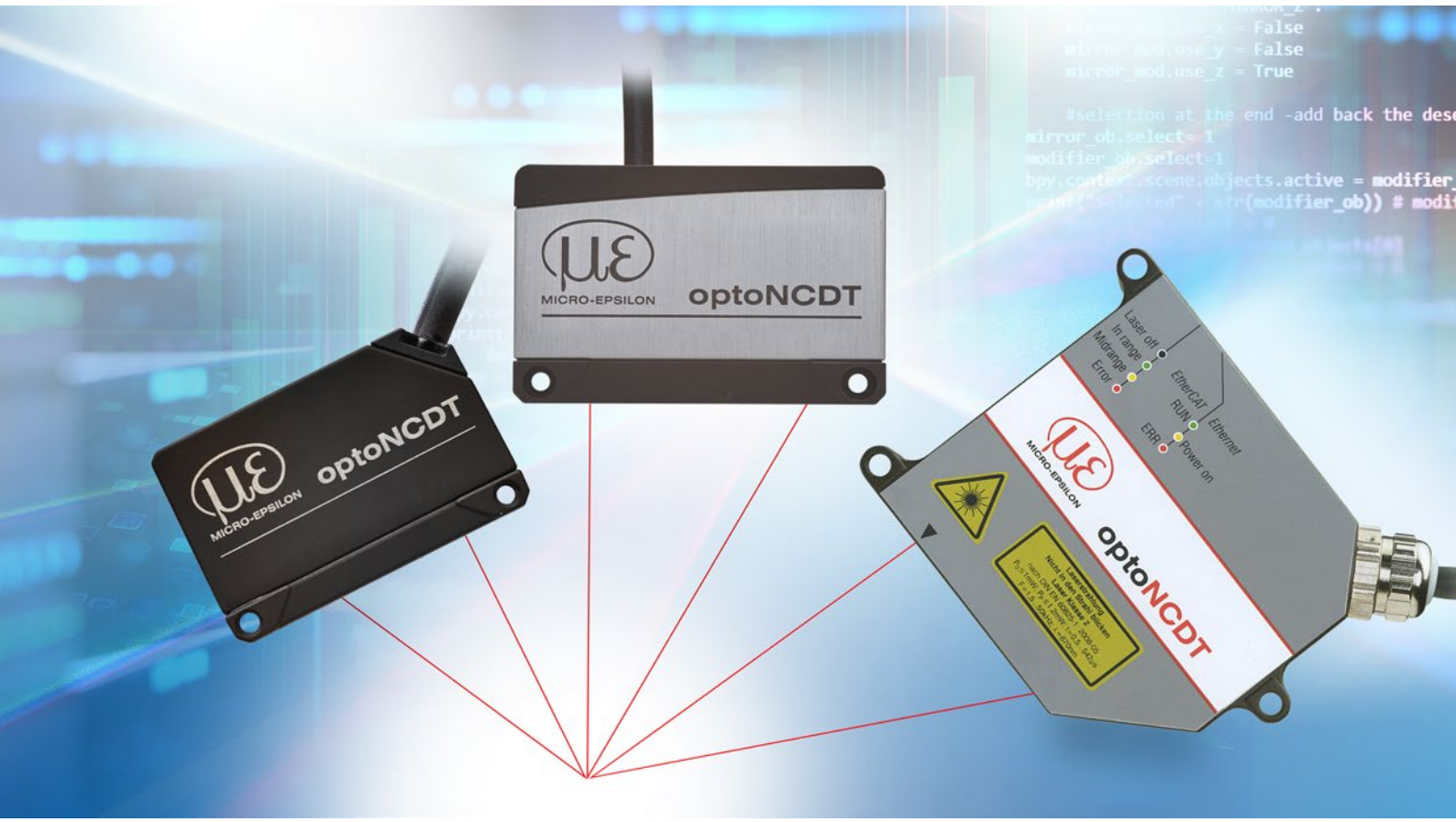
MICRO-EPSILON

More Precision

optoNCDT // Laser displacement sensors (triangulation)



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

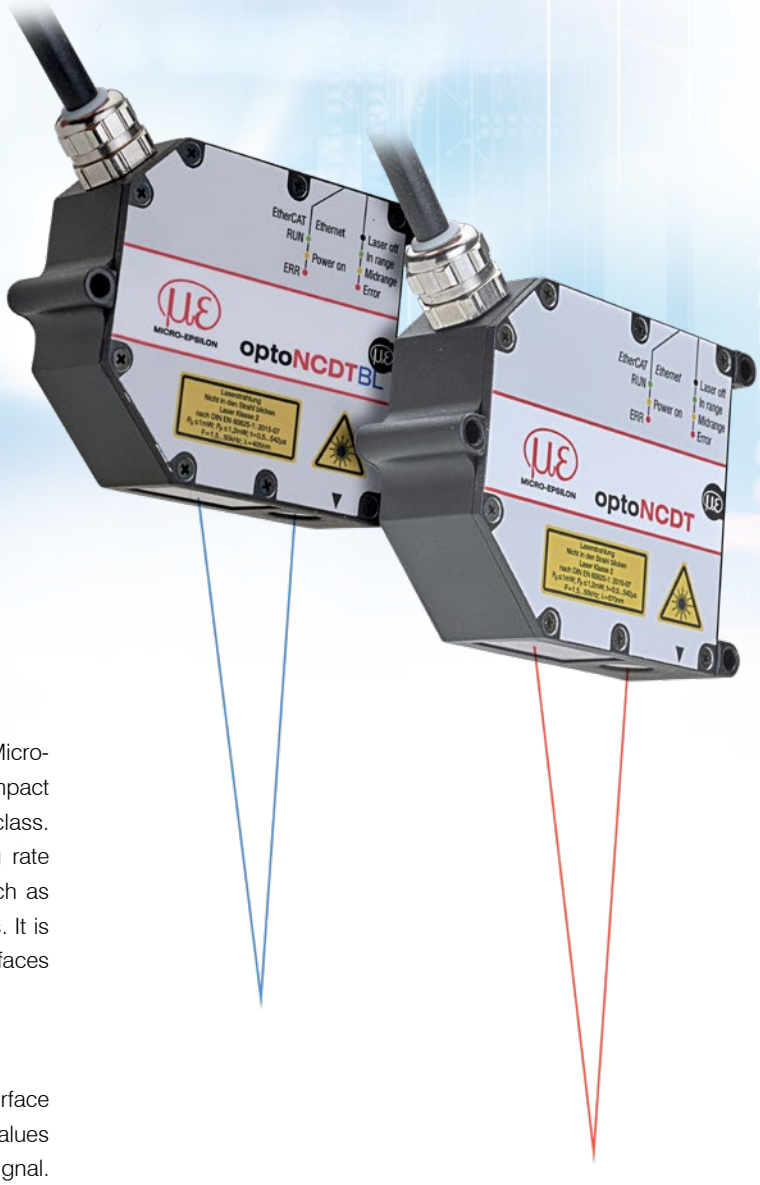
Laser sensors for special measurement tasks

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 1710		50 mm	from 7.5 µm	0.10 %
optoNCDT 1710BL		50 / 1000 mm	7.5 µm	from 0.10 %
optoNCDT 1760		1000 mm	from 7.5 µm	0.10 %
optoNCDT 1910		500 / 750 mm	from 20 µm	0.07 %

Highly dynamic laser sensors with high precision
optoNCDT 2300

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



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

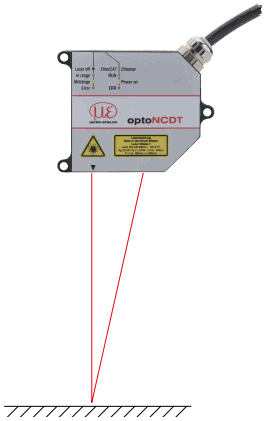
User-friendly web interface for easy operation

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

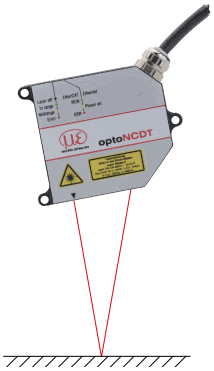
Fast exposure control for demanding surfaces

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

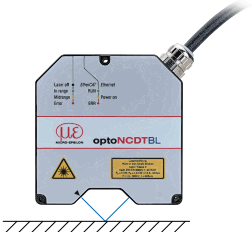
Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 2300		2 - 300 mm	0.03 µm	from 0.02 %
optoNCDT 2300BL		2 - 50 mm	0.03 µm	from 0.02 %
optoNCDT 2300LL		2 - 50 mm	0.1 µm	from 0.02 %
optoNCDT 2300-2DR		2 mm	0.03 µm	from 0.03 %
optoNCDT 2310		10 - 50 mm	0.5 µm	from 0.03 %



Distance measurement on diffuse reflecting surfaces



Distance measurement on directly reflecting surfaces

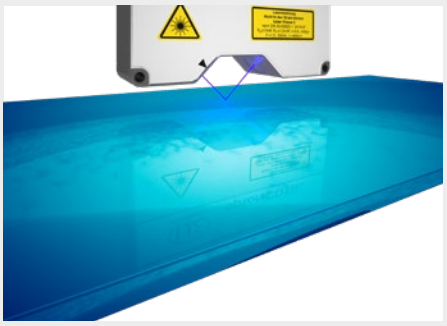


High precision distance measurement on directly reflecting surfaces

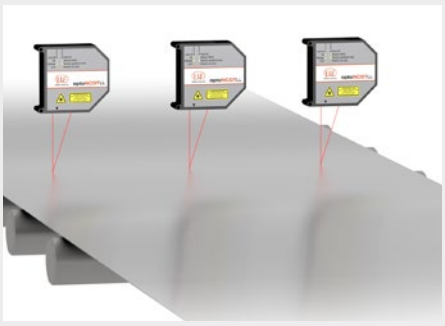
Versatile use

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

Application examples



Distance measurement of coated glass



Planarity testing of metal strips

Testing the radial run out of rollers

Laser point - optoNCDT 2300 / Measuring ranges 50 - 300

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

[1] Value in brackets applies for measuring rate 49.14 kHz
[2] FSO = Full Scale Output
The specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)
[3] Measuring rate 20 kHz
[4] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

Blue laser - optoNCDT 2300BL

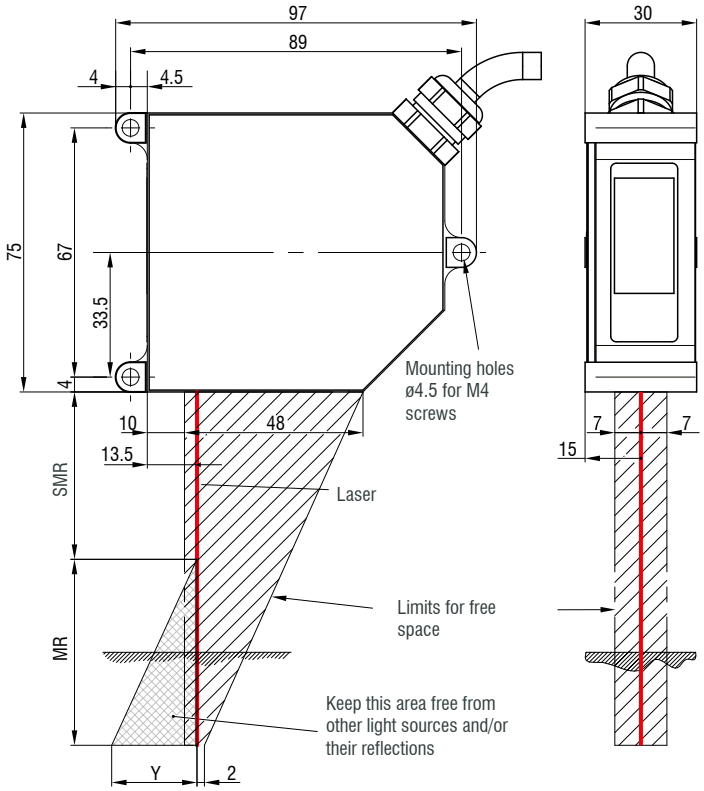
Model		ILD2300-2BL	ILD2300-5BL	ILD2300-10BL	ILD2310-50BL
Measuring range [1]		2 (2) mm	5 (2)	10 (5) mm	50 (25) mm
Start of measuring range [1]		24 (24) mm	24 (24) mm	30 (35) mm	550 (575) mm
Mid of measuring range [1]		25 (25) mm	26.5 (25) mm	35 (37.5) mm	575 (587.5) mm
End of measuring range [1]		26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

[1] Value in brackets applies for measuring rate 49.14 kHz
[2] Measuring rate 20 kHz
[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

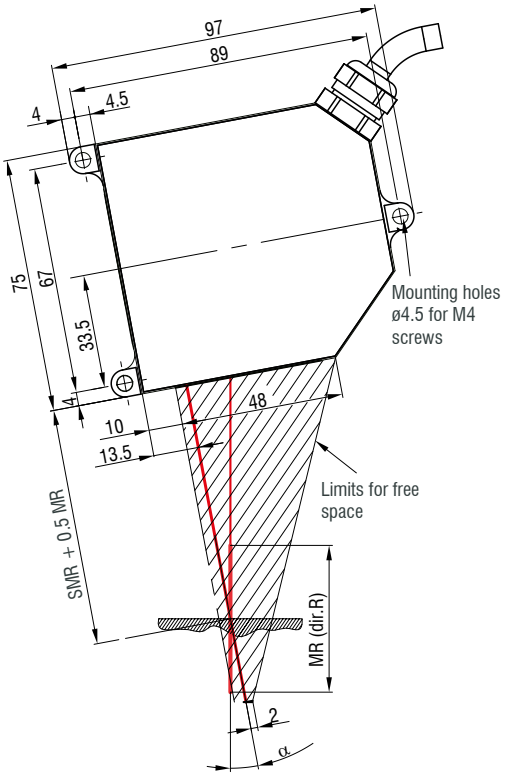
Dimensions
optoNCDT 2300

optoNCDT 2300 / Measuring range 2 - 100

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



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



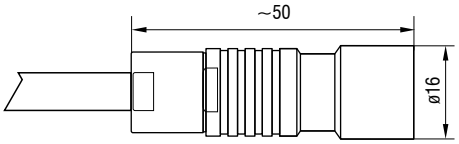
optoNCDT 2300 (Diffuse reflection)
optoNCDT 2300LL
optoNCDT 2300BL (Diffuse reflection)

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

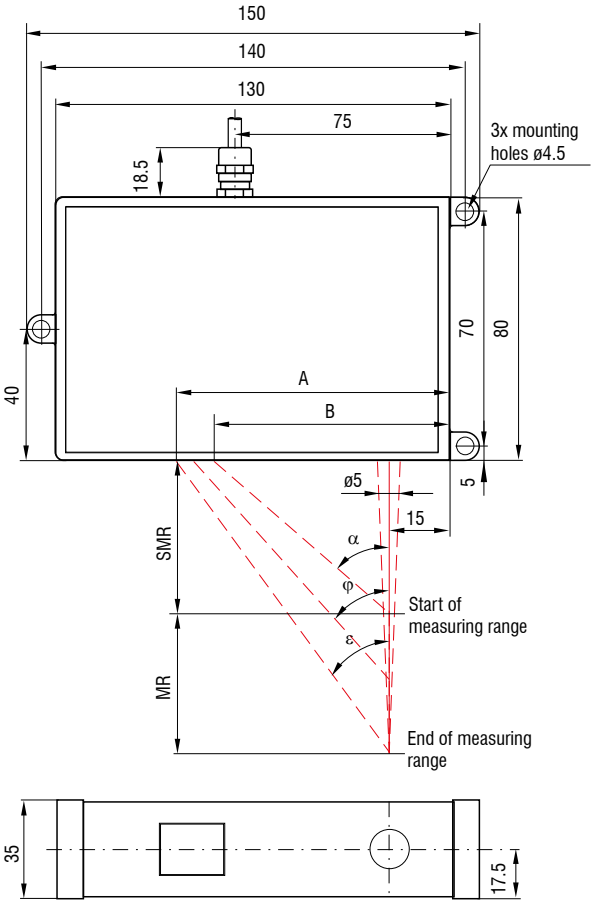
optoNCDT 2300 (Direct reflection)
optoNCDT 2300BL (Direct reflection)

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

Connector (sensor side)

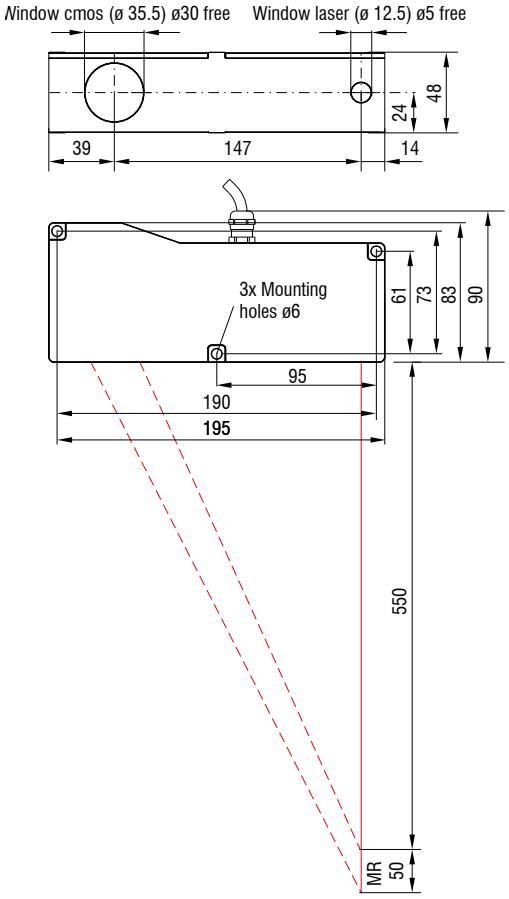


optoNCDT 2300 / Measuring ranges 200/300



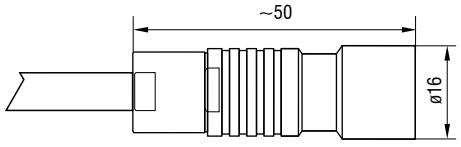
MR	α	φ	ε	A	B
200	25.1 °	16.7 °	13.1 °	91.6	76
300	18.3 °	12.2 °	9.6 °	99.4	81

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



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

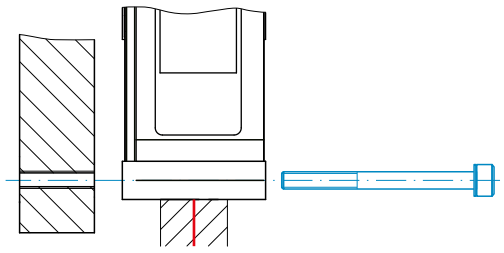
Connector (sensor side)



Installation options

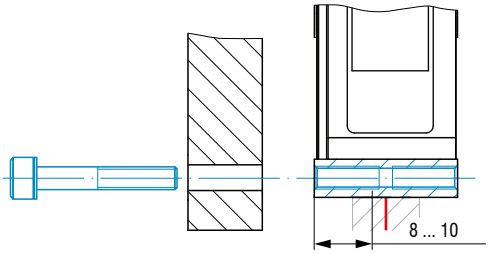
Housings M and L

Bolt connection



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

Direct fastening



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

Accessories for optoNCDT 2300/2310

Power supply unit
PS2020 (power supply 24 V / 2.5 A, input 100 - 240 VAC, output 24 VDC / 2.5 A, mounting onto symmetrical standard rail 35 mm x 7.5 mm, DIN 50022)

Mounting plate
for easy alignment of the DR models

Protective housings
see page 62

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

Article designation

ILD2300-	6	LL	3R

Laser class
No indication: class 2 (standard)
3R: class 3R (on request)

Laser type
No indication: Red laser point (standard)
LL: Laser Line
BL: Blue Laser
DR: Direct Reflection

Measuring range in mm

Series
ILD2300: Highly dynamic laser sensor in the 50 kHz class
ILD2310: Laser sensors with small measuring range and large offset distance

Connection possibilities
optoNCDT 2300

Drag-chain suitable extension and adapter cables

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

Sensor	Cables	Type	Connection possibilities and accessories	
ILD2300-xx ILD2300-xxLL ILD2300-xxBL ILD2300-2DR ILD2310-xx	**Extension cable pigtail** Length 3 m / 6 m / 9 m / 15 m *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	
			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 *Art. no.* *Designation* 2901728 PC2300-3/IF2008 2901729 PC2300-6/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 *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	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
ILD2300-xx ILD2300-xxLL ILD2300-xxBL ILD2300-2DR ILD2310-xx	**Connection cable high temperatures** Length 3 m / 6 m / 9 m / 15 m *Art. no.* — *Designation* 29011118 — PC2300-3/OE/HT 29011119 — PC2300-6/OE/HT 29011095 — PC2300-9/OE/HT 29011120 — PC2300-15/OE/HT	Open ends

Connection possibilities and accessories	
Connection supply voltage PS2020	
Interface module of RS422 to USB IF2001/USB	
Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT	

Connection cable for EtherCAT operation

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

Input	Cables	Type
Sub-D (PC2300-x/ Sub-D)	**Adapter cable for EtherCAT** Length 0.5 m *Art. no.* — *Designation* 2901693 — PC2300-0,5Y Connection cable ILD2300 	Open ends & RJ45

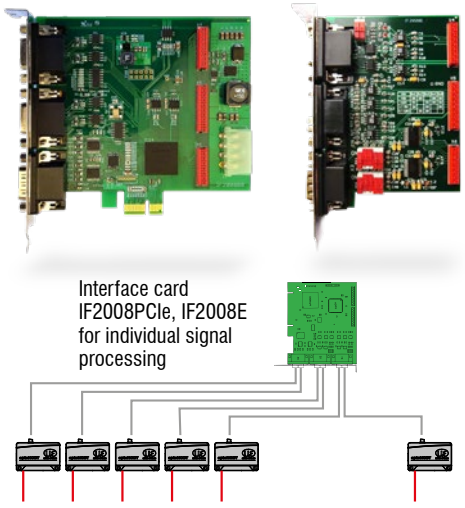
Connection possibilities and accessories	
Signal output EtherCAT & Ethernet	
Supply voltage connection Power supply unit PS2020	
Interface module of RS422 to USB IF2001/USB	

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

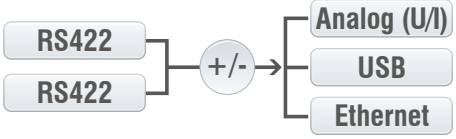
IF2008PCIe / IF2008E: Interface card for synchronous data acquisition

- 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 100 kHz) of 2 digital input signals or calculation of 2 digital sensor signals
- Averaging functions and calculation of thickness, step, diameter, ovality and radial run out
- Trigger input
- Multi-function output
- Measurement value output via Ethernet, USB, analog output 4 ... 20 mA/0 ... 5 V / 0 ... 10 V / ±5 V / ±10 V (scalable via web interface)
- 2x switching outputs for sensor or Dual Processing Unit status
- Parallel data output via three output interfaces
- Two filter possibilities
- Post-linearization of measured values or calculated values
- Easy parameter setting via web interface (controller and sensors)



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

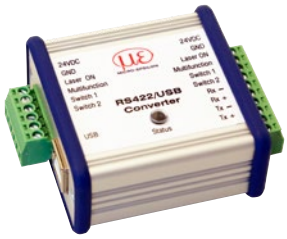
- Integration of eight sensors or encoders with RS422 interface in Ethernet network
- Four programmable switching in-/outputs (TTL and HTL logic)
- Fast data acquisition and output up to 200 kHz
- Simple parameter set up via web interface

IC2001/USB Single-channel converter cable RS422/USB

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

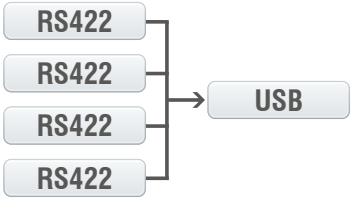
IF2001/USB: Interface module from RS422 to USB

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



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

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



Connection of 4 sensors via IF2008-Y-adapter cable

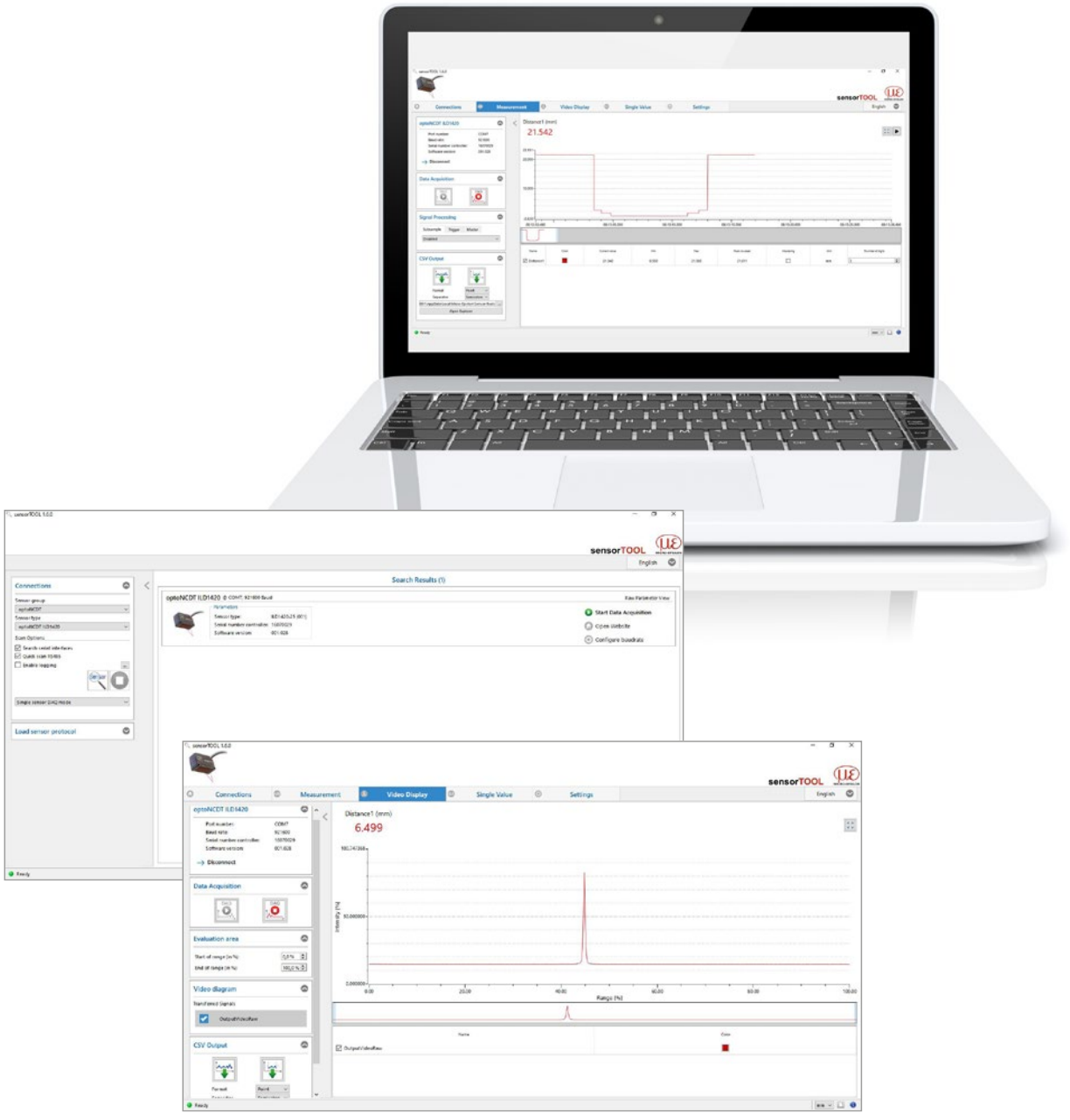
Protective housings for demanding environments
optoNCDT

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

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

sensorTOOL

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



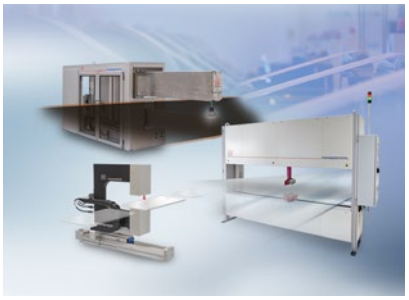
Free download

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

Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

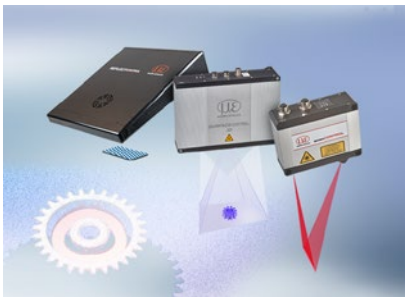
Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for metal strips, plastics and rubber

Optical micrometers and fiber optics, measuring and test amplifiers

Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection

Modifications reserved / Y9761188-N052055GKE

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