Product Guide
Sensors and Measuring Systems

Displacement
Distance
Position

Dimension
Temperature
Color

More Precision
More Precision

As a technology leader of precision sensors, Micro-Epsilon pursues the need to develop high precision sensors, measurement devices and systems. This need is the drive for continuous high performance in measurement technology. As well as sensors for displacement, distance, position, color and temperature, we also focus on 3D sensors.

Continuous development efforts, extensive know-how and a wide cooperation network enable us to develop high precision sensors. Further development of measuring techniques and technical innovations is our basis for the creation of sensor products that provide our customers with significant added value.

Why choose Micro-Epsilon?

- More precision and innovation made in Germany
- Wide range of powerful and flexible products which are easy to integrate
- Consultation, development and production from a single source
- Hand in hand with our customers we create quality and solution competence in series & OEM
- Profound knowledge of industries & applications in automation, machine building and machine design
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### Sensors for displacement, distance, length and position

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<td>Color sensors, color measuring system &amp; LED Analyzers</td>
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<table>
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</tr>
</tbody>
</table>
Sensors and measurement devices from Micro-Epsilon are used in numerous industries. Whether it is for quality assurance, applications in maintenance, process and machine monitoring, automation or R&D - sensors make a vital contribution to the improvement of products and processes. From global major groups to medium-sized companies and engineering service providers - sensors and solutions from Micro-Epsilon ensure reliable measurement results with the highest precision all over the world. From machine building and automated production lines in the food industry, to integrated OEM solutions - almost all industries benefit from sensor technologies.

Micro-Epsilon has the experience and the required resources to provide solutions starting from the basic idea through to series production, all from one source – and at a convincing price/performance ratio. A team of specialist development and application engineers implements concepts and designs according to customer-specific requirements. All project members are involved in development, prototype construction and series production.
Automotive

Aerospace

Semiconductors & lenses

Advanced automation

Additive manufacturing

Automotive

Renewable energies
Laser triangulation sensors
for precise displacement distance measurements

**optoNCDT**
- Measurement of displacement, distance and position on numerous surfaces
- Detection of smallest parts due to point-shaped measurement
- Comprehensive product range with numerous measuring ranges
- High resolution and linearity
- Ideal for measurement tasks with high measuring rates
- Numerous interfaces, also for bus connection

**optoNCDT sensors** are designed for both measurement tasks in factory automation and integration into machines and systems. Despite their very compact dimensions, these robust laser sensors have a fully integrated controller. As a result, simple installation and wiring is possible in confined installation spaces or on a robot. Their high performance enables the sensors to provide precise measurement results at a high measuring rate.

Monitoring the metal sheet infeed during pressing  
Measuring scribe lines on PCB panels  
Distance control with laser welding
optoNCDT 1220/1320
Compact laser triangulation sensor for high speed, precision measurements

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>10</th>
<th>25</th>
<th>50</th>
<th>100</th>
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<td>Linearity</td>
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<tr>
<td>Repeatability</td>
<td>from 1 µm</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Measuring rate</td>
<td>2 kHz</td>
<td>4 kHz</td>
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optoNCDT 1420/1420 CL1
Smart laser triangulation displacement sensor for fast and precise measurements

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<th>100</th>
<th>200</th>
<th>500</th>
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<tbody>
<tr>
<td>Linearity</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Repeatability</td>
<td>from 0.5 µm</td>
<td></td>
<td></td>
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<td>Measuring rate</td>
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optoNCDT 1750-DR
Universal sensor with integrated controller for industrial applications

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<tr>
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<tr>
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optoNCDT 1420LL / 1900LL / 2300LL
Laser sensors for shiny metallic and structured surfaces

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<th>50</th>
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<tbody>
<tr>
<td>Linearity</td>
<td>≤ ±0.02% FSO</td>
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<tr>
<td>Resolution</td>
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</tr>
<tr>
<td>Measuring rate</td>
<td>49 kHz</td>
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optoNCDT 1710 / 1750 / 1760 / 2310
Long-range sensors for large distances

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<th>Measuring ranges (mm)</th>
<th>10</th>
<th>20</th>
<th>40</th>
<th>50</th>
<th>500</th>
<th>750</th>
<th>1000</th>
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<tr>
<td>Resolution</td>
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optoNCDT 1750BL / 2300BL / 2300-2DR
Laser sensor with Blue Laser Technology for metals and organic materials

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<th>50</th>
<th>200</th>
<th>500</th>
<th>750</th>
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<tbody>
<tr>
<td>Linearity</td>
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<tr>
<td>Resolution</td>
<td>0.0015 % FSO</td>
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<tr>
<td>Measuring rate</td>
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optoNCDT 1900
Innovative laser sensor for advanced automation

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<th>50</th>
<th>100</th>
<th>200</th>
<th>500</th>
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<td>Repeatability</td>
<td>from 0.1 µm</td>
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<td></td>
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</tr>
<tr>
<td>Measuring rate</td>
<td>10 kHz</td>
<td></td>
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</table>

now with integrated EtherCAT, EtherNet/IP and PROFINET interfaces

optoNCDT 2300
Highly dynamic laser sensor in the 50 kHz class

<table>
<thead>
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<th>Measuring ranges (mm)</th>
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<th>10</th>
<th>20</th>
<th>50</th>
<th>100</th>
<th>200</th>
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<tbody>
<tr>
<td>Linearity</td>
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</tr>
<tr>
<td>Resolution</td>
<td>0.0015 % FSO</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring rate</td>
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<td></td>
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</table>

thicknessSENSOR
Sensor for non-contact thickness measurements of strip and plate materials

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>10</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity</td>
<td>≤ ±0.01 % FSO</td>
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<tr>
<td>Measuring rate</td>
<td>4 kHz</td>
<td></td>
</tr>
<tr>
<td>Measuring widths (mm)</td>
<td>200</td>
<td>400</td>
</tr>
</tbody>
</table>
Confocal chromatic sensors
for high precision displacement & thickness measurements

confocalDT
- Distance measurement with extremely high resolution and measuring rate
- Precise thickness measurement of transparent materials with up to 5 layers
- Extremely high resolution
- Suitable for all surfaces
- Extremely small, constant spot size
- Compact beam path
- Vacuum-suitable sensor design
- Numerous interfaces, also for bus connection

The confocalDT product range stands for the highest precision and dynamics in confocal chromatic measurement technology. The measuring system includes the worldwide fastest controller currently available, which in combination with the sensors enables high precision measurement results in displacement and distance measurement tasks, as well as thickness measurement of transparent objects. A large number of sensors and different interfaces can be used in versatile measurement tasks, e.g., in the semiconductor industry, glass industry, medical engineering and machine building.

Roughness measurement and geometry inspection in coordinate measuring machines
Measuring the curvature of lenses
Wall thickness of medical glass containers
**confocalDT 2421/2422**
Single and dual-channel controller with integrated light source for industrial applications and measuring rates up to 6.5 kHz

**confocalDT 2465/2466**
Light-intensive controller for high measuring rates up to 30 kHz

**IFS2402**
Miniature sensors (gradient index lens) for the inspection of smallest inner bodies

- Measuring ranges (mm): 0.4 | 1.5 | 2.5 | 3.5
- Available with axial / radial beam path

**IFS2403**
Confocal hybrid sensors with narrow gradient index lens and relay lens

- Measuring ranges (mm): 0.4 | 1.5 | 4 | 10
- Resolution: 0.0015 % FSO
- Available with axial / radial beam path

**IFS2404**
Confocal chromatic sensors for high precision applications in restricted spaces

- Measuring ranges (mm): 2
- Resolution (µm): 0.04
- Available with axial / radial beam path

**IFS2405**
Standard sensors for precise distance and thickness measurements

- Measuring ranges (mm): 0.3 | 1 | 3 | 6 | 10 | 28 | 30
- Large offset distance and tilt angle

**IFS2406**
Confocal chromatic compact sensors for displacement & thickness measurements

- Measuring ranges (mm): 2.5 | 3 | 10
- Available with axial / radial beam path

**IFS2407**
Confocal sensors for precise displacement, thickness & roughness measurements

- Measuring ranges (mm): 0.1 | 0.3 | 0.8 | 3
- Small measurement spot and large tilt angle
- Available with axial / radial beam path

**confocalDT 2411**
Compact controller for series applications
Measuring rate up to 8 kHz

**confocalDT 2410/2415**
Compact sensors with integrated controller

- Measuring ranges (mm): 1 | 3 | 6 | 10
- Linearity: up to ±0.025 % FSO
- Measuring rate: up to 25 kHz
High-precision white light interferometer
for non-contact distance and thickness measurements

interferoMETER
- Absolute distance measurement and multi-peak distance measurement
- Distance-independent thickness measurement & multi-layer thickness measurement
- Best-in-Class: resolution < 30 picometers and outstanding linearity
- High signal stability due to new evaluation algorithms and active temperature compensation
- Simple parameter set up via web interface
- Numerous interfaces, also for bus connection

The innovative white light interferometers from Micro-Epsilon set a benchmark in high-precision distance and thickness measurements. These sensors enable stable measurement results with sub-nanometer resolution offering a comparatively large measuring range and offset distance. The interferometers are available in 3 series: the IMS5400-DS for high-precision industrial distance measurements, the IMS5400-TH for accurate thickness measurements and the vacuum-suitable IMS5600-DS for distance measurements with picometer resolution.
Integration in industrial environments
Robust sensors and a controller enclosed in metal make the interferometer ideal for integration into production lines and machines. These compact sensors are extremely space-saving and can also be integrated in confined spaces. The controller is installed in the control cabinet via DIN rail mounting and provides very stable measurement results due to active temperature compensation and passive cooling.

interferoMETER 5400-DS
White light interferometer for absolute distance measurement with nanometer accuracy
- Measuring range: 2.1 mm
- Linearity: < ±50 nm
- Resolution: < 1 nm
- Measuring rate: up to 6 kHz
- Multi-peak distance measurement (thickness calculation)

interferoMETER 5400-TH
White light interferometer for stable thickness measurement with submicron accuracy
- Working distance: 45 mm ±3.5 mm
  70 mm ±2.1 mm
- Linearity: < ±100 nm
- Resolution: < 1 nm
- Measuring rate: up to 6 kHz
- Multi-peak thickness measurement

interferoMETER 5600-DS
White light interferometer for absolute distance measurement with subnanometer accuracy
- Measuring range: 2.1 mm
- Linearity: < ±10 nm
- Resolution: < 30 pm
- Measuring rate: up to 6 kHz
- Multi-peak distance measurement (thickness calculation)

interferoMETER 5420
Interferometer for high-precision wafer thickness measurement
- Resolution up to 1 nm
- Light spot diameter of just 20 µm
- Measurement of undoped and doped wafers (p+/p++, 5 Ω:cm)
- Intuitive operation via web interface
- Single and multi-layer thickness measurements

Thicknless measurement of plastic films

Absolute measurement of step profiles
Unlike interferometers based on relative measurements, the IMS-DS also enables the measurement of step profiles. Thanks to the absolute measurement, the scanning is performed with high signal stability and precision. When measuring on moving objects, the differences in height of heels, steps and depressions can thus be reliably detected.
Laser distance sensors
for the precise measurement of large distances

**optoNCDT ILR**
- Precise measurement of displacement, distance & position on different surfaces
- Very large measuring range
- High repeatability
- Fast response time
- Excellent price/performance ratio
- Open interfaces

Optoelectronic optoNCDT ILR sensors are designed for non-contact distance and displacement measurements with large measuring ranges. Depending on the application and the required measuring range, the sensors detect diffuse reflecting surfaces or special reflector plates. Thanks to their robust design, optoNCDT ILR sensors are suitable for measurement tasks indoors and also outdoors.

- Position detection for robots
- Diameter monitoring on seamless rolled rings
- Acquisition of coil diameters
**optoNCDT ILR 1030/LC1 and 1031/LC1**
Compact laser distance sensors

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>±25 mm</th>
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<td>Linearity</td>
<td>&lt; 5 mm</td>
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<tr>
<td>Repeatability</td>
<td>10 ms</td>
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</tbody>
</table>

**Measuring range**
- no reflector: 0.2 - 15 m
- with reflector: 0.2 - 50 m

**optoNCDT ILR ILR1171-125**
Fast sensors for outdoor applications

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>±1 mm</th>
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<tbody>
<tr>
<td>Linearity</td>
<td>&lt; 25 mm</td>
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<tr>
<td>Repeatability</td>
<td>&lt; 300 µm</td>
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<tr>
<td>Measuring rate</td>
<td>20 Hz</td>
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</table>

**Measuring range**
- no reflector: 0.5 - 150 m
- with reflector: 125 m - 270 m

**optoNCDT ILR 2250**
Compact laser distance sensors

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>±1 mm</th>
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</thead>
<tbody>
<tr>
<td>Linearity</td>
<td>&lt; 300 µm</td>
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<tr>
<td>Repeatability</td>
<td>20 Hz</td>
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</tbody>
</table>

**Measuring range**
- 0.5 - 150 m
- 270 m

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**optoNCDT ILR sensors** are particularly suitable for filling level measurement, safety applications, height measurement of lifting systems, overhead conveyors, crane systems and for positioning lifts.
Capacitive sensors for non-contact displacement & distance measurements

CapaNCDT

- Non-contact measurement of displacement, distance and thickness as well as on electrical conductors and insulators
- Resolution down to the nanometer range
- Temperature stability over a large temperature range
- World’s most modern product portfolio for a wide range of laboratory and industrial applications
- Numerous interfaces, also for bus connection

Capacitive sensors are designed for non-contact displacement and distance measurements with the highest precision and are used for measurement tasks in the laboratory as well as in industrial applications. Their special sensor design, triaxial sensor cables and innovative controller technology result in a perfectly matched measuring system. For this reason, capacitive sensors from Micro-Epsilon stand for the highest precision and signal stability. Even in industrial applications, capacitive sensors achieve resolutions in the submicrometer range.

Measuring the bearing gap in roll drives
Positioning of precision stages
Checking the tilt angle of lens carriers
### capaNCDT 6110
Compact single-channel system

<table>
<thead>
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<th>Measuring ranges (mm)</th>
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<th>0.2</th>
<th>0.5</th>
<th>0.8</th>
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<th>2</th>
<th>3</th>
<th>5</th>
<th>10</th>
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<tr>
<td>Resolution</td>
<td>0.01 \text{ % FSO}</td>
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<tr>
<td>Frequency response</td>
<td>up to 20 kHz (-3dB)</td>
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### capaNCDT 61x0/IP
Measuring system for industrial applications

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<th>1</th>
<th>1.25</th>
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<td>Resolution</td>
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### capaNCDT 6200
Modular multi-channel system

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<th>0.8</th>
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<th>3</th>
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<tr>
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<td>0.00005 \text{ % FSO}</td>
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<tr>
<td>Frequency response</td>
<td>up to 20 kHz (-3dB)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### capaNCDT 61x4
Active sensor system, ideal for long signal transmission paths up to 15 m

- Sensor cable for use on drag chains and robots
- Easy integration due to flexible cable routing
- Robust sensor design

### capaNCDT DTV
Measuring the Disc Thickness Variation of brake discs

- Multi-channel controller for multi-track thickness measurements
- High dynamics up to 20 kHz
- Robust sensor design for long-life operation
- Comprehensive software package for ease of use and real-time evaluation of measurement results
- Analog interfaces, Ethernet, EtherCAT

### capaNCDT 6500
Modular multi-channel system

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>0.05</th>
<th>0.2</th>
<th>0.5</th>
<th>0.8</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity</td>
<td>( \leq \pm 0.025 \text{ % FSO} )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>0.000075 \text{ % FSO}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency response</td>
<td>8.5 kHz (-3dB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### capaNCDT 6228
Capacitive measuring system for high temperature application

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity</td>
<td>from 0.5 \text{ µm}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>up to 0.01 \text{ % FSO}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency response</td>
<td>up to 1 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wide temperature range:</td>
<td>(-50 \ldots +800 ^\circ\text{ C})</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### capaNCDT 6228
Capacitive measuring system for high temperature application

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity</td>
<td>from 0.5 \text{ µm}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>up to 0.01 \text{ % FSO}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency response</td>
<td>up to 1 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wide temperature range:</td>
<td>(-50 \ldots +800 ^\circ\text{ C})</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Adaption of sensors to OEM serial applications

- Shape & size
- Sensor material
- Cable
- Vacuum suitability
- Cryogenic or high temperatures
- Integrated controller with sensor for OEM design

### Other capacitive sensors for special measurement tasks
on page 37
Inductive sensors (eddy current)
for high precision displacement & distance measurements

**eddyNCDT**
- Non-contact and wear-free
- High resolution and linearity
- Stable measurement signals
- High dynamics
- Excellent temperature range and temperature stability
- For industrial applications
- Numerous interfaces, also for fieldbus connection

For many years, Micro-Epsilon has been a pioneer in displacement measurement using eddy current technology. eddyNCDT displacement sensors are designed for non-contact measurement of displacement, distance, position, oscillation, vibrations etc. Considered as extremely robust and precise, eddy current sensors from Micro-Epsilon are preferably used in industrial environments. eddyNCDT sensors are based on the eddy current principle and are used for measurements on metallic targets. They enable non-contact and wear-free measurements without exerting any forces onto the measuring object. The insensitivity to, e.g., oil, dirt, water or electromagnetic interference fields makes eddyNCDT sensors ideal for measurement tasks in which precise measurements are required despite harsh industrial environments.

**Extreme temperature stability**
Eddy current sensors from Micro-Epsilon can be used in a wide temperature range, some models from -50 °C to +350 °C. Their wide temperature range and insensitivity to dirt or dust enable a variety of applications in industrial environments. Active temperature compensation ensures the highest signal stability with fluctuating ambient temperatures.
For special requirements that are not met by standard models, the standard sensors can be modified accordingly. Cost-effective implementation can already be achieved with medium-sized quantities. For special applications where large quantities are required, Micro-Epsilon develops sensors that are precisely tailored to the customer’s requirements.

**Adaption of sensors for small and large series**
- Shape & size
- Sensor material
- Cable
- Connector
- Vacuum suitability
- Sensor with integrated controller

**Largest sensor range worldwide**
Our long-term technology leadership in the field of eddy current sensor technology is reflected by the range of products - more than 400 sensors are available in different designs for different applications. The range includes miniature sensors which achieve high precision measurement results with the smallest possible dimensions.

**eddyNCDT 3001**
Compact eddy current sensor with integrated controller
- Measuring ranges (mm): 2 | 4 | 6 | 8
- Linearity: < ±0.7 % FSO
- Resolution: 0.1 % FSO
- Frequency response: 5 kHz

**eddyNCDT 3005**
Miniature eddy current measuring system ideal for integration into plant and machinery
- Measuring ranges (mm): 1 | 2 | 3 | 6
- Linearity: < ±0.25 % FSO
- Resolution: 0.05 % FSO
- Frequency response: 5 kHz (-3dB)

**eddyNCDT 3060/3070**
A new performance class in inductive displacement measurements
- Measuring ranges (mm): 0.4 | 0.8 | 1 | 2 | 3 | 4 | 6 | 8
- Linearity: < ±0.1 % FSO
- Resolution: 0.002 % FSO
- Frequency response: 20 kHz (-3dB)

**eddyNCDT 3300**
High precision eddy current system for industrial applications
- Measuring ranges (mm): 0.4 | 0.8 | 1 | 2 | 3 | 4 | 6 | 8 | 15 | 22 | 40 | 80
- Linearity: < ±0.2 % FSO
- Resolution: 0.005 % FSO
- Frequency response: 100 kHz (-3dB)
- Standard and miniature sensors
Linear inductive displacement sensors
for industrial measurement tasks

induSENSOR
- More than 250 different models with measuring ranges from 1 to 630 mm
- Integrated or separate controller
- High accuracy
- Extreme stability and durability
- Different designs with plunger, tube or measuring ring
- Analog output, digital interfaces and fieldbus connection
- Ideal for customer-specific designs and serial applications

For decades, Micro-Epsilon has been renowned for its inductive displacement sensors and gauges and has extended the range of proven measurement techniques such as, e.g., LVDT by further innovative developments. induSENSOR displacement sensors from Micro-Epsilon are used extensively in applications for automated processes, quality assurance, test rigs, hydraulics, pneumatic cylinders, and building monitoring. Typical measurement tasks require a long service life and reliability.

The induSENSOR models stand out due to their robustness and reliability under harsh conditions. As they provide high signal quality, temperature stability, resistance to shocks and vibrations as well as insensitivity to dirt and humidity, these sensors are the preferred choice for industrial measurement tasks. induSENSOR systems are universally applicable and have been tried and tested in various industries. When several measuring points are required, the 2-channel controllers or multi-channel systems are used that are equipped with digital interfaces and, in addition, enable integration into fieldbus environments.

Stress and bending tests for material experiments
Checking the offset of gears
Lift height measurement in pneumatic cylinders
For special requirements that are not met by standard models, the standard sensors can be modified accordingly. Cost-effective implementation can already be achieved with medium-sized quantities. For special applications where large quantities are required, Micro-Epsilon develops sensors that are precisely tailored to the customer’s requirements.

### Adapted to ambient conditions

Depending on the location of use, environment, and application, different influences prevail to which the sensors are adapted.

- Ambient temperature
- Pressure
- Interference fields
- Dirt, dust, and moisture
- Vibration, shock
- Seawater, IP69K

### Miniature sensor controller for inductive displacement sensors

The MSC controllers are designed to be operated with LVDT and LDR measuring gauges and displacement sensors. Due to the robust and compact aluminum housing, the controllers are ideal for industrial measurement tasks. A wide variety of compatible, inductive displacement sensors and gauges combined with an optimized price/performance ratio opens up numerous fields of applications in automation technology and machine building.

#### induSENSOR LVDT series

- **Gauging sensor with external controller**
  - Measuring ranges (mm): ±1 | 3 | 5 | 10
  - Linearity: ±0.3 % FSO
  - Frequency response: 300 Hz (-3dB)
  - Target: Plunger with spring

- **Displacement sensors with external controller**
  - Measuring ranges (mm): ±1 | 3 | 5 | 10 | 15 | 25
  - Linearity: ±0.15 % FSO
  - Frequency response: 300 Hz (-3dB)
  - Target: Plunger

- **Linear displacement sensors with external controller for high temperatures up to 160 °C**
  - Measuring ranges (mm): 10 | 25 | 50
  - Linearity: ±0.30 % FSO
  - Frequency response: 300 Hz (-3dB)
  - Target: Plunger

#### induSENSOR EDS series

- **Displacement sensors with integral controller**
  - Measuring ranges (mm): 75 | 100 | 160 | 200 | 250 | 300 | 370 | 400 | 500 | 630
  - Linearity: ±0.3 % FSO
  - Resolution: 0.05 % FSO
  - Frequency response: 150 Hz (-3dB)
  - Target: Measuring tube
  - Pressure resistance: 450 bar

#### induSENSOR LDR series

- **Linear displacement sensors with external controller**
  - Measuring ranges (mm): 10 | 25 | 50
  - Linearity: ±0.8 % FSO
  - Frequency response: 300 Hz (-3dB)
  - Target: Plunger
Magneto-inductive distance sensors
for industrial measurement tasks

**mainSENSOR**

- Ideal alternative to inductive sensors and proximity sensors
- Linear output signal, high basic sensitivity and temperature stability
- High dynamics
- Measuring range can be adjusted via magnets
- Ideal for customer-specific designs and serial applications

mainSENSOR distance sensors use an innovative measuring principle, which combines the advantages of both inductive and magnetic sensors. Measuring the distance to a magnet which is attached to the measuring object, the sensor outputs a continuous, linear output signal. By using magnets of different strengths, measuring ranges between 20 mm and 55 mm can be achieved. In order to adapt the measuring range, you only have to change the magnet.

Magneto-inductive sensors are frequently used as an alternative to inductive sensors and proximity sensors in process automation, the packaging industry and in machine monitoring. Their sensor design brings numerous application possibilities, especially for OEM series applications. The sensor is available as simple PCB, in a plastic housing or in housings made from stainless steel, which are resistant to many chemicals as well as oil or dirt.

Load measurement in washing machines

Foreign body detection in blister packs

Valve lift measurement in the food industry
Flexible sensor design for OEM applications

Due to the flexible sensor design and the significant advantages of this physical measuring principle, various possibilities are available for adjusting the sensor to specific high volume applications. In OEM projects, the requirements of certain applications can be met at a very competitive price level.

- Improved dynamics
- Different shapes and materials for the housing
- Various output signals
- Special features such as pressure resistance, integrated cables, etc.

<table>
<thead>
<tr>
<th>Model</th>
<th>Measuring range</th>
<th>Output</th>
<th>Linearity</th>
<th>Resolution</th>
<th>Pressure resistance</th>
<th>Frequency response</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDS-45-M18-SA</td>
<td>20 - 55 mm*</td>
<td>2 - 10 V</td>
<td>&lt; ±3 % FSO</td>
<td>0.05 % FSO</td>
<td>up to 400 bar (front)</td>
<td>3 kHz (-3dB)</td>
</tr>
<tr>
<td>MDS-45-M12</td>
<td>20 - 55 mm*</td>
<td>2 - 10 V</td>
<td>&lt; ±3 % FSO</td>
<td>0.05 % FSO</td>
<td></td>
<td>3 kHz (-3dB)</td>
</tr>
<tr>
<td>MDS-45-M30-SA</td>
<td>20 - 55 mm*</td>
<td>2 - 10 V / 4 - 20 mA</td>
<td>&lt; ±3 % FSO</td>
<td>0.05 % FSO</td>
<td>50 bar (front)</td>
<td>1 kHz (-3dB)</td>
</tr>
<tr>
<td>MDS-35-M12-HT</td>
<td>20 - 55 mm*</td>
<td>2 V ±0.4 V ... 9.6 V ±0.4 V</td>
<td>&lt; ±5 % FSO</td>
<td>&lt; 0.05 % FSO</td>
<td></td>
<td>5 kHz (-3dB)</td>
</tr>
<tr>
<td>MDS-40-MK</td>
<td>approx. 40 mm*</td>
<td>different kinds</td>
<td>&lt; ±3 ... &lt; ±5 % FSO</td>
<td>0.05 % FSO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDS-40-LP</td>
<td>approx. 40 mm*</td>
<td>square</td>
<td>&lt; ±9 % FSO</td>
<td>0.05 % FSO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Accessories**
Measuring ranges of magnets: 20 mm, 27 mm, 35 mm, 45 mm, 55 mm
Power and output cables with M8x1 connector in different types

*depends on the magnet
Draw-wire sensors for displacement, position and length

wireSENSOR
- Measuring displacement, distance and position up to 50,000 mm
- Compact sensor housing combined with a large measuring range
- Ideal for difficult-to-access positions
- Easy, fast and flexible mounting
- Robust design, also for outdoors
- Excellent price/performance ratio
- Ideal for customized OEM series

Draw-wire sensors from Micro-Epsilon enable the measurement of long displacements with a small sensor size. Draw-wire displacement sensors measure the linear movement of a component using a wire made from highly flexible stainless steel strands, which is wound onto a drum by means of a long-life spring motor. The wire is attached directly to the measuring object and can also be guided over deflection pulleys to reach installation spaces that are difficult to access. The winding drum is axially coupled with a multi-turn potentiometer, an incremental encoder, or an absolute encoder.

Different sensor designs range from easy low-cost models to extremely robust designs for industrial applications. wireSENSOR models stand out due to their optimized ratio between measuring range and size, easy installation and handling. Their robust sensor design enables reliable measurements even in challenging ambient conditions.

Synchronization monitoring with draw-wire sensors in telescopic platforms
Measuring the deformation of rotor blades for wind turbines
Vibration monitoring of cranes
**wireSENSOR**

**MK30 / MK46 / MK77 / MK88 / MK120**  
OEM miniature sensors with plastic housing

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>50</th>
<th>150</th>
<th>250</th>
<th>500</th>
<th>750</th>
<th>2300</th>
<th>2400</th>
<th>3000</th>
<th>3500</th>
<th>5000</th>
<th>7500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog outputs</td>
<td>Potentiometer, voltage, current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital output</td>
<td>Encoder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**wireSENSOR P60/P96/ P115**  
Industrial sensors with aluminum housing

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>100</th>
<th>150</th>
<th>300</th>
<th>500</th>
<th>750</th>
<th>1000</th>
<th>1500</th>
<th>2000</th>
<th>2500</th>
<th>3000</th>
<th>4000</th>
<th>5000</th>
<th>7500</th>
<th>10,000</th>
<th>15,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog outputs</td>
<td>Potentiometer, voltage, current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital outputs</td>
<td>HTL, TTL, SSI, PB, CO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

**wireSENSOR MT**  
Miniature draw-wire sensors with aluminum housing

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>40</th>
<th>80</th>
<th>130</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog output</td>
<td>Potentiometer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**wireSENSOR P200**  
Long-range industrial sensors with aluminum housing

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>30,000</th>
<th>40,000</th>
<th>50,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital outputs</td>
<td>HTL, TTL, SSI, PB, CO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**wireSENSOR MPM/MP/MPW**  
Robust miniature sensors with aluminum housing

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>250</th>
<th>300</th>
<th>500</th>
<th>5000</th>
<th>1000</th>
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</thead>
<tbody>
<tr>
<td>Analog output</td>
<td>Potentiometer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**wireSENSOR K**  
Draw-wire sensors for integration & OEM

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>1500</th>
<th>2500</th>
<th>3500</th>
<th>5000</th>
<th>8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog outputs</td>
<td>Potentiometer, voltage, current</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**wireSENSOR mechanics**  
wireSENSOR mechanics are designed in such a way that they ensure easy mounting of an incremental or absolute encoder. Therefore, the user can individually choose the interface, resolution and connection type. Due to the robust housing, the draw-wire mechanisms are ideal for industrial use.

**WDS mechanics**  
Draw-wire sensor mechanics for encoder installation

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>1.500</th>
<th>3.000</th>
<th>5.000</th>
<th>7.500</th>
<th>10.000</th>
<th>15.000</th>
<th>30.000</th>
<th>40.000</th>
<th>50.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Plastics / aluminum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Output types          | depending on encoder |

**Protection class**  
IP67 / IP69K
2D/3D Laser profile sensors
with high accuracy and profile frequency

scanCONTROL
- Compact size with integrated evaluation: no external controller required
- High profile resolution for the detection of finest details
- High profile rate for dynamic measurement tasks
- Patented Blue Laser Technology
- Powerful software for parameterization and visualization
- SDKs for integration in individual software environments
- SMART design with integrated evaluation

Laser scanners from Micro-Epsilon are among the highest performing profile sensors with respect to accuracy and measuring rate. They detect, measure and evaluate profiles on different object surfaces without contact. The available models are suitable for numerous industrial applications. The integrated intelligence in their sensor head (scanCONTROL SMART) solves versatile measurement tasks. Models for the customer’s own programming are available for system integrators. scanCONTROL profile scanners do not require any external controller, which considerably simplifies the installation effort.

Equipped with powerful processors and highly sensitive optical components, these scanners ensure precise profile measurements on almost any type of surface. While they can be integrated in numerous environments, the laser scanners also impress with their compact design which includes an integrated controller.
scanCONTROL 25xx
Laser scanner for serial applications

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>z-axis</th>
<th>up to 265 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-axis</td>
<td>up to 143.5 mm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution</th>
<th>x-axis</th>
<th>640 points/profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile frequency</td>
<td></td>
<td>up to 2,000 Hz</td>
</tr>
</tbody>
</table>

scanCONTROL 29xx
Laser scanner with high precision

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>z-axis</th>
<th>up to 265 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-axis</td>
<td>up to 143.5 mm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution</th>
<th>x-axis</th>
<th>1,280 points/profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile frequency</td>
<td></td>
<td>up to 2,000 Hz</td>
</tr>
</tbody>
</table>

scanCONTROL 30x2
Powerful 2D/3D laser scanners

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>z-axis</th>
<th>up to 300 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-axis</td>
<td>up to 290 mm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution</th>
<th>x-axis</th>
<th>1,024 points/profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile frequency</td>
<td></td>
<td>up to 10,000 Hz</td>
</tr>
</tbody>
</table>

scanCONTROL 30x0
High-performance laser scanner

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>z-axis</th>
<th>up to 300 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-axis</td>
<td>up to 290 mm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution</th>
<th>x-axis</th>
<th>2,048 points/profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile frequency</td>
<td></td>
<td>up to 10,000 Hz</td>
</tr>
</tbody>
</table>

scanCONTROL Configuration Tools
Configuration of different measuring programs by mouse click
Dynamic tracking of evaluations in the profile
Parameterizing outputs and displaying measured values
Output of measured values across a large number of interfaces

scanCONTROL Software integration
Ethernet GigE Vision
SDK for fast integration in C/C++ (Linux and Windows) or C# (Windows) applications
Example VIs for NI LabVIEW for integration using LLTDLL or NI IMAQdx
Compatible with COGNEX® VisionPro

Large measuring range with 430 and 600 mm
The scanCONTROL 30x0 laser scanners are now also available with a large measuring range covering a measuring field of 240 x 400 mm or 380 x 600 mm. This allows large measuring objects to be detected with high accuracy.
Optical micrometers & fiber optic sensors

**optoCONTROL**
- Various models for different applications
- Large working distance
- Compact designs with integrated controller
- High accuracy
- Large measuring ranges up to 95 mm
- Detection of edges, gaps, positions and diameters of round objects
- Inspection and detection of position and presence

Optical micrometers are primarily used for production control and quality monitoring, and continuously measure both endless material and single parts. The technologies used are suitable for a wide range of applications. The compact optoCONTROL models are suitable for applications in production lines, as well as for integration in testing machines and automated production systems. The high measuring rates ensure a high and continuous cycle rate in the production process.

All optoCONTROL models work without rotating mirrors and are therefore completely wear-free. The parallel light curtain is created by special optics in the light source. High quality components in the receiving optics, e.g. filters and lenses, enable the high accuracy of the micrometers. This is why optoCONTROL micrometers are particularly suitable for fields where high precision and reliability are required.
### optoCONTROL 1200
Compact high-speed micrometer (laser)

<table>
<thead>
<tr>
<th>Measuring ranges (mm)</th>
<th>2</th>
<th>5</th>
<th>10</th>
<th>16</th>
<th>20</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity</td>
<td>±40 µm (independent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>10 µm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency response</td>
<td>100 kHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated controller</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### optoCONTROL 2520
Compact laser micrometer (class 1M)

<table>
<thead>
<tr>
<th>Measuring range (mm)</th>
<th>46</th>
<th>95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity</td>
<td>±12 µm</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>1 µm</td>
<td></td>
</tr>
<tr>
<td>Measuring rate</td>
<td>2.5 kHz</td>
<td></td>
</tr>
<tr>
<td>Integrated controller</td>
<td>(web interface)</td>
<td></td>
</tr>
</tbody>
</table>

### optoCONTROL 2600
High-resolution micrometer (LED)

<table>
<thead>
<tr>
<th>Measuring range (mm)</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity</td>
<td>±3 µm</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 µm</td>
</tr>
<tr>
<td>Measuring rate</td>
<td>2.3 kHz</td>
</tr>
<tr>
<td>External controller</td>
<td></td>
</tr>
</tbody>
</table>

### optoCONTROL 1200/90:
Version with 90° beam path for mounting in tight spaces. Optional mounting with ODC1202-L mounting rail as C-frame.

### optoCONTROL CLS1000
Fiber optic sensor for industrial applications

- Extremely robust and compact
- Numerous fiber optic sensors
- Large detection and operating ranges
- Extremely high resistance to ambient light
- Numerous teach-in modes and output types

### optoCONTROL 2520-46(090) and optoCONTROL 2520-95 (270)
micrometers offer a receiver equipped with a lens that is turned by 90°. The flat design of the receiver simplifies the installation process in restricted spaces.

### Breakage inspection of belt material

### Groove detection on the shaft

### Packaging control of blisters
With the surfaceCONTROL, reflectCONTROL and scanCONTROL sensor systems, Micro-Epsilon presents a new generation of 3D sensors which are based on a common software platform. These 3D sensors are used for high-resolution geometry and surface measurements and detect the measuring object by scan or by single snapshot, allowing fast inspection of matt and glossy surfaces. In contrast to conventional 3D systems with 2.5D evaluation, Micro-Epsilon’s Valid3D technology enables a complete representation and precise evaluation of the 3D point cloud.

These 3D sensors are used, e.g., for geometric component testing, position determination, presence checks and the measurement of flatness or planarity. Thanks to their high performance, the sensors are used for inline applications, on robots and also for offline inspection.
**reflectCONTROL Automotive**

Fully automatic surface inspection of painted car bodies

- Ideal for large-surface and curved objects
- Recognition of defects, inclusions, craters etc.

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**scanCONTROL**

Precise laser line scanners for 3D point clouds

- Red laser & patented Blue Laser Technology
- Up to 2048 points per profile
- Measuring rates up to 10,000 kHz
- One design for all measuring ranges

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**surfaceCONTROL 3D 3200/3500**

3D sensor for the inspection of geometry, shape and surfaces

- Highest precision in z up to < 0.4 µm
- Complete 3D images from 0.2 s
- Micrometer-accurate snapshots with large measuring fields

**New:** for large measuring fields 240 x 150 mm

---

**surfaceCONTROL 3D 2500**

3D inspection of large format surfaces

- Large measuring fields
- Detecting surface shape defects
- Detection and evaluation of 3D surface data within a few seconds

---

**surfaceCONTROL 3D 2500**

3D sensor for the inspection of geometry, shape and surfaces

- Highest precision in z up to < 0.4 µm
- Complete 3D images from 0.2 s
- Micrometer-accurate snapshots with large measuring fields

**New:** for large measuring fields 240 x 150 mm

---

**The powerful solution for 3D measurement tasks**

The Industrial Performance Unit (IPU) is a powerful computing platform for the efficient commissioning of Micro-Epsilon 3D sensors. The 3DInspect software enables the parameter setting of the sensors and the point cloud evaluation.

High compatibility to image processing environments is ensured via the GerliCam standard.
Precise color sensors, color measuring systems & LED Analyzers

**colorSENSOR / colorCONTROL**
- Non-contact color measurement for industrial applications
- Precise and fast measurements even on poorly reflecting surfaces
- Numerous sensors for all tasks
- Measurement accuracies $\Delta E$ up to 0.08
- Measurement frequencies up to 30 kHz
- Intuitive operation and configuration
- Ethernet and RS232 process interfaces

Color sensors from Micro-Epsilon are used for precise color measurements and color recognition. The sensors measure color values, intensities and functions on different surfaces. As a result, they are used in a variety of applications and stand for high productivity and cost reduction in manufacturing, automation and quality assurance.

colorSENSOR and colorCONTROL sensors are used for numerous measurement tasks. In addition to print mark recognition or batch testing, the sensors are used for measurement tasks that cannot be solved with other measurement processes. For example, the sensors check the presence of transparent coatings or determine the orientation of bottles based on an embossing mark. The MFA LED Analyzer also checks the function, color and intensity of LEDs, lamps or light sources. Thanks to the high accuracy and measuring rate, the range of applications is extremely diverse and can be found in numerous industries.

Checking the identical coloring of attachments in automotive production

Inspection of the interior coating in aluminum cans

Sorting of plastic components (connector colors)
**colorSENSOR CFO**  
Precise True Color Sensors for industry and automation  
Repeatability $\Delta E \leq 0.3$  
Measurement speed max. 30 kHz  
Color memory 320 colors in 254 color groups  
Numerous sensors for all surfaces  
New: colorSENSOR CFO250 for fast output of measurement values

**CFS sensors**  
with integrated optical glass fibers for adaptation to colorSENSOR CFO controller  
Ambient temperature -40 ... 400 °C  
Working distance 5 ... 320 mm  
Measurement spot diameter 0.8 ... 70 mm

**colorSENSOR OT-3-LD**  
Color sensors with fixed lens for large measurement distances  
Repeatability $\Delta E \leq 0.9$  
Switching frequency max. 35 kHz  
Color recognition from a large distance up to 900 m

**colorCONTROL MFA**  
Sensor system for LED tests  
Color distinction, intensity tests & function tests of LEDs  
Available with either 7, 14, 21 or 28 measurement channels

**colorCONTROL ACS7000**  
Inline color measuring system for non-contact color measurements  
Measurement geometries Transmission sensor, circular sensor, 30°/0° sensor  
Repeatability $\Delta E \leq 0.08$  
Spectral measuring range 390 ... 780 nm  
Measuring rate 2 kHz  
Color recognition from a taught reference list

Inline color measurement of plastic injection-molded parts directly after demolding

Inline color gradient measurement of transparent film and acrylic glasses

Color measurement of continuous strip coating such as aluminum, zinc and paper during production
Non-contact infrared pyrometers
for industrial measurement tasks

thermoMETER

- Infrared pyrometer for non-contact temperature measurement
- Temperature ranges from -50 °C to 1600 °C
- Compact design for non-contact temperature measurement without influencing the object
- Monitoring of hot, fast moving or difficult-to-access objects
- Robust, wear-free and reliable

Infrared pyrometers from Micro-Epsilon determine the object temperature without contact based on the infrared radiation emitted by the object. The thermoMETER series opens up numerous possibilities for measuring and displaying temperature curves in industrial fields of application. As this measurement is a non-contact technology, the pyrometers perform wear-free and can therefore be reliably used over long periods of time. Selectable models and optical systems enable the cameras to be installed in different distances from the surface. This allows for the target to be measured from a safe distance in critical areas of use.

Pioneering infrared technology for industrial applications

thermoMETER pyrometers combine high accuracy with measurements in ambient temperatures of up to 250 °C without cooling. New infrared sensor elements with small dimensions and high sensitivity enable outstanding sensor characteristics with high measurement accuracy and short response time. Temperature sensors are mainly used in machine building, research and development, maintenance and process monitoring.
thermoMETER CS / CSmicro / CSLaser
Compact, miniature and low cost
Temperature ranges from -50 °C to 1030 °C
Robust, silicon-coated lens
Integrated controller
Scalable analog output: 0 - 10V / 0 - 5V
Ideal for OEM, also available as two-wire version and high-resolution models

thermoMETER CT / CTfast
Extremely low cost and high accuracy
Temperature ranges from -50 °C to 975 °C
Short response times from 3 ms
Up to 180 °C ambient temperature without cooling

thermoMETER CTM2/M3
Version for metal production, temperature ranges from 50 °C to 1600 °C

thermoMETER CTM4
Fast measurement of metals and non-metals due to large, short-wave spectral range

thermoMETER CThot
for difficult ambient conditions up to 250 °C ambient temperature without cooling

thermoMETER CTLaser / CTLaserFAST
Precise pyrometer with laser sighting
Temperature ranges from -50 °C to 975 °C
Infrared sensor heads with optical resolution up to 75:1, from a measurement spot of 0.9 mm
Double laser marks the exact spot location from a spot size of 1 mm
Response time from 120 ms

thermoMETER TIM 8
Intelligent spotfinder pyrometer
Temperature ranges from -20 °C to 900 °C
Robust and compact pyrometer with motorized focus
Excellent optical resolution
Autonomous operation with automatic spotfinder and direct analog output
For temperature measurements in machine building and in automation

License-free evaluation software
Sensors with digital interfaces include the license-free compactCONNECT software for easy parameter set up, analysis and documentation purposes of measured temperature values.
Compact thermal imaging cameras
for industrial measurement tasks

thermoIMAGER

- Compact thermal imaging cameras for non-contact temperature measurement without affecting the object
- Temperature range from -20 °C to 1900 °C
- Monitoring of hot, fast moving or difficult-to-access objects
- Fast recognition of temperature deviations in power distribution systems, machines and production processes
- Powerful software included in delivery
- Software Developer Kit with examples, C, C++, C# included

thermoIMAGER infrared cameras are designed for industrial use. The cameras impress with their compact design and favorable price/performance ratio. They are available with different wavelengths optimized for different industries. Data is streamed in real time from the camera to the software via a USB interface. The powerful process and analysis software is included and enables the acquisition of thermal images at up to 128 Hz. The data can be stored in an image or video file and viewed and analyzed offline without a camera at a later time. In addition, the software can be used as a runtime application where the user is able to program and configure a custom environment (e.g. multiple monitoring windows, alarms, hot spot localization, line profiles). Advanced interface concepts enable integration into networks and automated systems.
thermoMAGER TIM M1 / TIM M-08
Thermal imaging camera for hot metal surfaces
Temperature ranges: 450 °C to 1900 °C
Excellent thermal sensitivity (NETD) of <1 K
Optical resolution 764 x 480 pixels
Spectral range 0.92 to 1.1 µm / 500 to 540 nm

thermoMAGER TIM 40
Compact OEM thermal imaging camera
Detector with 382 x 288 pixels
Temperature ranges: -20 °C to 900 °C
Excellent thermal sensitivity (NETD) of up to 0.04 K
Optical resolution: 382 x 288 pixels
Lenses with 18°, 29°, 53°, 80° FOV

thermoMAGER Microscope lens
Thermal imager with microscope lens
Measuring ranges:
-20 °C to 100 °C / 0 °C to 250 °C / 150 °C to 900 °C
Excellent thermal sensitivity (NETD) 90 mK or 120 mK
Optical resolution: 382x288 or 640x480 pixels
Smallest spot size: 42 µm / 28 µm
Spectral range: 7.5 to 13 µm

thermoMAGER TIM 160S
Temperature ranges:
-20 °C to 900 °C (special variant 1500 °C)
Excellent thermal sensitivity (NETD) of 0.08 K
Exchangeable lenses 12°/30°/55°/80° FOV
Real-time thermography with 120 Hz frame rate via USB 2.0 interface
Extremely compact, 45 x 45 x 62 - 77 mm
Analog input and output, trigger interface

thermoMAGER TIM QVGA / QVGA-HD
Detector with 382 x 288 pixels
Temperature ranges: -20 °C to 900 °C (special variant 1500 °C)
Excellent thermal sensitivity (NETD) of up to 0.075 K
Optical resolution: 382 x 288 or 640 x 480 pixels
Image recording in real time at 80 Hz
Analog input and output, trigger interface

thermoMAGER TIM 640 VGA
Thermography with VGA resolution
640 x 480 pixels
Temperature ranges: -20 °C to 900 °C (special variant 1500 °C)
Excellent thermal sensitivity (NETD) of 0.075 K
Radiometric video recording with 32 Hz
Analog input and output, trigger interface

thermoMAGER NetPCQ
Embedded, industrial PC solution with passive cooling for thermoMAGER applications
Supports all thermoMAGER TIM models
Integrated watchdog feature

Cooling Jacket Advanced
Universal cooling housing up to 315 °C
Ambient temperatures up to 315 °C
Air/water cooling with integrated air purging and optional protective windows
Modular concept for easy fitting of different cameras and lenses
As well as standard sensors based on various measuring principles, Micro-Epsilon has developed numerous sensors for special applications, which go beyond pure displacement and position measurements.

These application-specific sensors were developed for special measurement tasks and have proven themselves there many times. These developments incorporate the many years of know-how that Micro-Epsilon has accumulated in the design and application of sensor technology. High performance, precision and reliability at cost-effective OEM conditions are the main focus.

Rotational speed measurement of turbochargers
Measuring the thermal extension of spindles
Inspection of the inner diameter of extruder housings
**SGS Spindle Growth System**
Sensor system developed for measuring the thermal extension of milling spindles
Measuring range 500 µm
Resolution 0.5 µm
High temperature range

**idiamCONTROL**
Non-contact inspection of extruder bores
Non-contact and wear-free measurement technique for all metals without calibration
Exact, non-destructive inspection

**DZ140**
Sensor for rotational speed measurement during driving operations and tests
Optimized for modern, thin blades made from aluminum or titanium
Speed range from 200 to 400,000 rpm
Wide operating temperature range
Large distance between sensor & blade
No rotor modification required

**combiSENSOR**
One-side thickness measurement of plastic films and coated metals (battery film)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness of the target</td>
<td>40 µm to max. 6 mm</td>
</tr>
<tr>
<td>Working distance</td>
<td>2 to 10 mm</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.0018 % FSO</td>
</tr>
<tr>
<td>Frequency response</td>
<td>1 kHz (-3dB)</td>
</tr>
</tbody>
</table>

**Inline yarn thickness measurement**
**Load detection in washing machines**
**Non-contact, inline thickness measurement of plastic films**
Measuring and testing systems from Micro-Epsilon combine sensors, software and mechanics in an integrated overall solution. The systems are used for process monitoring and quality assurance in the production line and impress with high precision and ease of integration. The sensor and software modules used originate from the Micro-Epsilon group, enabling optimum and efficient component matching.

These measuring and inspection systems are integrated into existing or newly designed production lines to carry out fully automatic applications such as thickness measurements, surface inspections and parts classification. The systems are used, for example, in metal rolling mills, battery production, the plastics industry, and in the manufacture of tires and technical rubber.

The appropriate measurement concept depends on the measurement task. In addition to laser, eddy current, profile and capacitive sensors, micrometers and special combination sensors are used. The latter are free of X-rays or isotope radiation and provide highly accurate readings. Signal processing and output can be arranged to suit the application requirements.

The measuring systems communicate with existing environments via various interfaces and can therefore also be retrofitted into existing production lines.
thicknessGAUGE C-frame systems
Sensor system for precise inline thickness measurements
For many types of surfaces / materials due to different sensor technologies
Traversing sensors on linear axis
Fully automatic calibration

thicknessGAUGE O-frame systems
Sensor system for precise thickness measurements of strip and plate materials
Compact complete solution for inline thickness measurements
Different material widths up to 1,250 mm
Traversing measurement or fixed track measurement

Systems for the preparation area in the rubber and tire production
Profilometer
Color code
Measuring length

Final finishing systems in the rubber and tire production
Tire geometry
Tire marking
Tire identity

Systems for the plastics inspection
C-frames for thickness measurement of flat film
O-frame systems for profile thickness measurement
Reverse-frame systems for the profile measurement of blown films

thicknessGAUGE C-frame systems
Sensor technology used:
Laser triangulation displacement sensors

thicknessGAUGE O-frame systems
Sensor technology used:
Confocal chromatic displacement sensors

thicknessGAUGE C-frame systems
Sensor technology used:
Blue Laser profile sensors

thicknessGAUGE O-frame systems
Sensor technology used:
combiSENSOR

thicknessGAUGE O.frame systems
Sensor technology used:
white light interferometers

Systems for metal thickness measurements
For fast and precise measurements on all alloys
Laser sensor technology without isotopes and X-rays
Reliable measurement independent from belt movements, tilt and surface
For cold rolling mills and hot rolling mills

Measuring systems for battery production
High precision thickness measuring system for coated anode and cathode films
Quad measuring system consisting of two robust measuring frames, each containing eight confocal sensors
Robust design with temperature compensation
Measuring range (thickness) <6 mm
System accuracy ±0.3 µm