



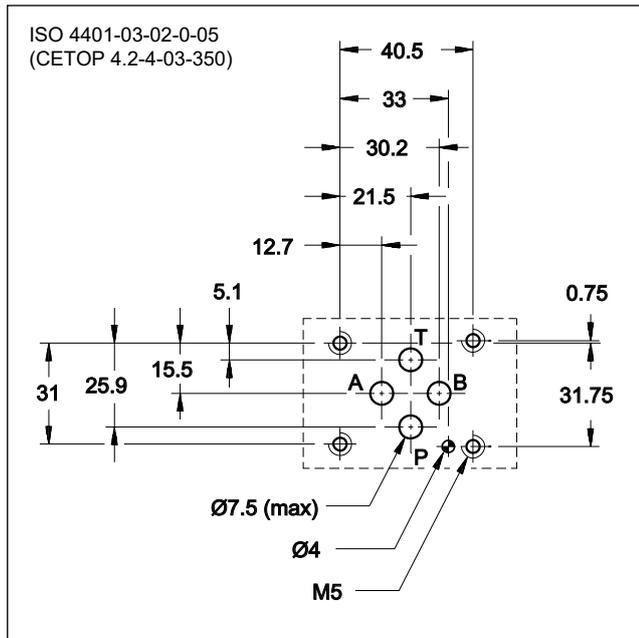
MDS3

SOLENOID OPERATED SWITCHING VALVE

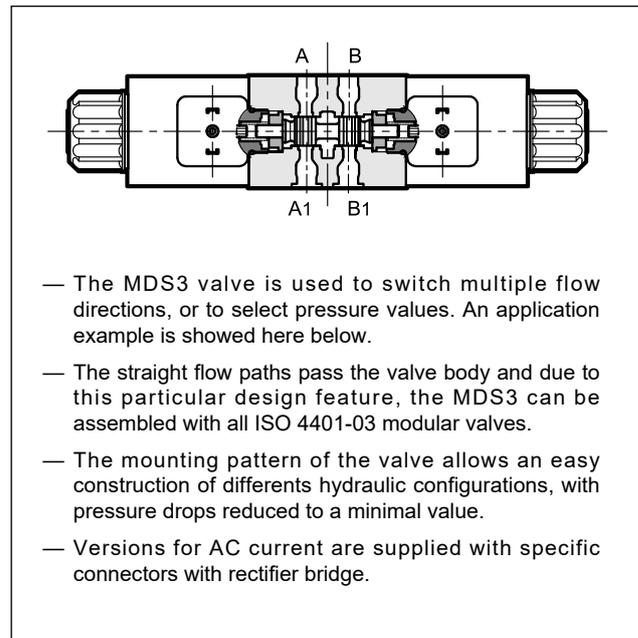
MODULAR VERSION ISO 4401-03

p max **350** bar
Q max **50** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE

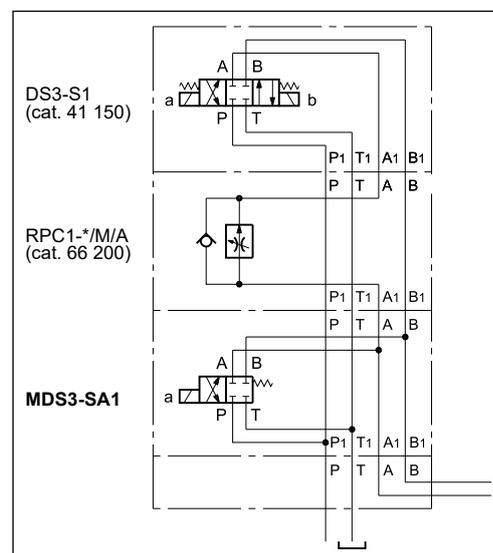


PERFORMANCES

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

Max operating pressure: P - A - B ports T port	bar	350 210
Maximum flow on P - A - B ports	l/min	50
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
Mass: double solenoid single solenoid	kg	2 1.5

APPLICATION EXAMPLE



1 - IDENTIFICATION CODE

	MDS	3	-	/		-		/	
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Modular switching valve

Size: ISO 4401-03

Spools (see point 2):

S*	SA*	SB*	TA
	RSA1	RSB1	TB
			TA31 DC only
			TB31 DC only

Series no.: _____

10 = for DC valves
20 = for AC valves
(the overall and mounting dimensions remain unchanged from 10 to 19)

Seals: _____

N = NBR seals for mineral oils (**standard**)
V = FPM seals for special fluids

Manual override (see at point 12):
Omit for override integrated in the tube (**standard**)

Coil electrical connection :

K1 = plug for connector type EN 175301-803 (ex DIN 43650) (**standard**)
K7 = plug for connector type DEUTSCH DT04-2P male (available on **D12** and **D24** coils only)

DC power supply

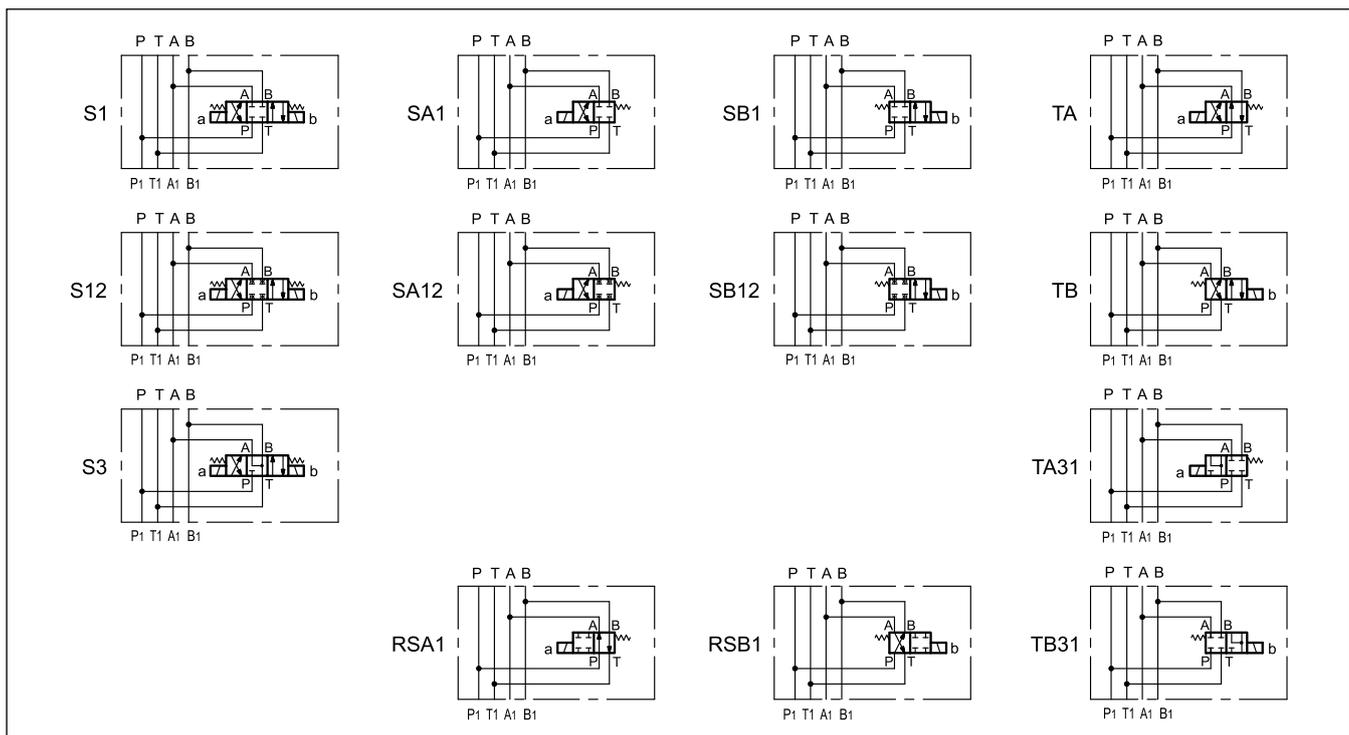
D12 = 12 V
D24 = 24 V
D28 = 28 V
D48 = 48 V
D110 = 110 V
D220 = 220 V

AC power supply (**NOTE**)

RD24 = 24 V - 50 Hz
RD48 = 48 V - 50 Hz
RD110 = 110 V - 50 Hz / 120 V - 60 Hz
RD220 = 220 V - 50 Hz / 240 V - 60 Hz

NOTE: Connectors with rectifier bridge included.

2 - SPOOLS TYPES

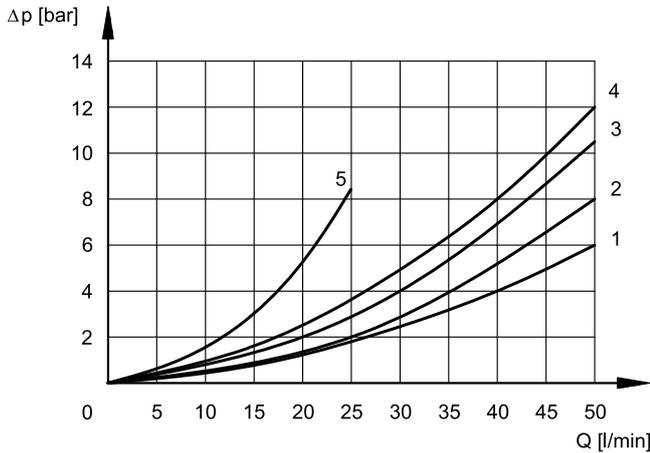


3 - HYDRAULIC FLUIDS

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



SPOOL	FLOW DIRECTIONS			
	P→A	P→B	A→T	B→T
	CURVES ON GRAPHS			
S1, S12	2	2	3	3
S3 (*)	2	2	1	1
RSA1	2			2
TA	3	4	4	4
TA31			3	

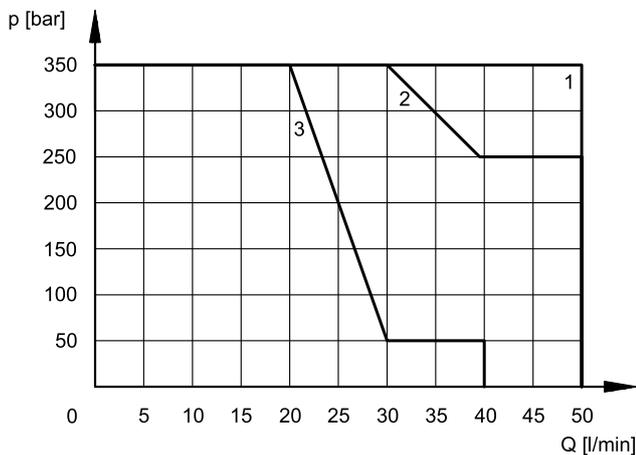
(*) the limit for central position of S3 spool is 25 l/min (curve 5)

5 - OPERATING LIMITS

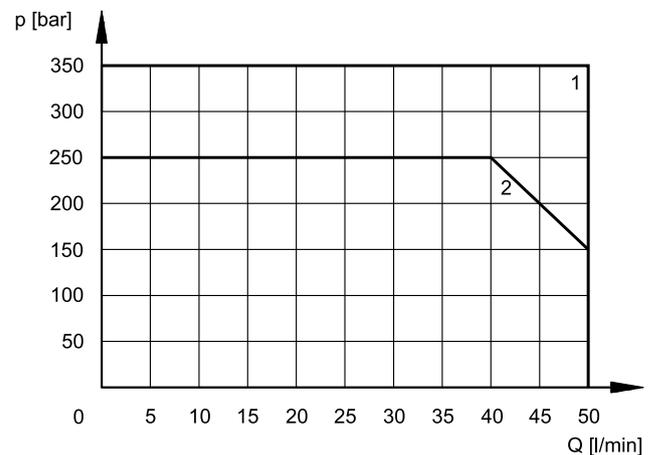
The curves define the flow rate operating fields according to the valve pressure of the different versions. The values indicated in the graphs are relevant to the standard solenoid valve.

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, S12, RSA1, TA	1
S3	2
TA31	3



SPOOL	CURVE
S1, S12, RSA1, TA	1
S3	2

6 - SWITCHING TIMES

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

	TIMES (±10%) [ms]	
	ENERGIZING	DE-ENERGIZING
DC	80 - 150	15 - 25
AC	25 - 50	20 - 40

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 to suit the available space.

Protection from atmospheric agents IEC 60529

The IP protection degree is guaranteed only with both valve and connectors of an equivalent IP degree, correctly connected and installed.

electric connection	electric connection protection	whole valve protection
K1	IP65	IP65
K7	IP65/67	

SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY DC valve AC valve	18.000 ins/hr 10.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE)	In compliance with 2014/30/EU
LOW VOLTAGE	In compliance with 2014/35/EU
CLASS OF PROTECTION: Coil insulation (VDE 0580) Impregnation	class H class F

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

7.2 - Current and absorbed power for DC solenoid valve

The table shows current and power consumption values relevant to the DC coils.

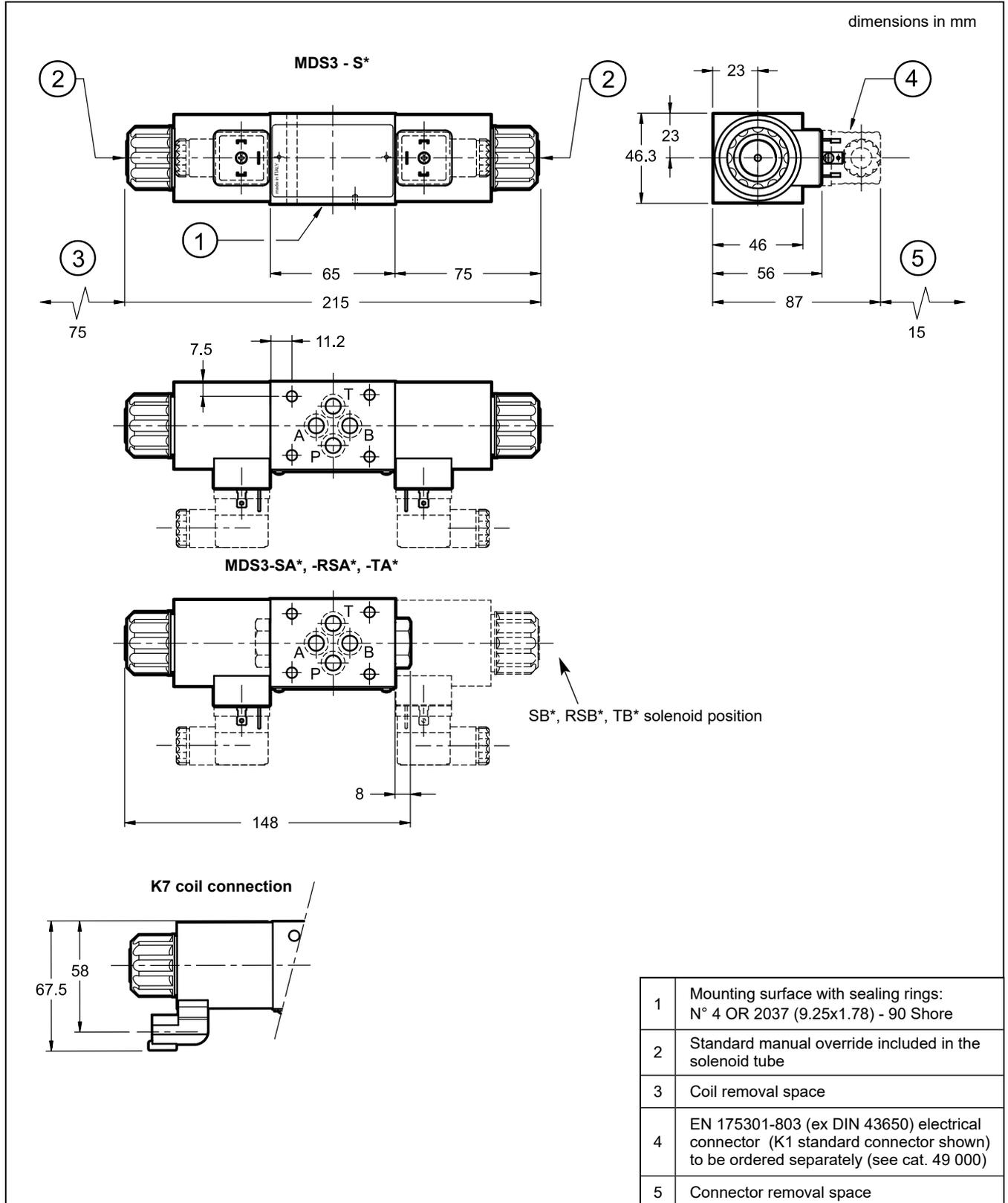
Available DC coils (values ±10%)

	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt [W]	Coil code	
					K1	K7
D12	12	4.4	2.72	32.7	1903080	1902940
D24	24	18.6	1.29	31	1903081	1902941
D28	28	26	1.11	31	1903082	
D48	48	78,6	0.61	29.5	1903083	
D110	110	423	0.26	28.2	1903464	
D220	220	1692	0.13	28.2	1903465	

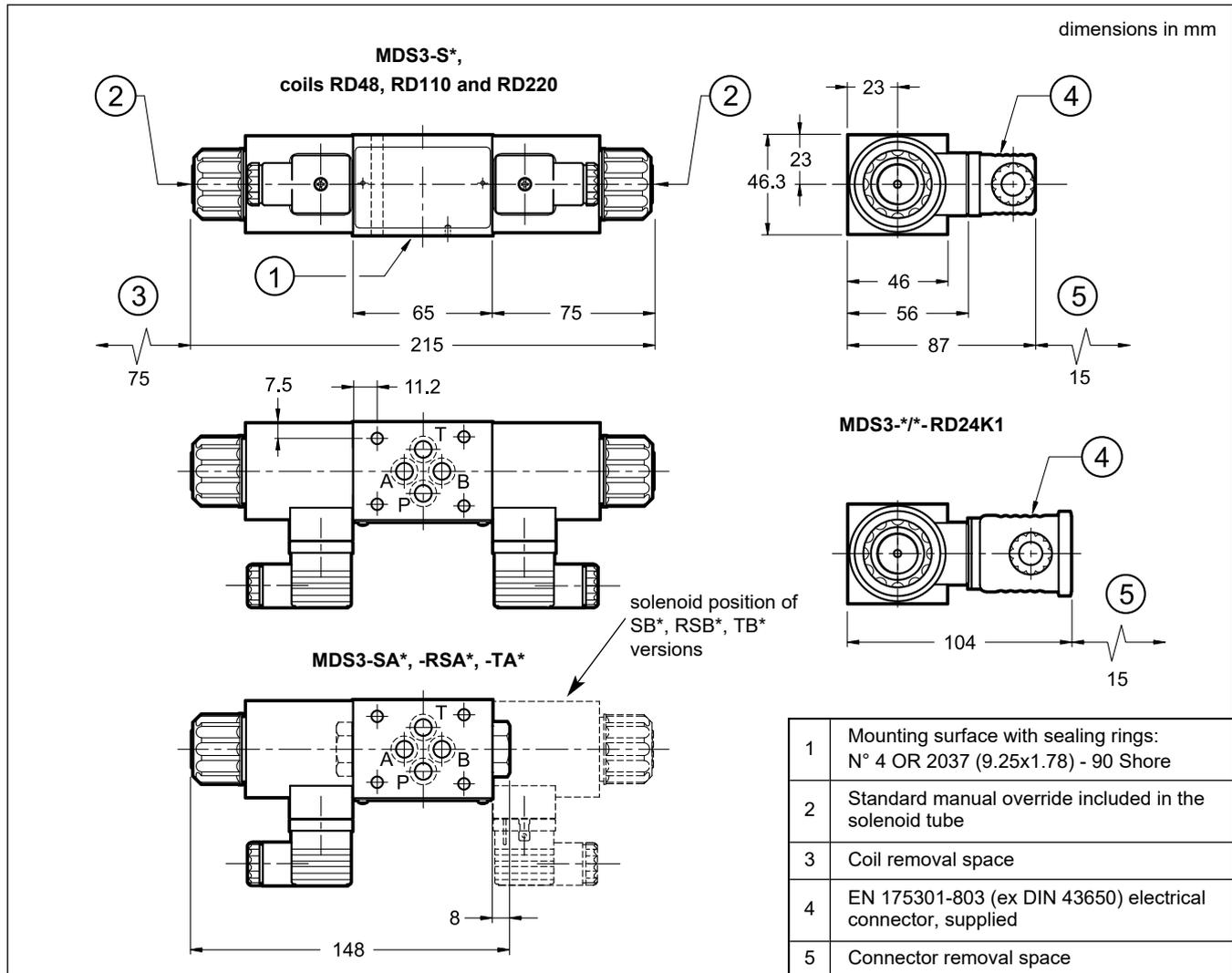
7.3 - Current and absorbed power for AC solenoid valve

Refer to the DC coil values table at 8.2 as the coils are the same. Alternate current usage is possible applying the relevant connectors with rectifier bridge, delivered with the valve.

8 - DC VALVE - OVERALL AND MOUNTING DIMENSIONS



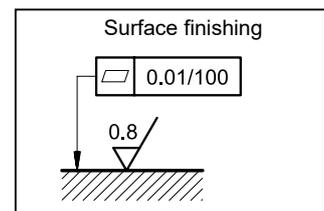
9 - AC VALVE - OVERALL AND MOUNTING DIMENSIONS



10 - INSTALLATION

The valve can be mounted in any position. Valve fixing takes place by means of screws or tie rods, with the valve mounted 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 and/or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.



11 - ELECTRIC CONNECTORS

Solenoid valves for AC are supplied with connectors. Instead, DC solenoid valves are delivered without connectors. Connectors for K1 connections, type EN 175301-803 (ex DIN 43650), can be ordered separately. See catalogue 49 000.

12 - MANUAL OVERRIDES

The standard valve has solenoids whose pin for the manual operation is integrated in the tube. The operation of this control must be executed with a suitable tool, minding not to damage the sliding surface.

Three different manual override versions are available upon request: **CM** boot protected; **CP** push button; **CPK** push button with mechanical retention.

For more information please refer to the catalogue 41 150, manual overrides for DC versions.