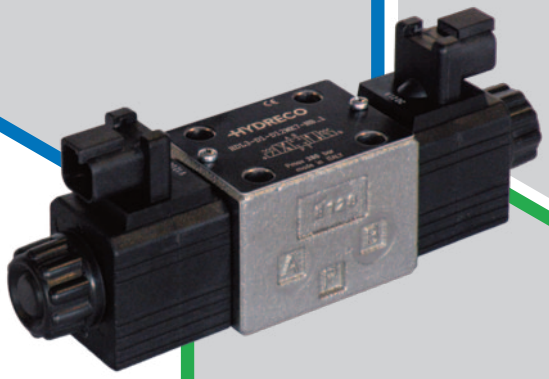
HYDRECO

# HDL3

## DIRECTIONAL SOLENOID VALVE

280 bar  50 l/min



TECHNICAL CATALOGUE

## INTRODUCTION

The HDL3 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 600 h (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

| | | | |
|---|---|---|---|
| **MAXIMUM OPERATING PRESSURE** | P - A - B ports | 280 bar | 4000 psi |
| | T port | 250 bar | 3600 psi |
| **FLOW RATE** | | 50 l/min | 13.2 gpm |
| **MOUNTING SURFACE** | | ISO 4401-03-02-0-05<br>NFPA D03 | |

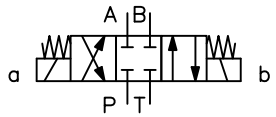
| | | |
|---|---|---|
| **STEP RESPONSE** | 0 → 100% | 25 ÷ 75 ms |
| | 100 → 0% | 15 ÷ 25 ms |

| | | | |
|---|---|---|---|
| **WEIGHT** | single solenoid | 1.1 kg | 2.4 lbs |
| | double solenoid | 1.4 kg | 3.1 lbs |

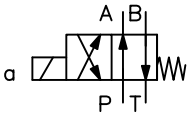
| | | | |
|---|---|---|---|
| **RANGE TEMPERATURES** | ambient | -20 to +54 °C | -4 to +130 °F |
| | fluid | -20 to +82 °C | -4 to +180 °F |
| **FLUID VISCOSITY** | range | 10 - 400 cSt | 60 - 1900 SUS |
| | recommended | 25 cSt | 120 SUS |
| **FLUID CONTAMINATION** | | ISO 4406:1999<br>class 20/18/15 | |

## HYDRAULIC SYMBOLS (TYPICAL)

HDL3-D1

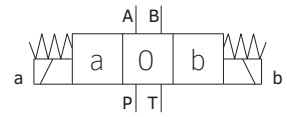
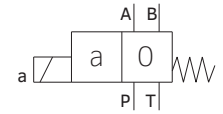
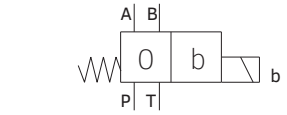
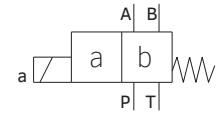
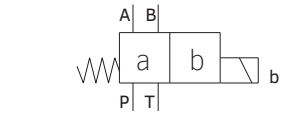
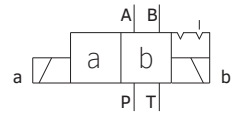



HDL3-TA1



# HDL3 - □□ - □□ - □□ - 1

design mark

| FUNCTION | |
|---|---|
| D |  double solenoid 3 positions - spring centred |
| A |  single solenoid at side A 2 positions - spring return |
| B |  single solenoid at side B 2 positions - spring return |
| TA |  single solenoid at side A 2 positions - spring return |
| TB |  single solenoid at side B 2 positions - spring return |
| K |  double solenoid and detent 2 positions |

| VOLTAGE | |
|---|---|
| D12 | 12 V DC solenoid |
| D24 | 24 V DC solenoid |
| D28 | 28 V DC solenoid |
| D48 | 48 V DC solenoid |
| D00 | without coils |

| SPOOL |
|---|
| See next page |

| COIL | |
|---|---|
| K1 | DIN 43650 |
| K2 | AMP Junior |
| K4 | lead wires |
| K7 | DT04-2P 'deutsch' zinc-nickel plated |
| K8 | Amp Superseal |

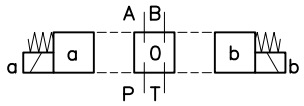
| SEAL | |
|---|---|
| N | NBR (**standard**) |
| V | Viton |

| MANUAL OVERRIDE | |
|---|---|
| B | built-in with the tube, boot protected (**standard**) |
| K | knob, turning |

CODE EXAMPLE:

HDL3 - D1 - D12WK7 - NB - 1

## FUNCTION D

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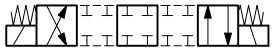

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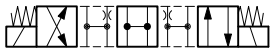

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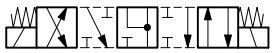

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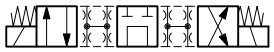
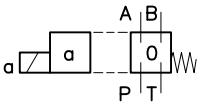


## FUNCTION A

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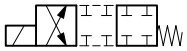

2


3


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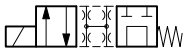
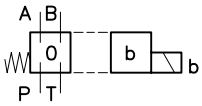


## FUNCTION B

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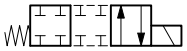

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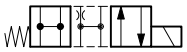

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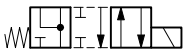

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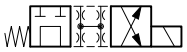
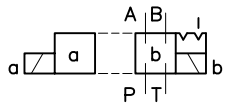


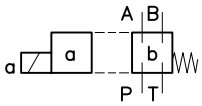
## FUNCTION K




1

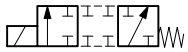


## FUNCTION TA

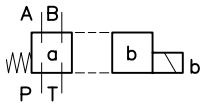



1


2

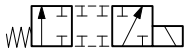

3


## FUNCTION TB



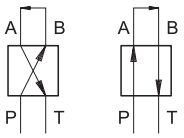

1


2

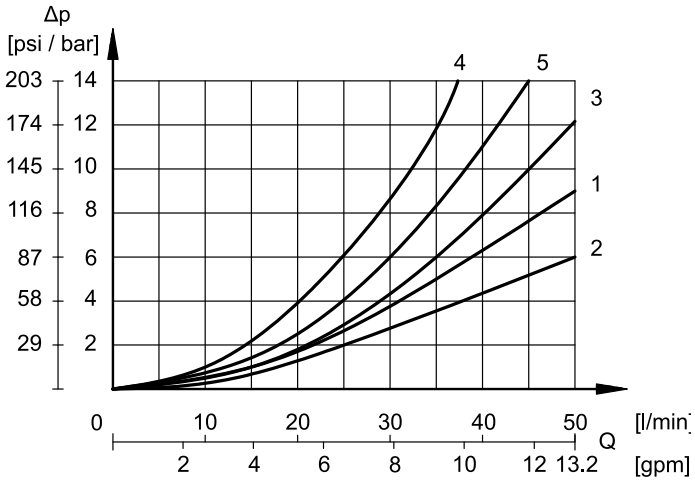

3


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

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




## PRESSURE DROPS Δp-Q



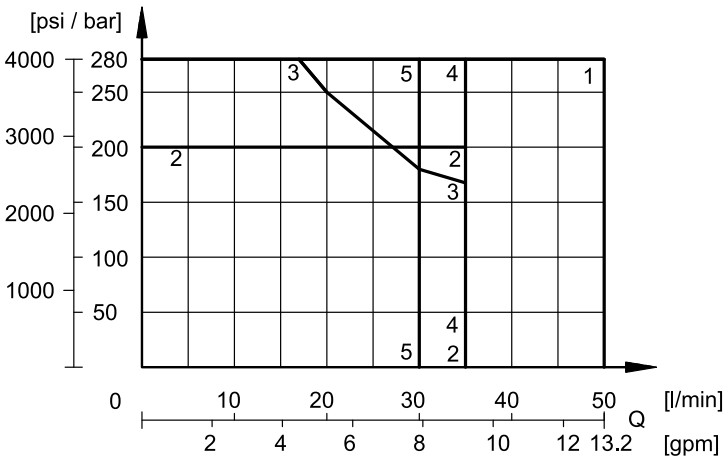

**ENERGIZED POSITION**

| TYPE | FLOW DIRECTION | | | |
|---|---|---|---|---|
| | P→A | P→B | A→T | B→T |
| | CURVES ON GRAPH | | | |
| D1, A1, B1 | 1 | 1 | 1 | 1 |
| D2, A2, B2 | 1 | 1 | 2 | 2 |
| D3, A3, B3 | 3 | 3 | 2 | 2 |
| D4, A4, B4 | 4 | 4 | 4 | 4 |
| TA1, TB1 | 1 | 1 | 1 | 1 |
| K1 | 3 | 3 | 3 | 3 |

**DE-ENERGIZED POSITION**

| TYPE | FLOW DIRECTION | | | | |
|---|---|---|---|---|---|
| | P→A | P→B | A→T | B→T | P→T |
| | CURVES ON GRAPH | | | | |
| D2, A2, B2 | | | | | 3 |
| D4, A4, B4 | | | | | 5 |

## PERFORMANCE CURVES - STANDARD OPERATION




| TYPE | CURVE |
|---|---|
| D1, TA1 | 1 |
| D2 | 2 |
| D3 | 3 |
| D4 | 4 |
| K | 5 |

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.

It is possible to feed D48 coils with alternating current (50 or 60 Hz) using connectors with built-in Graetz bridge rectifier. In this case consider a reduction of the operating limits.

Contact us to order coils as 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 H (180 °C) |

**(values ± 10%)**

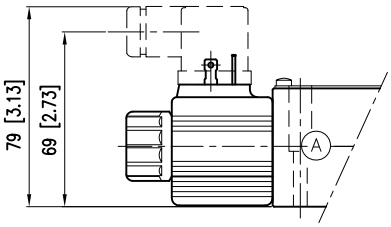
| | Nominal voltage [V] | Resistance at 20°C [Ω] | Current consumpt. [A] | Power consumpt [W] |
|---|---|---|---|---|
| **D12** | 12 | 5.4 | 2.2 | 26.5 |
| **D24** | 24 | 20.7 | 1.16 | 27.8 |
| **D28** | 28 | 27.5 | 1.02 | 28.5 |
| **D48** | 48 | 82 | 0.58 | 28 |

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

K7 and K8 coils reach a better IP degree than standard coils thanks to some constructive measures. Because of the plastic coil and the zinc-nickel coating on the valve body, these valves have a salt spray resistance up to 600 hours
(test performed according to UNI EN ISO 9227 and assessment test performed according to UNI EN ISO 10289).

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

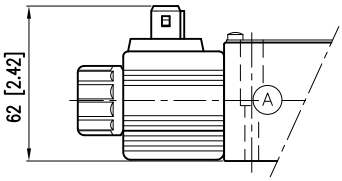
## K1




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

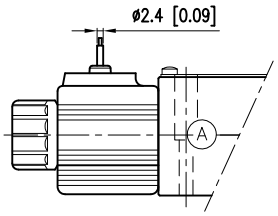
IP degree of electrical connection: IP66
IP degree of whole valve: IP66

## K2




**AMP Junior**
IP degree of electrical connection: IP65/IP67
IP degree of whole valve: IP65/IP67

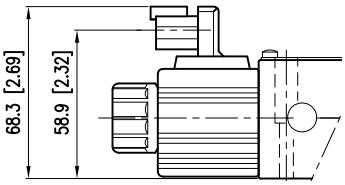
## K4




**OUTGOING WIRES**
Two outgoing wires of 1 metre length.

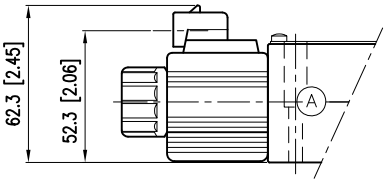
IP degree of electrical connection: IP65
IP degree of whole valve: IP65

## K7




**DEUTSCH DT04 MALE**
IP degree of electrical connection: IP65/IP68/IP69
IP degree of whole valve: IP65/IP68/IP69
IP degree according to ISO 20653: IP69K

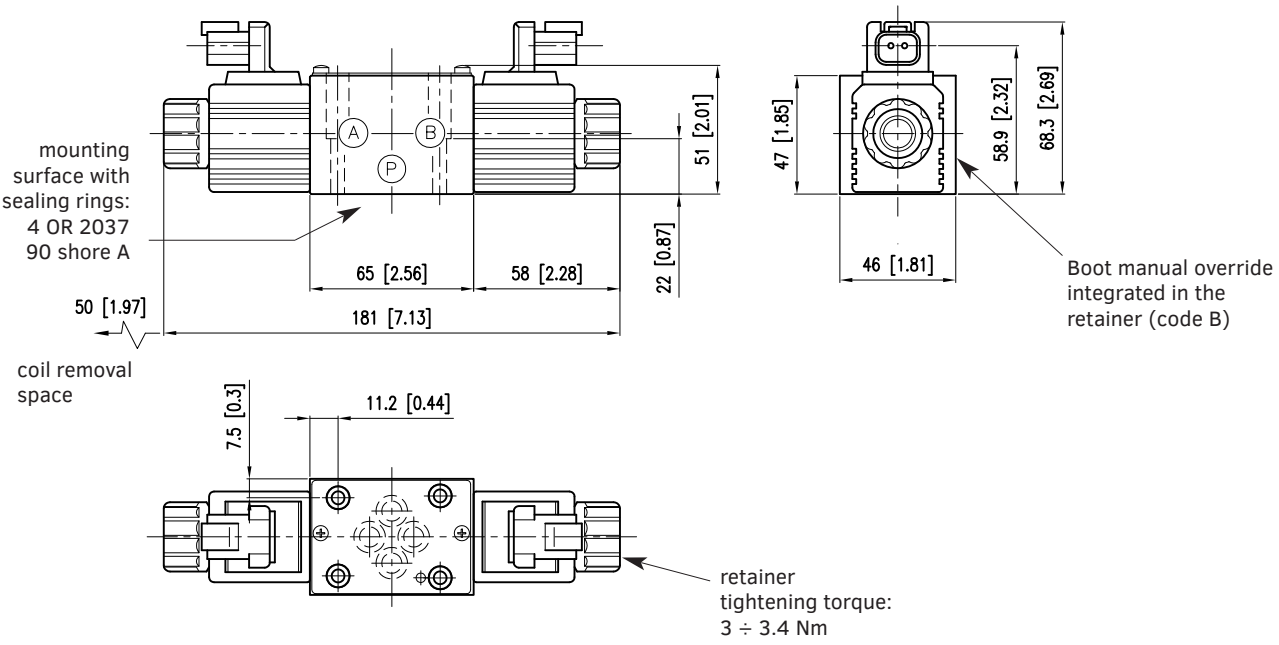
## K8



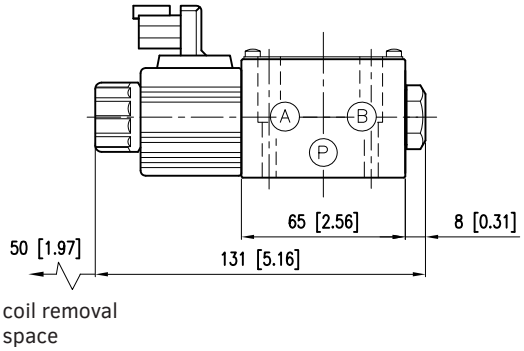

**AMP SUPERSEAL**
IP degree of electrical connection: IP66/IP68/IP69
IP degree of whole valve: IP66/IP68/IP69
IP degree according to ISO 20653: IP69K

## HDL3 DOUBLE SOLENOID (K7 COIL)

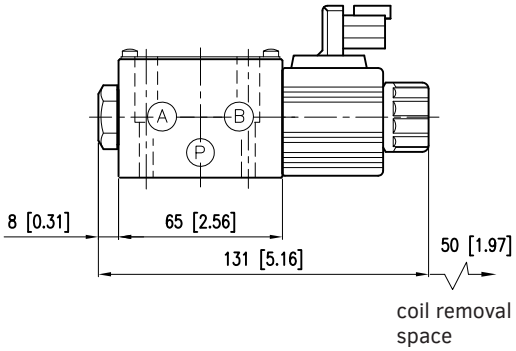
dimensions in mm [in]




## HDL3 SINGLE SOLENOID SIDE A (K7 COIL)




## HDL3 SINGLE SOLENOID SIDE B (K7 COIL)




**Fastening bolts**:
4 SHCS M5x30 - ISO 4762 - torque 5 Nm (A 8.8)
**Threads of mounting holes**: M5x10

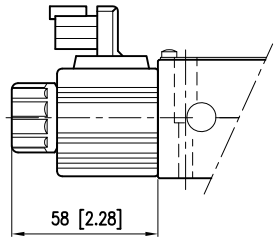
The standard valve has override pins integrated in the tube and protected by the boot-retainer.

Actuate this override by pushing it with a suitable tool, or by hand, minding not to damage the rubber surface.

Turning knob override is also available, entering the proper code in the model number.

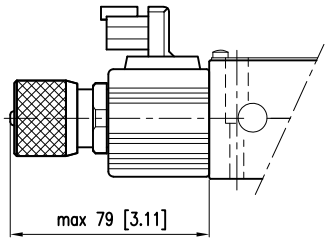
## BOOT-PROTECTED

Code B




## KNOB, TURNING

Code K




## IP DEGREE TIPS

The technical reference standard for IP degree is IEC 60529, which classifies and rates the degree of protection provided by equipments and electrical enclosures against intrusions.

The first digit (6) concerns the protection from solid particles (body parts to dust).

The second digit of the IP rating concerns the liquid ingress protection. It indicates three different types of atmospheric agents from which protection is provided:

Values from 1 to 6 → water jets.
Values 7 and 8 → immersion.
Value 9 → high pressure and high temperature water jets.

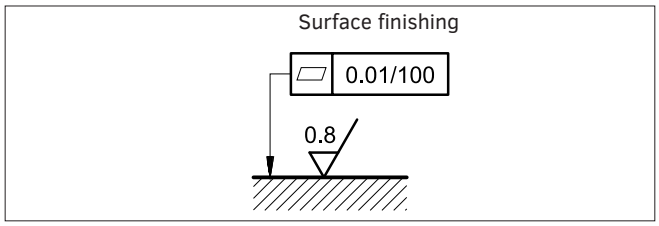
This means that IP66 covers all the lower steps, rating IP68 covers IP67 but not IP66 and lower. Instead, IP69 does not cover any of them. Whether a device meets two types of protection requirements it must be indicated by listing both separated by a slash. (E.g. a marking of an equipment covered both by temporary immersion and water jets is IP66/IP68).

## 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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Hydreco Hydraulics - Version Control Number: HDL3_EN_2023_01

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001:2015

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