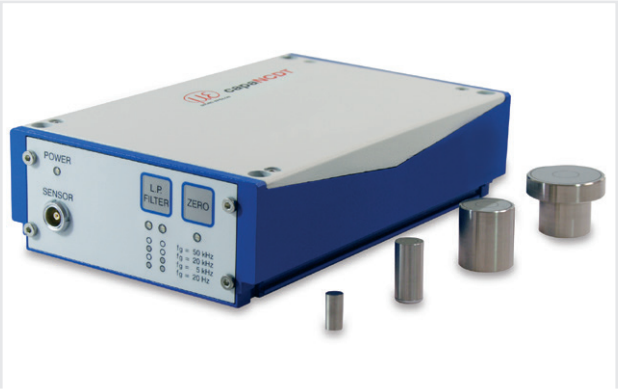
MICRO-EPSILON




# Instruction Manual

## capaNCDT 6350

CS02
CSH02
CSH02FL
CS05
CSE05
CSH05
CSH05FL
CS1
CSE1
CSH1
CSH1FL
CS1HP
CSH1.2
CSH1.2FL
CSH2FL
CS2
CSE2
CS3
CS5
CS10
CSG0.50
CSG1.00

Non-contact Capacitive Displacement Measuring

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CE

Certified acc. to DIN EN ISO 9001: 2008

# Contents

# 1. Safety

Knowledge of the operating instructions is a prerequisite for equipment operation.

## 1.1 Symbols Used

The following symbols are used in this instruction manual:

| | |
|---|---|
| ⚠CAUTION | Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury. |
| ***NOTICE*** | Indicates a situation which, if not avoided, may lead to property damage. |
|  | Indicates a user action. |
|  | Indicates a user tip. |

## 1.2 Warnings

⚠CAUTION

Disconnect the power supply before touching the sensor surface.
> Danger of injury

> Static discharge

Connect the power supply and the display/output device in accordance with the safety regulations for electrical equipment.
> Danger of injury

> Damage to or destruction of the sensor and/or controller

***NOTICE***

Avoid shock and vibration the sensor and controller.
> Damage to or destruction of the sensor and/or controller

The power supply may not exceed the specified limits.
> Damage to or destruction of the sensor and/or controller

Protect the sensor cable against damage
> Destruction of the sensor

> Failure of the measuring device

## 1.3 Notes on CE Identification

The following applies to the capaNCDT6350 : EMC regulation 2004/108/EC

Products which carry the CE mark satisfy the requirements of the EMC regulation 2004/108/EC 'Electromagnetic Compatibility' and the European standards (EN) listed therein.

The EC declaration of conformity is kept available according to EC regulation, article 10 by the authorities responsible at

MICRO-EPSILON Messtechnik GmbH & Co. KG
Königbacher Straße 15
D-94496 Ortenburg

The system is designed for use in industry and satisfies the requirements of the standards:

- DIN EN 61326-1: 2006-10 Electrical Equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
- DIN EN 61326-2-3: 2007-05 Electrical Equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements

The systems satisfy the requirements if they comply with the regulations described in the instruction manual for installation and operation.

## 1.4 Proper Use

- The capaNCDT6350 measuring system is designed for use in industrial areas. It is used for
  - displacement, distance, thickness and movement measurement
  - position measuring of parts or machine components
- The system may only be operated within the limits specified in the technical data, see Chap. 2.3.
- The system should only be used in such a way that in case of malfunction or failure personnel or machinery are not endangered.
- Additional precautions for safety and damage prevention must be taken for safety-related applications.

## 1.5 Proper Environment

- Operating temperature:
  - Sensor: -50 ... +200 °C (-58 to +392 °F)
  - Sensor cable: -50 ... +150 C (-58 to +302 °F)
  - Controller: +10 ... +50 °C (-50 to +122 °F)
- Humidity: 5 - 95 % (non condensing)
- Ambient pressure: atmospheric pressure
- EMC: according to

| | |
|---|---|
| DIN EN 61326-1: 2006-10 | Electrical Equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements |
| DIN EN 61326-2-3: 2007-05 | Electrical Equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements |

- Storage temperature: 0 ... +75 °C (0 to +167 °F)
- The space between the sensor surface and the target must have an unvarying dielectric constant.
- The space between the sensor surface and the target may not be contaminated (for example water, rubbed-off parts, dust, et cetera)

# 2. Functional Principle, Technical Data

## 2.1 Measuring Principle

The principle of capacitive distance measurement with the capaNCDT system is based on the principle of the parallel plate capacitor. For conductive targets, the sensor and the target opposite form the two plate electrodes.

If a constant AC current flows through the sensor capacitor, the amplitude of the AC voltage at the sensor is proportional to the distance between the capacitor electrodes. The AC voltage is demodulated, amplified and output as an analog signal.

The capaNCDT system evaluates the reactance $X_c$ of the plate capacitor which changes strictly in proportion to the distance.

$$X_c = \frac{1}{j\omega C}; \quad \text{capacitance } C = \varepsilon_r * \varepsilon_o * \frac{\text{area}}{\text{distance}}$$

i A small target and bent (uneven) surfaces cause a non-linear characteristic.

This theoretical relationship is realized almost ideally in practice by designing the sensors as guard ring capacitors.

The linear characteristic of the measuring signal is achieved for electrically conductive target materials (metals) without any additional electronic linearization. Slight changes in the conductivity or magnetic properties do not affect the sensitivity or linearity.

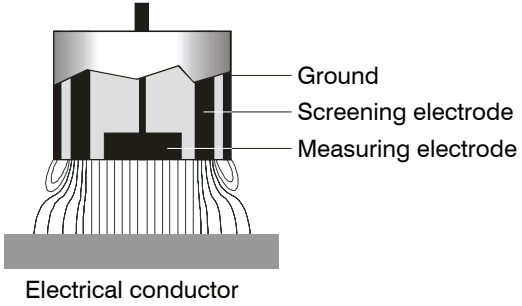



*Fig. 1 Functional principle of the guard ring capacitor*

## 2.2 Structure

The capaNCDT 6350 controller is a compact, single-channel system with a modular signal conditioning electronics. The controller is installed in an aluminium housing. The high precision DSP (Digital Signal Processor) achieves up to 50 kHz (-3 dB) bandwidth on the analog output.

The non-contact, single-channel measuring system consists of:

- sensor,
- sensor cable,
- controller

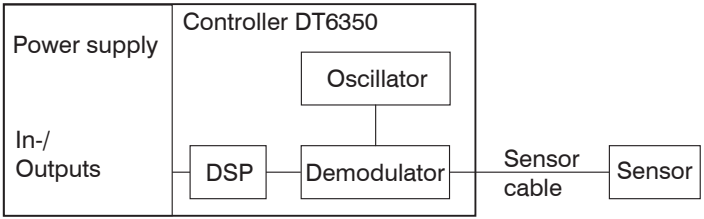



*Fig. 2 Block diagram capaNCDT 6350*

### 2.2.1 Sensors

For this measurement system, several sensors can be used. In order to obtain accurate measuring results, the surface of the sensor must be kept clean and free from damage.

The capacitive measuring process is area-related. A minimum area (see table) is required depending on the sensor model and measuring range.

**Sensors for electrical conducting targets (metals)**

| Sensor model | Measuring range | Min. target diameter |
|---|---|---|
| CS02 | 0.2 mm | 5 mm |
| CSH02 | 0.2 mm | 7 mm |
| CSH02FL | 0.2 mm | 7 mm |
| CS05 | 0.5 mm | 7 mm |
| CSE05 | 0.5 mm | 6 mm |
| CSH05 | 0.5 mm | 7 mm |
| CSH05FL | 0.5 mm | 7 mm |
| CS1 | 1 mm | 9 mm |
| CSE1 | 1 mm | 8 mm |
| CSH1 | 1 mm | 11 mm |
| CSH1FL | 1 mm | 11 mm |
| CS1HP | 1 mm | 9 mm |
| CSH1.2 | 1.2 mm | 11 mm |
| CSH1.2FL | 1.2 mm | 11 mm |
| CSH2FL | 2 mm | 17 mm |
| CS2 | 2 mm | 17 mm |
| CSE2 | 2 mm | 14 mm |
| CS3 | 3 mm | 27 mm |
| CS5 | 5 mm | 37 mm |
| CS10 | 10 mm | 57 mm |
| CSG0.50 | 0.5 mm | ca. 7 x 8 mm |
| CSG1.00 | 1.00 mm | ca. 8 x 9 mm |

### 2.2.2 Sensor Cable

The sensor and controller are connected by a special, double screened, 1 m (3 ft) long sensor cable. Sensor cables with 0.5 m or 2 m length are possible, see Chap. 5.2.4.

Do not shorten or lengthen these special cables.

Usually, a damaged cable can not be repaired.

Switch off the device when plugging and removing connectors.

The sensors of type CSH have integrated a 1.4 long sensor cable. Cable lengths of 2.8 m are available too if required.

| Model | Cable length | 2 axial connectors | 1x axial + 1x 90 ° | For sensors |
|---|---|---|---|---|
| CC0.5C | 0.5 m | x | | 0.2 - 0.5 mm |
| CC1C | 1 m | x | | 0.2 - 0.5 mm |
| CC2C | 2 m | x | | 0.2 - 0.5 mm |
| CC1C/90 | 1 m | | x | 0.2 - 0.5 mm |
| CC2C/90 | 2 m | | x | 0.2 - 0.5 mm |
| CC0,5B | 0.5 m | x | | 1 ... 10 mm |
| CC1B | 1 m | x | | 1 ... 10 mm |
| CC2B | 2 m | x | | 1 ... 10 mm |
| CC1B/90 | 1 m | | x | 1 ... 10 mm |
| CC2B/90 | 2 m | | x | 1 ... 10 mm |

Minimum bending radius: 10 mm (once)
38 mm (permanently)

The sensor cable may not be crushed. Modifications must not be permitted to the sensor cable.

### 2.2.3 Controller

The controller principally consists of an oscillator- and a demodulator unit. Both are stored in an aluminium housing.

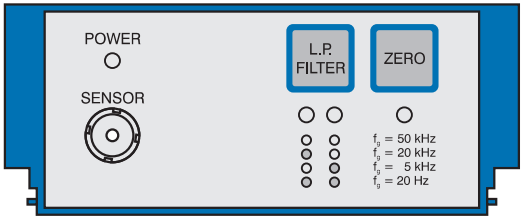



*Fig. 3 Front view DT6350*

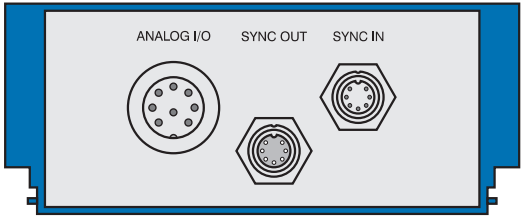



*Fig. 4 Rear view DT6350*

The oscillator supplies the sensor with constant frequency and amplitude-stable sinusoidal current. The frequency is 250 kHz.

Demodulation and amplifying of the distance-dependent measuring signal are tasks of the demodulator unit.

The DSP calculates the output signal for the half respectively the double measuring range. In addition it considers the different sensor cable lengths, filtering and zero setting.

i The output voltage can achieve up to 10.5 VDC, if no sensor is connected or target out of measuring range.

## 2.3 Technical Data

| Controller type | DT6350 |
|---|---|
| Resolution static | 0.005 % FSO |
| Resolution dynamic | 0.1 % FSO (50 kHz) |
| Limit frequency | 50 kHz |
| Limit frequency adjustable | 20 Hz / 5 kHz / 20 kHz / 50 kHz |
| Linearity | ±0.3 % FSO |
| Max. sensitivity deviation | ±0.2 % FSO |
| Long term stability | ≤0.02 % FSO / month |
| Synchronous operation | yes |
| Insulator measurement | no |
| Temperature stability | ±0.01 % FSO / °C |
| Temperature range (operation) | +10 ... +50 °C |
| Temperature range (storage) | -10 … +75 °C |
| Supply | 24 VDC (9 … 30 V) / 5.5 W |
| | optional: ±15 VDC |
| Output | 0 … 10 V (max. 10 mA short circuit proof) |
| | optional: 4 … 20 mA / 0 … 20 mA |
| Suitable for sensors | all sensors except CS005 and CS08 |
| Sensor cable standard | 0.5 m; 1 m; 2 m |
| Sensor cable (matched) | with fixed assignment:<br>3 m up to 100 % FSO<br>4 m up to 50 % FSO |

| | |
|---|---|
| Ambient conditions sensor | Humidity 0 to 95 % (non condensing) |
| Protection class | IP 54 (Controller and sensors) |
| Electromagnetic compatibility (EMC) | DIN EN 61326-1: 2006-10 Electrical equipment for measurement, control and laboratory use - Part 1: General requirements,<br>DIN EN 61326-2-3: 2007-05 Electrical equipment for measurement, control and laboratory use - Part 2-3: Particular requirements |

FSO = Full scale output

# 3. Delivery

## 3.1 Unpacking

1 Controller

1 Plug (if PC3/8 was not ordered)

1 Instruction manual

**Optional accessories, separately packed:**

1 Sensor

1 Sensor cable with plug

1 Power and output cable PC3/8

➡ Remove the parts of the system carefully from the packaging and transport them in such a way that they are not damaged.

➡ Check for completeness and shipping damages immediately after unpacking. In case of damage or missing parts, please contact the manufacturer or supplier.

## 3.2 Storage

| | |
|---|---|
| Storage temperature: | 0 °C up to +75 °C (+14 to 167 °F) |
| Humidity: | 0 - 95 % RH (not condensing) |

# 4. Installation and Assembly

## 4.1 Precautionary Measures

No sharp-edged or heavy objects may get into contact with the sensor cable sheath.

➡ Protect the cable against pressure loads in pressurised rooms.

➡ Avoid kinks in any case.

➡ Check the connections for tight fit.

i A damaged cable cannot be repaired.

## 4.2 Sensor

The sensors may be mounted free-standing or flush.

➡ When assembling, make sure that the polished sensor surface is not scratched.

### 4.2.1 Radial Point Clamping with Grub Screw, Cylindric Sensors

This simple type of fixture is only recommended for a force and vibration-free installation position. The grub screw must be made of plastic so that it cannot damage or deform the sensor housing.

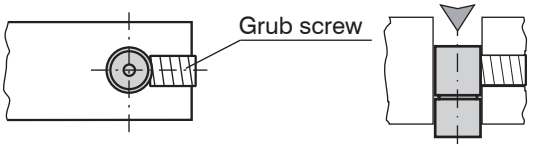


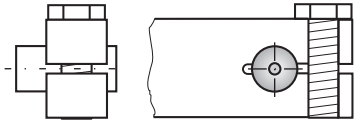

*Fig. 5 Radial point clamping with grub screw*

**NOTICE**

Do not use metal grub screws.
> Danger of damaging the sensor

### 4.2.2 Circumferential Clamping, Cylindric Sensors

This sensor mounting option offers maximum reliability because the sensor is clamped around its cylindrical housing. It is absolutely necessary in difficult installation environments, for example on machines, production plants et cetera.



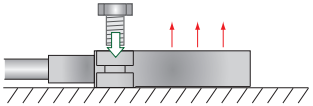
Mounting with clamping ring

*Fig. 6 Circumferential clamping*

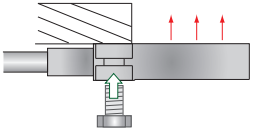
### 4.2.3 Flat Sensors

Flat sensors are mounted by means of a tap hole for M2 (in case of sensors 0.2 and 0.5 mm) or by a through hole for M2 screws. The sensors can be bolted on top or below.

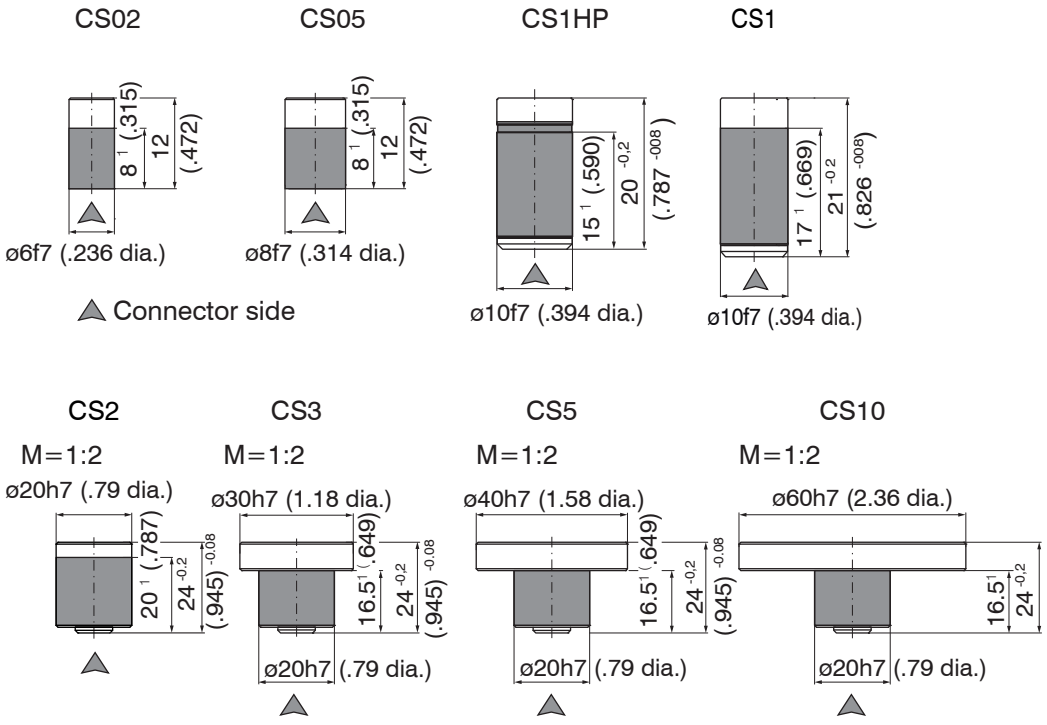
**Screwing from above**



**Screwing from bottom**



### 4.2.4 Dimensional Drawings Sensors

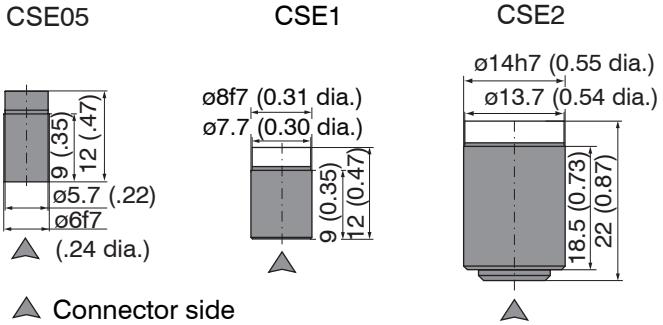



| Dimension | Fit tolerance |
|---|---|
| 6e7 | -20 |
| | -32 |
| 6h6 | 0 |
| | -8 |
| 6f7 | -10 |
| | 22 |
| 8f7 | -13 |
| | -28 |
| 10f7 | -13 |
| | -28 |
| 20h7 | 0 |
| | -21 |
| 30h7 | 0 |
| | -21 |
| 40h7 | 0 |
| | -25 |
| 60h7 | 0 |
| | -30 |

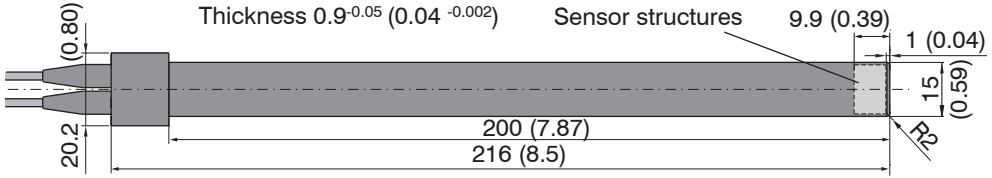
1 µm = 0.001 mm
= 1 micron

Dimensions in mm (inches), not to scale

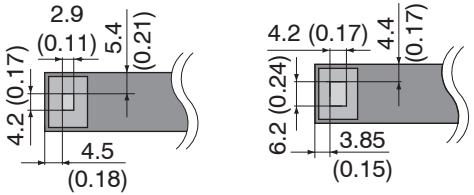
1) Adjustment area for radial point respectively circumferential clamping




CSG0.50-CAm2.0 and CSG1.00-CAm2.0

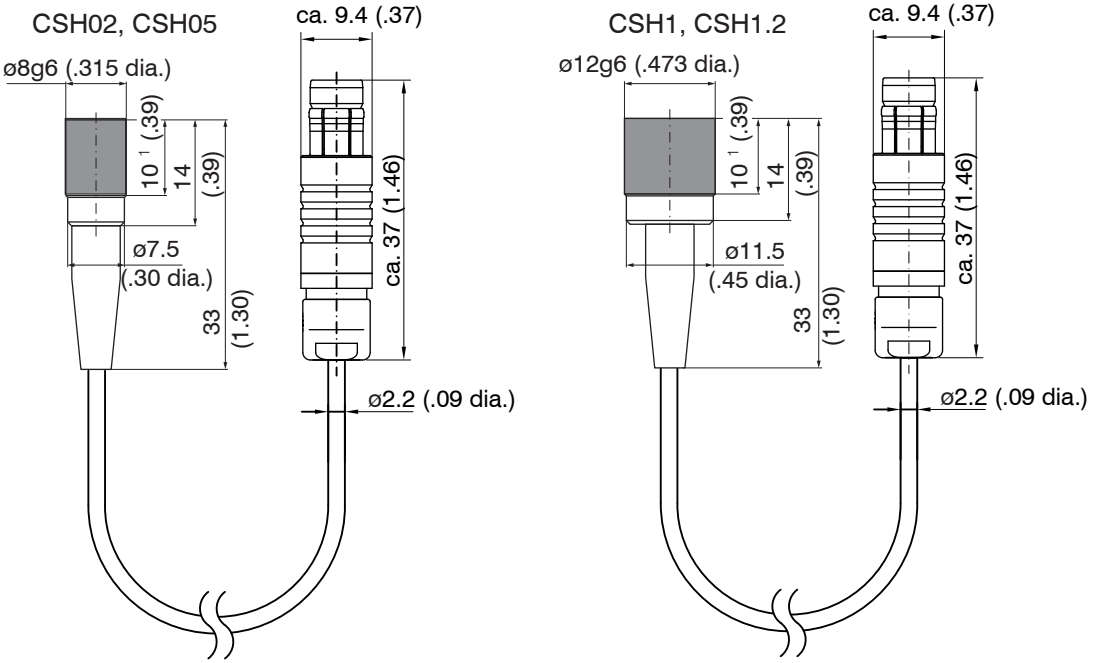



Sensor structures



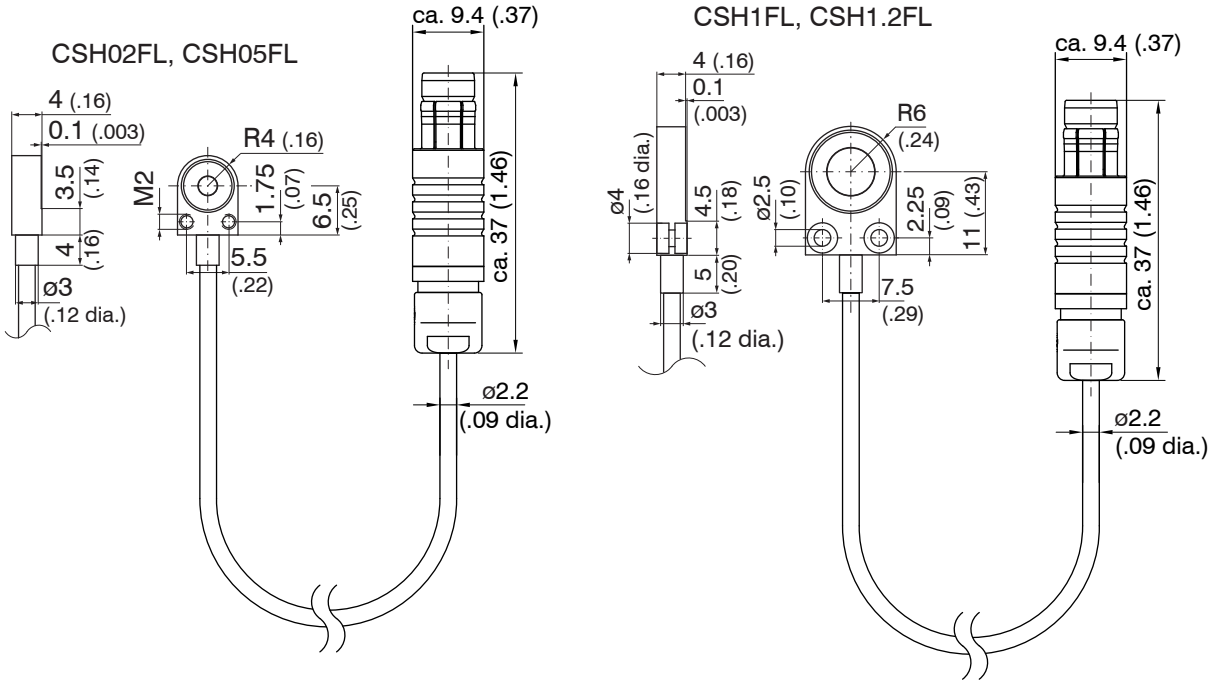

CSG0.50-CAm2.0 CSG1.00-CAm2.0

Dimensions in mm (inches), not to scale

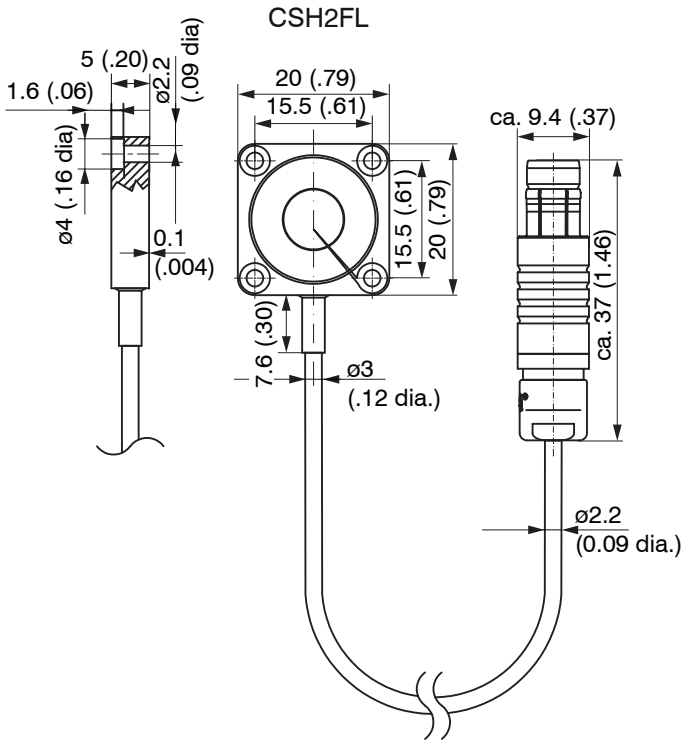



Dimensions in mm (inches), not to scale

1) Adjustment area for radial point respectively circumferential clamping



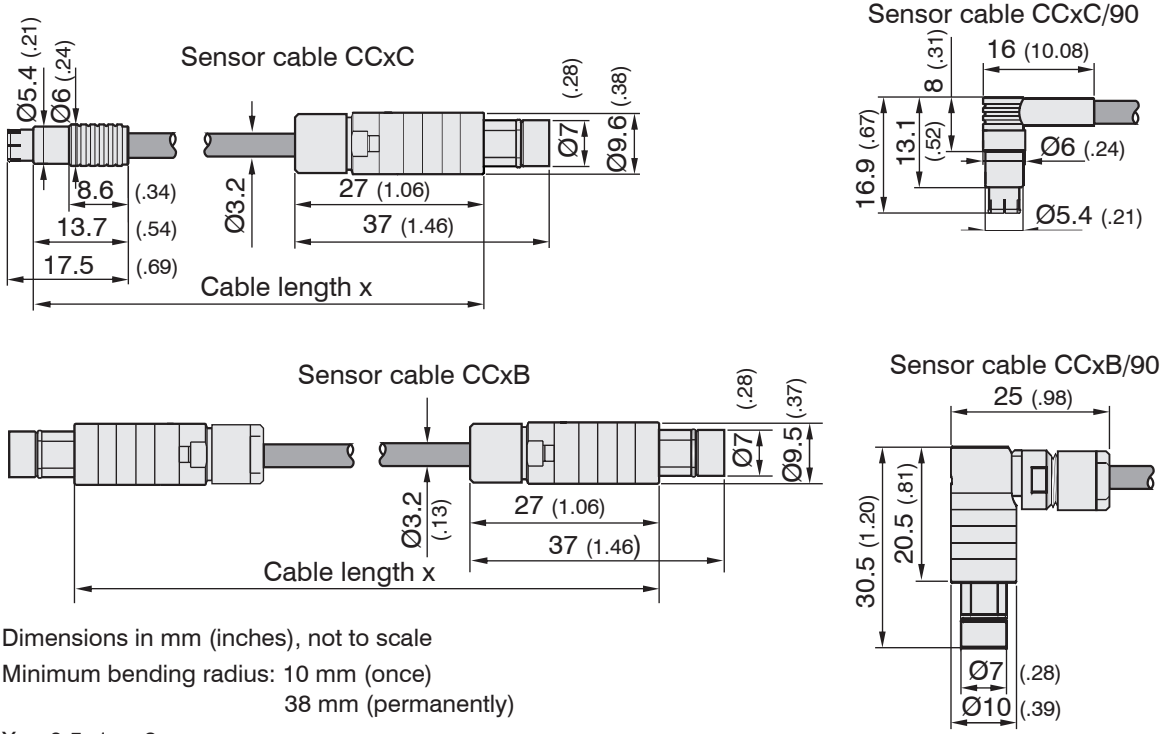

Dimensions in mm (inches), not to scale




Dimensions in mm (inches), not to scale

## 4.3 Sensor Cable

The sensor is connected to the controller by the sensor cable. The connection is made by simple plugging. The connector locks automatically. The tight fit can be checked by pulling the connector housing (cable bushing). The lock can be released and the connector can be opened by pulling the knurled housing sleeve of the cable bushing.



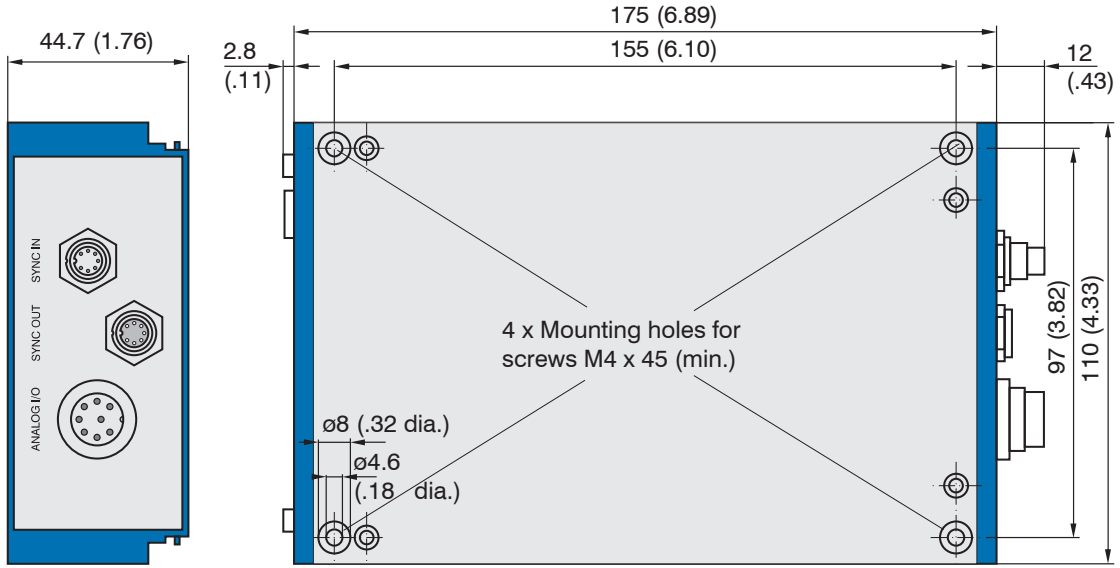

Dimensions in mm (inches), not to scale

Minimum bending radius: 10 mm (once)
38 mm (permanently)

X = 0.5, 1 or 2 m

| Model | 2 axial connectors | 1x axial+ 1x angled connector | Suitable for sensors |
|---|---|---|---|
| CCxC | • | | < 1 mm |
| CCxC/90 | | • | < 1 mm |
| CCxB | • | | ≥ 1 mm |
| CCxB/90 | | • | ≥ 1 mm |

## 4.4 Controller




Dimensions in mm (inches), not to scale

## 4.5 Ground Connection, Earthing

Make sure you have a sufficient grounding of the target, for example connect it with the sensor or the supply ground.

**Non-contact target earthing**

In several Applications, the target earthing is difficult or even impossible. Different to other systems, with capaNCDT systems is no target earthing necessary.

Figure 7 shows two synchronized capaNCDT sensors, measuring against a mill. Due to the unique synchronizing technique of Micro-Epsilon is in most cases a special target earthing not needed.

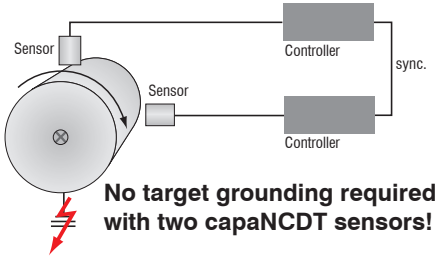



*Fig. 7 Position- and unbalance-measuring with two systems*

## 4.6 Power Supply, the Display/Output Device and Synchronization

The power supply and the signal output are located at the backside of the controller. A regarding plug for the cable is included in the standard scope of delivery for customized cable assembling.

Furthermore, several controller DT6350 can be synchronized with the ESC30.

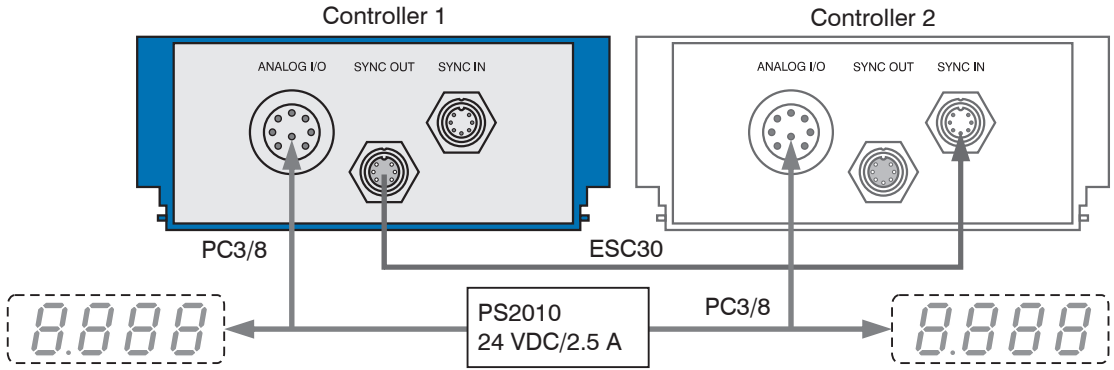



*Fig. 8 System assembly and synchronization with a second controller*

**Synchronization in multi-channel mode**

Several measuring systems capaNCDT6350 can simultaneously be used as multi-channel system. With the synchronization of the systems, a mutual influence to the sensors is avoided:

➪ Plug the synchronize cable ESC30 (accessory) into the female connector SYNC OUT at controller 1.

➪ Plug the second end of ESC30 into the male connector SYNC IN at controller 2.

- The oscillator of controller 2 switches automatically into sychronization, this means, depending on the oscillator of controller 1.
- An influence of poor earthed target is excepted.

➪ Where necessary, synchronize more measuring systems with the cable ESC30.

i Automatic synchronization. Every controller can be master.

## 4.7 Pin Assignment

| Pin | Assignment | Color PC 3/8 | |
|---|---|---|---|
| | | Inner cable | Outer cable |
| 1 | Supply ground | | white |
| 2 | NC | | brown |
| 3 | $U_{OFF}$ (Load min. 10 kOhm) | green | |
| 4 | NC | | yellow |
| 5 | Signal ground | | grey |
| 6 | +24 VDC | | green |
| 7 | Signal ground | blue | |
| 8 | $I_{OFF}$ (Load max. 500 Ohm) | red | |

PC3/8 [1] is a 3 m (9.84 ft) long, preassembled 8-wire power and output cable. It is supplied as an optional accessory.

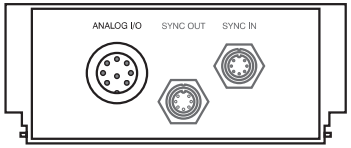
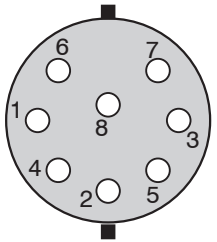



*Fig. 9 Power supply input at controller, 8-wire DIN-plug (DIN 45326)*




View on solder pin side,
8-pole DIN female cable connector

1) In addition the following should be noted when assembling the user-side connecting cable:
- Use a double screened cable!
- Outer screening mesh surrounds all cable wires.
- Inner screening mesh surrounds signal wires PIN 3, 7, 8.
- Inner screening mesh at pin 7
- Total screen via connector housing to housing ground
- Recommended conductor cross-section 0.14 mm²

The EMC regulations, see Chap. 1.3, are only satisfied if these basic conditions have been observed.

| Pin | Assignment |
|---|---|
| 1 | Sync Out |
| 2 | Digital ground |
| 3 | NC |
| 4 | Analog ground |
| 5 | NC |
| 6 | +24 VDC |
| 7 | Supply ground |

| Pin | Assignment |
|---|---|
| 1 | Sync Out |
| 2 | Digital ground |
| 3 | NC |
| 4 | Analog ground |
| 5 | NC |
| 6 | +24 VDC |
| 7 | Supply ground |

ESC30 is a 0.3 m (0.98 ft) long, preassembled synchronization cable. It is supplied as an optional accessory.

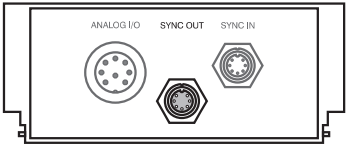



*Fig. 10 Output for synchronization, 7-pole female connector*

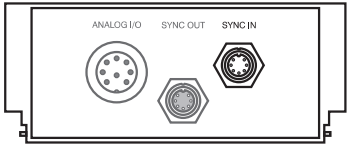



*Fig. 11 Input for synchronization, 7-pole female connector*

# 5. Operation

## 5.1 Starting Up

Connect the display/output devices through the signal output socket, see Chap. 4.6, see Chap. 4.7, before connecting the device to the power supply and switching on the power supply.

Allow the measuring system to warm up for about ten minutes before the first measurement or calibration.

## 5.2 Control and Display Elements

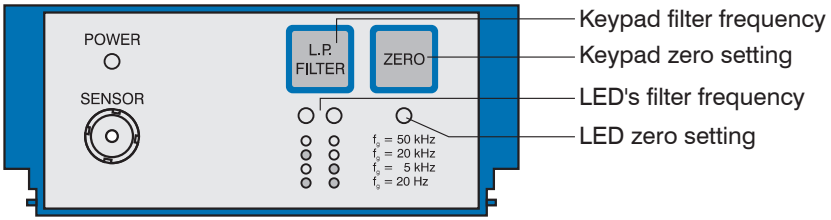



*Fig. 12 Control elements at the controller*

**CAUTION**

Disconnect the power supply before touching the sensor surface.
> Static discharge

> Danger of injury

| LED | | | Function |
|---|---|---|---|
| Filter frequency | ○ | ○ | 50 kHz (-3 dB) |
| | ☼ | ○ | 20 kHz |
| | ○ | ☼ | 5 kHz |
| | ☼ | ☼ | 20 Hz |
| Zero point | | ○ | Absolute measuring |
| | | ☼ | Active zero setting |

*Fig. 13 Meaning of the LED's on the controller*

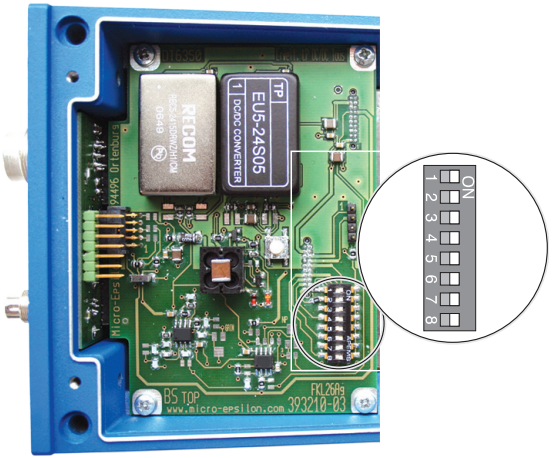



*Fig. 14 DIP switches in the controller*

The measuring system is calibrated for sensors and sensor cables prior to shipment. No user action is necessary.

Use the DIP switches to set the
- measuring range,
- sensor type and
- sensor cable length.

### 5.2.1 Bandwidth

Use the L.P. FILTER keypad, see Fig. 12, to reduce the output low pass frequency. Reducing the frequency increases the system resolution. The corresponding LED's show you the currently used bandwidth. Variants: 50 kHz (standard) / 20 kHz / 5 kHz / 20 Hz.

### 5.2.2 Zero Point

Use the ZERO keypad, see Fig. 12, to shift the zero point of the output signal. Pressing the ZERO keypad sets the output signal to zero and the corresponding zero LED at the front side of the controller flashes.

Reset the zero point setting:

➡ Press the ZERO keypad at least three seconds long.

### 5.2.3 Sensor Selection

The measuring system is calibrated for the used sensor prior to shipment. If another sensor with different measuring range is operated on the controller than the originally used sensor, the appropriate type of sensor has to be set on the controller.

➡ For it use the DIP switches 3 up to 6, see Fig. 14, see Fig. 15.

Sensors of the same type (measuring range) can be exchanged and/or renewed, without recalibration of the controller.

| Sensor | DIP 3 | DIP 4 | DIP 5 | DIP 6 |
|---|---|---|---|---|
| CS02 | 0 | 1 | 0 | 0 |
| CS05 | 1 | 1 | 0 | 0 |
| CS1,CS1HP | 0 | 0 | 1 | 0 |
| CS2 | 1 | 0 | 1 | 0 |
| CS3 | 0 | 1 | 1 | 0 |
| CSE2, CS5 | 1 | 1 | 1 | 0 |
| CS10 | 0 | 0 | 0 | 1 |
| CSH02-x, CSH02FL-x | 1 | 0 | 0 | 1 |
| CSH05-x, CSH05FL-x | 0 | 1 | 0 | 1 |
| CSH1-x, CSH1FL-x | 1 | 1 | 0 | 1 |
| CSH1.2-x, CSH1.2FL-x | 0 | 0 | 1 | 1 |

0 = OFF
1 = ON


*Fig. 15 Setting the sensor type*

### 5.2.4 Sensor Cable

The measuring system is calibrated for the used sensor cable prior to shipment. If another sensor cable with different length is operated on the controller than the originally used cable, the appropriate type of cable has to be set on the controller.

➡ For it use the DIP switches 7 and 8, see Fig. 14, see Fig. 16.

Sensor cables of the same length can be exchanged and/or renewed, without recalibration of the controller. Standard cable length is 1 meter, in the case of sensors CSHx 1.4 m .

| Sensor cable | Kabel length | DIP 7 | DIP 8 |
|---|---|---|---|
| CC0.5x | 0.5 m | 0 | 0 |
| CC1x | 1 m | 1 | 0 |
| CCm1.4<br>CSHx-CAm1.4<br>CSHxFL-CRm1.4 | 1.4 m | 1 | 0 |
| CC2x | 2 m | 0 | 1 |
| CCm2.8<br>CSHx-CAm2.8<br>CSHxFL-CRm2.8 | 2.8 m | 0 | 1 |

0 = OFF
1 = ON

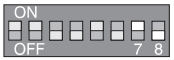



*Fig. 16 Setting the sensor cable type*

### 5.2.5 Extended Measuring Range

The controller enables a restriction of the measuring range on 50 % or an extension up to 200 %.

➡ For it use the DIP switches 1 and 2, see Fig. 14, see Fig. 17.

The specified technical data apply to the standard measuring range (100 %).

| Measuring range | DIP 1 | DIP 2 |
|---|---|---|
| 50 % | 0 | 1 |
| 100 % | 1 | 1 |
| 200 % | 1 | 0 |

0 = OFF
1 = ON

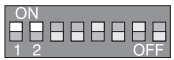



*Fig. 17 Setting the measuring range*

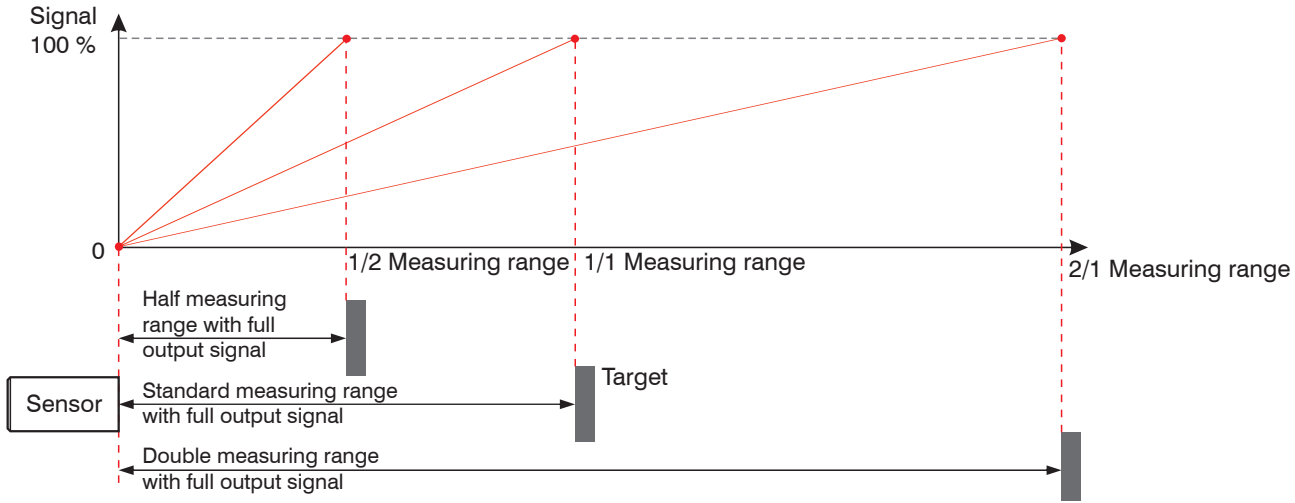



*Fig. 18 Scaling the measuring range and the output signal*

i Output voltage can achieve up to 10.5 VDC, if no sensor is connected or target out of measuring range.

## 5.3 Measuring

Preconditions:
- Metallic target
- Specific resistance of the target $<1\ k\Omega\,cm$

For metallic targets a linear characteristic is already available automatically on account of the measuring principle and sensor construction.

The measuring device is set to a output signal of 0 up to 10 Volts (optional 4 up to 20 mA) corresponding to the measuring range of each sensor model.

The electrical zero point can be set across the whole measuring range with the ZERO keypad, see Fig. 12. The start of the measuring range (= mechanical zero point) is on the front face of the sensor. Zero setting is used for relative measurements and does not enlarge the measuring range. At the end of the measuring range the maximum output signal is reduced through the offset value.

A tilted sensor or target results in a reduced measuring range and zero point shifting according to the tilting.

Curved target surfaces cause linearity reductions if the distance between the sensor and the target is small.

Also with small target surfaces losses in linearity and sensibility occur.

Extension of the measuring range:

The sensor measuring ranges can be extended considerably (by a factor of 2) with some loss in linearity and sensitivity, see Chap. 5.2.5.

# 6. Operation and Maintenance

Please take care of the following:

- Make sure that the sensor surface is always clean.
- Switch off the power supply before cleaning.
- Clean with a damp cloth; then rub the sensor surface dry.
- Disconnect the power supply before touching the sensor surface.

**⚠ CAUTION**

> Static discharge

> Danger of injury

In the event of a defect in the controller, the sensor or the sensor cable, the parts concerned must be sent back for repair or replacement. In the case of faults the cause of which is not clearly identifiable, the whole measuring system must be sent back for repair or replacement to

MICRO-EPSILON MESSTECHNIK GmbH & Co. KG
Königbacher Straße 15
94496 Ortenburg

## 7. Warranty

All components of the device have been checked and tested for perfect function in the factory. In the unlikely event that errors should occur despite our thorough quality control, this should be reported immediately to Micro-Epsilon.

The warranty period lasts 12 months following the day of shipment. Defective parts, except wear parts, will be repaired or replaced free of charge within this period if you return the device free of cost to Micro-Epsilon.

This warranty does not apply to damage resulting from abuse of the equipment and devices, from forceful handling or installation of the devices or from repair or modifications performed by third parties.

No other claims, except as warranted, are accepted.

Micro-Epsilon will specifically not be responsible for eventual consequential damage. The terms of the purchasing contract apply in full.

Micro-Epsilon always strives to supply the customers with the finest and most advanced equipment.

Development and refinement is therefore performed continuously and the right to design changes without prior notice is accordingly reserved.

For translations in other languages, the data and statements in the German language operation manual are to be taken as authoritative.

## 8. Decommissioning, Disposal

➡ Disconnect the cable for electrical power and output signal on the controller.

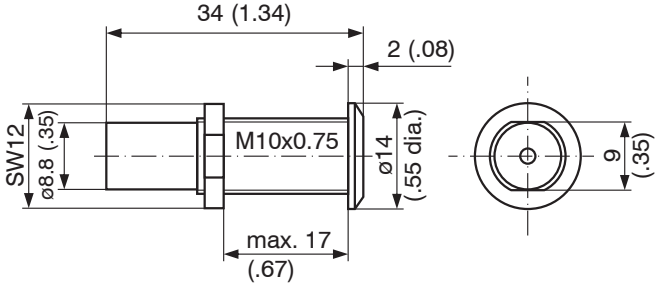
➡ Disconnect the cable between sensor and controller.

The capaNCDT6350 is produced according to the directive 2002/95/EC („RoHS“).

➡ Do the disposal according to the legal regulations (see directive 2002/96/EC).

# 9. Accessories, Service

| | |
|---|---|
| MC2.5 | Micrometer calibration fixture, range 0-2.5 mm / 0-0.1 inch, division 1 $\mu$m<br>for sensors CS02 ... CS2 |
| MC25D | Digital micrometer calibration fixture,<br>Range 0-25 mm / 0-1 inch,<br>adjustable offset (zero), for all sensors |
| PS2010 | Power supply, mounting on DIN-rail,<br>input 210 ... 240 VAC (110 ... 120 VAC), output +24 VDC/2.5 A<br>L/W/H 120 x 20 x 40 mm |
| PC3/8 | Power and output cable, 3 m (9.84 ft) length, 8-wire |
| CSP 301 | Digital signal processing unit with display for synchronous processing of two channels |
| ESC30 | Supply- / synchronization cable for multi-channel operation, 0.3 m long |
| SWH | Vacuum feed through |




Dimensions in mm (inches), not to scale

**Service**

Function and linearity check-out, inclusive 11-point-protocoll with grafic and post-calibration.

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