

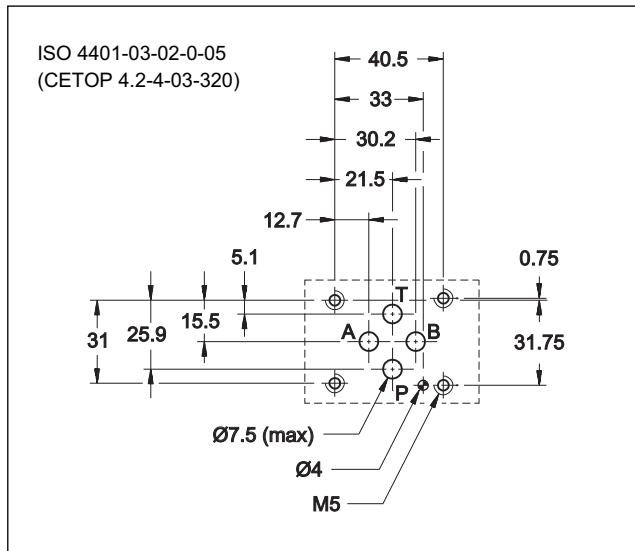
DL3

SOLENOID OPERATED DIRECTIONAL CONTROL VALVE IN COMPACT EXECUTION SERIES 10

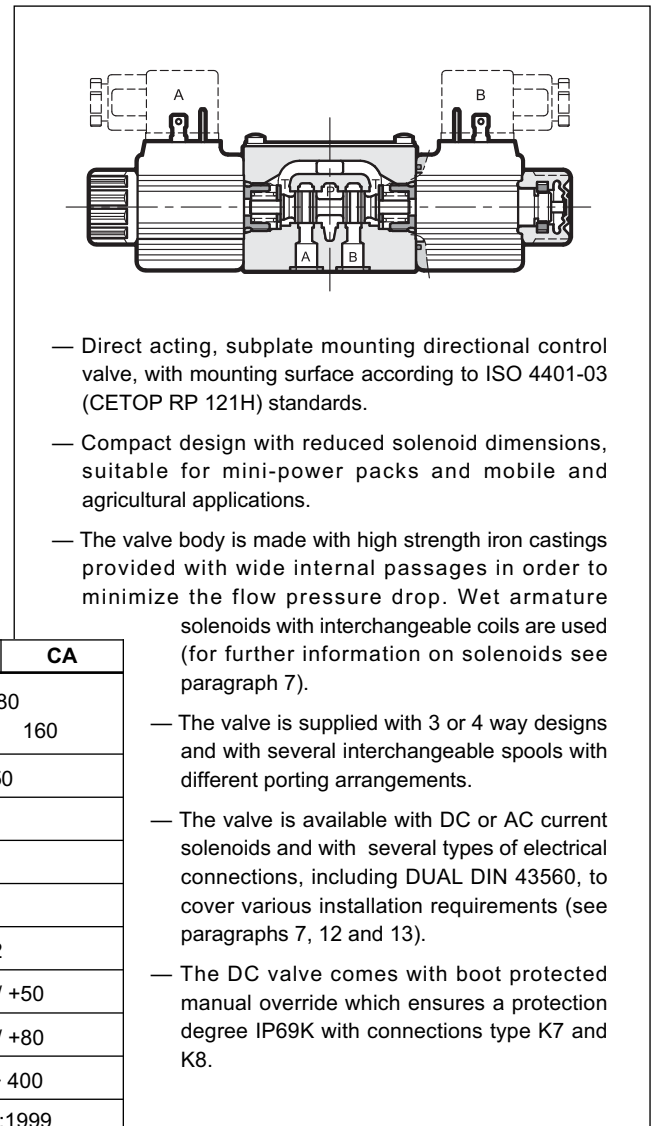
SUBPLATE MOUNTING
ISO 4401-03 (CETOP 03)

p max **280** bar
Q max **50** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



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

	bar	CC	CA
		280	160
Maximum operating pressure: - ports P - A - B - port T		250	
Maximum flow rate	l/min	50	
Pressure drop Δp -Q		see paragraph 4	
Operating limits		see paragraph 5	
Electrical features		see paragraph 7	
Electrical connections		see paragraph 12	
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 solenoide valve	kg	1,1 1,4	

1 - IDENTIFICATION CODE

	D	L	3	-		/	10	-		/	
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Solenoid operated directional control valve

Model in compact execution

ISO 4401-03 (CETOP 03) 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 1: Coils locking ring and related OR are supplied together with valves.

NOTE 2: The valve is supplied with standard surface treatment of phosphating black. On request we can supply these valves with other surface finishes. Add suffix / **W** * at the end of the code.

W4 = carbonitriding with oxidation process.black colour
W5 = semi-gloss epoxy painting black RAL 9005
thickness 80 + 100µ
W6 = gloss polyurethane painting black RAL 9005
thickness 140µ

Option: Surface treatment not standard. Omit if not required (see **NOTE 2**)

Manual override
Available as standard for DC version on AC version only:
CM = boot protected. Omit if not required (see par. 11)

Coil electrical connection: (see paragraph 12)

DC supply

K1 = plug for connector type DIN 43650 (**standard**)
K2 = plug for connector type AMP JUNIOR
K4 = outgoing cables
K7 = plug for connector type DEUTSCH DT04-2P male
K8 = plug for connector type AMP SUPER SEAL
K12 = plug for M12 connector K1 coils and DUAL DIN 43560 connector delivered together (see par. 13)

AC supply

K1 = plug for connector type DIN 43650 (**standard**)
K12 = plug for M12 connector K1 coils and DUAL DIN 43560 connector delivered together (see par. 13)

DC power supply

D12 = 12 V
D24 = 24 V
D28 = 28 V
D48 = 48 V
} direct current

R110 = 110 V
R230 = 230 V
} rectified current

D00 = valve without coils (see **NOTE 1**)

AC power supply

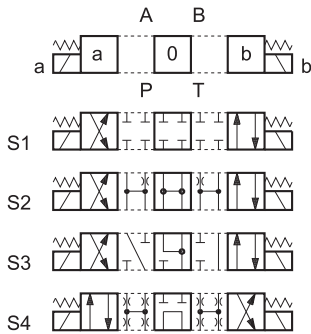
A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz
A230 = 230 V - 50 Hz
A00 = valve without coils (see **NOTE 1**)

2 - HYDRAULIC FLUIDS

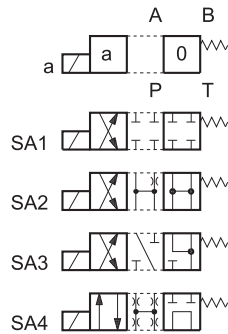
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures 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

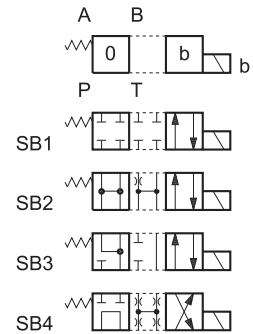
Type S*:
2 solenoids - 3 positions
with spring centering



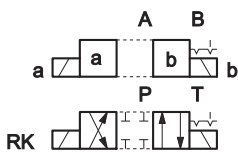
Type SA*:
1 solenoid side A
2 positions (central + external)
with spring centering



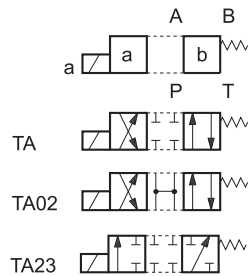
Type SB*:
1 solenoid side B
2 positions (central + external)
with spring centering



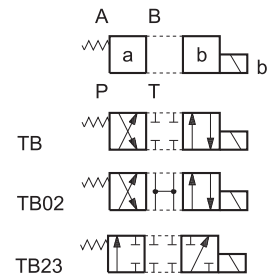
Type RK:
2 solenoids - 2 positions
with mechanical retention



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

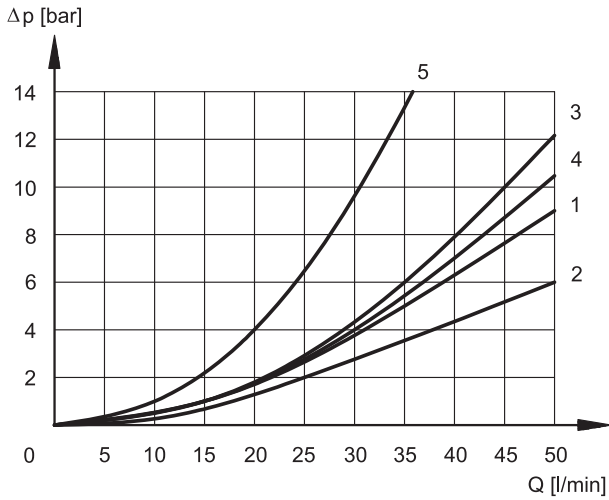


Type TB:
1 solenoid side B
2 external positions
with return spring



NOTE: Others spools available on request only.

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



ENERGIZED VALVE

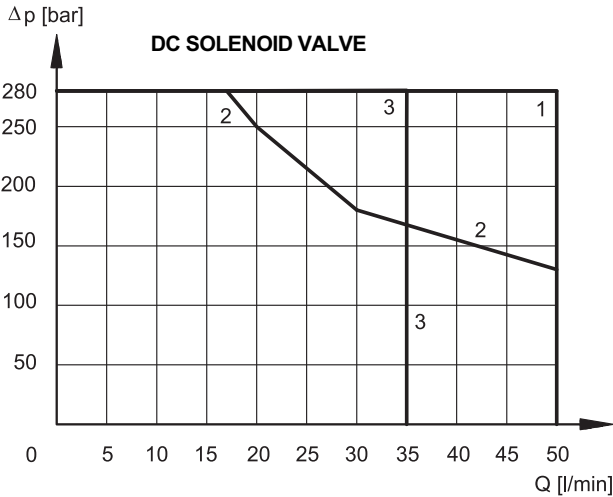
SPOOL	FLOW DIRECTIONS			
	P→A	P→B	A→T	B→T
	CURVES ON GRAPHS			
S1	1	1	1	1
S2	1	1	2	2
S3	3	3	2	2
S4	5	5	5	5
RK	1	1	1	1
TA	4	4	4	4

For the pressure drop with a de-energized valve (P→T) of the spool S2 refer to the curve 3, for the spool S4 refer to the curve 5.

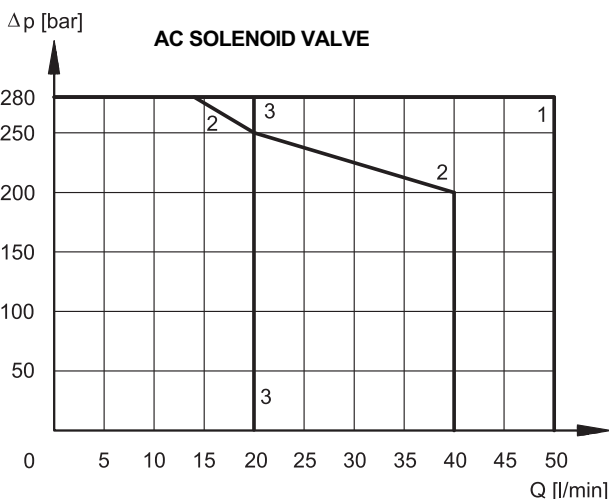
5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the valve pressure of the different versions. The values indicated in the graphs are relevant to the standard solenoid valve. 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, S2, RK, TA	1
S3	2
S4	3



SPOOL	CURVE
S1, S2, RK, TA	1
S3	2
S4	3

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.

SUPPLY	TIMES ($\pm 10\%$) [ms]	
	ENERGIZING	DE-ENERGIZING
DC	25 + 75	15 + 25
AC	10 + 25	15 + 30

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 +/- 90°, to suit the available space

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

Protection from atmospheric agents CEI EN 60529

Plug-in type	IP 65	IP 67	IP 69 K
K1 DIN 43650	x (*)		
K2 AMP JUNIOR	x	x (*)	
K4 outgoing cable	x	x	
K7 DEUTSCH DT04 male	x	x	x (*)
K8 AMP SUPER SEAL	x	x	x (*)
K12 DUAL DIN 43650	x	x (*)	

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

SUPPLY VOLTAGE FLUCTUATION	$\pm 10\%$ Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC)	In compliance with 2004/108/CE
LOW VOLTAGE	In compliance with 2006/95 CE
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation:	class H class H

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).

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 CC and RC coil types.

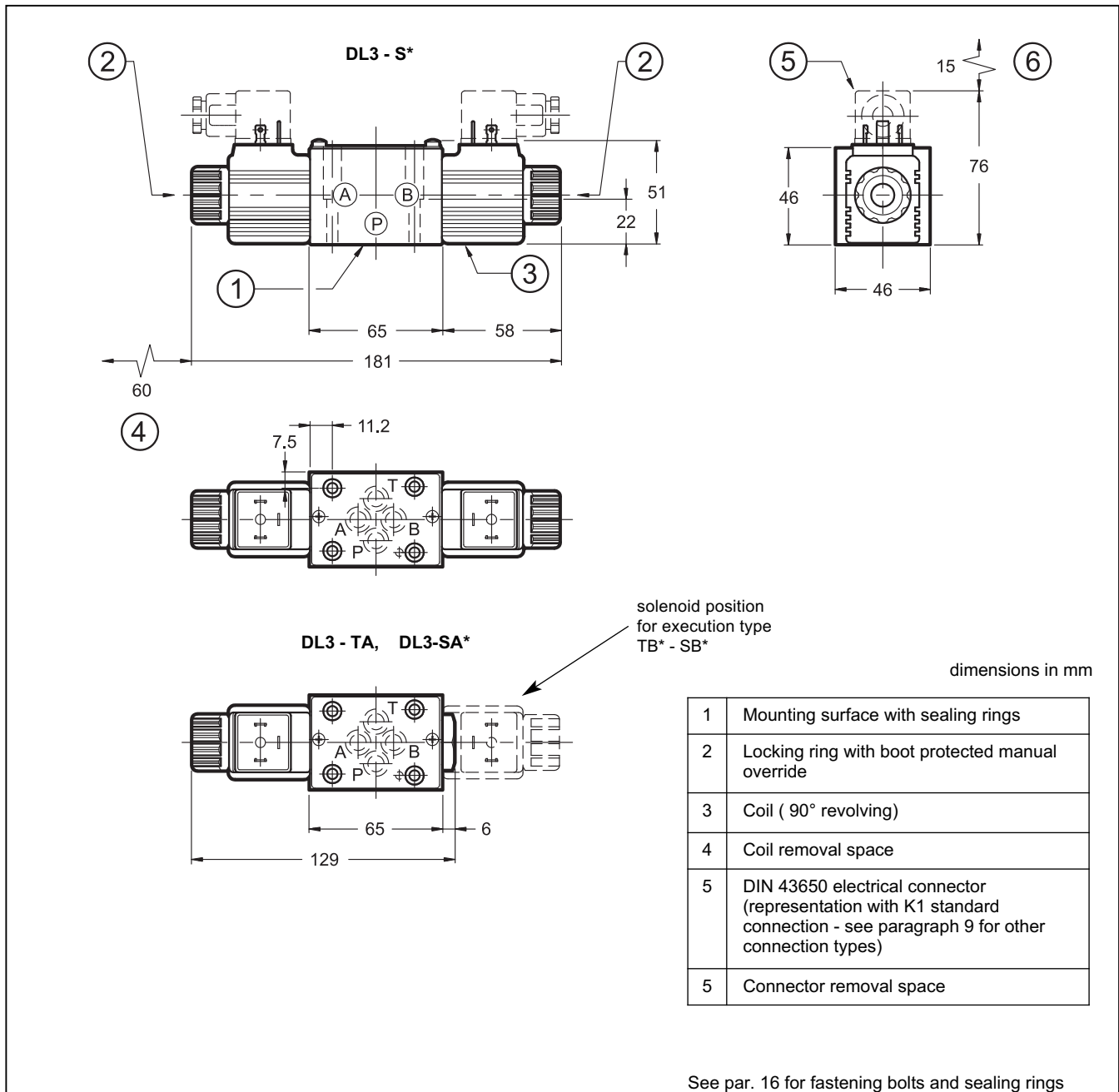
	Resistance at 20°C [Ω] ($\pm 1\%$)	Current consumption [A] ($\pm 5\%$)	Power consumption ($\pm 5\%$)		Coil code				
			[W]	[VA]	K1 and K12	K2	K4	K7	K8
C14L3-D12	5,4	2,2	26,5		1902740	1902750	1902770	1902980	1903020
C14L3-D24	20,7	1,16	27,8		1902741	1902751	1902771	1902981	1903021
C14L3-D28	27,5	1,02	28,5		1902744				
C14L3-D48	48	78,6	0,61		1902863				
C14L3-R110	363	0,25		27,2	1902742				
C14L3-R230	1640	0,11		26,4	1902743				

7.3 AC valve - Current and power consumption

In alternating current energizing, an initial phase (maximum movement) is seen, during which the solenoid consumes elevated value currents (inrush current); the current values diminish during the plunger stroke until it reaches the minimum values (holding current) when the plunger reaches the stroke end. The table shows the values of absorption at the inrush and at holding.

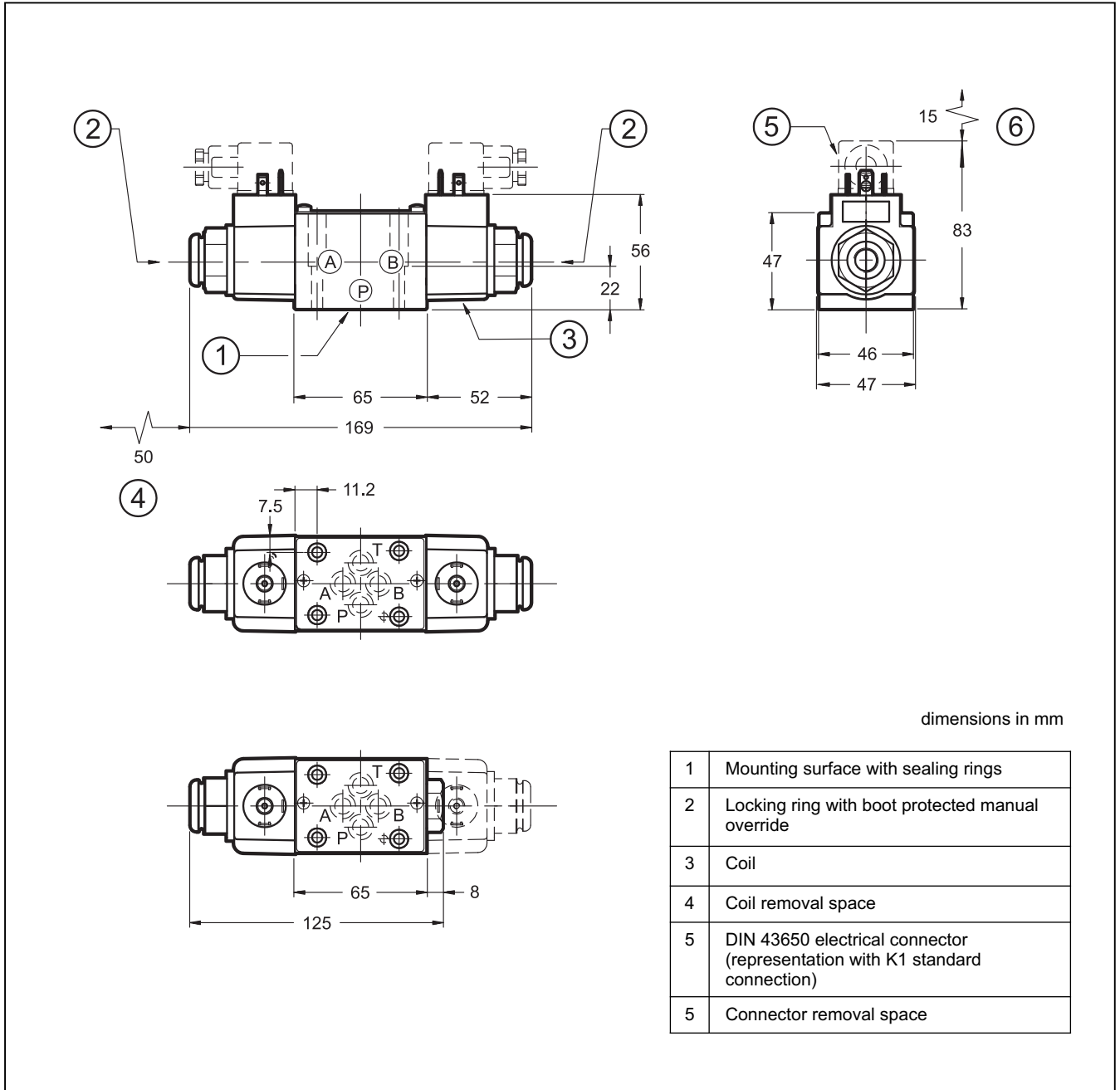
	Freq. [Hz]	Resistance at 20°C [Ω] (±5%)	Current consumption at inrush [A] (±10%)	Current consumption at holding [A] (±10%)	Power consumption at inrush (±10%) [VA]	Power consumption at holding (±10%) [VA]	Coil code K1 and K12
C18L3-A24	50	3,6	4,5	1,38	110	34	1903130
C18L3-A48		13,8	2,3	0,79	110	34	1903131
C18L3-A110		73,4	1,0	0,32	110	34	1903132
C18L3-A230		324	0,5	0,16	110	34	1903133

8 - DL3 DC OVERALL AND MOUNTING DIMENSIONS



See par. 16 for fastening bolts and sealing rings

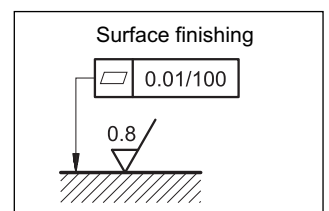
9 - DL3 AC OVERALL AND MOUNTING DIMENSIONS



10 - INSTALLATION

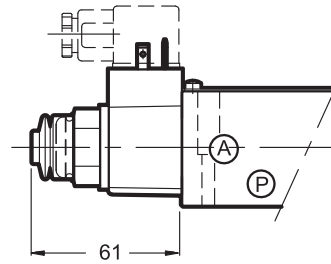
The configuration with centering and return springs can be mounted in any position.

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.



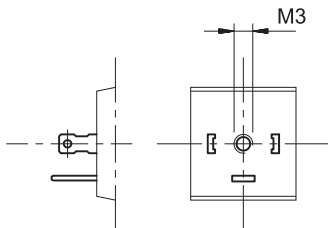
11 - BOOT MANUAL OVERRIDE

On the CC version the manual override is integrated in the tube as standard.
The manual override is available also on the AC version, as option.

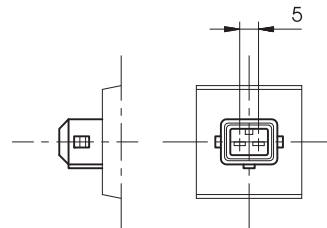


12 - ELECTRIC CONNECTIONS

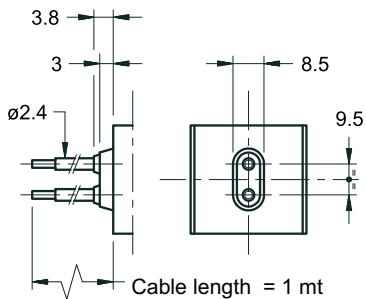
connection for DIN 43650 connector type
code **K1 (standard)**



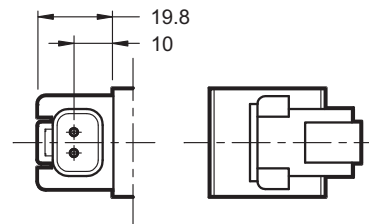
connection for AMP JUNIOR connector type
code **K2**



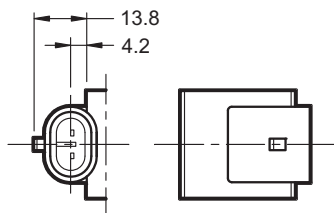
outgoing cable connections
code **K4**



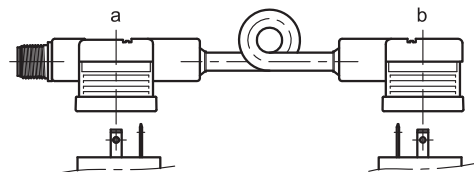
connection for DEUTSCH DT04-2P male
connector type
code **K7**



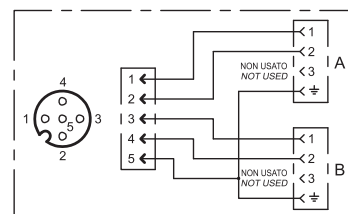
connection for AMP SUPER SEAL (two contacts)
connector type
code **K8**



connection for DUAL DIN 43650 connector type
code **K12**



CONNECTOR M12x1 CONNECTION SCHEME

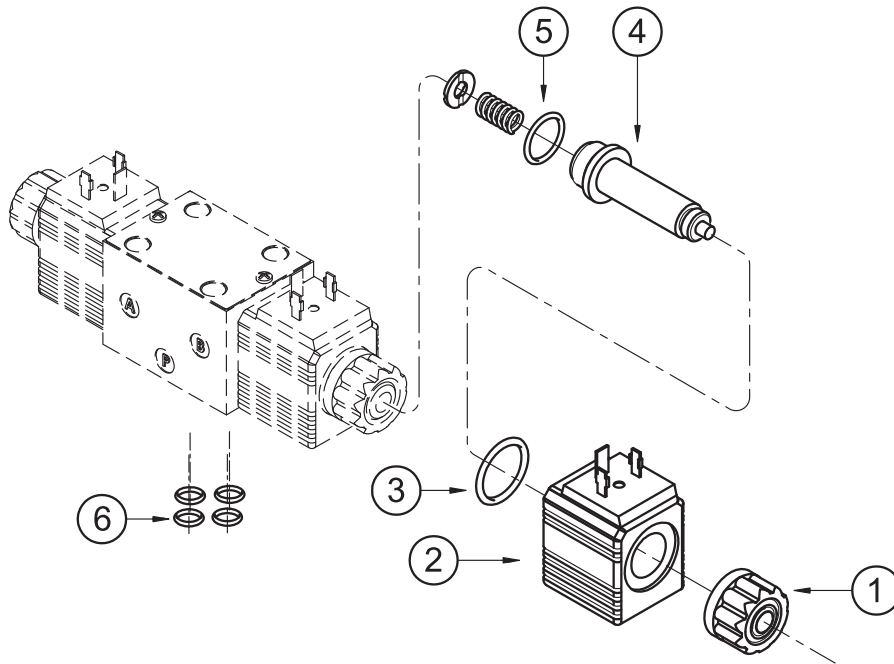


In K12 version the valve will be delivered together with the connector DUAL DIN 43650 with M12 connection already mounted on K1 coils. DUAL DIN connector allows you to power two solenoids with a single cable with socket M12.

13 - ELECTRIC CONNECTORS

The solenoid operated valves are delivered without connector, except the version K12, where the connector is delivered together with the valve. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see cat. 49 000. For K2, K7 and K8 connection type the relative connectors are not available.

14 - SPARE PARTS FOR DC SOLENOID VALVE



IDENTIFICATION CODE FOR DC AND RC COILS

C 14 L3 - / 10

Supply voltage
D12 = 12 V } direct
D24 = 24 V } current
D28 = 28 V }
D48 = 48 V }
R110 = 110 V } rectified
R230 = 230 V } current

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

Coil electrical connection:
K1 = plug for connector type DIN 43650 (**standard**)
K2 = plug for connector type AMP JUNIOR
K4 = outgoing cables
K7 = plug for connector type DEUTSCH DT04-2P male
K8 = plug for connector type AMP SUPER SEAL
K12 = K1 coils + DUAL DIN 43560 connector

1	Coil locking ring - code 0119382
2	Coil (see identification code)
3	OR type 2112 (28.3x1.78)
4	Solenoid tube: TD14-M18/11N (NBR seals) TD14-M18/11V (FPM seals) (OR n° 5 included)
5	OR type 2062 (15.6x1.78) - 70 Shore
6	N. 4 OR type 2037 (9.25x1.78) - 90 Shore

SEAL KIT

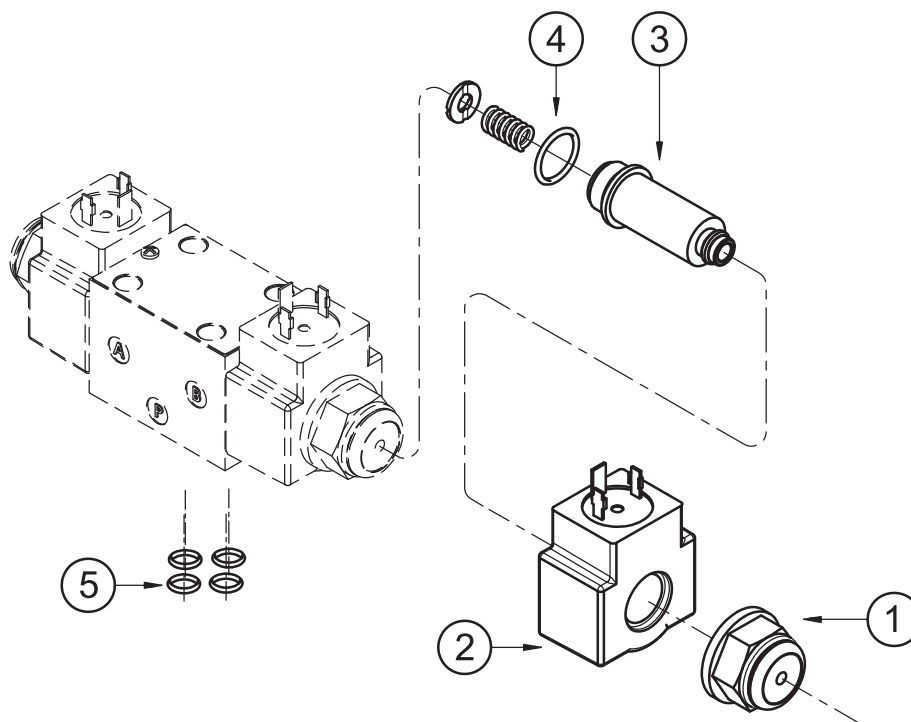
The codes included the OR n° 5 and 6.

Cod. 1984435 NBR seals

Cod. 1984436 FPM seals

NOTE: the spare part of the connector K12 (DUAL DIN) may be ordered with code 0672136

15 - SPARE PARTS FOR AC SOLENOID VALVE



IDENTIFICATION CODE FOR AC COILS

C 18 L3 - / 10

Supply voltage

A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz
A230 = 230 V - 50 Hz

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

Coil electrical connection:

K1 = plug for connector type DIN 43650 (**standard**)

K12 = K1 coils + DUAL DIN 43560 connector

1	Coil locking ring - code. 0119469
2	Coil (see identification code)
3	Solenoid tube: TA18-M18/10N (NBR seals) TA18-M18/10V (FPM seals) NOTE: l'OR n° 4 included.
4	OR type 2062 (15.6x1.78) - 70 Shore
5	N. 4 OR type 2037 (9.25x1.78) - 90 Shore

SEAL KIT

The codes included the OR n° 5 and 6.

Cod. 1984435 NBR seals

Cod. 1984436 FPM seals

NOTE: the spare part of the connector K12 (DUAL DIN) may be ordered with code 0672136

16 - FASTENING BOLTS AND SEALING RINGS

Single valve fastening: 4 screws M5x30

Tightening torque: 5 Nm

Threads of mounting holes: M5x10

Sealing rings: N. 4 OR type 2037 (9.25x1.78) - 90 Shore

17 - SUBPLATES (See catalogue 51 000)

Type PMMD-AI3G with rear ports

Type PMMD-AL3G with side ports

P, T, A, B port threading: 3/8" BSP



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