

Proximity transducer system type MDS16 / MDT16

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. The most common use of this type of transducer is shaft differential expansion (the thermal differential expansion between shaft expansion and casing expansion). This type of measurement is typical for steam turbines.

Description

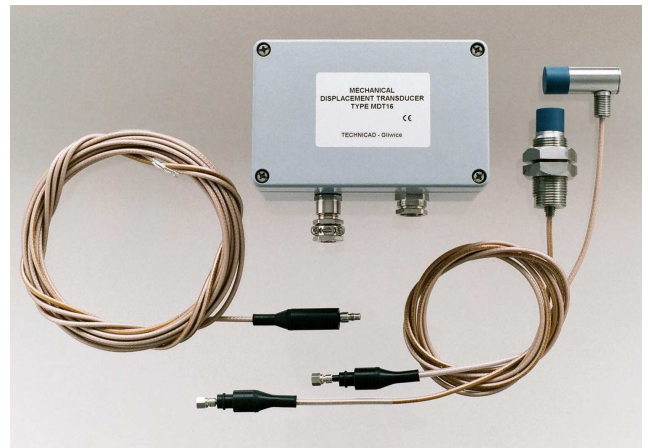
One measuring system consists of the MDS16 probe and the MDT16 transducer. The transducer radio frequency oscillator generates a radio frequency signal, that is radiated through the probe into the observed surface. The transducer detects in the return signal the strength loss for the eddy-currents generated in observed surface and conditions the signal to linear voltage output.

The probe tip is constructed of polyphenylene sulfide, a high performance plastic, impervious to oil, water and many different chemical liquids. The probe housing is made of stainless steel. The probe cable is concentric with PTFE/FEP isolation and can be provided with stainless steel protective armour.

The transducer circuit is placed in aluminium alloy enclosure with gland seals for probe and supply/output cable. The electronics is silicon-resin encapsulated and electrically isolated from the enclosure.

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 DC voltage proportional to the distance between the target and the probe tip. The environmental protection rate for transducer is IP65.



A three - conductor, shielded cable of 0,5 to 1,5mm² 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.

The terminal block inside the transducer have five screw connections: probe cable central wire, probe cable screen, common 0V, output voltage and supply -24V. Output signal is of -4V to -20V standard. The probe-transducer system is factory calibrated for nominal range 8mm (working gap 1 to 9mm, sensitivity -2,00V/mm) with linearity error of $\pm 1\%$ 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 $\pm 3\%$ FS.

Performances

METROLOGICAL

Nominal measuring range: 8mm(gap 1-9mm)

Nominal output voltage range: -4V ÷ -20V

Sensitivity: -2,00V/mm

Frequency response: 0 ÷ 1KHz

Max. linearity error of FS (full scale) at +22°C: $\pm 1\%$

Max. linearity error of FS including additional error of interchangeability of probe, extension cable and transducer in temperature range 0°C to + 50 °C: $\pm 5\%$

Maximum temperature error of FS:

Probe: +1%, -3%(for -35 to +150 °C range)
+1%, -5%(for -35 to +170 °C range)

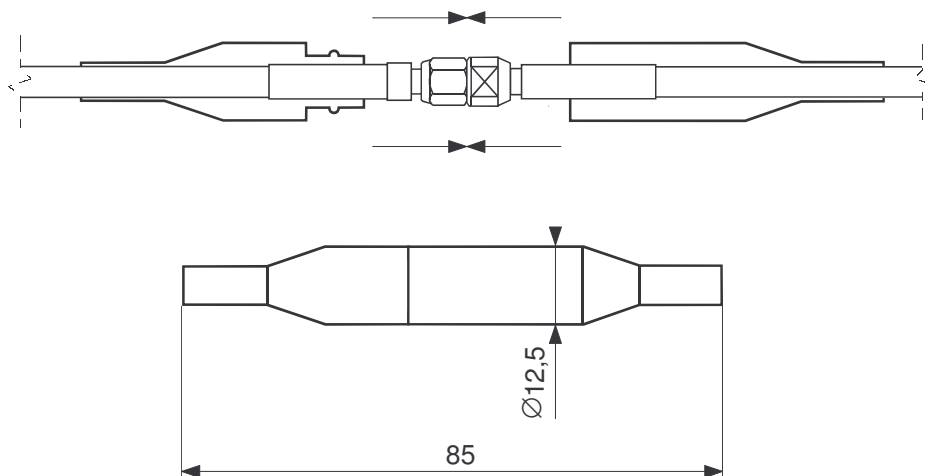
Transducer: $\pm 1\%$

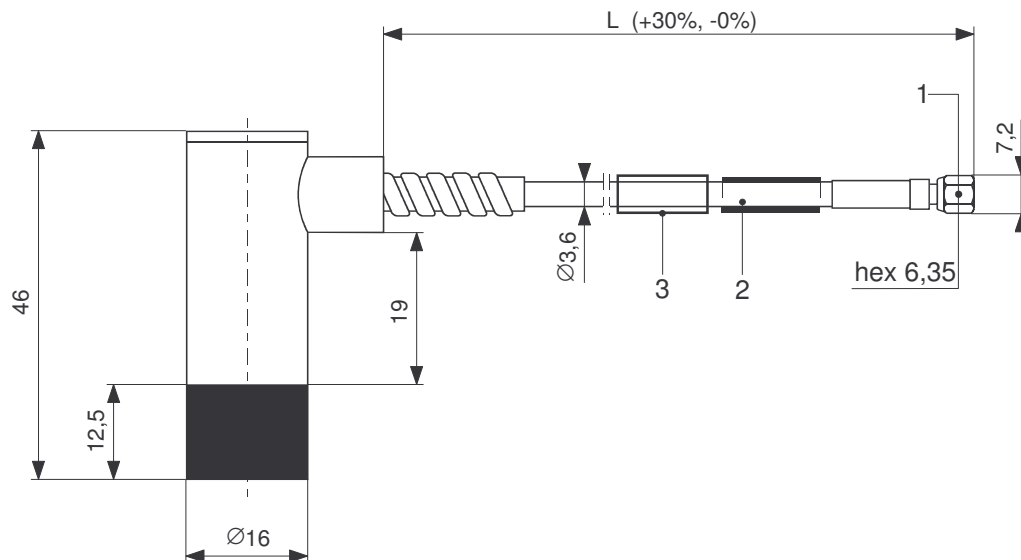
Minimum target size in diameter: 50 mm



ELECTRICAL**Power supply:** $-24V \pm 1,5V$ **Current consumption:** $< 15 \text{ mA}$ **Output load, minimum:** 10Kohm **ENVIRONMENTAL****Operating temperature:****Probe:** $-35 \div +170^{\circ}\text{C}$ **Transducer:** $-35 \div +70^{\circ}\text{C}$ **Relative humidity:****Probe:** to 95%, without condensation**Transducer:** 100%, not submerged**MECHANICAL****Mass(typical):****Probe with 1m cable, without armour :** 210g**Cable:** 32g/m**Armour:** 50g/m**Transducer:** 600g

The probe option with integral cable with miniature connector (described in ordering information below) is equipped with one part of rubber protection shield(Fig.1). 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.

**Fig.1 Connector rubber shield at probe cable**



- 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

Figure 2. MDS16K probe – probe shape with side cable exit, smooth casing

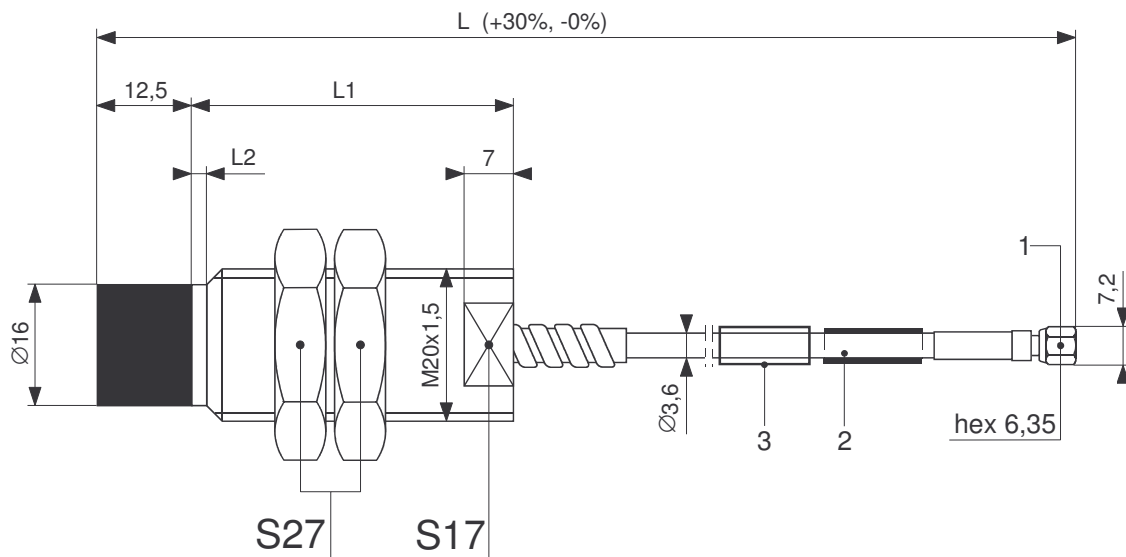
Ordering information for MDS16K probe

MDS16K - **A** **B** **C**
 □□-□□-□□

Options description

- A** □□ Total probe integral cable length L
 05 cable length 0.5m
 10 cable length 1.0m
 20 cable length 2.0m
 50 cable length 5.0m
 90 cable length 9.0m
- B** □□ Cable stainless steel armour protection
 00 without armor
 01 with armor
 02 with armor having additional PVDF outer jacket
- C** □□ Probe cable with miniature connector to connect with extension cable
 00 without connector(cable wire and screen ended with kneaded sleeves)
 01 with connector (apply to probe with L=0.5m, 1.0m, 2.0m)





- 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

Figure 3. MDS16P probe – probe shape with axial cable exit

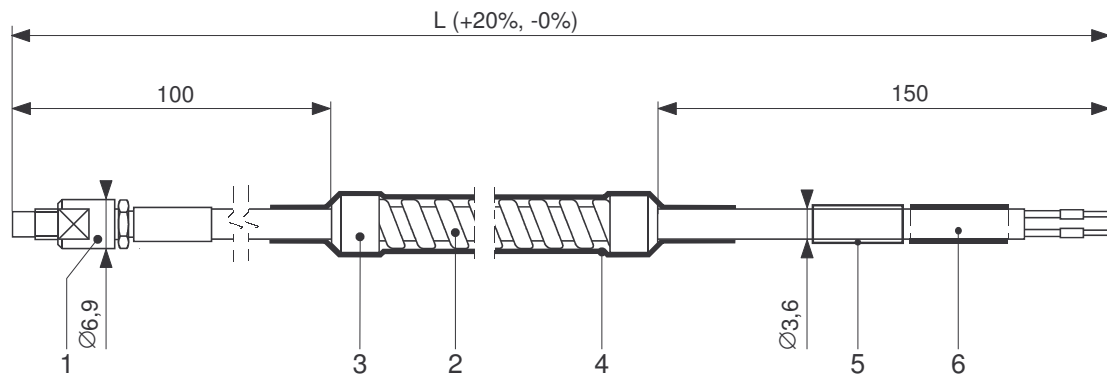
Ordering information for probe with axial cable exit

A B C D E
MDS16P -□□□-□□□-□□-□□-□□

Options description

- A** □□□ Overall case length L1 in mm, range from 040 to 100 with 10mm step
- B** □□□ Unthreaded length L2 in mm, range from 000, 010 and further to 060 with 10mm step
- C** □□ Total probe integral cable length L
- 05** cable length 0.5m
 - 10** cable length 1.0m
 - 20** cable length 2.0m
 - 50** cable length 5.0m
 - 90** cable length 9.0m
- D** □□ Cable stainless steel armor protection
- 00** without armor
 - 01** with armor
 - 02** with armor having additional PVDF outer jacket
- E** □□ Probe cable with miniature connector to connect with extension cable
- 00** without connector (cable wire and screen ended with kneaded sleeves)
 - 01** with connector (apply to probe with L=0.5m, 1.0m, 2.0m)





- 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.4 MDS16C – Extension cable for MDS16 probe

Ordering information for extension cable

A B
MDS16C- □□-□□

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

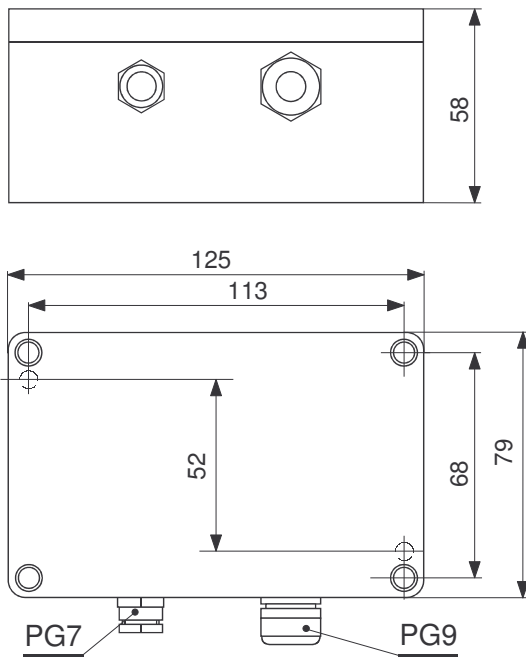
B □□ Cable stainless steel armour protection

0 0 without armor

0 1 with armor

0 2 with armor having additional PVDF outer jacket





**Fig.5 Transducer MDT16.
Dimensions.**

Ordering information for transducer cooperating with MDS16(K or P) probe

A B
MDT16 - □□ - □□

Options description

A □□ 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

B □□ Output voltage range

0 1 - 4 to -20V

0 2 - 2 to -18V

