DUPLOMATIC
HYDRAULICS

MD1L

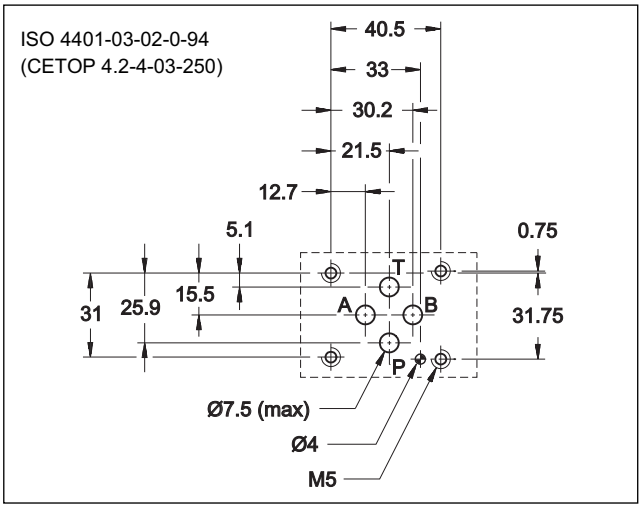
SOLENOID OPERATED DIRECTIONAL CONTROL VALVE IN COMPACT EXECUTION

SERIES 10

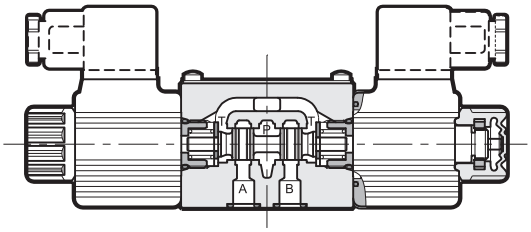
SUBPLATE MOUNTING
ISO 4401-03 (CETOP 03)

p max **250** bar
Q max **40** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE



— Direct acting, subplate mounting directional control valve, with mounting surface according to ISO 4401-03 (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 6).

— The valve is supplied with 3 or 4 way designs and with several interchangeable spools with different porting arrangements.

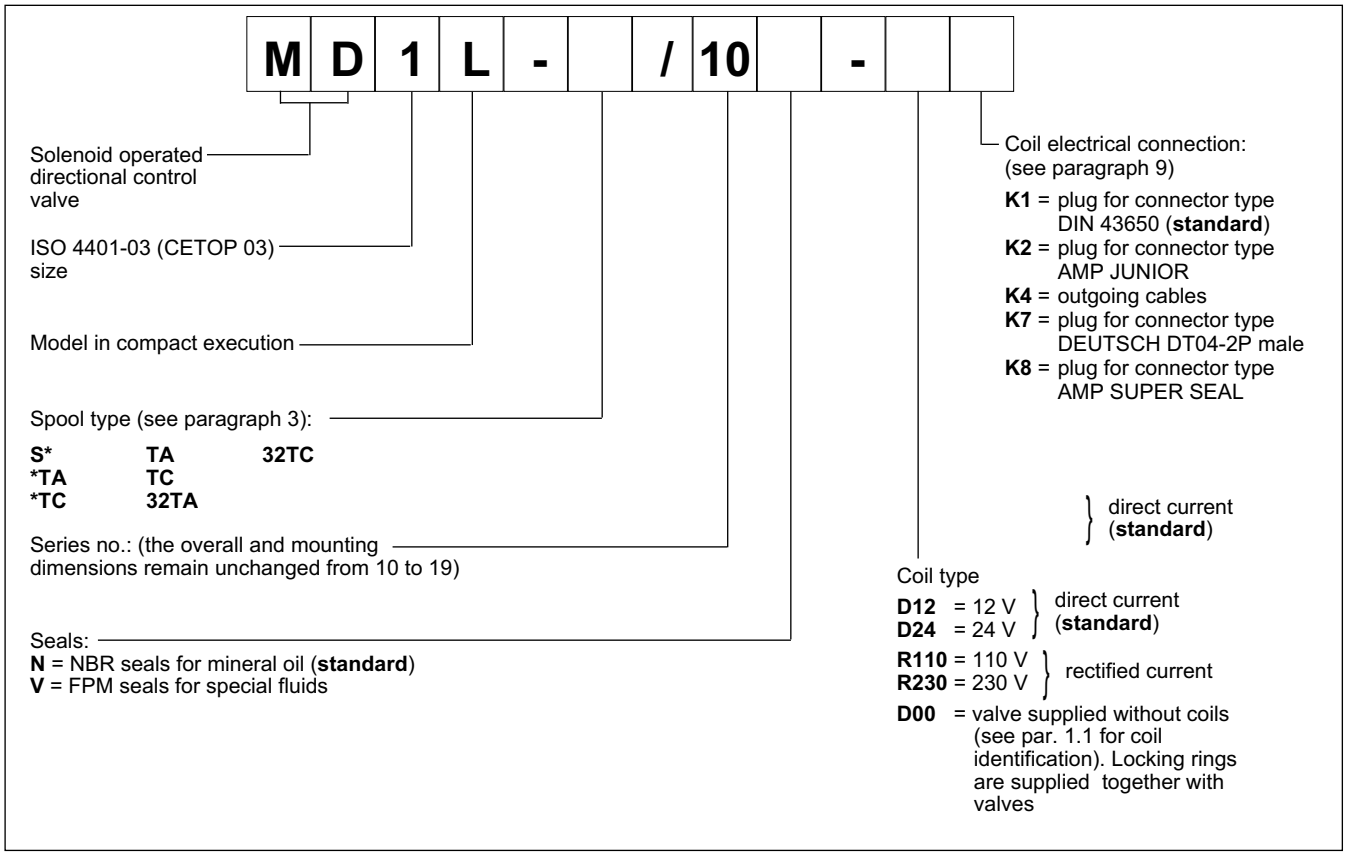
— The valve is available with DC or rectified current solenoids and with five different types of electrical connections in order to cover many installation requirements (see paragraph 9).

— It is normally supplied with boot protected manual override which ensures IP65 protection degree.

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

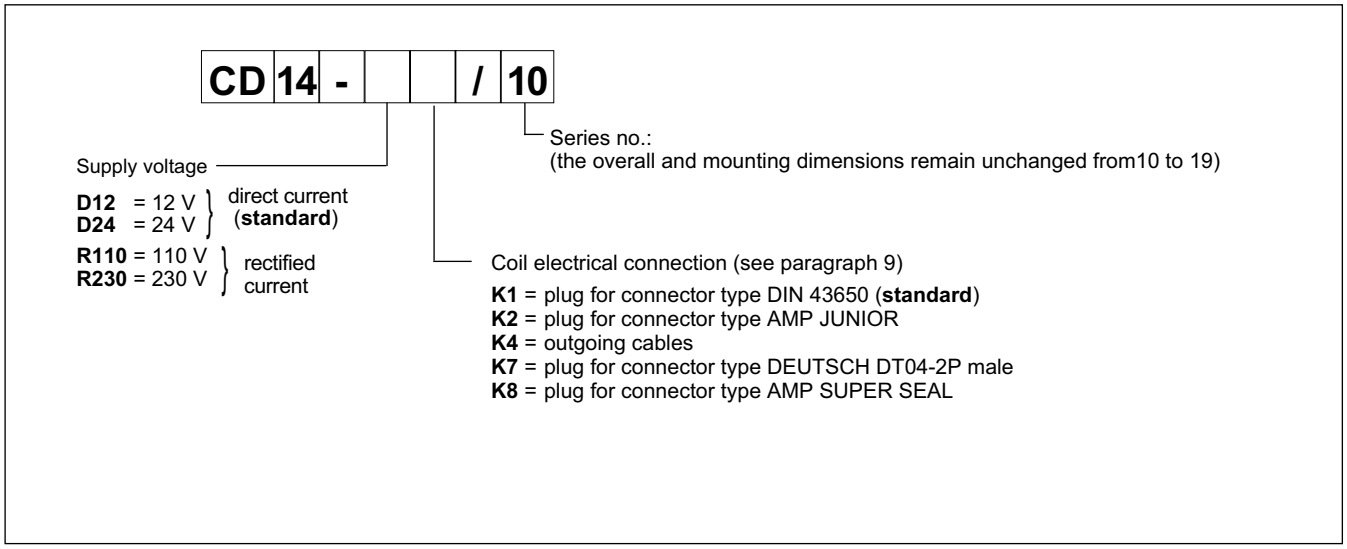
Maximum operating pressure Ports P - A - B - T	bar	250
Maximum flow rate	l/min	40
Pressure drop Δp-Q	see paragraph 4	
Operating limits	see paragraph 5	
Electrical features	see paragraph 6	
Electrical connections	see paragraph 9	
Ambient temperature range	°C	-20 / +50
Fluid temperature range	°C	-20 / +80
Fluid viscosity range	cSt	10 ÷ 400
Fluid contamination degree	according to ISO 4406:1999 class 20/18/15	
Recommended viscosity	cSt	25
Masse: single solenoid valve double solenoide valve	kg	1,15 1,42

1 - IDENTIFICATION CODE



NOTE: The standard valve is supplied with phosphating surface treatment, black colour.
Upon request, this valve can be supplied with black epoxy paint (add **/W5** at the end of identification code).

1.1 - Coil identification code



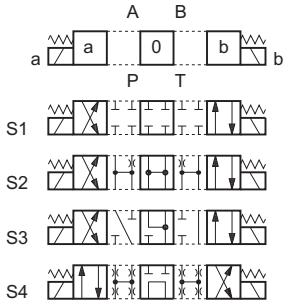
2 - HYDRAULIC FLUIDS

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 kinds of fluid such as HFA, HFB, HFC, please consult our technical department.

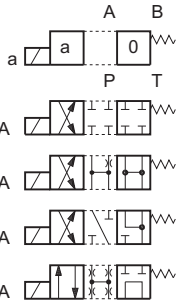
Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

3 - CONFIGURATIONS

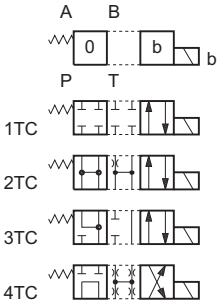
Type **S***:
2 solenoids - 3 positions
spring centering



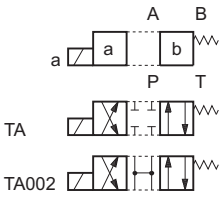
Type ***TA**:
1 solenoid side A
2 positions (central + external)
spring centering



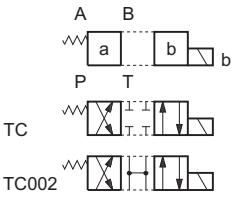
Type ***TC**:
1 solenoid side B
2 positions (central + external)
spring centering



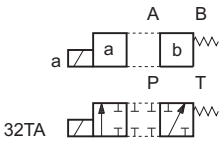
Type **TA**:
1 solenoid side A - 2 external positions
with return spring

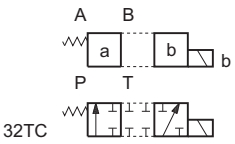


Type **TC**:
1 solenoid side B - 2 external positions
with return spring



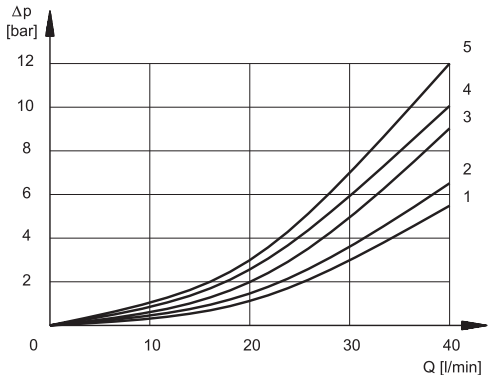
Type **32TA / 32TC**
3 way valve - 1 solenoid - 2 external positions, return spring

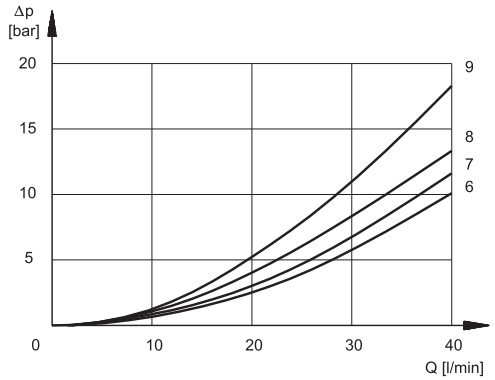




Other spool type available upon request only.

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



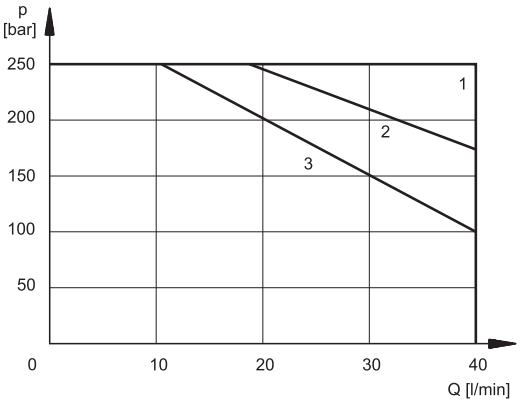


SPOOL	SPOOL POSITION	CONNECTIONS				
		P→A	P→B	A→T	B→T	P→T
		CURVES ON GRAPH				
S1, 1TA, 1TC	energized	3	3	5	5	
S2, 2TA, 2TC	de-energized energized	2	2	1	1	2*
S3, 3TA, 3TC	de-energized energized			4▪ 1	4◦ 1	
S4, 4TA, 4TC	de-energized energized	9	9	9	9	8
TA, TC	de-energized energized	6	6	6	6	
32TA, 32TC	de-energized energized	7	7	7	7	

* A-B blocked ▪ B blocked ◦ A blocked

5 - OPERATING LIMITS

The curves define the flow rate operating fields according to the solenoid valve pressure with DC and AC rectified solenoids.
The values have been obtained with viscosity 36 cSt, temperature 50 °C, filtration 25 µm and with solenoids at 140°C coil temperature and supplied with voltage equal to 90% of the nominal voltage.



SPOOL	CURVE
S1, 1TA, 1TC	1
S2, 2TA, 2TC	2
32TA, 32TC	2
S3, 3TA, 3TC	3
S4, 4TA, 4TC	3

The values indicated in the graph can be considerably reduced if a 4-way valve is used with port A or B plugged.

5.1 Switching times

The values indicated refer to an S1 solenoid valve for Q=25 l/min, p=150 bar working with mineral oil at a temperature of 50°C, a viscosity of 36 cSt and with PA and BT connections. The energizing times are obtained at the time the spool switches over. The de-energizing times are measured at the time pressure variation occurs on the line.

TIMES (±10%) [ms]	
ENERGIZING	DE-ENERGIZING
25 ÷ 75	15 ÷ 25

6 - ELECTRICAL FEATURES

6.1 Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded onto 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 nut, and can be rotated 360°, compatible with the available space.
The interchangeability of coils of different voltages is allowed within the same type of supply current, alternating or direct.

Protection according CEI EN 60529 - atmpspheric agents

Connector	IP 65	IP 67	IP 69 K
K1 DIN 43650	x		
K2 AMP JUNIOR	x	x	
K4 outgoing cables	x	x	
K7 DEUTSCH DT04 male	x	x	x
K8 AMP SUPER SEAL	x	x	x

NOTE: The protection degree is guaranteed only with the con-nector correctly con-nected and installed.

SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) emissions (see **NOTE**) EN 50081-1 immunity EN 50082-2	In compliance with 89/336 CEE
LOW VOLTAGE	In compliance with 73/23/CEE 96/68/CEE
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation	 class H class H

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

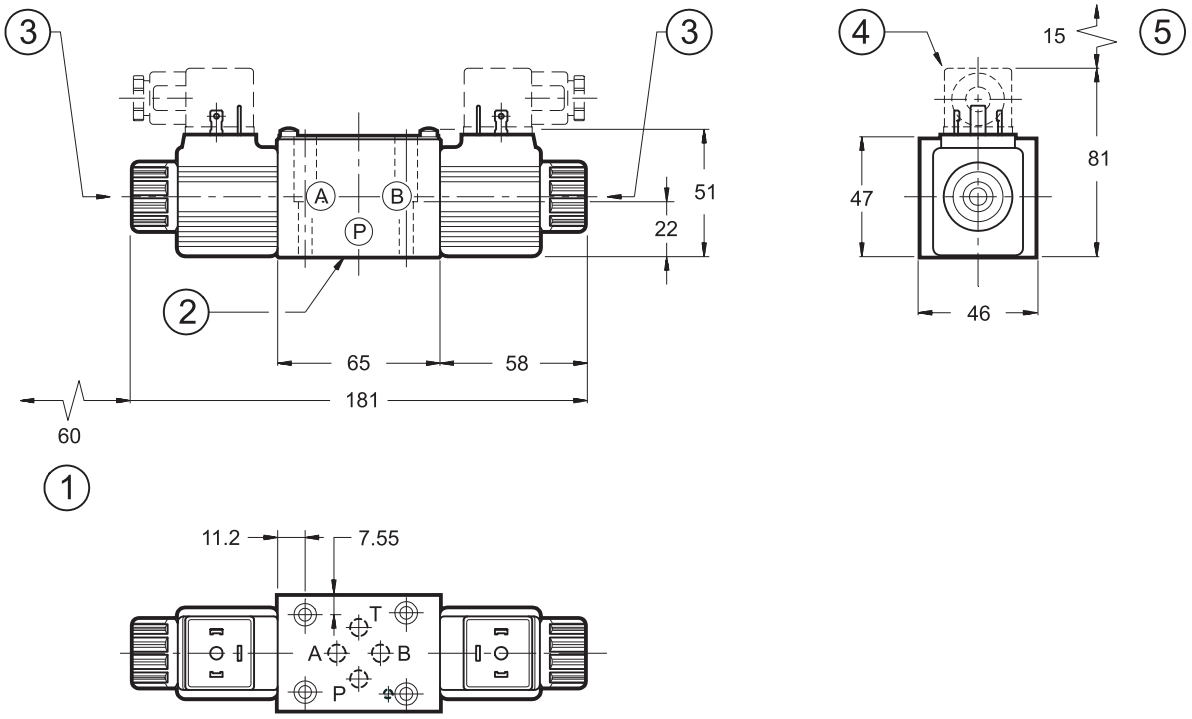
6.2 Current and absorbed power

In the table are shown current and power consumption values relevant to the different coil types. “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).

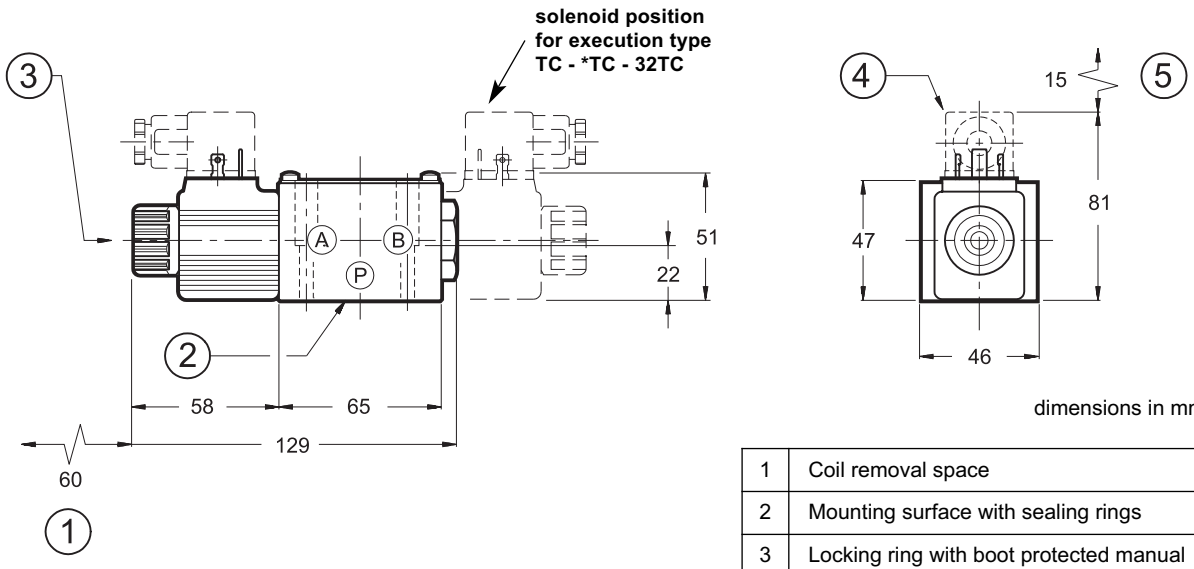
	Resistance at 20°C [Ω] (±1%)	Absorbed current [A] (±5%)	Absorbed power (±5%) [W]	[VA]	Coil code K1	K2	K4	K7	K8
CD14-D12*	5,4	2,2	26,5		1902740	1902750	1902770	1902980	1903020
CD14-D24*	20,7	1,16	27,8		1902741	1902751	1902771	1902981	1903021
C14-R110*	363	0,25		27,2	1902742				
C14-R230*	1640	0,11		26,4	1902743				

7 - OVERALL AND MOUNTING DIMENSIONS

3 POSITION EXECUTION
MD1L - S*



2 POSITION EXECUTION
MD1L - TA, MD1L-*TA, MD1L-32TA



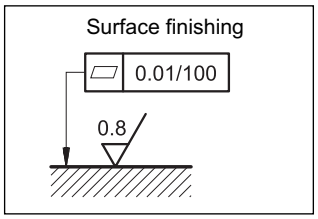
dimensions in mm

1	Coil removal space
2	Mounting surface with sealing rings
3	Locking ring with boot protected manual override
4	DIN 43650 electrical connector (representation with K1 standard connection - see paragraph 9 for other connection types)
5	Connector removal space

See par. 11 for fastening bolts and sealing rings

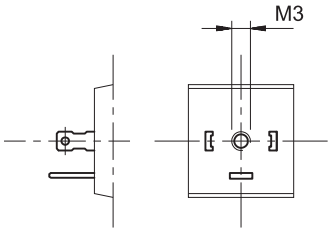
8 - INSTALLATION

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.

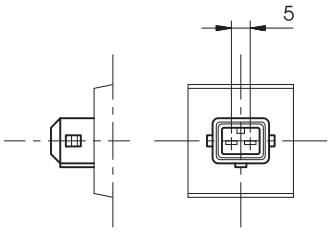


9 - ELECTRIC CONNECTIONS

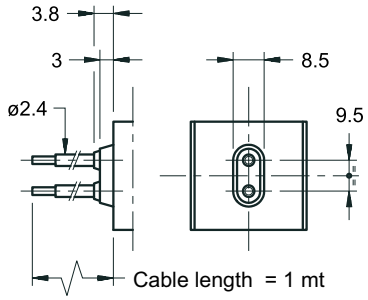
connection for DIN 43650
connector type
code **K1** (**standard**)



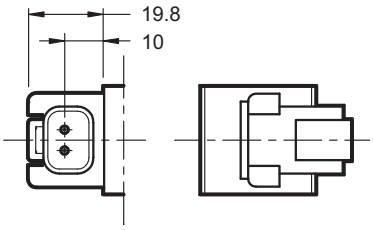
connection for AMP JUNIOR
connector type
code **K2**



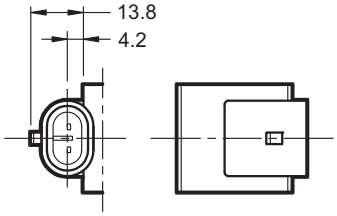
outgoing cable connections
code **K4**



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



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



10 - ELECTRIC CONNECTORS

The solenoid valves are supplied without connectors.
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.

11 - 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

12 - 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

DUPLOMATIC HYDRAULICS

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