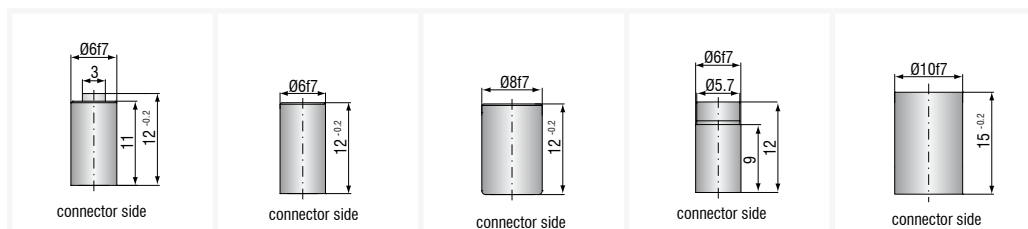




# More Precision

capa**N**CDT // Capacitive displacement sensors and systems





| Sensor type                 |                    | CS005                      | CS02              | CS05              | CSE05             | CS08              |
|-----------------------------|--------------------|----------------------------|-------------------|-------------------|-------------------|-------------------|
| Article No.                 |                    | 6610083                    | 6610051           | 6610053           | 6610102           | 6610080           |
| Measuring range             | reduced            | 0.025 mm                   | 0.1 mm            | 0.25 mm           | 0.25 mm           | 0.4 mm            |
|                             | nominal            | 0.05 mm                    | 0.2 mm            | 0.5 mm            | 0.5 mm            | 0.8 mm            |
|                             | extended           | 0.1 mm                     | 0.4 mm            | 1 mm              | 1 mm              | 1.6 mm            |
| Linearity <sup>1)</sup>     |                    | ≤ ±0.15 μm                 | ≤ ±0.4 μm         | ≤ ±0.15 μm        | ≤ ±0.5 μm         | ≤ ±0.4 μm         |
|                             |                    | ≤ ±0.3 % FSO               | ≤ ±0.2 % FSO      | ≤ ±0.03 % FSO     | ≤ ±0.1 % FSO      | ≤ ±0.2 % FSO      |
| Resolution <sup>1) 2)</sup> | static 2 Hz        | 0.0375 nm                  | 0.15 nm           | 0.375 nm          | 0.375 nm          | 0.6 nm            |
|                             | dynamic 8.5 kHz    | 1 nm                       | 4 nm              | 10 nm             | 10 nm             | 16 nm             |
| Temperature stability       | Zero <sup>5)</sup> | -60 nm/K                   | -60 nm/K          | -60 nm/K          | -60 nm/K          | -60 nm/K          |
|                             | Sensitivity        | -0.5 nm/K                  | -2 nm/K           | -5 nm/K           | -5 nm/K           | -8 nm/K           |
| Temperature range           | Operation          | -50 ... +200 °C            | -50 ... +200 °C   | -50 ... +200 °C   | -50 ... +200 °C   | -50 ... +200 °C   |
|                             | Storage            | -50 ... +200 °C            | -50 ... +200 °C   | -50 ... +200 °C   | -50 ... +200 °C   | -50 ... +200 °C   |
| Humidity <sup>3)</sup>      |                    | 0 % ... 95 % r.H.          | 0 % ... 95 % r.H. | 0 % ... 95 % r.H. | 0 % ... 95 % r.H. | 0 % ... 95 % r.H. |
| Dimensions                  |                    | Ø6 × 12 mm                 | Ø6 × 12 mm        | Ø8 × 12 mm        | Ø6 × 12 mm        | Ø10 × 15 mm       |
| Active measuring area       |                    | Ø1.3 mm                    | Ø2.3 mm           | Ø3.9 mm           | Ø3.9 mm           | Ø4.9 mm           |
| Guard ring width            |                    | 0.8 mm                     | 1 mm              | 1.4 mm            | 0.8 mm            | 1.6 mm            |
| Minimum target diameter     |                    | Ø3 mm                      | Ø5 mm             | Ø7 mm             | Ø6 mm             | Ø9 mm             |
| Weight                      |                    | 2 g                        | 2 g               | 4 g               | 2 g               | 7 g               |
| Material                    | Housing            | NiFe <sup>4)</sup> (magn.) | NiFe (magn.)      | NiFe (magn.)      | NiFe (magn.)      | NiFe (magn.)      |
| Connection                  |                    | type C                     | type C            | type C            | type C            | type C            |
| Mounting                    |                    | clamping                   | clamping          | clamping          | clamping          | clamping          |

FSO = Full Scale Output

<sup>1)</sup> Valid with reference controller, relates to standard measuring range

<sup>2)</sup> RMS value of the signal noise

<sup>3)</sup> Non condensing

<sup>4)</sup> Titanium version available

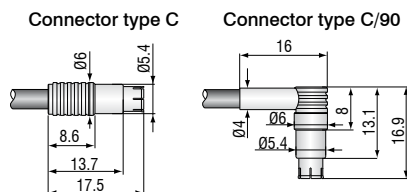
<sup>5)</sup> Sensor mounted in the mid of clamping area

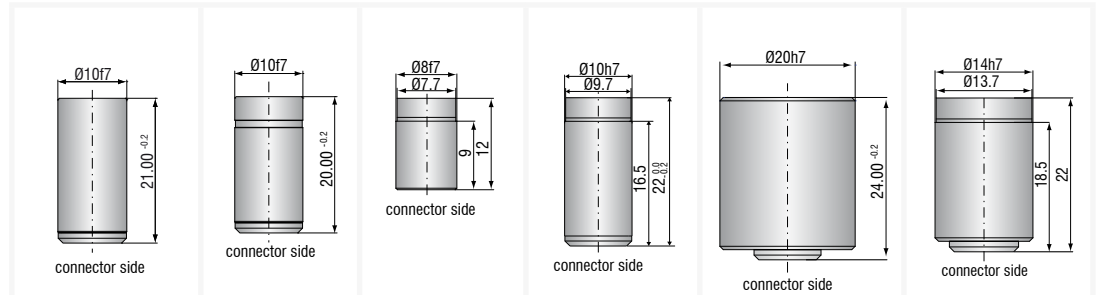
## Sensors

The sensors are designed as guard ring capacitors. They are connected to the signal conditioning electronics with a triaxial cable. The sensor cable is connected to the sensor using a high quality connector. All standard sensors can be used within a maximum deviation of 0.3 % without recalibration. Individually matched special sensors are produced on request.

## Measuring range expansion/reduction

The capaNCDT controller can optionally be configured so that the standard measuring ranges of the sensors are reduced by half or expanded by the factor of 2. The reduction increases the accuracy while the measuring range expansion reduces the accuracy.





| Sensor type                 |                    | CS1                                   | CS1HP                                 | CSE1                                 | CSE1,25                               | CS2                                   | CSE2                                  |
|-----------------------------|--------------------|---------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Article No.                 |                    | 6610054                               | 6610074                               | 6610103                              | 6610161                               | 6610052                               | 6610104                               |
| Measuring range             | reduced            | 0.5 mm                                | 0.5 mm                                | 0.5 mm                               | 0.625 mm                              | 1 mm                                  | 1 mm                                  |
|                             | nominal            | 1 mm                                  | 1 mm                                  | 1 mm                                 | 1.25 mm                               | 2 mm                                  | 2 mm                                  |
|                             | extended           | 2 mm                                  | 2 mm                                  | 2 mm                                 | 2.5 mm                                | 4 mm                                  | 4 mm                                  |
| Linearity <sup>1)</sup>     |                    | $\leq \pm 1.5 \mu\text{m}$            | $\leq \pm 1.5 \mu\text{m}$            | $\leq \pm 1 \mu\text{m}$             | $\leq \pm 1.25 \mu\text{m}$           | $\leq \pm 1 \mu\text{m}$              | $\leq \pm 2 \mu\text{m}$              |
|                             |                    | $\leq \pm 0.15 \% \text{ FSO}$        | $\leq \pm 0.15 \% \text{ FSO}$        | $\leq \pm 0.1 \% \text{ FSO}$        | $\leq \pm 0.1 \% \text{ FSO}$         | $\leq \pm 0.05 \% \text{ FSO}$        | $\leq \pm 0.1 \% \text{ FSO}$         |
| Resolution <sup>1) 2)</sup> | static 2 Hz        | 0.75 nm                               | 0.75 nm                               | 0.75 nm                              | 0.9 nm                                | 1.5 nm                                | 1.5 nm                                |
|                             | dynamic 8.5 kHz    | 20 nm                                 | 20 nm                                 | 20 nm                                | 25 nm                                 | 40 nm                                 | 40 nm                                 |
| Temperature stability       | Zero <sup>5)</sup> | -170 nm/K                             | -60 nm/K                              | -60 nm/K                             | -65 nm/K                              | -170 nm/K                             | -170 nm/K                             |
|                             | Sensitivity        | -32 nm/K                              | -10 nm/K                              | -10 nm/K                             | -50 nm/K                              | -64 nm/K                              | -64 nm/K                              |
| Temperature range           | Operation          | -50 ... +200 °C                       | -50 ... +200 °C                       | -50 ... +200 °C                      | -50 ... +200 °C                       | -50 ... +200 °C                       | -50 ... +200 °C                       |
|                             | Storage            | -50 ... +200 °C                       | -50 ... +200 °C                       | -50 ... +200 °C                      | -50 ... +200 °C                       | -50 ... +200 °C                       | -50 ... +200 °C                       |
| Humidity <sup>3)</sup>      |                    | 0 % ... 95 % r.H.                     | 0 % ... 95 % r.H.                     | 0 % ... 95 % r.H.                    | 0 % ... 95 % r.H.                     | 0 % ... 95 % r.H.                     | 0 % ... 95 % r.H.                     |
| Dimensions                  |                    | $\varnothing 10 \times 21 \text{ mm}$ | $\varnothing 10 \times 20 \text{ mm}$ | $\varnothing 8 \times 12 \text{ mm}$ | $\varnothing 10 \times 22 \text{ mm}$ | $\varnothing 20 \times 24 \text{ mm}$ | $\varnothing 14 \times 22 \text{ mm}$ |
| Active measuring area       |                    | $\varnothing 5.7 \text{ mm}$          | $\varnothing 5.7 \text{ mm}$          | $\varnothing 5.7 \text{ mm}$         | $\varnothing 6.5 \text{ mm}$          | $\varnothing 7.9 \text{ mm}$          | $\varnothing 8.0 \text{ mm}$          |
| Guard ring width            |                    | 1.5 mm                                | 1.5 mm                                | 0.9 mm                               | 1.6 mm                                | 4.4 mm                                | 2.7 mm                                |
| Minimum target diameter     |                    | $\varnothing 9 \text{ mm}$            | $\varnothing 9 \text{ mm}$            | $\varnothing 8 \text{ mm}$           | $\varnothing 10 \text{ mm}$           | $\varnothing 17 \text{ mm}$           | $\varnothing 14 \text{ mm}$           |
| Weight                      |                    | 8 g                                   | 8 g                                   | 3.5 g                                | 8.2 g                                 | 50 g                                  | 20 g                                  |
| Material                    | Housing            | 1.4404 <sup>4)</sup> (non-magn.)      | NiFe (magn.)                          | NiFe (magn.)                         | 1.4404 (non-magn.)                    | 1.4404 <sup>4)</sup> (non-magn.)      | 1.4404 (non-magn.)                    |
| Connection                  |                    | type B                                | type B                                | type C                               | type B                                | type B                                | type B                                |
| Mounting                    |                    | clamping                              | clamping                              | clamping                             | clamping                              | clamping                              | clamping                              |

FSO = Full Scale Output

<sup>1)</sup> Valid with reference controller, relates to standard measuring range

<sup>2)</sup> RMS value of the signal noise

<sup>3)</sup> Non condensing

<sup>4)</sup> Titanium version available

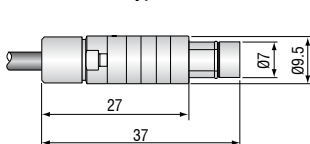
<sup>5)</sup> Sensor mounted in the mid of clamping area

### Mounting cylindrical sensors

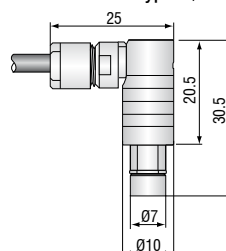
All sensors can be installed as both freestanding and flush units.

The sensors can be clamped or fastened using a collet.

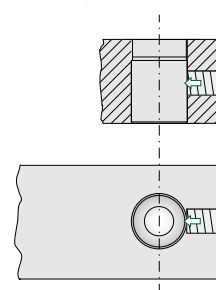
Connector type B



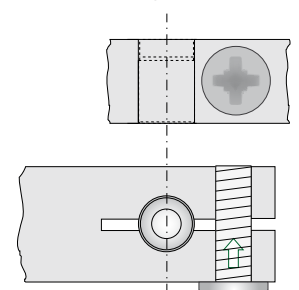
Connector type B/90

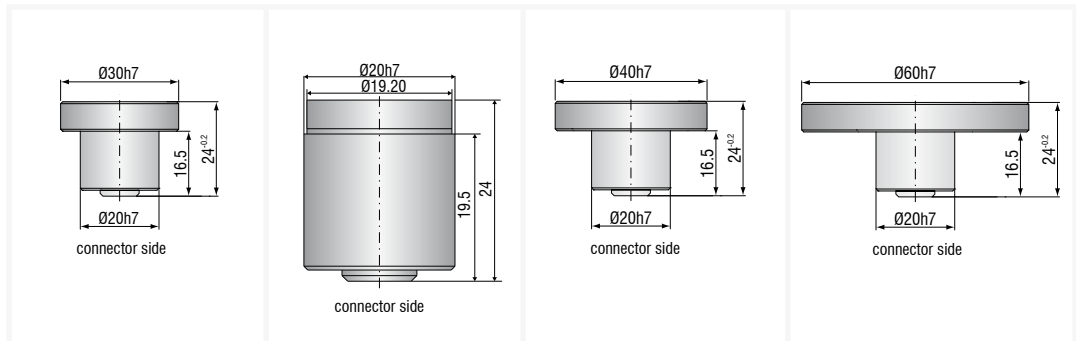


Mounting with set screw (plastic)



Mounting with collet





| Sensor type                 |                    | CS3                            | CSE3                          | CS5                              | CS10                             |
|-----------------------------|--------------------|--------------------------------|-------------------------------|----------------------------------|----------------------------------|
| Article No.                 |                    | 6610055                        | 6610170                       | 6610056                          | 6610057                          |
| Measuring range             | reduced            | 1.5 mm                         | 1.5 mm                        | 2.5 mm                           | 5 mm                             |
|                             | nominal            | 3 mm                           | 3 mm                          | 5 mm                             | 10 mm                            |
|                             | extended           | 6 mm                           | 6 mm                          | 10 mm                            | 20 mm                            |
| Linearity <sup>1)</sup>     |                    | $\leq \pm 0.9 \mu\text{m}$     | $\leq \pm 3 \mu\text{m}$      | $\leq \pm 2.5 \mu\text{m}$       | $\leq \pm 15 \mu\text{m}$        |
|                             |                    | $\leq \pm 0.03 \% \text{ FSO}$ | $\leq \pm 0.1 \% \text{ FSO}$ | $\leq \pm 0.05 \% \text{ FSO}$   | $\leq \pm 0.15 \% \text{ FSO}$   |
| Resolution <sup>1) 2)</sup> | static 2 Hz        | 2.25 nm                        | 2.25 nm                       | 3.75 nm                          | 7.5 nm                           |
|                             | dynamic 8.5 kHz    | 60 nm                          | 60 nm                         | 100 nm                           | 200 nm                           |
| Temperature stability       | Zero <sup>5)</sup> | -170 nm/K                      | -95 nm/K                      | -170 nm/K                        | -170 nm/K                        |
|                             | Sensitivity        | -96 nm/K                       | -85 nm/K                      | -160 nm/K                        | -320 nm/K                        |
| Temperature range           | Operation          | -50 ... +200 °C                | -50 ... +200 °C               | -50 ... +200 °C                  | -50 ... +200 °C                  |
|                             | Storage            | -50 ... +200 °C                | -50 ... +200 °C               | -50 ... +200 °C                  | -50 ... +200 °C                  |
| Humidity <sup>3)</sup>      |                    | 0 % ... 95 % r.H.              | 0 % ... 95 % r.H.             | 0 % ... 95 % r.H.                | 0 % ... 95 % r.H.                |
| Dimensions                  |                    | Ø30 × 24 mm                    | Ø20 × 24 mm                   | Ø40 × 24 mm                      | Ø60 × 24 mm                      |
| Active measuring area       |                    | Ø9.8 mm                        | Ø10 mm                        | Ø12.6 mm                         | Ø17.8 mm                         |
| Guard ring width            |                    | 8 mm                           | 4.6 mm                        | 11.6 mm                          | 19 mm                            |
| Minimum target diameter     |                    | Ø27 mm                         | Ø20 mm                        | Ø37 mm                           | Ø57 mm                           |
| Weight                      |                    | 70 g                           | 50 g                          | 95 g                             | 180 g                            |
| Material                    | Housing            | 1.4404 (non-magn.)             | 1.4404 (non-magn.)            | 1.4404 <sup>4)</sup> (non-magn.) | 1.4404 <sup>4)</sup> (non-magn.) |
| Connection                  |                    | type B                         | type B                        | type B                           | type B                           |
| Mounting                    |                    | clamping                       | clamping                      | clamping                         | clamping                         |

FSO = Full Scale Output

<sup>1)</sup> Valid with reference controller, relates to standard measuring range

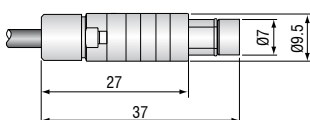
<sup>2)</sup> RMS value of the signal noise

<sup>3)</sup> Non condensing

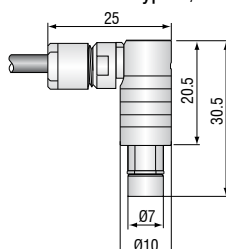
<sup>4)</sup> Titanium version available

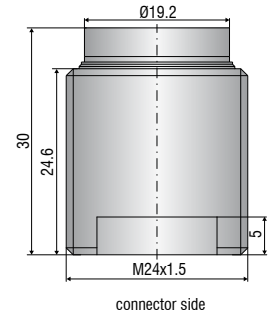
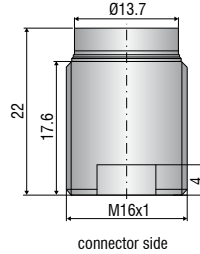
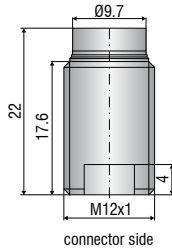
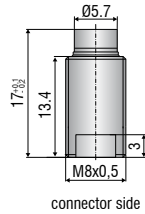
<sup>5)</sup> Sensor mounted in the mid of clamping area

Connector type B



Connector type B/90





| Sensor type  |                    | CSE05/M8                      | CSE1,25/M12                   | CSE2/M16                      | CSE3/M24                      |
|--|--------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Article No.  |                    | 6610172                       | 6610160                       | 6610167                       | 6610171                       |
| Measuring range  | reduced            | 0.25 mm                       | 0.625 mm                      | 1 mm                          | 1.5 mm                        |
|  | nominal            | 0.5 mm                        | 1.25 mm                       | 2 mm                          | 3 mm                          |
|  | extended           | 1 mm                          | 2.5 mm                        | 4 mm                          | 6 mm                          |
| Linearity <sup>1)</sup>  |                    | $\leq \pm 0.5 \mu\text{m}$    | $\leq \pm 1.25 \mu\text{m}$   | $\leq \pm 2 \mu\text{m}$      | $\leq \pm 3 \mu\text{m}$      |
|  |                    | $\leq \pm 0.1 \% \text{ FSO}$ | $\leq \pm 0.1 \% \text{ FSO}$ | $\leq \pm 0.1 \% \text{ FSO}$ | $\leq \pm 0.1 \% \text{ FSO}$ |
| Resolution <sup>1) 2)</sup>  | static, 2 Hz       | approx. 0.375 nm              | approx. 0.95 nm               | approx. 1.5 nm                | approx. 2.25 nm               |
|  | dynamic, 8.5 kHz   | approx. 10 nm                 | approx. 25 nm                 | approx. 40 nm                 | approx. 60 nm                 |
| Temperature stability <sup>3)</sup>                                  | Zero <sup>4)</sup> | -10 nm/K                      | -65 nm/K                      | -65 nm/K                      | -75 nm/K                      |
|  | Sensitivity        | -5 nm/K                       | -50 nm/K                      | -80 nm/K                      | -85 nm/K                      |
| Temperature range  | Operation          | -50 ... +200 °C               | -50 ... +200 °C               | -50 ... +200 °C               | -50 ... +200 °C               |
|  | Storage            | -50 ... +200 °C               | -50 ... +200 °C               | -50 ... +200 °C               | -50 ... +200 °C               |
| Humidity <sup>5)</sup>   |                    | 0 ... 95 % r.H.               | 0 ... 95 % r.H.               | 0 ... 95 % r.H.               | 0 ... 95 % r.H.               |
| Dimensions   |                    | Ø8 x 17 mm                    | Ø12 x 22 mm                   | Ø16 x 22 mm                   | Ø24 x 30 mm                   |
| Active measuring area  |                    | Ø 3.9 mm                      | Ø 6.3 mm                      | Ø 8.0 mm                      | Ø 9.8 mm                      |
| Guard ring width   |                    | 0.8 mm                        | 1.6 mm                        | 2.7 mm                        | 4.6 mm                        |
| Minimum target diameter  |                    | Ø6 mm                         | Ø10 mm                        | Ø14 mm                        | Ø20 mm                        |
| Weight   |                    | 3.5 g                         | 11.5 g                        | 35 g                          | 80 g                          |
| Material   | Housing            | NiFe (magn.)                  | 1.4404 (non-magn.)            | 1.4404 (non-magn.)            | 1.4404 (non-magn.)            |
| Connection   |                    | type C                        | type B                        | type B                        | type B                        |
| Mounting   |                    | Thread M8x0.5                 | Thread M12x1                  | Thread M16x1                  | Thread M24x1.5                |
| Distance from the sensor surface for the recommended mounting option |                    | 3.6 mm                        | 4.4 mm                        | 4.4 mm                        | 5.4 mm                        |

FSO = Full Scale Output

<sup>1)</sup> Valid with reference controller, relates to standard measuring range

<sup>2)</sup> RMS value of the signal noise

<sup>3)</sup> from more than +140°C: non-linear signal drift

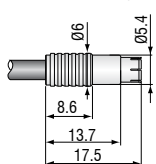
<sup>4)</sup> with recommended mounting option

<sup>5)</sup> non-condensing

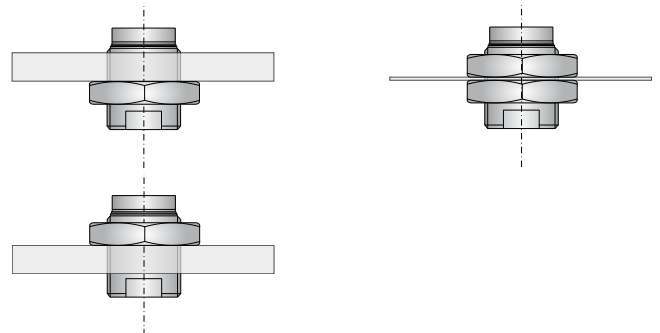
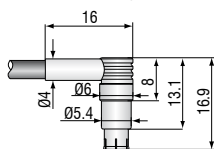
### Installing thread sensors

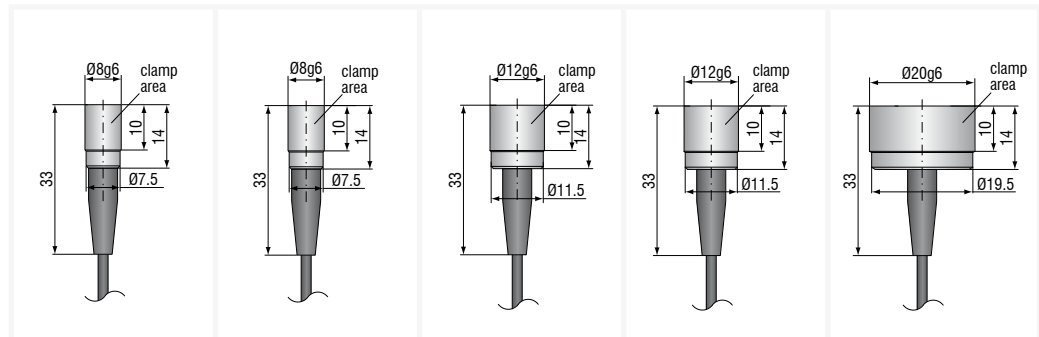
Please refer to the operating instructions for the tightening torque.

Connector type C



Connector type C/90





| Sensor type                        |                    | CSH02-CAM1,4                    | CSH05-CAM1,4                    | CSH1-CAM1,4                     | CSH1,2-CAM1,4                  | CSH2-CAM1,4                     |
|------------------------------------|--------------------|---------------------------------|---------------------------------|---------------------------------|--------------------------------|---------------------------------|
| Article No.                        |                    | 6610086                         | 6610087                         | 6610088                         | 6610089                        | 6610107                         |
| Measuring range                    | reduced            | 0.1 mm                          | 0.25 mm                         | 0.5 mm                          | 0.6 mm                         | 1 mm                            |
|                                    | nominal            | 0.2 mm                          | 0.5 mm                          | 1 mm                            | 1.2 mm                         | 2 mm                            |
|                                    | extended           | 0.4 mm                          | 1 mm                            | 2 mm                            | 2.4 mm                         | 4 mm                            |
| Linearity <sup>1)</sup>            |                    | $\leq \pm 0.054 \mu\text{m}$    | $\leq \pm 0.13 \mu\text{m}$     | $\leq \pm 0.13 \mu\text{m}$     | $\leq \pm 0.84 \mu\text{m}$    | $\leq \pm 0.5 \mu\text{m}$      |
|                                    |                    | $\leq \pm 0.027 \% \text{ FSO}$ | $\leq \pm 0.026 \% \text{ FSO}$ | $\leq \pm 0.013 \% \text{ FSO}$ | $\leq \pm 0.07 \% \text{ FSO}$ | $\leq \pm 0.025 \% \text{ FSO}$ |
| Resolution <sup>1) 2)</sup>        | static 2 Hz        | 0.15 nm                         | 0.38 nm                         | 0.75 nm                         | 0.9 nm                         | 1.5 nm                          |
|                                    | dynamic 8.5 kHz    | 4 nm                            | 10 nm                           | 20 nm                           | 24 nm                          | 40 nm                           |
| Temperature stability              | Zero <sup>5)</sup> | -19 nm/K                        | -19 nm/K                        | -19 nm/K                        | -19 nm/K                       | -19 nm/K                        |
|                                    | Sensitivity        | -2.4 nm/K                       | -6 nm/K                         | -12 nm/K                        | -14.4 nm/K                     | -24 nm/K                        |
| Temperature range                  | Operation          | -50 ... +200 °C                 | -50 ... +200 °C                 | -50 ... +200 °C                 | -50 ... +200 °C                | -50 ... +200 °C                 |
|                                    | Storage            | -50 ... +200 °C                 | -50 ... +200 °C                 | -50 ... +200 °C                 | -50 ... +200 °C                | -50 ... +200 °C                 |
| Humidity <sup>3)</sup>             |                    | 0 % ... 95 % r.H.               | 0 % ... 95 % r.H.               | 0 % ... 95 % r.H.               | 0 % ... 95 % r.H.              | 0 % ... 95 % r.H.               |
| Dimensions <sup>4)</sup>           |                    | Ø8 × 14 mm                      | Ø8 × 14 mm                      | Ø12 × 14 mm                     | Ø12 × 14 mm                    | Ø20 × 14 mm                     |
| Active measuring area              |                    | Ø2.6 mm                         | Ø4.1 mm                         | Ø5.7 mm                         | Ø6.3 mm                        | Ø8.1 mm                         |
| Guard ring width                   |                    | 1.9 mm                          | 1.2 mm                          | 2.4 mm                          | 2.1 mm                         | 4.4 mm                          |
| Minimum target diameter            |                    | Ø7 mm                           | Ø7 mm                           | Ø11 mm                          | Ø11 mm                         | Ø17 mm                          |
| Weight (incl. cable and connector) |                    | 30 g                            | 30 g                            | 33 g                            | 33 g                           | 38 g                            |
| Material                           | Housing            | 1.4104 (magn.)                  | 1.4104 (magn.)                  | 1.4104 (magn.)                  | 1.4104 (magn.)                 | 1.4104 (magn.)                  |
| Connection                         | Cable integrated   | Ø2.1 mm × 1.4 m axial           | Ø2.1 mm × 1.4 m axial           | Ø2.1 mm × 1.4 m axial           | Ø2.1 mm × 1.4 m axial          | Ø2.1 mm × 1.4 m axial           |
| Mounting                           |                    | clamping                        | clamping                        | clamping                        | clamping                       | clamping                        |

FSO = Full Scale Output CSH Sensors are matched to controller with standard cable length

<sup>1)</sup> Valid with reference controller, relates to standard measuring range

<sup>2)</sup> RMS value of the signal noise

<sup>3)</sup> Non condensing

<sup>4)</sup> Without cable, bend protection and crimp

<sup>5)</sup> In the case of a sensor mounting 2 mm behind front surface

### Important!

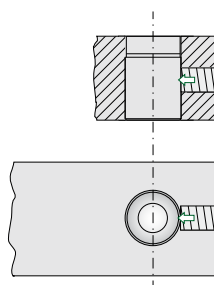
All Micro-Epsilon sensors are short circuit proof. Unlike other systems the pre-amplifier will not get damaged, if the front face of the sensor gets shorted by touching the conductive target.

### Mounting cylindrical sensors

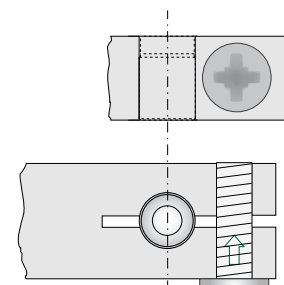
All sensors can be installed as both freestanding and flush units.

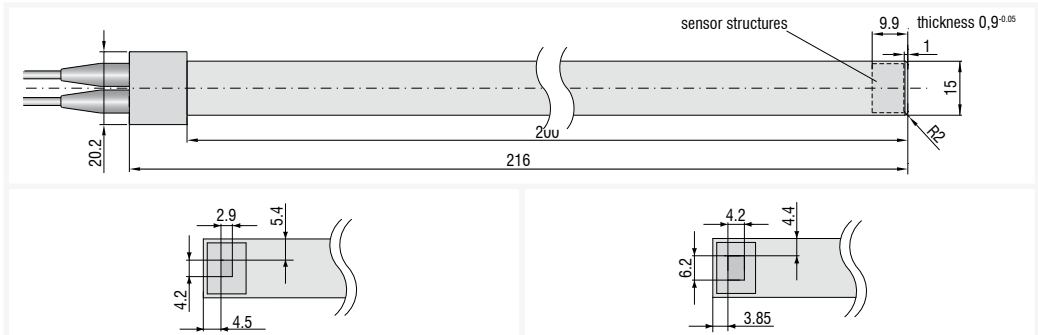
The sensors can be clamped or fastened using a collet.

#### Mounting with set screw (plastic)



#### Mounting with collet





| Sensor type                  |                  | CSG0,50-CAm2,0    | CSG1,00-CAm2,0    |
|------------------------------|------------------|-------------------|-------------------|
| Article No.                  |                  | 6610112           | 6610111           |
| Measuring range              | Standard         | 0.5 mm            | 1 mm              |
| Gap width <sup>1)</sup>      |                  | 0.9 ... 1.9 mm    | 0.9 ... 2.9 mm    |
| Linearity <sup>2)</sup>      |                  | ≤ ±0.5 μm         | ≤ ±1 μm           |
| Resolution <sup>2),3)</sup>  | static 2 Hz      | 4 nm              | 8 nm              |
|                              | dynamic 8.5 kHz  | 90 nm             | 180 nm            |
| Temperature stability        | Zero             | -50 nm/K          | -50 nm/K          |
|                              | Sensitivity      | -20 nm/K          | -40 nm/K          |
| Temperature range            | Operation        | -50 ... +100 °C   | -50 ... +100 °C   |
|                              | Storage          | -50 ... +100 °C   | -50 ... +100 °C   |
| Humidity <sup>3)</sup>       |                  | 0 ... 95 %        | 0 ... 95 %        |
| Dimensions (without housing) |                  | 200 x 15 x 0.9 mm | 200 x 15 x 0.9 mm |
| Active measuring area        |                  | 3 x 4.3 mm        | 4.2 x 5.1 mm      |
| Guard ring width             |                  | 2.7 mm            | 2.2 mm            |
| Minimum target diameter      |                  | approx. 7 x 8 mm  | approx. 8 x 9 mm  |
| Weight                       |                  | 77 g              | 77 g              |
| Material                     | Housing          | 1.4301            | 1.4301            |
|                              | Sensor           | FR4               | FR4               |
| Connection                   | Cable integrated | 2 m               | 2 m               |

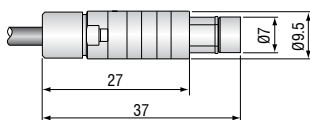
<sup>1)</sup> Sensor width + measuring range on both sides

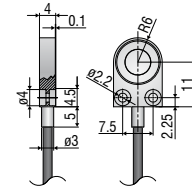
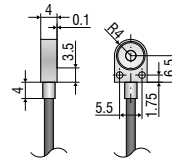
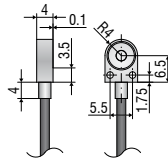
<sup>2)</sup> RMS value of the signal noise

<sup>3)</sup> Valid with controller DT6530

<sup>4)</sup> Non condensing

Connector type B





| Sensor type                        |                    | CSH02FL-CRm1,4                  | CSH05FL-CRm1,4                  | CSH1FL-CRm1,4                  |
|------------------------------------|--------------------|---------------------------------|---------------------------------|--------------------------------|
| Article No.                        |                    | 6610075                         | 6610085                         | 6610072                        |
| Measuring range                    | reduced            | 0.1 mm                          | 0.25 mm                         | 0.5 mm                         |
|                                    | nominal            | 0.2 mm                          | 0.5 mm                          | 1 mm                           |
|                                    | extended           | 0.4 mm                          | 1 mm                            | 2 mm                           |
| Linearity <sup>1)</sup>            |                    | $\leq \pm 0.05 \mu\text{m}$     | $\leq \pm 0.09 \mu\text{m}$     | $\leq \pm 0.2 \mu\text{m}$     |
|                                    |                    | $\leq \pm 0.025 \% \text{ FSO}$ | $\leq \pm 0.018 \% \text{ FSO}$ | $\leq \pm 0.02 \% \text{ FSO}$ |
| Resolution <sup>1) 2)</sup>        | static 2 Hz        | 0.15 nm                         | 0.38 nm                         | 0.75 nm                        |
|                                    | dynamic 8.5 kHz    | 4 nm                            | 10 nm                           | 20 nm                          |
| Temperature stability              | Zero <sup>5)</sup> | -37.6 or 2.4 nm/°C              | -37.6 or 2.4 nm/°C              | -37.6 or 2.4 nm/°C             |
|                                    | Sensitivity        | -2.4 nm/K                       | -6 nm/K                         | -12 nm/K                       |
| Temperature range                  | Operation          | -50... +200 °C                  | -50... +200 °C                  | -50... +200 °C                 |
|                                    | Storage            | -50... +200 °C                  | -50... +200 °C                  | -50... +200 °C                 |
| Humidity <sup>3)</sup>             |                    | 0 % ... 95 % r.H.               | 0 % ... 95 % r.H.               | 0 % ... 95 % r.H.              |
| Dimensions <sup>4)</sup>           |                    | 10.5 × 8 × 4 mm                 | 10.5 × 8 × 4 mm                 | 17 × 12 × 4 mm                 |
| Active measuring area              |                    | Ø2.6 mm                         | Ø4.1 mm                         | Ø5.7 mm                        |
| Guard ring width                   |                    | 1.9 mm                          | 1.2 mm                          | 2.4 mm                         |
| Minimum target diameter            |                    | Ø7 mm                           | Ø7 mm                           | Ø11 mm                         |
| Weight (incl. cable and connector) |                    | 28 g                            | 28 g                            | 30 g                           |
| Material                           | Housing            | 1.4104 (magn.)                  | 1.4104 (magn.)                  | 1.4104 (magn.)                 |
| Connection                         | Cable integrated   | Ø2.1 mm × 1.4 m radial          | Ø2.1 mm × 1.4 m radial          | Ø2.1 mm × 1.4 m radial         |
| Mounting                           |                    | 2x thread M2                    | 2x thread M2                    | 2x screw M2 DIN 84A            |

FSO = Full Scale Output CSH Sensors are matched to controller with standard cable length

<sup>1)</sup> Valid with reference controller, relates to standard measuring range

<sup>2)</sup> RMS value of the signal noise

<sup>3)</sup> Non condensing

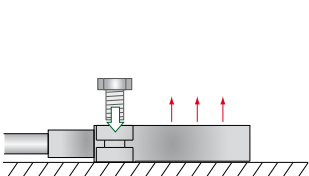
<sup>4)</sup> Without cable, bend protection and crimp

<sup>5)</sup> In the case of a sensor mounting on the top or underside

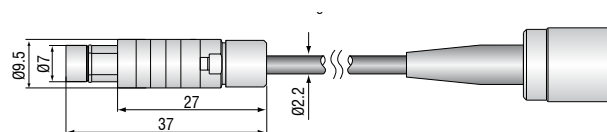
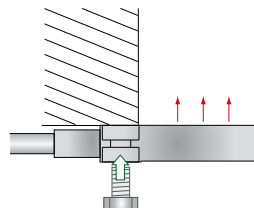
### Mounting flat sensors

The flat sensors are attached using a threaded bore for M2 (for the sensors CSH02FL and CSH05FL) or using a through-hole for M2 bolts. The sensors can be bolted on top or below.

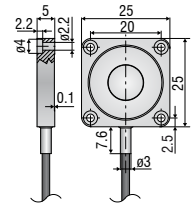
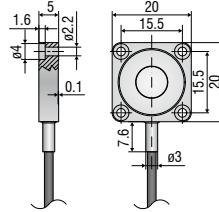
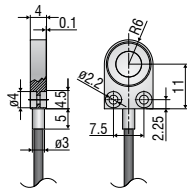
#### Screw connection from above on the underside



#### Screw connection from below on the sensor top side







| Sensor type                        |                    | CSH1,2FL-CRm1,4                            | CSH2FL-CRm1,4                              | CSH3FL-CRm1,4                              |
|------------------------------------|--------------------|--|--|--|
| Article No.                        |                    | 6610077                                    | 6610094                                    | 6610140                                    |
| Measuring range                    | reduced            | 0.6 mm                                     | 1 mm                                       | 1.5 mm                                     |
|                                    | nominal            | 1.2 mm                                     | 2 mm                                       | 3 mm                                       |
|                                    | extended           | 2.4 mm                                     | 4 mm                                       | 6 mm                                       |
| Linearity <sup>1)</sup>            |                    | 0.84 $\mu$ m                               | 0.32 $\mu$ m                               | $\leq \pm 0.9 \mu$ m                       |
|                                    |                    | 0.07 % FSO                                 | 0.016 % FSO                                | $\leq \pm 0.03$ % FSO                      |
| Resolution <sup>1) 2)</sup>        | static 2 Hz        | 0.9 nm                                     | 1.5 nm                                     | 2.25 nm                                    |
|                                    | dynamic 8.5 kHz    | 24 nm                                      | 40 nm                                      | 60 nm                                      |
| Temperature stability              | Zero <sup>5)</sup> | -37.6 or 2.4 nm/ $^{\circ}$ C              | -47 or 4 nm/K                              | -50 nm/K                                   |
|                                    | Sensitivity        | -14.4 nm/K                                 | -24 nm/K                                   | -40 nm/K                                   |
| Temperature range                  | Operation          | -50...+200 $^{\circ}$ C                    | -50...+200 $^{\circ}$ C                    | -50...+200 $^{\circ}$ C                    |
|                                    | Storage            | -50...+200 $^{\circ}$ C                    | -50...+200 $^{\circ}$ C                    | -50...+200 $^{\circ}$ C                    |
| Humidity <sup>3)</sup>             |                    | 0 ... 95 % r.H.                            | 0 ... 95 % r.H.                            | 0 ... 95 % r.H.                            |
| Dimensions <sup>4)</sup>           |                    | 17 $\times$ 12 $\times$ 4 mm               | 20 $\times$ 20 $\times$ 5 mm               | 25 $\times$ 25 $\times$ 5 mm               |
| Active measuring area              |                    | $\varnothing$ 6.3 mm                       | $\varnothing$ 8.1 mm                       | $\varnothing$ 10 mm                        |
| Guard ring width                   |                    | 2.1 mm                                     | 4.4 mm                                     | 7.8 mm                                     |
| Minimum target diameter            |                    | $\varnothing$ 11 mm                        | $\varnothing$ 17 mm                        | $\varnothing$ 24 mm                        |
| Weight (incl. cable and connector) |                    | 30 g                                       | 36 g                                       | 37 g                                       |
| Material                           | Housing            | 1.4104 (magn.)                             | 1.4104 (magn.)                             | 1.4104 (magn.)                             |
| Connection                         | Cable integrated   | $\varnothing$ 2.1 mm $\times$ 1.4 m radial | $\varnothing$ 2.1 mm $\times$ 1.4 m radial | $\varnothing$ 2.1 mm $\times$ 1.4 m radial |
| Mounting                           |                    | 2x screw M2 DIN 84A                        | 4x screw M2 DIN 84A                        | 4x screw M2 DIN 84A                        |

FSO = Full Scale Output CSH Sensors are matched to controller with standard cable length

<sup>1)</sup> Valid with reference controller, relates to standard measuring range

<sup>2)</sup> RMS value of the signal noise

<sup>3)</sup> Non condensing

<sup>4)</sup> Without cable, bend protection and crimp

<sup>5)</sup> In the case of a sensor mounting on the top or underside

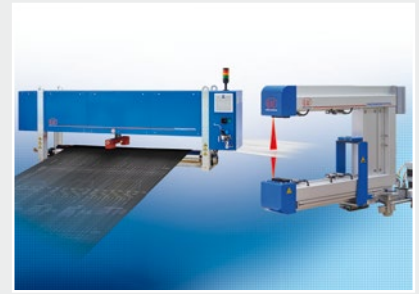
## Sensors and Systems from Micro-Epsilon



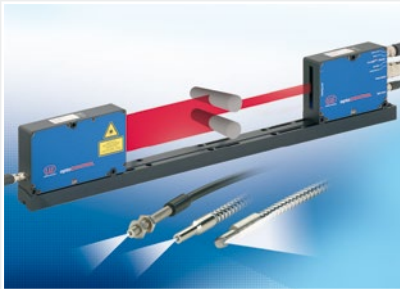
Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for metal strips, plastics and rubber



Optical micrometers and fiber optics, measuring and test amplifiers



Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection