MICRO-EPSILON

More Precision

optoNCDT 5500 // The new high-performance laser sensors

The new class of high-performance laser sensors
optoNCDT 5500

- Measuring rate up to 150 kHz
- Analog, Ethernet and RS422
- Advanced Surface Compensation
- Increased linearity of 0.015 % due to improved lens design
- Repeatability < 0.008 µm
- Highest immunity to ambient light
- High resistance to shocks and vibrations

Highest performance:
A new class of laser triangulation sensors

The optoNCDT 5500 from Micro-Epsilon represents the latest performance class among laser triangulation sensors. With its increased measuring rate up to 150 kHz, the sensor is ideal for highly dynamic measurement tasks. It delivers extremely precise measurement results, even on rapidly changing and poorly reflective surfaces. Its high repeatability enables measurements with submicron precision.

Versatile use

The optoNCDT 5500 sensors are available with different measuring ranges. In addition to the standard measuring range, an extended measuring range can be used, which significantly expands the fields of use.

With IP67 protection and high resistance to ambient light, the laser sensor can also be used in challenging environmental conditions.

Advanced Surface Compensation -
The intelligent exposure control for all surfaces

The optoNCDT 5500 is equipped with an intelligent surface control feature. New algorithms enable fast exposure control and therefore stable measurement results on surfaces where changing reflections occur. In addition, the sensor is extremely resistant to ambient light and can also be used in strongly illuminated environments. New algorithms compensate for ambient light up to 200,000 lux.

New features:

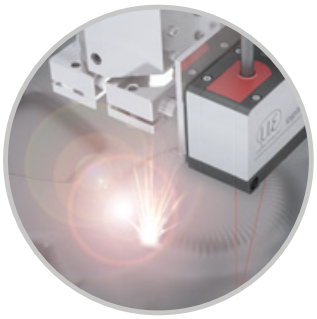
- Activation of both encoder inputs
- 2-point scaling for the digital and analog interfaces
- 32-bit data transmission for RS422 (previously 16-bit)
- Automatic definition of the measuring range when switching the measuring rate

NEW: Industrial Ethernet for easy integration

The optoNCDT 5500 laser triangulation sensors are now also available with the integrated Industrial Ethernet interfaces PROFINET and EtherCAT. Depending on the model, you can integrate the full sensor performance into your PLC directly via PROFINET and EtherCAT without any additional interface module. You benefit from real-time data without time delay as well as reduced installation and wiring effort.

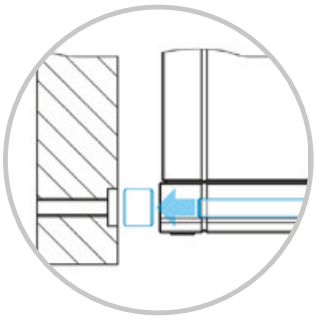
The sensor parameters can be set directly via Industrial Ethernet or still via web interface. For high speed measurements, the sensor offers an Oversampling feature which allows, depending on the fieldbus, measurement data to be detected or transmitted 20 times faster than the bus cycles.

No external controller required: maximum performance in a minimum of space



Highest ambient light compensation up to 200,000 lux

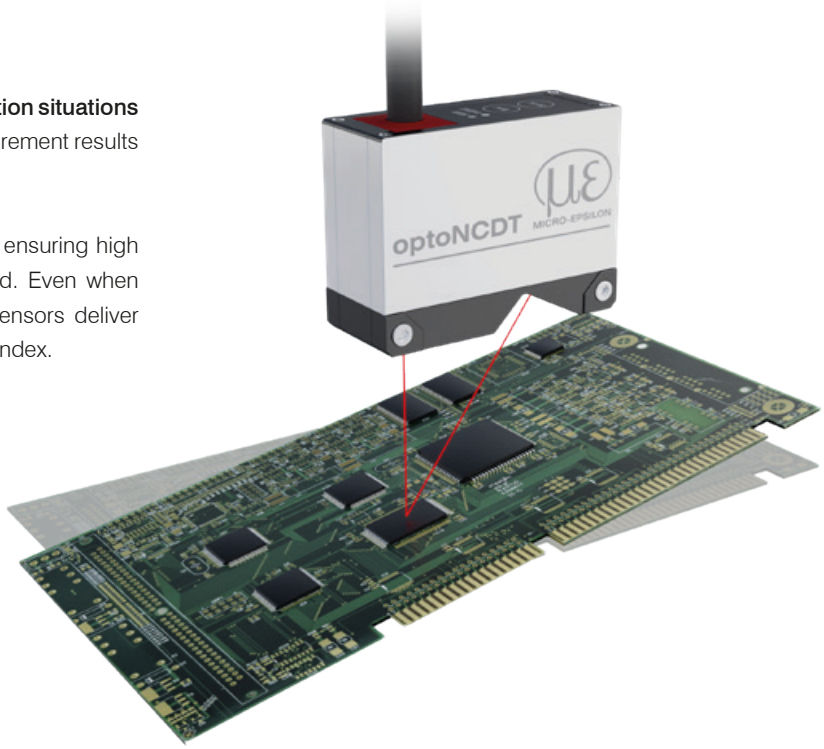
Robust and durable sensor design (IP67)



Patented mounting concept for repeatable fastening

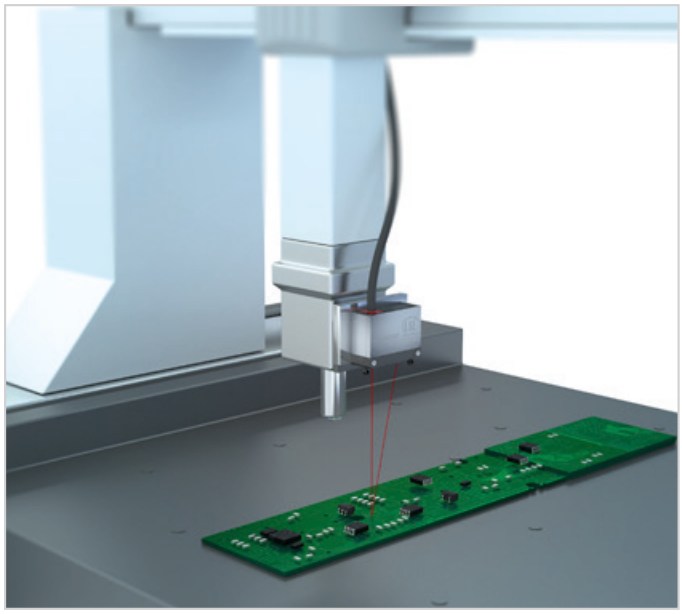
Accurate measurements even in challenging installation situations
The integrated field linearization enables reliable measurement results even when the objects to be measured are inclined.

The sensor automatically compensates for inclination, ensuring high measurement accuracy even when the device is tilted. Even when taking measurements through protective glass, the sensors deliver precise results by accounting for the glass's refractive index.



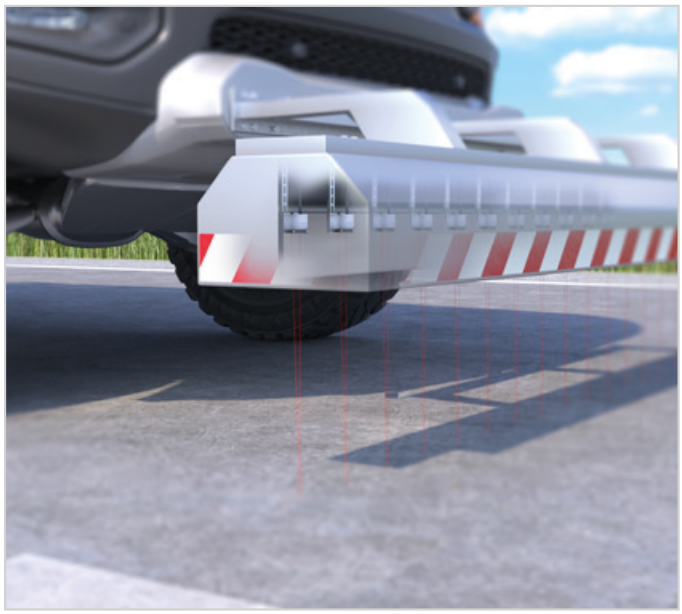
Adapter plate for seamless transition
To ensure an easy transition from the optoNCDT ILD2300 laser sensor to its successor, the ILD5500, an adapter plate is available. Using this plate, you can retain the drilling pattern for the ILD2300 on your system and also attach the ILD5500 to it. Due to the thin wall thickness of the plate, the ILD5500 is positioned so that the laser beam is in the same place as its predecessor.

Application examples
optoNCDT 5500

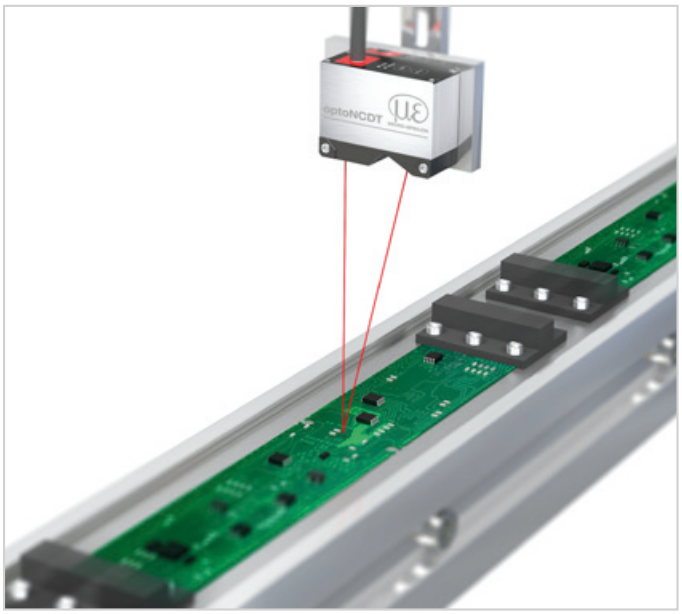


Coordinate measuring machines
optoNCDT 5500 laser triangulation sensors support the fast positioning of the measuring heads. Due to their advanced sensor technology, these laser sensors enable exact distance control of the sensor head.

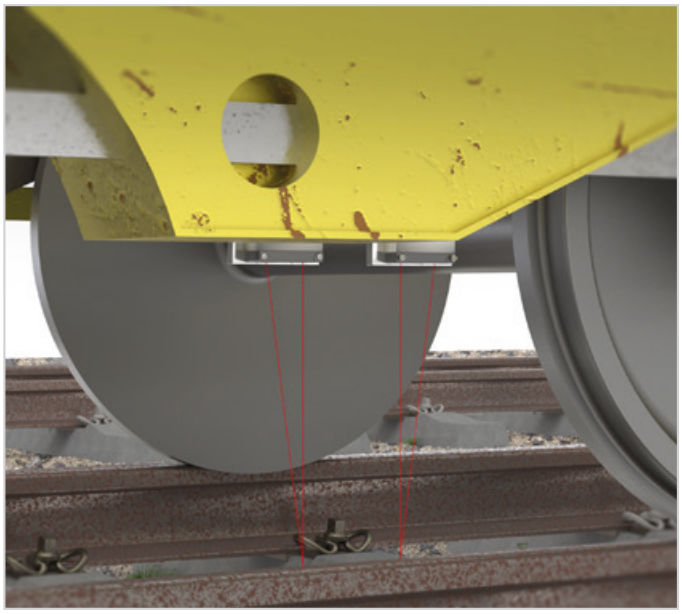
Tire inspection
optoNCDT 5500 sensors are used to detect the tire thickness. They measure fast and precisely on black surfaces.



Road surface testing
A total of up to 48 sensors (40 at the front, 8 at the sides) regularly check the road surface. The condition of various roads (e.g. highway, cycle paths, footpaths) can be measured.

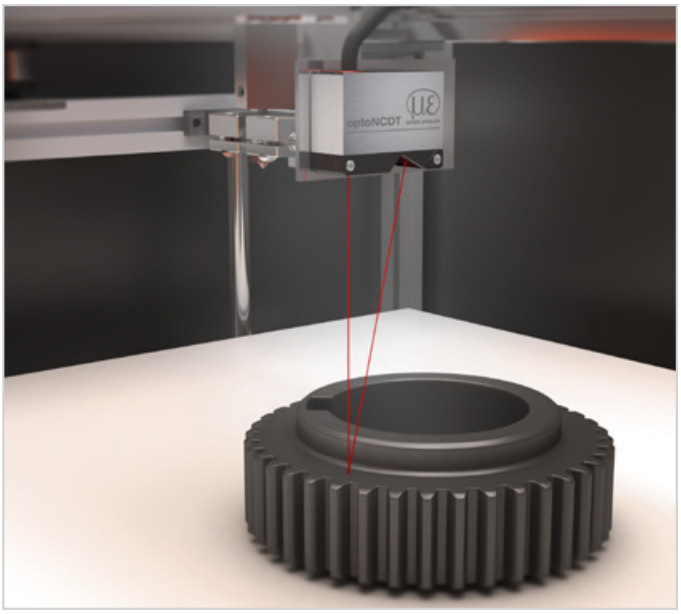


PCB assembly
When assembling printed circuit boards, the presence and position of the components is inspected using optoNCDT 5500 laser sensors. Regardless of the surface reflection and due to their small light spot, these sensors deliver precise measurement results and reliably detect even the smallest parts.



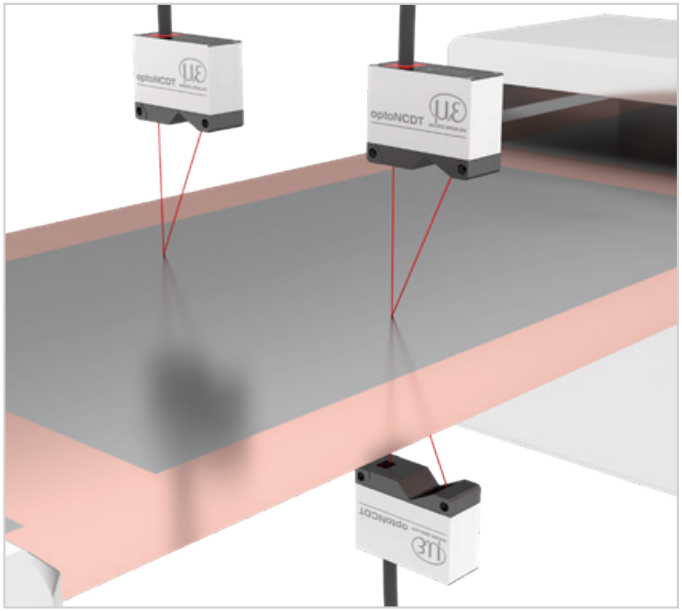
Wear test on rails

High-speed lines are maintained by special grinding trains. These are equipped with optoNCDT 5500 laser displacement sensors, which detect the distance from the track at a high measuring rate, and thus also the slippage. Changing reflections and ambient light hardly affect these robust sensors.



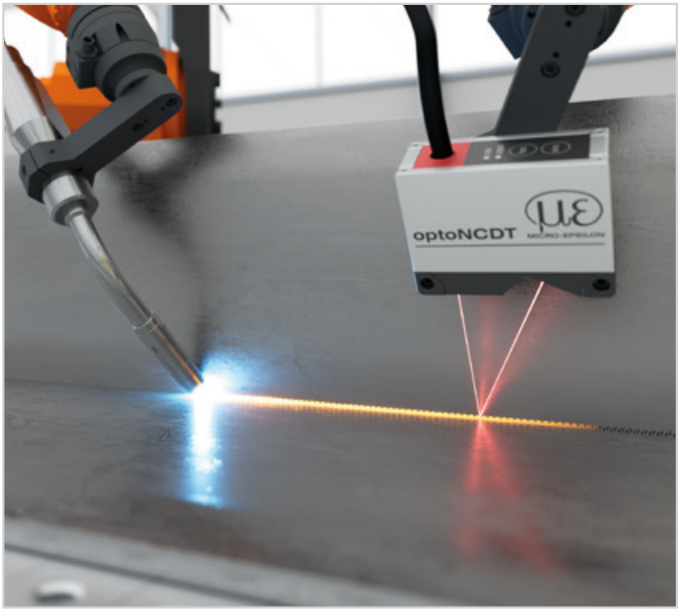
3D printing

The unique combination of high performance, compact size and ease of integration makes the optoNCDT 5500 sensors ideal for use in 3D printing. They reliably detect the positioning of the print head in a 3D printer and ensure precise production of the components.



Quality assurance in battery cell production

With a measuring rate of up to 150 kHz and excellent performance on metal and coatings, the sensor is ideal for inline thickness measurements in battery cell production. In this process, the electrode coating (known as slurry) is applied to both sides of an aluminum or copper film. The porous surface that forms during drying and calendering poses significant challenges for measurement technology. The measured thickness values of the coated film are used for quality assurance.



Precise and reliable weld seam inspection

The optoNCDT 5500 stands out for its high resistance to stray light, making it ideal for use in welding fixtures. Immediately after the welding process, the sensor is guided along the weld seam to measure it precisely, and reliably detect defects or deviations from standards. Additional filters are available upon request.

Technical data

General technical data		ILD5500
Measuring rate [1]		0,25 kHz ... 150 kHz
Light source		Laser 670 nm
Laser class		Class 2 in accordance with IEC 60825-1: 2022-07
Supply voltage		12 … 30 VDC
Power consumption		max. 5 W
Signal input		Laser on/off, sync in, trigger/MFI in, 1 encoder (A+, A-, B+, B-, Index) | 2 encoders (A+, A-, B+, B-)
Digital interface [2]		Ethernet (32 bit), RS422 (32 or 18)
Analog output		4 ... 20 mA / 0 ... 5 V / 0 ... 10 V
Switching output		1 or 2 switching outputs (error & limit value): npn, pnp, push pull
Connection		Sensor with 3 m integrated cable with open ends and RJ45 connector; or integrated pigtail 0.3 m with 24-pin M16 plug
Mounting		Support points with locating holes for centering sleeves for reproducible clamping of the sensor 2 x M4 direct or M3 bolt connection
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)		50 g / 20 … 500 Hz / max. displacement 3.6 mm
Protection class (DIN EN 60529)		IP67
Material		Aluminum housing
Weight		approx. 310 g (incl. pigtail); < 600 g (sensor with 3 m OE)
Control and indicator elements [3]		Select & Function buttons: interface selection, mastering (zero), teaching, presets, quality slider, frequency selection, factory setting; web interface for setup: application-specific presets, peak selection, video signal, freely selectable averaging, data reduction, setup management, expert mode; 2 x color LEDs for power / status
Permissible extraneous light [4]		≥ 200,000 lx

[1] Factory setting: 4 kHz
[2] EtherNet/IP require connection via interface module IF2035 (see accessories)
[3] Access to web interface requires connection to PC
[4] ≥ 200,000 lx with background suppression | Default settings with 20 kHz measurement frequency: 50,000 lx

Model		ILD5500-10	ILD5500-25	ILD5500-50	ILD5500-100	ILD5500-200
Measuring range		10 mm	25 mm	50 mm	100 mm	200 mm
Start of measuring range		30 mm	40 mm	45 mm	70 mm	100 mm
Mid of measuring range		35 mm	52.5 mm	70 mm	120 mm	200 mm
End of measuring range		40 mm	65 mm	95 mm	170 mm	300 mm
Linearity [1]		< ±1.5 µm	< ±5 µm	< ±7.5 µm	< ±30 µm	< ±80 µm
		< ±0.015% FSO	< ±0,015% FSO	< ±0.015 % FSO	< ±0.02% FSO	< ±0.03% FSO
Repeatability [2]		< 0.008 µm	< 0.013 µm	< 0.021 µm	< 0.042 µm	< 0.098 µm
Light spot diameter [3]	SMR	85 x 200 µm	140 x 310 µm	270 x 530 µm	200 x 500 µm	780 x 1800 µm
	MMR	60 x 75 µm	60 x 90 µm	130 x 150 µm	200 x 500 µm	780 x 1800 µm
	EMR	130 x 250 µm	230 x 380 µm	325 x 570 µm	640 x 1100 µm	780 x 1800 µm
	smallest Ø	30 x 47 µm with 34,5 mm	46 x 66 µm with 51,1 mm	58 x 82 µm with 68,1 mm	82 x 117 µm with 99 mm	-
Temperature stability [4]		± 0.008 % FSO / K			± 0.02 % FSO / K	

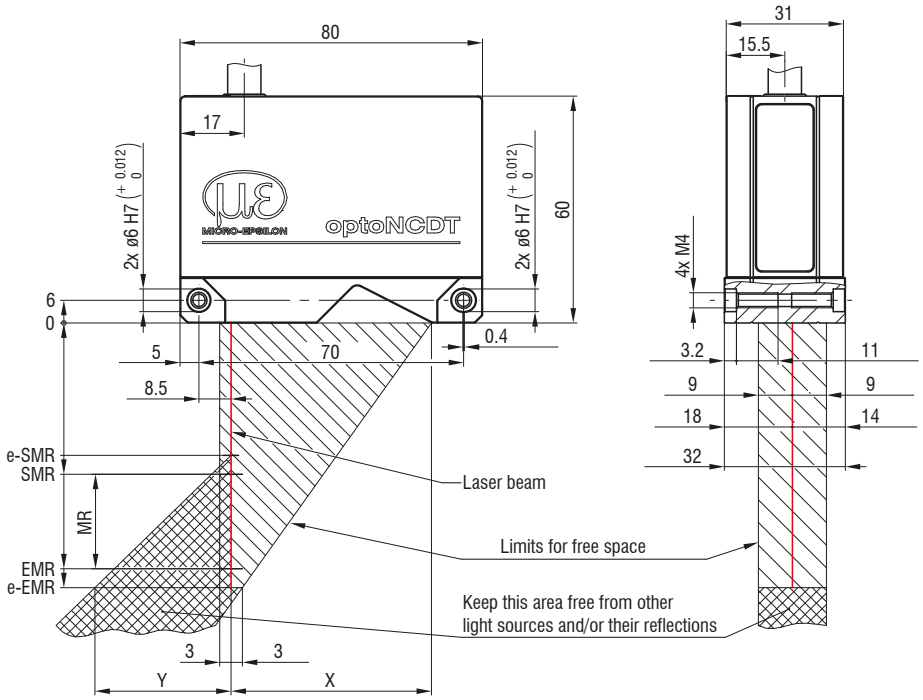
[1] Value applies only to the standard measuring range; value for median 9 + moving average 4096; Ethernet, 20 kHz, in the mid of the measuring range, on white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for optoNCDT sensors)
[2] Value valid only for the standard measurement range; value for median 9 + moving average 4096; Ethernet, 150 kHz, at the center of the measurement range, on a white, diffusely reflecting surface (Micro-Epsilon reference ceramic for optoNCDT sensors)
[3] ±20 %; 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 $1/e^2$ width)
[4] 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; this value is valid in the range from 20 to 50 °C

General technical data		ILD5500-x with integrated Industrial Ethernet interface
Measuring rate[1]		0,25 kHz ... 20 kHz
Light source		Laser 670 nm
Laser class		Class 2 in accordance with IEC 60825-1: 2022-07
Supply voltage		12 … 30 VDC
Power consumption		max. 5 W
Signal input		Laser on/off
Digital interface		EtherCAT / PROFINET
Switching output		1 or 2 switching outputs (error & limit value): npn, pnp, push pull
Connection		integrated pigtail 0.3 m with 12-pin M12 plug; optional extension to 3 m / 6 m / 9 m / 15 m (see accessories for suitable connection cables)
Mounting		Support points with locating holes for centering sleeves for reproducible clamping of the sensor 2 x M4 direct or M3 bolt connection
Temperature range	Storage	-20 ... 70 °C (non-condensing)
	Operation	0 ... 45 °C (non-condensing)
Shock (DIN EN 60068-2-27)		15 g / 6 ms in 3 axes
Vibration (DIN EN 60068-2-6)		50 g / 20 … 500 Hz / max. displacement 3.6 mm
Protection class (DIN EN 60529)		IP67
Material		Aluminum housing
Weight		approx. 310 g (incl. pigtail)
Control and indicator elements [2]		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; 3 x color LEDs for “STATE”, “RUN/SF”, “ERR/BF”
Permissible extraneous light [3]		≥ 200,000 lx

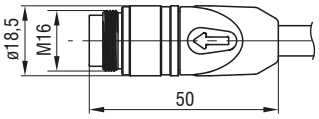
[1] Factory setting 4 kHz
[2] Access to web interface requires connection to PC
[3] ≥ 200,000 lx with background suppression | Default settings with 20 kHz measurement frequency: 50,000 lx

Dimensions

optoNCDT 5500 / Measuring ranges 10/25/50



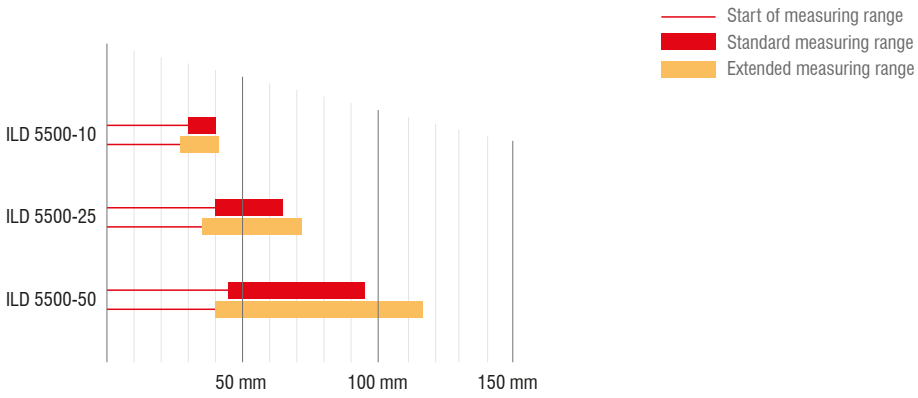
Connector (sensor side)



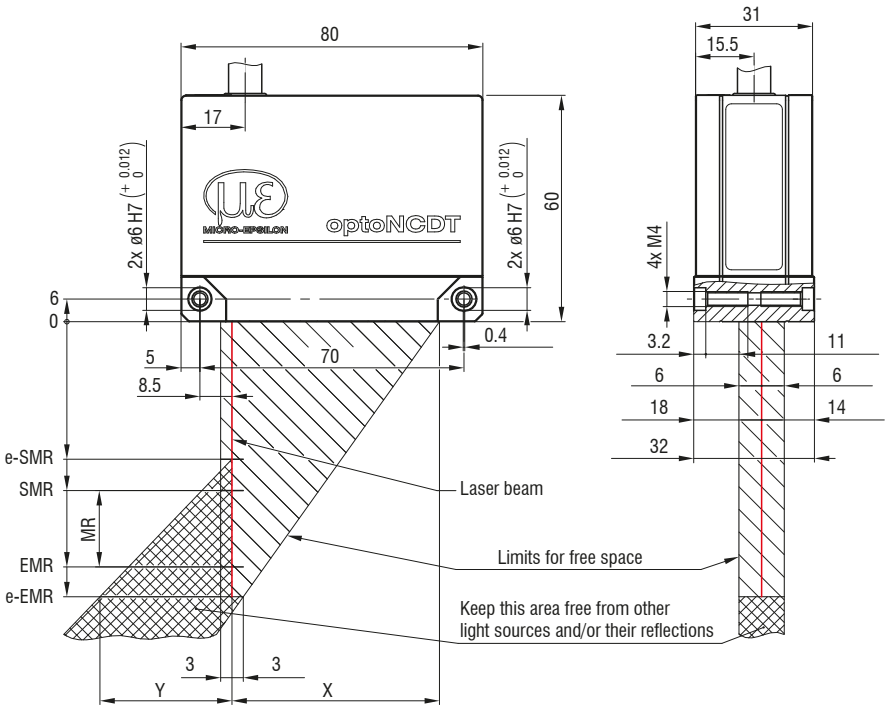
(Dimensions in mm, not to scale)

MR	e-SMR	SMR	MMR	EMR	e-EMR	X with Standard MR	X with e-MR	Y with Standard MR	Y with e-MR
10 mm	27.5 mm	30 mm	35 mm	40 mm	42.5 mm	49 mm	49 mm	17 mm	26 mm
25 mm	35 mm	40 mm	52.5 mm	65 mm	72.5 mm	52 mm	53 mm	32 mm	51 mm
50 mm	40 mm	45 mm	70 mm	95 mm	115 mm	51 mm	52 mm	51 mm	81 mm

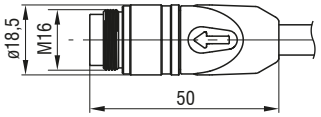
MR = measuring range
SMR = Start of measuring range
MMR = Mid of measuring range
EMR = End of measuring range
e-SMR = Start of extended measuring range
e-EMR = End of extended measuring range



optoNCDT 5500 / Measuring ranges 100/200



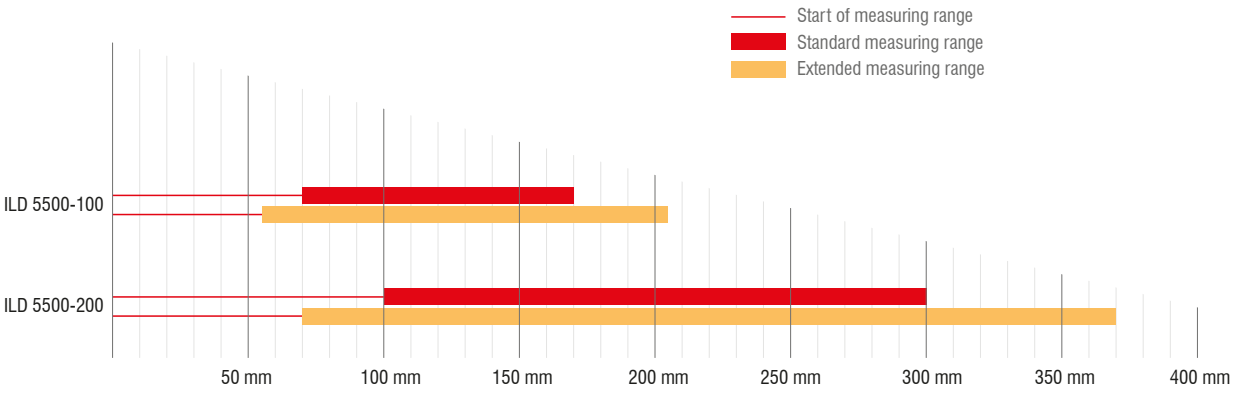
Connector (sensor side)



(Dimensions in mm, not to scale)

MR	e-SMR	SMR	MMR	EMR	e-EMR	X with Standard MR	X with e-MR	Y with Standard MR	Y with e-MR
100 mm	55 mm	70 mm	120 mm	170 mm	205 mm	58 mm	59 mm	64 mm	106 mm
200 mm	70 mm	100 mm	200 mm	300 mm	370 mm	59 mm	60 mm	92 mm	167 mm

MR = measuring range
SMR = Start of measuring range
MMR = Mid of measuring range
EMR = End of measuring range
e-SMR = Start of extended measuring range
e-EMR = End of extended measuring range



Connection possibilities

Connection possibilities for sensors with integrated cables

Cable diameter: 8.1 … 8.9 mm
Drag chain: yes
Robot: no
Temperature range: -40 ... 90 °C (movable)
-50 ... 90 °C (not movable)
Bending radius: > 45 mm (fixed installation)
> 108 mm (dynamic)

Sensor	Cables	Type	Connection possibilities and accessories	
ILD5500-xx	**Integrated cable** Length 3 m	Open ends	**Supply voltage connection** Power supply unit PS2020	
			Interface module of RS422 to USB IF2001/USB	
			Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT	

Drag-chain suitable extension and adapter cables for sensors with pigtail

Cable diameter: 8.1 … 8.9 mm
Drag chain: yes
Robot: no
Temperature range: -40 ... 90 °C (movable)
-50 ... 90 °C (not movable)
Bending radius: > 45 mm (fixed installation)
> 108 mm (dynamic)

Sensor	Cables	Type	Connection possibilities and accessories	
ILD5500-xx	**Supply/output cable with RJ45 and encoder cables** Length 3 m / 6 m / 9 m / 15 m *Art. no.* *Designation* 29011422 PC5500-3/OE-RJ45 29011423 PC5500-6/OE-RJ45 29011424 PC5500-9/OE-RJ45 29011425 PC5500-15/OE-RJ45 **Supply/output cable** Length 3 m / 6 m / 9 m / 15 m 29011638 PC5500-3/OE 29011639 PC5500-6/OE 29011640 PC5500-9/OE 29011641 PC5500-15/OE	Open ends	**Supply voltage connection** Power supply unit PS2020	
			Interface module of RS422 to USB IF2001/USB	
			Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT	
	Adapter cable for PC interface card Length 3 m / 6 m / 9 m / 15 m *Art. no.* *Designation* 29011654 PC5500-3/IF2008 29011655 PC5500-6/IF2008 29011656 PC5500-9/IF2008 29011657 PC5500-15/IF2008	Sub-D	**Interface card for synchronous data acquisition** IF2008PCIe / IF2008E	
			4-fold interface module from RS422 to USB IF2004/USB	
	Adapter cable for sensor calculation Length 3 m / 6 m / 9 m / 15 m *Art. no.* *Designation* 29011658 PC5500-3/DPU 29011659 PC5500-6/DPU 29011660 PC5500-9/DPU 29011661 PC5500-15/DPU	Sub-D	**Controller for D/A conversion and evaluation of up to 2 sensor signals** Dual Processing Unit	
	Adapter cable for IF2008/ETH Length 3 m / 6 m / 9 m / 15 m *Art. no.* *Designation* 29011662 PCE5500-3/M12 29011663 PCE5500-6/M12 29011664 PCE5500-9/M12 29011665 PCE5500-15/M12	M12	**Interface module for Ethernet connection of up to 8 sensors** IF2008/ETH	

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
ILD5500-xx-PROFINET* ILD5500-xx-EtherCAT	**Connection cables PoE, laser On/Off hardware** Length 3 m / 6 m / 9 m / 15 m *Art. no.* — *Designation* 29011332 — PC1900-IE-3/OE-RJ45 29011333 — PC1900-IE-6/OE-RJ45 29011334 — PC1900-IE-9/OE-RJ45 29011444 — PC1900-IE-15/OE-RJ45	Open ends & RJ45	**Signal / Supply PoE** optional: PoE Switch
ILD5500-xx-EtherCAT	**Connection cables PoE, laser On/Off Software** Length 3 m / 6 m / 9 m / 15 m *Art. no.* — *Designation* 29011338 — PC1900-IE-3/RJ45 29011355 — PC1900-IE-6/RJ45 29011356 — PC1900-IE-9/RJ45 29011445 — PC1900-IE-15/RJ45	RJ45	

*PoE is not supported with PROFINET

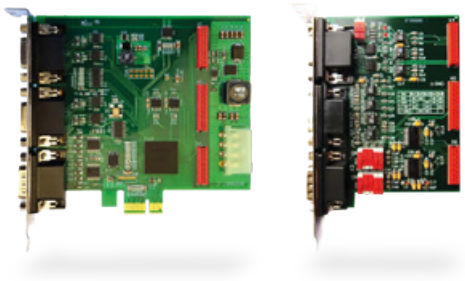
Accessories

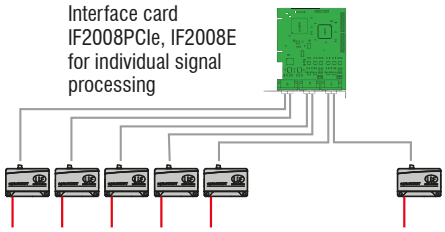
IF2035: Interface module for Industrial Ethernet connection

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

IF2008PCIe / IF2008E: Interface card for synchronous data acquisition

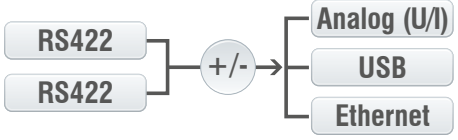
- IF2008PCIe - Basic PCB: 4 digital signals and 2 encoders
- IF2008E - Expansion board: 2x digital signals, 2x analog signals and 8x I/O signals
- Absolutely synchronous data acquisition for multi-channel applications (e.g. for planarity or thickness measurement)





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

- Fast D/A conversion (16 bit, with a maximum of 150 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
- Sensor connections 1 and 2 switchable to encoder
- 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

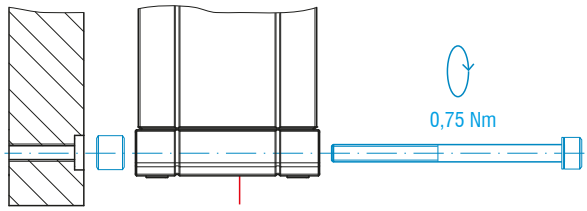
RS422
RS422
RS422
RS422 → USB

Connection of 4 sensors via IF2008-Y-adapter cable

Installation options and Accessories

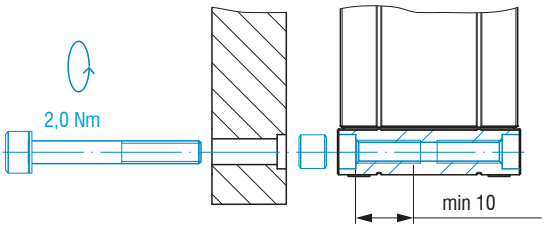
Installation options

Bolt connection



M3 x 40; ISO 4762, A2-70

Direct fastening



M4; ISO 4762, A2-70
Screwing depth at least 10 mm

Accessories for optoNCDT 5500

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 ILD5500 sensor
- 1 Assembly instructions
- 2 laser warning signs German, 2 laser warning signs English, 2 laser warning sign French
- Accessories (2 pc. centering sleeves, 2 pc. M3 x 40)

Software

sensorTOOL

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

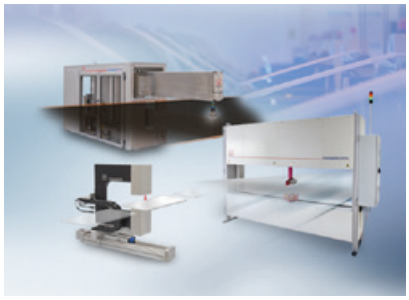
Free download

All software tools, drivers and documented driver DLL for easy integration of the sensors into existing or internally-generated software are available free of charge under www.micro-epsilon.com/download

Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for metal strips, plastics and rubber

Optical micrometers and fiber optics, measuring and test amplifiers

Color recognition sensors, LED analyzers and inline color spectrometers

3D measurement technology for dimensional testing and surface inspection

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