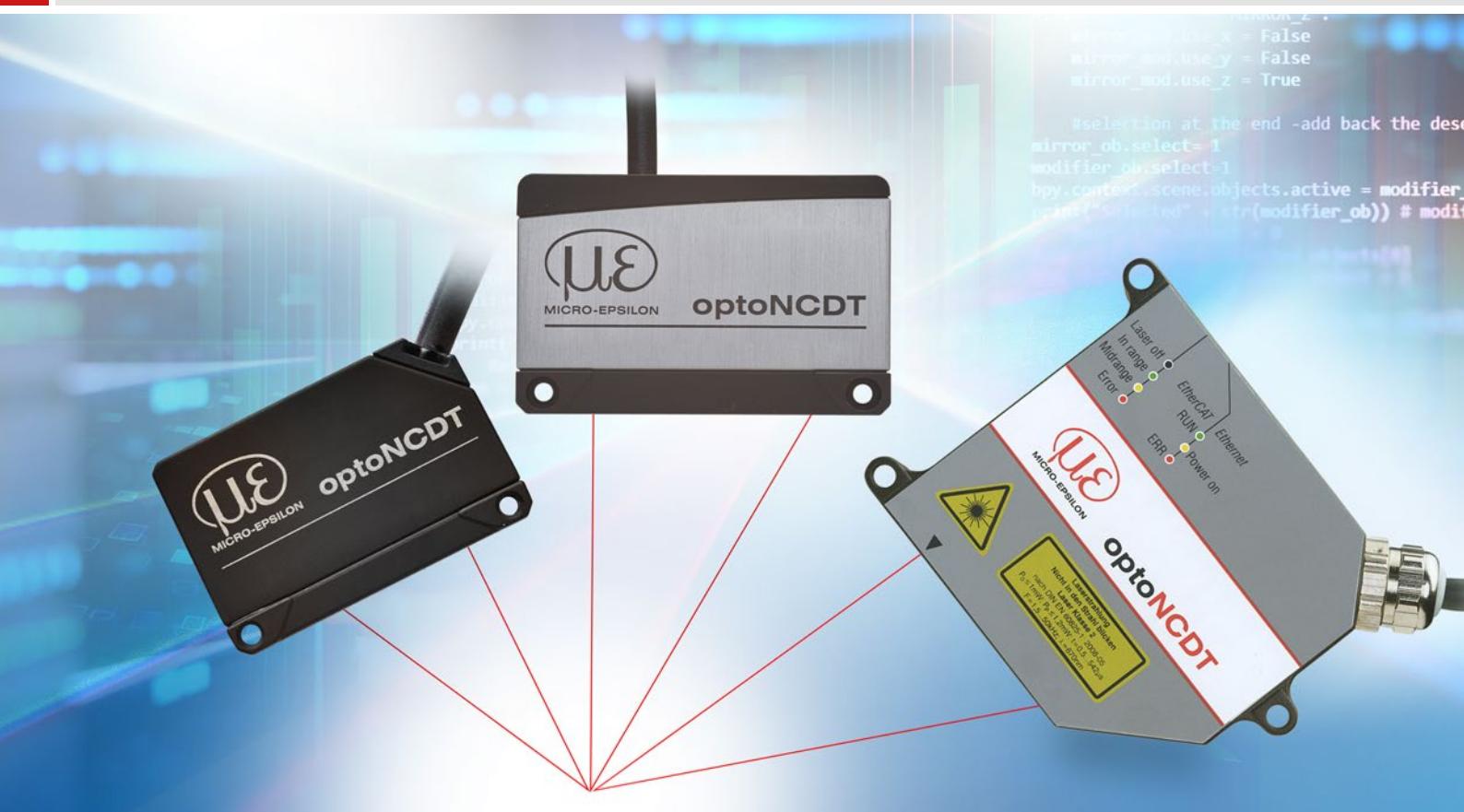




# More Precision

**optoNCDT** // Laser displacement sensors (triangulation)



# Laser triangulation sensors optoNCDT

## optoNCDT - Highest precision in laser displacement measurements

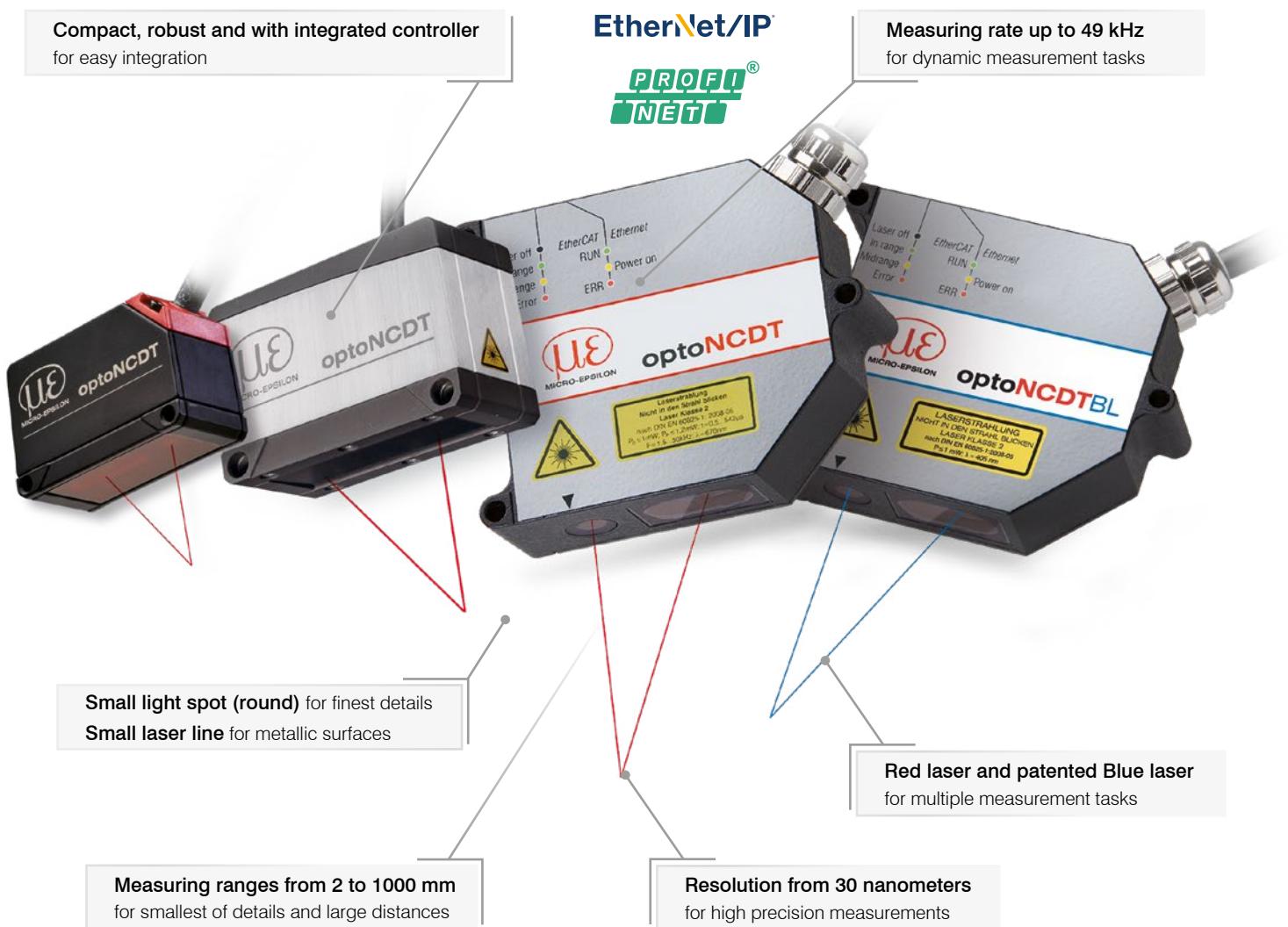
optoNCDT laser sensors set milestones for industrial laser displacement measurement.

They stand out due to their size, measuring rate, functionality and, in particular, to their high precision. The current optoNCDT range comprises numerous sensor models, each of which is among the best in its class impressing in automation, inline quality assurance and machine building.

EtherCAT®

EtherNet/IP®

PROFINET®



Reliable on all measuring objects & surfaces



Shiny metallic



Dark/poorly reflecting



Different colors



(Semi-)transparent

General information	Page	
Available models and model variants	4 - 5	
Possible applications - the right technology for every application	6 - 7	
Features	8 - 11	
Application examples	12 - 13	
Sensor type	Page	
optoNCDT 1x20	Compact laser sensors for OEM and series use	14 - 23
optoNCDT 1900	Sensors for precision automation	24 - 33
optoNCDT 23x0	Precise laser sensors for dynamic measurement tasks	34 - 45
optoNCDT 17x0/1910	Laser sensors for special measurement tasks	46 - 57
Accessories	Page	
Interface modules	58 - 59	
Protective housings	60	
sensorTOOL Software	61	

## optoNCDT 1x20

Miniature laser sensors for serial applications

from page 14



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 %

## optoNCDT 1900

High performance sensors for precision automation

from page 24



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 %

## 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

## optoNCDT 1910

## Laser sensors for special measurement tasks

from page 46



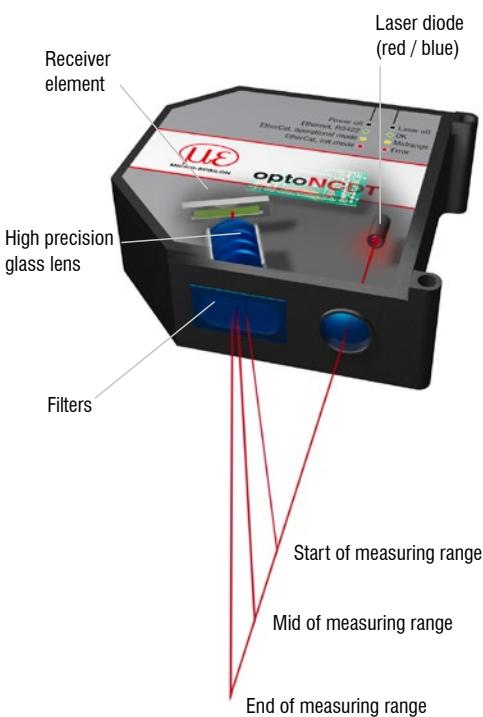
Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 1750BL		2 - 750 mm	0.8 µm	from 0.06 %
optoNCDT 1750-DR		2 - 20 mm	0.1 µm	0.08 %
optoNCDT 1760		1000 mm	from 7.5 µm	0.10 %
optoNCDT 1910		500 / 750 mm	from 20 µm	0.07 %

## Measuring principle

### Laser triangulation

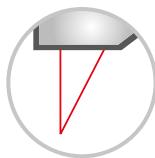
Laser triangulation sensors operate with a laser diode that projects a visible light spot onto the surface of the target. The light reflected from the spot is imaged by an optical receiving system onto a position-sensitive element. If the light spot changes its position, this change is imaged on the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

## Laser line sensors

### with oval-shaped light spot



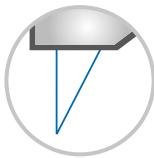
Rough and structured surfaces cause interferences within the laser point (left) which leads to a faulty projection on the sensor element. This effect becomes particularly obvious with metallic surfaces.

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

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



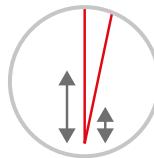


## Blue laser sensors for challenging surfaces

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

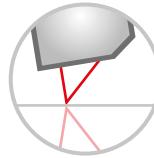


## Long-range sensors for large distances

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

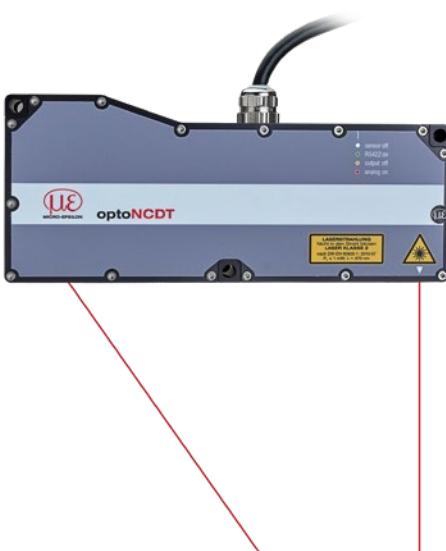


## Direct-reflection sensors for shiny & mirroring targets

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.

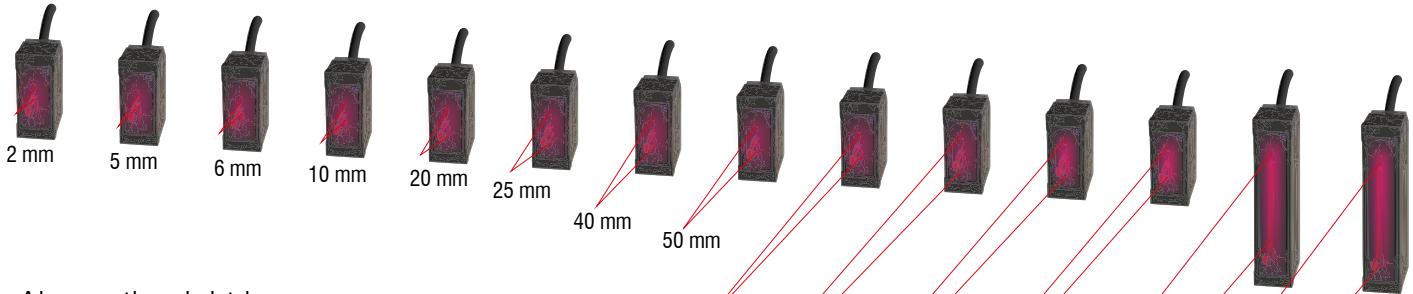
- Ideal for distance measurements on shiny and mirroring surfaces
- Available with red laser and blue laser



# 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®

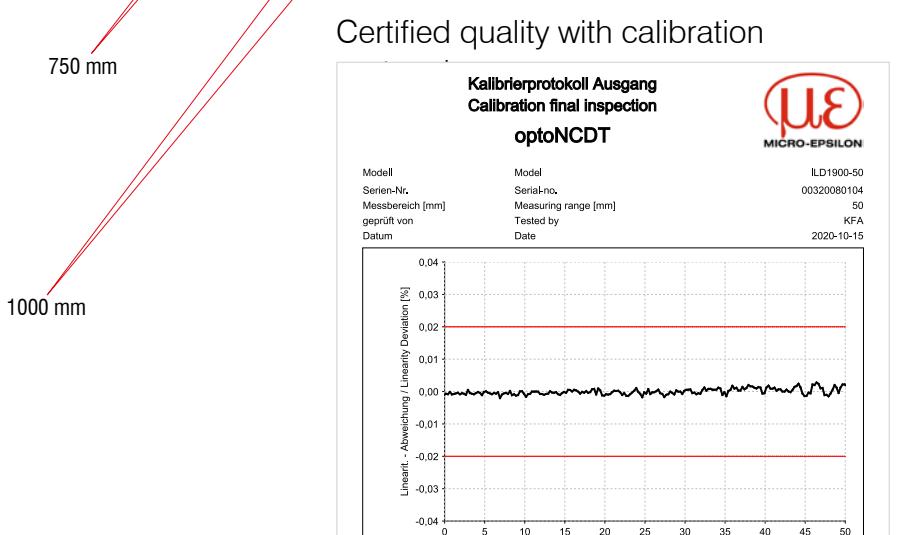
EtherNet/IP®

PROFINET®

RS422

Ethernet

Analog U / I



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.

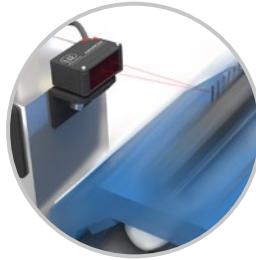


## Compact sensors with integrated controller

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)



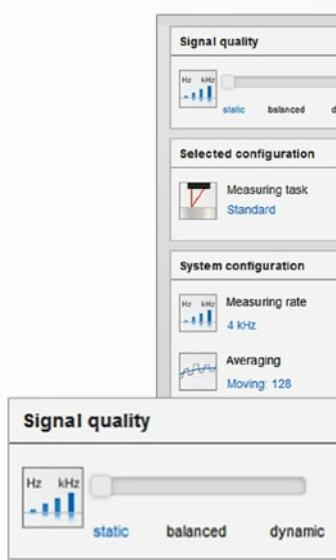
Extremely high temperature stability

## Precise measurements in industrial environments

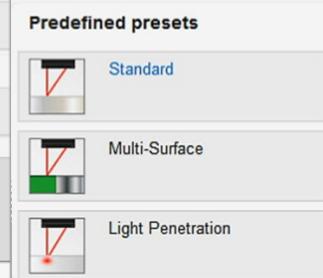
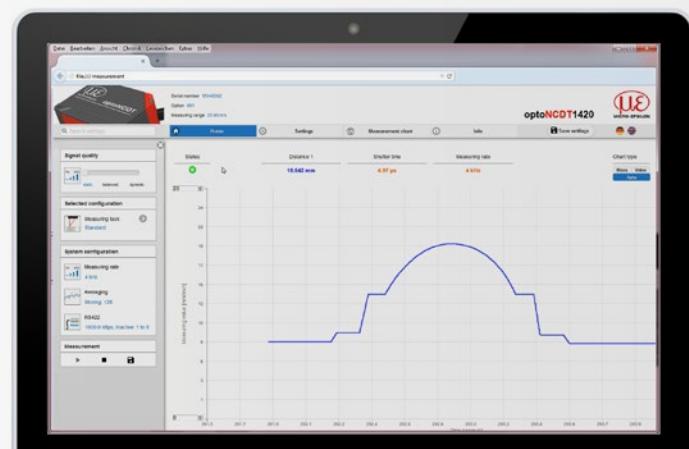
The optoNCDT sensors are designed for measurement tasks in factory automation, machines and systems. As a result, simple installation and wiring is possible in confined spaces or on a robot. Their high performance enables the sensors to provide precise measurement results at a high measuring rate.

## 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.



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.



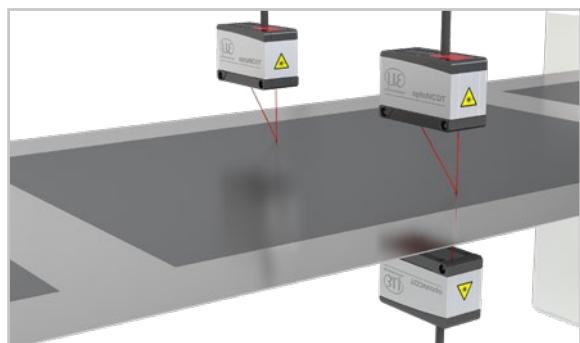
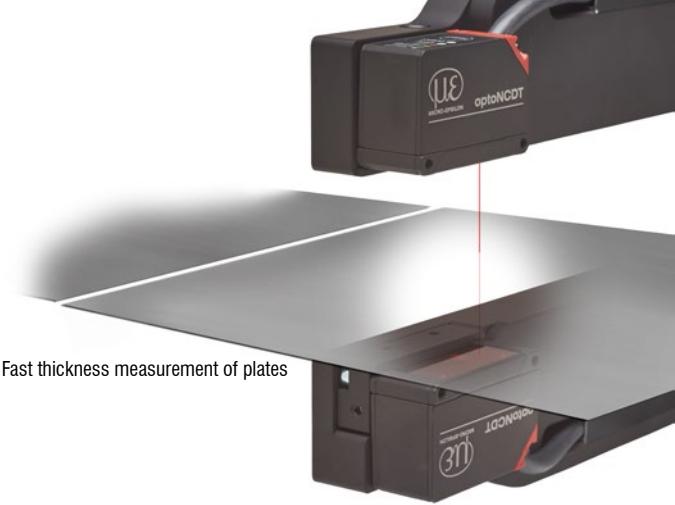
e.g., metal, ceramics,...

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

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

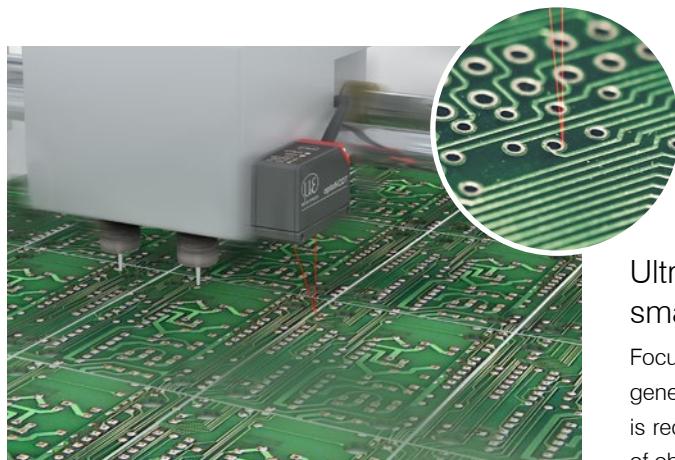
With the presets, predefined sensor settings for specific measuring objects can be quickly and easily adopted.

## Advantages & outstanding features **optoNCDT** Laser sensors



### 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

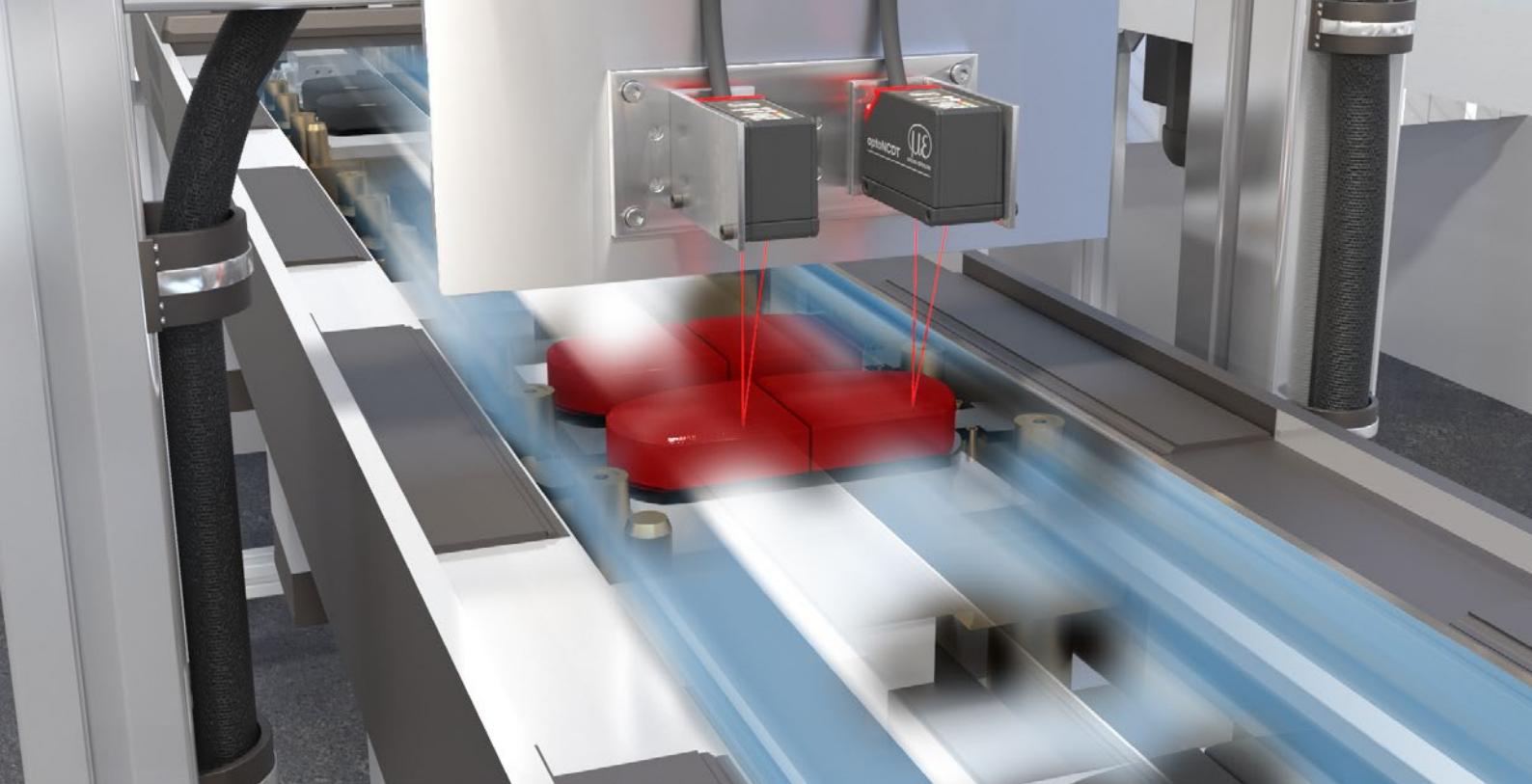
Focusing the laser beam via a special lens arrangement in the sensor generates a small light spot on the target surface. This small light spot is required for a high spatial resolution and ensures that the smallest of objects and details can be detected.



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.

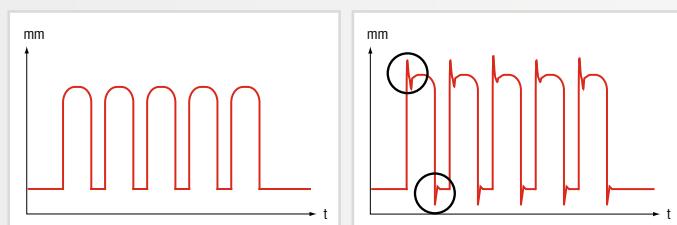


## Ideal for fast control & positioning

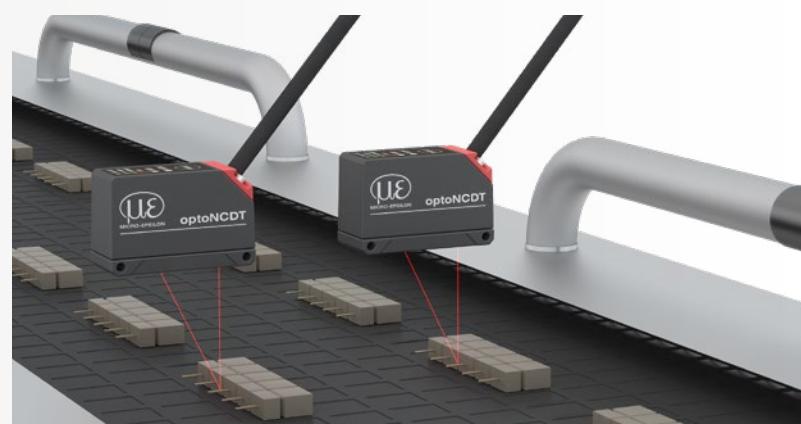
When measuring poorly reflective surfaces or fast moving objects, high measuring rates are required. The optoNCDT sensors operate at high measuring rates with simultaneous surface compensation and are therefore able to reliably check dynamic processes.

## 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.

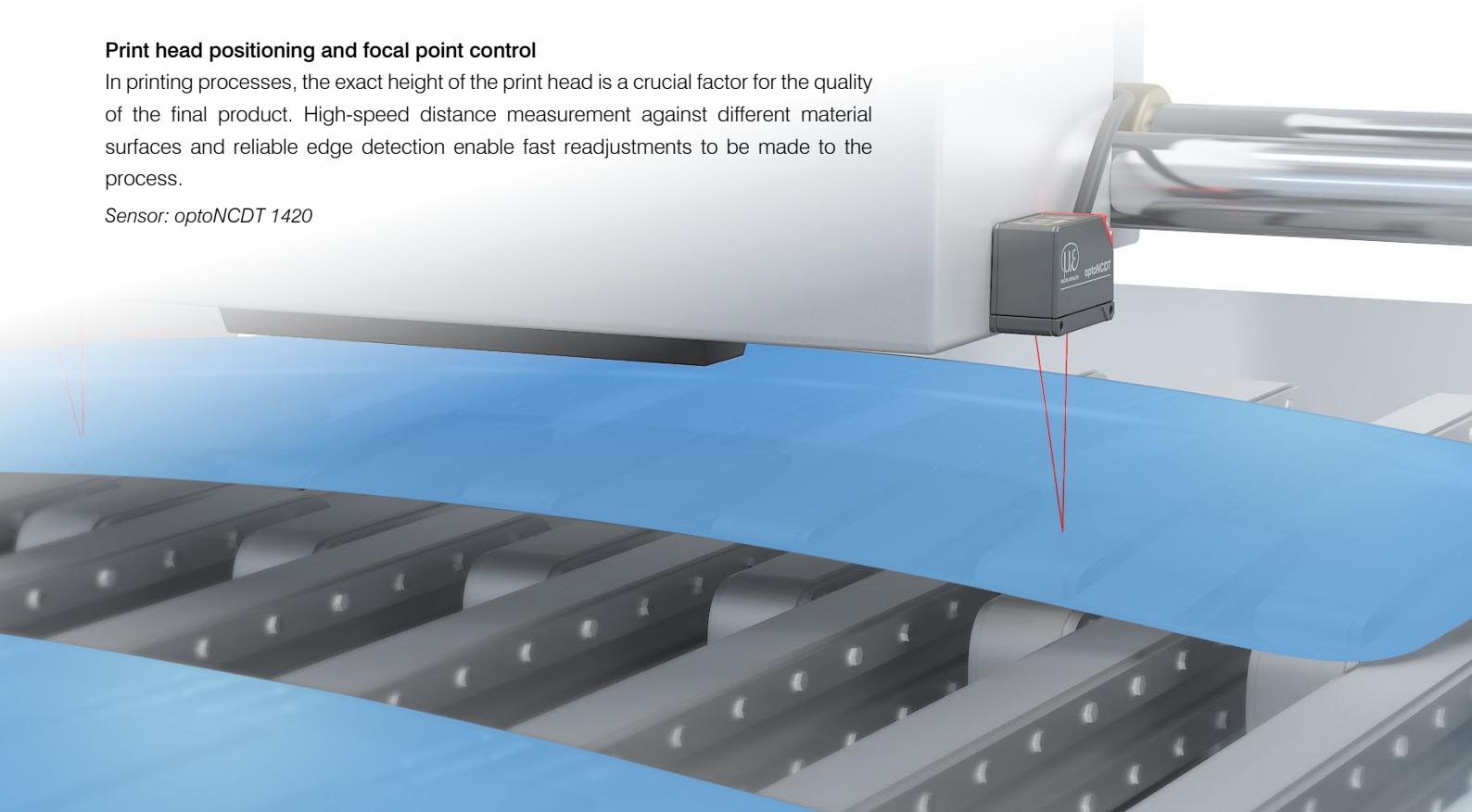
# Application examples

## 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.

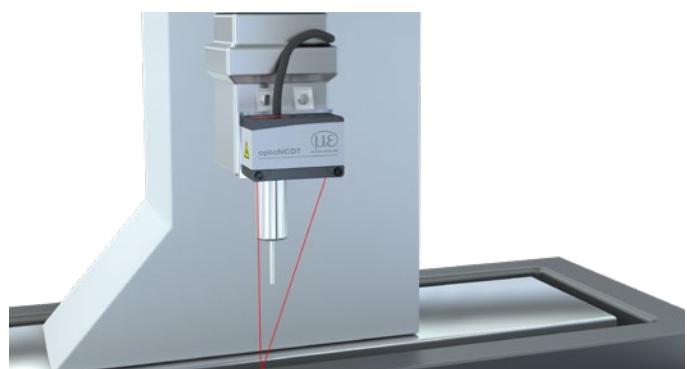
*Sensor: optoNCDT 1420*



### 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.

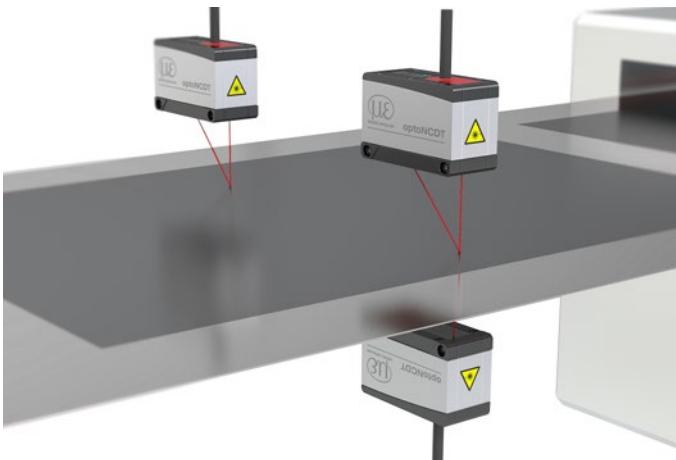
*Sensor: optoNCDT 1420*



### 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.

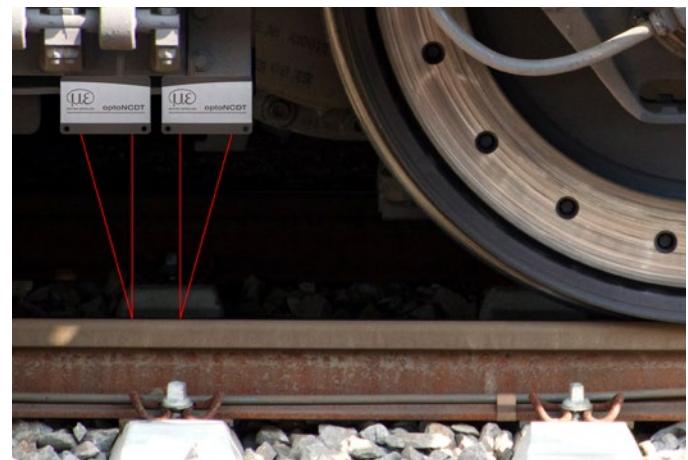
*Sensor: optoNCDT 1900*



#### 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.

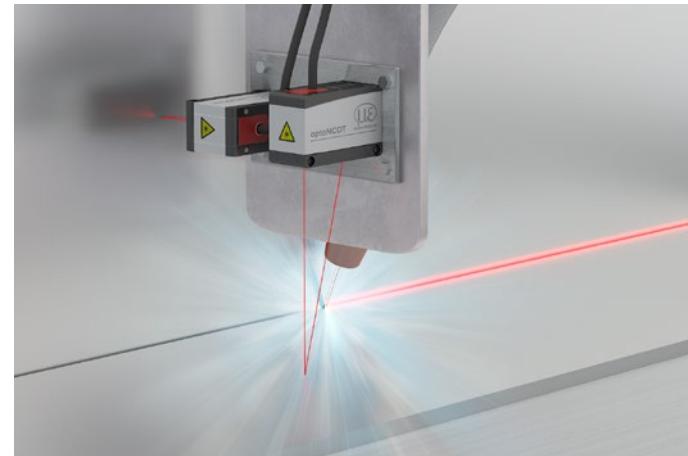
*Sensor: optoNCDT 1900LL*



#### 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
-  Analog (U/I) / RS422 / PROFINET / EtherNet/IP / EtherCAT
-  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 $\mu\text{m}$	0.10 %
optoNCDT 1320		10 - 500 mm	1 $\mu\text{m}$	0.10 %
optoNCDT 1420		10 - 500 mm	0.5 $\mu\text{m}$	from 0.08 %
optoNCDT 1420LL		10 - 50 mm	0.5 $\mu\text{m}$	from 0.08 %
optoNCDT 1420CL1		10 - 50 mm	0.5 $\mu\text{m}$	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.



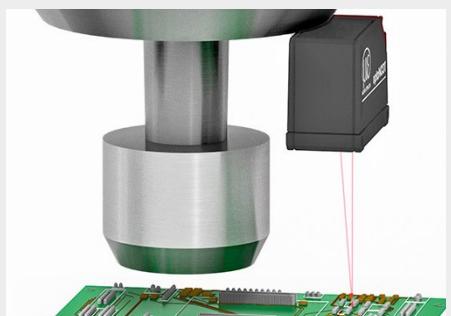
#### Application examples



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 <sup>[1]</sup>			4 adjustable stages: 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz			
Linearity <sup>[2]</sup>	< ±10 µm	< ±25 µm	< ±50 µm	< ±100 µm	< ±200 µm	< ±750 µm ... 1500 µm
			< ±0.10 % FSO			< ±0.15 % ... 0.30 % FSO
Repeatability <sup>[3]</sup>	1 µm	2.5 µm	5 µm	10 µm	20 µm	50 µm
Temperature stability <sup>[4]</sup>		±0.015 % FSO / K			±0.01 % FSO / K	
Light spot diameter <sup>[5]</sup>	SMR	100 x 130 µm	200 x 260 µm	250 x 340 µm		
	MMR	45 x 50 µm	55 x 60 µm	80 x 95 µm	710 x 910 µm	710 x 910 µm
	EMR	158 x 200 µm	255 x 330 µm	300 x 380 µm		
	smallest Ø	45 x 40 µm with 24 mm	53 x 60 µm with 31 mm	70 x 85 µm with 42 mm	710 x 910 µm	710 x 910 µm
Light source				Semiconductor laser < 1 mW, 670 nm (red)		
Laser class				Class 2 in accordance with IEC 60825-1: 2014		
Permissible ambient light <sup>[6]</sup>		20,000 lx			7,500 lx	
Supply voltage			24V (11.2 ... 30 V) DC, P < 2 W			
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, push-pull negative			
Connection			integrated cable 2 m, open ends, minimum bending radius 30 mm (fixed installation)			
Mounting			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. 40 g (without cable), approx. 120 g (incl. cable)			
Control and indicator elements <sup>[7]</sup>			Select button: zero, teach, factory settings; web interface for setup; 2 x color LEDs for power / status			

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

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

<sup>[3]</sup> Measuring rate 1 kHz, median 9

<sup>[4]</sup> 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.

<sup>[5]</sup> ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

<sup>[6]</sup> Illuminant: light bulb

<sup>[7]</sup> 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 <sup>[1]</sup>		5 adjustable stages: 4 kHz / 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz									
Linearity <sup>[2]</sup>		< ±10 µm	< ±25 µm	< ±50 µm	< ±100 µm	< ±200 µm	< ±600 µm ... ±1200 µm				
		< ±0.10 % FSO				< ±0.12 ... ±0.24 % FSO					
Repeatability <sup>[3]</sup>		1 µm	2.5 µm	5 µm	10 µm	20 µm	50 µm				
Temperature stability <sup>[4]</sup>		±0.015 % FSO / K			±0.01 % FSO / K						
Light spot diameter <sup>[5]</sup>	SMR	100 x 130 µm	200 x 260 µm	250 x 340 µm							
	MMR	45 x 50 µm	55 x 60 µm	80 x 95 µm	710 x 910 µm	710 x 910 µm	710 x 910 µm				
	EMR	158 x 200 µm	255 x 330 µm	300 x 380 µm							
	smallest Ø	45 x 40 µm with 24 mm	53 x 60 µm with 31 mm	70 x 85 µm with 42 mm	710 x 910 µm	710 x 910 µm	710 x 910 µm				
Light source		Semiconductor laser < 1 mW, 670 nm (red)									
Laser class		Class 2 in accordance with IEC 60825-1: 2014									
Permissible ambient light <sup>[6]</sup>		30,000 lx		20,000 lx		7,500 lx					
Supply voltage		24V (11.2 ... 30 V) DC, P < 2 W									
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 <sup>[7]</sup>		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, push-pull negative									
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. 40 g (without cable), approx. 150 g (incl. cable)									
Control and indicator elements <sup>[8]</sup>		Select button: zero, teach, factory settings; web interface for setup with defined presets; 2 x color LEDs for power / status									

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

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

<sup>[3]</sup> Measuring rate 1 kHz, median 9

<sup>[4]</sup> 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.

<sup>[5]</sup> ± 10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

<sup>[6]</sup> Illuminant: light bulb

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

<sup>[8]</sup> 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 <sup>[1]</sup>	6 adjustable stages: 8 kHz / 4 kHz / 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz	
Supply voltage	24V (11,2 ... 30V) DC, P < 2W	
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 <sup>[2]</sup>	RS422 (16 bit) / EtherCAT / PROFINET / EtherNet/IP	
Analog output <sup>[3]</sup>	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, push-pull negative	
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) <sup>[4]</sup>	IP67	
Material	Aluminum housing	
Weight	approx. 70 g (incl. pigtail), approx. 150 g (incl. cable)	
Control and indicator elements <sup>[5]</sup>	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	

<sup>[1]</sup> 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

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

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

<sup>[4]</sup> Models with laser class 1 have the protection class IP65

<sup>[5]</sup> 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 <sup>[1]</sup>	< ±8 µm	< ±20 µm	< ±40 µm	< ±80 µm	< ±160 µm	< ±500 ... ±1000 µm
			< ±0.08 % FSO			< ±0.1 ... ±0.2 % FSO
Repeatability <sup>[2]</sup>	0.5 µm	1 µm	2 µm	4 µm	8 ... 16 µm	20 ... 40 µm
Temperature stability <sup>[3]</sup>		±0.015 % FSO / K			±0.01 % FSO / K	
Light spot diameter <sup>[4]</sup>	SMR	100 x 130 µm	200 x 260 µm	250 x 340 µm		
	MMR	45 x 50 µm	55 x 60 µm	80 x 95 µm	710 x 910 µm	710 x 910 µm
	EMR	158 x 200 µm	255 x 330 µm	380 x 380 µm		
	smallest Ø	45 x 40 µm with 24 mm	53 x 60 µm with 31 mm	75 x 85 µm with 42 mm	710 x 910 µm	710 x 910 µm
Light source					Semiconductor laser < 1 mW, 670 nm (red)	
Laser class					Class 2 in accordance with IEC 60825-1: 2014	
Permissible ambient light <sup>[5]</sup>		50,000 lx		30,000 lx		10,000 lx

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

<sup>[2]</sup> Measuring rate 2 kHz, median 9

<sup>[3]</sup> 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.

<sup>[4]</sup> ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

<sup>[5]</sup> 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 <sup>[1]</sup>	< ±8 µm	< ±20 µm	< ±40 µm
		< ±0.08 % FSO	
Repeatability <sup>[2]</sup>	0.5 µm	1 µm	2 µm
Temperature stability <sup>[3]</sup>		±0.015 % FSO / K	
Light spot diameter <sup>[4]</sup>	SMR	120 x 660 µm	215 x 900 µm
	MMR	55 x 635 µm	70 x 930 µm
	EMR	130 x 570 µm	200 x 915 µm
	smallest Ø	55 x 635 µm with 25 mm	70 x 930 µm with 37.5 mm
Light source		Semiconductor laser < 1 mW, 670 nm (red)	
Laser class		Class 2 in accordance with IEC 60825-1: 2014	
Permissible ambient light <sup>[5]</sup>		50,000 lx	

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

<sup>[2]</sup>Measuring rate 2 kHz, median 9

<sup>[3]</sup>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.

<sup>[4]</sup>±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

<sup>[5]</sup>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 <sup>[1]</sup>	< ±8 µm	< ±20 µm	< ±40 µm
		< ±0.08 % FSO	
Repeatability <sup>[2]</sup>	0.5 µm	1 µm	2 µm
Temperature stability <sup>[3]</sup>		±0.015 % FSO / K	
Light spot diameter <sup>[4]</sup>	SMR	100 x 130 µm	200 x 260 µm
	MMR	45 x 50 µm	55 x 60 µm
	EMR	160 x 200 µm	260 x 330 µm
	smallest Ø	45 x 40 µm with 24mm	55 x 60 µm with 31 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 <sup>[5]</sup>		15,000 lx	

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

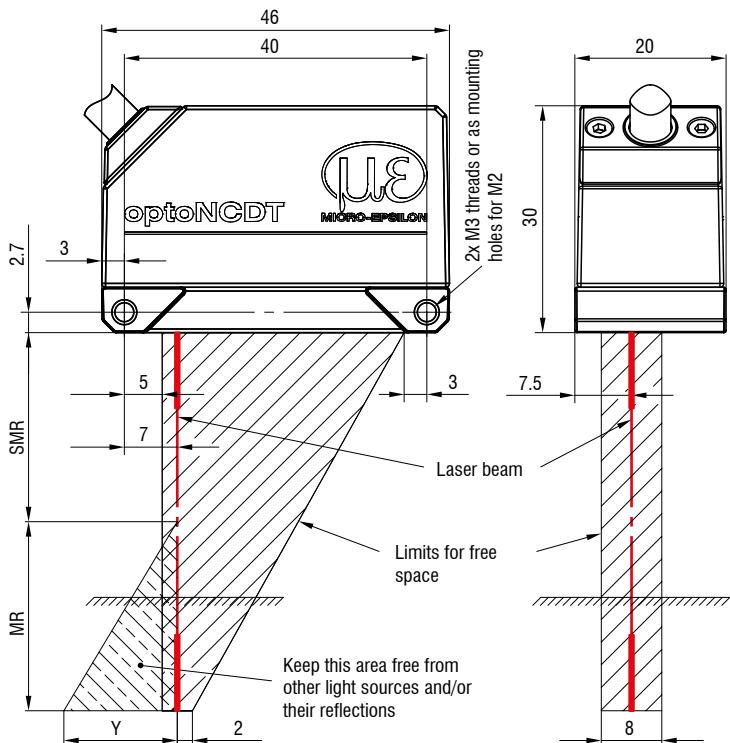
<sup>[2]</sup>Measuring rate 2 kHz, median 9

<sup>[3]</sup>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.

<sup>[4]</sup>±10 %; SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range

<sup>[5]</sup>Illuminant: light bulb

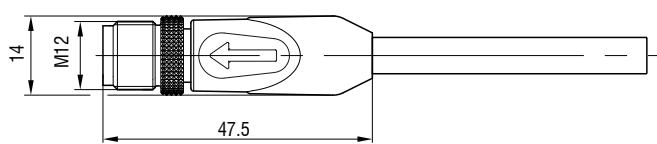
# Dimensions optoNCDT 1220 / 1320 / 1420



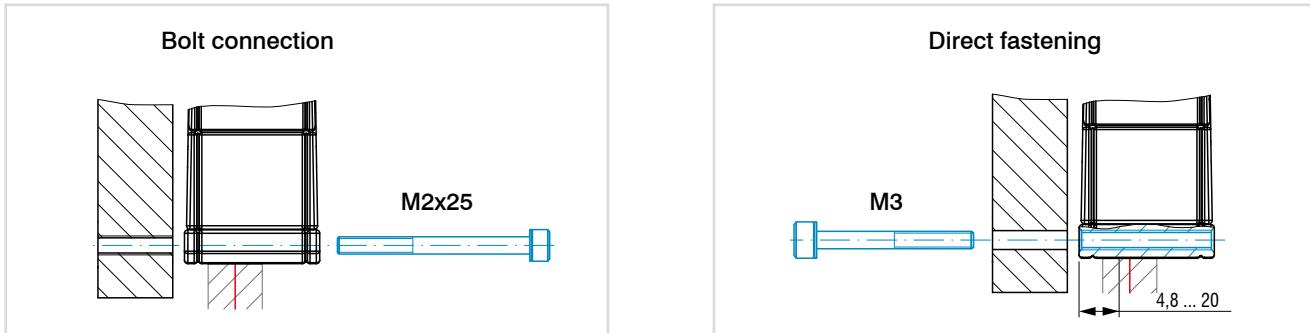
MR	SMR	Y
10	20	10
25	25	21
50	35	28
100	50	46
200	60	70
500	100	190

(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
			<b>Laser class</b> No indication: class 2 (standard) CL1: Class 1 (only with ILD1420)
			<b>Laser type</b> No indication: Red laser point (standard) LL: Laser Line (only with ILD1420)
			<b>Measuring range</b> in mm
<b>Series</b>			
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 $\pm 0.2$ 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	<p>Supply voltage connection Power supply unit PS2020</p> 
ILD1320-xx ILD1420-xx ILD1420-xxLL	Integrated cable Length 3 m	Open ends	<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 extension and adapter cables

Cable diameter:	6.0 $\pm 0.2$ 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	<p>Extension cable pigtail Length 3 m / 6 m / 10 m / 15 m</p> <table> <tr> <td>Art. no.</td> <td>Designation</td> </tr> <tr> <td>29011067</td> <td>PCF1420-3/I</td> </tr> <tr> <td>29011068</td> <td>PCF1420-6/I</td> </tr> <tr> <td>29011069</td> <td>PCF1420-10/I</td> </tr> <tr> <td>29011070</td> <td>PCF1420-15/I</td> </tr> <tr> <td>29011071</td> <td>PCF1420-3/U</td> </tr> <tr> <td>29011072</td> <td>PCF1420-6/U</td> </tr> <tr> <td>29011073</td> <td>PCF1420-10/U</td> </tr> <tr> <td>29011074</td> <td>PCF1420-15/U</td> </tr> </table> <p>Adapter cable for PC interface card Length 3 m / 6 m / 10 m</p> <table> <tr> <td>Art. no.</td> <td>Designation</td> </tr> <tr> <td>29011079</td> <td>PCF1420-3/IF2008</td> </tr> <tr> <td>29011088</td> <td>PCF1420-6/IF2008</td> </tr> <tr> <td>29011089</td> <td>PCF1420-10/IF2008</td> </tr> </table> <p>Adapter cable for sensor calculation Length 3 m / 6 m / 9 m</p> <table> <tr> <td>Art. no.</td> <td>Designation</td> </tr> <tr> <td>29011171</td> <td>PCF1420-3/C-Box</td> </tr> <tr> <td>29011172</td> <td>PCF1420-6/C-Box</td> </tr> <tr> <td>29011170</td> <td>PCF1420-9/C-Box</td> </tr> </table> <p>Adapter cable for sensor calculation Length 2 m</p> <table> <tr> <td>Art. no.</td> <td>Designation</td> </tr> <tr> <td>29011149</td> <td>PCE1420-2/M12</td> </tr> </table>	Art. no.	Designation	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	Art. no.	Designation	29011079	PCF1420-3/IF2008	29011088	PCF1420-6/IF2008	29011089	PCF1420-10/IF2008	Art. no.	Designation	29011171	PCF1420-3/C-Box	29011172	PCF1420-6/C-Box	29011170	PCF1420-9/C-Box	Art. no.	Designation	29011149	PCE1420-2/M12	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>  <p>Interface card for synchronous data acquisition IF2008PCle / IF2008E</p>  <p>4-fold interface module from RS422 to USB IF2004/USB</p>  <p>Controller for D/A conversion and evaluation of up to 2 sensor signals Dual Processing Unit</p>  <p>Interface module for Ethernet connection of up to 8 sensors IF2008/ETH</p> 
Art. no.	Designation																																								
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																																								
Art. no.	Designation																																								
29011079	PCF1420-3/IF2008																																								
29011088	PCF1420-6/IF2008																																								
29011089	PCF1420-10/IF2008																																								
Art. no.	Designation																																								
29011171	PCF1420-3/C-Box																																								
29011172	PCF1420-6/C-Box																																								
29011170	PCF1420-9/C-Box																																								
Art. no.	Designation																																								
29011149	PCE1420-2/M12																																								

## 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> <p>Art. no. 2901528      Designation IF2008-Y-adapter cable</p> 	Sub-D	<p>Interface card for synchronous data acquisition IF2008PCIe / IF2008E</p> 



# Smart laser sensors for precise measurements optoNCDT 1900

designed for advanced  
**AUTOMATION**

-  For common surfaces
-  Measuring rate up to 10 kHz
-  Analog (U/I) / RS422 / PROFINET / EtherNet/IP / EtherCAT
-  Advanced Surface Compensation
-  Repeatability <0.1 µm
-  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.



## 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.

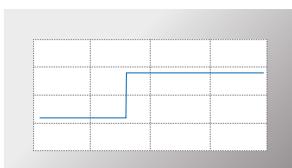
**EtherCAT** 

**EtherNet/IP**

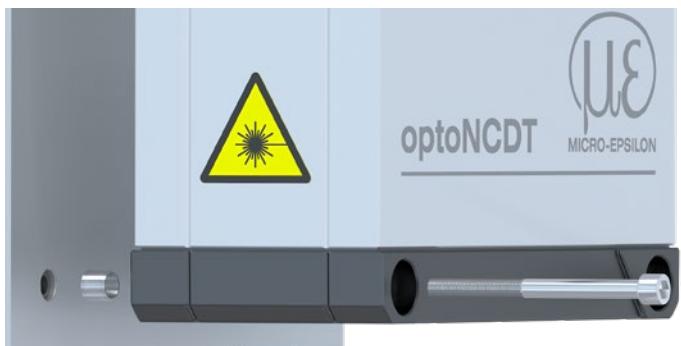
**PROFINET** 

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.

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).



#### Patented installation

Easy mounting and high repeatability when replacing the sensor

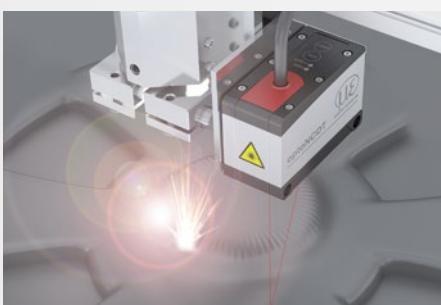
#### Highest stability based on intelligent signal optimization

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.

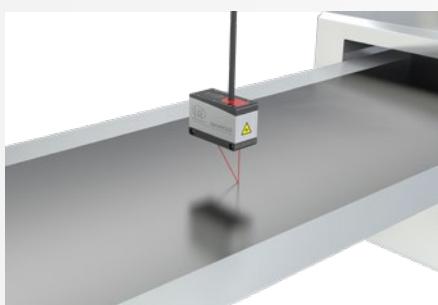
#### Simple mounting and initial operation

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 <sup>[1]</sup>	7 adjustable stages: 10 kHz / 8 kHz / 4 kHz / 2 kHz / 1 kHz / 500 Hz / 250 Hz	
Temperature stability <sup>[2]</sup>	±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 <sup>[3]</sup>	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 <sup>[4]</sup>	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	

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

<sup>[2]</sup> 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

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

<sup>[4]</sup> 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 <sup>[1]</sup>	7 adjustable stages: 10 kHz / 8 kHz / 4 kHz / 2 kHz / 1 kHz / 500 Hz / 250 Hz	
Temperature stability <sup>[2]</sup>	±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 <sup>[3]</sup>	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	approx. 185 g (incl. pigtail)	
Control and indicator elements <sup>[4]</sup>	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	

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

<sup>[2]</sup> 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

<sup>[3]</sup> PoE not possible with PROFINET

<sup>[4]</sup> 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 <sup>[1]</sup>	< ±1 µm	< ±1.8 µm	< ±2 µm	< ±5 µm
	< ±0.05 % FSO	< ±0.03 % FSO	< ±0.02 % FSO	< ±0.02 % FSO
Repeatability <sup>[2]</sup>	< 0.1 µm	< 0.25 µm	< 0.4 µm	< 0.8 µm
Light spot diameter <sup>[3]</sup>	SMR	60 x 75 µm	85 x 105 µm	115 x 150 µm
	MMR	55 x 65 µm	57 x 60 µm	60 x 65 µm
	EMR	65 x 75 µm	105 x 120 µm	120 x 140 µm
	smallest Ø	55 x 65 µm with 16 mm	57 x 60 µm with 20 mm	60 x 65 µm with 25 mm
Permissible ambient light			50,000 lx	

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

<sup>[2]</sup> Typical value with measurements at 4 kHz and median 9

<sup>[3]</sup> ±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/e<sup>2</sup> 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 <sup>[1]</sup>	< ±10 µm	< ±30 µm	< ±100 µm	< ±400 µm
	< ±0.02 % FSO	< ±0.03 % FSO	< ±0.05 % FSO	< ±0.08 % FSO
Repeatability <sup>[2]</sup>	< 1.6 µm	< 4 µm	< 8 µm	< 20 ... 40 µm
Light spot diameter <sup>[3]</sup>	SMR	220 x 300 µm	310 x 460 µm	
	MMR	95 x 110 µm	140 x 170 µm	950 x 1200 µm
	EMR	260 x 300 µm	380 x 410 µm	950 x 1200 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

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

<sup>[2]</sup> Typical value with measurements at 4 kHz and median 9

<sup>[3]</sup> ±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/e<sup>2</sup> 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 rangee	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 <sup>[1]</sup>	< ±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 <sup>[2]</sup>	< 0.1 µm	< 0.25 µm	< 0.4 µm	< 0.8 µm	< 1.6 µm
Light spot diameter <sup>[3]</sup>	SMR	55 x 480 µm	100 x 600 µm	125 x 730 µm	210 x 950 µm
	MMR	40 x 460 µm	50 x 565 µm	55 x 690 µm	80 x 970 µm
	EMR	55 x 440 µm	100 x 525 µm	125 x 660 µm	220 x 1000 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
Permissible ambient light				50,000 lx	

<sup>[1]</sup> Related to digital output; FSO = Full Scale Output

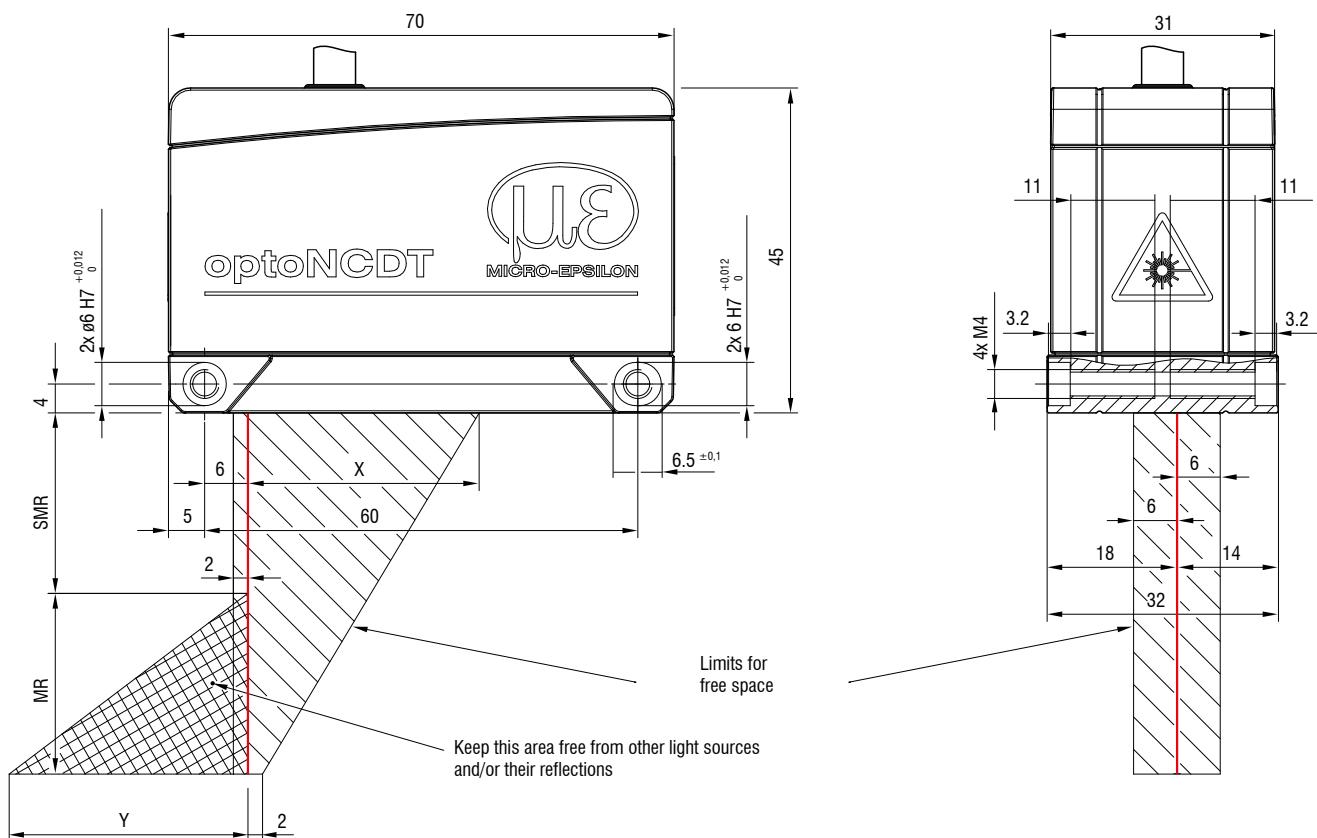
The specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

<sup>[2]</sup> Typical value with measurements at 4 kHz and median 9

<sup>[3]</sup> ±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



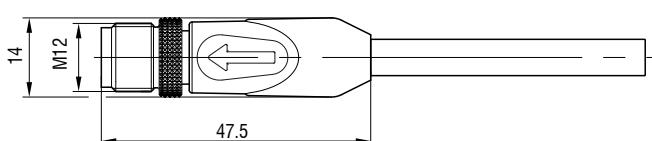
MR	SMR	X	Y
2	15	23	3
6	17	27	9
10	20	33	14
25	25	33	33
50	40	36	45
100	50	37	75
200	60	39	130
500	100	43	215

(Dimensions in mm, not to scale)

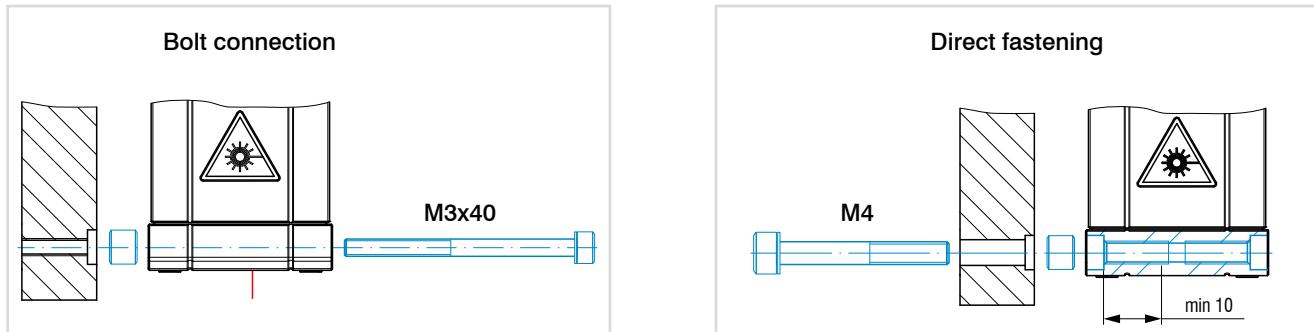
MR = measuring range; SMR = start of measuring range

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)

### Scope of supply

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

### **Protective film**

Transparent protective film 52 x 15 mm for ILD1900

### **Protective housings**

with air purge and cooling, see page 60

## **Article designation**

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

# Connection possibilities optoNCDT 1900

## Connection possibilities for sensors with integrated cables

Cable diameter:	5.80 $\pm 0.2$ 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 $\pm 0.2$ 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	<p>Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m</p> <table> <tr> <td>Art. no.</td> <td>Designation</td> </tr> <tr> <td>29011218</td> <td>PC1900-3/OE</td> </tr> <tr> <td>29011219</td> <td>PC1900-6/OE</td> </tr> <tr> <td>29011220</td> <td>PC1900-9/OE</td> </tr> <tr> <td>29011221</td> <td>PC1900-15/OE</td> </tr> </table>	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> 
Art. no.	Designation												
29011218	PC1900-3/OE												
29011219	PC1900-6/OE												
29011220	PC1900-9/OE												
29011221	PC1900-15/OE												
			<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> 										
			<p>Interface card for synchronous data acquisition IF2008PCIe / IF2008E</p> 										
			<p>4-fold interface module from RS422 to USB IF2004/USB</p> 										
			<p>Controller for D/A conversion and evaluation of up to 2 sensor signals Dual Processing Unit</p> 										
			<p>Interface module for Ethernet connection of up to 8 sensors IF2008/ETH</p> 										
			<p>Adapter cable for sensor calculation Length 3 m / 6 m / 9 m / 15 m</p> <table> <tr> <td>Art. no.</td> <td>Designation</td> </tr> <tr> <td>29011320</td> <td>PC1900-3/C-Box</td> </tr> <tr> <td>29011321</td> <td>PC1900-6/C-Box</td> </tr> <tr> <td>29011322</td> <td>PC1900-9/C-Box</td> </tr> <tr> <td>29011323</td> <td>PC1900-15/C-Box</td> </tr> </table>	Art. no.	Designation	29011320	PC1900-3/C-Box	29011321	PC1900-6/C-Box	29011322	PC1900-9/C-Box	29011323	PC1900-15/C-Box
Art. no.	Designation												
29011320	PC1900-3/C-Box												
29011321	PC1900-6/C-Box												
29011322	PC1900-9/C-Box												
29011323	PC1900-15/C-Box												
			<p>Adapter cable for sensor calculation Length 2 m</p> <table> <tr> <td>Art. no.</td> <td>Designation</td> </tr> <tr> <td>29011326</td> <td>PCE1900-3/M12</td> </tr> </table>	Art. no.	Designation	29011326	PCE1900-3/M12						
Art. no.	Designation												
29011326	PCE1900-3/M12												

## 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 ILD1910-xx	Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m  Art. no. 29011404 Designation 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 
			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. 29011332 Designation 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 
ILD1900-xx-EtherCAT ILD1900-xxLL-EtherCAT ILD1900-xx-EtherNet/IP ILD1900-xxLL-EtherNet/IP	Connection cables PoE, laser On/Off Software Length 3 m / 6 m / 9 m / 15 m  Art. no. 29011338 Designation PC1900-IE-3/RJ45 29011355 PC1900-IE-6/RJ45 29011356 PC1900-IE-9/RJ45 29011445 PC1900-IE-15/RJ45	RJ45	Signal / Supply PoE optional: PoE Switch 

\*PoE not possible with PROFINET

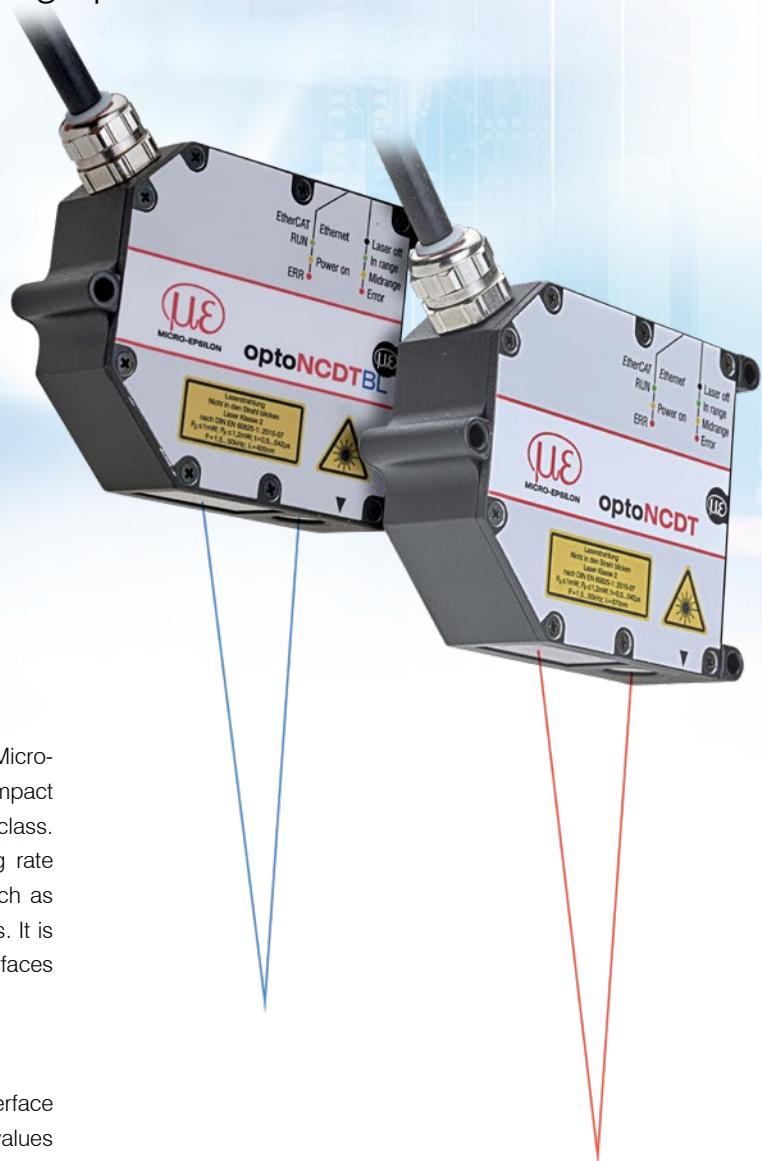
## Other cables

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. 2901528 Designation IF2008-Y-adapter cable 	Sub-D	Interface card for synchronous data acquisition IF2008PCIE / 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
-  ARTSC Advanced Real Time Surface Compensation
-  Resolution 0.03  $\mu$ m
-  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.

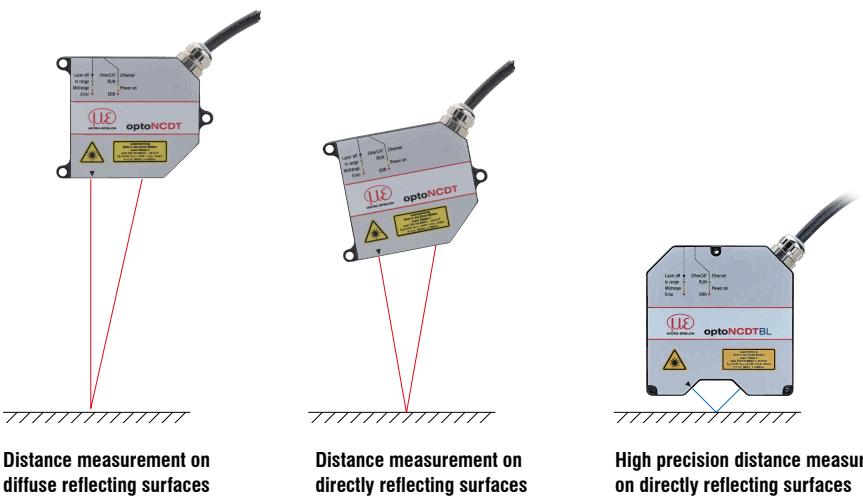
## User-friendly web interface for easy operation

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.

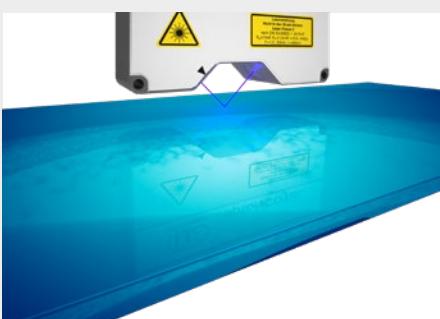
Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 2300		2 - 300 mm	0.03 µm	from 0.02 %
optoNCDT 2300BL		2 - 50 mm	0.03 µm	from 0.02 %
optoNCDT 2300LL		2 - 50 mm	0.1 µm	from 0.02 %
optoNCDT 2300-2DR		2 mm	0.03 µm	from 0.03 %
optoNCDT 2310		10 - 50 mm	0.5 µm	from 0.03 %



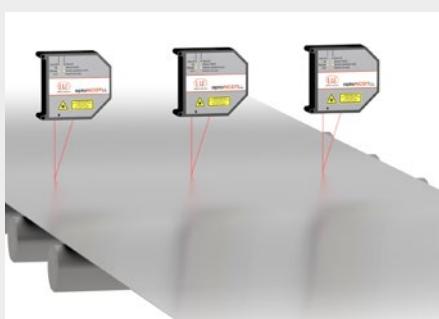
### Versatile use

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 <sup>[1]</sup>	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 <sup>[2]</sup>	RS422 (16 bit) / Ethernet / EtherCAT / PROFINET / EtherNet/IP	
Analog output <sup>[3]</sup>	4 ... 20 mA / 0 ... 5 V / 0 ... 10 V / $\pm$ 5 V / $\pm$ 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 <sup>[4]</sup>	Web interface for setup: user management, measurement settings, data output, measurement control, parameters and extras; 2x color LEDs for status / Ethernet and EtherCAT	

<sup>[1]</sup> Measuring rate 49.14 kHz with reduced measuring range (in brackets)

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

<sup>[3]</sup> Requires connection via interface module (see accessories)

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



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

Model	ILD2300-2	ILD2300-5	ILD2300-10	ILD2300-20
Measuring range <sup>[1]</sup>	2 (2) mm	5 (2) mm	10 (5) mm	20 (10) mm
Start of measuring range <sup>[1]</sup>	24 (24) mm	24 (24) mm	30 (35) mm	40 (50) mm
Mid of measuring range <sup>[1]</sup>	25 (25) mm	26.5 (25) mm	35 (37.5) mm	50 (55) mm
End of measuring range <sup>[1]</sup>	26 (26) mm	29 (26) mm	40 (40) mm	60 (60) mm
Linearity <sup>[2]</sup>	< $\pm$ 0.6 $\mu$ m	< $\pm$ 1.5 $\mu$ m	< $\pm$ 2 $\mu$ m	< $\pm$ 4 $\mu$ m
Resolution <sup>[3]</sup>	< $\pm$ 0.03 % FSO	< $\pm$ 0.03 % FSO	< $\pm$ 0.02 % FSO	< $\pm$ 0.02 % FSO
Light spot diameter <sup>[4]</sup>	SMR	55 x 85 $\mu$ m	70 x 80 $\mu$ m	75 x 85 $\mu$ m
	MMR	23 x 23 $\mu$ m	30 x 30 $\mu$ m	32 x 45 $\mu$ m
	EMR	35 x 85 $\mu$ m	70 x 80 $\mu$ m	110 x 160 $\mu$ m
Material	Die-cast zinc housing			

<sup>[1]</sup> Value in brackets applies for measuring rate 49.14 kHz

<sup>[2]</sup> FSO = Full Scale Output

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

<sup>[3]</sup> Measuring rate 20 kHz

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

<sup>[1]</sup>Value in brackets applies for measuring rate 49.14 kHz

<sup>[2]</sup>FSO = Full Scale Output

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

<sup>[3]</sup>Measuring rate 20 kHz

<sup>[4]</sup>±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 <sup>[1]</sup>	2 (2) mm	5 (2)	10 (5) mm	50 (25) mm
Start of measuring range <sup>[1]</sup>	24 (24) mm	24 (24) mm	30 (35) mm	550 (575) mm
Mid of measuring range <sup>[1]</sup>	25 (25) mm	26.5 (25) mm	35 (37.5) mm	575 (587.5) mm
End of measuring range <sup>[1]</sup>	26 (26) mm	29 (26) mm	40 (40) mm	600 (600) mm
Linearity	< ±0.6 µm < ±0.03 % FSO	< ±1.5 µm < ±0.03 % FSO	< ±2 µm < ±0.02 % FSO	< ±40 µm < ±0.08 % FSO
Resolution <sup>[2]</sup>	0.03 µm	0.08 µm	0.15 µm	7.5 µm
	SMR	70 x 80 µm	200 x 200 µm	75 x 85 µm
Light spot diameter <sup>[3]</sup>	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			

<sup>[1]</sup>Value in brackets applies for measuring rate 49.14 kHz

<sup>[2]</sup>Measuring rate 20 kHz

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

<sup>[1]</sup> Value in brackets applies for a measuring rate of 49.14 kHz

<sup>[2]</sup> FSO = Full Scale Output

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

<sup>[3]</sup> Measuring rate 20 kHz

<sup>[4]</sup> ±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 <sup>[1]</sup>	2 (1) mm
Start of measuring range <sup>[1]</sup>	9 (9) mm
Mid of measuring range <sup>[1]</sup>	10 (9.5) mm
End of measuring range <sup>[1]</sup>	11 (10) mm
Linearity <sup>[2]</sup>	< ±0.6 µm
	< ±0.03 % FSO
Resolution <sup>[3]</sup>	0.03 µm
Temperature stability <sup>[4]</sup>	±0.01 % FSO / K
	SMR
Light spot diameter <sup>[5]</sup>	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)

<sup>[1]</sup> Value in brackets applies for a measuring rate of 49.14 kHz

<sup>[2]</sup> The specified data apply to directly reflecting surfaces; FSO = Full Scale Output

<sup>[3]</sup> Measuring rate 20 kHz

<sup>[4]</sup> Relates to digital output in mid of measuring range

<sup>[5]</sup> ±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/e<sup>2</sup> width)



## Laser-Point - optoNCDT 2310

Model	ILD2310-10	ILD2310-20	ILD2310-40	ILD2310-50
Measuring range <sup>[1]</sup>	10 (5) mm	20 (10) mm	40 (20) mm	50 (25) mm
Start of measuring range <sup>[1]</sup>	95 (100) mm	90 (100) mm	175 (195) mm	550 (575) mm
Mid of measuring range <sup>[1]</sup>	100 (102.5) mm	100 (105) mm	195 (205) mm	575 (587.5) mm
End of measuring range <sup>[1]</sup>	105 (105) mm	110 (110) mm	215 (215) mm	600 (600) mm
Linearity <sup>[2]</sup>	< ±3 µm	< ±6 µm	< ±12 µm	< ±50 µm
	< ±0.03 % FSO	< ±0.03 % FSO	< ±0.03 % FSO	< ±0.1 % FSO
Resolution <sup>[3]</sup>	0.5 µm	1 µm	2 µm	7.5 µm
	SMR		200 µm	230 µm
Light spot diameter <sup>[4]</sup>	MMR	400 x 500 µm	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			

<sup>[1]</sup>Value in brackets applies for measuring rate 49.14 kHz

<sup>[2]</sup>FSO = Full Scale Output

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

<sup>[3]</sup>with 10 kHz, without averaging

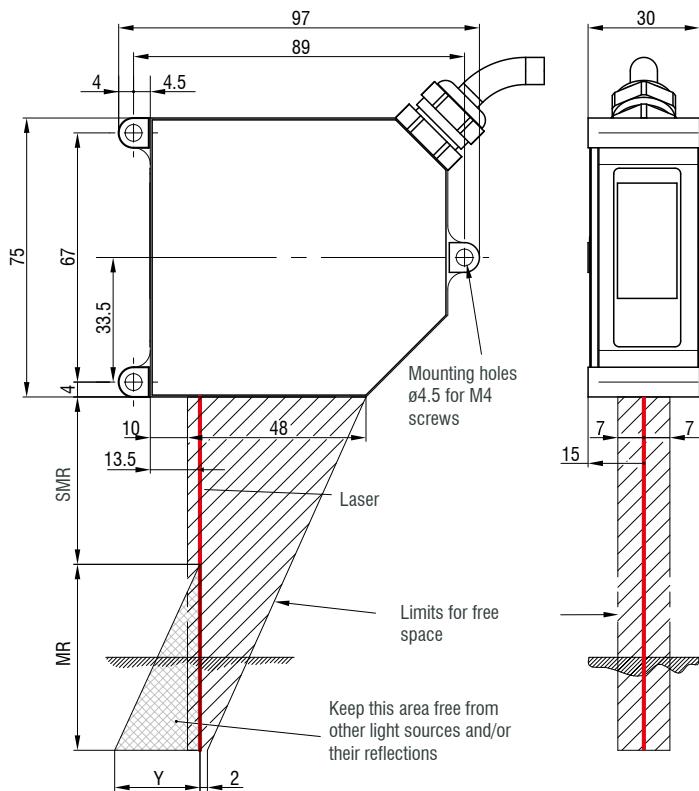
<sup>[4]</sup>±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

# Dimensions optoNCDT 2300

optoNCDT 2300 / Measuring range 2 - 100

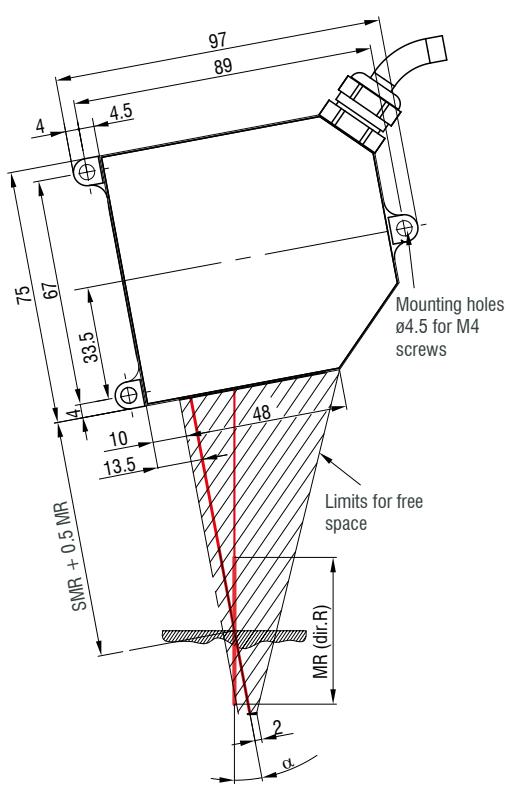
## optoNCDT 2300-2 ... 2300-100

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)

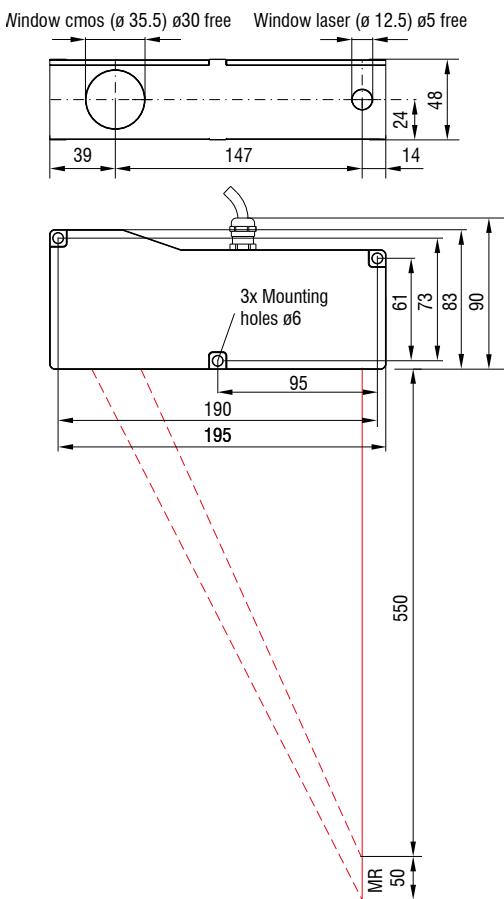
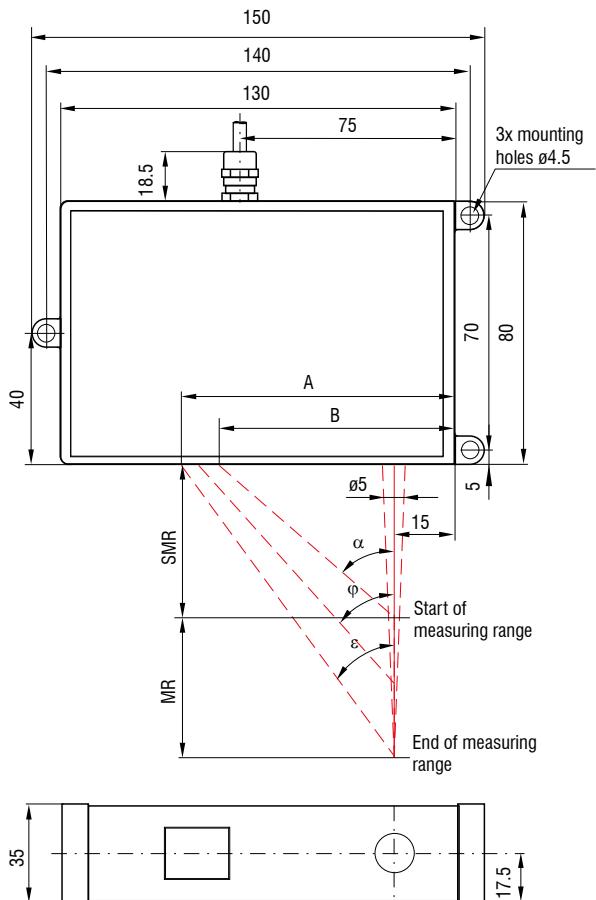
MR	SMR + 0.5 MR	$\alpha$
2	25	20.5 °
5	26.5	20 °
10	35	17.5 °
20	50	13.8 °

## Connector (sensor side)



optoNCDT 2300 / Measuring ranges 200/300

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



MR	$\alpha$	$\varphi$	$\varepsilon$	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

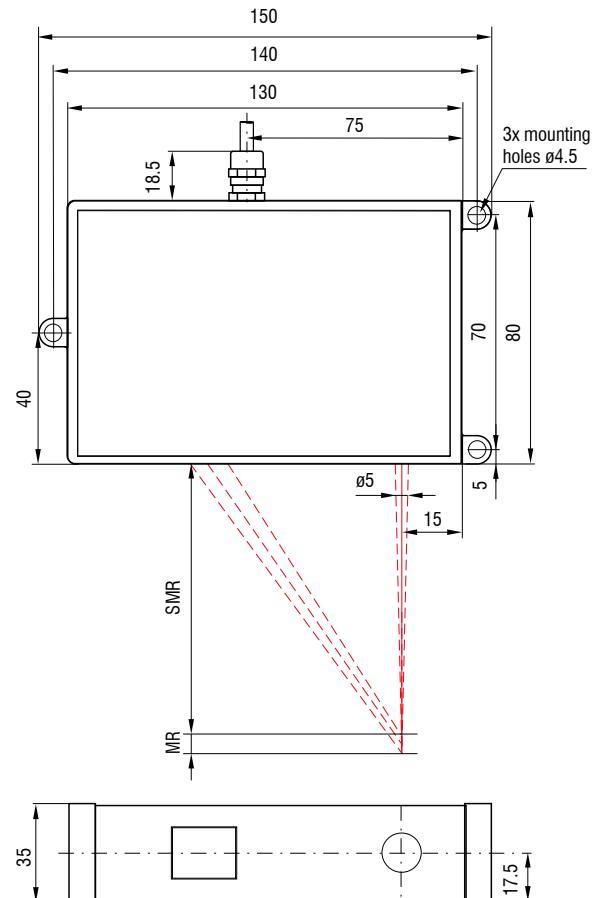
MMR = mid of measuring range; EMR = end of measuring range

Connector (sensor side)

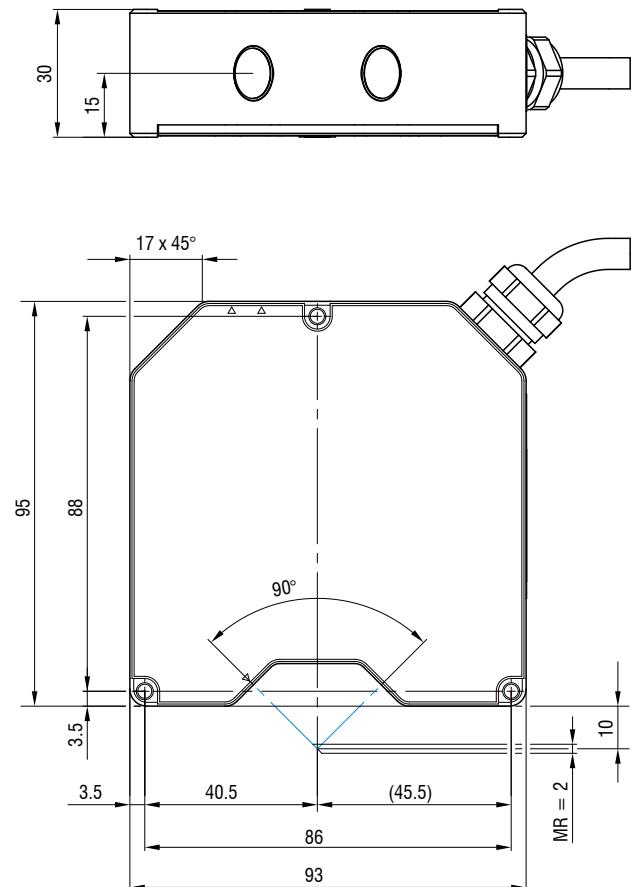


# Dimensions optoNCDT 2300

optoNCDT 2310 / Measuring ranges 10/20/40



optoNCDT 2300-2DR



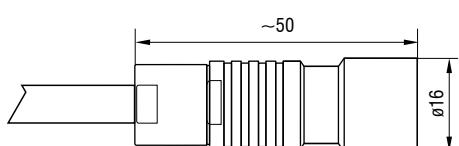
MR	SMR	MMR	EMR
10	95	100	105
20	90	100	110
40	175	195	215

(Dimensions in mm, not to scale)

MR = measuring range; SMR = start of measuring range

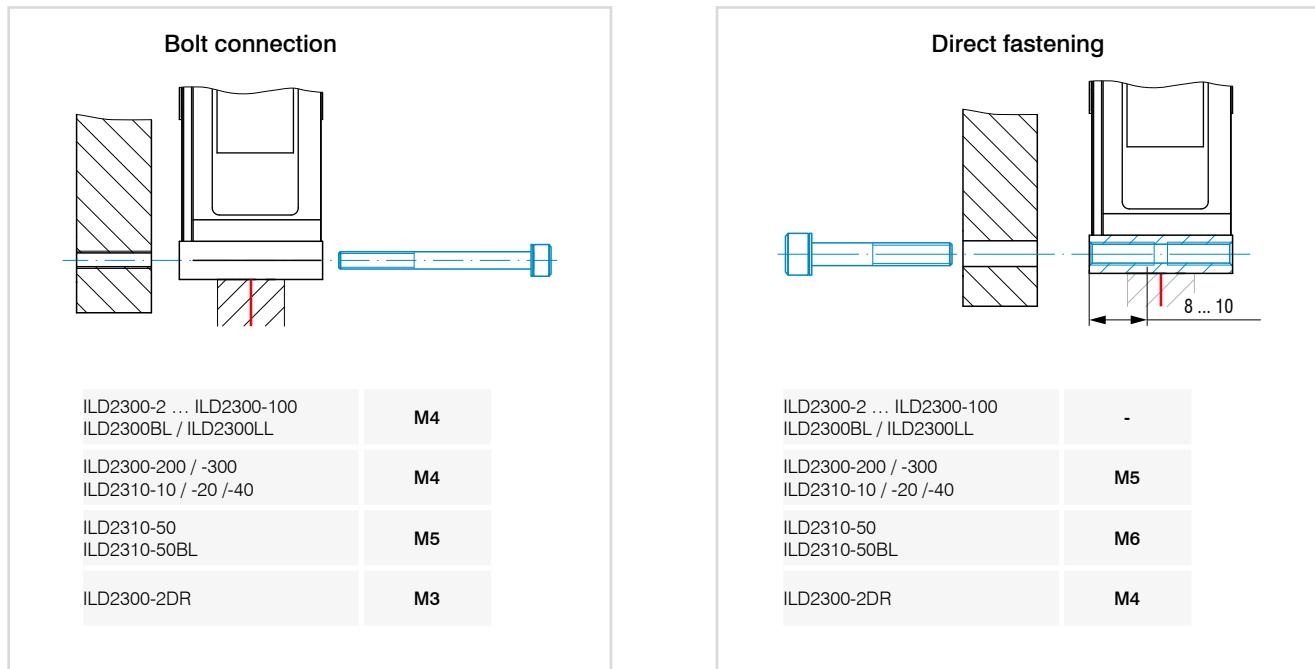
MMR = mid of measuring range; EMR = end of measuring range

Connector (sensor side)



## Installation options

### Housings M and L



## 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 60

### Article designation

ILD2300-	6	LL	3R
<b>Laser class</b> No indication: class 2 (standard) 3R: class 3R (on request)			
<b>Laser type</b> No indication: Red laser point (standard) LL: Laser Line BL: Blue Laser DR: Direct Reflection			
<b>Measuring range</b> in mm			
<b>Series</b> 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	Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m  Art. no.      Designation 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  Art. no.      Designation 2901728      PC2300-3/IF2008 2901729      PC2300-6/IF2008		Interface module of RS422 to USB IF2001/USB
	Adapter cable for sensor calculation Length 3 m / 6 m / 9 m  Art. no.      Designation 29011031      PC2300-3/C-Box/RJ45 29011044      PC2300-6/C-Box/RJ45 29011045      PC2300-9/C-Box/RJ45		Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT
	Adapter cable for sensor calculation Length 2 m  Art. no.      Designation 29011279      PCE2300-3/M12		Interface card for synchronous data acquisition IF2008PCIe / IF2008E
	Adapter cable Sub-D for EtherCAT Length 3 m / 6 m  Art. no.      Designation 2901661      PC2300-3/SUB-D 2901976      PC2300-6/SUB-D		4-fold interface module from RS422 to USB IF2004/USB
ILD2310-xx	Adapter cable for sensor calculation Length 3 m / 6 m / 9 m  Art. no.      Designation 29011031      PC2300-3/C-Box/RJ45 29011044      PC2300-6/C-Box/RJ45 29011045      PC2300-9/C-Box/RJ45	Sub-D	Controller for D/A conversion and evaluation of up to 2 sensor signals Dual Processing Unit
	Adapter cable for sensor calculation Length 2 m  Art. no.      Designation 29011279      PCE2300-3/M12		Interface module for Ethernet connection of up to 8 sensors IF2008/ETH
	Adapter cable Sub-D for EtherCAT Length 3 m / 6 m  Art. no.      Designation 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	<b>Connection cable high temperatures</b> Length 3 m / 6 m / 9 m / 15 m  Art. no. <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	<b>Connection supply voltage</b> PS2020   <b>Interface module of RS422 to USB</b> IF2001/USB   <b>Interface module for Industrial Ethernet connection</b> IF2035-PROFINET IF2035-EIP IF2035-EtherCAT 

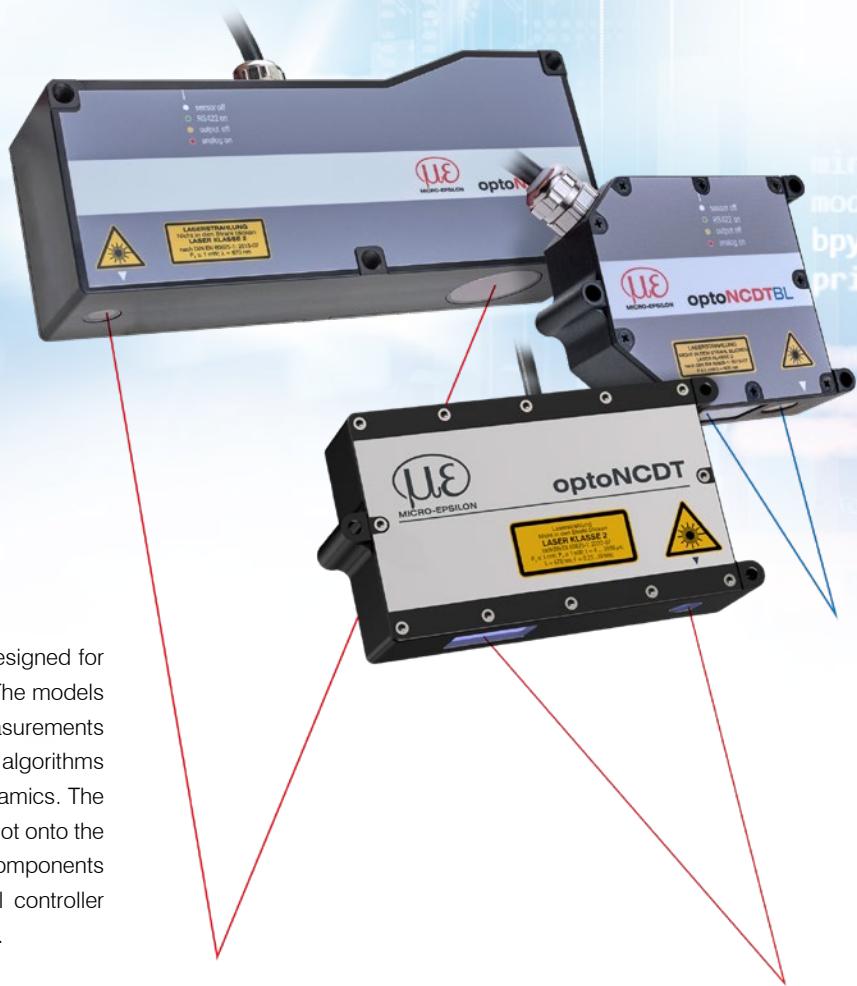
## Connection cable for EtherCAT operation

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)	<b>Adapter cable for EtherCAT</b> Length 0.5 m  Art. no. <i>Designation</i> 2901693      PC2300-0,5Y Connection cable ILD2300 	Open ends & RJ45	<b>Signal output EtherCAT &amp; Ethernet</b> EtherCAT®   <b>Supply voltage connection</b> Power supply unit PS2020   <b>Interface module of RS422 to USB</b> 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 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.

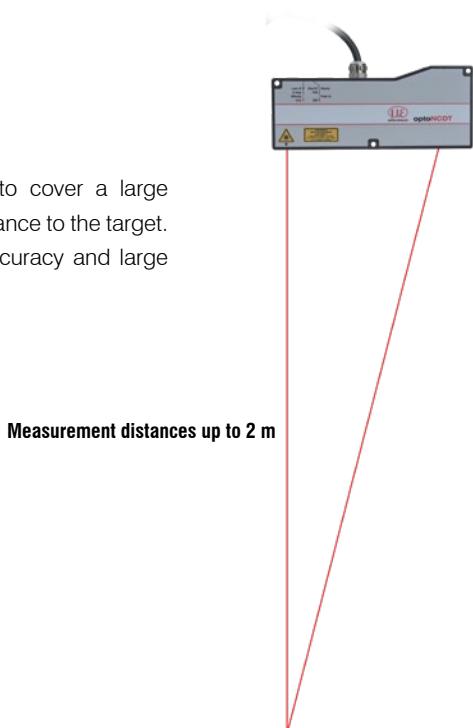
## Ideal for industrial applications

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 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

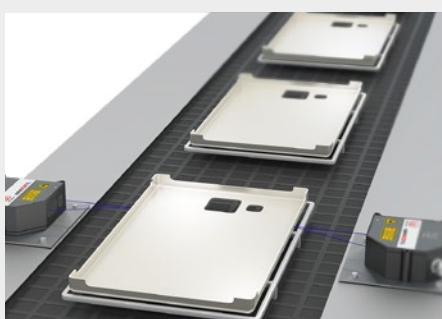
The optoNCDT long-range models are used to cover a large measuring range or to measure from a large distance to the target. The long-range laser sensors combine high accuracy and large measuring distances.



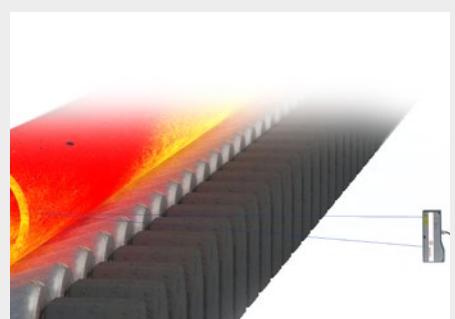
#### Application examples



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 <sup>[1]</sup>	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 <sup>[2]</sup>	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 <sup>[3]</sup>	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	

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

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

<sup>[3]</sup> 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 <sup>[1]</sup>	< ±12 µm	< ±160 µm	< ±350 µm	< ±670 µm	
Linearity <sup>[1]</sup>	< ±0.06 % FSO	< ±0.08 % FSO	< ±0.07 % FSO	< ±0.09 % FSO	
Repeatability <sup>[2]</sup>	0.8 µm	15 µm	20 µm	45 µm	
Light spot diameter <sup>[3]</sup>	SMR	320 µm	1300 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		

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

<sup>[2]</sup>Measuring rate 5 kHz, median 9

<sup>[3]</sup>±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 <sup>[1]</sup>	< ±1.6 µm	< ±6 µm	< ±12 µm
Linearity <sup>[1]</sup>	< ±0.08 % FSO		
Repeatability <sup>[2]</sup>	0.1 µm	0.4 µm	0.8 µm
Measuring angle	20°	17.6°	11.5°
Light spot diameter <sup>[3]</sup>	SMR	80 µm	110 µm
	MMR	35 µm	50 µm
	EMR	80 µm	110 µm

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

<sup>[2]</sup>Measuring rate 5 kHz, median 9

<sup>[3]</sup>±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 <sup>[1]</sup>	6 adjustable stages: 7.5 kHz / 5 kHz / 2.5 kHz / 1.25 kHz / 625 Hz / 300 Hz	
Linearity <sup>[2]</sup>	$< \pm 1000 \mu\text{m}$ $< \pm 0.1 \% \text{ FSO}$	
Repeatability <sup>[3]</sup>	100 $\mu\text{m}$	
Light spot diameter <sup>[4]</sup>	SMR	
	MMR	2500 ... 5000 $\mu\text{m}$
	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 <sup>[5]</sup>	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 <sup>[6]</sup>	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	

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

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

<sup>[3]</sup> Measuring rate 5 kHz, median 9

<sup>[4]</sup>  $\pm 10 \%$ ; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

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

<sup>[6]</sup> 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 <sup>[1]</sup>	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 <sup>[2]</sup>	< ±0.07 % FSO ±350 µm	±0.08 % FSO ±600 µm
Repeatability <sup>[3]</sup>	20 µm	30 µm
Light spot diameter <sup>[4]</sup>	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 <sup>[5]</sup>	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 <sup>[6]</sup>	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 <sup>[7]</sup>	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	

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

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

<sup>[3]</sup> Typical value with measurements at 4 kHz and median 9

<sup>[4]</sup> ±15 %; light spot diameter determined with point-shaped laser with Gaussian fit (full 1/e<sup>2</sup> width)

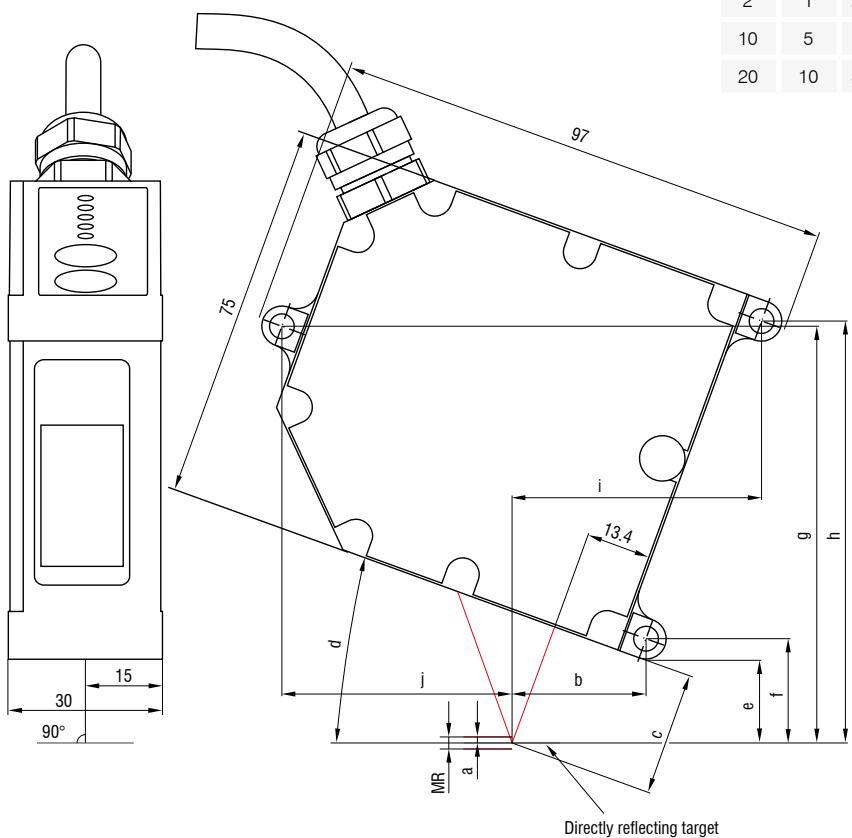
<sup>[5]</sup> Illuminant: light bulb

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

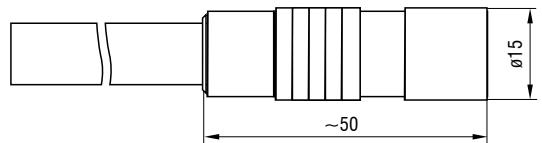
<sup>[7]</sup> Access to web interface requires connection to PC via IF2001/USB (see accessories)

# Dimensions optoNCDT 17x0

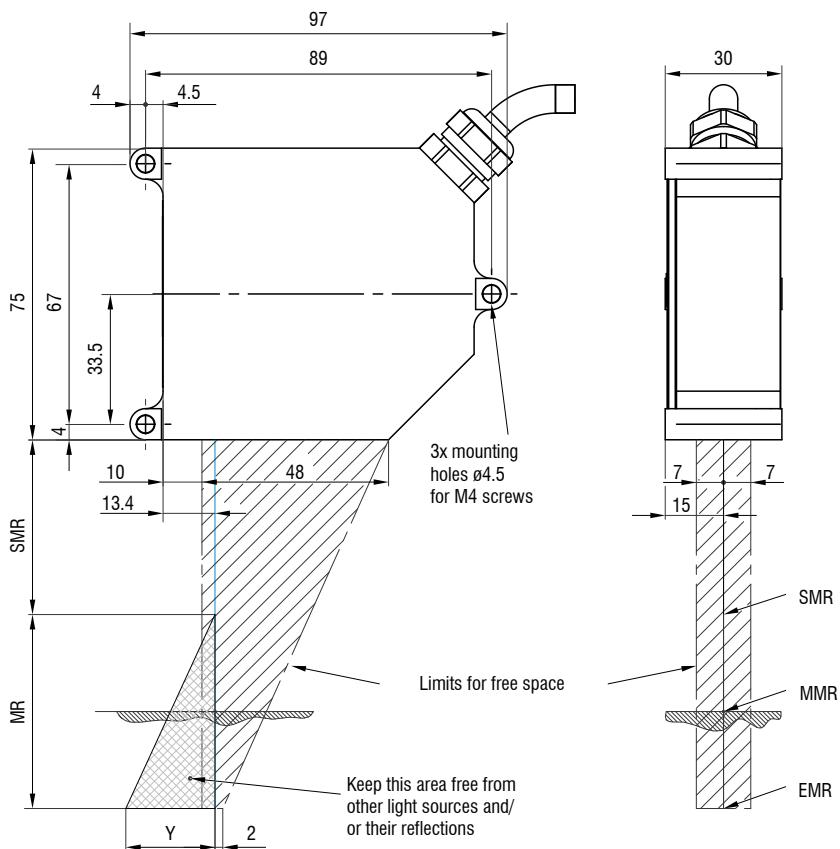
## optoNCDT 1750DR



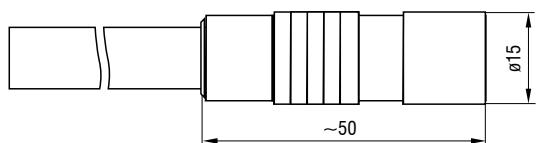
Connector (sensor side)



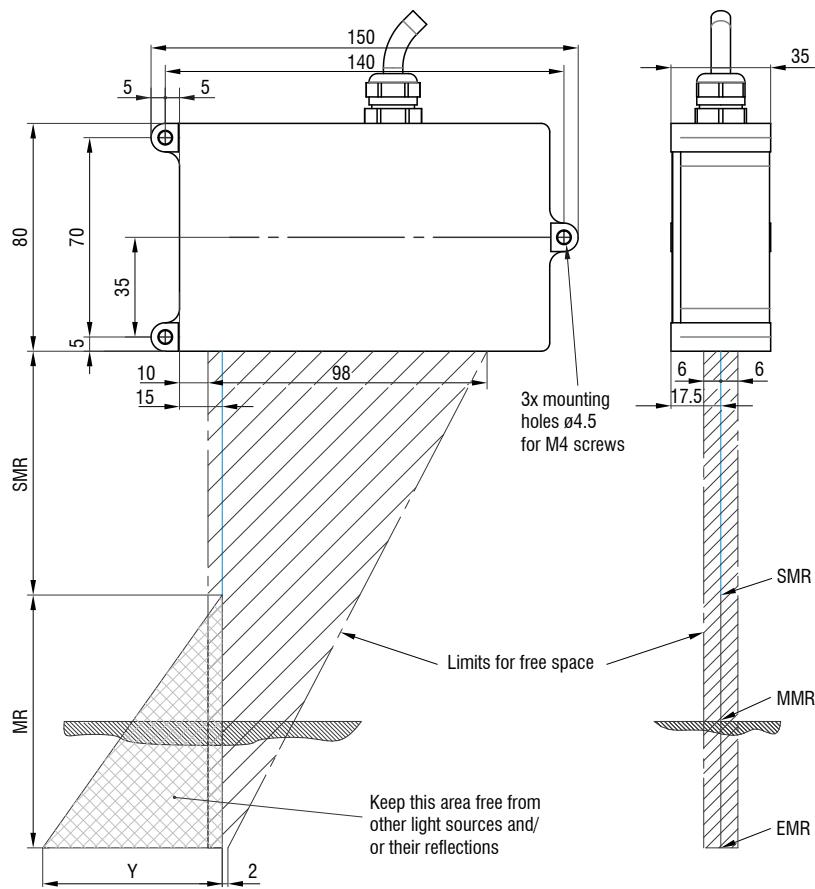
## optoNCDT 1750BL / Measuring ranges 20 / 200



Connector (sensor side)

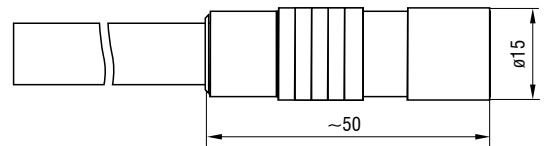


optoNCDT 1750BL / Measuring ranges 500 / 750



MR	SMR	Y
500	200	180
750	200	270

Connector (sensor side)

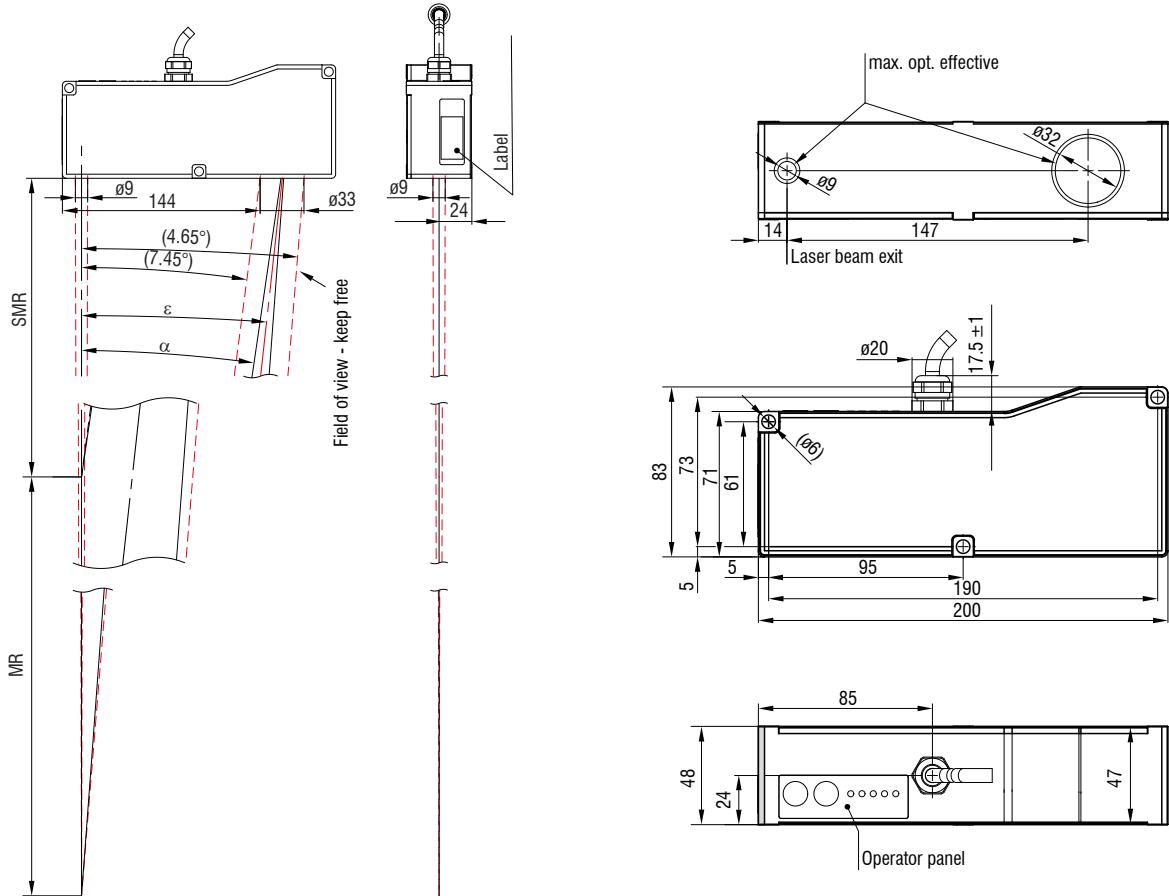


(Dimensions in mm, not to scale)

MR = measuring range; SMR = start of measuring range,  
MMR = Mid of measuring range, EMR = end of measuring range

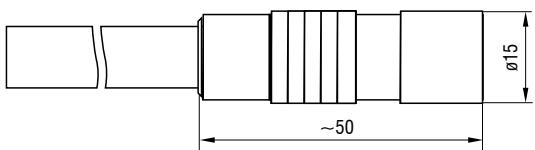
# Dimensions optoNCDT 17x0

## optoNCDT 1760-1000



MR	SMR	$\alpha$	$\varepsilon$
1000	1000	7.45 °	4.65 °

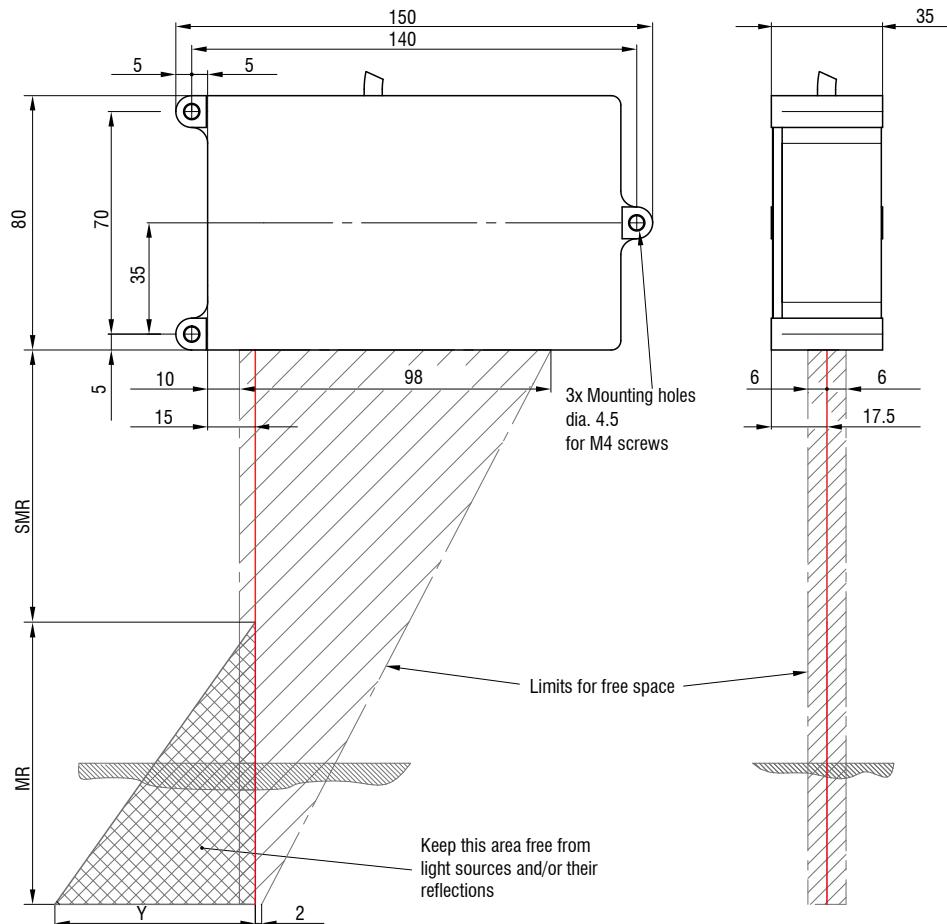
### Connector (sensor side)



(Dimensions in mm, not to scale)

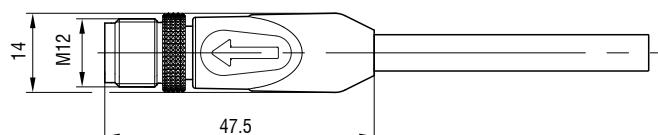
MR = measuring range; SMR = start of measuring range,  
MMR = Mid of measuring range, EMR = end of measuring range

# Dimensions optoNCDT 1910



MR	SMR	Y
500	200	180
750	200	270

Connector (sensor side)



## Accessories for optoNCDT 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 60

## Article designation

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

### Series

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 1750 / 1760

### Drag-chain suitable extension and adapter cables

Cable diameter: 6.8  $\pm$ 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
ILD1750-xxBL ILD1750-xxDR ILD1760-1000	Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m  Art. no.      Designation 2901189      PC1700-3 2901357      PC1700-6 2901191      PC1700-10 2901266      PC1700-15	Open ends	Supply voltage connection Power supply unit PS2020
	Adapter cable for PC interface card Length 3 m / 6 m  Art. no.      Designation 2901555      PC1700-3/IF2008 2901556      PC1700-6/IF2008 2901557      PC1700-8/IF2008		Interface module of RS422 to USB IF2001/USB IC2001/USB
	Adapter cable for sensor calculation Length 3 m / 6 m / 9 m  Art. no.      Designation 29011173      PC1750-3/C-Box 29011180      PC1750-6/C-Box 29011181      PC1750-9/C-Box		Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT
	Interface card for synchronous data acquisition IF2008PCIe / IF2008E	Sub-D	Interface card for synchronous data acquisition IF2008PCIe / IF2008E
	4-fold USB converter IF2004/USB		4-fold USB converter IF2004/USB
	Controller for D/A conversion and evaluation of up to 2 sensor signals Dual Processing Unit		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
ILD1750-xxBL ILD1750-xxDR ILD1760-1000	Extension cable pigtail: Length 3 m / 6 m / 9 m / 15 m  Art. no.      Designation 2901494      PCR1700-5 2901299      PCR1700-10	Open ends	Connection supply voltage PS2020
	Interface module from RS422 to USB IF2001/USB IC2001/USB		Interface module from RS422 to USB IF2001/USB IC2001/USB
	Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT		Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT

## 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	
ILD1750-xxBL ILD1750-xxDR ILD1760-1000	Extension cables high temperatures	Open ends	Supply voltage connection	 Power supply unit PS2020
	Length 3 m / 6 m / 9 m / 15 m		Interface module of RS422 to USB	 IF2001/USB
	Art. no.	Designation	Interface module for Industrial Ethernet connection	 IF2035-PROFINET IF2035-EIP IF2035-EtherCAT

## 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)	<p><b>Adapter cables for 4-fold sensor connection</b> Length 0.1 m</p> <p>Art. no. 2901528      <i>Designation</i> IF2008-Y-adapter cable</p> 	Sub-D	<p><b>Interface card for synchronous data acquisition</b> IF2008PCIe / IF2008E</p> 

optoNCDT 1910

see Connection possibilities optoNCDT 1900 on pg. 32.

### IF2035: Interface module for Industrial Ethernet connection

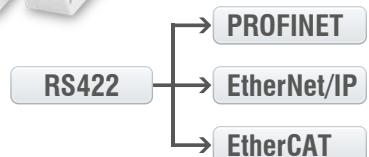
- Connection of RS422 or RS485 interfaces to PROFINET / Ethernet/ IP / EtherCAT
- Synchronization output for RS422 sensors
- 2 network connections for different network topologies
- Data rate up to 4 MBaud
- 4-fold oversampling (with EtherCAT)
- Ideal for confined spaces due to a compact housing and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



EtherCAT®

EtherNet/IP®

PROFI  
NET®

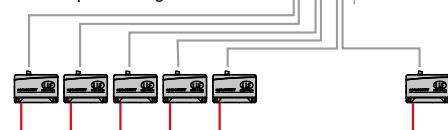


### IF2008PCIe/IF2008E: Interface card for synchronous data acquisition

- 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)

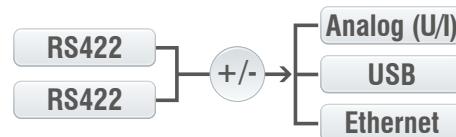


Interface card  
IF2008PCIe, IF2008E  
for individual signal  
processing



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

- 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



RS422 → Ethernet

### 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



RS422 → USB

### 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



RS422 → USB

### 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



RS422  
RS422  
RS422  
RS422 → USB

Connection of 4 sensors via  
IF2008-Y-adapter cable

# Protective housings for demanding environments

## optoNCDT

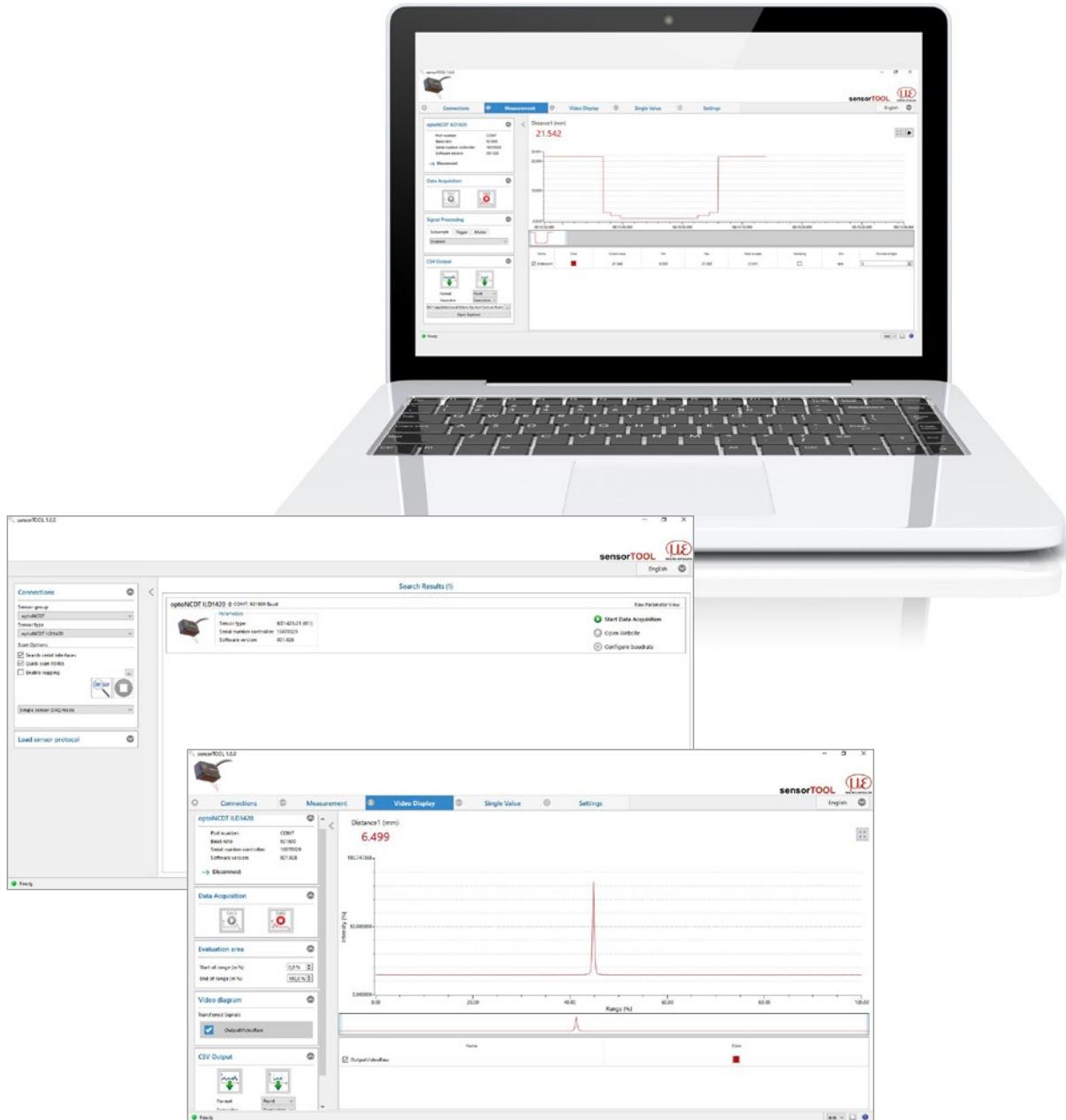
SGH & SGHF models				SGHF-HT model
Protective housing Size S		Protective housing Size M		
SGH	SGHF	SGH	SGHF	 (260 x 180 x 154 mm)
 (140 x 140 x 71 mm)		 (180 x 140 x 71 mm)		Water-cooled protective housing with window and compressed-air connection for measurement tasks in ambient temperatures up to 200 °C. Maximum temperature of cooling water T(max) = 10 °C Minimum water flow rate Q(min) = 3 liters/min
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.
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 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 ILD1900-6 / -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](http://www.micro-epsilon.de/download)

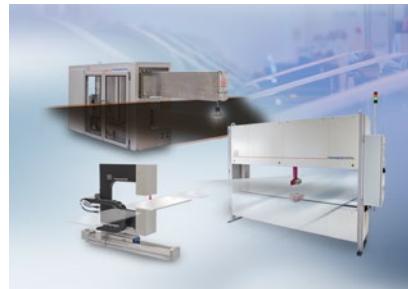
## Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



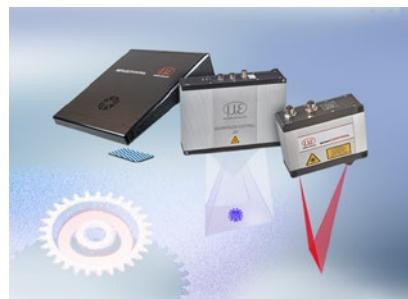
Measuring and inspection systems for metal strips, plastics and rubber



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