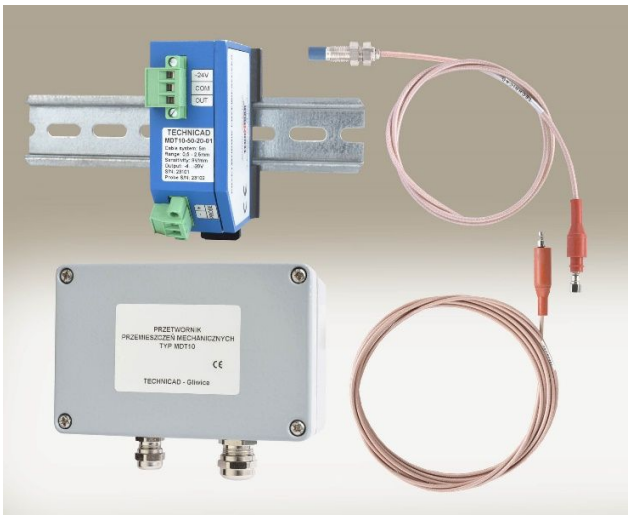
Proximity transducer system type MDS10 / MDT10(MDT10R)

with probe extension cable



Application

The non-contacting displacement probe-transducer systems are gap to voltage devices that measure static as well as dynamic distances between the probe tip and the observed target. The general application is any requirement for an accurate, non-contacting displacement measurement. However, the most common use is for shaft position, relative vibration and phase marker measurement on rotating machinery. They can be used at such machines as water and steam turbines, compressors, pumps, centrifuges, electric motors and generators where fluid film bearings are implemented. The probe-transducer system indicates the dynamic motion of the shaft relative to the bearing.

Description

One measuring system consists of MDS10 probe and MDT10 transducer (or MDT10R - housing version for mounting on a TS35 rail). The transducer radio frequency oscillator generates a radio frequency signal, that is radiated through the probe into the observed surface. The transducer detects in the return signal the strength loss for the eddy-currents generated in the observed surface and conditions the signal to linear voltage output.

The probe tip is constructed of a high performance plastic, impervious to oil, water and many different chemical liquids. The probe housing is made of stainless steel in several shapes (Fig. 1-5). The probe cable is concentric with PTFE/FEP isolation, can be provided with steel protective armor.
The transducer circuit is placed in a gray aluminum alloy enclosure (or blue for MDT10R). The MDT10 version of the transducer is mounted to the plate with two M4x16 screws, and in the MDT10R version it is mounted with a special holder for mounting on the TS35 rail.

The probe is connected with the transducer through cable of 5m or 9m total length. This total length is a length of probe integral cable or is a sum of probe integral cable length and extension cable length. In last case both cables are connected by threaded miniature coaxial connector. The possible length combinations of probe integral cable and extension cable are described below in ordering information.

The transducer is powered from -24V DC source (from monitor). The output voltage from the transducer is a negative voltage proportional to the distance between the target and the probe tip. The protection rate of the housing is IP65 for MDT10 and IP20 for MDT10R due to the connectors mounted in the walls of the housing. The transducer in the variant for mounting on the TS35 rail (MDT10R) requires installation in an additional protective box ensuring protection rate of at least IP 65.

A three - conductor, twisted and shielded cable of 0,5 to 1,5mm^2 cross section is recommended to connect transducer with monitor providing power supply and output signal interface. The transducer can be placed up to 300 m from monitor without degradation of performance.

In the case of MDT10, the transducer have under the housing cover a terminal block with five screw connections: probe cable coaxial wire, probe cable screen, common 0V, output voltage and supply -24V. In the case of the MDT10R version, analogous terminals are mounted in the housing wall in the form of two connectors: 2-pin for the sensor and 3-pin for the signal line. These are socket-plus-plug connectors, the plug is screwed to the socket with two screws.

Output signal is of -4V to -20V or –2V to –18V. The probe-transducer system is factory calibrated for ordered range with linearity error of ±1%FS at +22°C, target material 4140 steel. However probes, extension cables and transducers are mutually interchangeable within the same cable length. Without individual calibration the linearity error can grow to maximum ±3%FS.

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Performances

(meets API 670 specifications)

METROLOGICAL

Measuring range, sensitivity:
2,0mm(gap 0,5 to 2,5mm), -8,00V/mm
2,5mm(gap 0,5 to 3,0mm), -6,40V/mm
3,0mm(gap 0,5 to 3,5mm), -5,33V/mm
3,5mm(gap 0,5 to 4,0mm), -4,57V/mm
4,0mm(gap 0,5 to 4,5mm), -4,00V/mm
Nominal output voltage range:
-4V to -20V or –2V to –18V
Frequency response: 0 ÷ 10 KHz
Max. linearity error of FS (full scale) at +22ºC: ±1%
Max. linearity error of FS including additional error of interchangeability of probe, extension cable and transducer in temperature range 0ºC to + 50 ºC: ±5%
Maximum temperature error of FS:
Probe: ±3%
Transducer: ±1%

ELECTRICAL

Power supply: –24 V ± 1,5 V
Current consumption: < 15 mA
Output load, minimum: 10 kΩ

ENVIRONMENTAL

Operating temperature:
Probe: -35ºC to +180ºC
Transducer: -35ºC to +70ºC
Relative humidity:
Probe: to 95%, without condensation
Transducer: to 95%, without condensation

CE requirements: Directive 2014/30/EC
Electromagnetic compatibility, Standard EN 61326-1

MECHANICAL

Mass(typical):
Probe with 1m cable, without armor : 100g
Cable: 32g/m
Armor: 50g/m
Transducer: 600g(MDT10), 220g(MDT10R)

Probe designated as MDS10P (Fig.1) have axial cable exit and two fixing nuts, probe MDS10PO (Fig.2) have integral with casing hexagon for flat wrench and is dedicated for reverse mount in a holder what means that first a cable is inserted into the holder and next the probe, MDS10K probe (Fig.3, casing with thread) and MDS10KG probe (Fig.4, smooth casing) have side cable exit and can be applied in places with limited space for probe in measuring axis direction. Probe MDS10M (Fig.5) is a model with „miniature" size, side cable exit and smooth casing.
The probe option with integral cable with miniature connector (described in ordering information below) is equipped with one part of rubber protection shield (Fig.6). Second part of rubber connector shield is standard element of extension cable. The connector protection shield is made of high quality rubber impervious to oil, high temperature and many different chemical liquids. The rubber shield is an element sealing and galvanic isolating the connector. As both parts of the shield are mutually connected in „flange-groove" way the shield is a kind of additional connector protection from disconnection.

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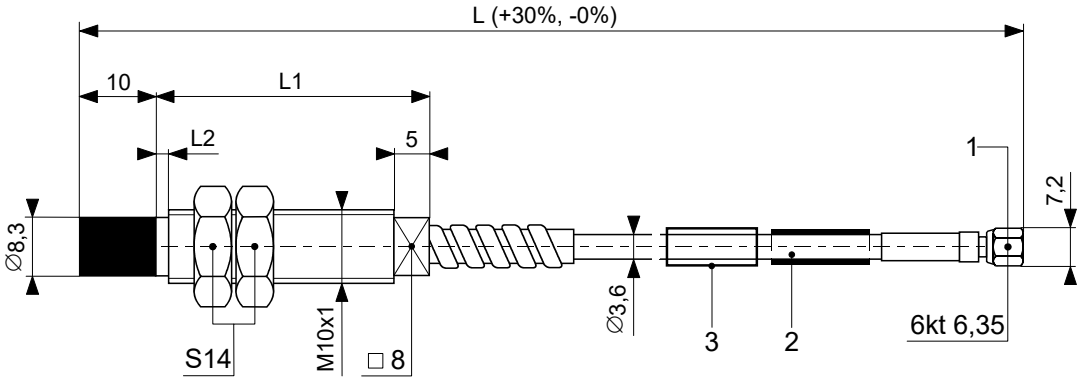

1 – Miniature female coaxial connector
2 – Part number and serial number
3 – Heat shrinkable jacket for user‘s designation

- Cable diameter 3,6mm , FEP isolation
- Stainless steel armor, outer diameter 7.0mm
- Stainless steel armor diameter with additional PVDF outer jacket: 7.5mm

Fig.1 MDS10P - probe in basic shape

Ordering information for probe of basic shape

MDS10P – A – B – C – D – E

Options description
A Overall case length L1 in mm, range from 030 to 200 with 10mm step
B Unthreaded length L2 in mm, range from 000, 010 and further to 160 with 10mm step
C Total probe integral cable length L
- **0 5** cable length 0.5m
- **1 0** cable length 1.0m
- **2 0** cable length 2.0m
- **5 0** cable length 5.0m
- **9 0** cable length 9.0m

D Cable stainless steel armor protection
- **0 0** without armor
- **0 1** with armor
- **0 2** with armor having additional PVDF outer jacket

E Probe cable with miniature connector to connect with extension cable
- **0 0** without connector (cable wire and screen ended with kneaded sleeves)
- **0 1** with connector (apply to probe with L=0.5m, 1.0m, 2.0m)

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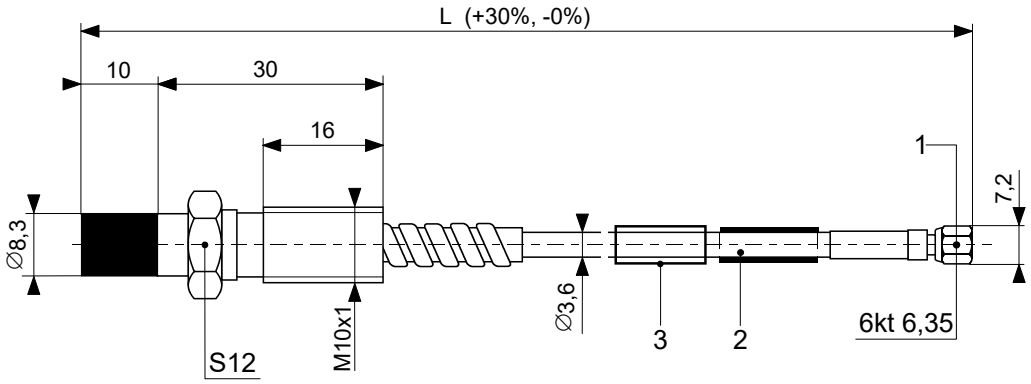

1 – Miniature female coaxial connector
2 – Part number and serial number
3 – Heat shrinkable jacket for user's designation

- Cable diameter 3,6mm , FEP isolation
- Stainless steel armor, outer diameter 7.0mm
- Stainless steel armor diameter with additional PVDF outer jacket: 7.5mm

Fig.2 MDS10PO – probe shape for reverse mount.

Ordering information for probe of reverse mount shape

MDS10PO – A – B – C

Options description
A Total probe integral cable length L
- **0 5** cable length 0.5m
- **1 0** cable length 1.0m
- **2 0** cable length 2.0m
- **5 0** cable length 5.0m
- **9 0** cable length 9.0m

B Cable stainless steel armor protection
- **0 0** without armor
- **0 1** with armor
- **0 2** with armor having additional PVDF outer jacket

C Probe cable with miniature connector to connect with extension cable
- **0 0** without connector (cable wire and screen ended with kneaded sleeves)
- **0 1** with connector (apply to probe with L=0.5m, 1.0m, 2.0m)

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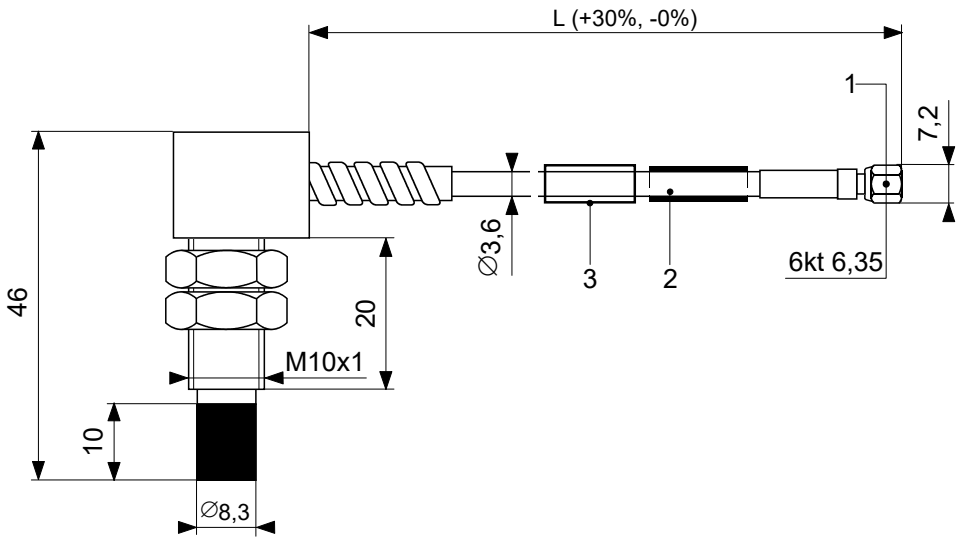

1 – Miniature female coaxial connector
2 – Part number and serial number
3 – Heat shrinkable jacket for user‘s designation

- Cable diameter 3,6mm , FEP isolation
- Stainless steel armor, outer diameter 7.0mm
- Stainless steel armor diameter with additional PVDF outer jacket: 7.5mm

Fig.3 MDS10K – probe shape with side exit cable

Ordering information for probe with side exit cable

MDS10K – A – B – C
Options description
A Total probe integral cable length L
- **0 5** cable length 0.5m
- **1 0** cable length 1.0m
- **2 0** cable length 2.0m
- **5 0** cable length 5.0m
- **9 0** cable length 9.0m

B Cable stainless steel armor protection
- **0 0** without armor
- **0 1** with armor
- **0 2** with armor having additional PVDF outer jacket

C Probe cable with miniature connector to connect with extension cable
- **0 0** without connector (cable wire and screen ended with kneaded sleeves)
- **0 1** with connector (apply to probe with L=0.5m, 1.0m, 2.0m)

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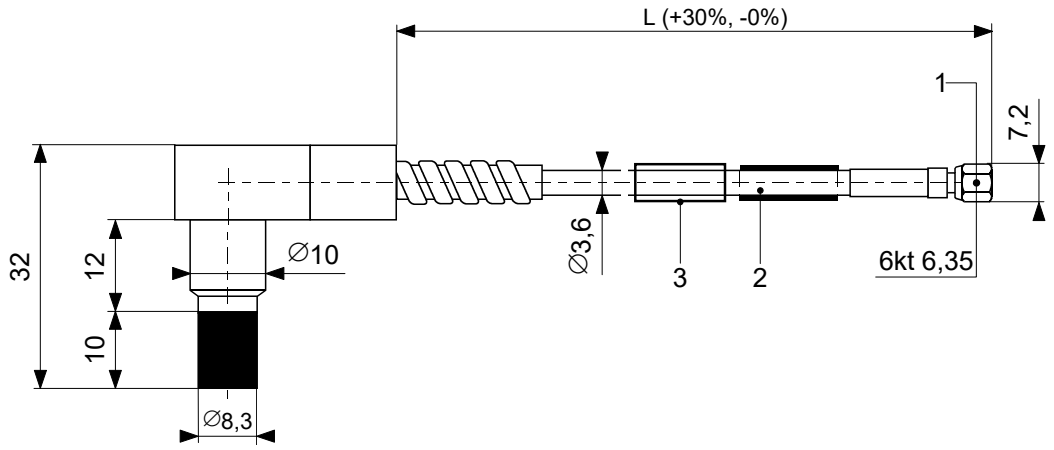

1 – Miniature female coaxial connector
2 – Part number and serial number
3 – Heat shrinkable jacket for user‘s designation

- Cable diameter 3,6mm , FEP isolation
- Stainless steel armor, outer diameter 7.0mm
- Stainless steel armor diameter with additional PVDF outer jacket: 7.5mm

Fig.4 MDS10KG – probe shape with side exit cable and smooth casing

Ordering information for probe with side exit cable, smooth casing

MDS10KG – A – B – C
Options description
A Total probe integral cable length L
- **0 5** cable length 0.5m
- **1 0** cable length 1.0m
- **2 0** cable length 2.0m
- **5 0** cable length 5.0m
- **9 0** cable length 9.0m

B Cable stainless steel armor protection
- **0 0** without armor
- **0 1** with armor
- **0 2** with armor having additional PVDF outer jacket

C Probe cable with miniature connector to connect with extension cable
- **0 0** without connector (cable wire and screen ended with kneaded sleeves)
- **0 1** with connector (apply to probe with L=0.5m, 1.0m, 2.0m)

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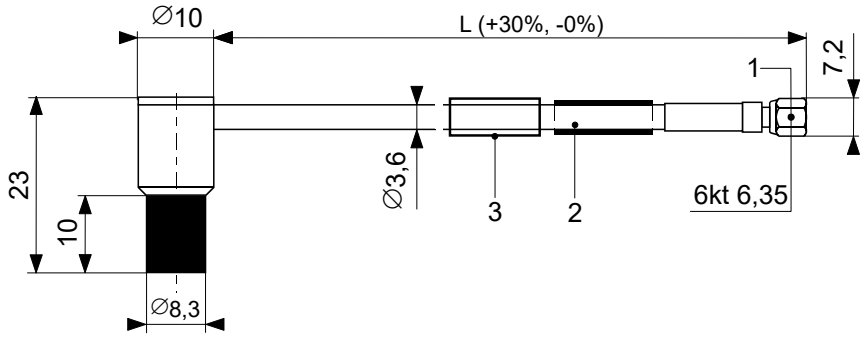

1 – Miniature female coaxial connector
2 – Part number and serial number
3 – Heat shrinkable jacket for user‘s designation

- cable diameter 3,6mm , FEP isolation
- MDS10M probe is not offered with stainless steel armor

Fig.5 MDS10M – probe shape with miniature size

Ordering information for probe with miniature size

MDS10M – A – B

Options description
A Total probe integral cable length L
- **0 5** cable length 0.5m
- **1 0** cable length 1.0m
- **2 0** cable length 2.0m
- **5 0** cable length 5.0m
- **9 0** cable length 9.0m

B Probe cable with miniature connector to connect with extension cable
- **0 0** without connector (cable wire and screen ended with kneaded sleeves)
- **0 1** with connector (apply to probe with L=0.5m, 1.0m, 2.0m)

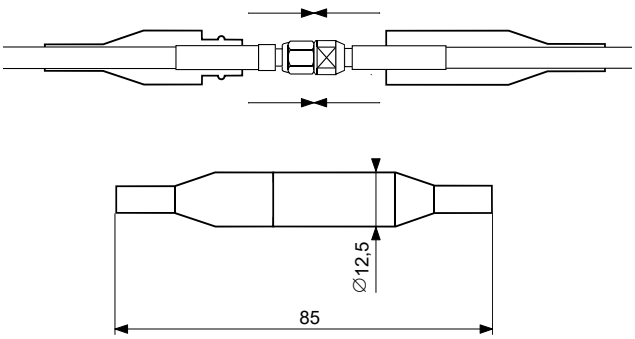

Fig.6 CP - Rubber connector cover on the sensor cable

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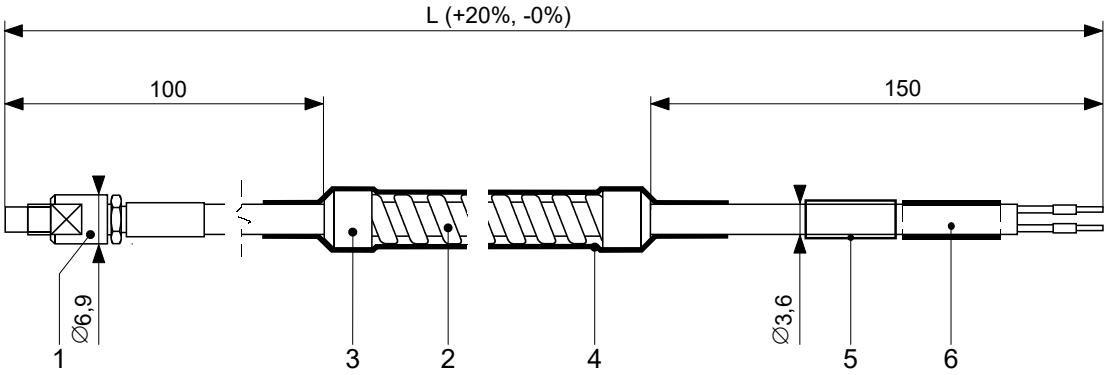

1 – Miniature male coaxial connector
2 – Stainless steel armor, outer diameter 7.0mm
3 – Stainless steel ferrules, 8.0mm diameter
4 – PVDF jacket, outer diameter 7.5mm
5 – Heat shrinkable jacket for user‘s designation
6 – Part number and serial number

- cable diameter 3,6mm , FEP isolation
- armor length is app.300mm shorter than true extension cable length

Fig.7 MDS10C – Extension cable for MDS10... probes

Ordering information for extension cable

MDS10C – A – B

Note: the probe cable total length (a sum of probe integral cable length and extension cable length) must equal one of two nominal total lengths: 5m or 9m

Options description
A Cable length L
- **3 0** 3.0m
- **4 0** 4.0m
- **4 5** 4.5m
- **7 0** 7.0m
- **8 0** 8.0m
- **8 5** 8.5m

B Cable stainless steel armor protection
- **0 0** without armor
- **0 1** with armor
- **0 2** with armor having additional PVDF outer jacket

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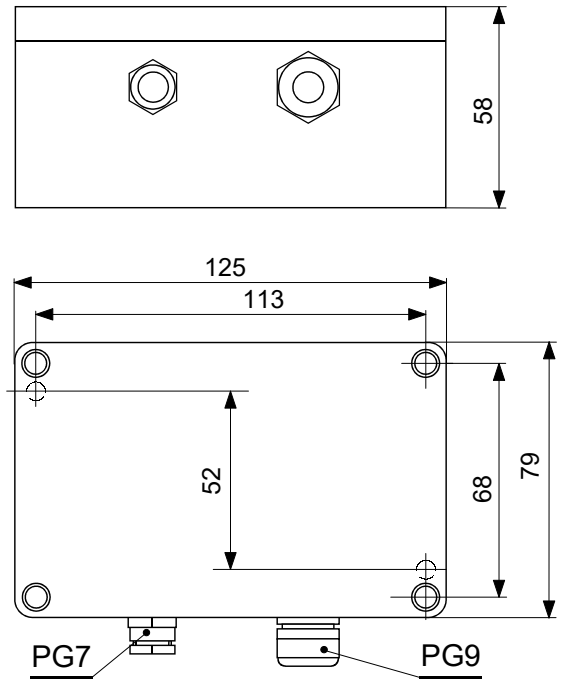

Fig.8 Transducer MDT10. Dimensions.
Housing type for mounting on the mounting plate

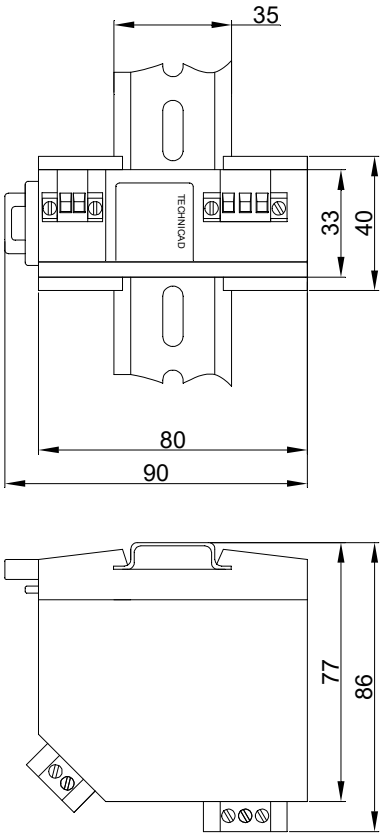

Fig.9 Transducer MDT10R. Dimensions.
Housing type for mounting on the TS35 rail

Ordering information for transducer cooperating with MDS10 series probes

MDT10 – A – B – C – D

Options description

A Housing type
- **?** no entry means housing for mounting on the mounting plate
- **R** housing for mounting on the TS35 rail

B Probe cable total length (a sum of probe integral cable length and extension cable length)
- **5 0** cable total length 5.0m
- **9 0** cable total length 9.0m

C Measuring range in mm
- **2 0** measuring range 2,0mm, sensitivity –8,00 V/mm
- **2 5** measuring range 2,5mm, sensitivity –6,40 V/mm
- **3 0** measuring range 3,0mm, sensitivity –5,33 V/mm
- **3 5** measuring range 3,5mm, sensitivity –4,57 V/mm
- **4 0** measuring range 4,0mm, sensitivity –4,00 V/mm

D Output voltage range
- **0 1** - 4 to –20V
- **0 2** - 2 to –18V

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