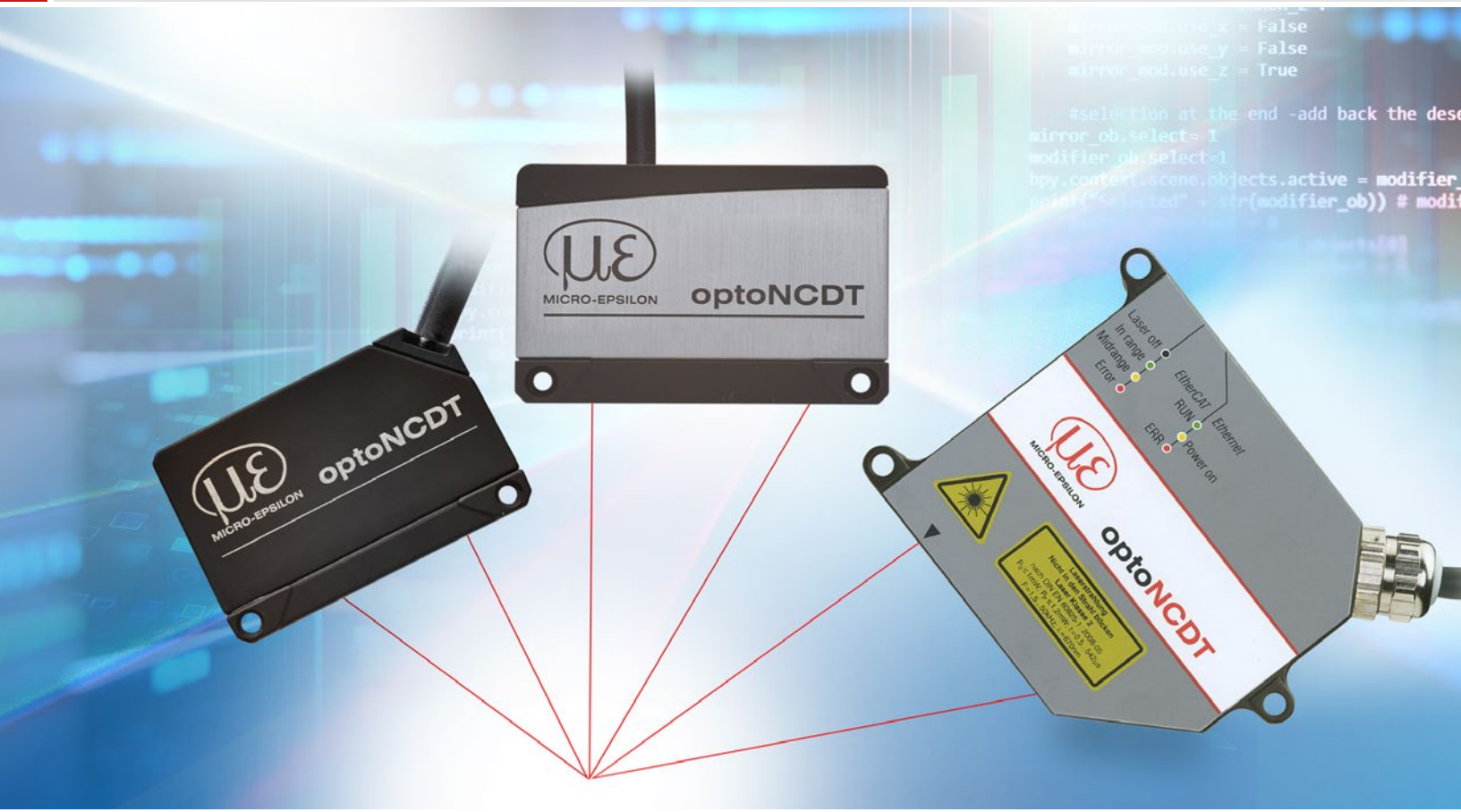




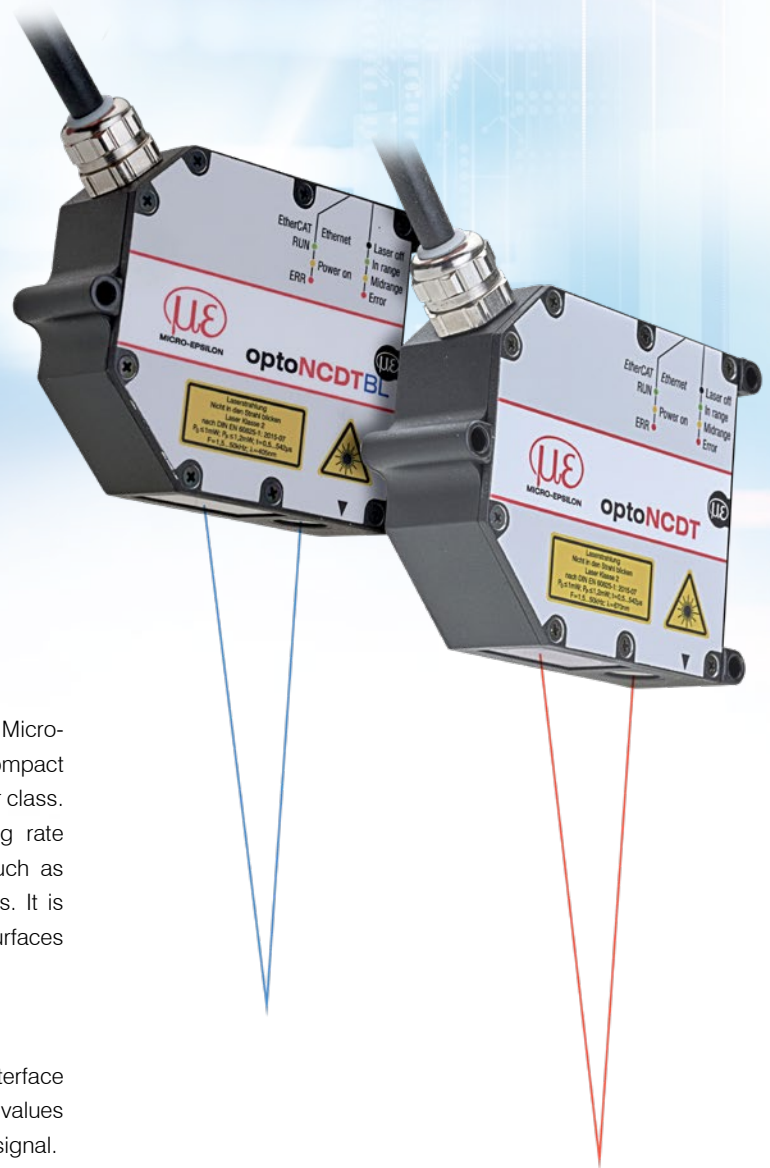
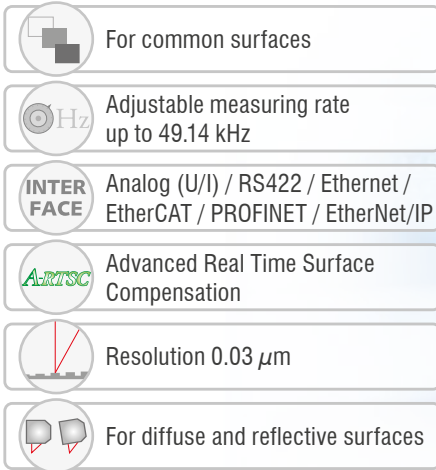
# More Precision

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



# Highly dynamic laser sensors with high precision

## optoNCDT 2300








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.

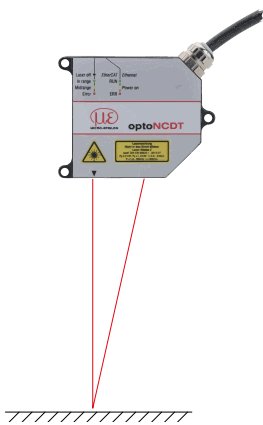
### User-friendly web interface for easy operation

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.

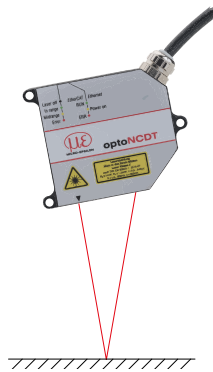
### Fast exposure control for demanding surfaces

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.

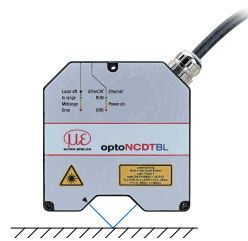
Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 2300		2 - 300 mm	0.03 $\mu\text{m}$	from 0.02 %
optoNCDT 2300BL		2 - 50 mm	0.03 $\mu\text{m}$	from 0.02 %
optoNCDT 2300LL		2 - 50 mm	0.1 $\mu\text{m}$	from 0.02 %
optoNCDT 2300-2DR		2 mm	0.03 $\mu\text{m}$	from 0.03 %
optoNCDT 2310		10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



Distance measurement on diffuse reflecting surfaces



Distance measurement on directly reflecting surfaces

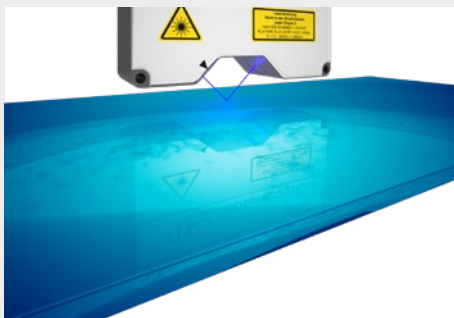


High precision distance measurement on directly reflecting surfaces

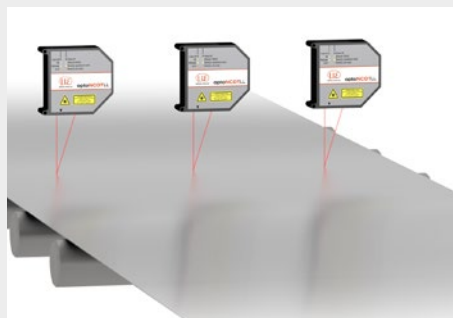
### Versatile use

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

# Technical data

## optoNCDT 2300

### optoNCDT 2300 (General technical data)

<b>Model</b>	<b>ILD23x0-xx</b>	
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>		< $\pm 0.6 \mu\text{m}$	< $\pm 1.5 \mu\text{m}$	< $\pm 2 \mu\text{m}$	< $\pm 4 \mu\text{m}$
		< $\pm 0.03$ % FSO	< $\pm 0.03$ % FSO	< $\pm 0.02$ % FSO	< $\pm 0.02$ % FSO
Resolution <sup>[3]</sup>		0.03 $\mu\text{m}$	0.08 $\mu\text{m}$	0.15 $\mu\text{m}$	0.3 $\mu\text{m}$
Light spot diameter <sup>[4]</sup>	SMR	55 x 85 $\mu\text{m}$	70 x 80 $\mu\text{m}$	75 x 85 $\mu\text{m}$	140 x 200 $\mu\text{m}$
	MMR	23 x 23 $\mu\text{m}$	30 x 30 $\mu\text{m}$	32 x 45 $\mu\text{m}$	46 x 45 $\mu\text{m}$
	EMR	35 x 85 $\mu\text{m}$	70 x 80 $\mu\text{m}$	110 x 160 $\mu\text{m}$	140 x 200 $\mu\text{m}$
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	< ±20 μm	< ±60 μm	< ±90 μm
		< ±0.02 % FSO	< ±0.02 % FSO	< ±0.03 % FSO	< ±0.03 % FSO
Resolution <sup>[3]</sup>		0.8 μm	1.5 μm	3 μm	4.5 μm
Light spot diameter <sup>[4]</sup>	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	

<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	< ±1.5 μm	< ±2 μm	< ±40 μm
		< ±0.03 % FSO	< ±0.03 % FSO	< ±0.02 % FSO	< ±0.08 % FSO
Resolution <sup>[2]</sup>		0.03 μm	0.08 μm	0.15 μm	7.5 μm
Light spot diameter <sup>[3]</sup>	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			

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

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

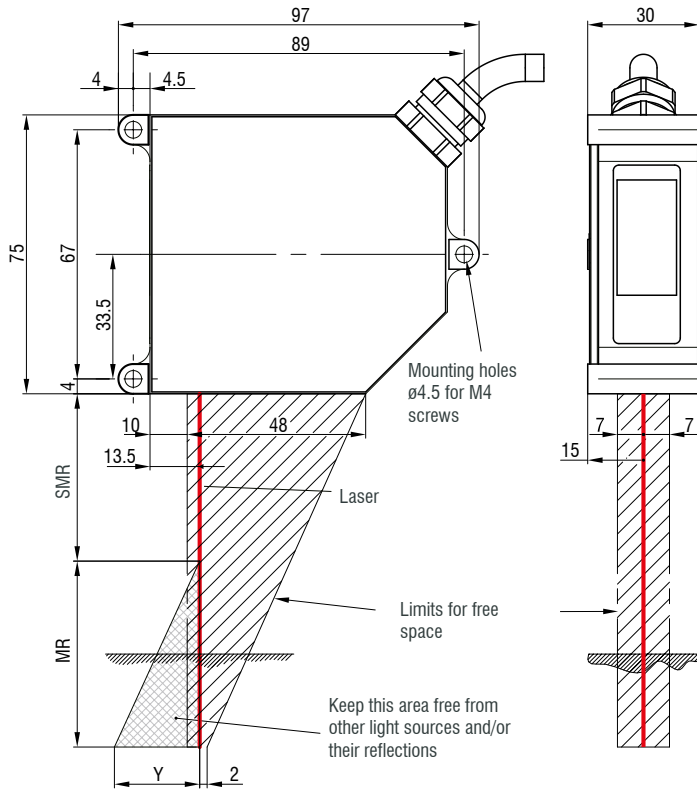
<sup>[3]</sup> ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

# Dimensions

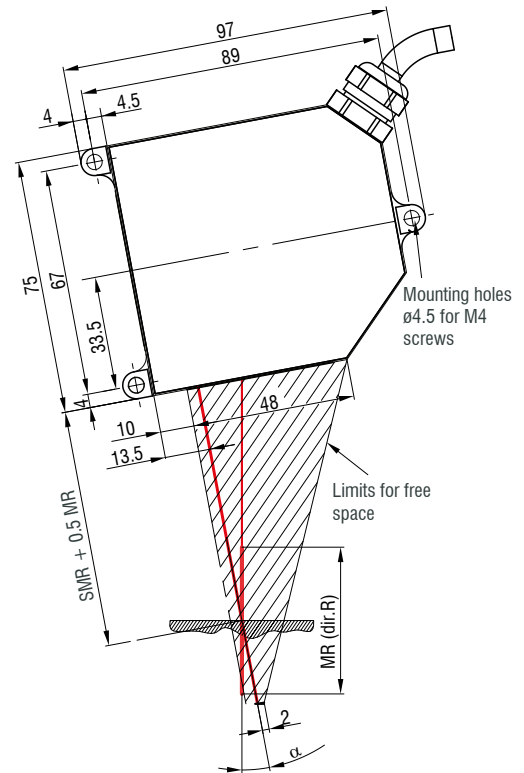
## optoNCDT 2300

optoNCDT 2300 / Measuring range 2 - 100

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



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



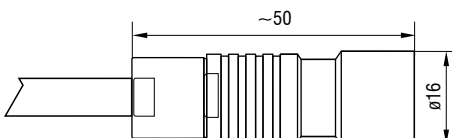
**optoNCDT 2300** (Diffuse reflection)  
**optoNCDT 2300LL**  
**optoNCDT 2300BL** (Diffuse reflection)

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

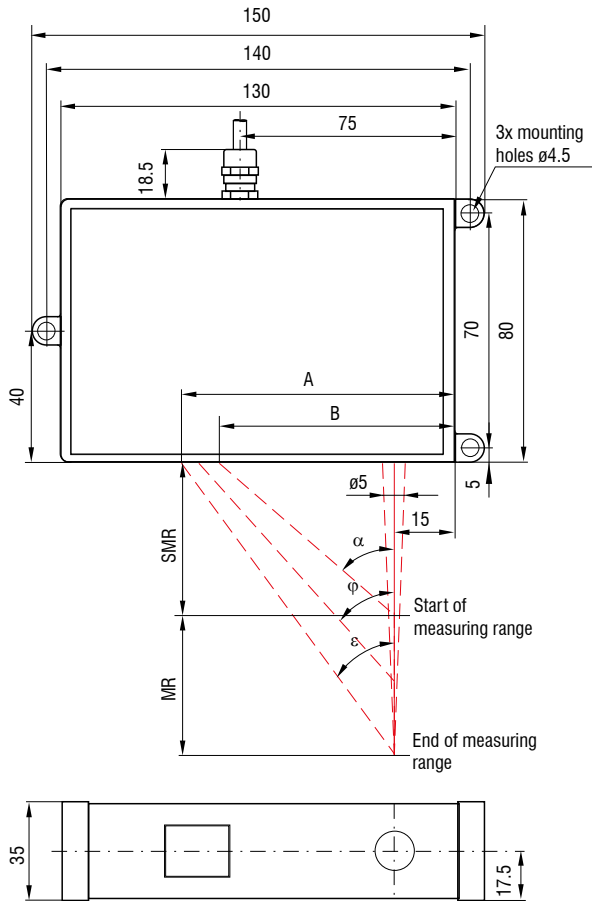
**optoNCDT 2300** (Direct reflection)  
**optoNCDT 2300BL** (Direct reflection)

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

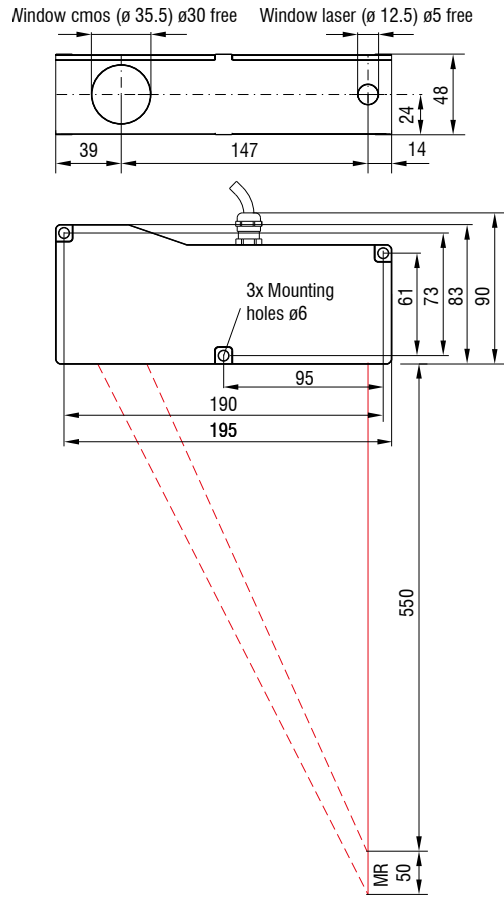
**Connector (sensor side)**



optoNCDT 2300 / Measuring ranges 200/300



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



MR	SMR	$\alpha$	$\phi$	$\epsilon$	A	B
200	130	25.1 °	16.7 °	13.1 °	91.6	76
300	200	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

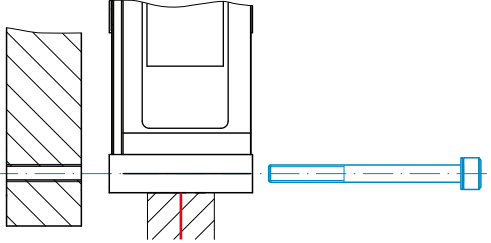
Connector (sensor side)



## Installation options

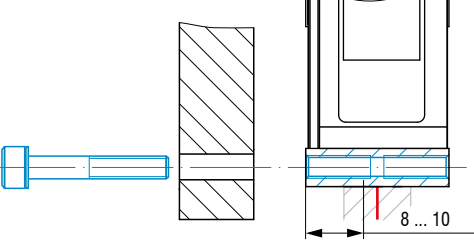
### Housings M and L

**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 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			

### Series

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

## Scope of supply









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

# Connection possibilities

## optoNCDT 2300




### Drag-chain suitable extension and adapter cables

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

Sensor	Cables	Type	Connection possibilities and accessories	
ILD2300-xx ILD2300-xxLL ILD2300-xxBL ILD2300-2DR	<b>Extension cable pigtail</b> Length 3 m / 6 m / 9 m / 15 m <i>Art. no.</i> <i>Designation</i> 2901717      PC2300-3/OE 2901760      PC2300-6/OE 2901761      PC2300-9/OE 2901762      PC2300-15/OE	Open ends	<b>Supply voltage connection</b> Power supply unit PS2020 	
	<b>Adapter cable for PC interface card</b> Length 3 m / 6 m <i>Art. no.</i> <i>Designation</i> 2901728      PC2300-3/IF2008 2901729      PC2300-6/IF2008	Sub-D	<b>Interface module of RS422 to USB</b> IF2001/USB 	
ILD2310-xx	<b>Adapter cable for sensor calculation</b> Length 3 m / 6 m / 9 m <i>Art. no.</i> <i>Designation</i> 29011031      PC2300-3/C-Box/RJ45 29011044      PC2300-6/C-Box/RJ45 29011045      PC2300-9/C-Box/RJ45	Sub-D	<b>Interface module for Industrial Ethernet connection</b> IF2035-PROFINET IF2035-EIP IF2035-EtherCAT 	
	<b>Adapter cable for sensor calculation</b> Length 2 m <i>Art. no.</i> <i>Designation</i> 29011279      PCE2300-3/M12	M12	<b>Interface card for synchronous data acquisition</b> IF2008PCle / IF2008E 	
	<b>Adapter cable Sub-D for EtherCAT</b> Length 3 m / 6 m <i>Art. no.</i> <i>Designation</i> 2901661      PC2300-3/SUB-D 2901976      PC2300-6/SUB-D	Sub-D	<b>4-fold interface module from RS422 to USB</b> IF2004/USB 	
			<b>Controller for D/A conversion and evaluation of up to 2 sensor signals</b> Dual Processing Unit 	
			<b>Interface module for Ethernet connection of up to 8 sensors</b> IF2008/ETH 	
			<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  <table> <tr> <td><i>Art. no.</i></td> <td><i>Designation</i></td> </tr> <tr> <td>29011118</td> <td>PC2300-3/OE/HT</td> </tr> <tr> <td>29011119</td> <td>PC2300-6/OE/HT</td> </tr> <tr> <td>29011095</td> <td>PC2300-9/OE/HT</td> </tr> <tr> <td>29011120</td> <td>PC2300-15/OE/HT</td> </tr> </table>	<i>Art. no.</i>	<i>Designation</i>	29011118	PC2300-3/OE/HT	29011119	PC2300-6/OE/HT	29011095	PC2300-9/OE/HT	29011120	PC2300-15/OE/HT	Open ends	<b>Connection supply voltage</b> PS2020 	<b>Interface module of RS422 to USB</b> IF2001/USB 
		<i>Art. no.</i>	<i>Designation</i>											
29011118	PC2300-3/OE/HT													
29011119	PC2300-6/OE/HT													
29011095	PC2300-9/OE/HT													
29011120	PC2300-15/OE/HT													
<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  <table> <tr> <td><i>Art. no.</i></td> <td><i>Designation</i></td> </tr> <tr> <td>2901693</td> <td>PC2300-0,5Y Connection cable ILD2300</td> </tr> </table> 	<i>Art. no.</i>	<i>Designation</i>	2901693	PC2300-0,5Y Connection cable ILD2300	Open ends & RJ45	<b>Signal output EtherCAT &amp; Ethernet</b>  	<b>Supply voltage connection</b> Power supply unit PS2020 
		<i>Art. no.</i>	<i>Designation</i>					
		2901693	PC2300-0,5Y Connection cable ILD2300					
<b>Interface module of RS422 to USB</b> IF2001/USB 								

# Protective housings for demanding environments

**opto**NCDT

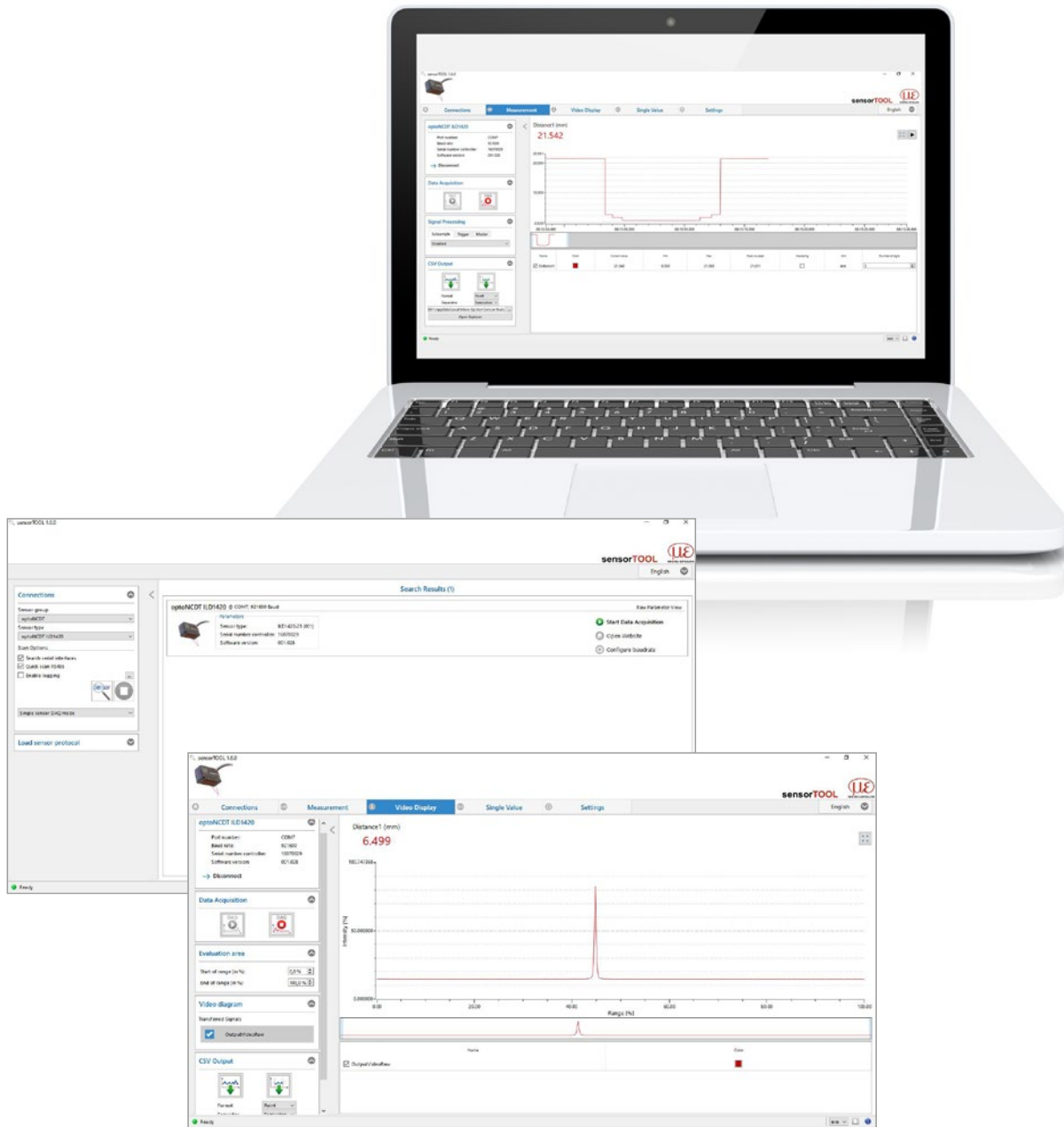
SGH & SGHF models				SGHF-HT model
Protective housing Size S		Protective housing Size M		
SGH	SGHF	SGH	SGHF	
				
(140 x 140 x 71 mm)		(180 x 140 x 71 mm)		(260 x 180 x 154 mm)
Water-resistant housing protects the sensor from solvents and detergents.	Ideal with high ambient temperatures. The integrated 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 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)

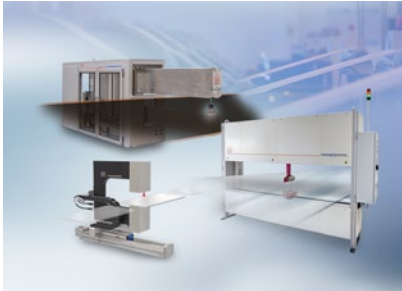
# Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



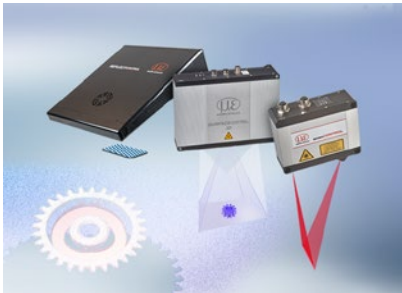
Measuring and inspection systems for metal strips, plastics and rubber



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

