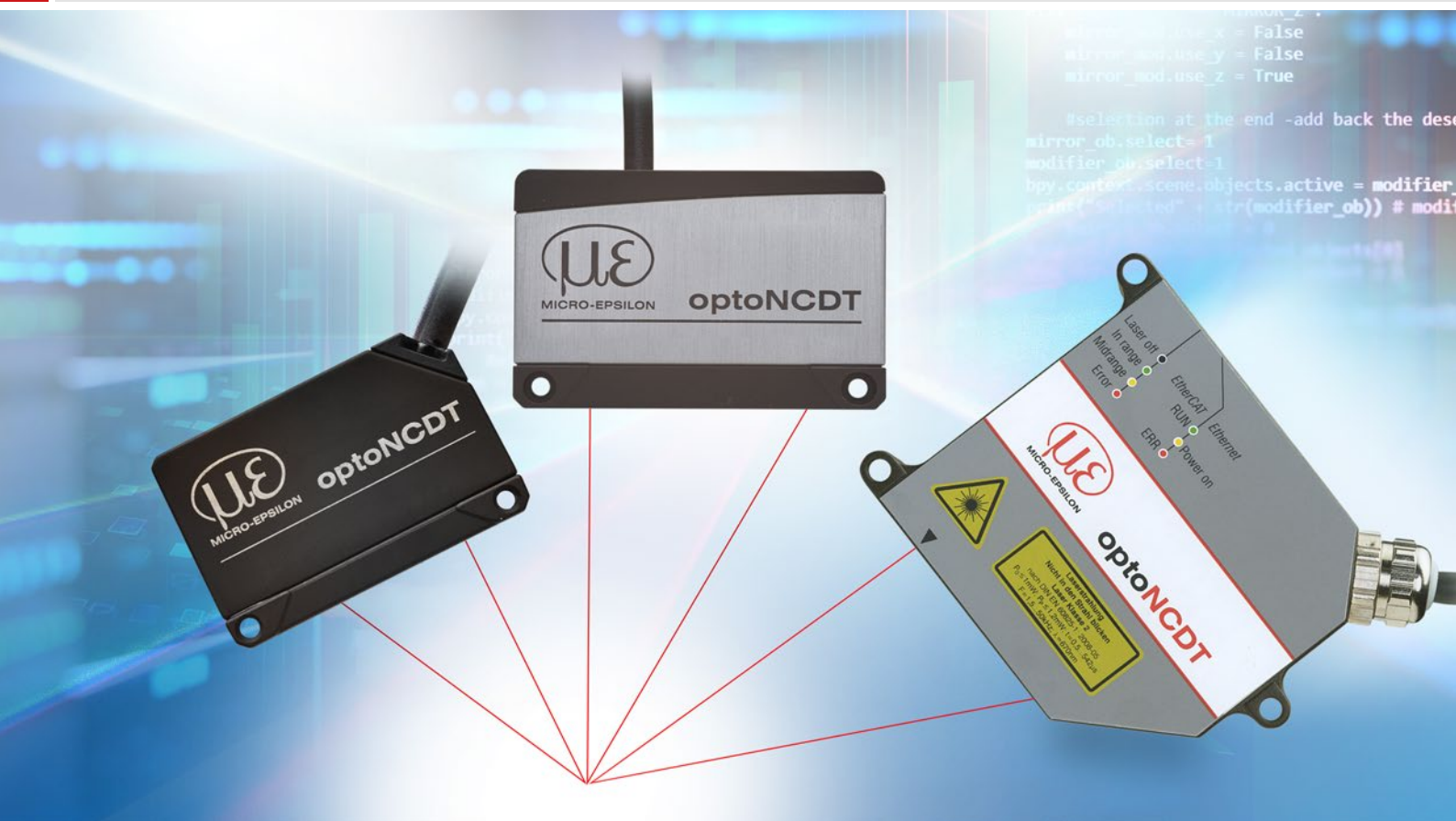




More Precision

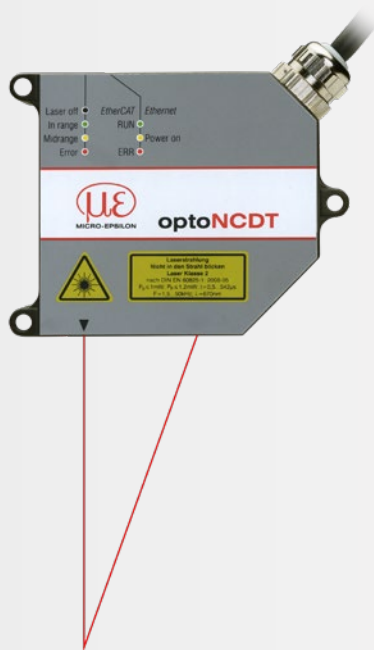
optoNCDT // Laser displacement sensors (triangulation)



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

Laser sensors for special measurement tasks

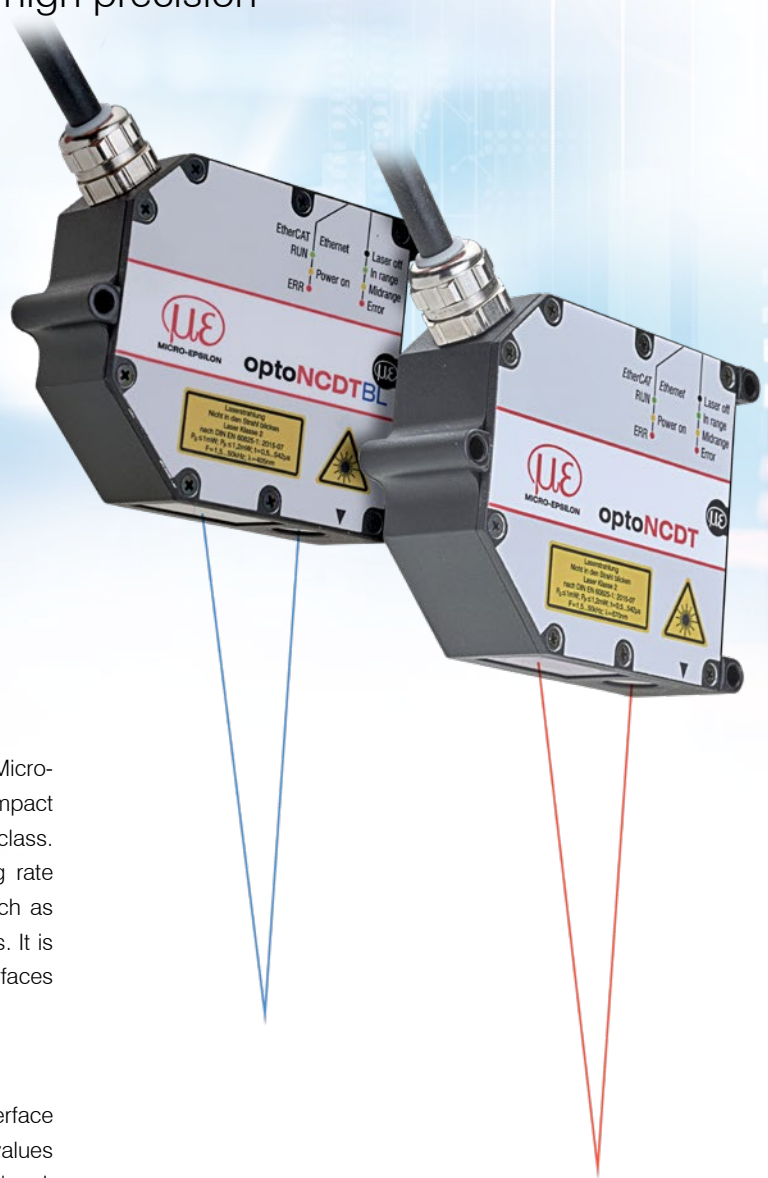
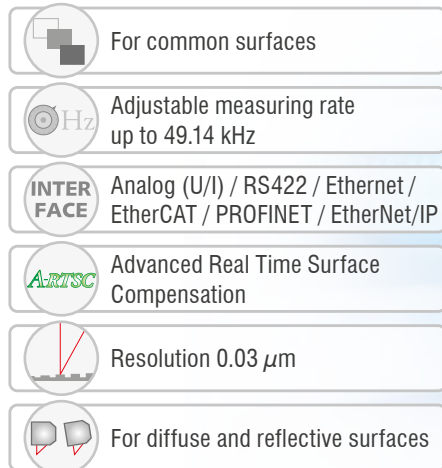
optoNCDT 1910

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**



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.

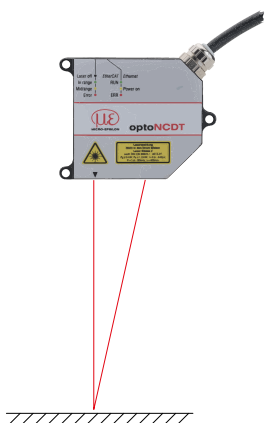
User-friendly web interface for easy operation

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.

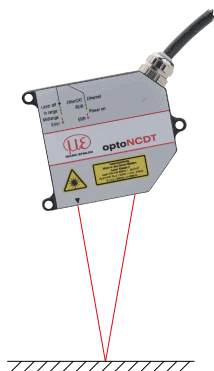
Fast exposure control for demanding surfaces

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.

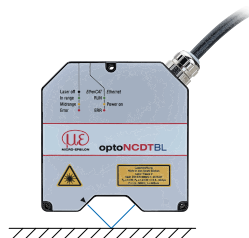
Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 2300		2 - 300 mm	0.03 μm	from 0.02 %
optoNCDT 2300BL		2 - 50 mm	0.03 μm	from 0.02 %
optoNCDT 2300LL		2 - 50 mm	0.1 μm	from 0.02 %
optoNCDT 2300-2DR		2 mm	0.03 μm	from 0.03 %
optoNCDT 2310		10 - 50 mm	0.5 μm	from 0.03 %



Distance measurement on diffuse reflecting surfaces



Distance measurement on directly reflecting surfaces

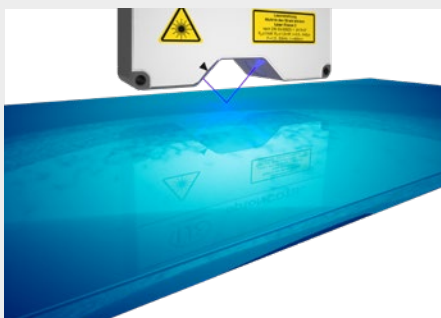


High precision distance measurement on directly reflecting surfaces

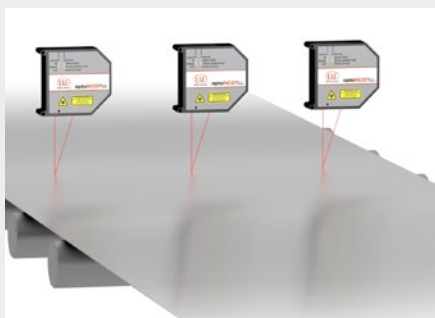
Versatile use

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

Technical data

optoNCDT 2300

optoNCDT 2300 (General technical data)

Model		ILD23x0-xx
Measuring rate ^[1]		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 ^[2]		RS422 (16 bit) / Ethernet / EtherCAT / PROFINET / EtherNet/IP
Analog output ^[3]		4 ... 20 mA / 0 ... 5 V / 0 ... 10 V / ± 5 V / ± 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 ^[4]		Web interface for setup: user management, measurement settings, data output, measurement control, parameters and extras; 2x color LEDs for status / Ethernet and EtherCAT

^[1] Measuring rate 49.14 kHz with reduced measuring range (in brackets)

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

^[3] Requires connection via interface module (see accessories)

^[4] 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 ^[1]		2 (2) mm	5 (2) mm	10 (5) mm	20 (10) mm
Start of measuring range ^[1]		24 (24) mm	24 (24) mm	30 (35) mm	40 (50) mm
Mid of measuring range ^[1]		25 (25) mm	26.5 (25) mm	35 (37.5) mm	50 (55) mm
End of measuring range ^[1]		26 (26) mm	29 (26) mm	40 (40) mm	60 (60) mm
Linearity ^[2]		< $\pm 0.6 \mu\text{m}$	< $\pm 1.5 \mu\text{m}$	< $\pm 2 \mu\text{m}$	< $\pm 4 \mu\text{m}$
		< $\pm 0.03 \%$ FSO	< $\pm 0.03 \%$ FSO	< $\pm 0.02 \%$ FSO	< $\pm 0.02 \%$ FSO
Resolution ^[3]		0.03 μm	0.08 μm	0.15 μm	0.3 μm
Light spot diameter ^[4]	SMR	55 x 85 μm	70 x 80 μm	75 x 85 μm	140 x 200 μm
	MMR	23 x 23 μm	30 x 30 μm	32 x 45 μm	46 x 45 μm
	EMR	35 x 85 μm	70 x 80 μm	110 x 160 μm	140 x 200 μm
Material		Die-cast zinc 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] $\pm 10 \%$; 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 ^[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

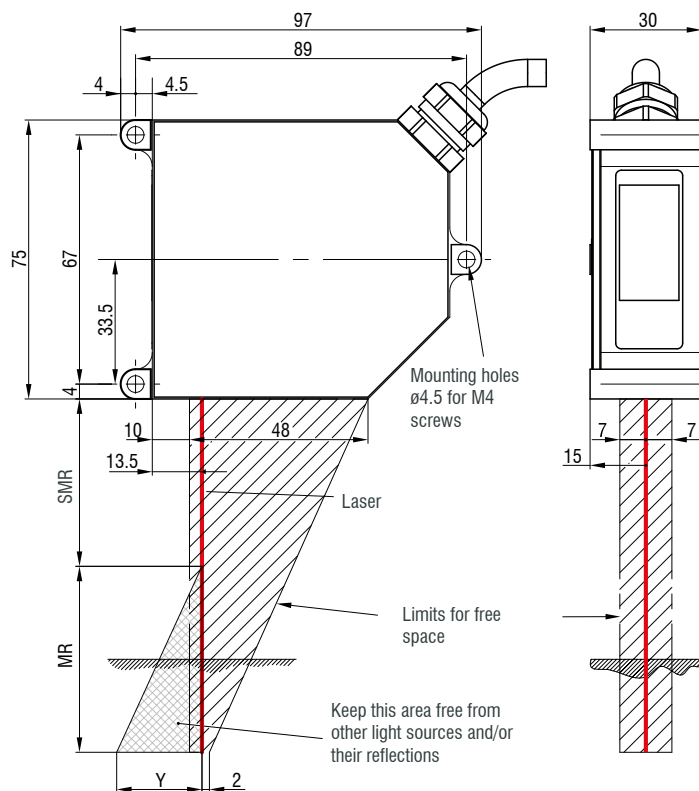
Dimensions

optoNCDT 2300

optoNCDT 2300 / Measuring range 2 - 100

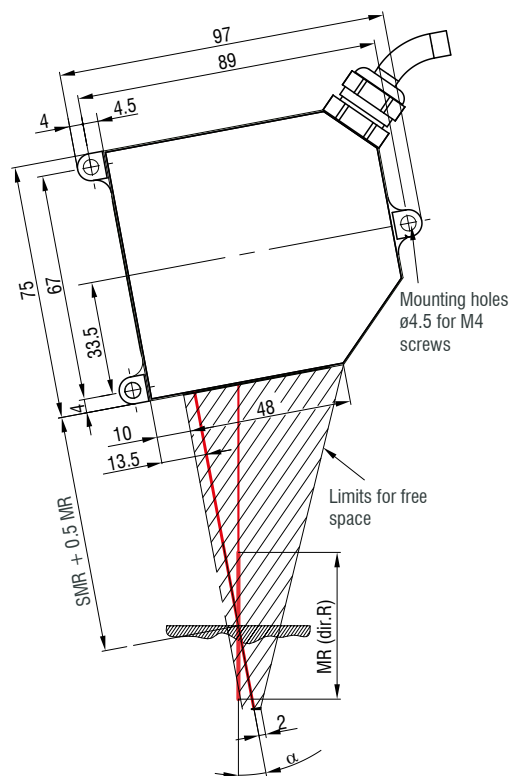
optoNCDT 2300-2 ... 2300-100

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)

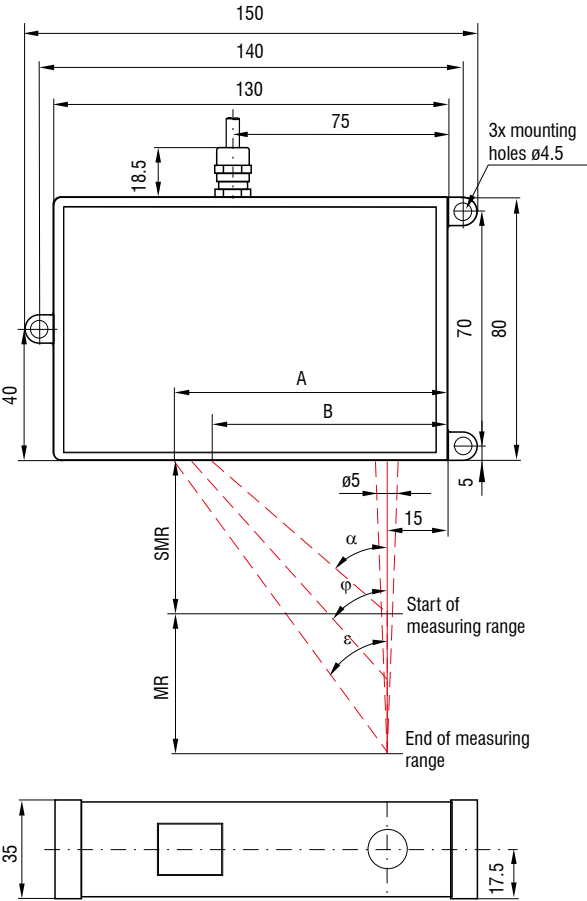
optoNCDT 2300BL (Direct reflection)

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

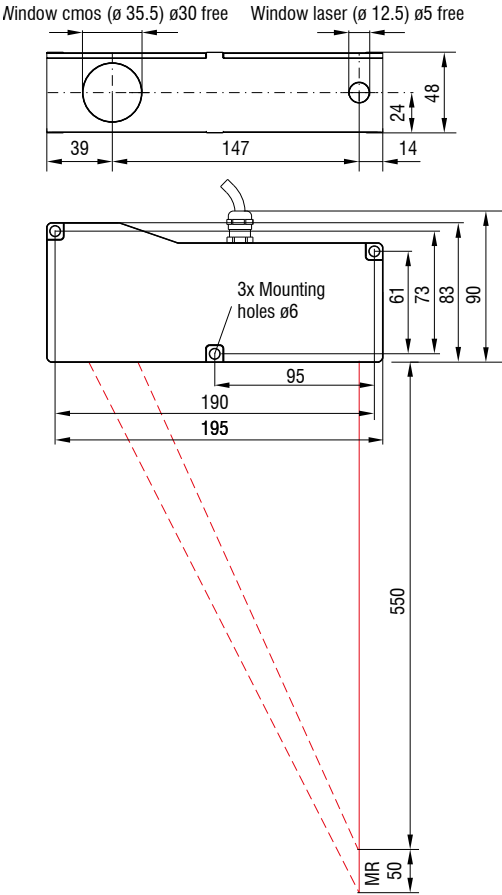
Connector (sensor side)



optoNCDT 2300 / Measuring ranges 200/300



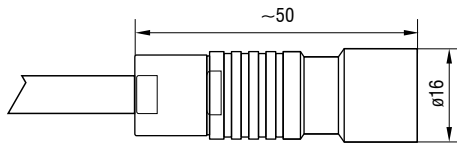
optoNCDT 2300BL / Measuring range 50
optoNCDT 2310 / Measuring range 50



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

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

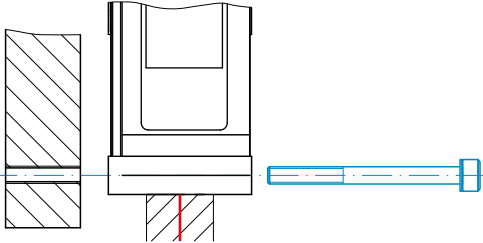
Connector (sensor side)



Installation options

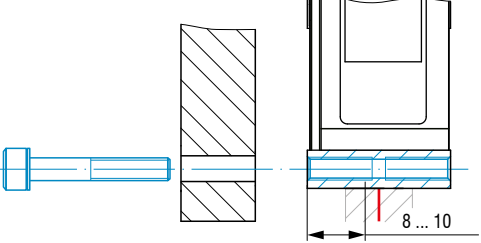
Housings M and L

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	Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m <table><tr><td>Art. no.</td><td>Designation</td></tr><tr><td>2901717</td><td>PC2300-3/OE</td></tr><tr><td>2901760</td><td>PC2300-6/OE</td></tr><tr><td>2901761</td><td>PC2300-9/OE</td></tr><tr><td>2901762</td><td>PC2300-15/OE</td></tr></table>	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	
	Art. no.	Designation												
	2901717	PC2300-3/OE												
	2901760	PC2300-6/OE												
2901761	PC2300-9/OE													
2901762	PC2300-15/OE													
	Interface module of RS422 to USB IF2001/USB													
	Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT													
	Interface card for synchronous data acquisition IF2008PCle / IF2008E													
ILD2310-xx	Adapter cable for PC interface card Length 3 m / 6 m <table><tr><td>Art. no.</td><td>Designation</td></tr><tr><td>2901728</td><td>PC2300-3/IF2008</td></tr><tr><td>2901729</td><td>PC2300-6/IF2008</td></tr></table>	Art. no.	Designation	2901728	PC2300-3/IF2008	2901729	PC2300-6/IF2008	Sub-D	4-fold interface module from RS422 to USB IF2004/USB					
Art. no.	Designation													
2901728	PC2300-3/IF2008													
2901729	PC2300-6/IF2008													
	Adapter cable for sensor calculation Length 3 m / 6 m / 9 m <table><tr><td>Art. no.</td><td>Designation</td></tr><tr><td>29011031</td><td>PC2300-3/C-Box/RJ45</td></tr><tr><td>29011044</td><td>PC2300-6/C-Box/RJ45</td></tr><tr><td>29011045</td><td>PC2300-9/C-Box/RJ45</td></tr></table>	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			
Art. no.	Designation													
29011031	PC2300-3/C-Box/RJ45													
29011044	PC2300-6/C-Box/RJ45													
29011045	PC2300-9/C-Box/RJ45													
	Adapter cable for sensor calculation Length 2 m <table><tr><td>Art. no.</td><td>Designation</td></tr><tr><td>29011279</td><td>PCE2300-3/M12</td></tr></table>	Art. no.	Designation	29011279	PCE2300-3/M12	M12	Interface module for Ethernet connection of up to 8 sensors IF2008/ETH							
Art. no.	Designation													
29011279	PCE2300-3/M12													
	Adapter cable Sub-D for EtherCAT Length 3 m / 6 m <table><tr><td>Art. no.</td><td>Designation</td></tr><tr><td>2901661</td><td>PC2300-3/SUB-D</td></tr><tr><td>2901976</td><td>PC2300-6/SUB-D</td></tr></table>	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					
Art. no.	Designation													
2901661	PC2300-3/SUB-D													
2901976	PC2300-6/SUB-D													

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	Connection cable high temperatures Length 3 m / 6 m / 9 m / 15 m	Open ends	Connection supply voltage PS2020	
	<i>Art. no.</i> <i>Designation</i>		Interface module of RS422 to USB IF2001/USB	
	29011118 PC2300-3/OE/HT			
	29011119 PC2300-6/OE/HT			
	29011095 PC2300-9/OE/HT			
29011120 PC2300-15/OE/HT				
			Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT	

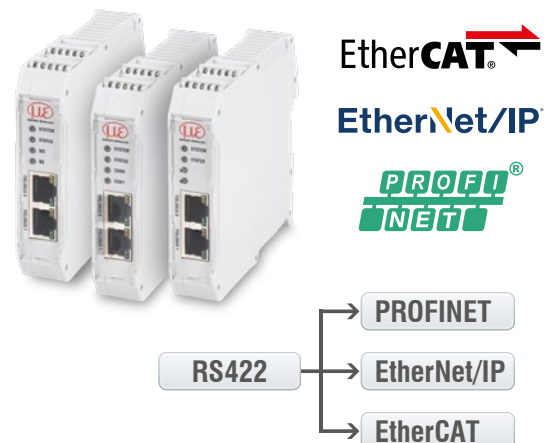
Connection cable for EtherCAT operation

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	Connection possibilities and accessories	
Sub-D (PC2300-x/ Sub-D)	Adapter cable for EtherCAT Length 0.5 m Art. no. 2901693 Designation PC2300-0,5Y Connection cable ILD2300 	Open ends & RJ45	Signal output EtherCAT & Ethernet	EtherCAT  
	Supply voltage connection Power supply unit PS2020			
	Interface module of RS422 to USB IF2001/USB			

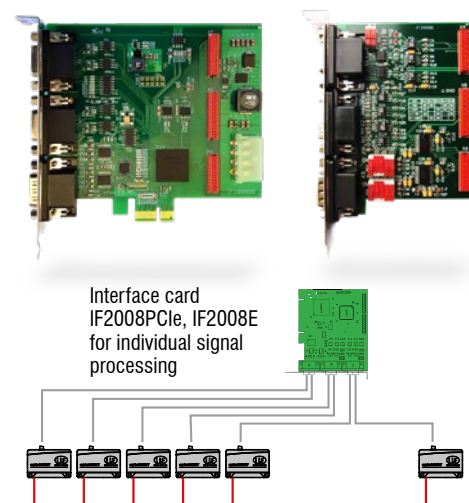
IF2035: Interface module for Industrial Ethernet connection

- 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



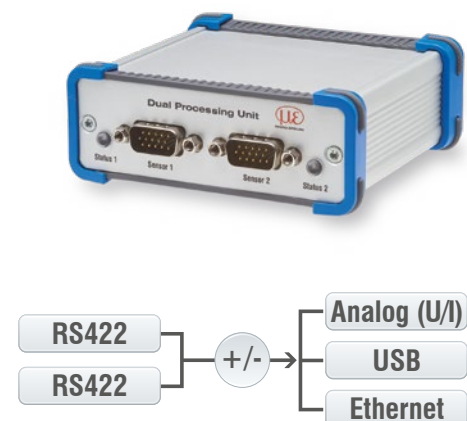
IF2008PCIe/IF2008E: Interface card for synchronous data acquisition

- 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



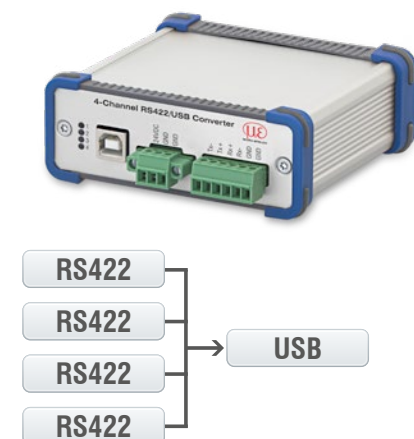
IF2001/USB: Interface module from RS422 to USB

- 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-adaptor cable

Protective housings for demanding environments

optoNCDT

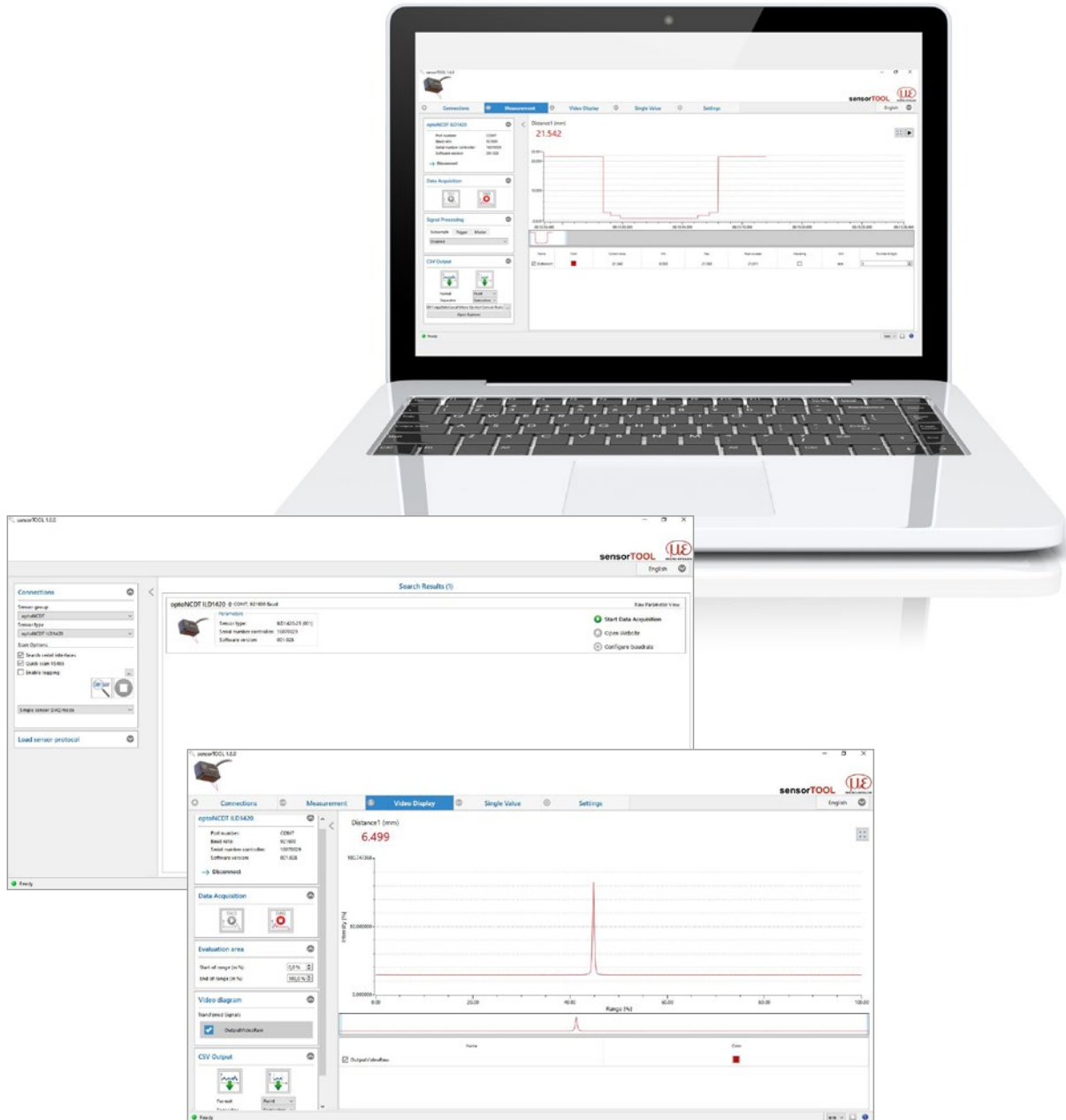
SGH & SGHF models				SGHF-HT model
Protective housing Size S		Protective housing Size M		
SGH	SGHF	SGH	SGHF	
				
(140 x 140 x 71 mm)		(180 x 140 x 71 mm)		(260 x 180 x 154 mm)
Water-resistant housing protects the sensor from solvents and detergents.	Ideal with high ambient temperatures. The integrated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