



More Precision

optoNCDT // Laser displacement sensors (triangulation)

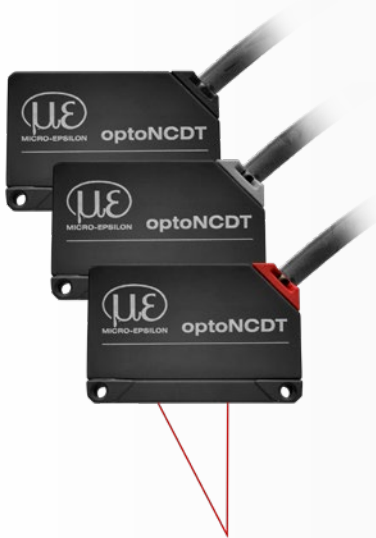


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optoNCDT 1x20

Miniature laser sensors for serial applications

from page 14



| Model | Technology | Measuring range | Repeatability | Linearity |
|------------------|------------|-----------------|---------------|-------------|
| optoNCDT 1220 | | 10 - 500 mm | 1 μ m | 0.10 % |
| optoNCDT 1320 | | 10 - 500 mm | 1 μ m | 0.10 % |
| optoNCDT 1420 | | 10 - 500 mm | 0.5 μ m | from 0.08 % |
| optoNCDT 1420LL | | 10 - 50 mm | 0.5 μ m | from 0.08 % |
| optoNCDT 1420CL1 | | 10 - 50 mm | 0.5 μ m | from 0.08 % |

optoNCDT 1900

High performance sensors for precision automation

from page 24

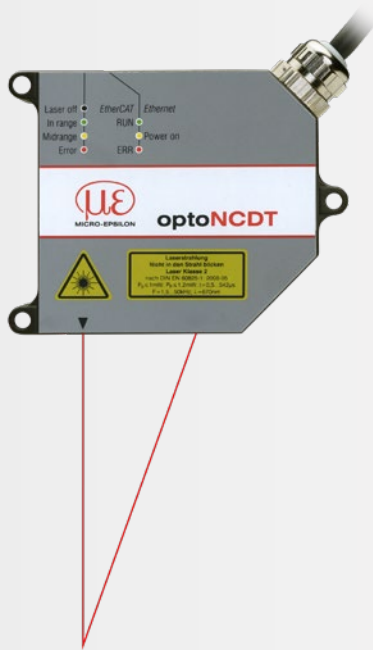


| Model | Technology | Measuring range | Repeatability | Linearity |
|-----------------|------------|-----------------|---------------|-------------|
| optoNCDT 1900 | | 2 - 500 mm | 0.1 μ m | from 0.02 % |
| optoNCDT 1900LL | | 2 - 50 mm | 0.1 μ m | from 0.02 % |

optoNCDT 23x0

High precision laser sensors

from page 34



| Model | Technology | Measuring range | Repeatability | Linearity |
|-------------------|------------|-----------------|--------------------|-------------|
| optoNCDT 2300 | | 2 - 300 mm | 0.03 μm | from 0.02 % |
| optoNCDT 2300BL | | 2 - 50 mm | 0.03 μm | from 0.02 % |
| optoNCDT 2300LL | | 2 - 50 mm | 0.1 μm | from 0.02 % |
| optoNCDT 2300-2DR | | 2 mm | 0.03 μm | from 0.03 % |
| optoNCDT 2310 | | 10 - 50 mm | 0.5 μm | from 0.03 % |

optoNCDT 17x0

Laser sensors for special measurement tasks

optoNCDT 1910

from page 46

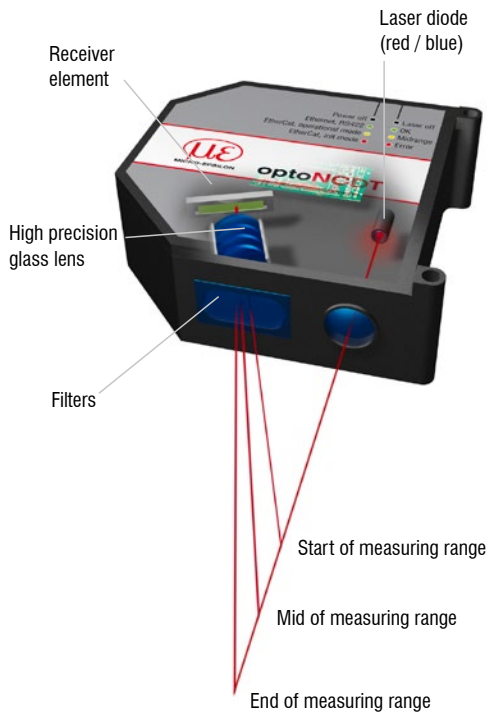


| Model | Technology | Measuring range | Repeatability | Linearity |
|------------------|------------|-----------------|------------------------|-------------|
| optoNCDT 1750BL | | 2 - 750 mm | 0.8 μm | from 0.06 % |
| optoNCDT 1750-DR | | 2 - 20 mm | 0.1 μm | 0.08 % |
| optoNCDT 1710 | | 50 mm | from 7.5 μm | 0.10 % |
| optoNCDT 1710BL | | 50 / 1000 mm | 7.5 μm | from 0.10 % |
| optoNCDT 1760 | | 1000 mm | from 7.5 μm | 0.10 % |
| optoNCDT 1910 | | 500 / 750 mm | from 20 μm | 0.07 % |

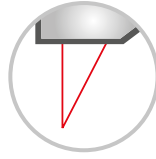
Measuring principle Laser triangulation

Laser triangulation sensors operate with a laser diode that projects a visible light spot onto the surface of the target. The light reflected from the spot is imaged by an optical receiving system onto a position-sensitive element. If the light spot changes its position, this change is imaged on the receiving element and evaluated.

The optoNCDT sensors use different technologies, which show their advantages in certain applications.



Laser point sensors with red laser



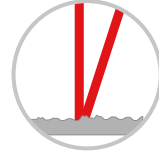
Triangulation sensors with a red laser are designed for diffusely reflecting measuring objects such as ceramics, plastics or matt metals.

The red laser has a high light intensity and is therefore also suitable for poorly reflecting objects, as the amount of light projected onto the sensor element is sufficient.

- Ultra-small light spot detects smallest details and structures
- Ideal for numerous surfaces
- Even for poorly reflecting surfaces
- Standard as laser class 2, optional as class 1 and class 3 laser



Laser line sensors with oval-shaped light spot

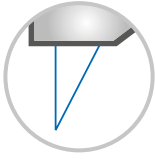


Rough and structured surfaces cause interferences within the laser point (left) which leads to a faulty projection on the sensor element. This effect becomes particularly obvious with metallic surfaces.

The small laser line of the optoNCDT LL sensors compensates for this effect (right) and enables stable measurements on metallic surfaces.

- Laser-line sensors for reliable measurements on rough and structured metallic surfaces
- No penetration, therefore also suitable for plastic and organic materials such as wood



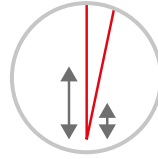


Blue laser sensors for challenging surfaces

The optoNCDT Blue Laser (BL) models use a blue-violet laser beam which does not penetrate the measuring object due to its shorter wavelength. The light spot is projected sharply to enable stable and precise measurement results.

The Blue Laser Technology is preferably used with red-hot glowing metals as well as organic and transparent objects.

- Ultra-small light spot detects smallest details and structures
- Ideal for numerous surfaces
- Patented for measurement tasks with red-hot measuring objects above 700 °C and transparent objects

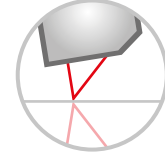
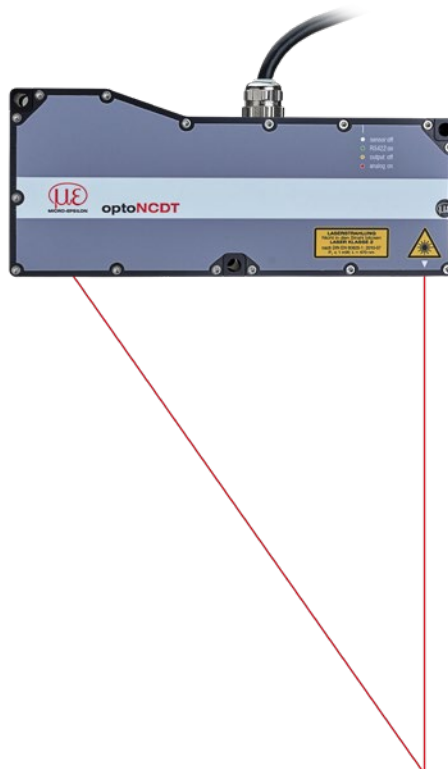


Long-range sensors for large distances

Some measurement tasks require a large measuring range or a large distance from the object to be measured.

Long-range sensors from Micro-Epsilon combine large measuring ranges and large offset distances. They enable high accuracy measurements from a safe distance.

- Measurement from a great distance up to 2000 mm
- Available with red laser and blue laser



Direct-reflection sensors for shiny & mirroring targets

Conventional laser triangulation sensors are designed for diffuse reflecting surfaces. Specular surfaces such as shiny plastics, mirror glass or polished metals require a sensor alignment where the angle of incidence is equal to the angle of reflection.

Micro-Epsilon offers sensors with special alignment (DR) for directly reflecting surfaces which ensure high accuracy and signal stability.

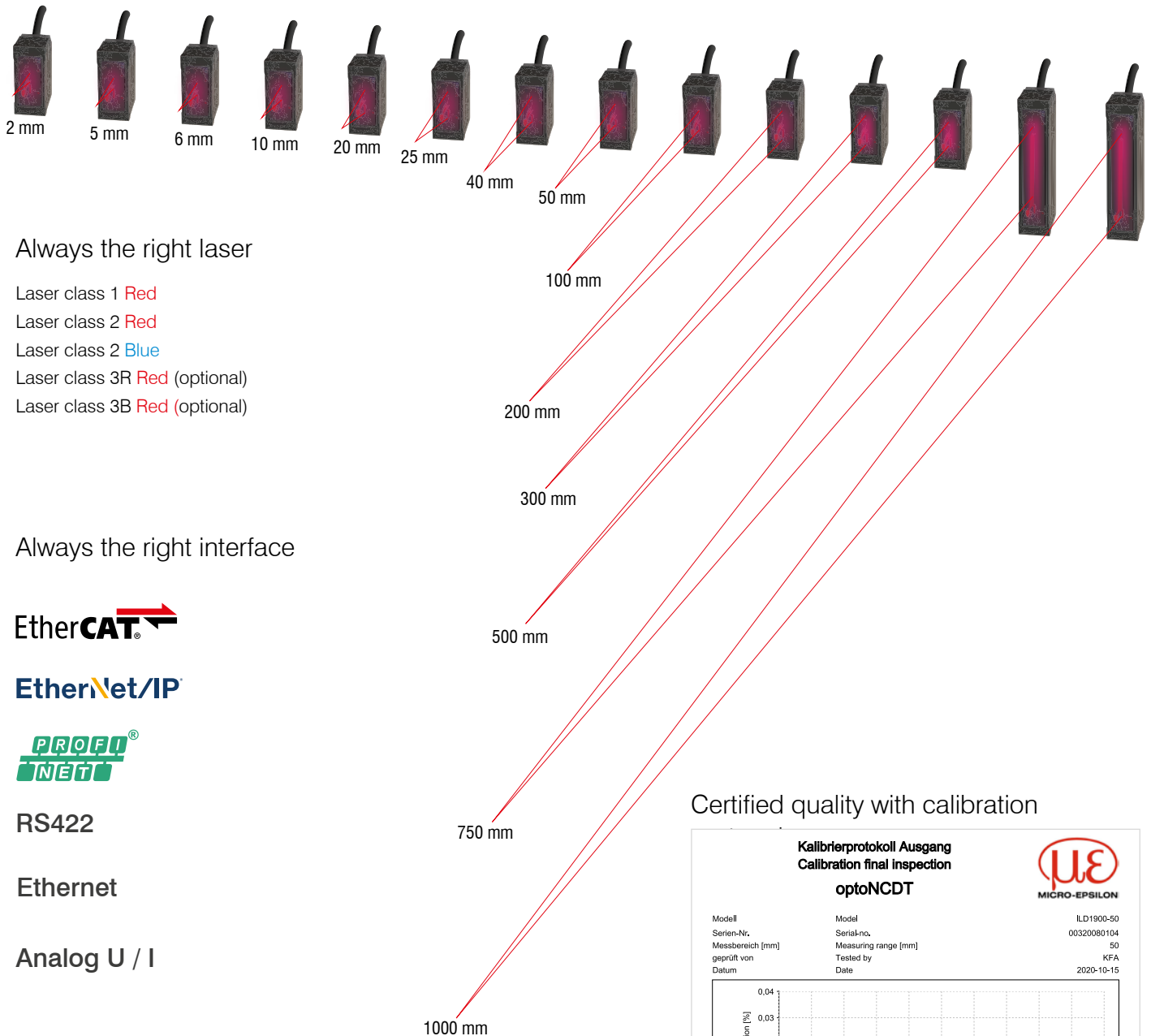
- Ideal for distance measurements on shiny and mirroring surfaces
- Available with red laser and blue laser



More Precision optoNCDT Laser sensors

Always the right measuring range

optoNCDT laser triangulation sensors measure from a large distance to the target using a very small light spot. The large measurement distance enables non-contact measurements to be taken against difficult surfaces such as hot metals. More than 70 standard models with measuring ranges from 2 – 1000 mm cater for a large number of applications across many different industries.



Always the right laser

- Laser class 1 Red
- Laser class 2 Red
- Laser class 2 Blue
- Laser class 3R Red (optional)
- Laser class 3B Red (optional)

Always the right interface

EtherCAT

EtherNet/IP

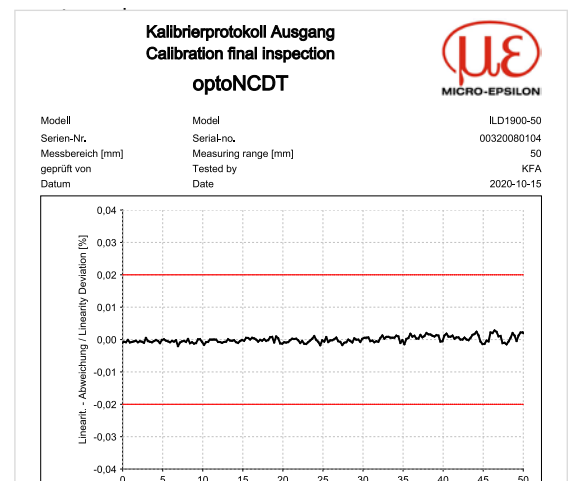
PROFINET

RS422

Ethernet

Analog U / I

Certified quality with calibration



To document the performance capability, each sensor is tested and delivered with its own calibration protocol. This document is included in delivery or accessible via web interface.

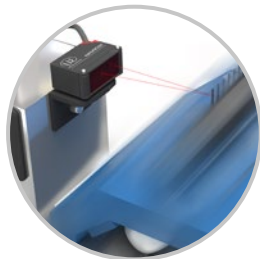


Compact sensors with integrated controller

optoNCDT laser sensors are extremely compact and equipped with a fully integrated controller. This makes installation and wiring quick and easy. Therefore, these laser sensors can be easily installed even in restricted spaces



Highest ambient light compensation up to 50,000 lux



Excellent shock and vibration resistance



Robust and durable sensor design (IP67)



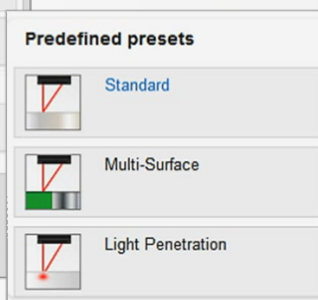
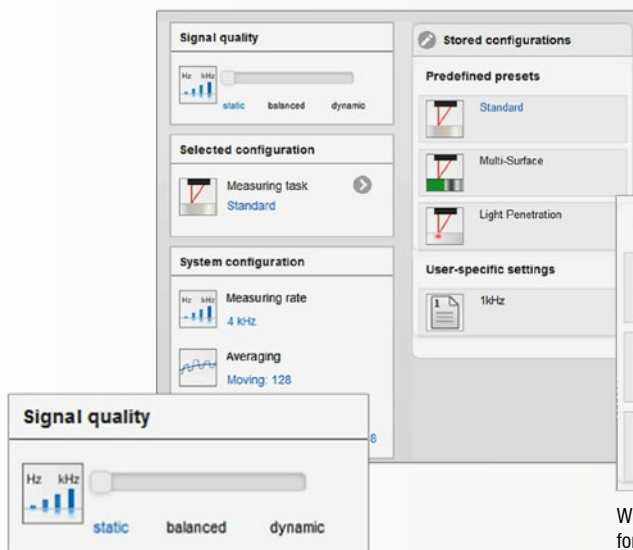
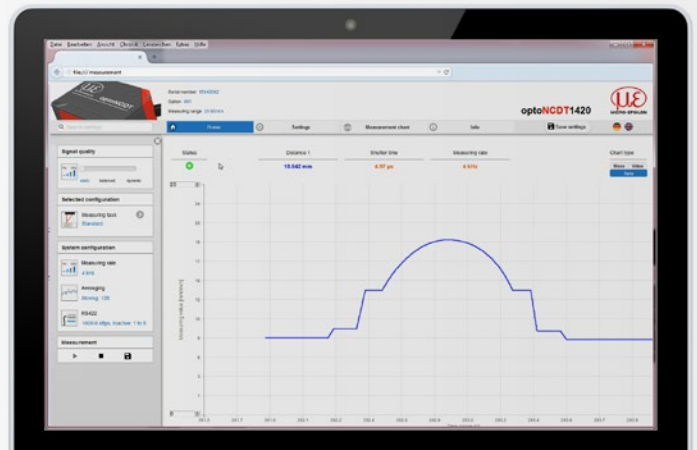
Extremely high temperature stability

Precise measurements in industrial environments

The optoNCDT sensors are designed for measurement tasks in factory automation, machines and systems. As a result, simple installation and wiring is possible in confined spaces or on a robot. Their high performance enables the sensors to provide precise measurement results at a high measuring rate.

Unique ease of use via web interface

The optoNCDT sensors are operated using an intuitive web interface. Therefore, the sensor is connected to a PC and the web interface is called up in a browser. This convenient web interface enables the user to make numerous settings for the processing of measured values and signals, e.g., peak selection, filter and masking features for the video signal.



e.g., metal, ceramics,...

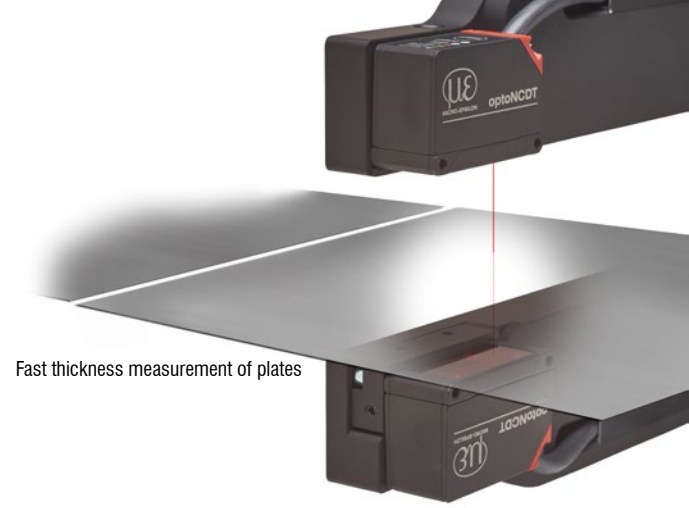
e.g., circuit boards, PCB,...

e.g., milk glass, plastics,....

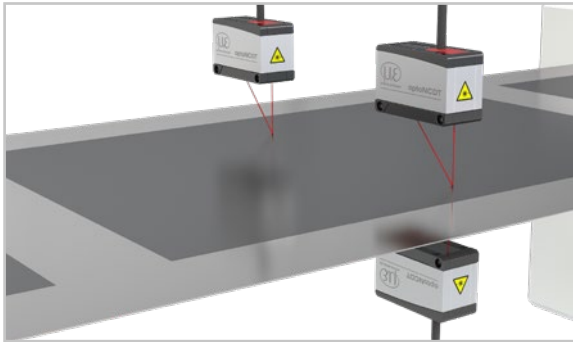
With the presets, predefined sensor settings for specific measuring objects can be quickly and easily adopted.

The quality slider enables the user to define the signal evaluation regarding process and measurement dynamics. Depending on the selected settings, the measuring rate and the averaging of the sensor are adapted.

Advantages & outstanding features optoNCDT Laser sensors

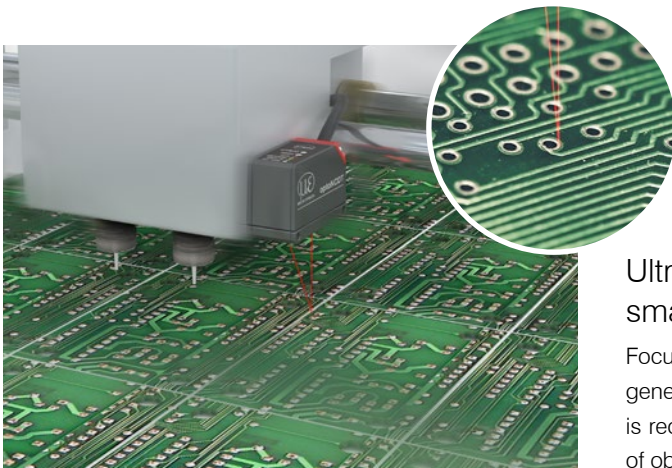


Fast thickness measurement of plates



Synchronization for multi-track and thickness measurements

Operating several laser sensors to measure multiple track or the thickness requires synchronization. Synchronizing ensures that the measurement values of the sensors are recorded at the same time.



Measurement spot from $8.5 \times 11 \mu\text{m}$
for the detection of the smallest of details

Ultra-small light spot detects smallest details & structures

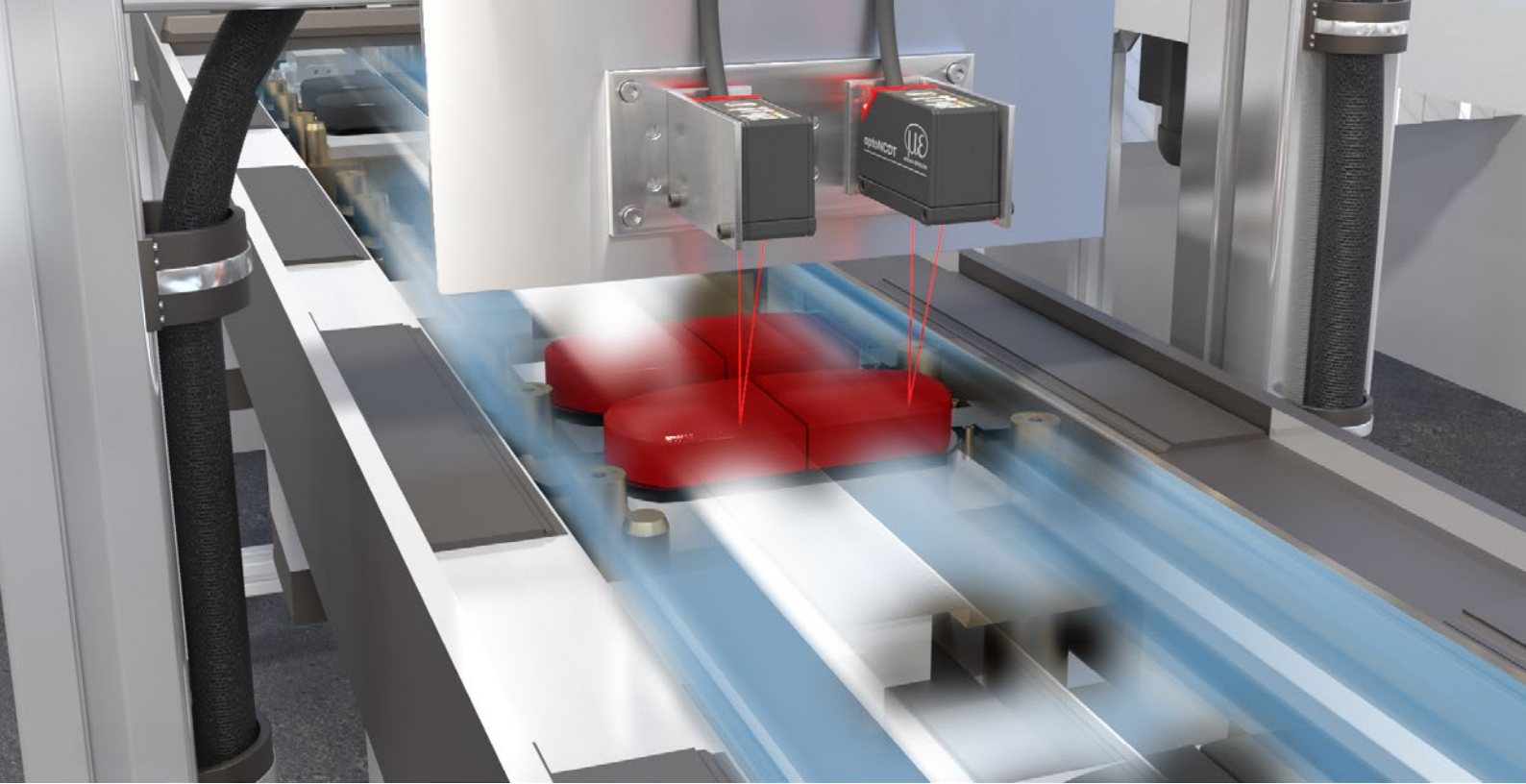
Focusing the laser beam via a special lens arrangement in the sensor generates a small light spot on the target surface. This small light spot is required for a high spatial resolution and ensures that the smallest of objects and details can be detected.



Ideal for robotic
applications

Ideal for drag chains and robots

The robust design allows the optoNCDT sensors to be used even with high accelerations, e.g. at the end effector. Compact and with integrated controller as well as robot-compatible cables, the optoNCDT sensors can be used for a wide range of measurement tasks on robots and in traversing systems.

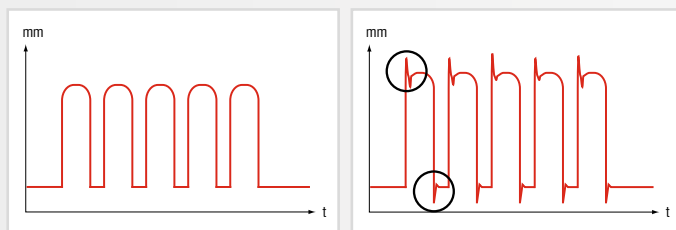


Ideal for fast control & positioning

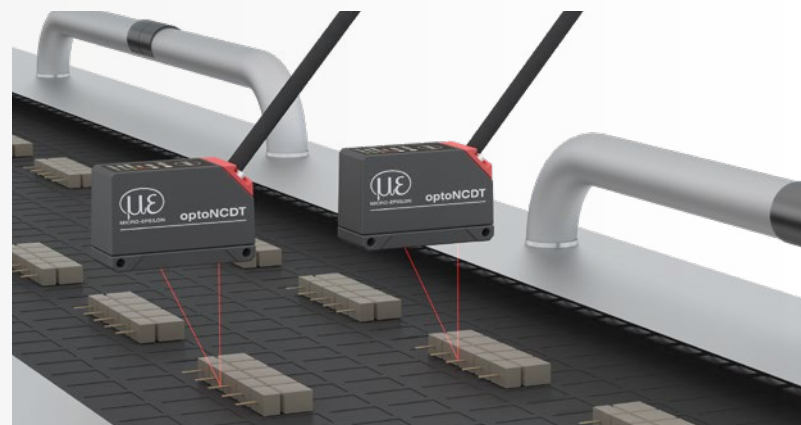
When measuring poorly reflective surfaces or fast moving objects, high measuring rates are required. The optoNCDT sensors operate at high measuring rates with simultaneous surface compensation and are therefore able to reliably check dynamic processes.

High precision with changing surfaces

optoNCDT sensors are equipped with intelligent control features which ensure high signal stability with bright/dark transition, regardless of the color and the brightness of the measuring object. This optimally adjusts the exposure time or the amount of light for the exposure cycle just performed or the next exposure cycle. These controls enable smooth signal courses without outliers even in dynamic measurements.



Comparison: optoNCDT sensor surface compensation (left) and conventional sensor providing faulty measurements with changing reflections (right)



The Active Surface Compensation provides stable distance signal control regardless of target color or brightness.



The Advanced Surface Compensation feature operates with innovative algorithms and enables stable measurement results even on demanding surfaces.



The Real-time Surface Compensation feature compensates for changing reflectance properties in the current measurement cycle. Each individual laser pulse is controlled in real time depending on the surface properties of the measuring object.



The Advanced Real Time Surface Compensation with its improved dynamic range enables a more precise real time surface compensation. This ensures maximum compensation of fluctuating reflectivity while generating stable measurement values with high accuracy.

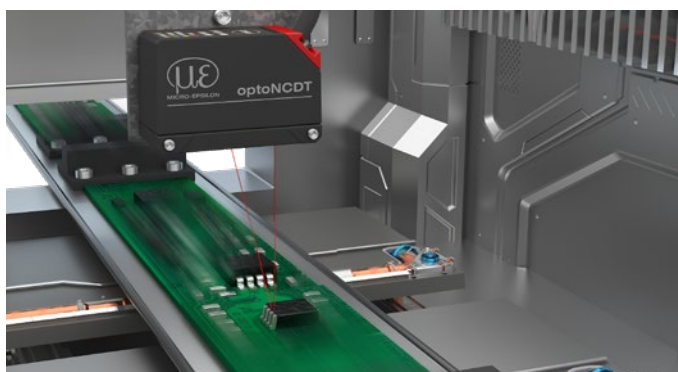
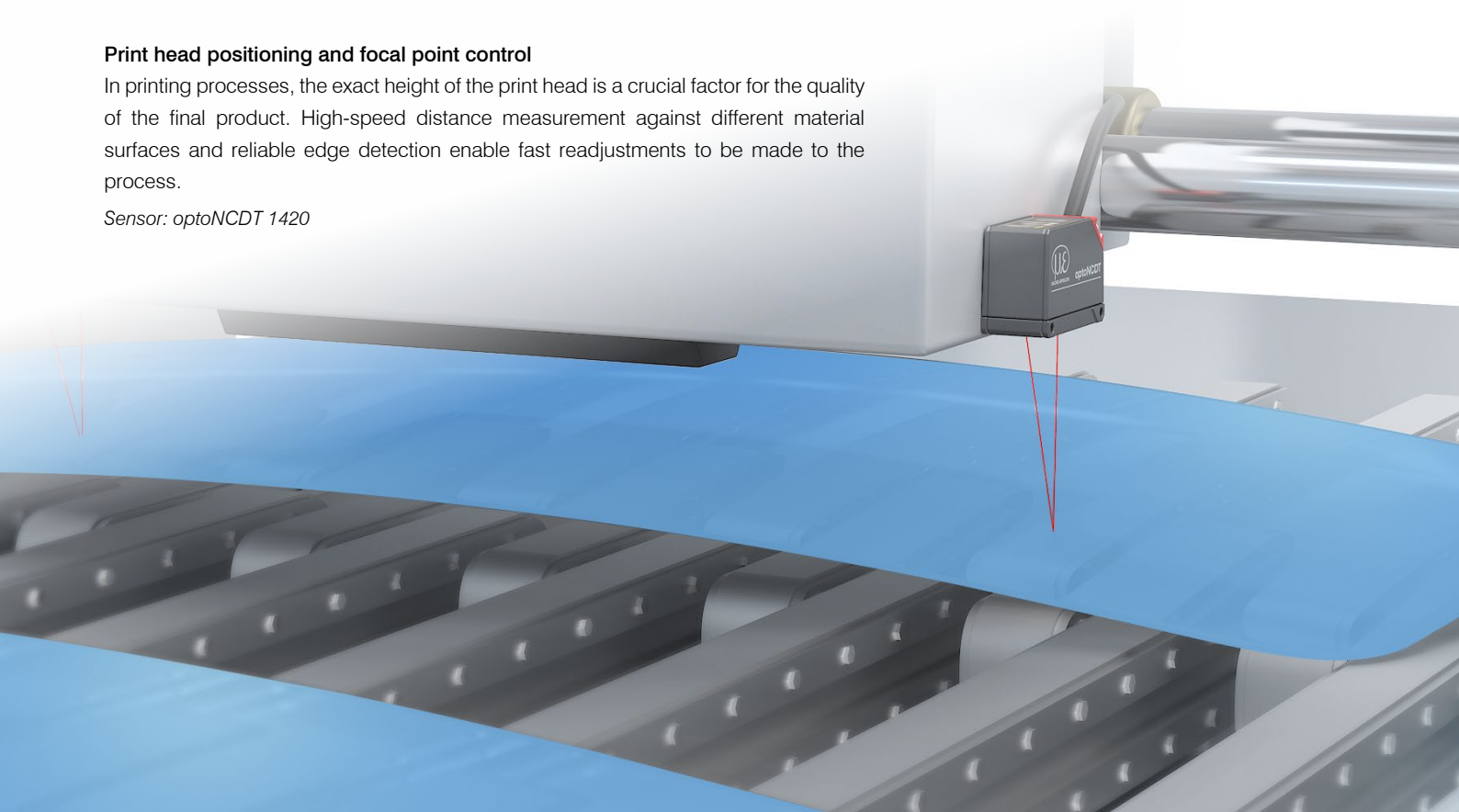
Application examples

optoNCDT Laser sensors

Print head positioning and focal point control

In printing processes, the exact height of the print head is a crucial factor for the quality of the final product. High-speed distance measurement against different material surfaces and reliable edge detection enable fast readjustments to be made to the process.

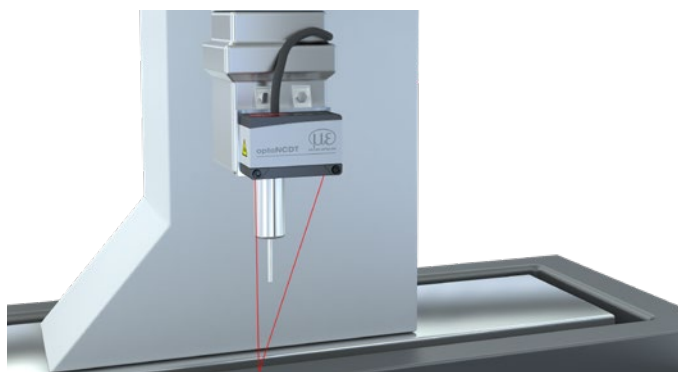
Sensor: optoNCDT 1420



High resolution inspection in assembly processes

During PCB assembly, the presence and position of the components is checked using optoNCDT laser sensors. Regardless of surface reflections, these sensors provide precise measurement results and detect even the tiniest parts reliably.

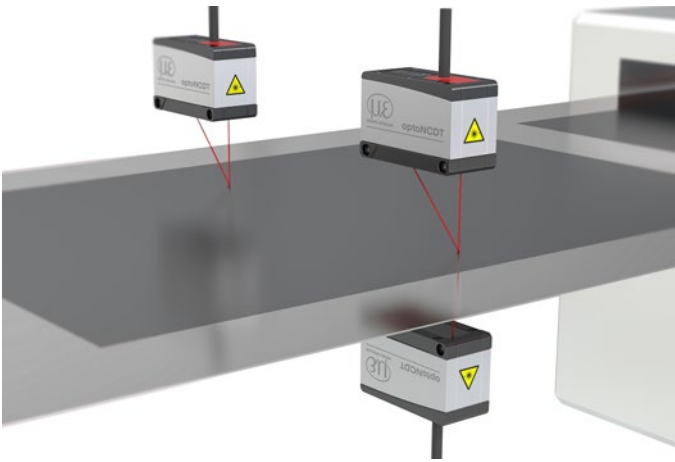
Sensor: optoNCDT 1420



Positioning gauge heads in measuring machines

optoNCDT laser triangulation sensors are used to position sensor heads quickly. Thanks to their advanced sensor technology, the laser sensors enable exact distance control of the sensor head.

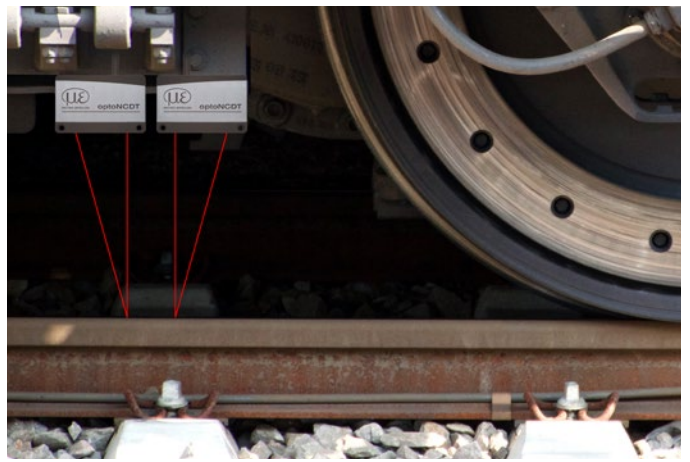
Sensor: optoNCDT 1900



Thickness measurement of coated electrodes

The coating thickness is tested to ensure the homogeneous quality of battery films. The optoNCDT laser sensors enable a resolution in the sub-micrometer range. The thickness values are used to control the application of the coating and for quality assurance purposes.

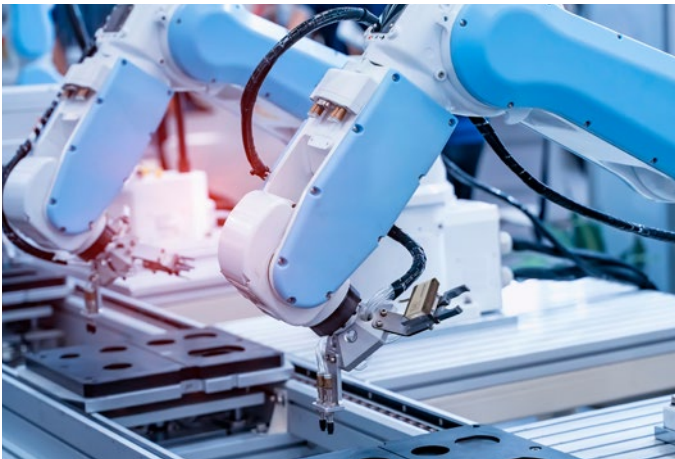
Sensor: *optoNCDT 1900LL*



Measuring the wear of high-speed railway lines

For the maintenance of high-speed tracks, special measurement wagons are used. They are equipped with optoNCDT 1900LL laser displacement sensors, which detect the distance to the track at a high measuring rate. These robust sensors are hardly affected by fluctuating reflections and ambient light.

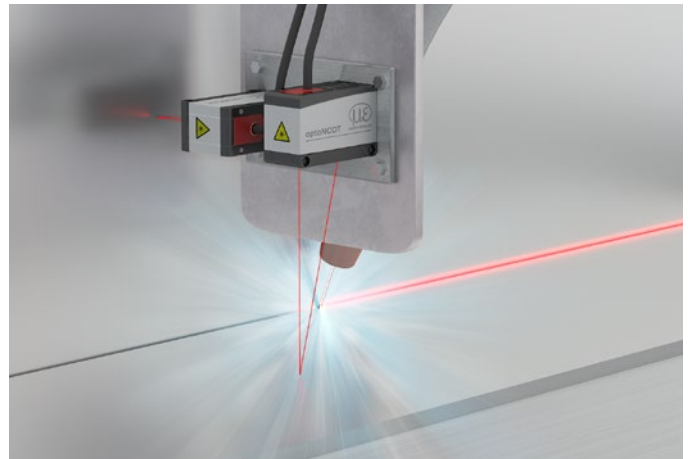
Sensor: *optoNCDT 1900LL*



Position detection in robotic applications

Precise positioning is required for automated machining processes with robots. optoNCDT laser sensors are therefore used for distance measurement. Thanks to the compact design with integrated controller, the sensors are ideal for integration on robots and end effectors.

Sensor: *optoNCDT 1900*









Distance control with fully automatic laser welding

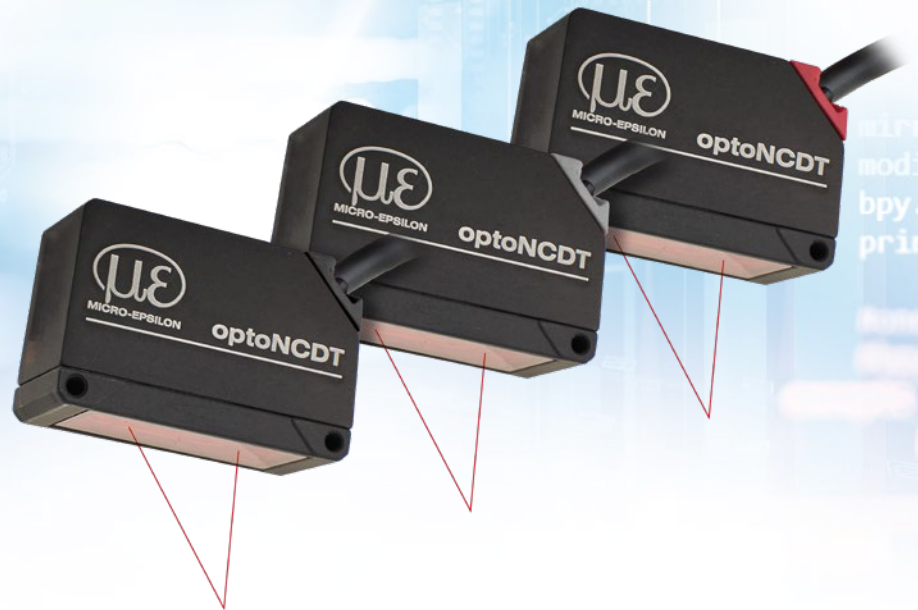
In order to position the welding head at the correct distance, optoNCDT laser sensors are used. These measure the distance from the steel plates with high accuracy. Thanks to their enormous insensitivity to ambient light, the sensors are ideal for measurement tasks in welding automation.

Sensor: *optoNCDT 1900*

High precision laser sensors in miniature design optoNCDT 1220 / 1320 / 1420

designed for advanced
AUTOMATION

-  Measuring rate up to 8 kHz
-  **INTER FACE** Analog (U/I) / RS422 / PROFINET / EtherNet/IP / EtherCAT
-  **ASC** Active Surface Compensation
-  Repeatability 0.5 μm
-  Ideal for series and OEM applications
-  Low weight, ideal for high accelerations



Best in Class:

Compact, precise and faster






The optoNCDT 1x20 laser sensors are among the best in their class. The sensors offer a unique combination of speed, size and performance. The laser sensors are used for the precise measurement of displacement, distance and position in all fields of automation technology, such as machine building, 3D printers and robotics.

The optoNCDT 1x20 sensors use an intelligent surface control feature. The Active Surface Compensation (ASC) ensures stable measurement results regardless of changing colors or brightness of the target surface.

Ideal for industrial series applications

Different output signals enable the sensor to be integrated into plant and machine control systems. As well as analog voltage and current outputs, a digital RS422 interface provides distance information from the sensor.

Due to the universal setting and evaluation possibilities, the optoNCDT 1x20 sensors meet all the requirements for use in industrial series and OEM applications.

| Model | Technology | Measuring range | Repeatability | Linearity |
|------------------|---|-----------------|-------------------|-------------|
| optoNCDT 1220 |  | 10 - 500 mm | 1 μm | 0.10 % |
| optoNCDT 1320 |  | 10 - 500 mm | 1 μm | 0.10 % |
| optoNCDT 1420 |  | 10 - 500 mm | 0.5 μm | from 0.08 % |
| optoNCDT 1420LL |  | 10 - 50 mm | 0.5 μm | from 0.08 % |
| optoNCDT 1420CL1 |  | 10 - 50 mm | 0.5 μm | from 0.08 % |

Highest precision in a minimum of space

Compact size combined with low weight opens up new fields of application. The selectable connector type, i.e. cable or pigtail, together with compact size reduce the sensor installation effort to a minimum.

Now even more powerful!

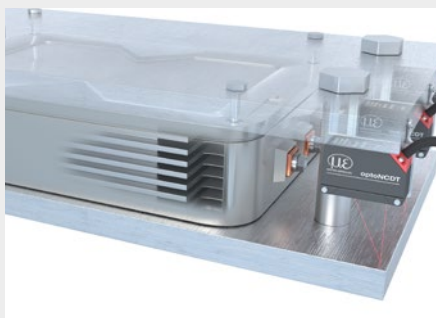
The optoNCDT 1x20 sensors have been optimized for industrial series use. Furthermore, the robust IP67 sensor housing allows use in industrial environments, even with high accelerations. A high-performance D/A converter enables 16 bit resolution at the analog output. Therefore, the sensor achieves even more precise measurement results. With the doubled measuring rate, even faster measurements can now be performed.



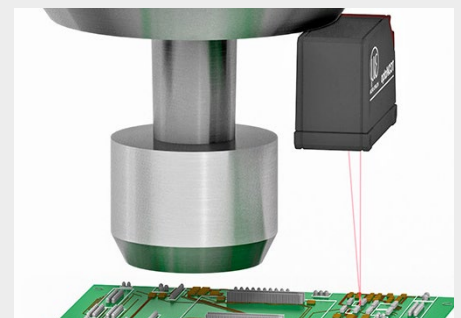
Application examples



Dimension control of turned parts



Monitoring the expansion of battery cells



Distance control of print heads

Technical data

optoNCDT 1220 / 1320



Laser point - optoNCDT 1220

| Model | ILD1220-10 | ILD1220-25 | ILD1220-50 | ILD1220-100 | ILD1220-200 | ILD1220-500 | |
|---|--|---------------------------------|-----------------------|-----------------------|---------------|--------------------------|---------------|
| Measuring range | 10 mm | 25 mm | 50 mm | 100 mm | 200 mm | 500 mm | |
| Start of measuring range | 20 mm | 25 mm | 35 mm | 50 mm | 60 mm | 100 mm | |
| Mid of measuring range | 25 mm | 37.5 mm | 60 mm | 100 mm | 160 mm | 350 mm | |
| End of measuring range | 30 mm | 50 mm | 85 mm | 150 mm | 260 mm | 600 mm | |
| Measuring rate ^[1] | 4 adjustable stages: 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz | | | | | | |
| Linearity ^[2] | < ±10 μm | < ±25 μm | < ±50 μm | < ±100 μm | < ±200 μm | < ±750 μm ... 1500 μm | |
| | < ±0.10 % FSO | | | | | < ±0.15 % ... 0.30 % FSO | |
| Repeatability ^[3] | 1 μm | 2.5 μm | 5 μm | 10 μm | 20 μm | 50 μm | |
| Temperature stability ^[4] | ±0.015 % FSO / K | | | ±0.01 % FSO / K | | | |
| Light spot diameter ^[5] | SMR | 90 x 120 μm | 100 x 140 μm | 90 x 120 μm | 750 x 1100 μm | 750 x 1100 μm | 750 x 1100 μm |
| | MMR | 45 x 40 μm | 120 x 130 μm | 230 x 240 μm | | | |
| | EMR | 140 x 160 μm | 390 x 500 μm | 630 x 820 μm | | | |
| | smallest Ø | 45 x 40 μm with 24 mm | 55 x 50 μm with 31 mm | 70 x 65 μm with 42 mm | - | - | |
| Light source | Semiconductor laser < 1 mW, 670 nm (red) | | | | | | |
| Laser class | Class 2 in accordance with IEC 60825-1: 2014 | | | | | | |
| Permissible ambient light ^[6] | 20,000 lx | | | | 7,500 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, teach | | | | | | |
| Digital interface | RS422 (16 bit) | | | | | | |
| Analog output | 4 ... 20 mA (16 bit, freely scalable within the measuring range) | | | | | | |
| Switching output | 1 x error output: npn, pnp, push pull | | | | | | |
| Connection | integrated cable 2 m, open ends, minimum bending radius 30 mm (fixed installation) | | | | | | |
| Installation | Screw connection via two mounting holes | | | | | | |
| Temperature range | Storage | -20 ... +70 °C (non-condensing) | | | | | |
| | Operation | 0 ... +50 °C (non-condensing) | | | | | |
| Shock (DIN EN 60068-2-27) | 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) | IP67 | | | | | | |
| Material | Aluminum housing | | | | | | |
| Weight | approx. 30 g (without cable), approx. 110 g (incl. cable) | | | | | | |
| Control and indicator elements ^[7] | Select button: zero, teach, factory settings; web interface for setup; 2 x color LEDs for power / status | | | | | | |

^[1] Factory setting 1 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)

^[2] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[3] Measuring rate 1 kHz, median 9

^[4] The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.

^[5] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

^[6] Illuminant: light bulb

^[7] Access to web interface requires connection to PC via IF2001/USB (see accessories)



Laser point - optoNCDT 1320

| Model | ILD1320-10 | ILD1320-25 | ILD1320-50 | ILD1320-100 | ILD1320-200 | ILD1320-500 | |
|---|---|---------------------------------|-----------------------|-----------------------|---------------|-------------------------|---------------|
| Measuring range | 10 mm | 25 mm | 50 mm | 100 mm | 200 mm | 500 mm | |
| Start of measuring range | 20 mm | 25 mm | 35 mm | 50 mm | 60 mm | 100 mm | |
| Mid of measuring range | 25 mm | 37.5 mm | 60 mm | 100 mm | 160 mm | 350 mm | |
| End of measuring range | 30 mm | 50 mm | 85 mm | 150 mm | 260 mm | 600 mm | |
| Measuring rate ^[1] | 5 adjustable stages: 4 kHz / 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz | | | | | | |
| Linearity ^[2] | < ±10 μm | < ±25 μm | < ±50 μm | < ±100 μm | < ±200 μm | < ±600 μm ... ±1200 μm | |
| | < ±0.10 % FSO | | | | | < ±0.12 ... ±0.24 % FSO | |
| Repeatability ^[3] | 1 μm | 2.5 μm | 5 μm | 10 μm | 20 μm | 50 μm | |
| Temperature stability ^[4] | ±0.015 % FSO / K | | | ±0.01 % FSO / K | | | |
| Light spot diameter ^[5] | SMR | 90 x 120 μm | 100 x 140 μm | 90 x 120 μm | 750 x 1100 μm | 750 x 1100 μm | 750 x 1100 μm |
| | MMR | 45 x 40 μm | 120 x 130 μm | 230 x 240 μm | | | |
| | EMR | 140 x 160 μm | 390 x 500 μm | 630 x 820 μm | - | - | - |
| | smallest Ø | 45 x 40 μm with 24 mm | 55 x 50 μm with 31 mm | 70 x 65 μm with 42 mm | - | - | - |
| Light source | Semiconductor laser < 1 mW, 670 nm (red) | | | | | | |
| Laser class | Class 2 in accordance with IEC 60825-1: 2014 | | | | | | |
| Permissible ambient light ^[6] | 30,000 lx | | | 20,000 lx | 7,500 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, teach | | | | | | |
| Digital interface ^[7] | RS422 (16 bit) / EtherCAT / PROFINET / EtherNet/IP | | | | | | |
| Analog output | 4 ... 20 mA (16 bit, freely scalable within the measuring range) | | | | | | |
| Switching output | 1 x error output: npn, pnp, push pull | | | | | | |
| Connection | integrated cable 3 m, open ends, minimum bending radius 30 mm (fixed installation) | | | | | | |
| Installation | Screw connection via two mounting holes | | | | | | |
| Temperature range | Storage | -20 ... +70 °C (non-condensing) | | | | | |
| | Operation | 0 ... +50 °C (non-condensing) | | | | | |
| Shock (DIN EN 60068-2-27) | 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) | IP67 | | | | | | |
| Material | Aluminum housing | | | | | | |
| Weight | approx. 30 g (without cable), approx. 145 g (incl. cable) | | | | | | |
| Control and indicator elements ^[8] | Select button: zero, teach, factory settings; web interface for setup with defined presets; 2 x color LEDs for power / status | | | | | | |

^[1] Factory setting 2 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)

^[2] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[3] Measuring rate 1 kHz, median 9

^[4] The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.

^[5] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

^[6] Illuminant: light bulb

^[7] For EtherCAT, PROFINET and EtherNet/IP, connection via interface module is required (see accessories)

^[8] Access to web interface requires connection to PC via IF2001/USB (see accessories)

Technical data

optoNCDT 1420

optoNCDT 1420 (General technical data)

| | | |
|--|--|---------------------------------|
| Model | ILD1420-xx | |
| Measuring rate ^[1] | 6 adjustable stages: 8 kHz / 4 kHz / 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz | |
| 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, teach | |
| Digital interface ^[2] | RS422 (16 bit) / EtherCAT / PROFINET / EtherNet/IP | |
| Analog output ^[3] | 4 ... 20 mA / 1 ... 5 V with PCF1420-3/U cable (16 bit, freely scalable within the measuring range) | |
| 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 60068-2-27) | 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) ^[4] | IP67 | |
| Material | Aluminum housing | |
| Weight | approx. 60 g (incl. pigtail), approx. 145 g (incl. cable) | |
| Control and indicator elements ^[5] | Select button: zero, teach, factory setting; web interface for setup: selectable presets, peak selection, video signal, freely selectable averaging, data reduction, setup management; 2 x color LEDs for power / status | |

^[1] Factory setting 4 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)

For models with laser class 1 the maximum measuring rate is 4 kHz

^[2] For EtherCAT, PROFINET and EtherNet/IP connection via interface module is required (see accessories)

^[3] For models with laser class 1 the D/A conversion is done with 12 bit

^[4] Models with laser class 1 have the protection class IP65

^[5] Access to web interface requires connection to PC via IF2001/USB (see accessories)



Laser point - optoNCDT 1420

| Model | | ILD1420-10 | ILD1420-25 | ILD1420-50 | ILD1420-100 | ILD1420-200 | ILD1420-500 |
|--|------------|--|--------------------------|--------------------------|-----------------|---------------|-----------------------|
| Measuring range | | 10 mm | 25 mm | 50 mm | 100 mm | 200 mm | 500 mm |
| Start of measuring range | | 20 mm | 25 mm | 35 mm | 50 mm | 60 mm | 100 mm |
| Mid of measuring range | | 25 mm | 37.5 mm | 60 mm | 100 mm | 160 mm | 350 mm |
| End of measuring range | | 30 mm | 50 mm | 85 mm | 150 mm | 260 mm | 600 mm |
| Linearity ^[1] | | < ±8 μm | < ±20 μm | < ±40 μm | < ±80 μm | < ±160 μm | < ±500 ... ±1000 μm |
| | | < ±0.08 % FSO | | | | | < ±0.1 ... ±0.2 % FSO |
| Repeatability ^[2] | | 0.5 μm | 1 μm | 2 μm | 4 μm | 8 μm | 20 ... 40 μm |
| Temperature stability ^[3] | | ±0.015 % FSO / K | | | ±0.01 % FSO / K | | |
| Light spot diameter ^[4] | SMR | 90 x 120 μm | 100 x 140 μm | 90 x 120 μm | 750 x 1100 μm | 750 x 1100 μm | 750 x 1100 μm |
| | MMR | 45 x 40 μm | 120 x 130 μm | 230 x 240 μm | | | |
| | EMR | 140 x 160 μm | 390 x 500 μm | 630 x 820 μm | | | |
| | smallest Ø | 45 x 40 μm with 24 mm | 55 x 50 μm with 31 mm | 70 x 65 μm with 42 mm | - | - | - |
| Light source | | Semiconductor laser < 1 mW, 670 nm (red) | | | | | |
| Laser class | | Class 2 in accordance with IEC 60825-1: 2014 | | | | | |
| Permissible ambient light ^[5] | | 50,000 lx | | | 30,000 lx | 10,000 lx | |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Measuring rate 2 kHz, median 9

^[3] The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.

^[4] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

^[5] Illuminant: light bulb



Laser line - optoNCDT 1420LL

| Model | ILD1420-10LL | ILD1420-25LL | ILD1420-50LL | |
|--|--|------------------------|--------------------------|----------------------------|
| Measuring range | 10 mm | 25 mm | 50 mm | |
| Start of measuring range | 20 mm | 25 mm | 35 mm | |
| Mid of measuring range | 25 mm | 37.5 mm | 60 mm | |
| End of measuring range | 30 mm | 50 mm | 85 mm | |
| Linearity ^[1] | < ±8 μm | < ±20 μm | < ±40 μm | |
| | < ±0.08 % FSO | | | |
| Repeatability ^[2] | 0.5 μm | 1 μm | 2 μm | |
| Temperature stability ^[3] | ±0.015 % FSO / K | | | |
| Light spot diameter ^[4] | SMR | 140 x 720 μm | 220 x 960 μm | 240 μm x 1250 μm |
| | MMR | 65 x 680 μm | 80 x 970 μm | 130 μm x 1450 μm |
| | EMR | 140 x 660 μm | 240 x 1000 μm | 380 μm x 1650 μm |
| | smallest Ø | 65 x 680 μm with 25 mm | 80 x 970 μm with 37.5 mm | 110 x 1400 μm with 52.5 mm |
| Light source | Semiconductor laser < 1 mW, 670 nm (red) | | | |
| Laser class | Class 2 in accordance with IEC 60825-1: 2014 | | | |
| Permissible ambient light ^[5] | 50,000 lx | | | |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Measuring rate 2 kHz, median 9

^[3] The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.

^[4] ±10 %; SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range

Light spot diameter with line-shaped laser determined based on the emulated 90/10 knife-edge method

^[5] Illuminant: light bulb



Laser class 1 - optoNCDT 1420 CL1

| Model | ILD1420-10CL1 | ILD1420-25CL1 | ILD1420-50CL1 | |
|--|--|----------------------|-----------------------|-----------------------|
| Measuring range | 10 mm | 25 mm | 50 mm | |
| Start of measuring range | 20 mm | 25 mm | 35 mm | |
| Mid of measuring range | 25 mm | 37.5 mm | 60 mm | |
| End of measuring range | 30 mm | 50 mm | 85 mm | |
| Linearity ^[1] | < ±8 μm | < ±20 μm | < ±40 μm | |
| | < ±0.08 % FSO | | | |
| Repeatability ^[2] | 0.5 μm | 1 μm | 2 μm | |
| Temperature stability ^[3] | ±0.015 % FSO / K | | | |
| Light spot diameter ^[4] | SMR | 90 x 120 μm | 100 x 140 μm | 90 x 120 μm |
| | MMR | 45 x 40 μm | 120 x 130 μm | 230 x 240 μm |
| | EMR | 140 x 160 μm | 390 x 500 μm | 630 x 820 μm |
| | smallest Ø | 45 x 40 μm with 24mm | 55 x 50 μm with 31 mm | 70 x 65 μm with 42 mm |
| Light source | Semiconductor laser < 0.39 mW, 670 nm (red) | | | |
| Laser class | Class 1 in accordance with DIN EN 60825-1: 2015-07 | | | |
| Permissible ambient light ^[5] | 15,000 lx | | | |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Measuring rate 2 kHz, median 9

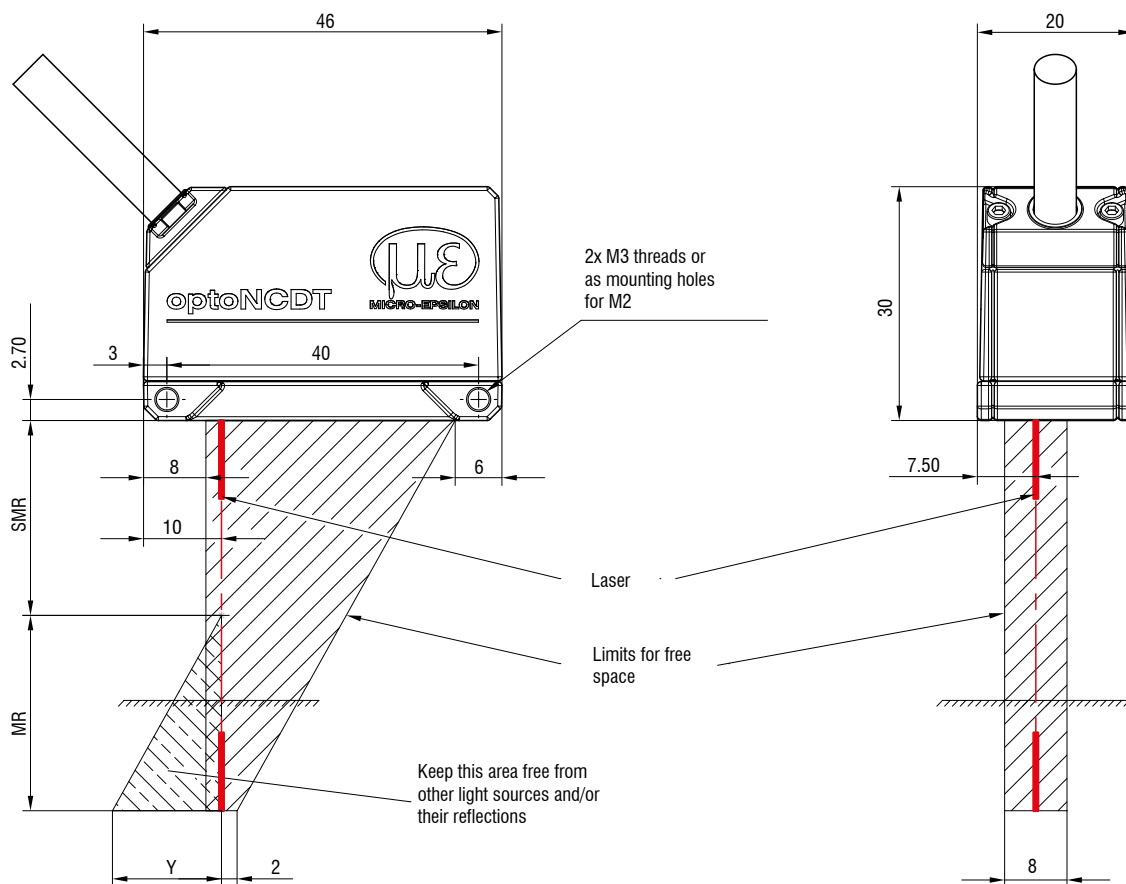
^[3] The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.

^[4] ±10 %; SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range

^[5] Illuminant: light bulb

Dimensions

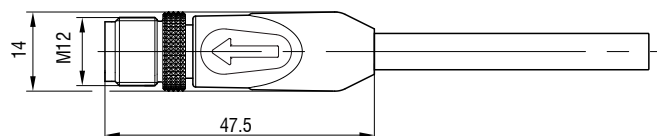
optoNCDT 1220 / 1320 / 1420



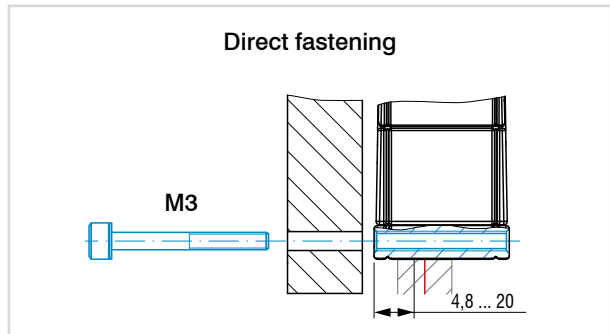
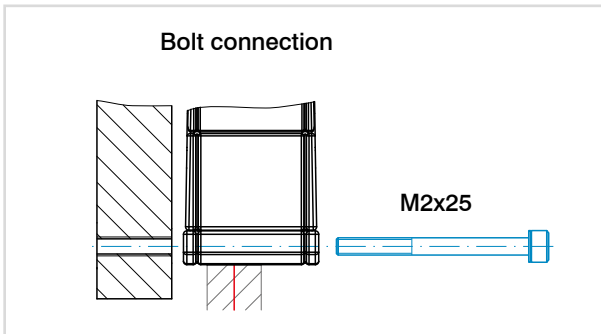
| MR | SMR | Y |
|-----|-----|-----|
| 10 | 20 | 10 |
| 25 | 25 | 21 |
| 50 | 35 | 28 |
| 100 | 50 | 46 |
| 200 | 60 | 70 |
| 500 | 100 | 190 |

(Dimensions in mm, not to scale)
 MR = measuring range; SMR = start of measuring range;
 MMR = mid of measuring range; EMR = end of measuring range

Connector (sensor side)



Installation options



Accessories for optoNCDT 1220/1320/1420

Power supply unit

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)

Protective film

Transparent protective film 32 x 11 mm for ILD1x20

Scope of supply

- 1 ILD1x20 sensor
- 1 Assembly instructions
- 1 digital calibration protocol accessible via web interface
- Accessories (2x M2 screws and 2 washers)

Article designation

| | | | |
|---|----|----|--|
| ILD1420- | 10 | LL | CL1 |
| | | | Laser class No indication: class 2 (standard) CL1: Class 1 (only with ILD1420) |
| | | | Laser type No indication: Red laser point (standard) LL: Laser Line (only with ILD1420) |
| Measuring range in mm | | | |
| Series ILD1220: Compact laser displacement sensor for OEM and serial applications ILD1320: Compact laser triangulation displacement sensor ILD1420: Smart laser triangulation displacement sensor | | | |

Connection possibilities

optoNCDT 1220 / 1320 / 1420

Sensors with integrated cable

| | |
|--------------------|--|
| Cable diameter: | 5.40 ±0.2 mm |
| Drag chain: | no |
| Robot: | no |
| Temperature range: | -25 ... 105 °C (moving) -40 ... 105 °C (not moving) |
| Bending radius: | > 27 mm (fixed installation) > 54 mm (dynamic) |

| Sensor | Cables | Type | Connection possibilities and accessories |
|--|---------------------------------------|-----------|--|
| ILD1220-xx | Integrated cable Length 2 m | Open ends | Supply voltage connection Power supply unit PS2020 |
| ILD1320-xx ILD1420-xx ILD1420-xxLL | Integrated cable Length 3 m | | Interface module of RS422 to USB IF2001/USB IC2001/USB |
| | | | Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT |




Drag-chain suitable extension and adapter cables

| | |
|--------------------|---|
| Cable diameter: | 6.0 ±0.2 mm |
| Drag chain: | yes |
| Robot: | no (optional on request) |
| Temperature range: | -40 ... 90 °C |
| Bending radius: | > 30 mm (fixed installation) > 60 mm (dynamic) |

| Sensor | Cables | Type | Connection possibilities and accessories |
|----------------------------|--|-----------|--|
| ILD1420-xx ILD1420-xxLL | Extension cable pigtail Length 3 m / 6 m / 10 m / 15 m <i>Art. no. Designation</i> 29011067 PCF1420-3/I 29011068 PCF1420-6/I 29011069 PCF1420-10/I 29011070 PCF1420-15/I 29011071 PCF1420-3/U 29011072 PCF1420-6/U 29011073 PCF1420-10/U 29011074 PCF1420-15/U | Open ends | Supply voltage connection Power supply unit PS2020 |
| | Adapter cable for PC interface card Length 3 m / 6 m / 10 m <i>Art. no. Designation</i> 29011079 PCF1420-3/IF2008 29011088 PCF1420-6/IF2008 29011089 PCF1420-10/IF2008 | Sub-D | Interface module of RS422 to USB IF2001/USB IC2001/USB |
| | Adapter cable for sensor calculation Length 3 m / 6 m / 9 m <i>Art. no. Designation</i> 29011171 PCF1420-3/C-Box 29011172 PCF1420-6/C-Box 29011170 PCF1420-9/C-Box | Sub-D | Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT |
| | Adapter cable for sensor calculation Length 2 m <i>Art. no. Designation</i> 29011149 PCE1420-2/M12 | M12 | Interface card for synchronous data acquisition IF2008PCIe / IF2008E |
| | | | 4-fold interface module from RS422 to USB IF2004/USB |
| | | | Controller for D/A conversion and evaluation of up to 2 sensor signals Dual Processing Unit |
| | | | Interface module for Ethernet connection of up to 8 sensors IF2008/ETH |









Other cables

| | |
|--------------------|---|
| Cable diameter: | 6.7 mm |
| Drag chain: | yes |
| Robot: | no |
| Temperature range: | -40 ... 80 °C |
| Bending radius: | > 27 mm (fixed installation) > 51 mm (dynamic) |

| Input | Cables | Type | Connection possibilities and accessories | | | | | |
|-------------------------------------|---|-----------------|--|---------|------------------------|-------|--|--|
| 2 x Sub-D (PCF1420-x/ IF2008) | <p>Adapter cable for the connection of two sensors per Sub-D connector Length 0.1 m</p> <table> <tr> <td><i>Art. no.</i></td> <td><i>Designation</i></td> </tr> <tr> <td>2901528</td> <td>IF2008-Y-adapter cable</td> </tr> </table>  | <i>Art. no.</i> | <i>Designation</i> | 2901528 | IF2008-Y-adapter cable | Sub-D | <p>Interface card for synchronous data acquisition IF2008PCle / IF2008E</p>  | <p>4-fold interface module from RS422 to USB IF2004/USB</p>  |
| <i>Art. no.</i> | <i>Designation</i> | | | | | | | |
| 2901528 | IF2008-Y-adapter cable | | | | | | | |

Smart laser sensors for precise measurements optoNCDT 1900

designed for advanced
AUTOMATION

-  For common surfaces
-  Measuring rate up to 10 kHz
-  **INTERFACE** Analog (U/I) / RS422 / PROFINET / EtherNet/IP / EtherCAT
-  **ASc** Advanced Surface Compensation
-  Repeatability $<0.1 \mu\text{m}$
-  Ideal for series and OEM applications
-  Highest immunity to ambient light
-  High resistance to shocks and vibrations



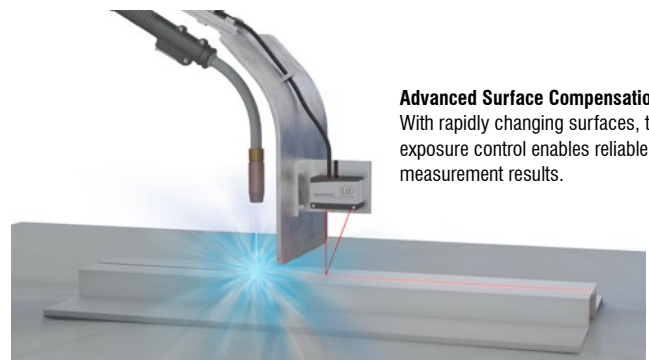
Next-generation laser sensors

The optoNCDT 1900 laser sensors are used for dynamic displacement, distance and position measurements and offer a unique combination of performance, design and integration capability. The integrated high-performance controller enables fast and highly precise processing and output of measurement values.

These innovative sensors are used whenever maximum precision is combined with the latest technology, e.g., in sophisticated automation, automotive production, 3D printing and coordinate measuring machines.

Advanced Surface Compensation – The intelligent exposure control for demanding surfaces

The optoNCDT 1900 laser sensors are equipped with an intelligent surface control feature. Innovative algorithms enable stable measurement results even on demanding surfaces where changing reflections occur. Furthermore, these new algorithms compensate for ambient light up to 50,000 lux. Therefore, these are the sensors with the highest resistance to ambient light in their class and can even be used in strongly illuminated environments.



Advanced Surface Compensation
With rapidly changing surfaces, the exposure control enables reliable measurement results.

Industrial Ethernet for easy integration



The latest optoNCDT 1900 laser triangulation sensors are also available with integrated Industrial Ethernet interface. Depending on the model, you can integrate the full sensor performance into your PLC directly via EtherCAT, EtherNet/IP or PROFINET without any additional interface module. You benefit from real-time data without time delay as well as reduced installation and wiring effort.

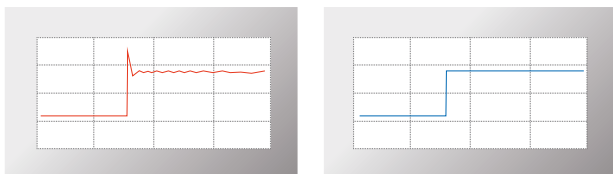
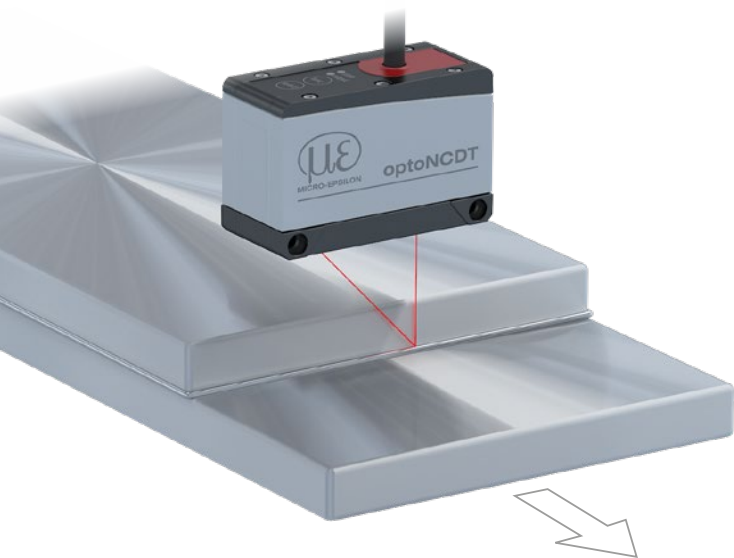
The sensor parameters can be set directly via Industrial Ethernet or still via web interface. For high speed measurements, the sensor offers an Oversampling feature which allows, depending on the fieldbus, measurement data to be detected or transmitted eight times faster than the bus cycles.

EtherCAT®

EtherNet/IP®

PROFINET®

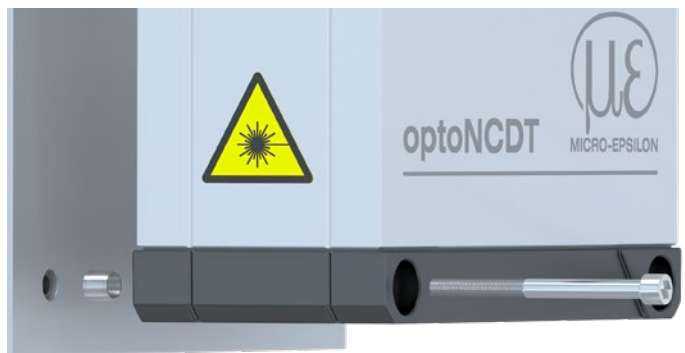
| Model | Technology | Measuring range | Repeatability | Linearity |
|-----------------|---|-----------------|-------------------|-------------|
| optoNCDT 1900 |  | 2 - 500 mm | 0.1 μm | from 0.02 % |
| optoNCDT 1900LL |  | 2 - 50 mm | 0.1 μm | from 0.02 % |



The two-step measurement value averaging enables smooth signal courses when measuring edges (right). Otherwise, interfering signals occur (left).

Highest stability based on intelligent signal optimization

For the first time, a two-step measurement value averaging feature is available to optimize the signal. This enables a smooth signal at edges and steps. Especially for high speed measurements of moving parts, measurement averaging enables a precise signal course.



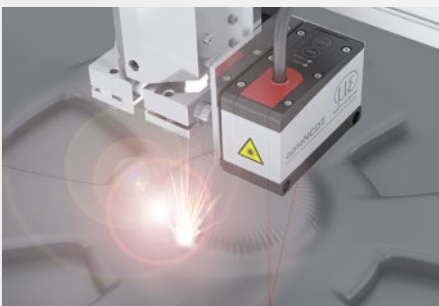
Patented installation

Easy mounting and high repeatability when replacing the sensor

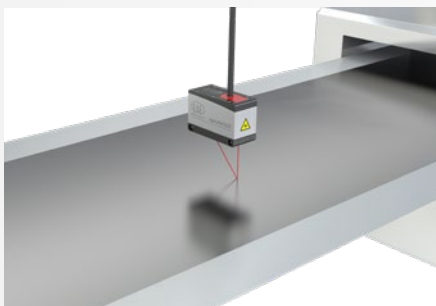
Simple mounting and initial operation

Mounting the sensor using fitting sleeves automatically aligns the sensor in the correct position. This enables both easy sensor replacement and even higher precision in solving measurement tasks. Thanks to its small dimensions, the laser sensor can also be integrated in confined spaces.

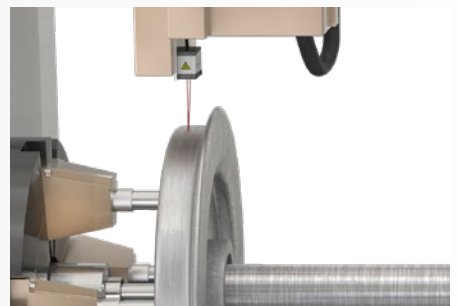
Application examples



Distance measurement of print heads



Thickness measurement of electrode film



Wear inspection of wheel tires

Technical data

optoNCDT 1900

optoNCDT 1900 (General technical data)

| Model | | ILD1900-xx |
|---|--|---------------------------------|
| Measuring rate ^[1] | 7 adjustable stages: 10 kHz / 8 kHz / 4 kHz / 2 kHz / 1 kHz / 500 Hz / 250 Hz | |
| Temperature stability ^[2] | ±0.005 % FSO / K | |
| Light source | Semiconductor laser ≤ 1 mW, 670 nm (red) with laser class 2 | |
| Laser class | Class 2 in accordance with IEC 60825-1: 2014 (Class 3 available on request) | |
| Supply voltage | 11 ... 30 VDC | |
| Power consumption | < 3 W (24 V) | |
| Signal input | 1 x HTL/TTL laser on/off; 1 x HTL/TTL multi-function input: trigger in, slave in, zero setting, mastering, teach-in; 1 x RS422 synchronization input: trigger in, sync in, master/slave, master/slave alternating | |
| Digital interface ^[3] | RS422 (18 bit) / EtherCAT / PROFINET / EtherNet/IP | |
| Analog output | 4 ... 20 mA / 0 ... 5 V / 0 ... 10 V (16 bit, freely scalable within the measuring range) | |
| Switching output | 2x switching outputs (error & limit value): 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 17-pin M12 plug; optional extension to 3 m / 6 m / 9 m / 15 m possible (suitable connection cable see Accessories) | |
| Temperature range | Storage | -20 ... +70 °C (non-condensing) |
| | Operation | 0 ... +50 °C (non-condensing) |
| Shock (DIN EN 60068-2-27) | 15 g / 6 ms in 3 axes | |
| Vibration (DIN EN 60068-2-6) | 30 g / 20 ... 500 Hz | |
| Protection class (DIN EN 60529) | IP67 | |
| Material | Aluminum housing | |
| Weight | approx. 185 g (incl. pigtail), approx. 300 g (incl. cable) | |
| Control and indicator elements ^[4] | Select & function keys: interface selections, mastering (zero), teach, presets, quality slider, frequency selection, factory settings; web interface for setup: application-specific presets, peak selection, video signal, freely selectable averaging possibilities, data reduction, setup management; 2 x color LEDs for power / status | |

^[1] Factory setting: measuring rate 4 kHz, median 9; modifying the factory setting requires the IF2001/USB converter (see accessories)

^[2] Related to digital output in the mid of the measuring range; the specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured; value is valid in a range from 20 °C to 50 °C

^[3] EtherCAT, PROFINET and EtherNet/IP require connection via interface module (see accessories)

^[4] Access to web interface requires connection to PC via IF2001/USB (see accessories)

optoNCDT 1900 with integrated Industrial Ethernet interface (General technical data)



| Model | | ILD1900-xx with integrated Industrial Ethernet interface |
|---|-----------|--|
| Measuring rate ^[1] | | 7 adjustable stages: 10 kHz / 8 kHz / 4 kHz / 2 kHz / 1 kHz / 500 Hz / 250 Hz |
| Temperature stability ^[2] | | ±0.005 % FSO / K |
| Light source | | Semiconductor laser ≤ 1 mW, 670 nm (red) with laser class 2 |
| Laser class | | Class 2 in accordance with IEC 60825-1: 2014 (Class 3 available on request) |
| Supply voltage | | 11 ... 30 VDC or PoE |
| Power consumption | | < 3 W (24 V) |
| Signal input | | 1 x HTL/TTL Laser on/off |
| Digital interface | | EtherCAT / EtherNet/IP / PROFINET |
| Connection | | integrated pigtail 0.3 m with 12-pin M12 plug; optional extension to 3 m / 6 m / 9 m (see accessories for suitable connection cables) |
| Temperature range | Storage | -20 ... +70 °C (non-condensing) |
| | Operation | 0 ... +50 °C (non-condensing) |
| Shock (DIN EN 60068-2-27) | | 15 g / 6 ms in 3 axes |
| Vibration (DIN EN 60068-2-6) | | 30 g / 20 ... 500 Hz |
| Protection class (DIN EN 60529) | | IP67 |
| Material | | Aluminum housing |
| Weight | | possible via fieldbus |
| Control and indicator elements ^[3] | | Select key: factory settings, switching the operation mode; web interface for setup: application-specific presets, peak selection, video signal, freely selectable averaging possibilities, data reduction, setup management; 1 x color LED for power / status; 2 x color LEDs for fieldbus status |

^[1] Maximum measuring rate depending on fieldbus and bus cycle time; factory settings: measuring rate 4 kHz, median 9

^[2] In the mid of the measuring range; the specified value is only achieved by mounting on a metallic sensor holder.
Good heat dissipation from the sensor to the holder must be ensured; value is valid in a range from 20 °C to 50 °C

^[3] Connection to PC via network cable (with EtherCAT: sensor in Ethernet setup mode)

Technical data

optoNCDT 1900



Laser point - optoNCDT 1900 / Measuring ranges 2 - 25

| Model | | ILD1900-2 | ILD1900-6 | ILD1900-10 | ILD1900-25 |
|------------------------------------|------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Measuring range | | 2 mm | 6 mm | 10 mm | 25 mm |
| Start of measuring range | | 15 mm | 17 mm | 20 mm | 25 mm |
| Mid of measuring range | | 16 mm | 20 mm | 25 mm | 37.5 mm |
| End of measuring range | | 17 mm | 23 mm | 30 mm | 50 mm |
| Linearity ^[1] | | < ±1 μm | < ±1.8 μm | < ±2 μm | < ±5 μm |
| | | < ±0.05 % FSO | < ±0.03 % FSO | < ±0.02 % FSO | < ±0.02 % FSO |
| Repeatability ^[2] | | < 0.1 μm | < 0.25 μm | < 0.4 μm | < 0.8 μm |
| Light spot diameter ^[3] | SMR | 60 x 75 μm | 85 x 105 μm | 115 x 150 μm | 200 x 265 μm |
| | MMR | 55 x 65 μm | 57 x 60 μm | 60 x 65 μm | 70 x 75 μm |
| | EMR | 65 x 75 μm | 105 x 120 μm | 120 x 140 μm | 220 x 260 μm |
| | smallest Ø | 55 x 65 μm with 16 mm | 57 x 60 μm with 20 mm | 60 x 65 μm with 25 mm | 65 x 70 μm with 35 mm |
| Permissible ambient light | | 50,000 lx | | | |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Typical value with measurements at 4 kHz and median 9

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

Light spot diameter determined using a point-shaped laser with Gaussian fit (full 1/e² width); for ILD1900-2: determined with emulated 90/10 knife-edge method



Laser point - optoNCDT 1900 / Measuring ranges 50 - 500

| Model | | ILD1900-50 | ILD1900-100 | ILD1900-200 | ILD1900-500 |
|------------------------------------|------------|-----------------------|-------------------------|---------------|----------------|
| Measuring range | | 50 mm | 100 mm | 200 mm | 500 mm |
| Start of measuring range | | 40 mm | 50 mm | 60 mm | 100 mm |
| Mid of measuring range | | 65 mm | 100 mm | 160 mm | 350 mm |
| End of measuring range | | 90 mm | 150 mm | 260 mm | 600 mm |
| Linearity ^[1] | | < ±10 μm | < ±30 μm | < ±100 μm | < ±400 μm |
| | | < ±0.02 % FSO | < ±0.03 % FSO | < ±0.05 % FSO | < ±0.08 % FSO |
| Repeatability ^[2] | | < 1.6 μm | < 4 μm | < 8 μm | < 20 ... 40 μm |
| Light spot diameter ^[3] | SMR | 220 x 300 μm | 310 x 460 μm | 950 x 1200 μm | 950 x 1200 μm |
| | MMR | 95 x 110 μm | 140 x 170 μm | | |
| | EMR | 260 x 300 μm | 380 x 410 μm | | |
| | smallest Ø | 85 x 90 μm with 55 mm | 120 x 125 μm with 75 mm | - | - |
| Permissible ambient light | | 50,000 lx | 30,000 lx | 10,000 lx | 10,000 lx |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Typical value with measurements at 4 kHz and median 9

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

Light spot diameter determined using a point-shaped laser with Gaussian fit (full 1/e² width); for ILD1900-2: determined with emulated 90/10 knife-edge method



Laser-Line - optoNCDT 1900LL

| Model | | ILD1900-2LL | ILD1900-6LL | ILD1900-10LL | ILD1900-25LL | ILD1900-50LL |
|------------------------------------|------------|------------------------|------------------------|------------------------|--------------------------|--------------------------|
| Measuring range | | 2 mm | 6 mm | 10 mm | 25 mm | 50 mm |
| Start of measuring range | | 15 mm | 17 mm | 20 mm | 25 mm | 40 mm |
| Mid of measuring range | | 16 mm | 20 mm | 25 mm | 37.5 mm | 65 mm |
| End of measuring range | | 17 mm | 23 mm | 30 mm | 50 mm | 90 mm |
| Linearity ^[1] | | < ±1 μm | < ±1.2 μm | < ±2 μm | < ±5 μm | < ±10 μm |
| | | < ±0.05 % FSO | < ±0.02 % FSO | < ±0.02 % FSO | < ±0.02 % FSO | < ±0.02 % FSO |
| Repeatability ^[2] | | < 0.1 μm | < 0.25 μm | < 0.4 μm | < 0.8 μm | < 1.6 μm |
| Light spot diameter ^[3] | SMR | 55 x 480 μm | 100 x 600 μm | 125 x 730 μm | 210 x 950 μm | 235 μm x 1280 μm |
| | MMR | 40 x 460 μm | 50 x 565 μm | 55 x 690 μm | 80 x 970 μm | 125 μm x 1500 μm |
| | EMR | 55 x 440 μm | 100 x 525 μm | 125 x 660 μm | 220 x 1000 μm | 325 μm x 1740 μm |
| | smallest Ø | 40 x 460 μm with 16 mm | 50 x 565 μm with 20 mm | 55 x 690 μm with 25 mm | 80 x 970 μm with 37.5 mm | 115 x 1450 μm with 59 mm |
| Permissible ambient light | | 50,000 lx | | | | |

^[1] Related to digital output; FSO = Full Scale Output

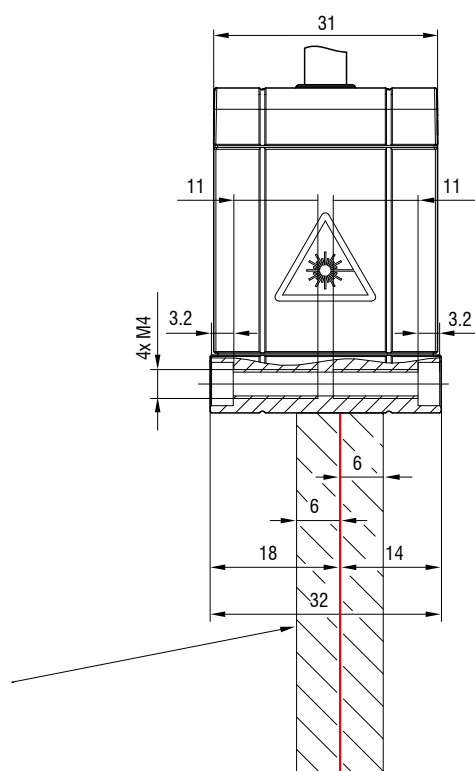
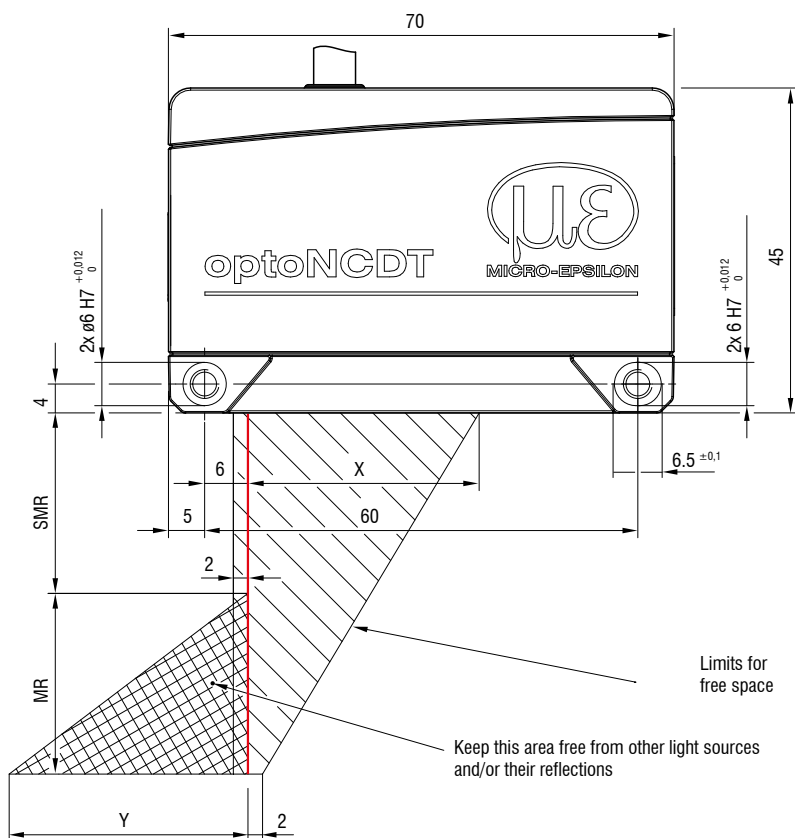
The specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Typical value with measurements at 4 kHz and median 9

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range
Light spot diameter with line-shaped laser determined based on the emulated 90/10 knife-edge method

Dimensions

optoNCDT 1900



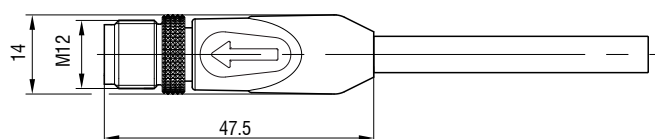
| MR | SMR | X | Y |
|-----|-----|----|-----|
| 2 | 15 | 23 | 3 |
| 6 | 17 | 27 | 9 |
| 10 | 20 | 33 | 14 |
| 25 | 25 | 33 | 33 |
| 50 | 40 | 36 | 45 |
| 100 | 50 | 37 | 75 |
| 200 | 60 | 39 | 130 |
| 500 | 100 | 43 | 215 |

(Dimensions in mm, not to scale)

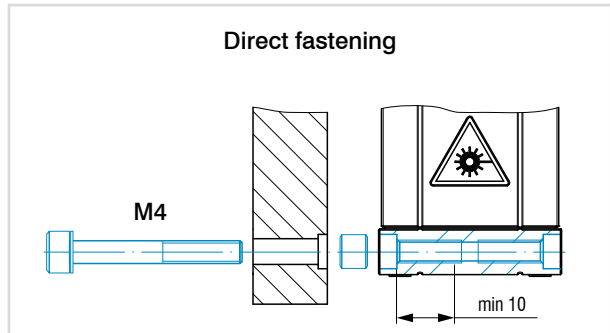
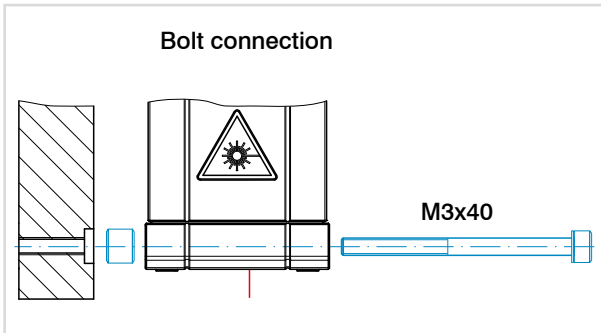
MR = measuring range; SMR = start of measuring range

MMR = mid of measuring range; EMR = end of measuring range

Connector (sensor side)



Installation options



Accessories for optoNCDT 1900/1910

Power supply unit

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)

Protective film

Transparent protective film 52 x 15 mm for ILD1900

Protective housings

with air purge and cooling, see page 62

Scope of supply

- 1 Sensor ILD1900/1910
- 1 Assembly instructions
- 1 Calibration protocol
- Accessories (2 pc. centering sleeves, 2 pc. M3 x 40)

Article designation




| | | | | |
|---|---|----|------|---|
| ILD1900- | 6 | LL | CL3B | EtherCAT |
| | | | | Interface No indication: RS422, current, voltage (standard) integrated fieldbus: EtherCAT, EtherNet/IP, PROFINET |
| | | | | Laser class No indication: class 2 (standard) 3B: on request 3R: on request |
| | | | | Laser type No indication: Red laser point (standard) LL: Laser Line |
| Measuring range in mm | | | | |
| Series ILD1900: Laser displacement sensor for Advanced Automation | | | | |

Connection possibilities

optoNCDT 1900








Connection possibilities for sensors with integrated cables

Cable diameter: 5.80 ±0.2 mm
 Drag chain: yes
 Robot: no
 Temperature range: -25 ... 80 °C (moving)
 -40 ... 80 °C (not moving)
 Bending radius: > 30 mm (fixed installation)
 > 75 mm (dynamic)

| Sensor | Cables | Type | Connection possibilities and accessories |
|---|-----------------------------|-----------|--|
| LD1900-xx ILD1900-xxLL ILD1910-xx | Integrated cable length 3 m | Open ends | <p>Supply voltage connection Power supply unit PS2020</p>  <p>Interface module of RS422 to USB IF2001/USB IC2001/USB</p>  <p>Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT</p>  |




Drag-chain suitable connection cables for sensors with pigtail

Cable diameter: 6.7 ±0.2 mm
 Drag chain: yes
 Robot: no
 Temperature range: -25 ... 80 °C (moving) (up to +105 °C for max. 3000 hrs)
 -40 ... 80 °C (not moving)
 Bending radius: > 34 mm (fixed installation)
 > 67 mm (dynamic)
 > 81 mm (drag chain)

| Sensor | Cables | Type | Connection possibilities and accessories |
|--|--|-----------|--|
| ILD1900-xx ILD1900-xxLL ILD1910-xx | Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m Art. no. Designation 29011218 PC1900-3/OE 29011219 PC1900-6/OE 29011220 PC1900-9/OE 29011221 PC1900-15/OE | Open ends | <p>Connection supply voltage PS2020</p>  <p>Interface module of RS422 to USB IF2001/USB IC2001/USB</p>  <p>Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT</p>  |
| | Adapter cable for PC interface card Length 3 m / 6 m / 9 m / 15 m Art. no. Designation 29011316 PC1900-3/IF2008 PCIE 29011317 PC1900-6/IF2008 PCIE 29011318 PC1900-9/IF2008 PCIE 29011319 PC1900-15/IF2008 PCIE | Sub-D | <p>Interface card for synchronous data acquisition IF2008PCIE / IF2008E</p>  <p>4-fold interface module from RS422 to USB IF2004/USB</p>  |
| | Adapter cable for sensor calculation Length 3 m / 6 m / 9 m / 15 m Art. no. Designation 29011320 PC1900-3/C-Box 29011321 PC1900-6/C-Box 29011322 PC1900-9/C-Box 29011323 PC1900-15/C-Box | Sub-D | <p>Controller for D/A conversion and evaluation of up to 2 sensor signals Dual Processing Unit</p>  |
| | Adapter cable for sensor calculation Length 2 m Art. no. Designation 29011326 PCE1900-3/M12 | M12 | <p>Interface module for Ethernet connection of up to 8 sensors IF2008/ETH</p>  |


Robot-suitable connection cables

| | |
|--------------------|--|
| Cable diameter: | approx. 7.3 mm |
| Drag chain: | no |
| Robot: | yes |
| Temperature range: | -40 ... 90 °C (moving) -50 ... 90 °C (not moving) |
| Bending radius: | > 37 mm (fixed installation) > 73 mm (dynamic) |

| Sensor | Cables | Type | Connection possibilities and accessories | |
|---------------------------|---|-----------|--|---|
| LD1900-xx ILD1900-xxLL | Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m Art. no. Designation 29011404 PC1900R-3/OE 29011405 PC1900R-6/OE 29011406 PC1900R-9/OE 29011407 PC1900R-15/OE | Open ends | Connection supply voltage PS2020 |  |
| | | | Interface module of RS422 to USB IF2001/USB IC2001/USB |  |
| ILD1910-xx | | | Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT |  |



Connection cables for sensors with integrated Industrial Ethernet interface

| | |
|--------------------|--|
| Cable diameter: | 7.5 ±0.2 mm |
| Drag chain: | yes |
| Robot: | no |
| Temperature range: | -40 ... 90 °C (moving) -50 ... 90 °C (not moving) |
| Bending radius: | > 38 mm (fixed installation) > 75 mm (dynamic) |







| Sensor | Cables | Type | Connection possibilities and accessories | |
|--|--|------------------|--|---|
| ILD1900-xx-PROFINET ILD1900-xxLL-PROFINET | Connection cables PoE, laser On/Off hardware Length 3 m / 6 m / 9 m / 15 m Art. no. Designation 29011332 PC1900-IE-3/OE-RJ45 29011333 PC1900-IE-6/OE-RJ45 29011334 PC1900-IE-9/OE-RJ45 29011444 PC1900-IE-15/OE-RJ45 | Open ends & RJ45 | Signal / Supply PoE optional: PoE Switch |  |
| | | | | |

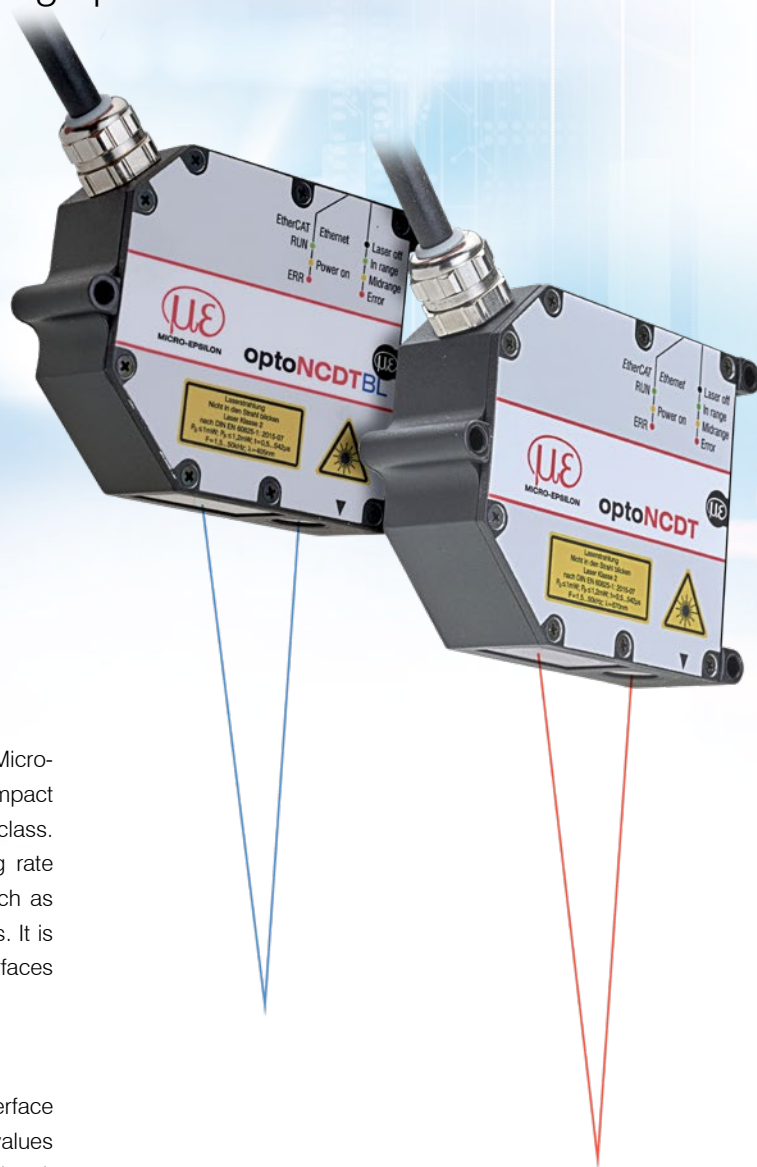
Other cables

| | |
|--------------------|---|
| Cable diameter: | 6.7 mm |
| Drag chain: | yes |
| Robot: | no |
| Temperature range: | -40 ... 80 °C |
| Bending radius: | > 27 mm (fixed installation) > 51 mm (dynamic) |

| Input | Cables | Type | Connection possibilities and accessories | |
|---|--|-------|--|---|
| 2 x Sub-D (PC1900-x/ IF2008 PCIE) | Adapter cable for the connection of two sensors per Sub-D connector Length 0.1 m Art. no. Designation 2901528 IF2008-Y-adapter cable | Sub-D | Interface card for synchronous data acquisition IF2008PCle / IF2008E |  |
| | | | 4-fold USB converter & parameter setting IF2004/USB |  |

Highly dynamic laser sensors with high precision optoNCDT 2300

-  For common surfaces
-  Adjustable measuring rate up to 49.14 kHz
-  **INTERFACE** Analog (U/I) / RS422 / Ethernet / EtherCAT / PROFINET / EtherNet/IP
-  **A-RTSC** Advanced Real Time Surface Compensation
-  Resolution 0.03 μm
-  For diffuse and reflective surfaces








The optoNCDT 2300 sensors form the high-end segment of Micro-Epsilon laser sensors. The entire electronics is integrated in a compact sensor housing which is a worldwide unique feature of this sensor class. The high-precision laser sensor has an adjustable measuring rate of 49.14 kHz and is used for particularly fast applications, such as monitoring vibrations or measurements on challenging surfaces. It is used on diffuse reflective surfaces and for directly reflecting surfaces when equipped with the special alignment feature.

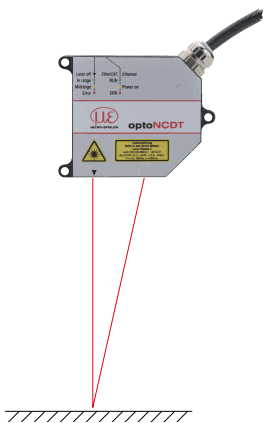
User-friendly web interface for easy operation

The optoNCDT 2300 laser sensors can be operated via a web interface which offers multiple possibilities in order to process measured values and signals, e.g., peak selection, filter and masking of the video signal.

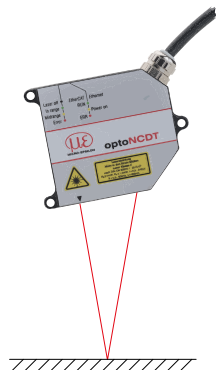
Fast exposure control for demanding surfaces

The new A-RTSC (Advanced Real Time Surface Compensation) feature is a development based on the proven RTSC technology and, with its improved dynamic range, enables more precise real time surface compensation during the measurement process. This means the sensor is not influenced by rapidly changing surface reflections and provides stable measurement results.

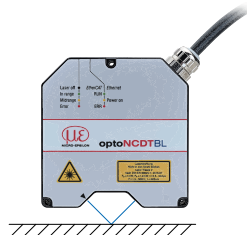
| Model | Technology | Measuring range | Repeatability | Linearity |
|-------------------|---|-----------------|--------------------|-------------|
| optoNCDT 2300 |  | 2 - 300 mm | 0.03 μm | from 0.02 % |
| optoNCDT 2300BL |  | 2 - 50 mm | 0.03 μm | from 0.02 % |
| optoNCDT 2300LL |  | 2 - 50 mm | 0.1 μm | from 0.02 % |
| optoNCDT 2300-2DR |  | 2 mm | 0.03 μm | from 0.03 % |
| optoNCDT 2310 |  | 10 - 50 mm | 0.5 μm | from 0.03 % |



Distance measurement on diffuse reflecting surfaces



Distance measurement on directly reflecting surfaces

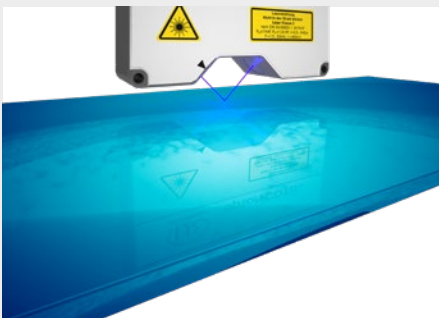


High precision distance measurement on directly reflecting surfaces

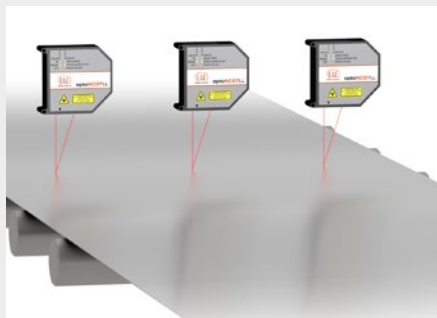
Versatile use

The optoNCDT 2300 sensors can be operated in several measurement modes: in standard mode for distance measurement on diffusely reflecting materials. In addition, the sensors can be used for distance measurement on reflective and shiny surfaces (direct reflection).

Application examples



Distance measurement of coated glass



Planarity testing of metal strips



Testing the radial run out of rollers

Technical data

optoNCDT 2300

optoNCDT 2300 (General technical data)

| Model | ILD23x0-xx |
|---|---|
| Measuring rate ^[1] | 7 adjustable stages: 49.14 kHz / 30 kHz / 20 kHz / 10 kHz / 5 kHz / 2.5 kHz / 1.5 kHz |
| Light source | Semiconductor laser < 1 mW, 670 nm (red) |
| Laser class | Class 2 in accordance with DIN EN 60825-1 : 2022-07 / (optional class 3R) |
| Permissible ambient light | 10,000...40,000 lx |
| Supply voltage | 11 ... 30 VDC |
| Power consumption | < 3 W (24 V) |
| Signal input | Laser on/off, sync in, trigger in |
| Digital interface ^[2] | RS422 (16 bit) / Ethernet / EtherCAT / PROFINET / EtherNet/IP |
| Analog output ^[3] | 4 ... 20 mA / 0 ... 5 V / 0 ... 10 V / ± 5 V / ± 10 V |
| Synchronization | possible for simultaneous or alternating measurements |
| Connection | integrated pigtail 0.25 m with 14-pin cable connector, min. bending radius 30 mm when firmly installed; optional extension to 3 m / 6 m / 9 m possible (see accessories for suitable connection cables) |
| Installation | Screw connection via three mounting holes |
| Temperature range | Storage -20 ... +70 °C (non-condensing) |
| | Operation 0 ... +50 °C (non-condensing) |
| Shock (DIN EN 60068-2-27) | 15 g / 6 ms in 3 axes |
| Vibration (DIN EN 60068-2-6) | 2 g / 20 ... 500 Hz |
| Protection class (DIN EN 60529) | IP65 |
| Weight | approx. 550 g (incl. pigtail) |
| Control and indicator elements ^[4] | Web interface for setup: user management, measurement settings, data output, measurement control, parameters and extras; 2x color LEDs for status / Ethernet and EtherCAT |

^[1] Measuring rate 49.14 kHz with reduced measuring range (in brackets)

^[2] PROFINET and EtherNet/IP require connection via interface module (see accessories)

^[3] Requires connection via interface module (see accessories)

^[4] Access to web interface requires connection to PC via IP2001/USB (see accessories)



Laser-Point - optoNCDT 2300 / Measuring ranges 2 - 20

| Model | | ILD2300-2 | ILD2300-5 | ILD2300-10 | ILD2300-20 |
|---|-----|-----------------------|---------------------|--------------------|--------------------|
| Measuring range ^[1] | | 2 (2) mm | 5 (2) mm | 10 (5) mm | 20 (10) mm |
| Start of measuring range ^[1] | | 24 (24) mm | 24 (24) mm | 30 (35) mm | 40 (50) mm |
| Mid of measuring range ^[1] | | 25 (25) mm | 26.5 (25) mm | 35 (37.5) mm | 50 (55) mm |
| End of measuring range ^[1] | | 26 (26) mm | 29 (26) mm | 40 (40) mm | 60 (60) mm |
| Linearity ^[2] | | < ± 0.6 μ m | < ± 1.5 μ m | < ± 2 μ m | < ± 4 μ m |
| | | < ± 0.03 % FSO | < ± 0.03 % FSO | < ± 0.02 % FSO | < ± 0.02 % FSO |
| Resolution ^[3] | | 0.03 μ m | 0.08 μ m | 0.15 μ m | 0.3 μ m |
| Light spot diameter ^[4] | SMR | 55 x 85 μ m | 70 x 80 μ m | 75 x 85 μ m | 140 x 200 μ m |
| | MMR | 23 x 23 μ m | 30 x 30 μ m | 32 x 45 μ m | 46 x 45 μ m |
| | EMR | 35 x 85 μ m | 70 x 80 μ m | 110 x 160 μ m | 140 x 200 μ m |
| Material | | Die-cast zinc housing | | | |

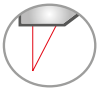
^[1] Value in brackets applies for measuring rate 49.14 kHz

^[2] FSO = Full Scale Output

The specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[3] Measuring rate 20 kHz

^[4] ± 10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range



Laser point - optoNCDT 2300 / Measuring ranges 50 - 300

| Model | | ILD2300-50 | ILD2300-100 | ILD2300-200 | ILD2300-300 |
|---|-----|-----------------------|---------------|------------------|---------------|
| Measuring range ^[1] | | 50 (25) mm | 100 (50) mm | 200 (100) mm | 300 (150) mm |
| Start of measuring range ^[1] | | 45 (70) mm | 70 (120) mm | 130 (230) mm | 200 (350) mm |
| Mid of measuring range ^[1] | | 70 (82.5) mm | 120 (145) mm | 230 (280) mm | 350 (425) mm |
| End of measuring range ^[1] | | 95 (95) mm | 170 (170) mm | 330 (330) mm | 500 (500) mm |
| Linearity ^[2] | | < ±10 μm | < ±20 μm | < ±60 μm | < ±90 μm |
| | | < ±0.02 % FSO | < ±0.02 % FSO | < ±0.03 % FSO | < ±0.03 % FSO |
| Resolution ^[3] | | 0.8 μm | 1.5 μm | 3 μm | 4.5 μm |
| Light spot diameter ^[4] | SMR | 255 x 350 μm | 350 μm | 1300 μm | 580 x 860 μm |
| | MMR | 70 x 70 μm | 130 μm | 1300 μm | 380 x 380 μm |
| | EMR | 255 x 350 μm | 350 μm | 1300 μm | 470 x 530 μm |
| Material | | Die-cast zinc housing | | Aluminum housing | |

^[1] Value in brackets applies for measuring rate 49.14 kHz

^[2] FSO = Full Scale Output

The specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[3] Measuring rate 20 kHz

^[4] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range



Blue laser - optoNCDT 2300BL

| Model | | ILD2300-2BL | ILD2300-5BL | ILD2300-10BL | ILD2310-50BL |
|---|-----|--|---------------|---------------|----------------|
| Measuring range ^[1] | | 2 (2) mm | 5 (2) | 10 (5) mm | 50 (25) mm |
| Start of measuring range ^[1] | | 24 (24) mm | 24 (24) mm | 30 (35) mm | 550 (575) mm |
| Mid of measuring range ^[1] | | 25 (25) mm | 26.5 (25) mm | 35 (37.5) mm | 575 (587.5) mm |
| End of measuring range ^[1] | | 26 (26) mm | 29 (26) mm | 40 (40) mm | 600 (600) mm |
| Linearity | | < ±0.6 μm | < ±1.5 μm | < ±2 μm | < ±40 μm |
| | | < ±0.03 % FSO | < ±0.03 % FSO | < ±0.02 % FSO | < ±0.08 % FSO |
| Resolution ^[2] | | 0.03 μm | 0.08 μm | 0.15 μm | 7.5 μm |
| Light spot diameter ^[3] | SMR | 70 x 80 μm | 200 x 200 μm | 75 x 85 μm | 400 ... 500 μm |
| | MMR | 20 x 20 μm | 20 x 20 μm | 32 x 45 μm | |
| | EMR | 80 x 100 μm | 200 x 400 μm | 110 x 160 μm | |
| Light source | | Semiconductor laser < 1 mW, 405 nm (blue violet) | | | |
| Permissible ambient light | | 10,000 lx | | | |

^[1] Value in brackets applies for measuring rate 49.14 kHz

^[2] Measuring rate 20 kHz

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

Technical data

optoNCDT 2300



Laser-Line - optoNCDT 2300LL

| Model | | ILD2300-2LL | ILD2300-10LL | ILD2300-20LL | ILD2300-50LL |
|---|-----|-----------------------|---------------|---------------|---------------|
| Measuring range ^[1] | | 2 (2) mm | 10 (5) mm | 20 (10) mm | 50 (25) mm |
| Start of measuring range ^[1] | | 24 (24) mm | 30 (35) mm | 40 (50) mm | 45 (70) mm |
| Mid of measuring range ^[1] | | 25 (25) mm | 35 (37.5) mm | 50 (55) mm | 70 (82.5) mm |
| End of measuring range ^[1] | | 26 (26) mm | 40 (40) mm | 60 (60) mm | 95 (95) mm |
| Linearity ^[2] | | < ±0.6 μm | < ±2 μm | < ±4 μm | < ±10 μm |
| | | < ±0.03 % FSO | < ±0.02 % FSO | < ±0.02 % FSO | < ±0.02 % FSO |
| Resolution ^[3] | | 0.03 μm | 0.15 μm | 0.3 μm | 0.8 μm |
| Light spot diameter ^[4] | SMR | 85 x 240 μm | 120 x 405 μm | 185 x 485 μm | 350 x 320 μm |
| | MMR | 24 x 280 μm | 35 x 585 μm | 55 x 700 μm | 70 x 960 μm |
| | EMR | 64 x 400 μm | 125 x 835 μm | 195 x 1200 μm | 300 x 1940 μm |
| Material | | Die-cast zinc housing | | | |

^[1] Value in brackets applies for a measuring rate of 49.14 kHz

^[2] FSO = Full Scale Output

The specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[3] Measuring rate 20 kHz

^[4] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range



Direct reflection - optoNCDT 2300-2DR

| Model | | ILD2300-2DR/BL |
|---|-----|--|
| Measuring range ^[1] | | 2 (1) mm |
| Start of measuring range ^[1] | | 9 (9) mm |
| Mid of measuring range ^[1] | | 10 (9.5) mm |
| End of measuring range ^[1] | | 11 (10) mm |
| Linearity ^[2] | | < ±0.6 μm |
| | | < ±0.03 % FSO |
| Resolution ^[3] | | 0.03 μm |
| Temperature stability ^[4] | | ±0.01 % FSO / K |
| Light spot diameter ^[5] | SMR | 21.6 x 25 μm |
| | MMR | 8.5 x 11 μm |
| | EMR | 22.4 x 23.7 μm |
| Light source | | Semiconductor laser <1 mW, 405 nm (blue violet) |
| Power consumption | | < 2 W (24 V) |
| Connection | | integrated pigtail 0.25 m with 14-pin cable connector, min. bending radius 30 mm when firmly installed; optional extension to 3 m / 10 m possible (see accessories for suitable connection cables) |
| Material | | Aluminum housing |
| Weight | | approx. 400 g (incl. pigtail) |

^[1] Value in brackets applies for a measuring rate of 49.14 kHz

^[2] The specified data apply to directly reflecting surfaces; FSO = Full Scale Output

^[3] Measuring rate 20 kHz

^[4] Relates to digital output in mid of measuring range

^[5] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

Light spot diameter determined with point-shaped laser with Gaussian fit (full 1/e² width)



Laser-Point - optoNCDT 2310

| Model | ILD2310-10 | ILD2310-20 | ILD2310-40 | ILD2310-50 |
|---|--|---------------|---------------|----------------|
| Measuring range ^[1] | 10 (5) mm | 20 (10) mm | 40 (20) mm | 50 (25) mm |
| Start of measuring range ^[1] | 95 (100) mm | 90 (100) mm | 175 (195) mm | 550 (575) mm |
| Mid of measuring range ^[1] | 100 (102.5) mm | 100 (105) mm | 195 (205) mm | 575 (587.5) mm |
| End of measuring range ^[1] | 105 (105) mm | 110 (110) mm | 215 (215) mm | 600 (600) mm |
| Linearity ^[2] | < ±3 μm | < ±6 μm | < ±12 μm | < ±50 μm |
| | < ±0.03 % FSO | < ±0.03 % FSO | < ±0.03 % FSO | < ±0.1 % FSO |
| Resolution ^[3] | 0.5 μm | 1 μm | 2 μm | 7.5 μm |
| Light spot diameter ^[4] | SMR | 200 μm | 230 μm | 400 ... 500 μm |
| | MMR | 60 μm | 210 μm | |
| | EMR | 200 μm | 230 μm | |
| Connection | integrated pigtail 0.25 m with 14-pin ODU plug, min. bending radius 30 mm when firmly installed (see accessories for suitable connection cable) | | | |
| Material | Aluminum housing | | | |

^[1] Value in brackets applies for measuring rate 49.14 kHz

^[2] FSO = Full Scale Output

The specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[3] with 10 kHz, without averaging

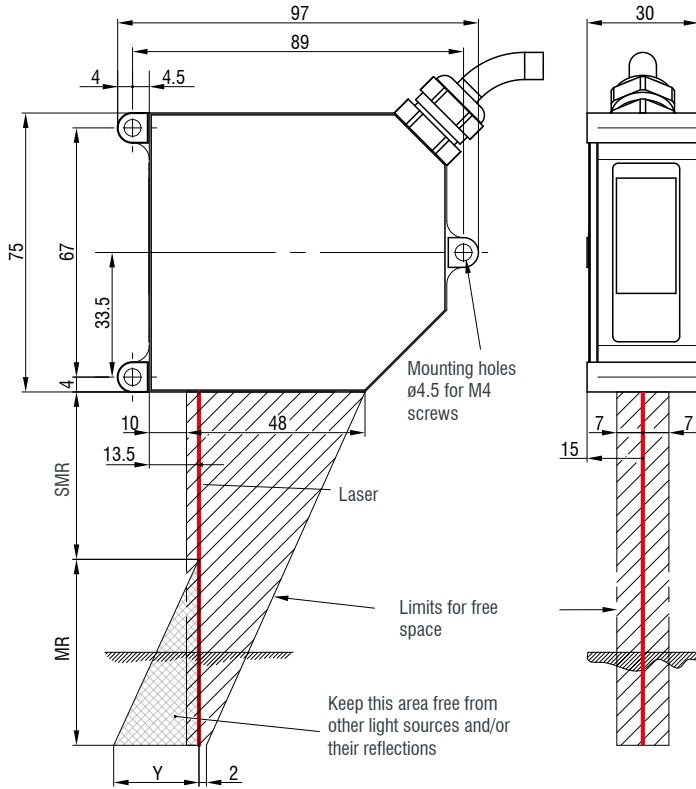
^[4] ± 10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

Dimensions

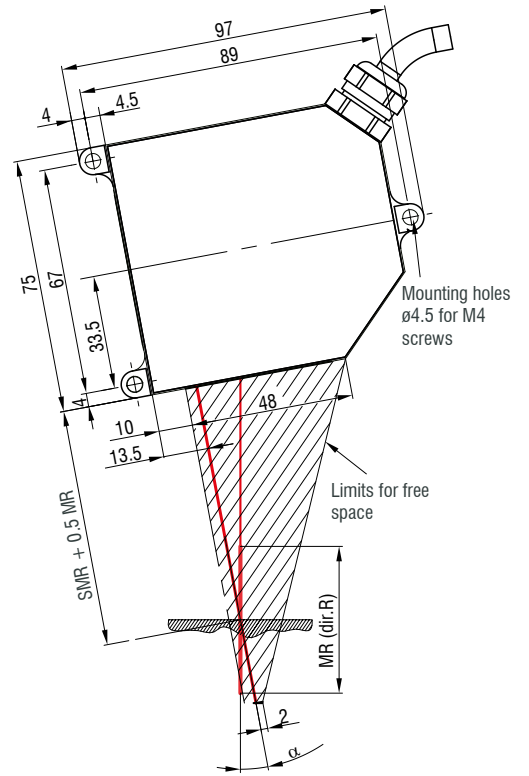
optoNCDT 2300

optoNCDT 2300 / Measuring range 2 - 100

optoNCDT 2300-2 ... 2300-100
Diffuse reflection



optoNCDT 2300-2 ... 2300-20
Direct reflection



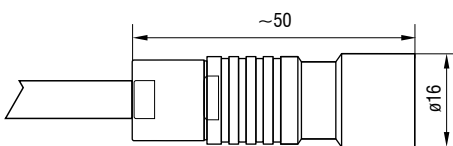
optoNCDT 2300 (Diffuse reflection)
optoNCDT 2300LL
optoNCDT 2300BL (Diffuse reflection)

| MR | SMR | Y |
|-----|-----|------|
| 2 | 24 | 1.5 |
| 5 | 24 | 3.5 |
| 10 | 30 | 6.5 |
| 20 | 40 | 10.0 |
| 50 | 45 | 23.0 |
| 100 | 70 | 33.5 |

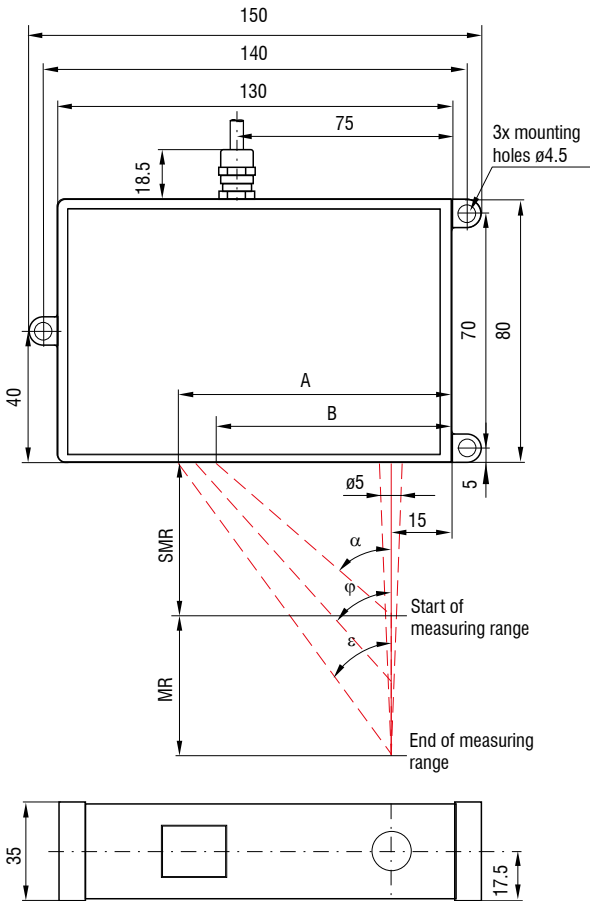
optoNCDT 2300 (Direct reflection)
optoNCDT 2300BL (Direct reflection)

| MR | SMR + 0.5 MR | α |
|----|--------------|----------|
| 2 | 25 | 20.5 ° |
| 5 | 26.5 | 20 ° |
| 10 | 35 | 17.5 ° |
| 20 | 50 | 13.8 ° |

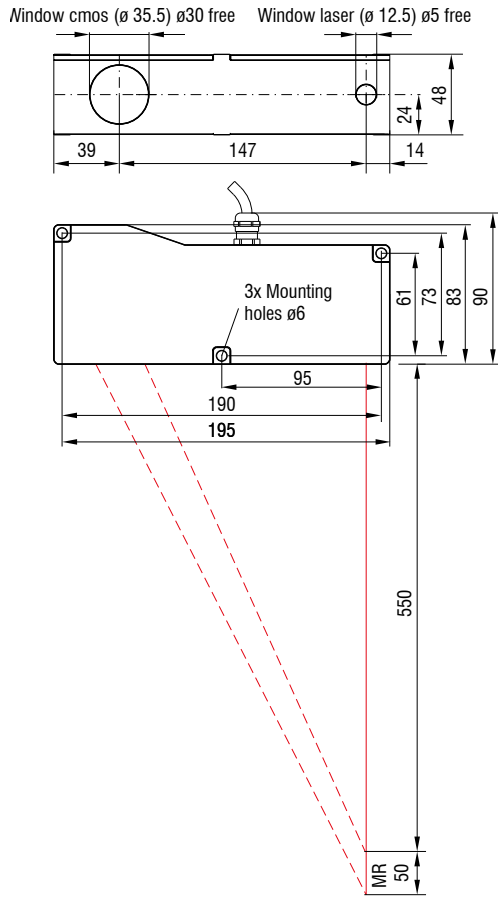
Connector (sensor side)



optoNCDT 2300 / Measuring ranges 200/300



optoNCDT 2300BL / Measuring range 50
optoNCDT 2310 / Measuring range 50



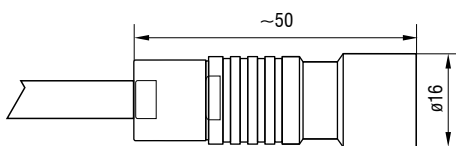
| MR | α | φ | ε | A | B |
|-----|----------|-----------|---------------|------|----|
| 200 | 25.1 ° | 16.7 ° | 13.1 ° | 91.6 | 76 |
| 300 | 18.3 ° | 12.2 ° | 9.6 ° | 99.4 | 81 |

(Dimensions in mm, not to scale)

MR = measuring range; SMR = start of measuring range

MMR = mid of measuring range; EMR = end of measuring range

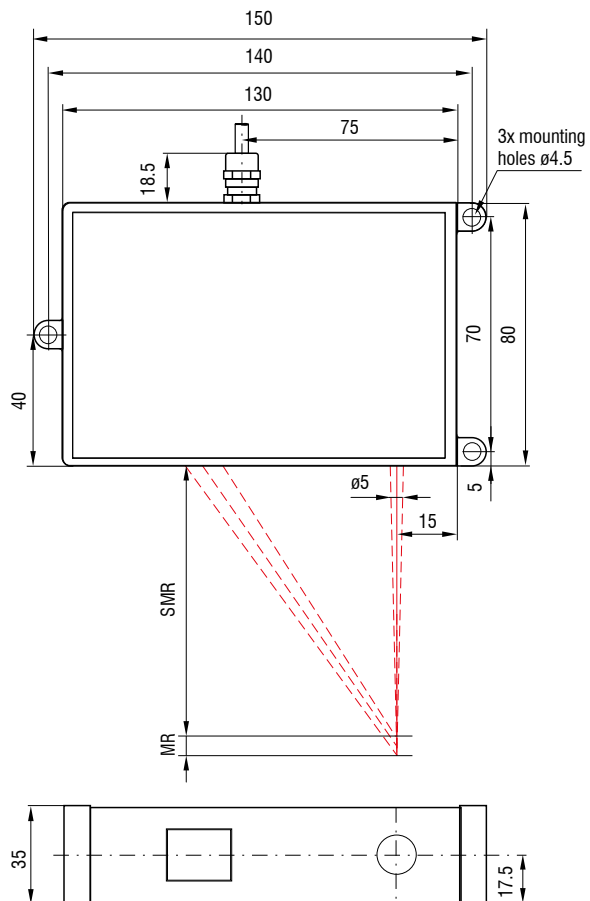
Connector (sensor side)



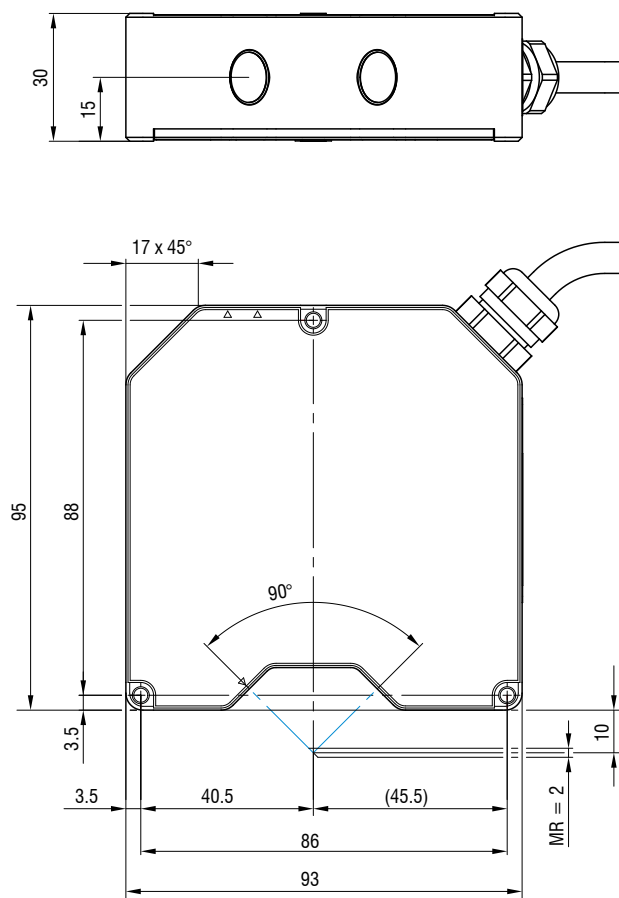
Dimensions

optoNCDT 2300

optoNCDT 2310 / Measuring ranges 10/20/40



optoNCDT 2300-2DR



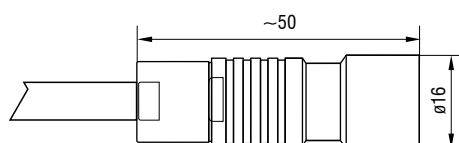
| MR | SMR | MMR | EMR |
|----|-----|-----|-----|
| 10 | 95 | 100 | 105 |
| 20 | 90 | 100 | 110 |
| 40 | 175 | 195 | 215 |

(Dimensions in mm, not to scale)

MR = measuring range; SMR = start of measuring range

MMR = mid of measuring range; EMR = end of measuring range

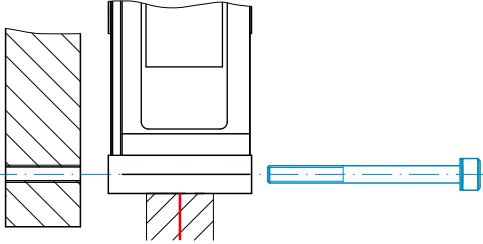
Connector (sensor side)



Installation options

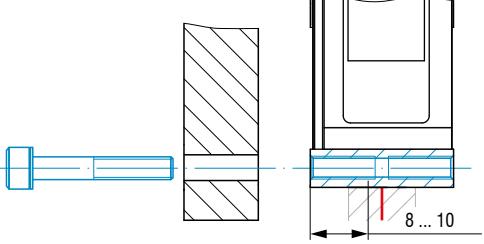
Housings M and L

Bolt connection



| | |
|--|-----------|
| ILD2300-2 ... ILD2300-100 ILD2300BL / ILD2300LL | M4 |
| ILD2300-200 / -300 ILD2310-10 / -20 / -40 | M4 |
| ILD2310-50 ILD2310-50BL | M5 |
| ILD2300-2DR | M3 |

Direct fastening



| | |
|--|-----------|
| ILD2300-2 ... ILD2300-100 ILD2300BL / ILD2300LL | - |
| ILD2300-200 / -300 ILD2310-10 / -20 / -40 | M5 |
| ILD2310-50 ILD2310-50BL | M6 |
| ILD2300-2DR | M4 |

Accessories for optoNCDT 2300/2310

Power supply unit

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)

Mounting plate

for easy alignment of the DR models

Protective housings

see page 62

Article designation

| | | | |
|--|----------|-----------|-----------|
| ILD2300- | 6 | LL | 3R |
| Laser class No indication: class 2 (standard) 3R: class 3R (on request) | | | |
| Laser type No indication: Red laser point (standard) LL: Laser Line BL: Blue Laser DR: Direct Reflection | | | |
| Measuring range in mm | | | |
| Series ILD2300: Highly dynamic laser sensor in the 50 kHz class ILD2310: Laser sensors with small measuring range and large offset distance | | | |

Scope of supply









- 1 sensor ILD23x0 with 0.25 m connection cable and cable socket
- 2 laser warning signs according to IEC standard
- RJ45 short-circuit plug

Connection possibilities

optoNCDT 2300




Drag-chain suitable extension and adapter cables

Cable diameter: max. 7.5 mm
 Drag chain: ja
 Robot: no
 Temperature range: -40 ... 70 °C (moving / not moving)
 Bending radius: > 90 mm (fixed installation / dynamic / drag chain)

| Sensor | Cables | Type | Connection possibilities and accessories | |
|--|--|--|---|--|
| ILD2300-xx ILD2300-xxLL ILD2300-xxBL ILD2300-2DR ILD2310-xx | Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m <i>Art. no.</i> <i>Designation</i> 2901717 PC2300-3/OE 2901760 PC2300-6/OE 2901761 PC2300-9/OE 2901762 PC2300-15/OE | Open ends | Supply voltage connection Power supply unit PS2020  | |
| | Adapter cable for PC interface card Length 3 m / 6 m <i>Art. no.</i> <i>Designation</i> 2901728 PC2300-3/IF2008 2901729 PC2300-6/IF2008 | Sub-D | Interface module of RS422 to USB IF2001/USB  | |
| | | | Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT  | |
| | Adapter cable for sensor calculation Length 3 m / 6 m / 9 m <i>Art. no.</i> <i>Designation</i> 29011031 PC2300-3/C-Box/RJ45 29011044 PC2300-6/C-Box/RJ45 29011045 PC2300-9/C-Box/RJ45 | Sub-D | Interface card for synchronous data acquisition IF2008PCIe / IF2008E  | |
| | | | 4-fold interface module from RS422 to USB IF2004/USB  | |
| Controller for D/A conversion and evaluation of up to 2 sensor signals Dual Processing Unit  | | | | |
| Adapter cable for sensor calculation Length 2 m <i>Art. no.</i> <i>Designation</i> 29011279 PCE2300-3/M12 | M12 | Interface module for Ethernet connection of up to 8 sensors IF2008/ETH  | | |
| Adapter cable Sub-D for EtherCAT Length 3 m / 6 m <i>Art. no.</i> <i>Designation</i> 2901661 PC2300-3/SUB-D 2901976 PC2300-6/SUB-D | Sub-D | Signal output Ethernet, EtherCAT, RS422 to PC or PLC PC2300-0,5Y Connection cable ILD2300  | | |





Connection cable for high temperature

| | |
|--------------------|--|
| Cable diameter: | max. 7.5 mm |
| Drag chain: | no |
| Robot: | no |
| Temperature range: | -55 ... 250 °C (moving) -90 ... 250 °C (not moving) |
| Bending radius: | > 40 mm (fixed installation) > 75 mm (dynamic) |

| Sensor | Cables | Type | Connection possibilities and accessories | |
|---|---|-----------|---|---|
| ILD2300-xx ILD2300-xxLL ILD2300-xxBL ILD2300-2DR ILD2310-xx | Connection cable high temperatures Length 3 m / 6 m / 9 m / 15 m <i>Art. no.</i> <i>Designation</i> 29011118 PC2300-3/OE/HT 29011119 PC2300-6/OE/HT 29011095 PC2300-9/OE/HT 29011120 PC2300-15/OE/HT | Open ends | Connection supply voltage PS2020 |  |
| | Interface module of RS422 to USB IF2001/USB | |  | |
| | Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT | |  | |
| | | | | |
| | | | | |






Connection cable for EtherCAT operation

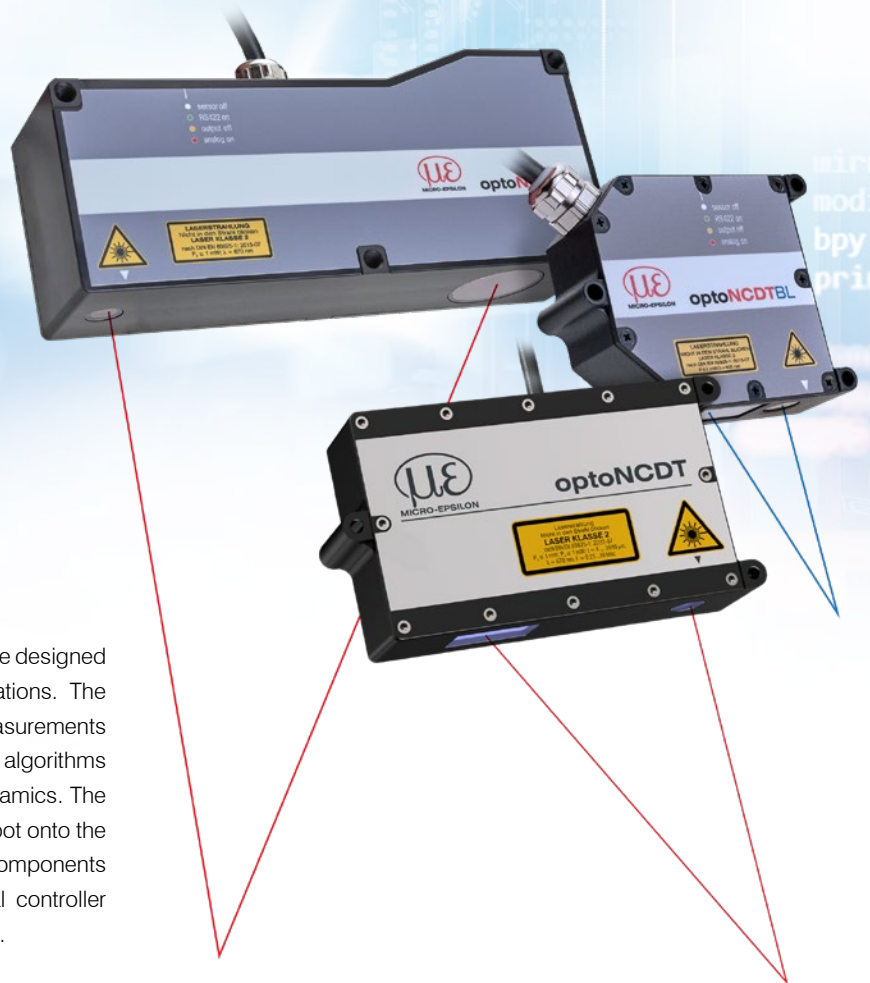
| | |
|--------------------|---|
| Cable diameter: | max. 7.5 mm |
| Drag chain: | yes |
| Robot: | no |
| Temperature range: | -40 ... 70 °C (moving / not moving) |
| Bending radius: | > 90 mm (fixed installation / dynamic / drag chain) |

| Input | Cables | Type | Connection possibilities and accessories | |
|-----------------------------------|---|------------------|--|---|
| Sub-D (PC2300-x/ Sub-D) | Adapter cable for EtherCAT Length 0.5 m <i>Art. no.</i> <i>Designation</i> 2901693 PC2300-0,5Y Connection cable ILD2300  | Open ends & RJ45 | Signal output EtherCAT & Ethernet |  |
| | | | Supply voltage connection Power supply unit PS2020 |  |
| | | | Interface module of RS422 to USB IF2001/USB |  |

Powerful laser sensors for special applications

optoNCDT 17x0 / optoNCDT 1910

-  Adjustable measuring rate up to 10 kHz
-  Analog (U/I) / RS422 / PROFINET / EtherNet/IP
-  Fast surface compensation
-  High repeatability
-  Ideal for large measurement distances









The optoNCDT 1910, 1710 and 1750 series laser sensors are designed for fast and precise measurements in industrial applications. The models are used for demanding surfaces and impress in measurements where large distances are required. Innovative evaluation algorithms and improved components enable high accuracy and dynamics. The high-performance optical system generates a small light spot onto the target which enables the detection of even the smallest of components reliably. The pigtail cable in conjunction with the internal controller reduces the installation effort for the sensors to a minimum.

The intelligent exposure control for demanding surfaces

The optoNCDT 1750 sensors feature real-time surface compensation. The real-time surface compensation feature (RTSC) determines the amount of reflection from the target surface during continuous exposure and in real-time. The exposure time or the amount of light produced by the laser is optimally matched to the reflection characteristics of the target surface. This enables extremely reliable measurements even on reflecting surfaces. The optoNCDT 1910 sensors use Advanced Surface Compensation and are also highly resistant to ambient light.

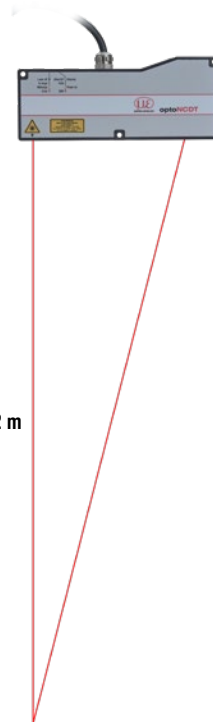
Ideal for industrial applications

Different output signals enable the integration of the sensor into plant and machine control systems. As well as analog voltage and current outputs, a digital interface provides distance information from the sensor. Due to the universal setting and evaluation possibilities, the sensors meet all the requirements for use in industrial applications.

| Model | Technology | Measuring range | Repeatability | Linearity |
|------------------|---|-----------------|------------------------|-------------|
| optoNCDT 1750BL |  | 2 - 750 mm | 0.8 μm | from 0.06 % |
| optoNCDT 1750-DR |  | 2 - 20 mm | 0.1 μm | 0.08 % |
| optoNCDT 1710 |  | 50 mm | from 7.5 μm | 0.10 % |
| optoNCDT 1710BL |  | 50 / 1000 mm | 7.5 μm | from 0.10 % |
| optoNCDT 1760 |  | 1000 mm | from 7.5 μm | 0.10 % |
| optoNCDT 1910 |  | 500 / 750 mm | from 20 μm | 0.07 % |

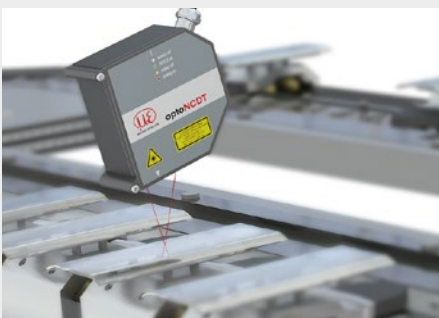
Large distance and large measuring range

The optoNCDT long-range models are used to cover a large measuring range or to measure from a large distance to the target. The long-range laser sensors combine high accuracy and large measuring distances.

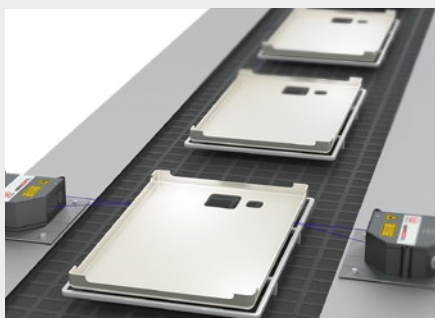


Measurement distances up to 2 m

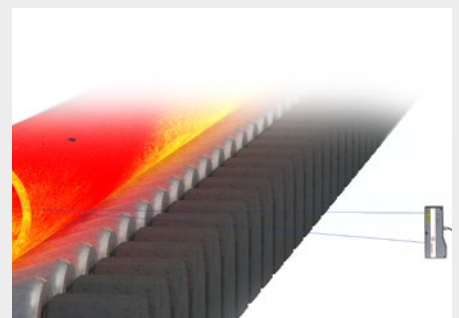
Application examples



Geometry testing of reflective glass parts



Position check of plastic components



Position measurement of red-hot glowing pipes

Technical data

optoNCDT 17x0 Laser sensors for demanding objects

optoNCDT 1750 (General technical data)

| Model | ILD1750-xx | |
|---|---|---------------------------------|
| Measuring rate ^[1] | 6 adjustable stages: 7.5 kHz / 5 kHz / 2.5 kHz / 1.25 kHz / 625 Hz / 300 Hz | |
| Light source | Semiconductor laser < 1 mW, 670 nm (red) | |
| Laser class | Class 2 in accordance with DIN EN 60825-1: 2022-07 | |
| Permissible ambient light | 10,000 lx | |
| Supply voltage | 11 ... 30 VDC | |
| Power consumption | < 3 W (24 V) | |
| Signal input | 1 x HTL/TTL laser on/off; 1 x HTL/TTL multi-function input: trigger in, slave in, zero setting, mastering, teach-in; 1 x RS422 synchronization input: trigger in, sync in, master/slave, master/slave alternating | |
| Digital interface ^[2] | RS422 (16 bit) / EtherCAT / PROFINET / EtherNet/IP | |
| Analog output | 4 ... 20 mA / 0 ... 5 V / 0 ... 10 V (16 bit, freely scalable within the measuring range) | |
| Switching output | 2x switching outputs (error & limit value): npn, pnp, push pull | |
| Connection | integrated pigtail 0.25 m with 14-pin ODU connector, min. bending radius 30 mm when firmly installed; optional extension to 3 m / 10 m possible (see accessories for suitable connection cables) | |
| Installation | Screw connection via three mounting holes | |
| Temperature range | Storage | -20 ... +70 °C (non-condensing) |
| | Operation | 0 ... +50 °C (non-condensing) |
| Shock (DIN EN 60068-2-27) | 15 g / 6 ms in 3 axes | |
| Vibration (DIN EN 60068-2-6) | 2 g / 20 ... 500 Hz | |
| Protection class (DIN EN 60529) | IP65 | |
| Material | Zinc die-cast housing | |
| Weight | approx. 550 g (incl. pigtail) | |
| Control and indicator elements ^[3] | Select & function keys: interface selections, mastering (zero), teach, presets, quality slider, frequency selection, factory settings; web interface for setup: application-specific presets, peak selection, video signal, freely selectable averaging possibilities, data reduction, setup management 2 x color LEDs for power / status | |

^[1] Factory setting: measuring rate 4 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)

^[2] EtherCAT, PROFINET and EtherNet/IP require connection via interface module (see accessories)

^[3] Access to web interface requires connection to PC via IF2001/USB (see accessories)



Blue laser - optoNCDT 1750BL

| Model | | ILD1750-20BL | ILD1750-200BL | ILD1750-500BL | ILD1750-750BL |
|------------------------------------|---|---------------|---------------|------------------|---------------|
| Measuring range | | 20 mm | 200 mm | 500 mm | 750 mm |
| Start of measuring range | | 40 mm | 100 mm | 200 mm | 200 mm |
| Mid of measuring range | | 50 mm | 200 mm | 450 mm | 575 mm |
| End of measuring range | | 60 mm | 300 mm | 700 mm | 950 mm |
| Linearity ^[1] | | < ±12 μm | < ±160 μm | < ±350 μm | < ±670 μm |
| | | < ±0.06 % FSO | < ±0.08 % FSO | < ±0.07 % FSO | < ±0.09 % FSO |
| Repeatability ^[2] | | 0.8 μm | 15 μm | 20 μm | 45 μm |
| Light spot diameter ^[3] | SMR | 320 μm | 1300 μm | 1500 μm | 1500 μm |
| | MMR | 45 μm | | | |
| | EMR | 320 μm | | | |
| Light source | Semiconductor laser <1 mW, 405 nm (blue violet) | | | | |
| Material | Die-cast zinc housing | | | Aluminum housing | |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Measuring rate 5 kHz, median 9

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range



Direct reflection - optoNCDT 1750DR

| Model | | ILD1750-2DR | ILD1750-10DR | ILD1750-20DR |
|------------------------------------|-----|---------------|--------------|--------------|
| Measuring range | | 2 mm | 10 mm | 20 mm |
| Start of measuring range | | 24 mm | 30.5 mm | 53.5 mm |
| Mid of measuring range | | 25 mm | 35.5 mm | 63.5 mm |
| End of measuring range | | 26 mm | 40.5 mm | 73.5 mm |
| Linearity ^[1] | | < ±1.6 μm | < ±6 μm | < ±12 μm |
| | | < ±0.08 % FSO | | |
| Repeatability ^[2] | | 0.1 μm | 0.4 μm | 0.8 μm |
| Measuring angle | | 20° | 17.6° | 11.5° |
| Light spot diameter ^[3] | SMR | 80 μm | 110 μm | 320 μm |
| | MMR | 35 μm | 50 μm | 45 μm |
| | EMR | 80 μm | 110 μm | 320 μm |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Measuring rate 5 kHz, median 9

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

Technical data

optoNCDT 17x0 Laser sensors for large measuring ranges



Long range - optoNCDT 1710

| Model | | ILD1710-50 |
|------------------------------------|-----------|--|
| Measuring range | | 50 mm |
| Start of measuring range | | 550 mm |
| Mid of measuring range | | 575 mm |
| End of measuring range | | 600 mm |
| Measuring rate | | 4 adjustable stages: 2.5 kHz / 1.25 kHz / 625 Hz / 312.5 Hz |
| Linearity ^[1] | | < ±50 μm < ±0.1 % FSO |
| Resolution ^[2] | | 7.5 μm |
| Light spot diameter ^[3] | SMR | 400 x 500 μm |
| | MMR | |
| | EMR | |
| Light source | | Semiconductor laser < 1 mW, 670 nm (red) |
| Laser class | | Class 2 in accordance with DIN EN 60825-1: 2022-07 |
| Permissible ambient light | | 10,000 lx |
| Supply voltage | | 11 ... 30 VDC |
| Max. current consumption | | 150 mA (24 V) |
| Signal input | | Zero, laser on/off |
| Digital interface | | RS422 (14 bit) |
| Analog output | | 4 ... 20 mA / 0 ... 10 V |
| Switching output | | 1 x error / 2 x limit values (configurable) |
| Connection | | integrated pigtail 0.25 m with 14-pin ODU plug, min. bending radius 30 mm when firmly installed (see accessories for suitable connection cable) |
| Installation | | Screw connection via three mounting holes |
| Temperature range | Storage | -20 ... +70 °C (non-condensing) |
| | Operation | 0 ... +50 °C (non-condensing) |
| Shock (DIN EN 60068-2-27) | | 15 g / 6 ms in 3 axes |
| Vibration (DIN EN 60068-2-6) | | 2 g / 20 ... 500 Hz |
| Protection class (DIN EN 60529) | | IP65 |
| Material | | Aluminum housing |
| Weight | | approx. 800 g (incl. pigtail) |
| Control and display elements | | Select & function keys: output type, measuring rate, type of averaging, averaging number, error analog, synchronization, operation mode, trigger mode, baud rate, data format; display of measured values via PC with sensorTOOL; 5x color LEDs for status display |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Measuring rate 2.5 kHz, without averaging

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range



Long range / Blue laser - optoNCDT 1710BL

| Model | | ILD1710-50BL | ILD1710-1000BL |
|------------------------------------|-----------|--|------------------|
| Measuring range | | 50 mm | 1 000 mm |
| Start of measuring range | | 550 mm | 1 000 mm |
| Mid of measuring range | | 575 mm | 1 500 mm |
| End of measuring range | | 600 mm | 2 000 mm |
| Measuring rate | | 4 adjustable stages: 2.5 kHz / 1.25 kHz / 625 Hz / 312.5 Hz | |
| Linearity ^[1] | | < ±50 μm | < ±1000 μm |
| | | < ±0.1 % FSO | |
| Resolution ^[2] | | 7.5 μm | 100 μm |
| Light spot diameter ^[3] | SMR | 400 x 500 μm | 2500 ... 5000 μm |
| | MMR | | |
| | EMR | | |
| Light source | | Semiconductor laser <1 mW, 405 nm (blue violet) | |
| Laser class | | Class 2 in accordance with DIN EN 60825-1: 2022-07 | |
| Permissible ambient light | | 10,000 lx | |
| Supply voltage | | 11 ... 30 VDC | |
| Max. current consumption | | 150 mA (24 V) | |
| Signal input | | Zero, laser on/off | |
| Digital interface | | RS422 (14 bit) | |
| Analog output | | 4 ... 20 mA / 0 ... 10 V | |
| Switching output | | 1 x error / 2 x limit values (configurable) | |
| Connection | | integrated pigtail 0.25 m with 14-pin ODU plug, min. bending radius 30 mm when firmly installed (see accessories for suitable connection cable) | |
| Installation | | Screw connection via three mounting holes | |
| Temperature range | Storage | -20 ... +70 °C (non-condensing) | |
| | Operation | 0 ... +50 °C (non-condensing) | |
| Shock (DIN EN 60068-2-27) | | 15 g / 6 ms in 3 axes | |
| Vibration (DIN EN 60068-2-6) | | 2 g / 20 ... 500 Hz | |
| Protection class (DIN EN 60529) | | IP65 | |
| Material | | Aluminum housing | |
| Weight | | approx. 800 g (incl. pigtail) | |
| Control and display elements | | Select & function keys: output type, measuring rate, type of averaging, averaging number, error analog, synchronization, operation mode, trigger mode, baud rate, data format; display of measured values via PC with sensorTOOL; 5x color LEDs for status display | |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Measuring rate 2.5 kHz, without averaging

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

Technical data

optoNCDT 17x0 Laser sensors for large measuring ranges



Long-Range - optoNCDT 1760

| Model | | ILD1760-1000 |
|---|-----------|---|
| Measuring range | | 1 000 mm |
| Start of measuring range | | 1 000 mm |
| Mid of measuring range | | 1 500 mm |
| End of measuring range | | 2 000 mm |
| Measuring rate ^[1] | | 6 adjustable stages: 7.5 kHz / 5 kHz / 2.5 kHz / 1.25 kHz / 625 Hz / 300 Hz |
| Linearity ^[2] | | < ±1000 µm |
| | | < ±0.1 % FSO |
| Repeatability ^[3] | | 100 µm |
| Light spot diameter ^[4] | SMR | 2500 ... 5000 µm |
| | MMR | |
| | EMR | |
| Light source | | Semiconductor laser < 1 mW, 670 nm (red) |
| Laser class | | Class 2 in accordance with DIN EN 60825-1: 2022-07 |
| Permissible ambient light | | 10,000 lx |
| Supply voltage | | 11 ... 30 VDC |
| Max. current consumption | | 150 mA (24 V) |
| Signal input | | 1 x HTL/TTL laser on/off; 1 x HTL/TTL multi-function input: trigger in, slave in, zero setting, mastering, teach-in; 1 x RS422 synchronization input: trigger in, sync in, master/slave, master/slave alternating |
| Digital interface ^[5] | | RS422 (16 bit) / EtherCAT / PROFINET / EtherNet/IP |
| Analog output | | 4 ... 20 mA / 0 ... 5 V / 0 ... 10 V (16 bit, freely scalable within the measuring range) |
| Switching output | | 2x switching outputs (error & limit value): npn, pnp, push pull |
| Connection | | integrated pigtail 0.25 m with 14-pin ODU connector, min. bending radius 30 mm when firmly installed; optional extension to 3 m / 10 m possible (see accessories for suitable connection cables) |
| Installation | | Screw connection via three mounting holes |
| Temperature range | Storage | -20 ... +70 °C (non-condensing) |
| | Operation | 0 ... +50 °C (non-condensing) |
| Shock (DIN EN 60068-2-27) | | 15 g / 6 ms in 3 axes |
| Vibration (DIN EN 60068-2-6) | | 2 g / 20 ... 500 Hz |
| Protection class (DIN EN 60529) | | IP65 |
| Material | | Aluminum housing |
| Weight | | approx. 800 g (incl. pigtail) |
| Control and indicator elements ^[6] | | Select & function keys: interface selections, mastering (zero), teach, presets, quality slider, frequency selection, factory settings; web interface for setup: application-specific presets, peak selection, video signal, freely selectable averaging possibilities, data reduction, setup management 2 x color LEDs for power / status |

^[1] Factory setting 5 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)

^[2] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[3] Measuring rate 5 kHz, median 9

^[4] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

^[5] EtherCAT, PROFINET and EtherNet/IP require connection via interface module (see accessories)

^[6] Access to web interface requires connection to PC via IF2001/USB (see accessories)

Technical data

optoNCDT 1910 Laser sensors for large measuring ranges



optoNCDT 1910

| Model | ILD1910-500 | ILD1910-750 |
|---|--|---------------------------------|
| Measuring range | 500 mm | 750 mm |
| Start of measuring range | 200 mm | 200 mm |
| Mid of measuring range | 450 mm | 575 mm |
| End of measuring range | 700 mm | 950 mm |
| Measuring rate ^[1] | continuously adjustable between 0.25 ... 9.5 kHz or 7 adjustable stages: 9.5 kHz / 8 kHz / 4 kHz / 2 kHz / 1.0 kHz / 500 Hz / 250 Hz | |
| Linearity ^[2] | < ±0.07 % FSO | ±0.08 % FSO |
| | ±350 μm | ±600 μm |
| Repeatability ^[3] | 20 μm | 30 μm |
| Light spot diameter ^[4] | 800 x 800 μm | 1100 x 1100 μm |
| Light source | Semiconductor laser ≤ 1 mW, 670 nm (red) with laser class 2 | |
| Laser class | Class 2 in accordance with IEC 60825-1: 2014 (Class 3 available on request) | |
| Permissible ambient light ^[5] | 10,000 lx | |
| Supply voltage | 11 ... 30 VDC | |
| Power consumption | < 3 W (24 V) | |
| Signal input | 1 x HTL/TTL laser on/off; 1 x HTL/TTL multi-function input: trigger in, slave in, zero setting, mastering, teach-in; 1 x RS422 synchronization input: trigger in, sync in, master/slave, master/slave alternating | |
| Digital interface ^[6] | RS422 (18 bit) / EtherCAT / PROFINET / EtherNet/IP | |
| Analog output | 4 ... 20 mA / 0 ... 5 V / 0 ... 10 V (16 bit, freely scalable within the measuring range) | |
| Switching output | 2x switching outputs (error & limit value): npn, pnp, push pull | |
| Connection | integrated pigtail 0.3 m with 17-pin M12 plug; optional extension to 3 m / 6 m / 9 m / 15 m possible (suitable connection cable see Accessories) | |
| Temperature range | Storage | -20 ... +70 °C (non-condensing) |
| | Operation | 0 ... +50 °C (non-condensing) |
| Shock (DIN EN 60068-2-27) | 15 g / 6 ms in 3 axes | |
| Vibration (DIN EN 60068-2-6) | 2 g / 20 ... 500 Hz | |
| Protection class (DIN EN 60529) | IP65 | |
| Material | Aluminum housing | |
| Weight | approx. 600 g (incl. pigtail) | |
| Control and indicator elements ^[7] | Select & function keys: interface selections, mastering (zero), teach, presets, quality slider, frequency selection, factory settings; web interface for setup: application-specific presets, peak selection, video signal, freely selectable averaging possibilities, data reduction, setup management; 2 x color LEDs for power / status | |

^[1] Factory setting 4 kHz, median 9, modifying the factory setting requires the IF2001/USB converter (see accessories)

^[2] FSO = Full Scale Output; data related to the digital output and valid for white, diffusely reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[3] Typical value with measurements at 4 kHz and median 9

^[4] ± 15 %; light spot diameter determined with point-shaped laser with Gaussian fit (full 1/e² width)

^[5] Illuminant: light bulb

^[6] For EtherCAT, PROFINET and EtherNet/IP, connection via interface module is required (see accessories)

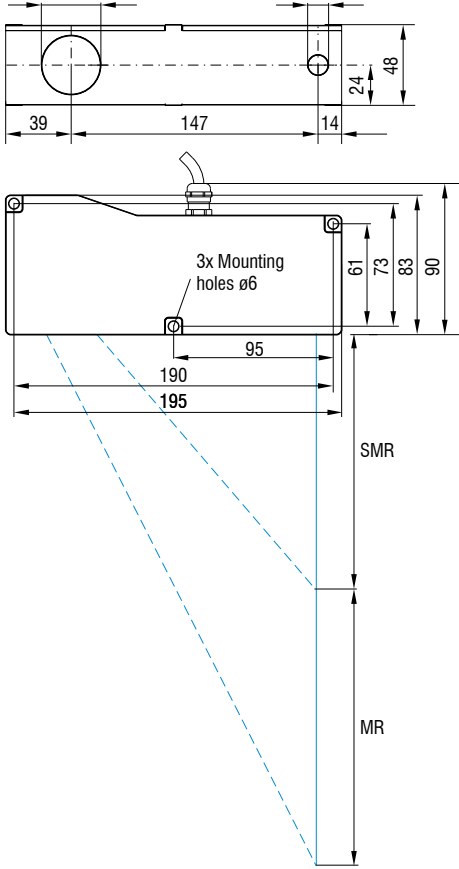
^[7] Access to web interface requires connection to PC via IF2001/USB (see accessories)

Dimensions

optoNCDT 17x0

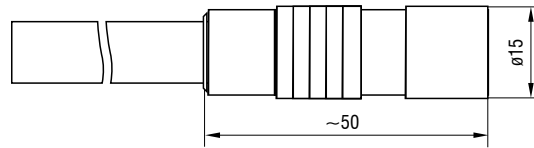
optoNCDT 1710BL

Window cmos ($\varnothing 35.5$) $\varnothing 30$ free Window laser ($\varnothing 12.5$) $\varnothing 5$ free



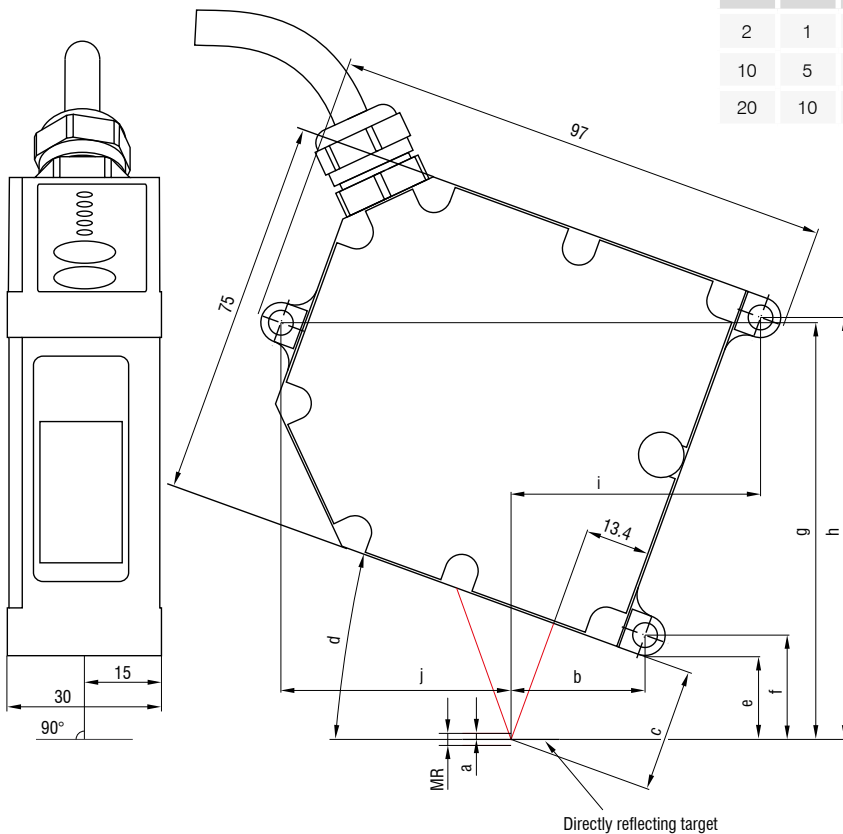
| MR | SMR |
|------|------|
| 50 | 550 |
| 1000 | 1000 |

Connector (sensor side)

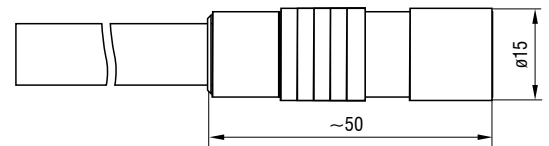


optoNCDT 1750DR

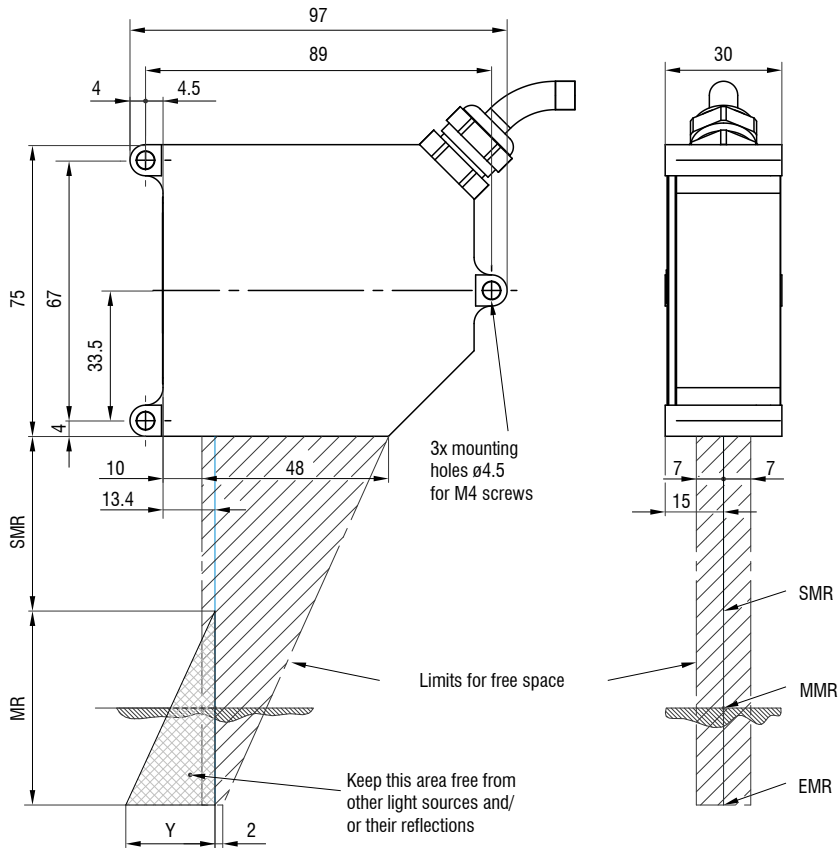
| MR | a | b | c | d | e | f | g | h | i | j |
|----|----|------|------|-------|------|------|-------|-------|------|------|
| 2 | 1 | 26.5 | 25 | 20° | 16.7 | 20.7 | 82.6 | 83.7 | 49.5 | 45.6 |
| 10 | 5 | 29 | 35.5 | 17.6° | 28.3 | 32.3 | 91.1 | 96.2 | 49.2 | 45.7 |
| 20 | 10 | 30.9 | 63.5 | 11.5° | 58.6 | 62.6 | 113.2 | 128.2 | 44.3 | 49.6 |



Connector (sensor side)

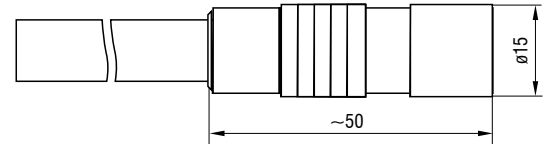


optoNCDT 1750BL / Measuring ranges 20 / 200

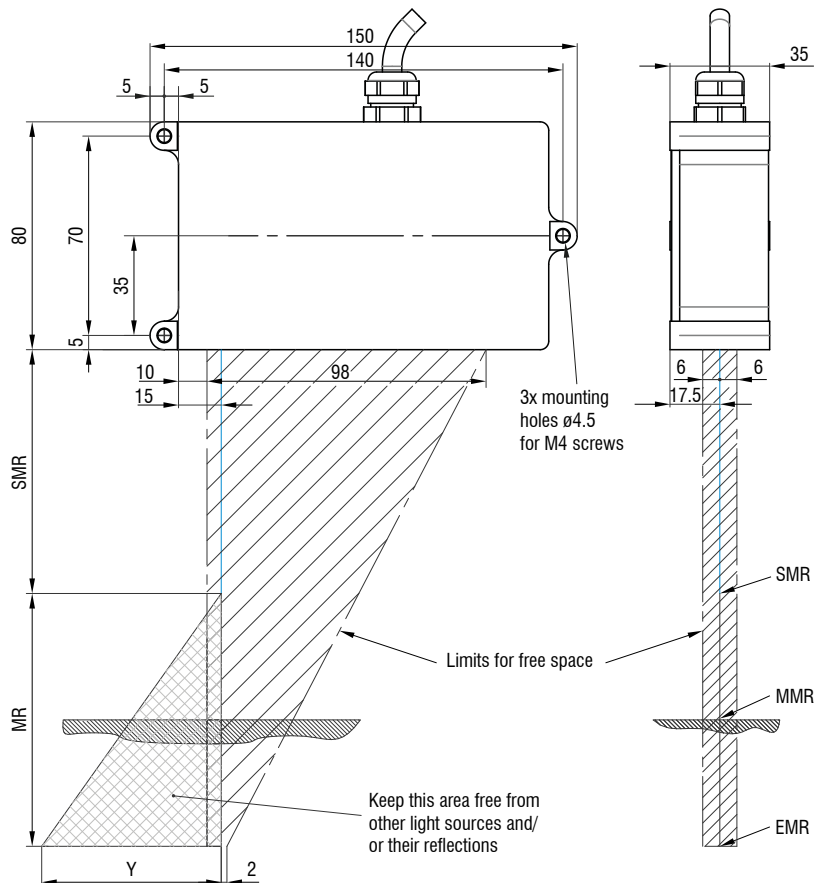


| MR | SMR | Y |
|-----|-----|----|
| 20 | 40 | 12 |
| 200 | 100 | 70 |

Connector (sensor side)

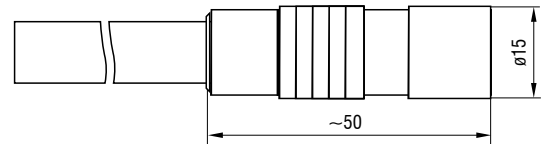


optoNCDT 1750BL / Measuring ranges 500 / 750



| MR | SMR | Y |
|-----|-----|-----|
| 500 | 200 | 180 |
| 750 | 200 | 270 |

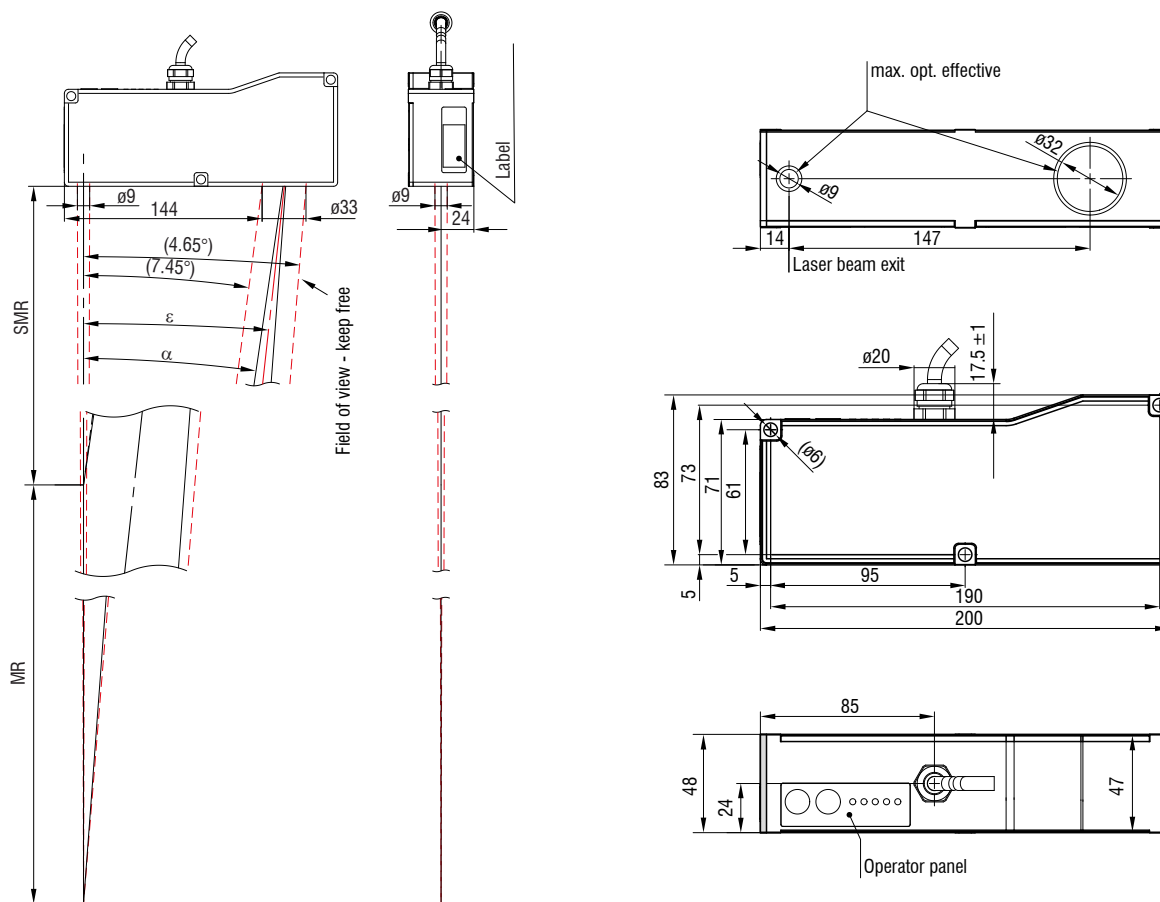
Connector (sensor side)



(Dimensions in mm, not to scale)
 MR = measuring range; SMR = start of measuring range,
 MMR = Mid of measuring range, EMR = end of measuring range

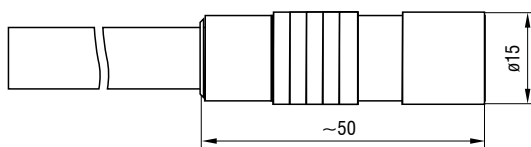
Dimensions optoNCDT 17x0

optoNCDT 1710-50 / 1760-1000



| MR | SMR | α | ϵ |
|------|------|----------|------------|
| 50 | 550 | 13.35 ° | 15.15 ° |
| 1000 | 1000 | 7.45 ° | 4.65 ° |

Connector (sensor side)



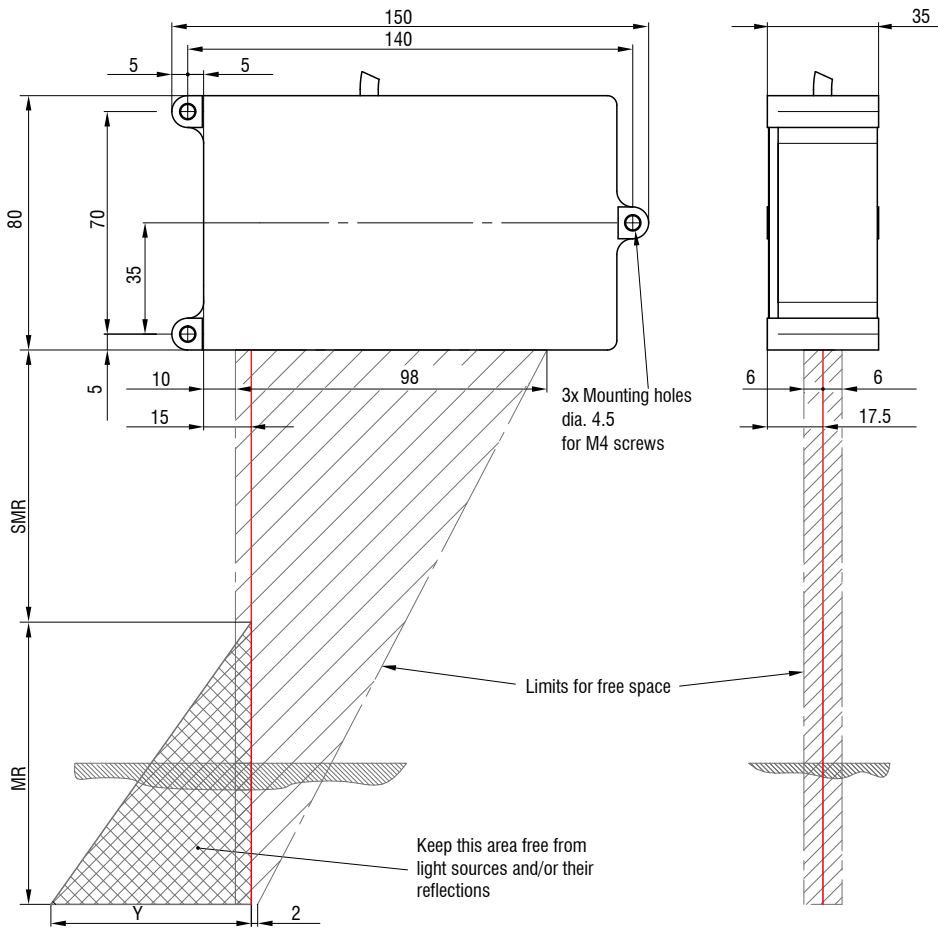
(Dimensions in mm, not to scale)

MR = measuring range; SMR = start of measuring range,

MMR = Mid of measuring range, EMR = end of measuring range

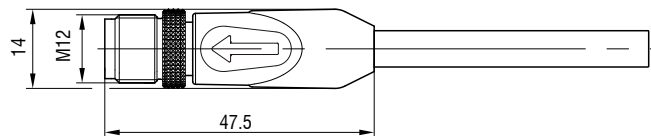
Dimensions

optoNCDT 1910



| MR | SMR | Y |
|-----|-----|-----|
| 500 | 200 | 180 |
| 750 | 200 | 270 |

Connector (sensor side)



Accessories for optoNCDT 1710/1750/1760/1910

Power supply unit

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)

Protective housings

see page 62

Article designation

| ILD17x0- | 50 | LL | CL3R |
|------------------------------|----|----|--|
| | | | Laser class No indication: class 2 (standard) CL3R: class 3R (on request, only ILD1910) |
| | | | Laser type No specification: Red laser dot (standard) BL: Blue Laser DR: Direct Reflection |
| Measuring range in mm | | | |

Series

ILD1710: Laser sensors with small measuring range and large offset distance
 ILD1750: Laser sensors for industrial applications
 ILD1760: Precise laser sensor for measuring ranges up to 1000 mm
 ILD1910: Compact long-range sensors for measuring ranges 500 / 750 mm

Connection possibilities

optoNCDT 17x0 / 1910

optoNCDT 1700 / 1750 / 1760

Drag-chain suitable extension and adapter cables

Cable diameter: 6.8 ±0.2 mm
 Drag chain: yes
 Robot: no
 Temperature range: -40 ... 90 °C (moving /not moving)
 Bending radius: > 55 mm (fixed installation / dynamic / drag chain)

| Sensor | Cables | Type | Connection possibilities and accessories |
|--|---|-----------|---|
| ILD1710-50 ILD1710-xxBL ILD1750-xxBL ILD1750-xxDR ILD1760-1000 | Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m <i>Art. no.</i> <i>Designation</i> 2901189 PC1700-3 2901357 PC1700-6 2901191 PC1700-10 2901266 PC1700-15 | Open ends | Supply voltage connection Power supply unit PS2020 Interface module of RS422 to USB IF2001/USB IC2001/USB Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT (not for ILD1710) |
| | Adapter cable for PC interface card Length 3 m / 6 m <i>Art. no.</i> <i>Designation</i> 2901555 PC1700-3/IF2008 2901556 PC1700-6/IF2008 2901557 PC1700-8/IF2008 | Sub-D | Interface card for synchronous data acquisition IF2008PCIe / IF2008E 4-fold USB converter IF2004/USB |
| | Adapter cable for sensor calculation Length 3 m / 6 m / 9 m <i>Art. no.</i> <i>Designation</i> 29011173 PC1750-3/C-Box 29011180 PC1750-6/C-Box 29011181 PC1750-9/C-Box | Sub-D | Controller for D/A conversion and evaluation of up to 2 sensor signals Dual Processing Unit |




Robot-suitable extension cables

Cable diameter: max. 9 mm
 Drag chain: no
 Robot: yes
 Temperature range: -40 ... 70 °C (moving / not moving)
 Bending radius: 110 mm (dynamic)

| Sensor | Cables | Type | Connection possibilities and accessories |
|--|---|-----------|---|
| ILD1710-50 ILD1710-xxBL ILD1750-xxBL ILD1750-xxDR ILD1760-1000 | Extension cable pigtail: Length 3 m / 6 m / 9 m / 15 m <i>Art. no.</i> <i>Designation</i> 2901494 PCR1700-5 2901299 PCR1700-10 | Open ends | Connection supply voltage PS2020 Interface module from RS422 to USB IF2001/USB IC2001/USB Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT (not for ILD1710) |




Extension cables for high temperatures

| | |
|--------------------|--|
| Cable diameter: | max. 7.5 mm |
| Drag chain: | no |
| Robot: | no |
| Temperature range: | -55 ... 250 °C (moving) -90 ... 250 °C (not moving) |
| Bending radius: | > 40 mm (fixed installation) > 75 mm (dynamic) |

| Sensor | Cables | Type | Connection possibilities and accessories | | | | | | | | | |
|------------------------------|--|--------------------|--|----------|----------------|----------|----------------|----------|-----------------|-----------|--|--|
| ILD1710-50 ILD1710-xxBL | Extension cables high temperatures Length 3 m / 6 m / 9 m / 15 m <table> <tr> <td><i>Art. no.</i></td> <td><i>Designation</i></td> </tr> <tr> <td>29011091</td> <td>PC1700-3/OE/HT</td> </tr> <tr> <td>29011092</td> <td>PC1700-6/OE/HT</td> </tr> <tr> <td>29011094</td> <td>PC1700-15/OE/HT</td> </tr> </table> | <i>Art. no.</i> | <i>Designation</i> | 29011091 | PC1700-3/OE/HT | 29011092 | PC1700-6/OE/HT | 29011094 | PC1700-15/OE/HT | Open ends | Supply voltage connection Power supply unit PS2020  |  Interface module of RS422 to USB IF2001/USB |
| <i>Art. no.</i> | | <i>Designation</i> | | | | | | | | | | |
| 29011091 | | PC1700-3/OE/HT | | | | | | | | | | |
| 29011092 | PC1700-6/OE/HT | | | | | | | | | | | |
| 29011094 | PC1700-15/OE/HT | | | | | | | | | | | |
| ILD1750-xxBL ILD1750-xxDR | Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT (not for ILD1710)  | | | | | | | | | | | |
| ILD1760-1000 | | | | | | | | | | | | |

Other cables

| | |
|--------------------|---|
| Cable diameter: | 6.7 mm |
| Drag chain: | yes |
| Robot: | no |
| Temperature range: | -40 ... 80 °C |
| Bending radius: | > 27 mm (fixed installation) > 51 mm (dynamic) |

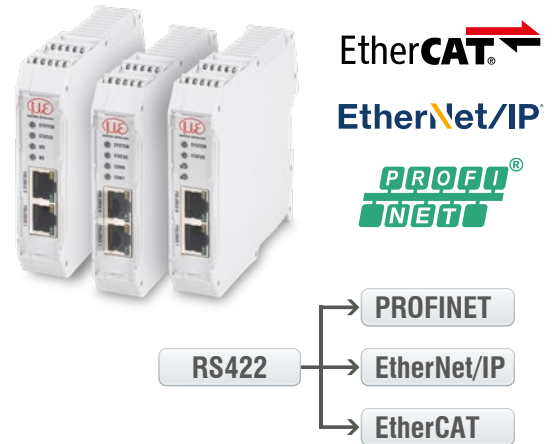
| Input | Cables | Type | Connection possibilities and accessories | | | | | |
|--|--|-----------------|--|---------|------------------------|-------|--|---|
| 2 x Sub-D (PC1700-x/ IF2008) | Adapter cables for 4-fold sensor connection Length 0.1 m <table> <tr> <td><i>Art. no.</i></td> <td><i>Designation</i></td> </tr> <tr> <td>2901528</td> <td>IF2008-Y-adapter cable</td> </tr> </table>  | <i>Art. no.</i> | <i>Designation</i> | 2901528 | IF2008-Y-adapter cable | Sub-D | Interface card for synchronous data acquisition IF2008PCle / IF2008E  | 4-fold USB converter & parameter setting IF2004/USB  |
| <i>Art. no.</i> | <i>Designation</i> | | | | | | | |
| 2901528 | IF2008-Y-adapter cable | | | | | | | |
| | | | | | | | | |

optoNCDT 1910

see Connection possibilities optoNCDT 1900 on pg. 32.

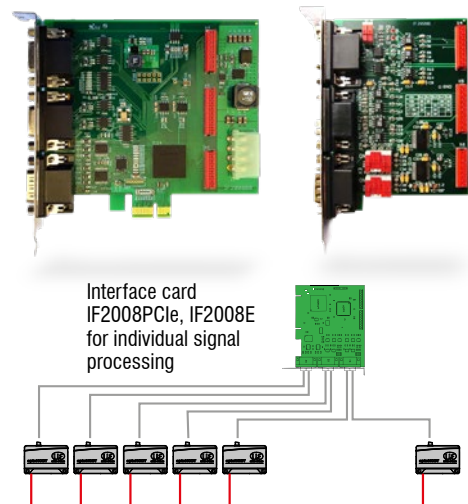
IF2035: Interface module for Industrial Ethernet connection

- Connection of RS422 or RS485 interfaces to PROFINET / Ethernet/IP / EtherCAT
- Synchronization output for RS422 sensors
- 2 network connections for different network topologies
- Data rate up to 4 MBaud
- 4-fold oversampling (with EtherCAT)
- Ideal for confined spaces due to a compact housing and DIN rail mounting



IF2008PCIe/IF2008E: Interface card for synchronous data acquisition

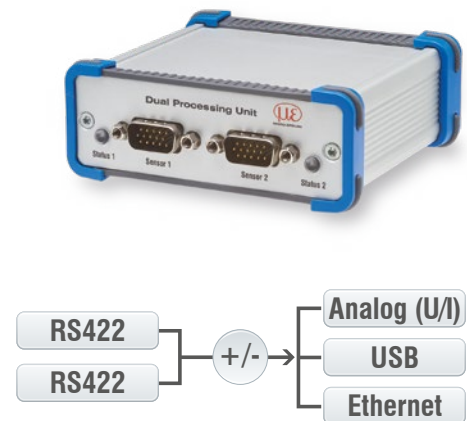
- IF2008PCIe - Basic PCB: 4 digital signals and 2 encoders
- IF2008E - Expansion board: 2x digital signals, 2x analog signals and 8x I/O signals
- Absolutely synchronous data acquisition for multi-channel applications (e.g. for planarity or thickness measurement)



Dual Processing Unit: Controller for D/A conversion and evaluation of up to 2 sensor signals

available from April 2024

- Fast D/A conversion (16 bit, with a maximum of 100 kHz) of 2 digital input signals or calculation of 2 digital sensor signals
- Averaging functions and calculation of thickness, step, diameter, ovality and radial run out
- 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 sensor or Dual Processing Unit status
- Parallel data output via three output interfaces
- Two filter possibilities
- Post-linearization of measured values or calculated values
- Easy parameter setting via web interface (controller and sensors)



IF2008/ETH: Interface module for Ethernet connection of up to 8 sensors

- Integration of eight sensors or encoders with RS422 interface in Ethernet network
- Four programmable switching in-/outputs (TTL and HTL logic)
- Fast data acquisition and output up to 200 kHz
- Simple parameter set up via web interface



IC2001/USB Single-channel converter cable RS422/USB

- Conversion from RS422 to USB
- 5-core interface cable without outer shield
- Easy sensor connection via USB
- Supports baud rates from 9.6 kBaud to 1 MBaud
- Ideal for integration into plant and machinery



IF2001/USB: Interface module from RS422 to USB

- Conversion from RS422 to USB
- Signals and functions such as laser on/off, switch signals and function output
- Supports baud rates from 9.6 kBaud to 12 MBaud
- Robust aluminum housing
- Easy sensor connection via screw terminals (plug and play)
- Parameter setting (converter and sensors) via software



IF2004/USB: 4-fold interface module from RS422 to USB






- Conversion of 4 digital signals (RS422) to USB
- 4x trigger inputs, 1x trigger output
- Synchronous data acquisition
- Parameter setting (converter and sensors) via software




Connection of 4 sensors via IF2008-Y-adapter cable

Protective housings for demanding environments

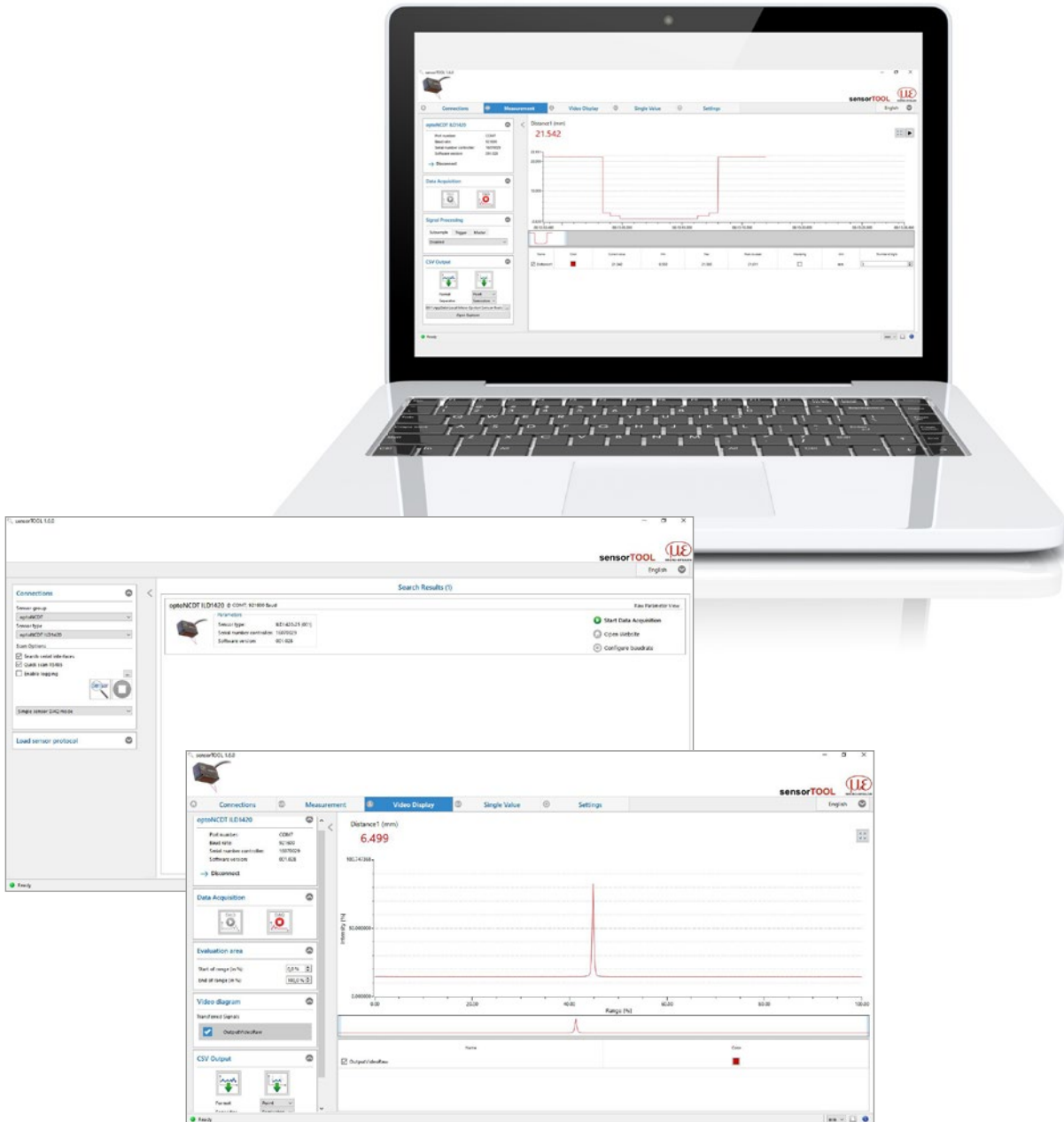
optoNCDT

| SGH & SGHF models | | | | SGHF-HT model |
|--|---|---|---|---|
| Protective housing Size S | | Protective housing Size M | | |
| SGH | SGHF | SGH | SGHF | |
|  |  |  |  |  |
| (140 x 140 x 71 mm) | | (180 x 140 x 71 mm) | | (260 x 180 x 154 mm) |
| Water-resistant housing protects the sensor from solvents and detergents. | Ideal with high ambient temperatures. The integrated air cooling of the housing offers optimum protection for the sensor. | Water-resistant housing protects the sensor from solvents and detergents. | Ideal with high ambient temperatures. The integrated air cooling of the housing offers optimum protection for the sensor. | Water-cooled protective housing with window and compressed-air connection for measurement tasks in ambient temperatures up to 200 °C. Maximum temperature of cooling water T(max) = 10 °C Minimum water flow rate Q(min) = 3 liters/min |
| Size S suitable for ILD1750-20BL ILD1750-200BL ILD2300-2 / -2LL / -2BL ILD2300-5 / -5BL ILD2300-10 / -10LL / -10BL ILD2300-20 / -20LL ILD2300-50 / -50LL ILD2300-100 | | Size M suitable for ILD1750-500BL ILD1750-750BL ILD2300-200 ILD2300-300 ILD2310-10 ILD2310-20 ILD2310-40 | | Suitable for ILD1710-50 / -50BL ILD1710-1000 / -1000BL ILD1750-500BL ILD1750-750BL ILD2300-200 ILD2300-300 ILD2310-10 ILD2310-20 ILD2310-40 ILD2310-50BL |

| Protective housing SGHF ILD1900 |
|---|
|  |
| Compact protective housing which is simply attached to the sensor. The protective housing has an air purge for cleaning the protective windows. It also cools the sensor. |
| Suitable for ILD1900-2 / -2LL ILD1900-6 / -6LL ILD1900-10 / -10LL ILD1900-25 / -25LL ILD1900-50 / -50LL ILD1900-100 ILD1900-200 ILD1900-500 |

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.de/download

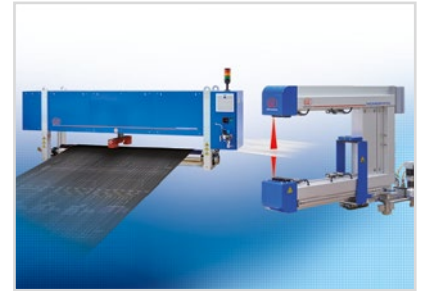
Sensors and Systems from Micro-Epsilon



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