More Precision

**optoNCDT** // Laser displacement sensors (triangulation)
The optoNCDT 1420 offers a unique combination of speed, size, performance and application versatility in the class of compact triangulation sensors. The sensor with integrated controller is used in restricted installation space or dynamic applications. The selectable connector type, i.e. cable or pigtail, together with compact size reduce the sensor installation effort to a minimum. The Auto Surface Compensation (ASC) provides stable distance signal control. The high-performance optical system projects the small light spot sharply onto the measurement object which enables to even detect smallest components and every little detail reliably.

**Highest precision in a minimum of space**
Compact size combined with low weight opens up new fields of application. Analog and digital output signals enable to integrate the sensor into plant or machine control systems. The triangulation sensor achieves a high measurement accuracy with measuring rates of up to 4 kHz.

**Unique ease of use, individual results**
All optoNCDT 1420 models are operated using an extended web interface. The settings for the measurement task can be quickly selected using predefined presets. The quality slider enables the sensor to be adapted to static and dynamic processes. Up to eight user-specific sensor settings can be stored and exported in the setup management. The video signal display, the signal peak selection and a freely adjustable signal averaging enable to optimize the measurement task.

The ROI function (region of interest) allows, e.g., for interfering signals in the background to be filtered out. The remaining signal peak is optimally corrected.

---

**Connector (sensor side)**

- 2x M3 threads or as mounting holes for M2
- Laser
- Limits for free space
- Keep this area free from other light sources and/or their reflections

**Limits for free space**

<table>
<thead>
<tr>
<th>MR</th>
<th>SMR</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>50</td>
<td>35</td>
<td>28</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>46</td>
</tr>
<tr>
<td>200</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>500</td>
<td>100</td>
<td>190</td>
</tr>
<tr>
<td>Model</td>
<td>ILD1420-10</td>
<td>ILD1420-25</td>
</tr>
<tr>
<td>--------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>Measuring range</td>
<td>10 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>Start of measuring range</td>
<td>20 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>Mid of measuring range</td>
<td>25 mm</td>
<td>37.5 mm</td>
</tr>
<tr>
<td>End of measuring range</td>
<td>30 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>Measuring rate 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 adjustable stages:</td>
<td>4 kHz / 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz</td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>&lt; ± 8 µm</td>
<td>&lt; ± 20 µm</td>
</tr>
<tr>
<td>Repeatability 2)</td>
<td>0.5 µm</td>
<td>1 µm</td>
</tr>
<tr>
<td>Temperature stability</td>
<td>± 0.015 % FSO / K</td>
<td>± 0.01 % FSO / K</td>
</tr>
</tbody>
</table>

**Light spot diameter (± 10 %)**

<table>
<thead>
<tr>
<th>Light source</th>
<th>Semiconductor laser &lt; 1 mW, 670 nm (red)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMR</td>
<td>90 x 120 µm</td>
</tr>
<tr>
<td>MMR</td>
<td>45 x 40 µm</td>
</tr>
<tr>
<td>EMR</td>
<td>140 x 160 µm</td>
</tr>
</tbody>
</table>

**Laser safety class**

Class 2 in accordance with DIN EN 60825-1 : 2015-07

**Permissible ambient light 3)**

50,000 lx 30,000 lx 10,000 lx

**Supply voltage**

11 … 30 VDC

**Power consumption**

< 2 W (24 V)

**Signal input**

1 x HTL laser on/off;
1 x HTL multifunction input: trigger in/zero setting/mastering/teach

**Digital interface**

RS422 (16 bit) / PROFINET 4) / EtherNet/IP 4)

**Analog output**

4 ... 20 mA / 1 ... 5 V with PCF1420-3/U cable (12 bit, freely scalable within the measuring range) 5)

**Switching output**

1 x error output: npn, pnp, push pull

**Connection**

integrated cable 3 m, open ends, min. bending radius 30 mm (fixed installation);
or integrated pigtail 0.3 m with 12-pin M12 plug (see accessories for suitable connection cable)

**Installation**

Screw connection via two mounting holes

**Temperature range**

Storage -20 ... +70 °C (non-condensing)
Operation 0 ... +50 °C (non-condensing)

**Shock (DIN-EN 60068-2-29)**

15 g / 6 ms in 3 axes, 1000 shocks each

**Vibration (DIN EN 60068-2-6)**

20 g / 20 … 500 Hz in 3 axes, 2 directions and 10 cycles each

**Protection class (DIN-EN 60529)**

IP65

**Material**

Aluminum housing

**Weight**

approx. 60 g (incl. pigtail), approx. 145 g (incl. cable)

**Control and display elements**

Select button: zero, teach, factory setting;
web interface for setup 6): selectable presets, peak selection, video signal,
freely selectable averaging, data reduction, setup management;
2 x color LEDs for power / status

---

1) Factory setting 2 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)
2) Measuring rate 2 kHz, median 9
3) Illuminant: light bulb
4) Connection via interface module (see accessories)
5) D/A conversion is executed with 12 bit
6) Connection to PC via IF2001/USB (see accessories)
Accessories for all optoNCDT series (except for LD16x0)

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
- IF2008PCI / 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)

Interface module for Industrial Ethernet connection
- IF2030/PNET
- IF2030/ENETIP

Accessories optoNCDT 1420 / 1402CL1

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/ (3 m)
- PCR1402-6/ (6 m)
- PCR1402-8/ (8 m)

Accessories for optoNCDT 1610 / 1630

Supply and output cable
- PC1605-3 (3 m)
- PC1605-6 (6 m)
- PC1607-5/BNC (5 m, BNC connector)

Accessories optoNCDT 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 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

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

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 for demanding environments
To protect the optoNCDT laser sensors in harsh environments, protective housings are available in different designs.

**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 $T_{(max)} = 10$ °C
Minimum water flow rate $Q_{(min)} = 3$ 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.

(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/IF2008PCIe - PCI Interface card for synchronous data acquisition**

The absolutely synchronous data acquisition is a decisive factor for the planarity or thickness measurement using several laser sensors. The IF2008PCI interface card is designed for installation in PCs and enables the synchronous capture of four digital sensor signals and two encoders. The data are 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**
- IF2008 basic printed circuit board: 4 digital signals and 2 encoders
- IF2008E - Expansion board: 2x digital signals, 2x analog signals and 8x I/O signals

---

**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
**C-Box/2A Controller for D/A conversion and evaluation**

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 und 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 3 output interfaces

**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 switching cabinets is via a DIN rail.
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