



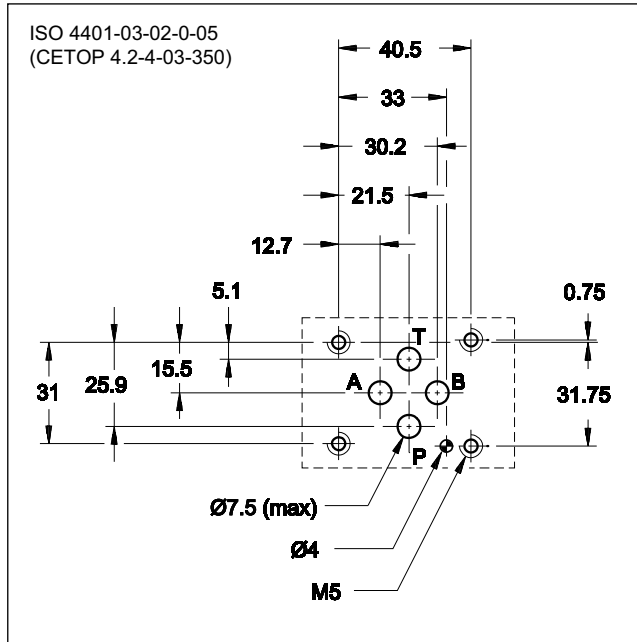
MDS3

SOLENOID OPERATED SWITCHING VALVE

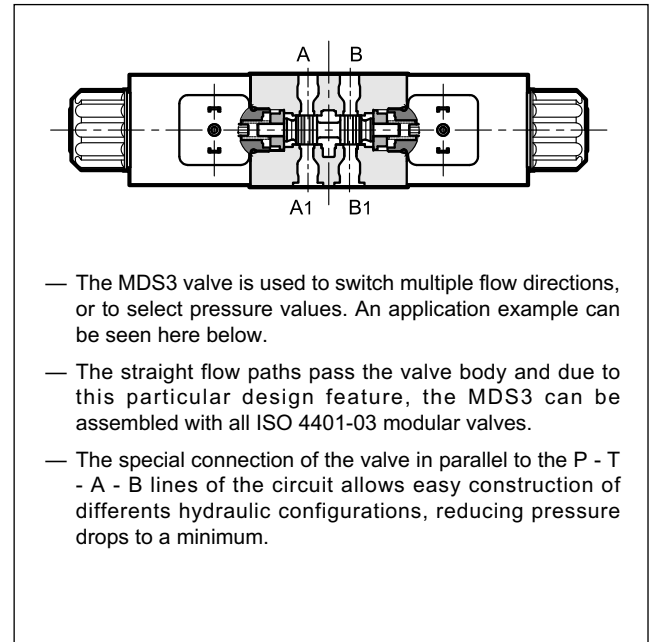
MODULAR VERSION ISO 4401-03

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

MOUNTING INTERFACE



OPERATING PRINCIPLE

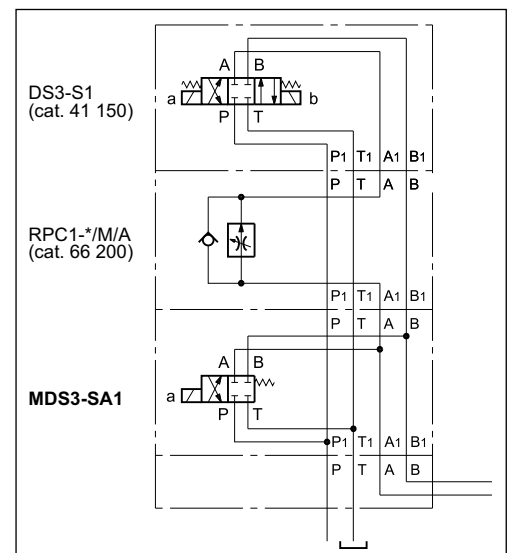


PERFORMANCES

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

| | | |
|---------------------------------|---|-----------|
| Max operating pressure: | | |
| P - A - B ports | bar | 350 |
| T port (DC version) | | 210 |
| T port (AC version) | | 140 |
| 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 | kg | 2 |
| single solenoid | | 1,5 |

APPLICATION EXAMPLE



1 - IDENTIFICATION CODE

| | | | | | | | |
|------------|----------|---|---|--|---|---|--|
| MDS | 3 | - | / | | - | / | |
|------------|----------|---|---|--|---|---|--|

Modular switching valve

Size: ISO 4401-03

Spools (see paragraph 3):

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

Series no.: _____

10 = for DC valves
11 = 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 paragraph 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)

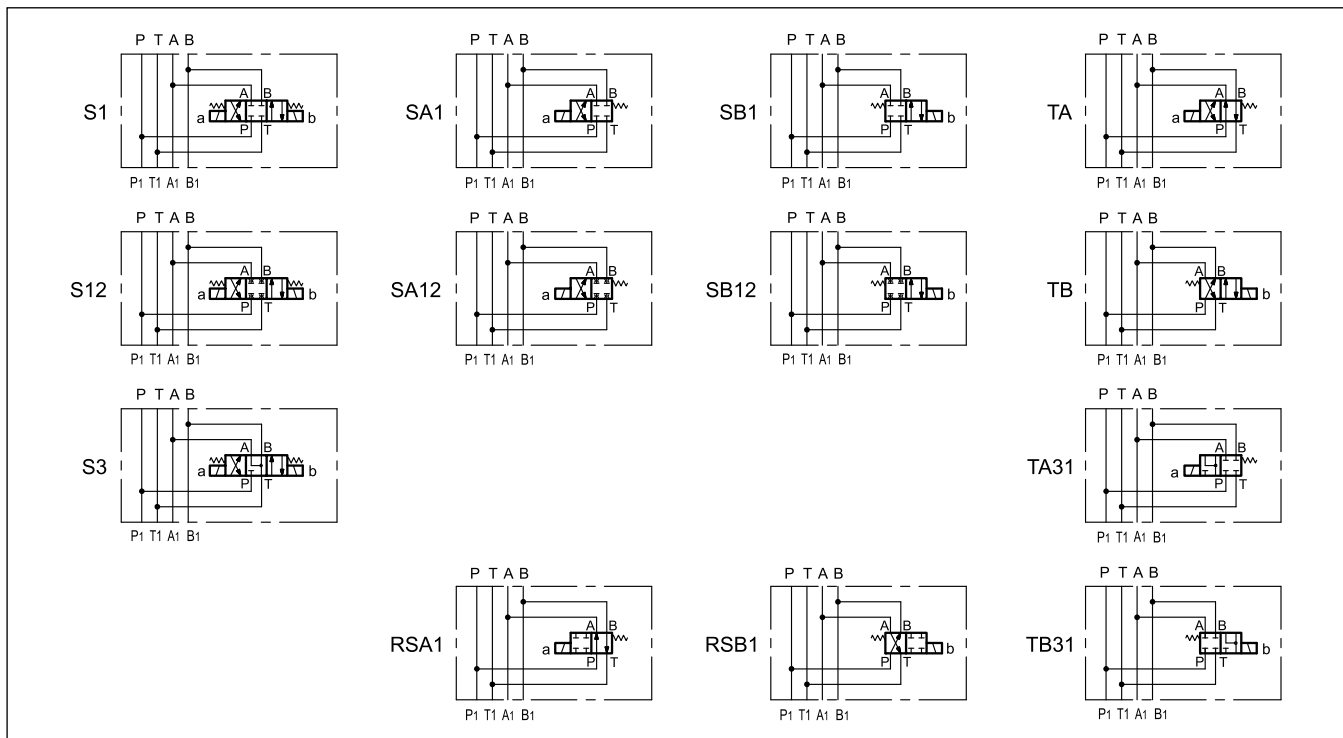
DC power supply

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

AC power supply

A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110V - 50 Hz / 120V - 60 Hz
A220 = 220V - 50 Hz / 240V - 60 Hz

2 - SPOOLS TYPES

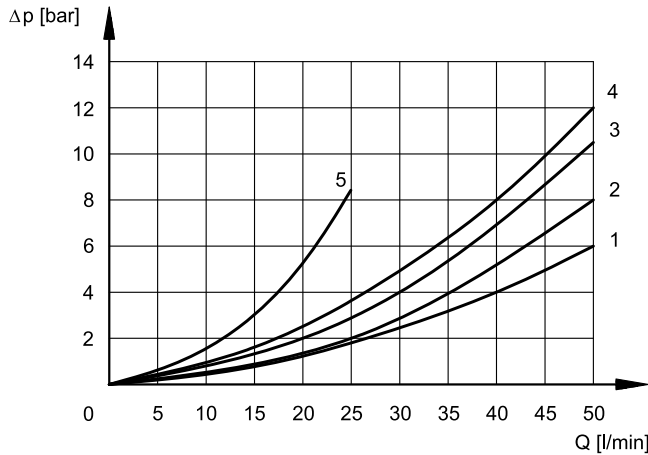


3 - HYDRAULIC FLUIDS

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 | |

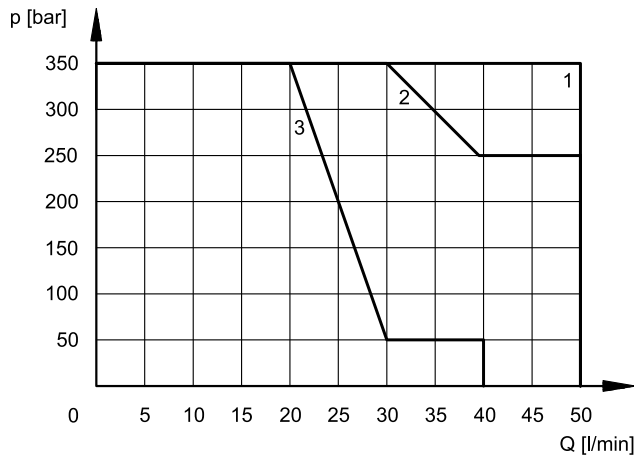
(*) the limit for central position of S3 spool is 25 l/min (curve 5)

5 - OPERATING LIMITS

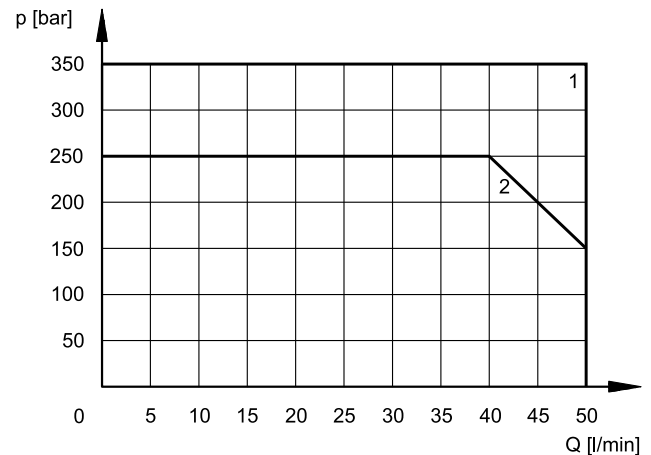
The curves define the flow rate operating fields according to the valve pressure of the different versions. The values indicated in the graphs are relevant to the standard solenoid valve.

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 |

8 - ELECTRICAL FEATURES

8.1 - 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 EN 60529

| Connector | IP 65 | IP 67 | IP 69 K |
|----------------------|-------|-------|---------|
| K1 EN 175301-803 | x (*) | | |
| K7 DEUTSCH DT04 male | x | x | x (*) |

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

| | |
|--|--------------------------------|
| 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 prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

8.2 - Current and absorbed power for DC solenoid valve

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

Using connectors type "D" (see cat. 49 000) with embedded bridge rectifier it is possible to feed DC coils (starting from 48V voltage) with alternating current (50 or 60 Hz), considering a reduction of the operating limits .

Available DC coils (values ±5%)

| | Nominal voltage [V] | Resistance at 20°C [Ω] | Current consumpt. [A] | Power consumpt [W] | Coil code | |
|-------------|---------------------|------------------------|-----------------------|--------------------|-----------|---------|
| | | | | | K1 | K7 |
| D12 | 12 | 4,4 | 2,72 | 32,6 | 1903080 | 1902940 |
| D24 | 24 | 18,6 | 1,29 | 31 | 1903081 | 1902941 |
| D28 | 28 | 26 | 1,11 | 31 | 1903082 | |
| D48 | 48 | 78,6 | 0,61 | 29,3 | 1903083 | |
| D110 | 110 | 436 | 0,26 | 28,6 | 1903464 | |
| D220 | 220 | 1758 | 0,13 | 28,6 | 1903465 | |

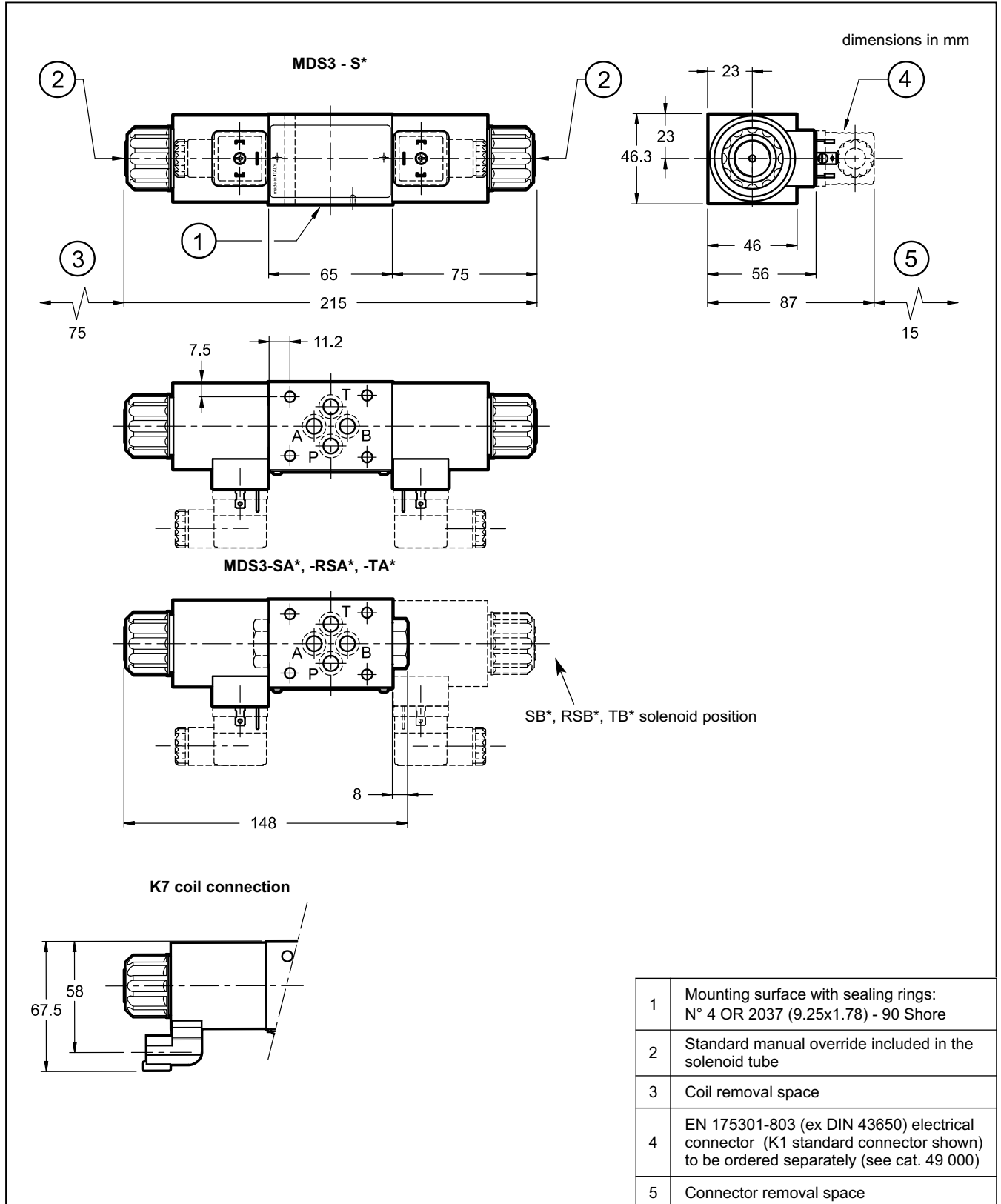
8.3 - Current and absorbed power for AC solenoid valve

The table shows current and power consumption values at inrush and at holding, relevant to the different coil types for AC current.

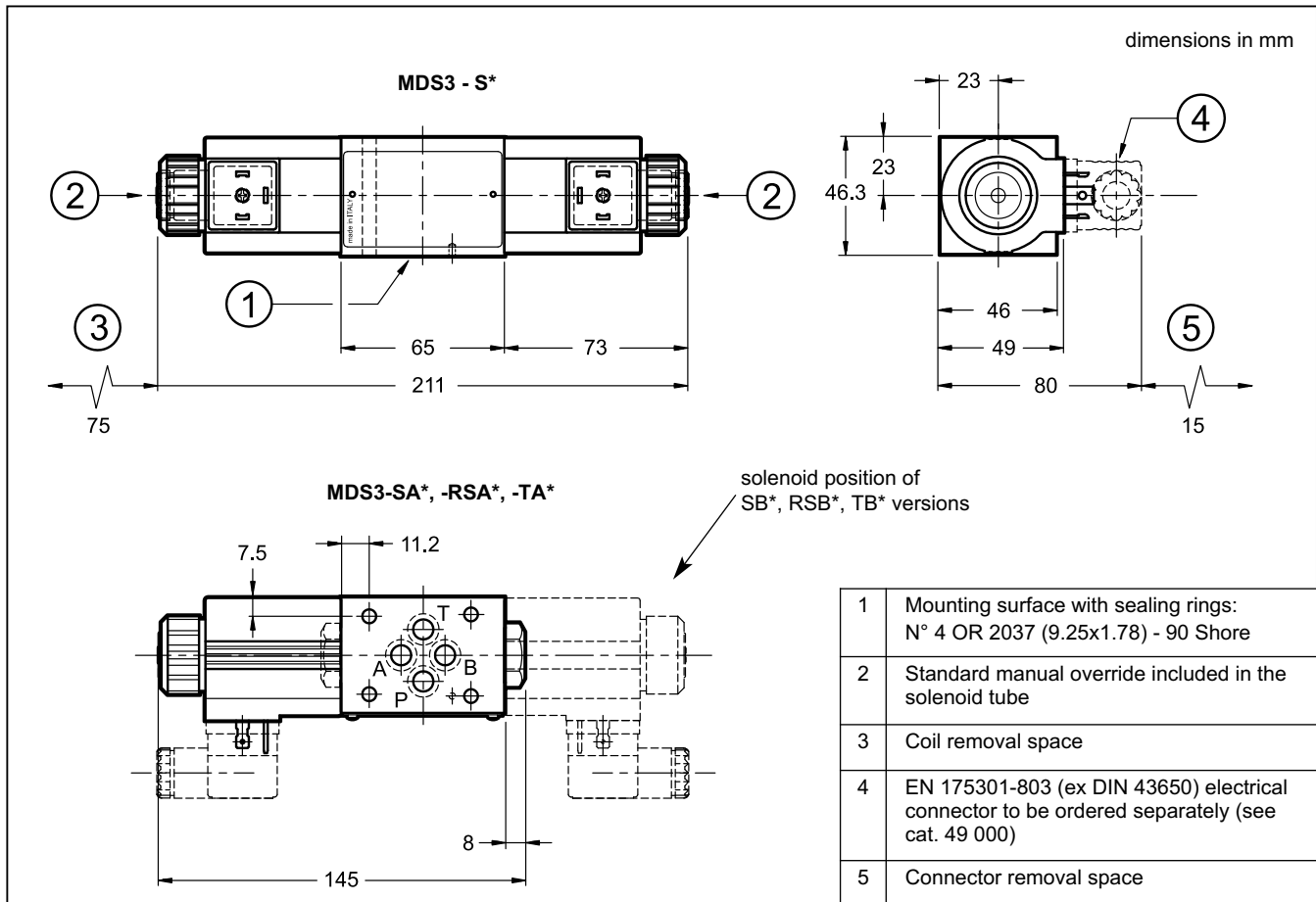
Available AC coils (values ± 5%)

| Suffix | Nominal Voltage [V] | Freq. [Hz] | Resistance at 20°C [Ω] (±1%) | Current consumption at inrush [A] | Current consumption at holding [A] | Power consumption at inrush [VA] | Power consumption at holding [VA] | Coil Code K1 | |
|-------------|------------------------|------------|------------------------------|-----------------------------------|------------------------------------|----------------------------------|-----------------------------------|--------------|---------|
| A24 | 24 | 50 | 0.88 | 8.7 | 2.35 | 209 | 56.5 | 1902660 | |
| A48 | 48 | | 3.2 | 4.5 | 1.25 | 216 | 60 | 1902661 | |
| A110 | 110V-50Hz 120V-60Hz | 50/60 | 17.5 | 1.9 | 0.48 | 209 | 52.8 | 1902677 | |
| | | | | 1.8 | 0.45 | 216 | 54 | | |
| A220 | 220V-50Hz 240V-60Hz | | 70 | | 0.95 | 0.23 | 209 | 50.6 | 1902678 |
| | | | | | 0.87 | 0.21 | | 50.4 | |

8 - DC VALVE - OVERALL AND MOUNTING DIMENSIONS



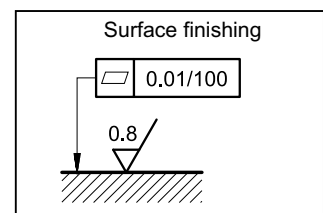
9 - DC VALVE - OVERALL AND MOUNTING DIMENSIONS



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 operated 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 (for DC valves only); **CPK**: Push manual override with mechanical retention (for DC valves only).

For more information about these manual overrides, see the catalogue 41 150.