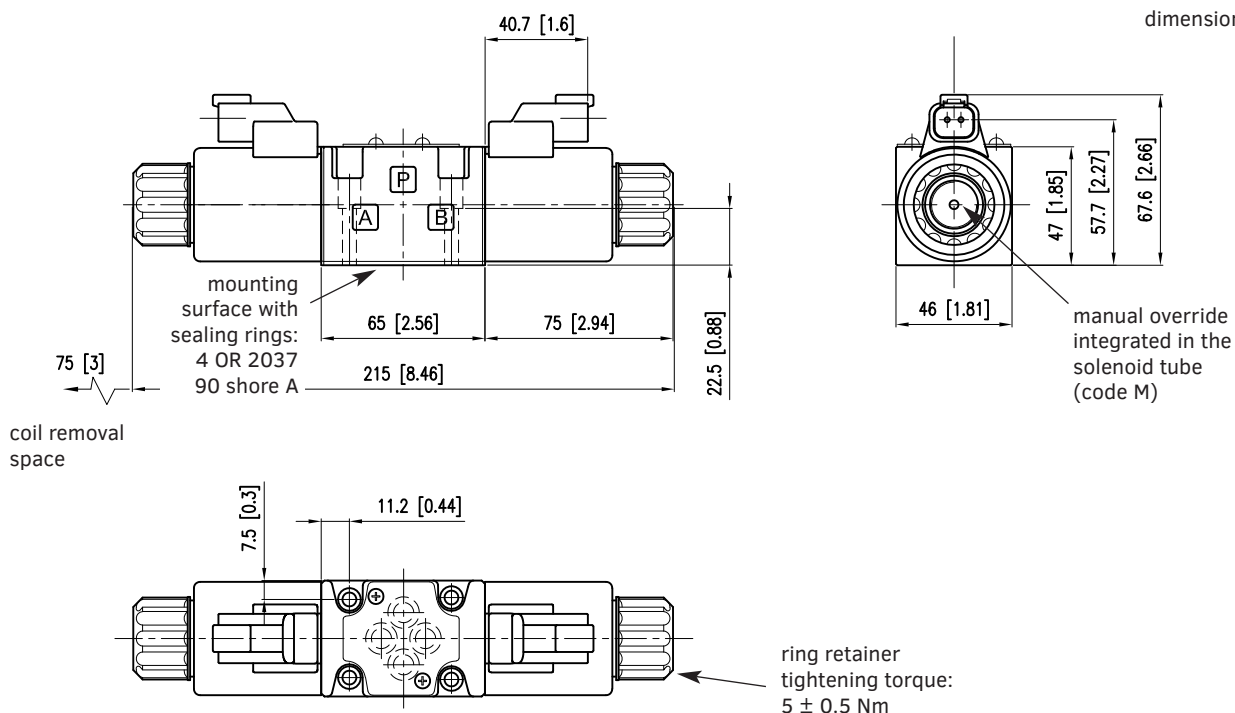
**DEUTSCH DT04 MALE**

IP rating of electrical connection: IP65/IP67

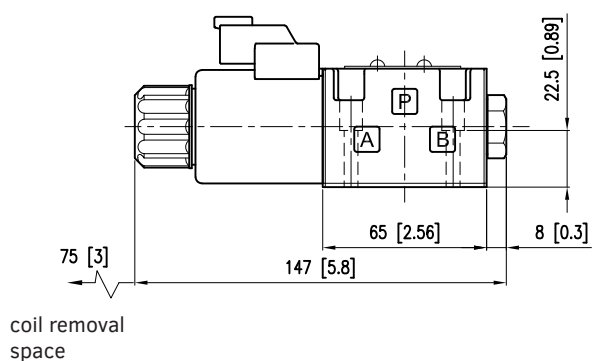
IP rating of whole valve: IP65

HDS3B DOUBLE SOLENOID (K7 COIL)

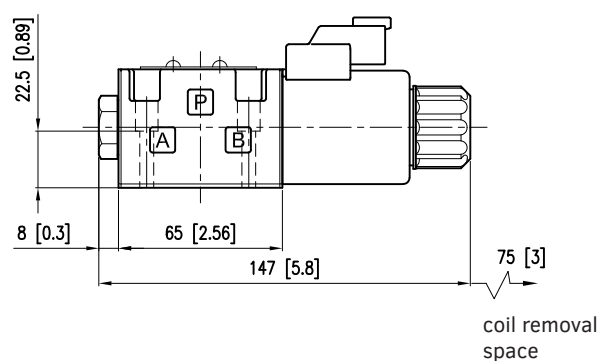
dimensions in mm [in]



HDS3B SINGLE SOLENOID SIDE A (K7 COIL)



HDS3B SINGLE SOLENOID SIDE B (K7 COIL)



**Fastening bolts:**

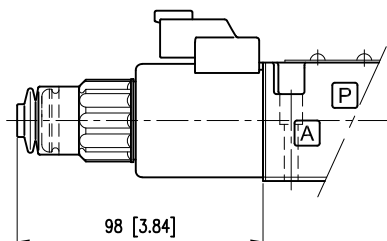
4 SHCS M5x30 - ISO 4762 - torque 5 Nm (A8.8)

**Threads of mounting holes:** M5x10

The standard valve has override pins integrated in the tube.  
The operation of this control must be executed with a suitable tool, carefully not to damage the sliding surface.

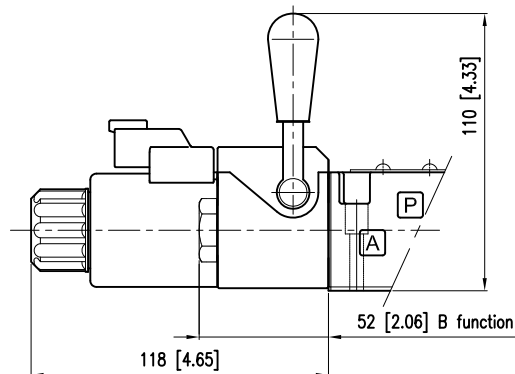
#### VERRIDE PIN INTEGRATED THE TUBE, BOOT PROTECTED

Code B



#### HAND LEVER

Code L



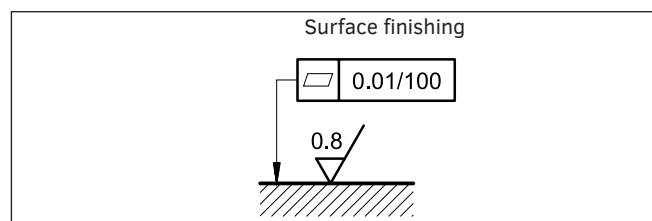
The L device is located on the A side of the valve, with the exception of the valves type HDS3-TB.

#### INSTALLATION

These valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed, fluid can easily leak between the valve and support surface.



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## CONTACT INFORMATION

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|         |                                             |                       |                         |
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|-------------|---------------------------------------------------------|-------------------|---------------------|

### APAC

|           |                                                 |                   |                            |
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