



# More Precision.

**capaNCDT 6228** // Capacitive measuring system for high temperature applications



# Capacitive measuring system for high temperature applications capaNCDT 6228

Ideal for extreme operating temperatures from  
-50 °C up to +800 °C

High temperature stability over the entire  
temperature range

Large measuring range up to 20 mm

Exceptionally high linearity within the  
temperature range

Interference-resistant high-temperature coaxial  
cable with drain wire



## Highest precision in extreme temperatures

The capaNCDT CSE high temperature sensors are used for measurements at ambient temperatures from -50 °C up to +800 °C. Thanks to the high temperature stability and the exceptionally high linearity within this temperature range, the measuring system delivers highly precise results even under challenging environmental conditions. The available sensors cover measuring ranges from 1 mm up to 20 mm. The integrated coaxial cable for high temperatures is interference-resistant and has a drain wire. The cable minimizes signal interference caused by external electric or magnetic fields.

The capaNCDT CSE high temperature sensors can be operated with the high-performance capaNCDT 6228 controllers.

Unlike conventional non-contact measurement techniques, capacitive displacement sensors from Micro-Epsilon are characterized by highest measurement accuracy. As thermally induced conductivity changes of the measuring object have no influence on measurements, the measurement values remain stable even with fluctuating temperatures.



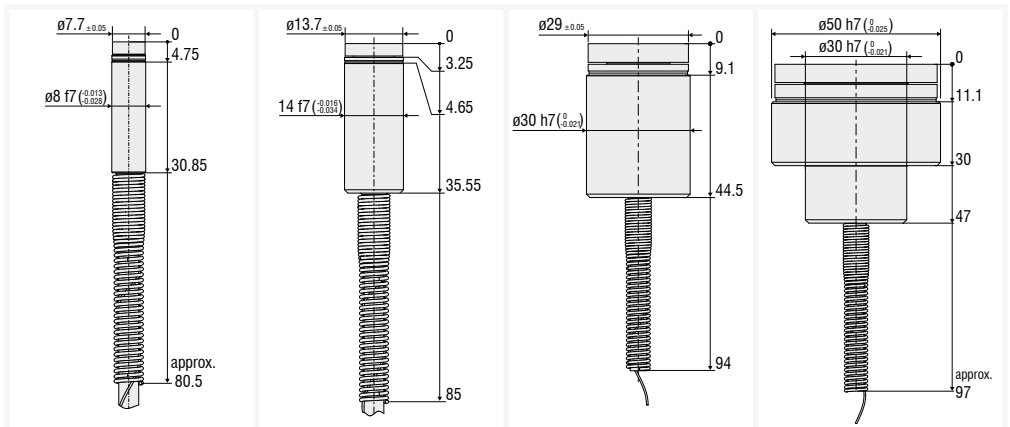
Level monitoring of molten glass

In the production of 6 mm thick flat glass, the molten glass is continuously fed in a long bath of liquid tin. To achieve other thicknesses, the glass is drawn or compressed by surface rollers before reaching the cooler end of the bath in a solidified state with a temperature of 600 °C. High-temperature sensors from Micro-Epsilon measure for inline thickness correction on the surface of the glass and on the surface of the tin bath. The difference between the two measured values gives the thickness of the flat glass.



Thickness measurement of brake discs

With the capaNCDT DTV, Micro-Epsilon has developed a product range that is specifically used for non-contact detection of the Disc Thickness Variation. The thickness of brake discs is measured in the test bench, in road tests or in car repair shops. The measurement takes place during the braking process where the brake disc can reach temperatures of up to 700 °C. Two high-temperature sensors measure the thickness of brake discs from two sides.



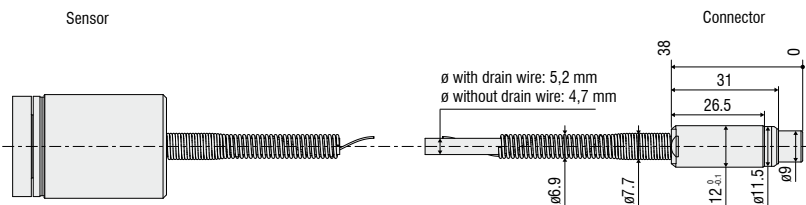
Model		CSE-1/HT/CA-1,0	CSE-2/HT/CA-1,0	CSE-5/HT/CA-1,0	CSE-10/HT/CA-1,0
Measuring range	Reduced	0.5 mm	1 mm	2.5 mm	5 mm
	Nominal	1 mm	2 mm	5 mm	10 mm
	Extended	2 mm	4 mm	10 mm	20 mm
Resolution <sup>1)</sup>	Static (20 Hz)	10 nm	20 nm	50 nm	100 nm
	Dynamic (1 kHz)	80 nm	160 nm	400 nm	800 nm
Linearity		< ±0.5 μm	< ±1.0 μm	< ±3.5 μm	< ±7 μm
Sensitivity		< ±2.0 μm	< ±4.0 μm	< ±10 μm	< ±20 μm
Temperature stability <sup>2)</sup>		-0.2 μm / K	-0.4 μm / K	-1.0 μm / K	-2.0 μm / K
Min. target size (flat)		ø 8 mm	ø 14 mm	ø 30 mm	ø 50 mm
Connector		integrated cable with socket (type FB0); standard length 1.0 m <sup>4)</sup>			
Mounting	Clamping	ø 8 mm	ø 14 mm	ø 30 mm	ø 30 mm / 50 mm
	Storage	-50 ... +200 °C			
Temperature range	Operation	Sensor with cable -50 ... +800 °C / connector -50 ... +200 °C			
	Humidity <sup>3)</sup>	0 ... 95 % r.H.			
Shock (DIN EN 60068-2-27)		20 g / 5 ms in XY axis, 1000 shocks each			
Vibration (DIN EN 60068-2-6)		10 g / 10 ... 2000 Hz in XY axis, 20 cycles each			
Protection class (DIN EN 60529)		IP40			
Material		Inconel Alloy 625			
Weight		approx. 62 g (incl. cable)	approx. 83 g (incl. cable)	approx. 225 g (incl. cable)	approx. 470 g (incl. cable)
Distance from the sensor surface for the recommended mounting option		4.75 mm	4.65 mm	9.10 mm	30 mm
Compatibility		compatible with the capaNCdT 6228 controller from Micro-Epsilon			

<sup>1)</sup> RMS noise referred to mid of measuring range and to nominal measuring range with standard cable CCm (1.4 m)

<sup>2)</sup> With recommended mounting option

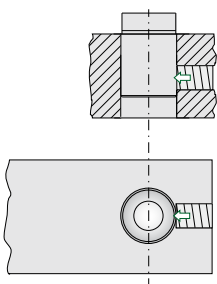
<sup>3)</sup> Non-condensing

<sup>4)</sup> Separate sensor cable with connector type B necessary for connection to controller. See accessories

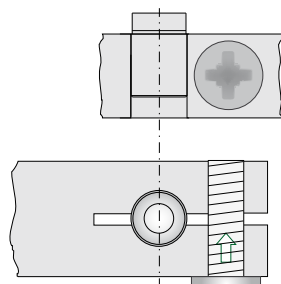


All dimensions in mm, not to scale

#### Mounting with grub screw (plastic)



#### Mounting with collet



#### Important!

All Micro-Epsilon sensors are short circuit proof. Unlike other systems, the preamplifier is not damaged when the sensor face is shorted to the conductive target.

# Modular multi-channel system capaNCDT 6228

Modular, expandable up to 4 channels

Ethernet / EtherCAT interface

Simple configuration via web interface

Resolution: up to 0.01 % FSO

Frequency response: up to 1 kHz

Measuring rate: 4x 3.906 kSa/s

Trigger feature

Synchronizable



## System design

The new capaNCDT 6228 is a modular measuring system that offers excellent performance at a very attractive price. Its modular design enables the system to be expanded at any time by up to four measuring channels. The measuring system includes a control unit and a demodulator for each sensor. The Ethernet interface integrated in the controller enables fast, easy configuration via web browser. The DL6228 demodulator provides high resolution measurements. For fast measurements, the controller achieves up to 1 kHz.

The compact controller can be used as a table-top device, wall-mounted unit or DIN rail-mounted via an adapter. In addition to the high temperature sensors, the capaNCDT 6228 is also compatible with all other sensor models from Micro-Epsilon. If more than 4 measuring channels are required, synchronization of several DT6238 controllers is possible.



### Web interface

The web interface for controller configuration opens via Ethernet. Up to 4 channels can be visualized and linked arithmetically.

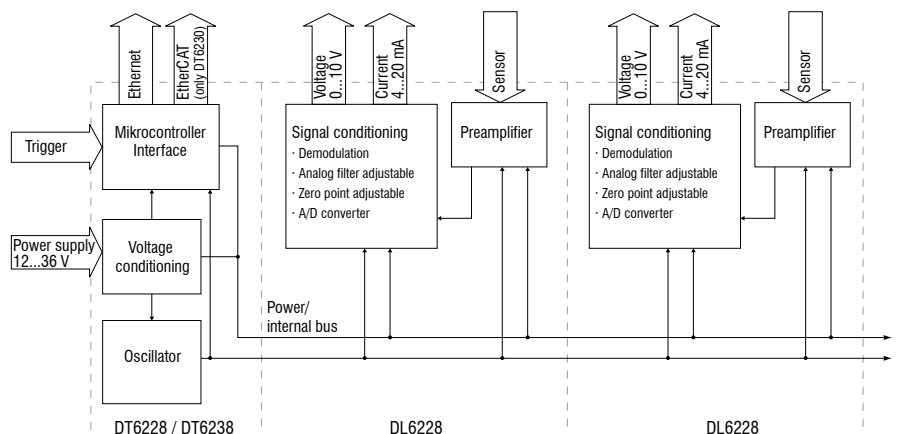
## A measuring system consists of:

- DT6228 or DT6238 controller
- One DL6228 demodulator module per sensor with integrated preamplifier
- Sensor
- Sensor cable
- Power supply cable
- Ethernet cable
- Signal output cable

## Accessories:

- Signal output cable
- Power supply cable
- DIN rail brackets
- Mounting plates for wall mounting

## Block diagram



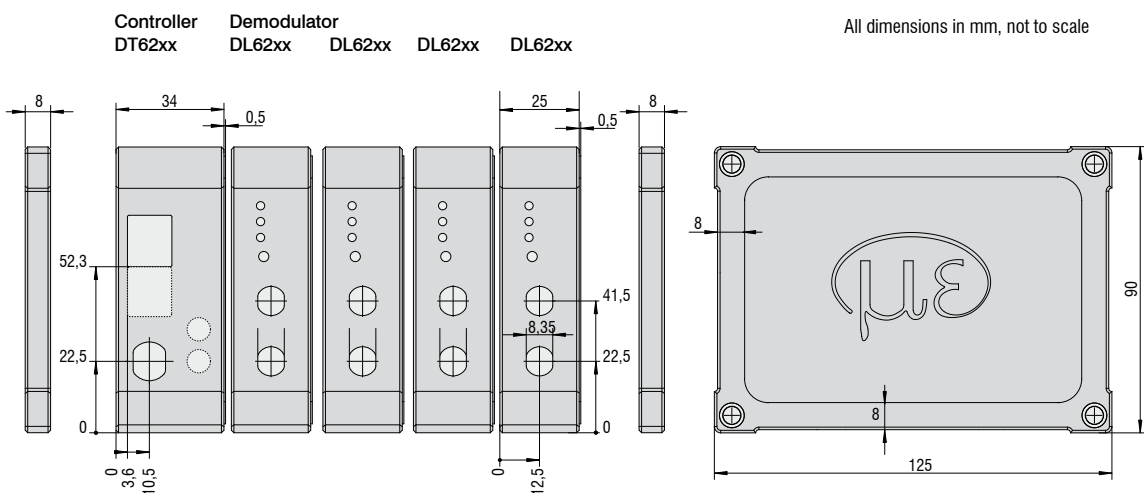
Model	DT6228		DT6238
<b>with demodulator</b>	<b>DL6228</b>		
Resolution <sup>1)</sup>	Static (20 Hz)	0.004% FSO	
	Dynamic (1 kHz)	0.01% FSO	
Frequency response (-3dB)	1 kHz, switchable to 20 Hz		
Measuring rate	max. 3.906 kSa/s		
Linearity <sup>2)</sup>	±0.05 % FSO		
Temperature stability	< 200 ppm FSO/K		
Sensitivity	< ±0.1 % FSO		
Long-term stability	< ±0.02% FSO/month		
Synchronization	yes (only internal)	yes	
Supply voltage	12 ... 36 VDC		15 ... 36 VDC
Power consumption	3.1 W (24 VDC) + 1.8 / demodulator		3.8 W (24 VDC) + 1.8 / demodulator
Signal input	TTL (5V)		
Digital interface	Ethernet		Ethernet/EtherCAT
Analog output	0 ... 10 V / 4 ... 20 mA		
Connector	Sensor: pluggable cable via triaxial socket; Supply/trigger: 4-pin connector; Sync: 5-pin connector; Signal: analog via 4-pin connector, digital via RJ45 connector (see accessories for suitable connection cables)		
Mounting	Table-top device or DIN rail		
Temperature range	Storage	-10 ... +75 °C	
	Operation	+10 ... +60 °C	
Shock (DIN EN 60068-2-27)	15 g / 6 ms in 3 axes, two directions each, 1000 shocks each		
Vibration (DIN EN 60068-2-6)	0.75 mm / 10 ... 500 Hz in 3 axes, 2 directions and 10 cycles each 2 g / 10 ... 500 Hz in 3 axes, 2 directions and 10 cycles each		
Protection class (DIN EN 60529)	IP40		
Weight	approx. 720 g + 185 g / demodulator		approx. 720 g + 210 g / demodulator
Compatibility	compatible with all capaNCDT sensors		
No. of measurement channels	max. 4		

FSO = Full Scale Output

<sup>1)</sup> RMS noise relates to mid of measuring range

<sup>2)</sup> Applies only to controller. The overall linearity of the measuring channel is given by adding up the values for the controller and the sensor.

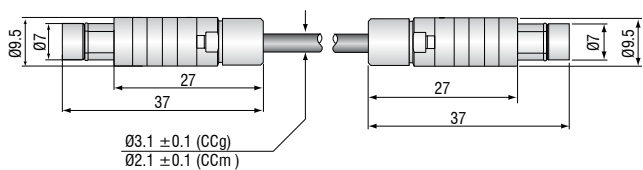
## Dimensions



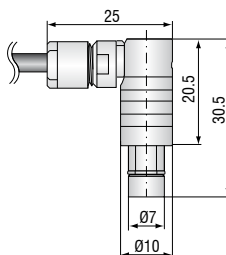
# Accessories

	Cable with connector type B			
Design	2 x straight connectors		1 x straight / 1 x 90° connector	
Type	CCm1,4B	CCg2,0B	CCm1,4B/90	CCg2,0B/90
1.4 m	•		•	
2.0 m		•		•

Sensor cable with connector type B



Connector type B/90

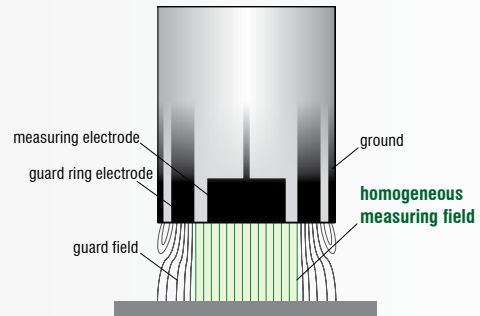


Accessories	capaNCDT	62x8
<b>MC2.5</b> Micrometer for sensor calibration, calibration range 0 - 2.5 mm, resolution 0.1 $\mu\text{m}$ , suitable for sensors CS005 to CS2		•
<b>MC25D</b> Digital micrometer for sensor calibration, range 0 - 25 mm, adjustable zero point, suitable for all sensors		•
<b>PC6200-3/4</b> Power-/trigger cable, 4 pin, 3 m		•
<b>SCAC3/4</b> Signal output cable, (necessary for multi-channel applications), 4 pin, 3 m		•
<b>SC6000-1,0</b> Synchronization cable, 5 pin, 1 m		•
<b>PS2020</b> Power supply for DIN rail mounting; input 230VAC (115VAC); output 24VDC / 2.5 A; L/W/H 120x120x40 mm		•

### Triaxial sensor design with active sensor cable

The completely triaxial sensor design is unique for capaNCDT sensors. The guard ring electrode, the grounding and the measurement electrode are located on the front edge of the sensor. The guard ring electrode ensures a homogeneous measuring field which is why precise measurements can be achieved with the highest signal stability. The sensor cable, which is extremely low noise, enables an impermeable electrical shield. Due to the triaxial design, the sensors are insensitive to magnetic interference fields and can be mounted flush in conductive materials. The sensors can also come into contact with each other in the case of multi-channel measurements.

capaNCDT sensor with triaxial design



### Web interface

The web interface for controller configuration opens via Ethernet. Up to 8 channels can be visualized and linked arithmetically.



## Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, position and dimension



Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for quality assurance



Optical micrometers, fiber optics, measuring and test amplifiers



Color recognition sensors, LED Analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection