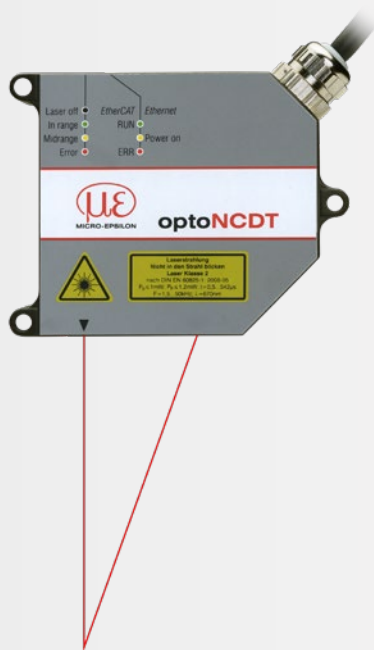**MICRO-EPSILON**

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
- **INTER FACE** — Analog (U/I) / RS422 / Ethernet / EtherCAT / PROFINET / EtherNet/IP
- *A-RTSC* — Advanced Real Time Surface Compensation
- Resolution 0.03 μm
- For diffuse and reflective surfaces
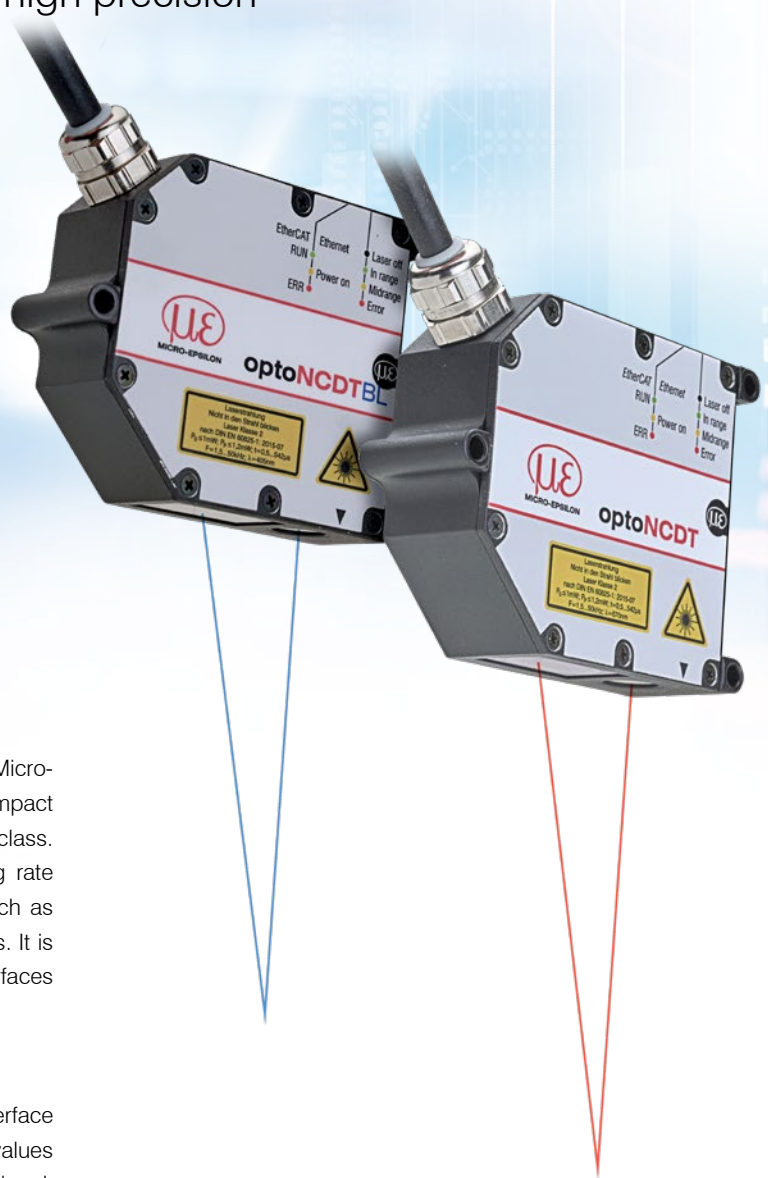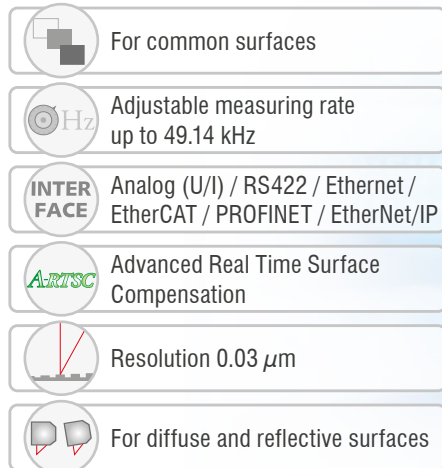
The optoNCDT 2300 sensors form the high-end segment of Micro-Epsilon laser sensors. The entire electronics is integrated in a compact sensor housing which is a worldwide unique feature of this sensor class. The high-precision laser sensor has an adjustable measuring rate of 49.14 kHz and is used for 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.
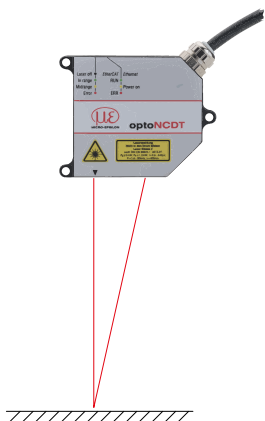
User-friendly web interface for easy operation
The optoNCDT 2300 laser sensors can be operated via a web interface which offers multiple possibilities in order to process measured values and signals, e.g., peak selection, filter and masking of the video signal.

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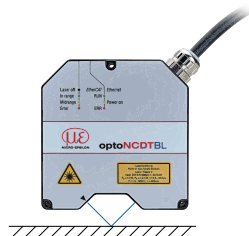
Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 2300		2 - 300 mm	0.03 μm	from 0.02 %
optoNCDT 2300BL		2 - 50 mm	0.03 μm	from 0.02 %
optoNCDT 2300LL		2 - 50 mm	0.1 μm	from 0.02 %
optoNCDT 2300-2DR		2 mm	0.03 μm	from 0.03 %
optoNCDT 2310		10 - 50 mm	0.5 μm	from 0.03 %

Distance measurement on diffuse reflecting surfaces
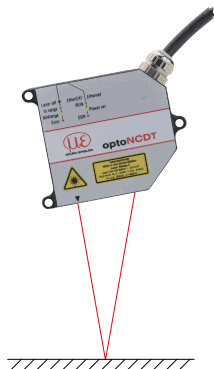
Distance measurement on directly reflecting surfaces

**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
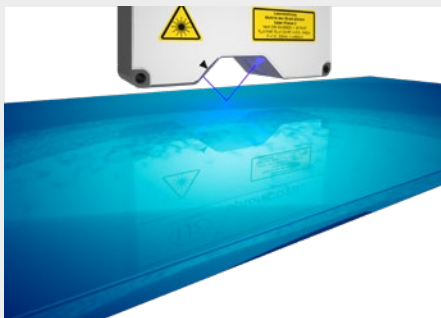
Distance measurement of coated glass
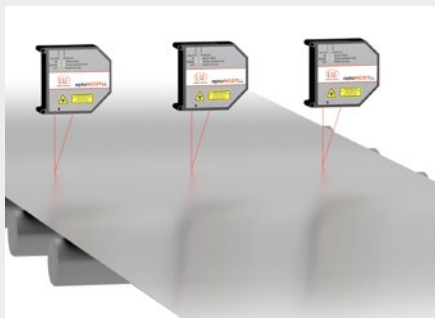
Planarity testing of metal strips

Testing the radial run out of rollers

Laser-Point - optoNCDT 2310

Model	ILD2310-10	ILD2310-20	ILD2310-40	ILD2310-50
Measuring range [1]	10 (5) mm	20 (10) mm	40 (20) mm	50 (25) mm
Start of measuring range [1]	95 (100) mm	90 (100) mm	175 (195) mm	550 (575) mm
Mid of measuring range [1]	100 (102.5) mm	100 (105) mm	195 (205) mm	575 (587.5) mm
End of measuring range [1]	105 (105) mm	110 (110) mm	215 (215) mm	600 (600) mm
Linearity [2]	$< \pm 3\,\mu m$	$< \pm 6\,\mu m$	$< \pm 12\,\mu m$	$< \pm 50\,\mu m$
	$< \pm 0.03$ % FSO	$< \pm 0.03$ % FSO	$< \pm 0.03$ % FSO	$< \pm 0.1$ % FSO
Resolution [3]	$0.5\,\mu m$	$1\,\mu m$	$2\,\mu m$	$7.5\,\mu m$
Light spot diameter [4] SMR	400 x 500 μm	$200\,\mu m$	$230\,\mu m$	400 … 500 μm
MMR		$60\,\mu m$	$210\,\mu m$	
EMR		$200\,\mu m$	$230\,\mu m$	
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			

[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)
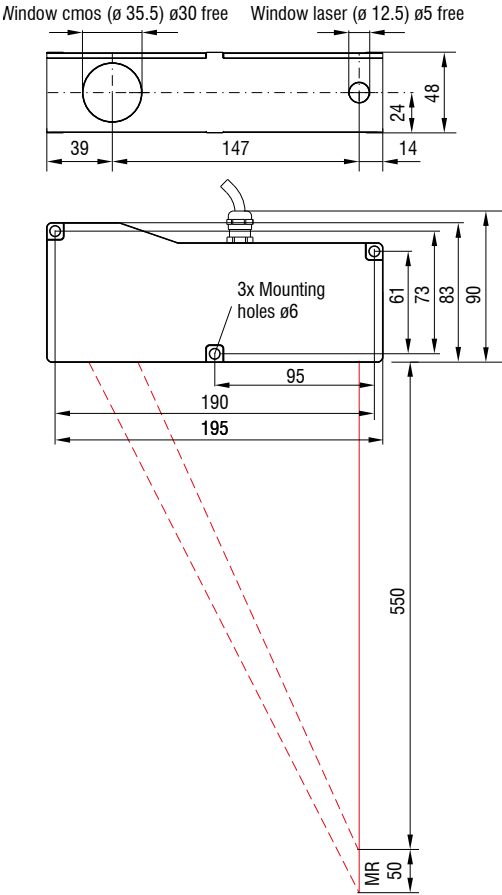[3] with 10 kHz, without averaging
[4] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

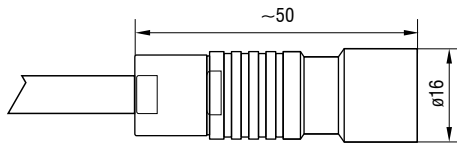## optoNCDT **2300** / Measuring ranges 200/300

optoNCDT **2300BL** / Measuring range 50
optoNCDT **2310** / Measuring range 50
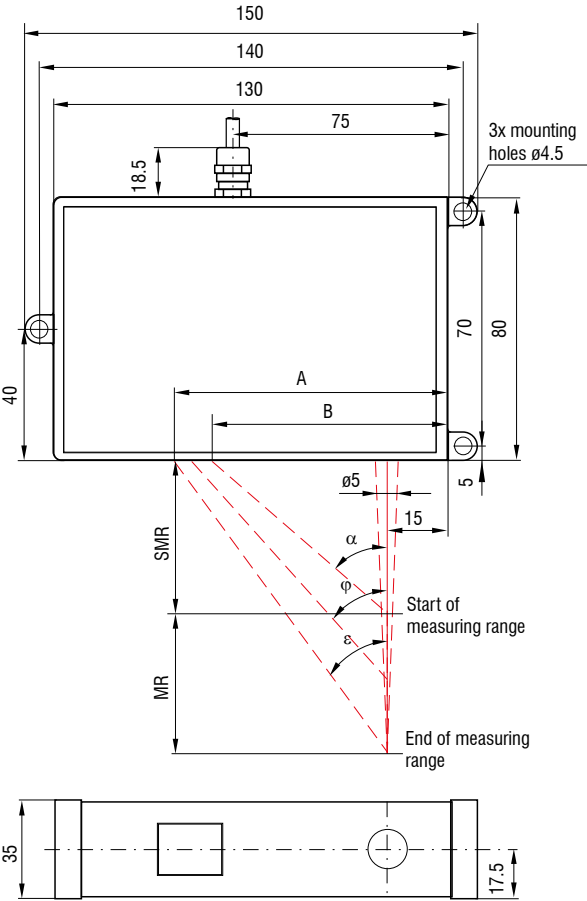
MR	α	φ	ε	A	B
200	25.1 °	16.7 °	13.1 °	91.6	76
300	18.3 °	12.2 °	9.6 °	99.4	81

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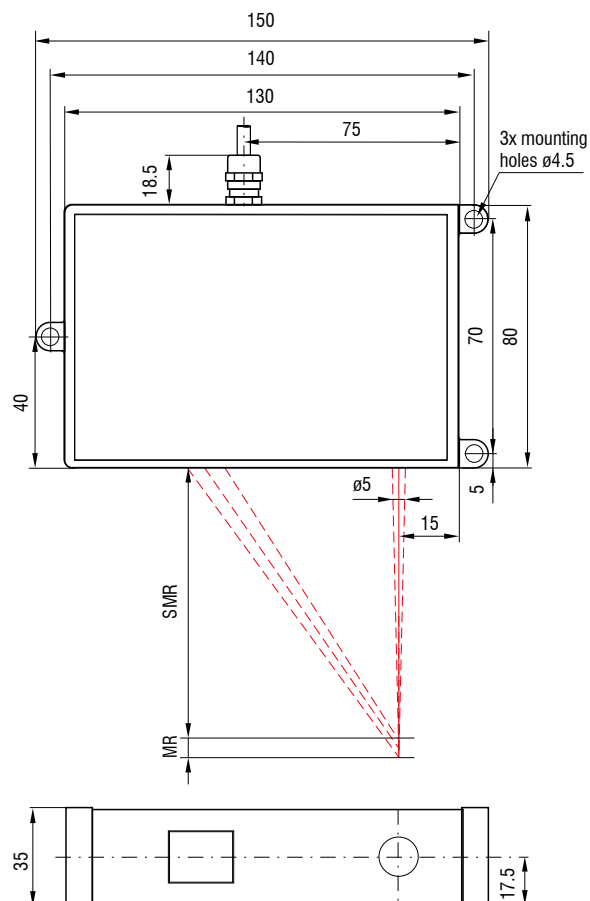MMR = mid of measuring range; EMR = end of measuring range

Connector (sensor side)

Dimensions
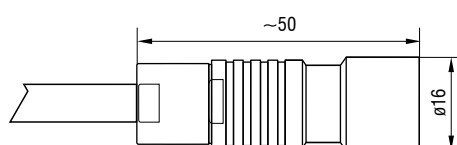## optoNCDT 2300

optoNCDT 2310 / Measuring ranges 10 / 20 / 40

optoNCDT 2300-2DR

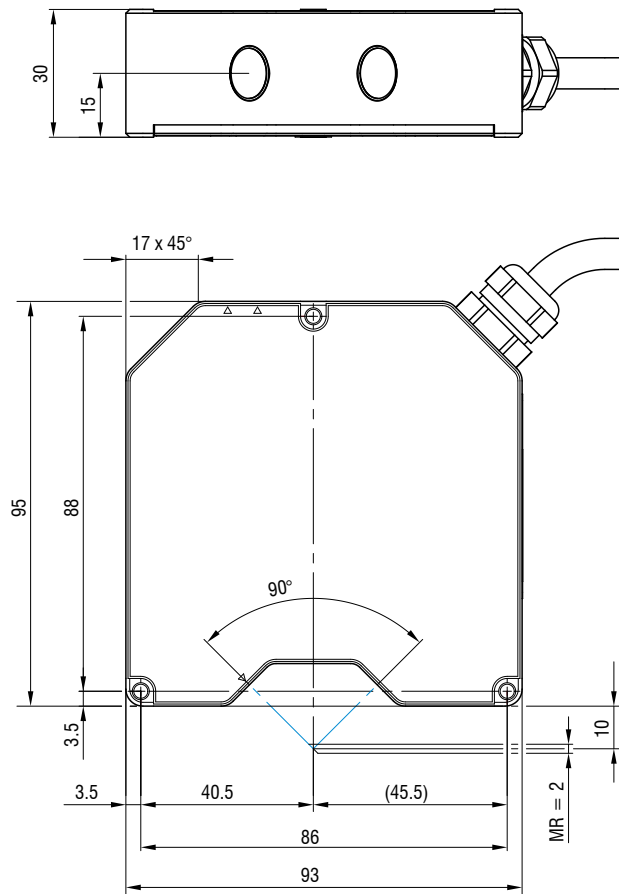| MR	SMR	MMR	EMR
10	95	100	105
20	90	100	110
40	175	195	215

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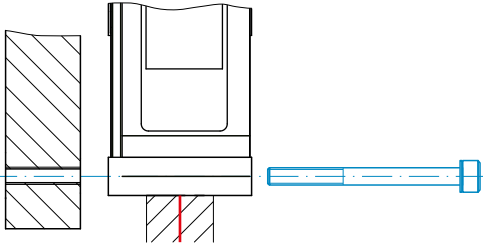MMR = mid of measuring range; EMR = end of measuring range
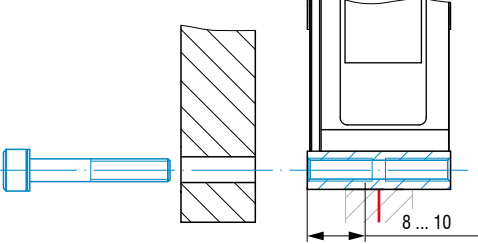
Connector (sensor side)

Installation options

Housings M and L

Bolt connection	Direct fastening

ILD2300-2 … ILD2300-100 ILD2300BL / ILD2300LL	M4		ILD2300-2 … ILD2300-100 ILD2300BL / ILD2300LL	-
ILD2300-200 / -300 ILD2310-10 / -20 /-40	M4		ILD2300-200 / -300 ILD2310-10 / -20 /-40	M5
ILD2310-50 ILD2310-50BL	M5		ILD2310-50 ILD2310-50BL	M6
ILD2300-2DR	M3		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			

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	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


RS422 → PROFINET
RS422 → EtherNet/IP
RS422 → EtherCAT
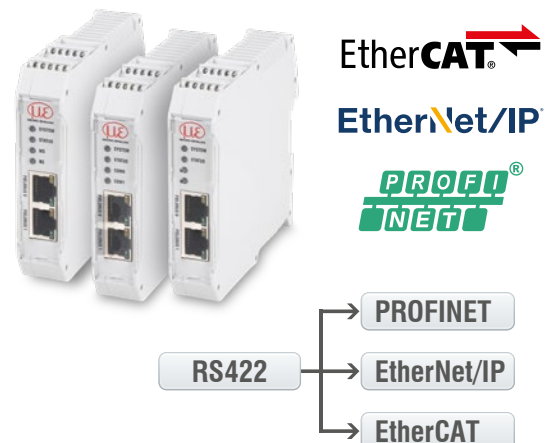
IF2008PCIe / IF2008E: Interface card for synchronous data acquisition

- 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)

Interface card IF2008PCIe, IF2008E for individual signal processing
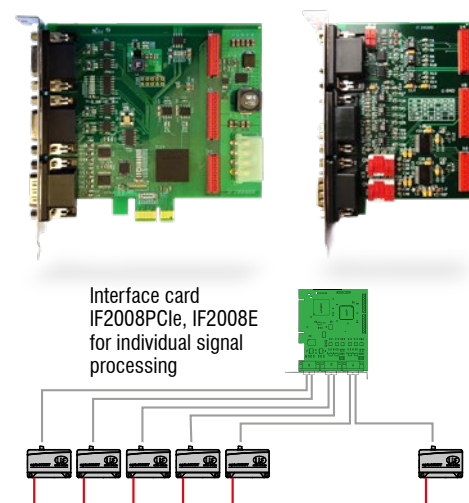
Dual Processing Unit: Controller for D/A conversion and evaluation of up to 2 sensor signals

- 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 / ±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)

RS422
RS422 → +/- → Analog (U/I)
USB
Ethernet
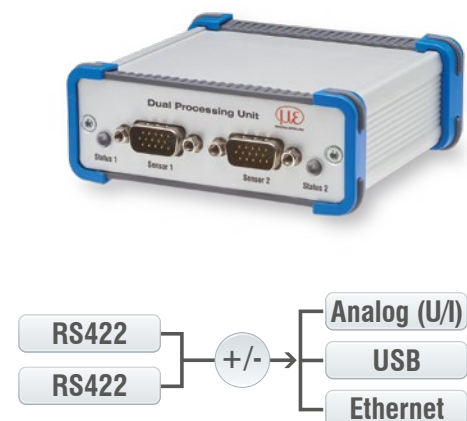
IF2008/ETH: Interface module for Ethernet connection of up to 8 sensors

- 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

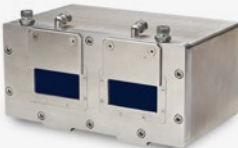## IF2004/USB: 4-fold interface module from RS422 to USB

- 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 → USB
RS422
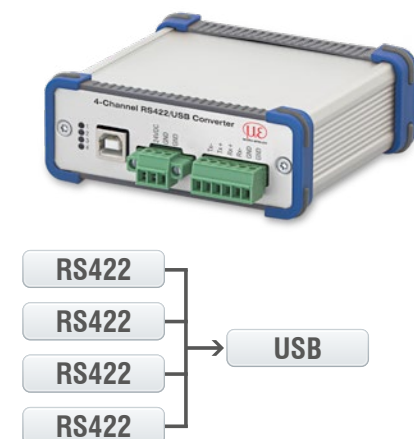
Connection of 4 sensors via
IF2008-Y-adapter cable

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		Size M suitable for		Suitable for	
ILD1750-20BL		ILD1750-500BL		ILD1710-50 / -50BL	
ILD1750-200BL		ILD1750-750BL		ILD1710-1000 / -1000BL	
ILD2300-2 / -2LL / -2BL		ILD2300-200		ILD1750-500BL	
ILD2300-5 / -5BL		ILD2300-300		ILD1750-750BL	
ILD2300-10 / -10LL / -10BL		ILD2310-10		ILD2300-200	
ILD2300-20 / -20LL		ILD2310-20		ILD2300-300	
ILD2300-50 / -50LL		ILD2310-40		ILD2310-10	
ILD2300-100				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.
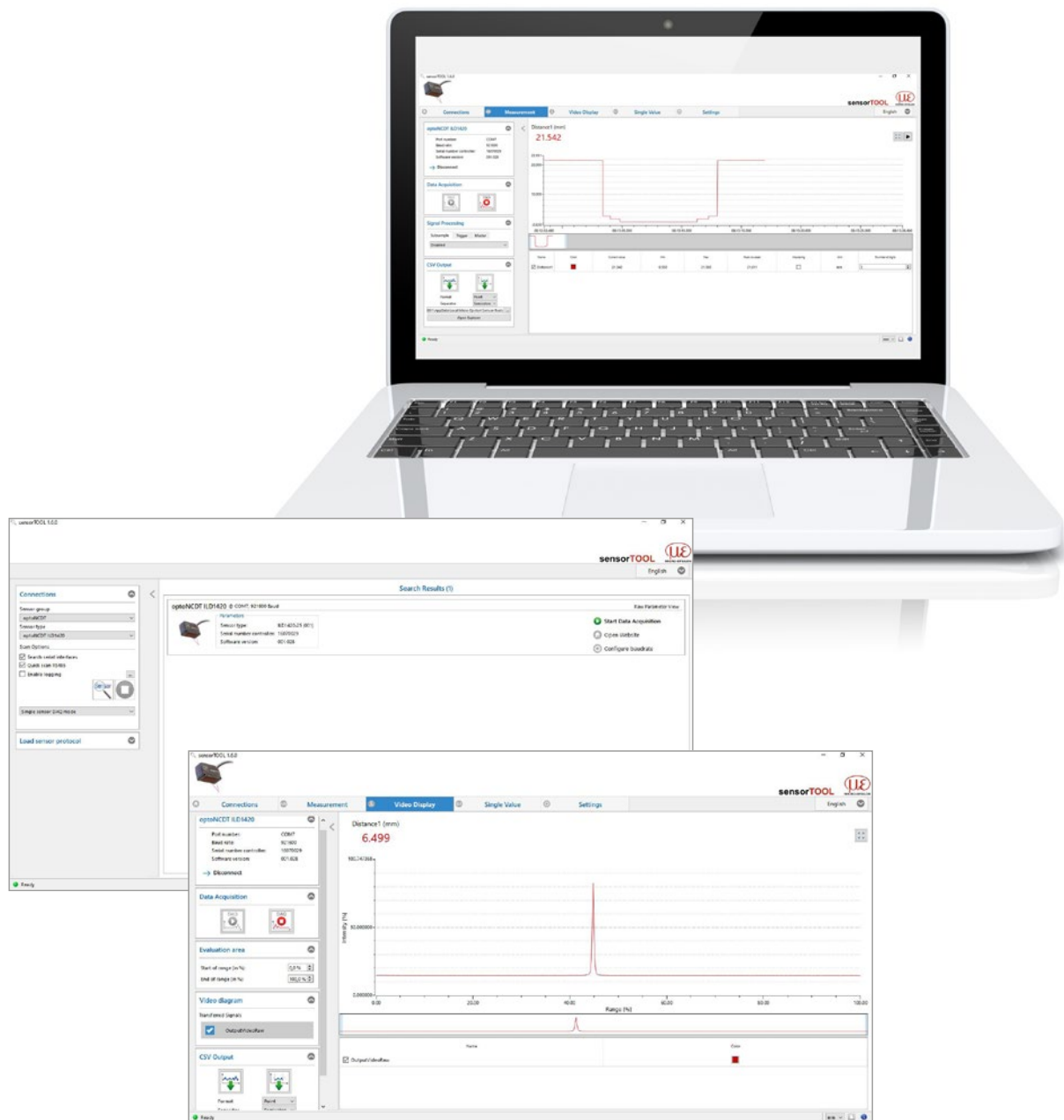
Free download

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
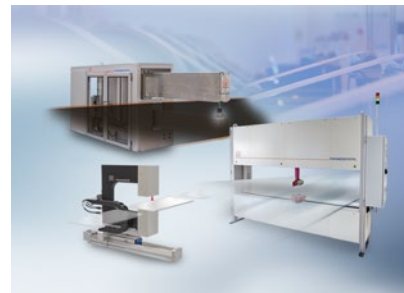
Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

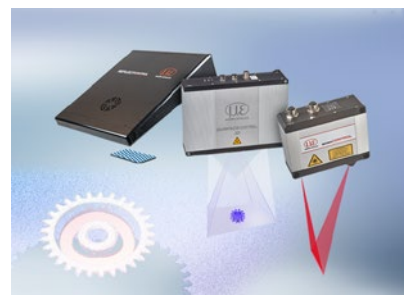Sensors and measurement devices for non-contact temperature measurement

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

MICRO-EPSILON Headquarters
Koenigbacher Str. 15 · 94496 Ortenburg / Germany
Tel. +49 (0) 8542 / 168-0 · Fax +49 (0) 8542 / 168-90
info@micro-epsilon.com · **www.micro-epsilon.com**