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 measurement 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 measurement 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 reflective, shiny surfaces
The optoNCDT 2300-2DR offers an adjustable measuring rate up to 49 kHz and so is suitable for dynamic high speed process monitoring. The new A-RTSC (Advanced Real Time Surface Compensation) 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 control purposes such as thickness measurement of flat glass, 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 of 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. All sensor configurations are carried out via a user-friendly web interface.
<table>
<thead>
<tr>
<th>Model</th>
<th>ILD 2300-2DR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>2 mm (1 mm)</td>
</tr>
<tr>
<td>Start of measuring range</td>
<td>9 mm (9 mm)</td>
</tr>
<tr>
<td>Mid of measuring range</td>
<td>10 mm (9.5 mm)</td>
</tr>
<tr>
<td>End of measuring range</td>
<td>11 mm (10 mm)</td>
</tr>
<tr>
<td>Linearity</td>
<td>≤ ± 0.6 µm</td>
</tr>
<tr>
<td>Resolution (with 20 kHz)</td>
<td>≤ ± 0.03% FSO</td>
</tr>
<tr>
<td>Resolution</td>
<td>30 nm</td>
</tr>
<tr>
<td>Measuring rate</td>
<td>switchable (software) 49.14 / 30 / 20 / 10 / 5 / 2.5 / 1.5 kHz (49.14 kHz with reduced measuring range)</td>
</tr>
<tr>
<td>Permissible ambient light</td>
<td>10,000 ... 40,000 lx</td>
</tr>
<tr>
<td>Light spot diameter</td>
<td>SMR 21.6 x 25 µm</td>
</tr>
<tr>
<td></td>
<td>MMR 8.5 x 11 µm</td>
</tr>
<tr>
<td></td>
<td>EMR 22.4 x 23.7 µm</td>
</tr>
<tr>
<td>Light source</td>
<td>Semiconductor laser &lt;1 mW, 405 nm (blue violet), laser class 2</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP65</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 ... +50 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 ... +70 °C</td>
</tr>
<tr>
<td>Inputs/Outputs</td>
<td>RS422 / Ethernet / EtherCAT</td>
</tr>
<tr>
<td>Inputs</td>
<td>Laser on/off Synch / Trigger</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>11 ... 30 VDC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 2 W (24 V)</td>
</tr>
<tr>
<td>Display Status LED</td>
<td>off = Laser OFF</td>
</tr>
<tr>
<td></td>
<td>red = Laser OFF</td>
</tr>
<tr>
<td></td>
<td>poor target; out of range</td>
</tr>
<tr>
<td></td>
<td>yellow = MMR</td>
</tr>
<tr>
<td></td>
<td>green = ok</td>
</tr>
<tr>
<td>Power LED</td>
<td>off = Power OFF</td>
</tr>
<tr>
<td></td>
<td>green = Ethernet / RS422</td>
</tr>
<tr>
<td>Sensor cable Standard</td>
<td>0.25 m (with connector)</td>
</tr>
<tr>
<td>Option</td>
<td>3/10 m with 15-pole sub-D Connector</td>
</tr>
<tr>
<td>Electromagnetic compatibility (EMC)</td>
<td>according to EN 55011/12.1998 and EN 50082-2/02.1996</td>
</tr>
<tr>
<td>Vibration</td>
<td>2 g / 20 ... 500 Hz</td>
</tr>
<tr>
<td>Shock</td>
<td>15 g / 6 ms / 3 axes</td>
</tr>
</tbody>
</table>

FSO = Full Scale Output
SMR = start of measuring range; MMR = midrange; EMR = end of measuring range

1) Range specifications: value in brackets is valid for a measuring rate of 49.14 kHz
**Accessories for all optoNCDT Series**

**Power supply**
- PS 2020 (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)

**Controller unit for evaluation and signal conversion**
- C-Box/2A (controller for conversion and evaluation of up to 2 sensor signals)

**Interface card**
- IF2008/PCI / IF2008PCIe (interface card for multiple signal processing; analog and digital interfaces)

**USB converter**
- IF2001/USB RS422/USB converter (converter for digital signals in USB)
- IF2004/USB 4-channel RS422/USB converter (converter for up to 4 digital signals in USB)

**Accessories for optoNCDT 1320 / 1420 / 1402CL1**

**Supply and output cable (drag-chain suitable)**
- PCF1420-1/I (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)
- PCR 1402-3/I (3 m)
- PCR 1402-6/I (6 m)
- PCR 1402-8/I (8 m)

**Accessories for optoNCDT 1750 / 1750LL / 1750BL / 1750DR / 1710 / 1710BL**

**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)

**Protection housing**
- SGH model (sizes S and M)
- SGHF model (sizes S and M)
- SGHF-HT model

**Accessories for optoNCDT 2300 / 2300LL / 2300BL / 2300-2DR**

**Supply and output cable**
- PC2300-0,5Y (connection cable to PC or PLC; for operation a PC2300-3/SUB-D will be required)
- PC2300-3/SUB-D (3 m; for operation a PC2300-0,5Y will be required)
- 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)

**Protection housing**
- SGH model (sizes S and M)
- SGHF model (sizes S and M)
- SGHF-HT model

**Accessories for optoNCDT 1610 / 1630**

**Supply and output cable**
- PC1605-3 (3 m)
- PC1605-6 (6 m)
- PC1607-5/BNC (5 m, BNC connector)
To protect the laser sensors in extreme environments, individual protective housings are available for all sensor models. There are three different models:

**SGH model:**
Completely enclosed housing with an integrated front window, where the sensor measures through the window. The water-resistant housing provides protection against solvents and detergents.

**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.

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

Suitable for all long-range sensors
- optoNCDT 1710
- optoNCDT 1750-500 and optoNCDT 1750-750
- optoNCDT 2310
- optoNCDT 2300 - 200

Maximum ambient temperature 200 °C
Maximum temperature of cooling water $T(\text{max}) = 10 ^\circ C$
Minimum water flow rate $Q(\text{min}) = 3$ liters/min

**OptoNCDT Demo Tool**
The scope of supply includes a software for easy sensor configuration. The settings can be implemented conveniently via a Windows user interface on the PC. The sensor parameters are transmitted to the sensor via the serial port and can also be saved if required. The software is available as single and multi-channel version. The sensor is connected to the PC via the sensor cable using a USB converter.

[f for any ILD sensor]

**Free download**
Download free of charge from www.micro-epsilon.com/download: software, driver and well-documented driver DLL for easy sensor integration in existing or customer software.

**Protection housing for harsh environments**
To protect the laser sensors in extreme environments, individual protective housings are available for all sensor models. There are three different models:

**SGH model:**
Completely enclosed housing with an integrated front window, where the sensor measures through the window. The water-resistant housing provides protection against solvents and detergents.

**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.

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Suitable for all long-range sensors
- optoNCDT 1710
- optoNCDT 1750-500 and optoNCDT 1750-750
- optoNCDT 2310
- optoNCDT 2300 - 200

Maximum ambient temperature 200 °C
Maximum temperature of cooling water $T(\text{max}) = 10 ^\circ C$
Minimum water flow rate $Q(\text{min}) = 3$ liters/min

**SGHx ILD size S (140x140x71 mm)**
for optoNCDT 1750 / 2300 dimensions 97x75 mm

**SGHx ILD size M (140x180x71 mm)**
for optoNCDT 1750 / 2300 dimensions 150x80 mm

**OptoNCDT Demo Tool**
The scope of supply includes a software for easy sensor configuration. The settings can be implemented conveniently via a Windows user interface on the PC. The sensor parameters are transmitted to the sensor via the serial port and can also be saved if required. The software is available as single and multi-channel version. The sensor is connected to the PC via the sensor cable using a USB converter.

[f for any ILD sensor]

**Free download**
Download free of charge from www.micro-epsilon.com/download: software, driver and well-documented driver DLL for easy sensor integration in existing or customer software.
IF2008PCI/IF2008 PCIe - PCI Interface card
The IF2008 interface card is designed for installation in PCs and enables the synchronous capture of four digital sensor signals and two encoders. The IF2008E expansion board enables the acquisition of two digital sensor signals, two analog sensor signals and eight I/O signals. The absolutely synchronous data acquisition plays an important role particularly for planarity or thickness measurement tasks. The data are stored in a FIFO memory in order to enable resource-saving processing in blocks in the PC.

Special features
• 4x digital signals and 2x encoders with IF2008 basic PCB
• 2x digital signals, 2x analog signals and 8x I/O signals with IF2008E expansion board
• 6x digital signals, 2x encoders, 2x analog signals and 8x I/O signals together with IF2008E
• FIFO data memory
• Synchronous data acquisition

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.
**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

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**C-Box/2A Controller for conversion and evaluation of up to two 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 2300 laser triangulation sensors. Output of the sensor signals is possible via two configurable analog outputs, Ethernet or USB. 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.
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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