



MDS3

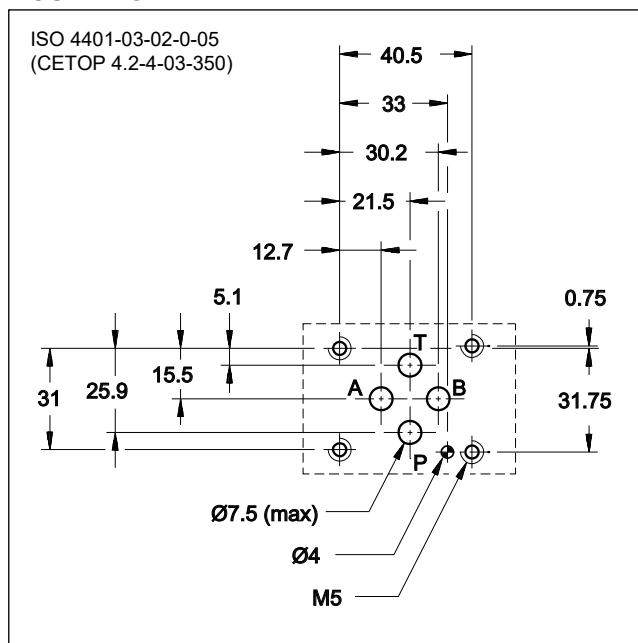
SOLENOID OPERATED SWITCHING VALVE

MODULAR VERSION ISO 4401-03

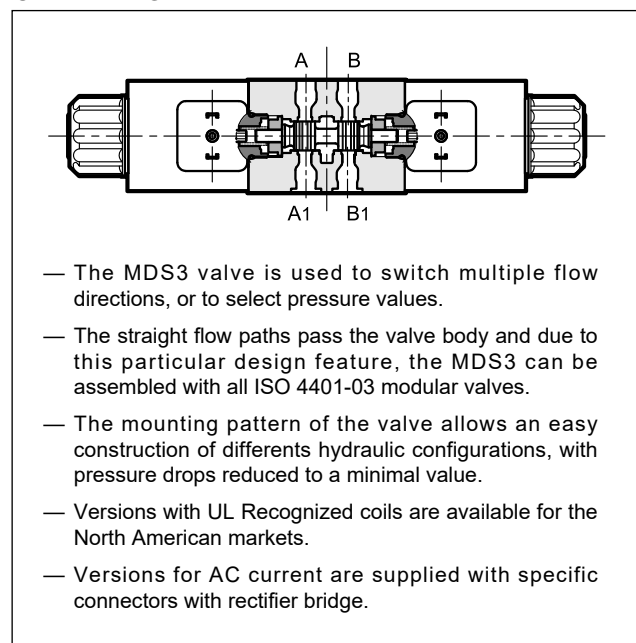
p max **350** bar

Q max **50** l/min

MOUNTING INTERFACE



OPERATING PRINCIPLE

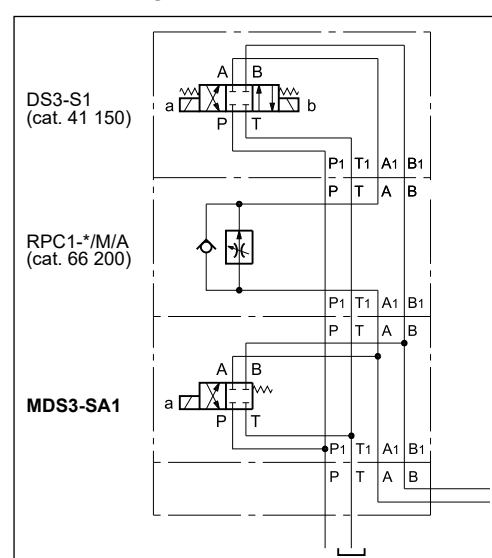


PERFORMANCES

(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 - / - /

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 13):
 Omit for override integrated in the tube (**standard**)

Coil electrical connection:
K1 = plug for connector type EN 175301-803 (ex DIN 43650)
K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S

Coil version (see availability table):
 Omit for standard zinc-plated version
ULW = UL Recognized (points 7.2 and 8)

DC power supply:

D12 = 12 V	D48 = 48 V
D24 = 24 V	D110 = 110 V
D26 = 26.4 V	D220 = 220 V

D00 = valve without coils, with locking rings and O-rings

AC power supply (**NOTE**):

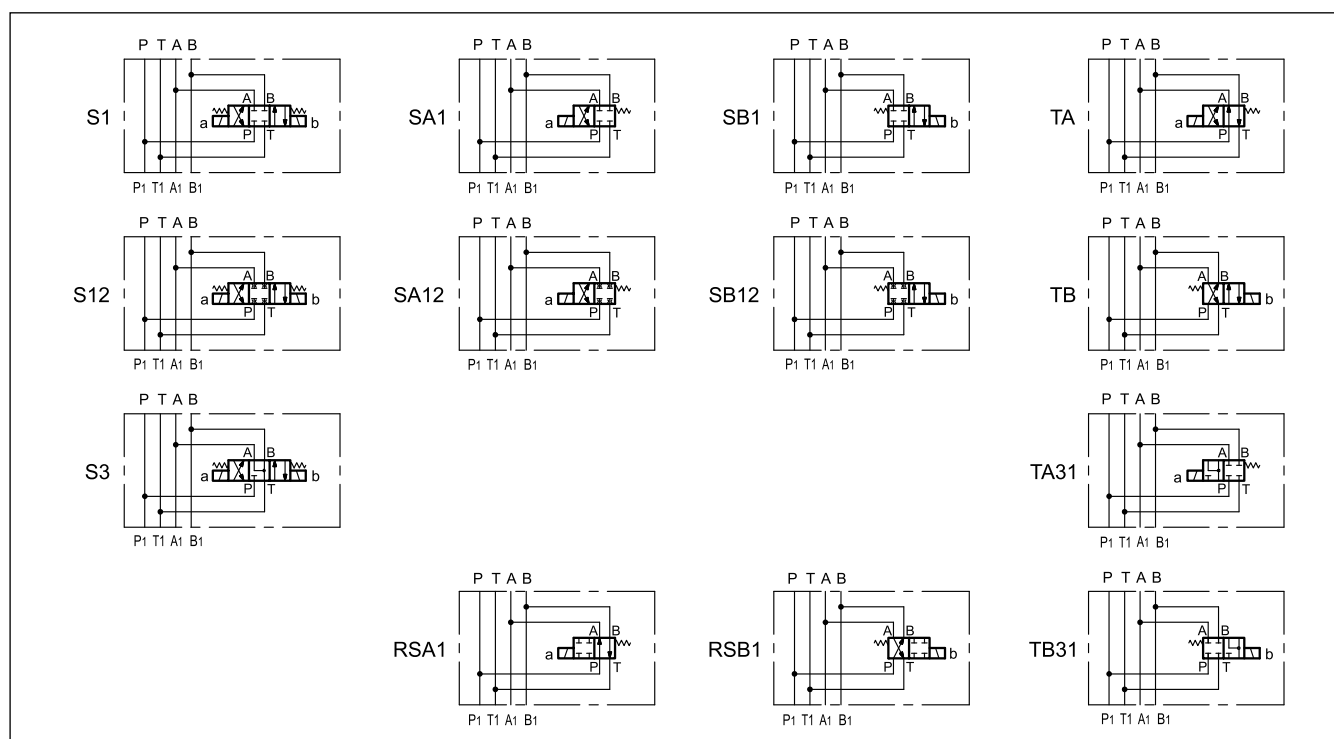
RD24 = 24 V - 50 Hz
RD48 = 48 V - 50 Hz
RD110 = 110 V - 50 Hz / 120 V - 60 Hz
RD220 = 220 V - 50 Hz / 240 V - 60 Hz

NOTE: Connectors with rectifier bridge included.

AVAILABILITY

voltage	electr. conn.	coil version	
		std	ULW
D12, D24	K1	■	■
	K7	-	■
D26	K1	-	■
	K7	-	■
RD24, RD48, RD110, RD220	K1	-	■

2 - SPOOLS TYPES

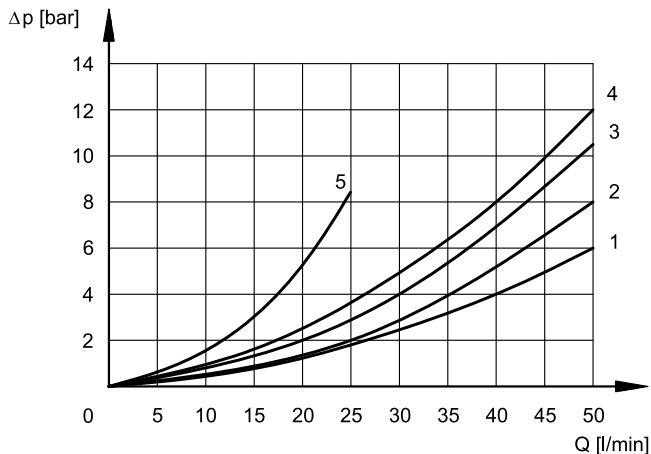


3 - HYDRAULIC FLUIDS

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	

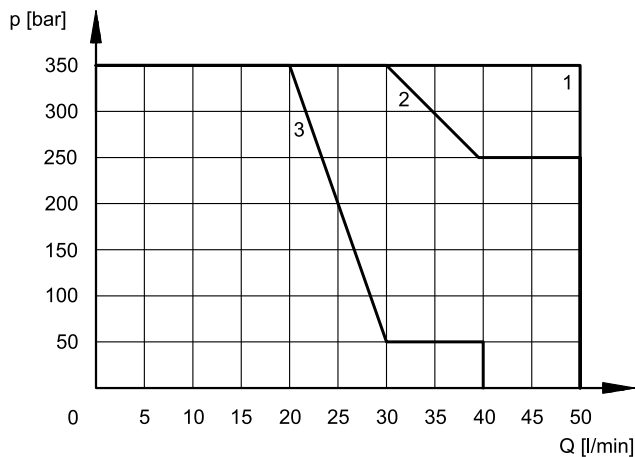
(*) the limit for central position of S3 spool is 25 l/min (curve 5)

5 - OPERATING LIMITS

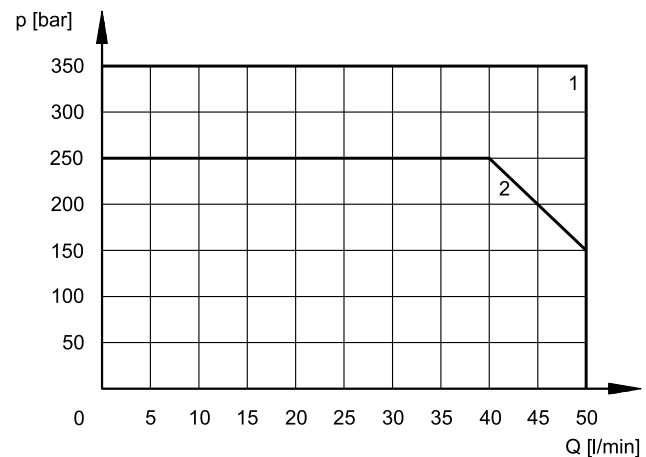
The curves define the flow rate operating fields according to the valve pressure of the different versions. The values indicated in the graphs are relevant to the standard solenoid valve.

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 360°, to suit the available space.

7.2 - UL Recognized coils

ULW type coils are UL Recognized Components (cUR@us marking) intended for installation within end-use equipment that is subject to evaluation in accordance with the applicable UL and CSA standards.

7.3. - DC solenoid valve - current and power consumption

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

Using connectors type 'D' or 'D1' (see cat. 49 000) with embedded bridge rectifier it is possible to feed DC coils with alternating current (50 or 60 Hz), considering a reduction of the operating limits (see diagram at point 6.4).

7.4 - AC solenoid valve - current and power consumption

AC operation is possible using the relevant connectors with rectifier bridge, delivered with the valve. Refer to the DC coil values table at 7.3, as the coils are the same.

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: To further reduce emissions, when using a DC power supply, type H connectors are recommended. These prevent overvoltage peaks when the coil supply circuit is opened (see catalogue 49 000).

(values ± 10%)

	nominal voltage [V]	resistance at 20°C [Ω]	current consumpt [A]	power consumpt [W]
D12	12	4.5	2.68	32.2
D24 (std)	24	18.6	1.29	31
D24 (ULW)	24	16.6	1.45	34.7
D26	26.4	20.6	1.28	33.9
D48	48	77.7	0.62	29.7
D110	110	419.8	0.26	28.8
D220	220	1670	0.13	29

8 - IP DEGREE OF PROTECTION

8.1 - IP degree of protection

The IP degree of protection is defined according to IEC 60529 and indicates the level of protection against the ingress of solid objects and liquids.

The actual IP degree of protection of the valve depends on the type of electrical connection, the solenoid tube protection and the design solutions adopted. The stated IP degree of protection is guaranteed only when a connector with an equivalent degree of protection is correctly wired and installed.

coil version	electrical connection type	IP rating	
		electrical conn.	valve
standard	K1	IP65	IP65
ULW	K1	IP66	IP65
	K7	IP66/IP68/IP69 IP69K*	
ULW + manual override type C*	K1	IP66	IP66
	K7	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*

(*) The IP69K degree of protection is not covered by IEC 60529 but is defined in ISO 20653.

IP Ratings: Selection Guide

The IP rating indicates protection against solid objects (first digit) and liquids (second digit). For solid objects, rating 6 is the highest level and provides complete dust protection. Our solenoid valves fall into this category.

For liquids, three types are distinguished:

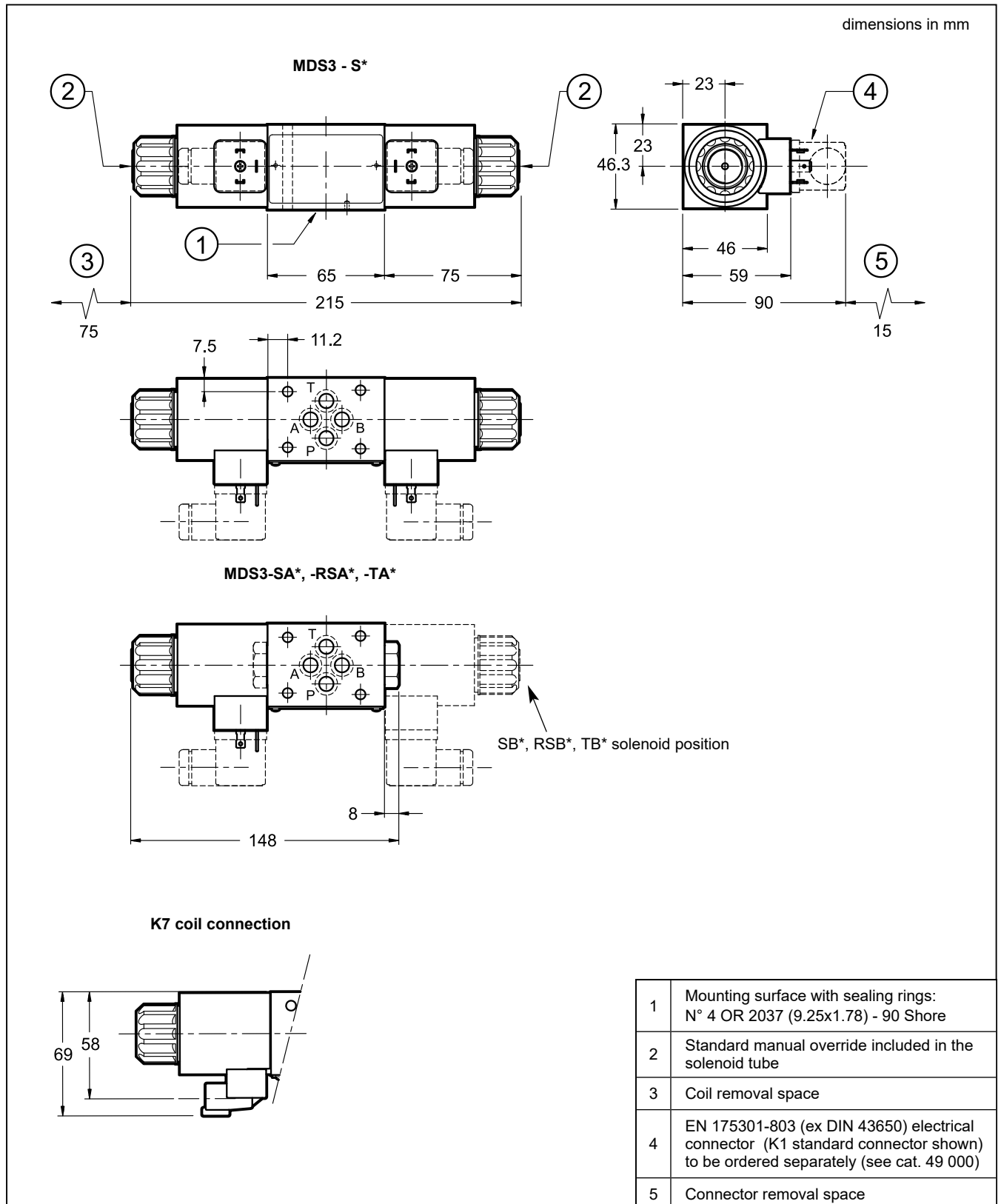
- degree 1 to 6: protection against water jets;
- degree 7 and 8: protection against immersion;
- degree 9: protection against high-pressure, high-temperature water jets.

IP ratings are neither equivalent nor cumulative: IP66 covers lower ratings; IP68 covers IP67 only, not IP66, IP65 or lower ratings; IP69 does not cover any other rating.

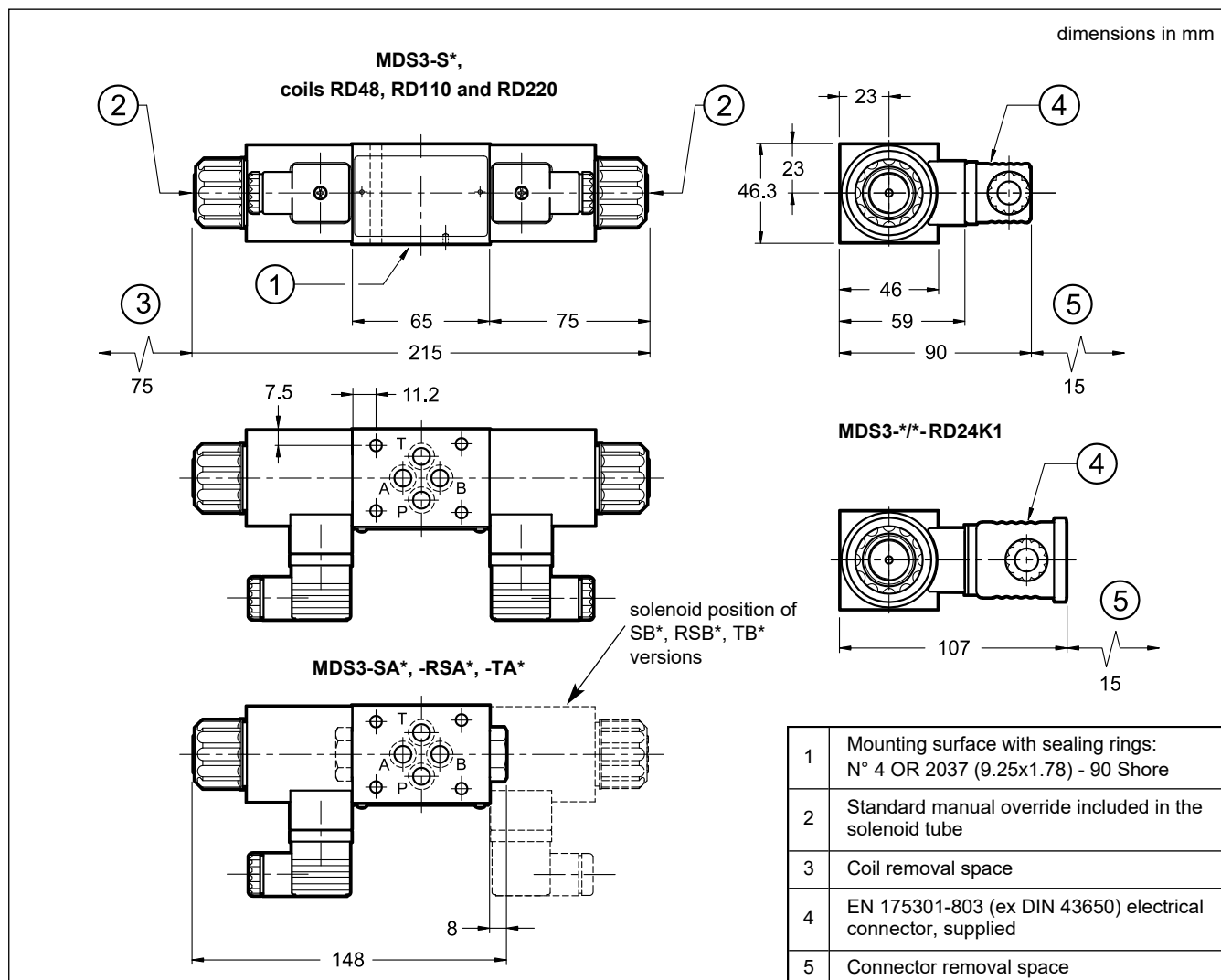
Where a component complies with more than one type of protection, all applicable IP ratings shall be stated.

Example: equipment protected against powerful water jets and continuous immersion is marked IP66/IP68.

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 - ELECTRICAL CONNECTORS

Solenoid valves for AC are supplied with connectors. Instead, DC solenoid valves are delivered without connectors. Connectors type EN 175301-803 (ex DIN 43650) for K1 connections 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.

