



DL2

SOLENOID OPERATED DIRECTIONAL CONTROL VALVE COMPACT VERSION

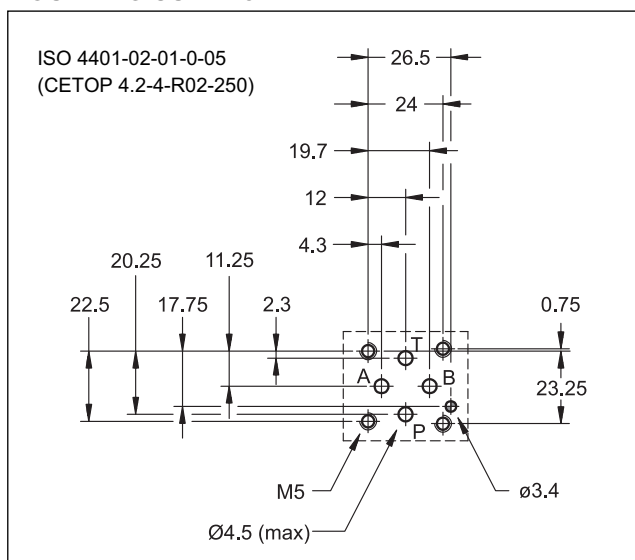
SERIES 10

SUBPLATE MOUNTING
ISO 4401-02 (CETOP R02)

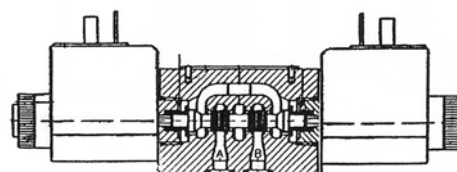
p max **250** bar

Q max **20** l/min

MOUNTING SURFACE



OPERATING PRINCIPLE



- Direct acting, subplate mounting directional control valve, with mounting surface according to ISO 4401-02 (CETOP RP 121H) standards.
- Compact design with reduced solenoid dimensions, suitable for mini-power packs and mobile and agricultural applications.
- 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).
- The valve is supplied with 4 way designs, with 2 or 3 positions and with several interchangeable spools with different porting arrangements.
- The valve is available with DC or rectified current solenoids.

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

Maximum operating pressure: - ports P - A - B - port T	bar	250 160
Maximum flow rate	l/min	20
Pressure drop $\Delta p-Q$	see paragraph 4	
Operating limits	see paragraph 5	
Electrical features	see paragraph 7	
Electrical connections	DIN 43650	
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 double solenoid valve	kg	0,8 1,1

1 - IDENTIFICATION CODE

D	L	2	-	/	10	-	K1
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Solenoid operated directional control valve

Compact version

ISO 4401-02 (CETOP R02) size

Spool type (see paragraph 2):

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

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

Coil electrical connection:
 plug for connector type
 DIN 43650 (**standard**)

Power supply

D12 = 12 V } direct current
D24 = 24 V }

R110 = 110 V } rectified current
R230 = 230 V }

D00 = valve without coils (see **NOTE**)

NOTE: Coils locking ring and related OR are supplied together with valves.

2 - SPOOL TYPE

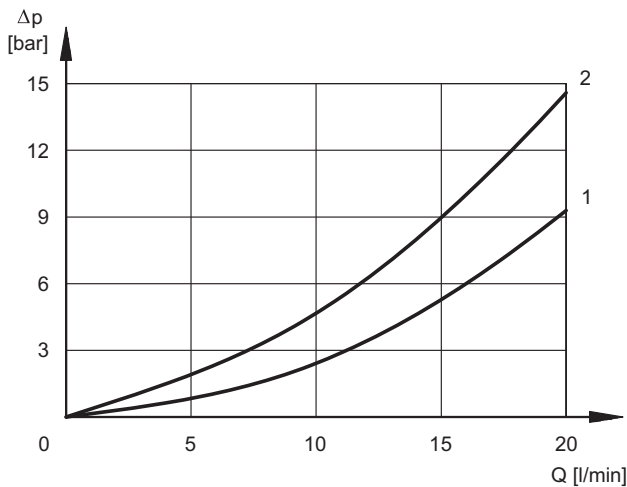
<p>Type S*: 2 solenoids - 3 positions with spring centering</p>	<p>Type SA*: 1 solenoid side A 2 positions (central + external) with spring centering</p>	<p>Type SB*: 1 solenoid side B 2 positions (central + external) with spring centering</p>
<p>Type TA: 1 solenoid side A 2 external positions with return spring</p>	<p>Type TB: 1 solenoid side B 2 external positions with return spring</p>	

3 - 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.

4 - PRESSURE DROPS Δp -Q (obtained with viscosity of 36 cSt at 50 °C)



ENERGIZED VALVE

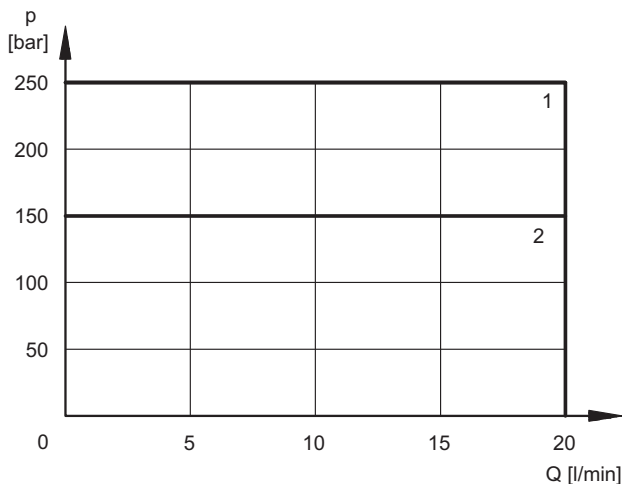
SPOOL	FLOW DIRECTIONS			
	P→A	P→B	A→T	B→T
	CURVES ON GRAPHS			
S1, SA1, SB1	1	1	1	1
S2, SA2, SB2	1	1	1	1
S3, SA3, SB3	1	1	1	1
S4, SA4, SB4	2	2	2	2
TA, TB	1	1	1	1

For the pressure drop with a de-energized valve P→T of the spools S2 and S4 refer to the curve 1.

5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. 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.

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.



SPOOL	CURVE
S1, S3, S4, TA, TB	1
S2	2

6 - SWITCHING TIMES

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

TIMES ($\pm 10\%$) [ms]	
ENERGIZING	DE-ENERGIZING
25 ÷ 75	15 ÷ 25

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 360°, to suit the available space.

The interchangeability of coils of different voltages is allowed within the same type of supply current, alternating or direct.

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

SUPPLY VOLTAGE FLUCTUATION	+5% -10% Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	In compliance with 2004/108/EC
LOW VOLTAGE	In compliance with 2006/95 EC
CLASS OF PROTECTION : Atmospheric agents CEI EN 60529 Coil insulation (VDE 0580) Impregnation:	IP 65* class H class F

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

7.2 - DC valve - Current and power consumption

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

'R' coil must be used when the valve is fed with AC power supply subsequently rectified by means of rectifier bridge, externally or incorporated in the "D" type connector (see cat. 49 000).

The table shows current and power consumption values for DC and rectified current coil types.

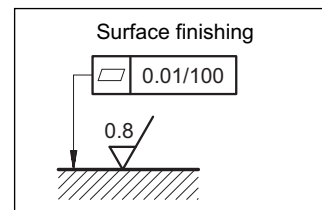
	Nominal voltage [V]	Resistance at 20°C [Ω] (±1%)	Current consumption [A] (±5%)	Power consumption (+5% -10%) [W] [VA]	
D12	12	6.7	2.4	28.8	
D24	24	24	1.2	28.8	
R110	110	350	0.3		29.7
R220	230	1500	0.15		31

8 - INSTALLATION

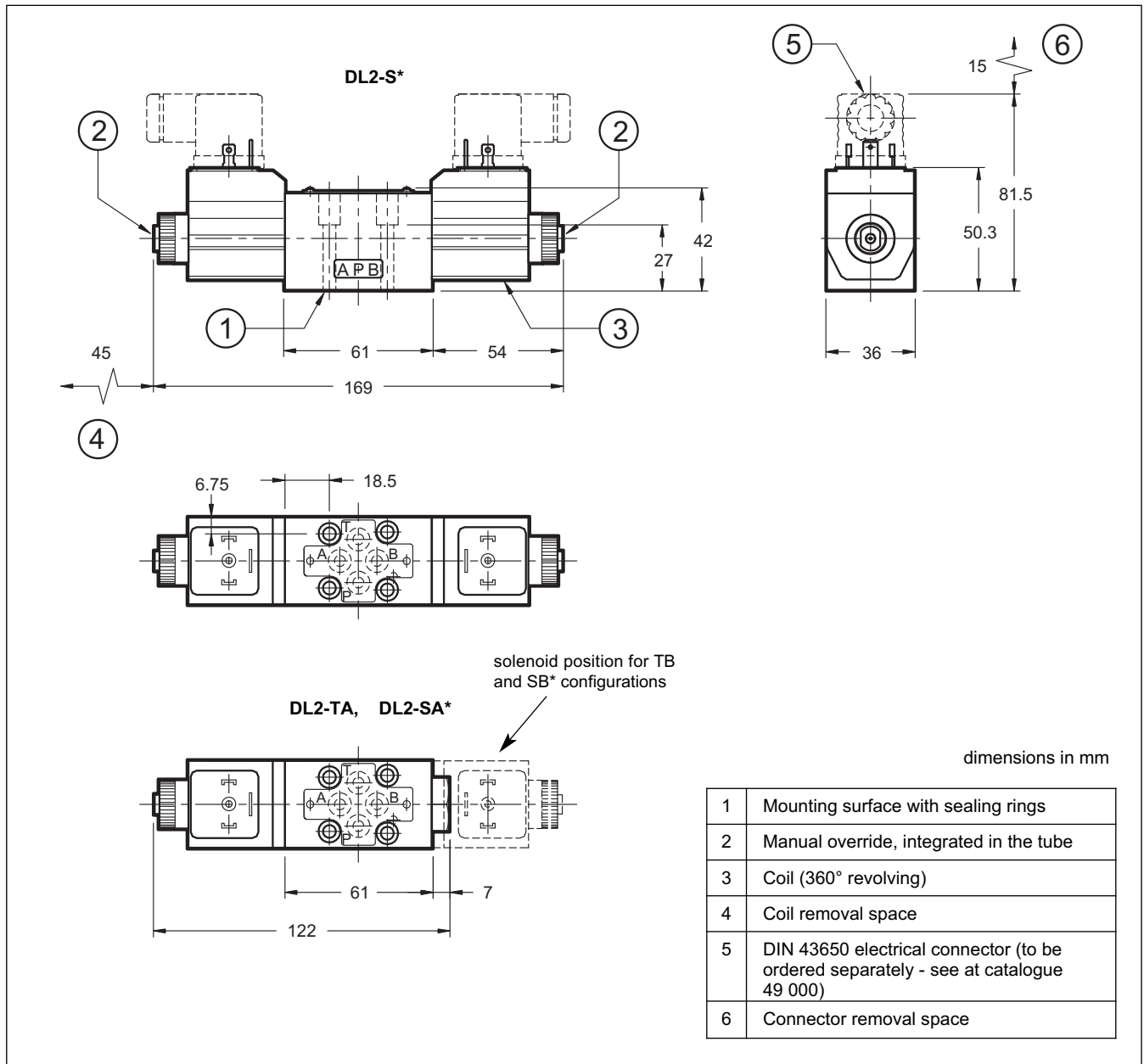
Configurations with centering and return springs can be mounted in any position.

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 - DL2 OVERALL AND MOUNTING DIMENSIONS



10 - ELECTRIC CONNECTORS

The solenoid valves are not supplied with connector. Connectors must be ordered separately.

For the identification of the connector type to be ordered, please see catalogue 49 000.

11 - FASTENING BOLTS AND SEALING RINGS

Single valve fastening: 4 SHC screws M5x35 - ISO 4762
Tightening torque: 5 Nm (bolts A 8.8)
Threads of mounting holes: M5x10
Sealing rings: N. 4 KANTSEAL type DKAR00011 (7.65x1.68x1.68) - 70 Shore



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