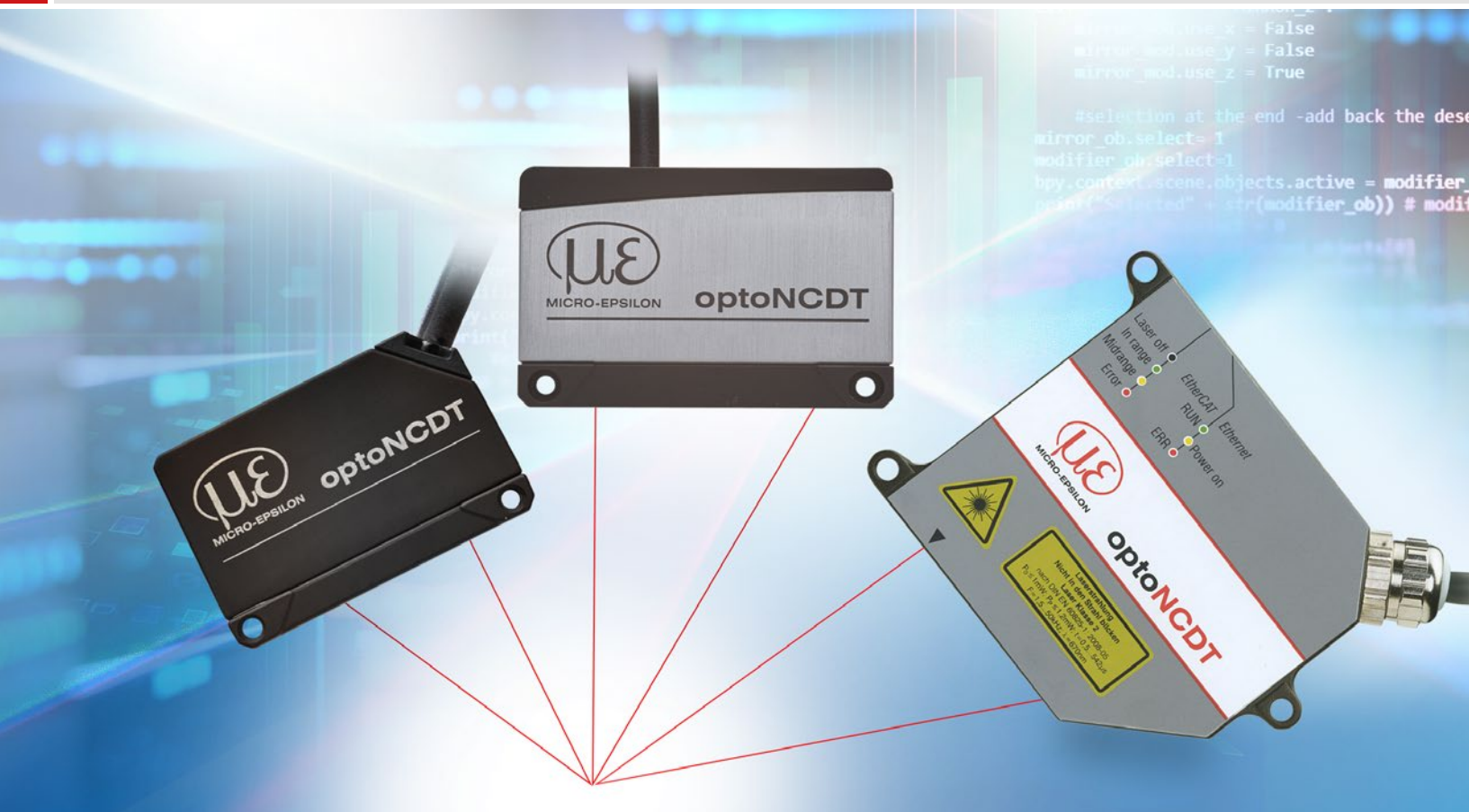




# More Precision

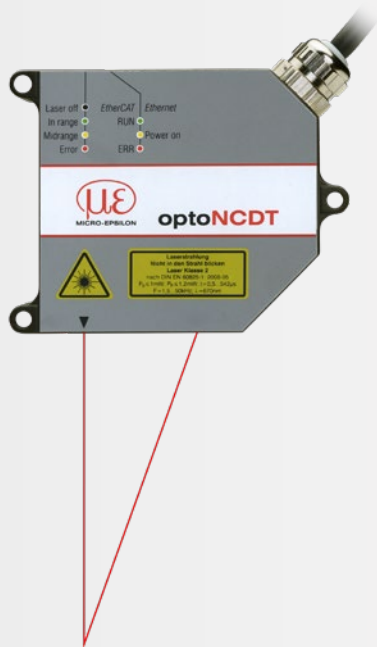
**optoNCDT** // Laser displacement sensors (triangulation)



## optoNCDT 23x0

## High precision laser sensors

from page 34



Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 2300		2 - 300 mm	0.03 $\mu\text{m}$	from 0.02 %
optoNCDT 2300BL		2 - 50 mm	0.03 $\mu\text{m}$	from 0.02 %
optoNCDT 2300LL		2 - 50 mm	0.1 $\mu\text{m}$	from 0.02 %
optoNCDT 2300-2DR		2 mm	0.03 $\mu\text{m}$	from 0.03 %
optoNCDT 2310		10 - 50 mm	0.5 $\mu\text{m}$	from 0.03 %

## optoNCDT 17x0

## Laser sensors for special measurement tasks

## optoNCDT 1910







from page 46

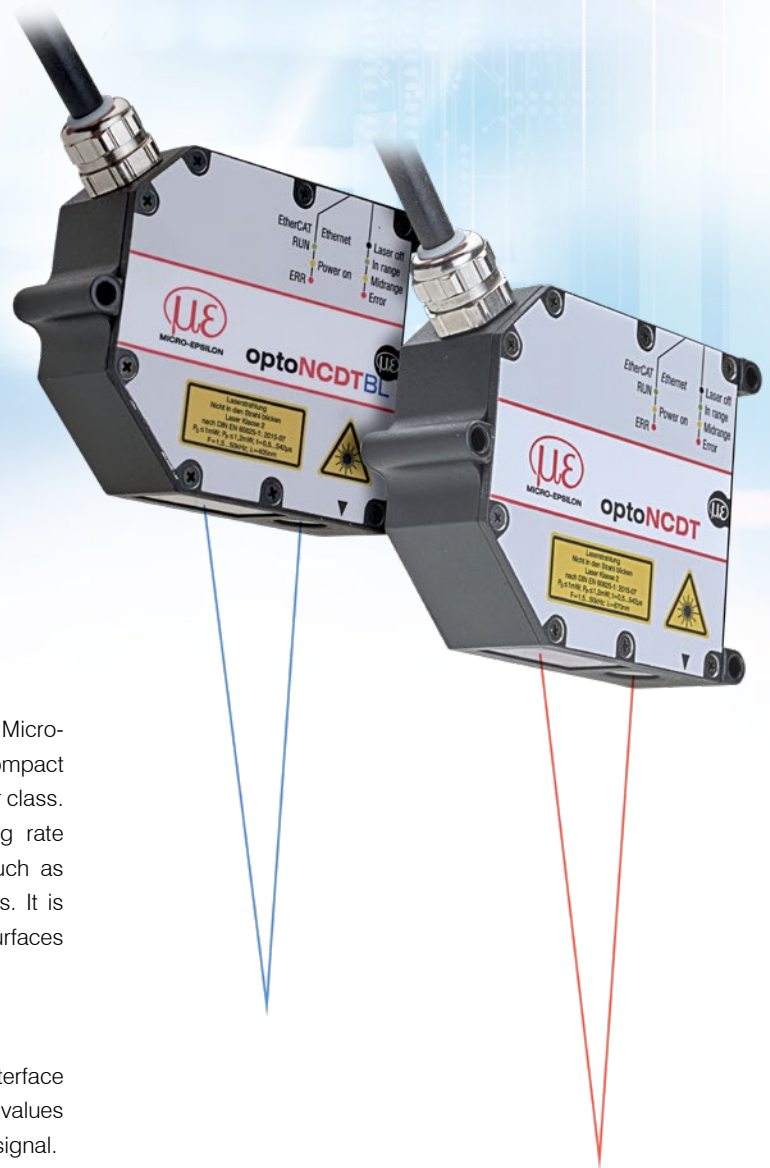


Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 1750BL		2 - 750 mm	0.8 $\mu\text{m}$	from 0.06 %
optoNCDT 1750-DR		2 - 20 mm	0.1 $\mu\text{m}$	0.08 %
optoNCDT 1710		50 mm	from 7.5 $\mu\text{m}$	0.10 %
optoNCDT 1710BL		50 / 1000 mm	7.5 $\mu\text{m}$	from 0.10 %
optoNCDT 1760		1000 mm	from 7.5 $\mu\text{m}$	0.10 %
optoNCDT 1910		500 / 750 mm	from 20 $\mu\text{m}$	0.07 %

# Highly dynamic laser sensors with high precision

## optoNCDT 2300

-  For common surfaces
-  Adjustable measuring rate up to 49.14 kHz
-  **INTERFACE** Analog (U/I) / RS422 / Ethernet / EtherCAT / PROFINET / EtherNet/IP
-  **A-RTSC** Advanced Real Time Surface Compensation
-  Resolution 0.03  $\mu\text{m}$
-  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.

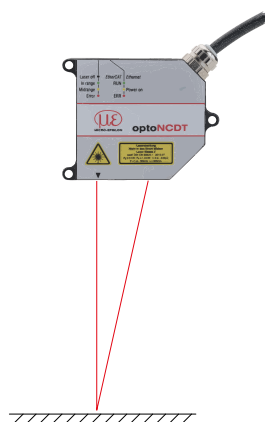
### User-friendly web interface for easy operation

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.

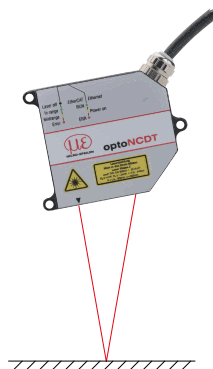
### Fast exposure control for demanding surfaces

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.

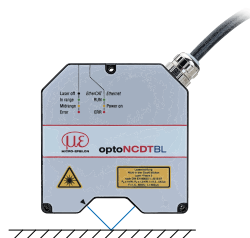
Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 2300		2 - 300 mm	0.03 $\mu\text{m}$	from 0.02 %
optoNCDT 2300BL		2 - 50 mm	0.03 $\mu\text{m}$	from 0.02 %
optoNCDT 2300LL		2 - 50 mm	0.1 $\mu\text{m}$	from 0.02 %
optoNCDT 2300-2DR		2 mm	0.03 $\mu\text{m}$	from 0.03 %
optoNCDT 2310		10 - 50 mm	0.5 $\mu\text{m}$	from 0.03 %



Distance measurement on  
diffuse reflecting surfaces



Distance measurement on  
directly reflecting surfaces

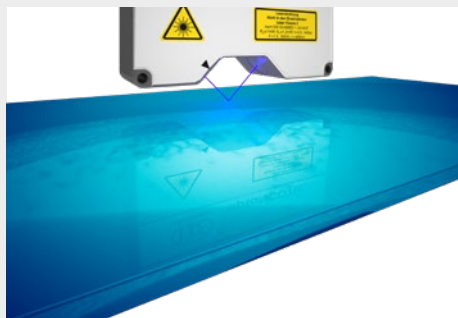


High precision distance measurement on  
directly reflecting surfaces

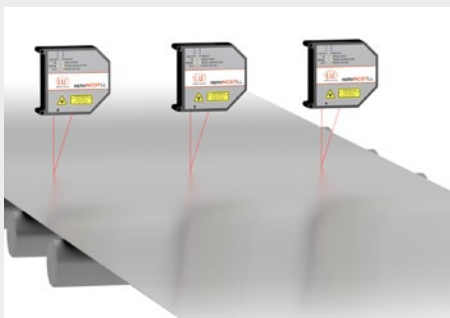
### Versatile use

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 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
Light spot diameter <sup>[4]</sup>	SMR	400 x 500 µm	200 µm	230 µm	400 ... 500 µm
	MMR		60 µm	210 µm	
	EMR		200 µm	230 µm	
Connection		integrated pigtail 0.25 m with 14-pin ODU plug, min. bending radius 30 mm when firmly installed (see accessories for suitable connection cable)			
Material		Aluminum housing			

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

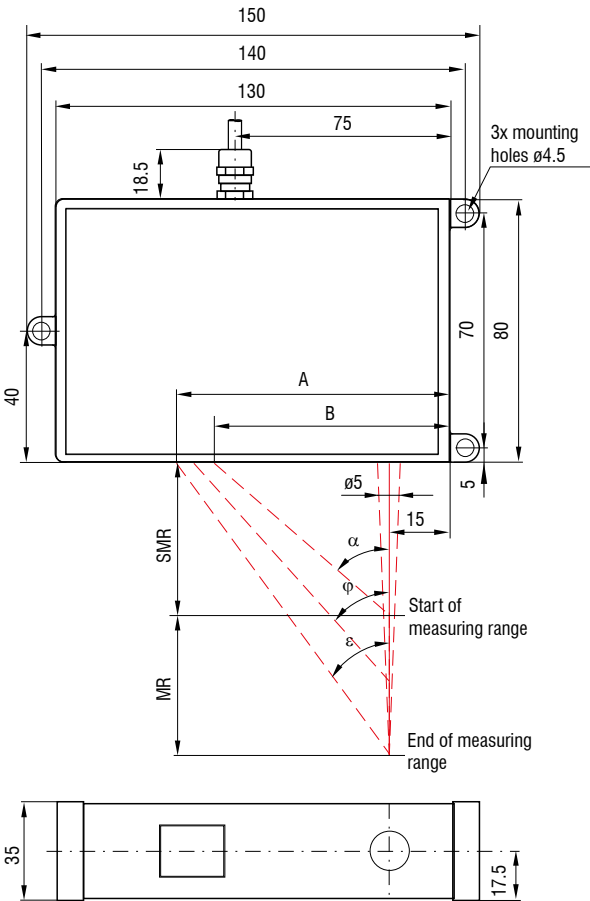
<sup>[2]</sup> FSO = Full Scale Output

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

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

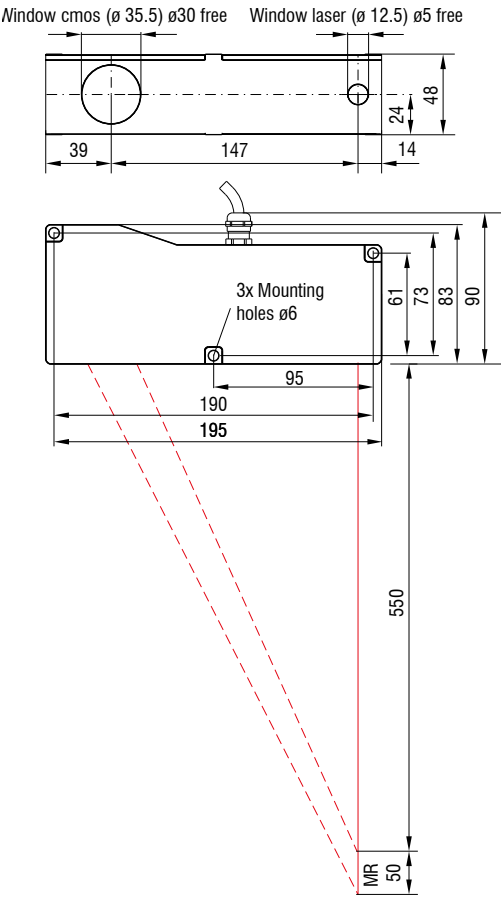
<sup>[4]</sup> ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

optoNCDT 2300 / Measuring ranges 200/300



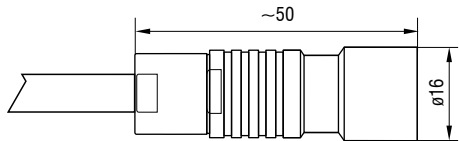
MR	$\alpha$	$\phi$	$\varepsilon$	A	B
200	25.1 °	16.7 °	13.1 °	91.6	76
300	18.3 °	12.2 °	9.6 °	99.4	81

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

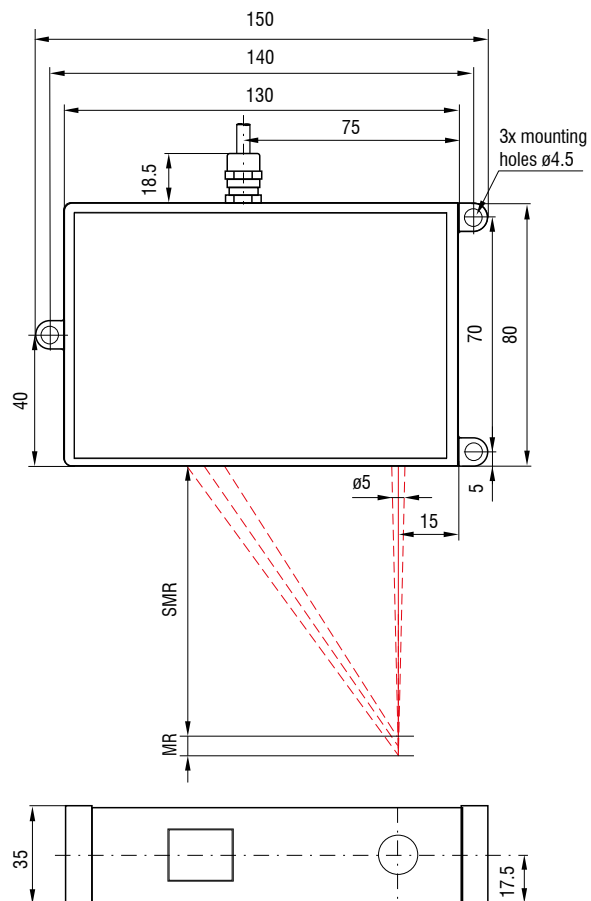
Connector (sensor side)



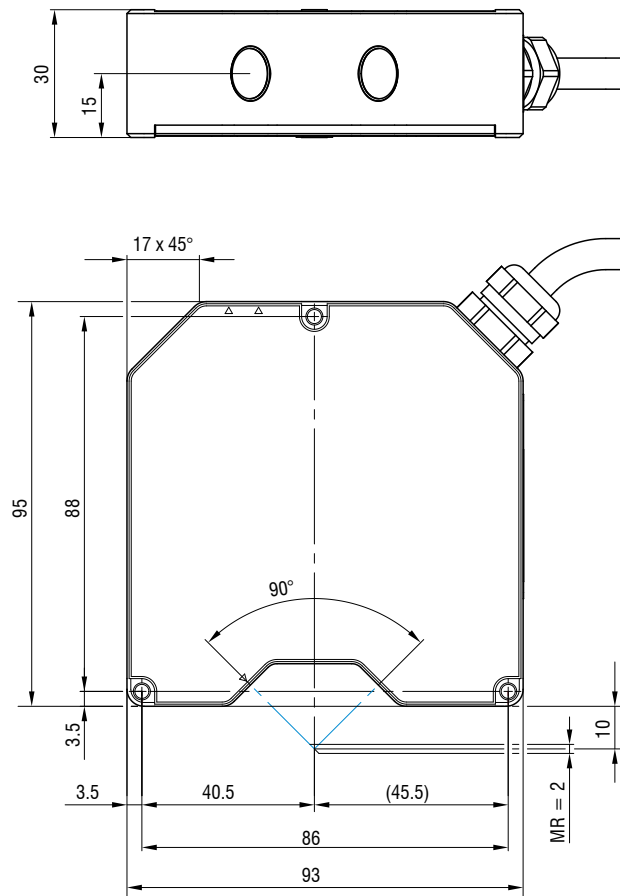
# Dimensions

## optoNCDT 2300

optoNCDT 2310 / Measuring ranges 10/20/40



optoNCDT 2300-2DR



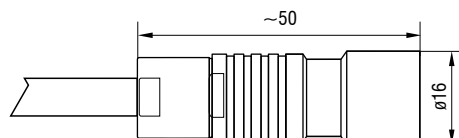
MR	SMR	MMR	EMR
10	95	100	105
20	90	100	110
40	175	195	215

(Dimensions in mm, not to scale)

MR = measuring range; SMR = start of measuring range

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

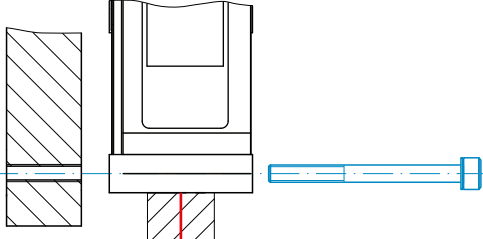
### Connector (sensor side)



Installation options

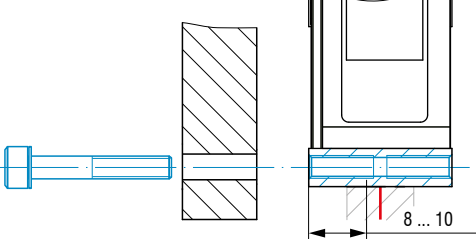
Housings M and L

**Bolt connection**



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

**Direct fastening**



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

Accessories for optoNCDT 2300/2310

Power supply unit

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

Mounting plate

for easy alignment of the DR models

Protective housings

see page 62

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
<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			











# 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	<b>Extension cable pigtail</b> 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	<b>Supply voltage connection</b> Power supply unit 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	
	<b>Adapter cable for PC interface card</b> Length 3 m / 6 m Art. no.      Designation 2901728      PC2300-3/IF2008 2901729      PC2300-6/IF2008	Sub-D	<b>Interface card for synchronous data acquisition</b> IF2008PCle / IF2008E	
			<b>4-fold interface module from RS422 to USB</b> IF2004/USB	
ILD2310-xx	<b>Adapter cable for sensor calculation</b> 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	<b>Controller for D/A conversion and evaluation of up to 2 sensor signals</b> Dual Processing Unit	
	<b>Adapter cable for sensor calculation</b> Length 2 m Art. no.      Designation 29011279      PCE2300-3/M12	M12	<b>Interface module for Ethernet connection of up to 8 sensors</b> IF2008/ETH	
	<b>Adapter cable Sub-D for EtherCAT</b> Length 3 m / 6 m Art. no.      Designation 2901661      PC2300-3/SUB-D 2901976      PC2300-6/SUB-D	Sub-D	<b>Signal output Ethernet, EtherCAT, RS422 to PC or PLC</b> 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	Open ends	<b>Connection supply voltage</b> PS2020	
	<i>Art. no.</i> <i>Designation</i> 29011118      PC2300-3/OE/HT		<b>Interface module of RS422 to USB</b> IF2001/USB	
	29011119      PC2300-6/OE/HT		<b>Interface module for Industrial Ethernet connection</b> IF2035-PROFINET IF2035-EIP IF2035-EtherCAT	
	29011095      PC2300-9/OE/HT			
	29011120      PC2300-15/OE/HT			

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	Open ends & RJ45	<b>Signal output EtherCAT &amp; Ethernet</b>	
	<i>Art. no.</i> <i>Designation</i> 2901693      PC2300-0,5Y Connection cable ILD2300		<b>Supply voltage connection</b> Power supply unit PS2020	
			<b>Interface module of RS422 to USB</b> IF2001/USB	

### IF2035: Interface module for Industrial Ethernet connection

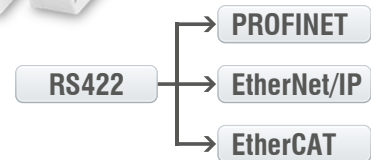
- Connection of RS422 or RS485 interfaces to PROFINET / Ethernet/IP / EtherCAT
- Synchronization output for RS422 sensors
- 2 network connections for different network topologies
- Data rate up to 4 MBaud
- 4-fold oversampling (with EtherCAT)
- Ideal for confined spaces due to a compact housing and DIN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



EtherCAT®

EtherNet/IP®

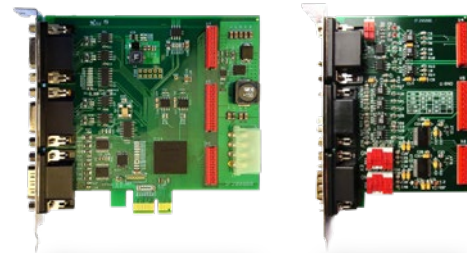
PROFINET®



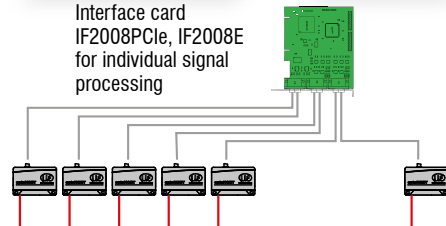
### IF2008PCle/IF2008E:

#### Interface card for synchronous data acquisition

- IF2008PCle - 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)

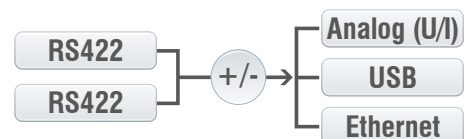


Interface card  
IF2008PCle, IF2008E  
for individual signal  
processing



### 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 /  $\pm 5$  V /  $\pm 10$  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



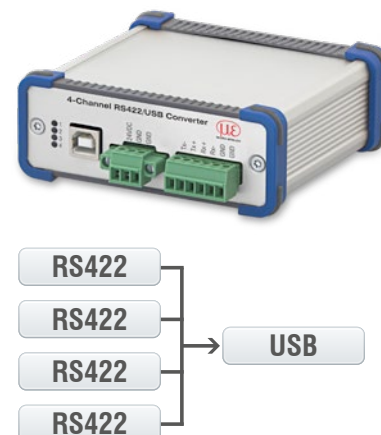
### IF2001/USB: Interface module from RS422 to USB

- 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

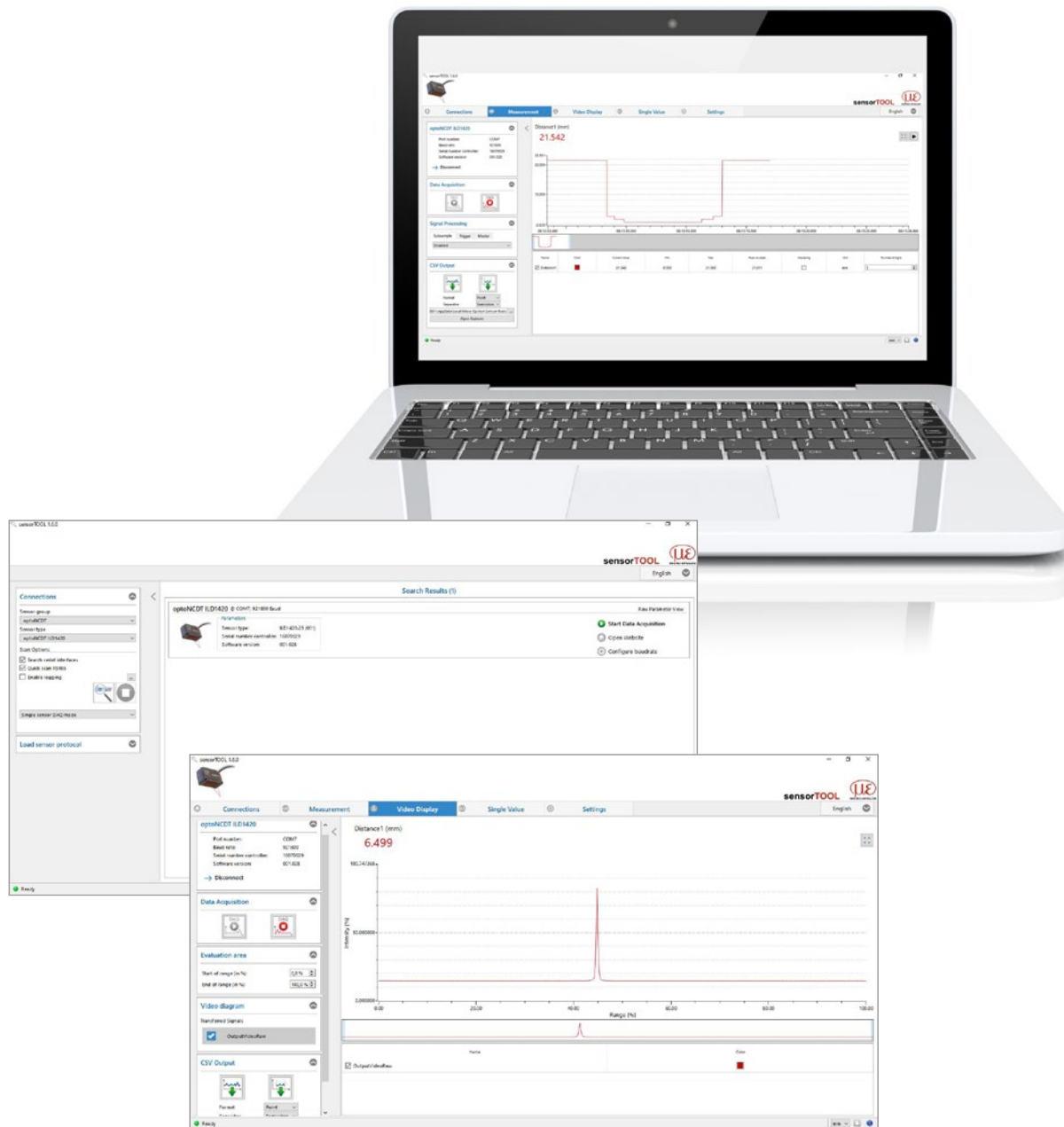
**opto**NCDT

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
 <p>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.</p>
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)

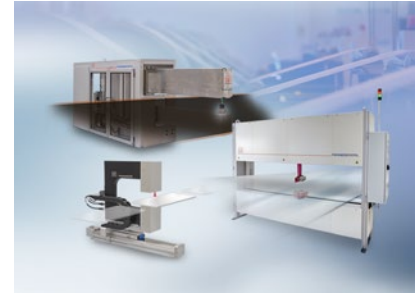
## Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



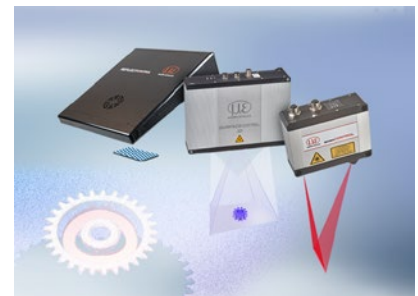
Measuring and inspection systems for metal strips, plastics and rubber



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