More Precision

optoNCDT // Laser displacement sensors (triangulation)
Blue Laser sensor for direct reflection
The optoNCDT 2300-2DR high precision laser triangulation sensor is designed for highly dynamic measurements on reflective and shiny targets. The sensor can be fixed parallel to the measuring object, which greatly simplifies the installation process. Unlike conventional laser triangulation sensors, the optoNCDT 2300-2DR uses the directly reflected light of the laser. During measurements, the blue laser light is directly reflected by the measuring object onto the receiving optics. Due to the blue laser light, the signal on the receiver element is extremely stable, which means the sensor is able to measure to nanometer resolution. An extremely small laser spot size enables the detection of very small objects.

High speed and precision on shiny & reflective surfaces
The optoNCDT 2300-2DR offers an adjustable measuring rate up to 49.14 kHz and so is suitable for dynamic high speed process monitoring. The Advanced Real Time Surface Compensation (A-RTSC) feature is a development of the proven RTSC technology and enables more precise real time surface compensation when measuring onto different surface types.

The sensor is used for production monitoring purposes such as distance measurement of wafers, assembly monitoring of extremely small parts and for distance measurements on annealed glass.

Compact and easy to integrate
The entire electronics is integrated in a compact sensor housing which is a worldwide unique feature in this sensor class. Data output is via Ethernet, RS422 or EtherCAT. If the sensor is operated with the C-Box/2A signal processing unit (optional), an analog output is also available. The entire sensor configuration is handled in a user-friendly web interface.
### Model

<table>
<thead>
<tr>
<th>Feature</th>
<th>ILD2300-2DR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range ¹)</td>
<td>2 (1) mm</td>
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<tr>
<td>Start of measuring range ⁵)</td>
<td>9 (9) mm</td>
</tr>
<tr>
<td>Mid of measuring range ⁶)</td>
<td>10 (9.5) mm</td>
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<tr>
<td>End of measuring range ⁶)</td>
<td>11 (10) mm</td>
</tr>
<tr>
<td>Measuring rate</td>
<td>7 adjustable stages: 49.14 kHz ²) / 30 kHz / 20 kHz / 10 kHz / 5 kHz / 2.5 kHz / 1.5 kHz</td>
</tr>
<tr>
<td>Linearity</td>
<td>&lt; ±0.6 µm</td>
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<tr>
<td>Resolution ³)</td>
<td>&lt; ±0.03 % FSO</td>
</tr>
<tr>
<td>Temperature stability</td>
<td>±0.01 % FSO / K</td>
</tr>
<tr>
<td>Light spot diameter (± 10 %)</td>
<td></td>
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<tr>
<td><strong>SMR</strong></td>
<td>21.6 x 25 µm</td>
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<tr>
<td><strong>MMR</strong></td>
<td>8.5 x 11 µm</td>
</tr>
<tr>
<td><strong>EMR</strong></td>
<td>22.4 x 23.7 µm</td>
</tr>
<tr>
<td>Light source</td>
<td>Semiconductor laser &lt;1 mW, 405 nm (blue violet)</td>
</tr>
<tr>
<td>Laser safety class</td>
<td>Class 2 in accordance with DIN EN 60825-1: 2015-07</td>
</tr>
<tr>
<td>Permissible ambient light</td>
<td>10,000…40,000 lx</td>
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<tr>
<td>Supply voltage</td>
<td>11 ... 30 VDC</td>
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<tr>
<td>Power consumption</td>
<td>&lt; 2 W (24 V)</td>
</tr>
<tr>
<td>Signal input</td>
<td>Laser on/off, sync in, trigger in</td>
</tr>
<tr>
<td>Digital interface</td>
<td>RS422 (16 bit) / Ethernet / EtherCAT / PROFINET ⁴) / EtherNet/IP ⁴)</td>
</tr>
<tr>
<td>Analog output ⁴)</td>
<td>4 ... 20 mA / 0 ... 5 V / 0 ... 10 V / ±5 V / ±10 V</td>
</tr>
<tr>
<td>Synchronization</td>
<td>possible for simultaneous or alternating measurements</td>
</tr>
<tr>
<td>Connector</td>
<td>integrated pigtail 0.25 m with 14-pin cable connector, min. bending radius 30 mm (fixed installation); optional extension to 3 m / 10 m possible (see accessories for suitable connection cables)</td>
</tr>
<tr>
<td>Mounting</td>
<td>Screw connection via three mounting holes</td>
</tr>
<tr>
<td>Temperature range</td>
<td></td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>-20 ... +70 °C (non-condensing)</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td>0 ... +50 °C (non-condensing)</td>
</tr>
<tr>
<td>Shock (DIN EN 60068-2-27)</td>
<td>15 g / 6 ms in 3 axes</td>
</tr>
<tr>
<td>Vibration (DIN EN 60068-2-6)</td>
<td>2 g / 20 ... 500 Hz</td>
</tr>
<tr>
<td>Protection class (DIN EN 60529)</td>
<td>IP65</td>
</tr>
<tr>
<td>Material</td>
<td>Aluminum housing</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 400 g (incl. pigtail)</td>
</tr>
<tr>
<td>Control and indicator elements</td>
<td>Web interface for setup: user management, measurement settings, data output, measurement control, parameters, extras; 2 x color LEDs for Status / Ethernet and EtherCAT</td>
</tr>
</tbody>
</table>

**FSO** = Full Scale Output  
SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range  
The specified data apply to directly reflecting surfaces  
The specified data apply to a measuring rate of 49.14 kHz  
¹) Value in brackets is valid for a measuring rate of 49.14 kHz  
²) Measuring rate of 49.14 kHz with reduced measuring range (in brackets)  
³) Measuring rate 20 kHz  
⁴) Optional connection via interface module (see accessories)  
⁵) Measuring rate 30 kHz  
⁶) Measuring rate 20 kHz

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**Patented Blue Laser Technology**

Measurement tasks involving Blue Laser sensors on red-hot glowing objects exceeding 700 °C and transparent objects such as plastics, adhesives and glass are patented by Micro-Epsilon. On these surfaces, the optoNCDT Blue Laser models achieve excellent signal stability and high precision measurement results.
Accessories for all optoNCDT series

Power supply
- PS2020 (power supply 24 V / 2.5 A, input 100 - 240 VAC, output 24 VDC / 2.5 A, mounting onto symmetrical standard rail 35 mm x 7.5 mm, DIN 50022)

Accessories for 1220/1320 series

Protective film
- Transparent protective film 32 x 11 mm for ILD1x20

Accessories for 1420 series

Supply and output cable (drag-chain suitable)
- PCF1420-1/I (1 m, output 4 ... 20 mA)
- PCF1420-1/I(01) (1 m, output 4...20 mA)
- PCF1420-3/I (3 m, output 4 ... 20 mA)
- PCF1420-6/I (6 m, output 4 ... 20 mA)
- PCF1420-10/I (10 m, output 4 ... 20 mA)
- PCF1420-15/I (15 m, output 4 ... 20 mA)
- PCF1420-3/U (3 m, with integrated resistor, output 1 ... 5 VDC)*
- PCF1420-6/U (6 m, with integrated resistor, output 1 ... 5 VDC)*
- PCF1420-10/U (10 m, with integrated resistor, output 1 ... 5 VDC)*
- PCF1420-15/U (15 m, with integrated resistor, output 1 ... 5 VDC)*
- PCF1420-3/IF2008 (3 m, interface and supply cable)
- PCF1420-6/IF2008 (6 m, interface and supply cable)
- PCF1420-10/IF2008 (10 m, interface and supply cable)
- PCF1420-3/C-Box (3 m)
  * on request with output 2 ...10 VDC

Supply and output cable, suitable for use with robots
(available in 90° version)
- PCR1402-3/I (3 m)
- PCR1402-6/I (6 m)
- PCR1402-8/I (8 m)

Protective film
Transparent protective film 32 x 11 mm for ILD1x20

Accessories for 1710/1750/1760 series

Supply and output cable (drag-chain suitable)
- PC1700-3 (3 m)
- PC1700-10 (10 m)
- PC1700-10/IF2008 (10 m, for use with interface card IF2008)
- PC1750-3/C-Box (3 m)
- PC1750-6/C-Box (6 m)
- PC1750-9/C-Box (9 m)

Supply and output cable (suitable for use with robots)
- PCR1700-5 (5 m)
- PCR1700-10 (10 m)

Supply and output cables for temperatures up to 200 °C
- PC1700-3/OE/HT (3 m)
- PC1700-6/OE/HT (6 m)
- PC1700-15/OE/HT (15 m)

Protective film
Transparent protective film 32 x 11 mm for ILD1x20

Accessories for 1900 series

Supply and output cable (drag-chain suitable)
- PC1900-3/IF2008 Supply/output cable 3 m
- PC1900-6/IF2008 Supply/output cable 6 m
- PC1900-9/IF2008 Supply/output cable 9 m
- PC1900-15/IF2008 Supply/output cable 15 m
- PC1900-3/C-Box Power/output cable 3 m
- PC1900-6/C-Box Power/output cable 6 m
- PC1900-9/C-Box Power/output cable 9 m
- PC1900-15/C-Box Power/output cable 15 m
- PC1900-3/OE Supply/output cable 3 m
- PC1900-6/OE Supply/output cable 6 m
- PC1900-9/OE Supply/output cable 9 m
- PC1900-15/OE Supply/output cable 15 m
- PC1900-3/OE-RJ45 Ethernet cable 3 m
- PC1900-6/OE-RJ45 Ethernet cable 6 m
- PC1900-9/OE-RJ45 Ethernet cable 9 m
- PC1900-3/RJ45 Ethernet cable 3 m
- PC1900-6/RJ45 Ethernet cable 6 m
- PC1900-9/RJ45 Ethernet cable 9 m

Protective housings
- SGH model (sizes S and M)
- SGHF model (sizes S and M)
- SGHF-HT model

Accessories for 2300/2310 series

Supply and output cable
- PC2300-0,5Y (connection cable to PC or PLC; for operation a PC2300-3/SUB-D will be required in addition)
- PC2300-3/SUB-D (3 m; for operation a PC2300-0,5Y will be required in addition)
- PC2300-3/IF2008 (interface and supply cable)
- PC2300-3/OE (3 m)
- PC2300-6/OE (6 m)
- PC2300-9/OE (9 m)
- PC2300-15/OE (15 m)
- PC2300-3/C-Box/RJ45 (3 m)
  * other cable lengths on request

Supply and output cables for temperatures up to 200 °C
- PC2300-3/OE/HT (3 m)
- PC2300-6/OE/HT (6 m)
- PC2300-9/OE/HT (9 m)
- PC2300-15/OE/HT (15 m)

Protective housings
- SGH model (sizes S and M)
- SGHF model (sizes S and M)
- SGHF-HT model
sensorTOOL

The Micro-Epsilon sensorTOOL is a powerful software that is used to operate one or more optoNCDT sensors. The sensorTOOL can be used to access the sensor connected to the PC, display its complete data stream and save it in a file (in Excel-compatible CSV format). The sensor is configured via its web interface.

Free download

All software tools, drivers and documented driver DLL for easy integration of the sensors into existing or internally-generated software are available free of charge under www.micro-epsilon.com/download
Protective housings for demanding environments
To protect the optoNCDT laser sensors in harsh environments, protective housings are available in different designs.

SGH model:
The SGH protective housing encloses the sensor and is equipped with a replaceable protective window. The water-resistant housing protects the sensor from solvents and detergents.

Size S for the following models:
- 1750-20BL and 1750-200BL
- 2300-2, 2300-5, 2300-10, 2300-20, 2300-50 and 2300-100
- 2300-2LL, 2300-10LL, 2300-20LL and 2300-50LL
- 2300-2BL, 2300-5BL and 2300-10BL

Size M for the following models:
- 1750-500BL and 1750-750BL
- 1750-500 and 1750-750
- 2300-200 and 2300-300
- 2310-10, 2310-20 and 2310-40

SGHF model:
With window and compressed-air connection ideal for high ambient temperatures. The integrated air cooling of the housing offers optimum protection for the sensor.

Size S for the following models:
- 1750-20BL and 1750-200BL
- 2300-2, 2300-5, 2300-10, 2300-20, 2300-50 and 2300-100
- 2300-2LL, 2300-10LL, 2300-20LL and 2300-50LL
- 2300-2BL, 2300-5BL and 2300-10BL

Size M for the following models:
- 1750-500BL and 1750-750BL
- 1750-500 and 1750-750
- 2300-200 and 2300-300
- 2310-10, 2310-20 and 2310-40

SGHF-HT model:
This water-cooled protective housing with window and compressed-air connection is designed for measurement tasks in ambient temperatures up to 200 °C.

For the following models:
- 1710-50 and 1710-1000
- 1710-50BL and 1710-1000BL
- 1750-500BL and 1750-750BL
- 2300-200 and 2300-300
- 2310-50BL
- 2310-10, 2310-20, 2310-40 and 2310-50

Maximum temperature of cooling water $T(\text{max}) = 10 \, ^\circ\text{C}$
Minimum water flow rate $Q(\text{min}) = 3 \, \text{liters/min}$
C-Box/2A Controller for D/A conversion and evaluation of up to 2 sensor signals

C-Box/2A is used for fast D/A conversion of two digital input signals or for evaluating two digital sensor signals. The controller is compatible with the optoNCDT 1420, 1750, 1900 and 2300 models. Handling of the C-Box/2A and of the connected sensors are performed via web interface. Averaging functions, thickness, diameter, step and inclinations can be calculated. The D/A conversion is executed at 16 bit and max. 70 kHz.

Special features
- Trigger input
- Multi-function output
- Measurement value output via Ethernet, USB, analog output 4 ... 20 mA / 0 ... 5 V / 0 ... 10 V / ±5 V / ±10 V (scalable via web interface)
- 2x switching outputs for sensors or C-Box/2A status
- Parallel data output via three output interfaces

### Interface modules

<table>
<thead>
<tr>
<th>Module</th>
<th>optoNCDT 1220</th>
<th>optoNCDT 1320</th>
<th>optoNCDT 1420</th>
<th>optoNCDT 1710</th>
<th>optoNCDT 1750</th>
<th>optoNCDT 1800</th>
<th>optoNCDT 2300</th>
<th>optoNCDT 2310</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-Box/2A</td>
<td>☒</td>
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<td>IF2001/USB</td>
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<td>IC2001/USB</td>
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<td>IF2004/USB</td>
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<td>IF2008/ETH</td>
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<td>IF2008PCIE</td>
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<tr>
<td>IF2030/PNET</td>
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<tr>
<td>IF2030/ENETIP</td>
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</table>

C-Box/2A Controller for D/A conversion and evaluation of up to 2 sensor signals
IF2030
Interface module for Industrial Ethernet connection
The IF2030 interface modules are designed for easy connection of Micro-Epsilon sensors to Ethernet-based fieldbuses, e.g., plant control systems. The PROFINET and Ethernet/IP modules are compatible with sensors that output data via an RS422 or RS485 interface. These modules operate on the sensor side with up to 4 MBd and have two network connections for different network topologies. Installation in control cabinets is via a DIN rail.

IF2008PCle/IF2008E
Interface card for synchronous data acquisition
Absolute synchronous data acquisition is a decisive factor for the planarity or thickness measurement using several laser sensors. The IF2008PCle interface card is designed for installation in PCs and enables the synchronous capture of four digital sensor signals and two encoders. The data is stored in a FIFO memory in order to enable resource-saving processing in blocks in the PC. The IF2008E expansion board enables to detect in addition two digital sensor signals, two analog sensor signals and eight I/O signals.

Special features
- IF2008PCle - Basic printed circuit board: 4 digital signals and 2 encoders
- IF2008E - Expansion board: 2x digital signals, 2x analog signals and 8x I/O signals

IF2008/ETH
IF2008/ETH Interface module for Ethernet connection with up to 8 sensors
The IF2008/ETH integrates up to eight sensors and/or encoders with an RS422 interface into an Ethernet network. Four programmable switching in-/outputs (TTL and HTL logic) are available. Ten indicator LEDs directly on the module show both the channel and the device status. In addition, acquisition and output of data via Ethernet is in addition performed at high speeds up to 200 kHz. Parameter setting of the interface module can be easily done via the web interface.
**IC2001/USB Single-channel converter cable RS422/USB**
The IC2001/USB single-channel converter cable is used for the USB connection of optoNCDT sensors equipped with an RS422 interface. The cable is easy to assemble and can therefore also be used for installation in machines and systems.

**Special features**
- 5-core interface cable without outer shield
- Conversion from RS422 to USB
- Easy sensor connection via USB
- Supports baud rates from 9.6 kBaud to 1 MBaud

**IF2001/USB converter RS422 to USB**
The RS422/USB converter transforms digital signals from a laser-optical sensor into a USB data packet. The sensor and the converter are connected via the RS422 interface of the converter.

Data output is done via USB interface. The converter loops through further signals and functions such as laser on/off, switch signals and function output. The connected sensors and the converter can be programmed through software.

**Special features**
- Robust aluminum housing
- Easy sensor connection via screw terminals (plug and play)
- Conversion from RS422 to USB
- Supports baud rates from 9.6 kBaud to 12 MBaud

**IF2004/USB: 4-channel converter from RS422 to USB**
The RS422/USB converter is used for transforming digital signals from up to four optical sensors into USB data signals. The converter has four trigger inputs and a trigger output for connecting additional converters. Data is output via an USB interface. The connected sensors and the converter can be programmed through software.

**Special features**
- 4x digital signals via RS422
- 4x trigger inputs, 1x trigger output
- Synchronous data acquisition
- Data output via USB
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

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