MICRO-EPSILON

More Precision

optoNCDT // Laser displacement sensors (triangulation)

Smart laser sensors for precise measurements
optoNCDT 1900

For common surfaces

Measuring rate up to 10 kHz

INTER FACE — Analog (U/I) / RS422 / PROFINET / EtherNet/IP

ASC — Advanced Surface Compensation

Repeatability $<0.1\ \mu m$

Ideal for series and OEM applications

Highest immunity to ambient light

High resistance to shocks and vibrations

Next-generation laser sensors

This optoNCDT 1900 is used for dynamic displacement, distance and position measurements offering a unique combination of high speed, compact desi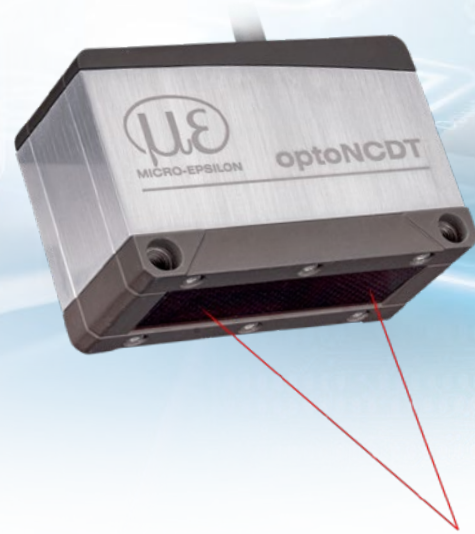gn and accuracy. The integrated high-performance controller enables fast and highly precise processing and output of measurement values.

The innovative optoNCDT 1900 laser triangulation sensor is used whenever maximum precision is combined with the latest technology, e.g., in sophisticated automation, automotive production, 3D printing and coordinate measuring machines.

Simple installation and initial operation

Via a mounting with fitting sleeves, the sensor is automatically aligned in the correct position. This enables both easy sensor replacement and increased measurement accuracy.

Highest stability based on intelligent signal optimization

For the first time, a two-step measurement value averaging feature is available to optimize the signal. This enables a smooth signal at edges and steps. Especially for high speed measurements of moving parts, measurement averaging enables a precise signal course.

Advanced Surface Compensation –
The intelligent exposure control for demanding surfaces

The optoNCDT 1900 is equipped with an intelligent surface control feature. Innovative algorithms generate stable measurement results even on demanding surfaces where changing reflections occur. Furthermore, these new algorithms compensate for ambient light up to 50,000 lux. Therefore, this is the sensor with the highest resistance to ambient light in its class which can even be used in strongly illuminated environments.

Limits for free space

Keep this area free from other light sources and/or their reflections
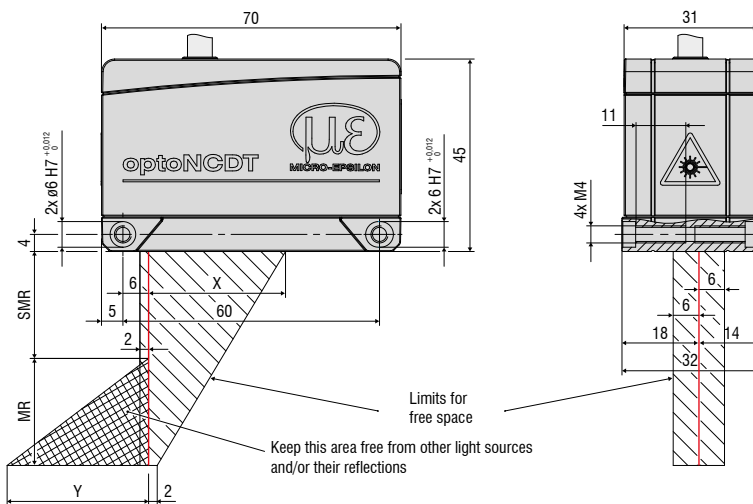
(dimensions in mm, not to scale)

Connector (sensor side)
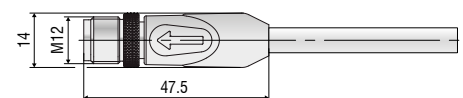
MR	SMR	X	Y
2	15	23	3
10	20	33	14
25	25	33	33
50	40	36	45
100	50	37	75
200	60	39	130
500	100	43	215

Model	ILD1900-2	ILD1900-10	ILD1900-25	ILD1900-50	ILD1900-100	ILD1900-200	ILD1900-500
Measuring range	2 mm	10 mm	25 mm	50 mm	100 mm	200 mm	500 mm
Start of measuring range	15 mm	20 mm	25 mm	40 mm	50 mm	60 mm	100 mm
Mid of measuring range	16 mm	25 mm	37.5 mm	65 mm	100 mm	160 mm	350 mm
End of measuring range	17 mm	30 mm	50 mm	90 mm	150 mm	260 mm	600 mm
Measuring rate [1]	continuously adjustable between 0.25 ... 10 kHz						
	7 adjustable stages: 10 kHz / 8 kHz / 4 kHz / 2 kHz / 1.0 kHz / 500 Hz / 250 Hz						
Linearity [2]	$< \pm 1\,\mu m$	$< \pm 2\,\mu m$	$< \pm 5\,\mu m$	$< \pm 10\,\mu m$	$< \pm 30\,\mu m$	$< \pm 100\,\mu m$	$< \pm 400\,\mu m$
	$< \pm 0.05\ \%$ FSO		$< \pm 0.02\ \%$ FSO		$< \pm 0.03\ \%$ FSO	$< \pm 0.05\ \%$ FSO	$< \pm 0.08\ \%$ FSO
Repeatability [3]	$< 0.1\,\mu m$	$< 0.4\,\mu m$	$< 0.8\,\mu m$	$< 1.6\,\mu m$	$< 4\,\mu m$	$< 8\,\mu m$	$< 20 \dots 40\,\mu m$
Temperature stability [4]	$\pm 0.005\ \%$ FSO / K						
Light spot diameter ($\pm 10\ \%$) [5] — SMR	$60 \times 75\,\mu m$	$115 \times 150\,\mu m$	$200 \times 265\,\mu m$	$220 \times 300\,\mu m$	$310 \times 460\,\mu m$	$950 \times 1200\,\mu m$	$950 \times 1200\,\mu m$
MMR	$55 \times 65\,\mu m$	$60 \times 65\,\mu m$	$70 \times 75\,\mu m$	$95 \times 110\,\mu m$	$140 \times 170\,\mu m$		
EMR	$65 \times 75\,\mu m$	$120 \times 140\,\mu m$	$220 \times 260\,\mu m$	$260 \times 300\,\mu m$	$380 \times 410\,\mu m$		
smallest diameter	$55 \times 65\,\mu m$ with 16 mm	$60 \times 65\,\mu m$ with 25 mm	$65 \times 70\,\mu m$ with 35 mm	$85 \times 90\,\mu m$ with 55 mm	$120 \times 125\,\mu m$ with 75 mm	-	-
Light source	Semiconductor laser < 1 mW, 670 nm (red)						
Laser safety class	Class 2 in accordance with DIN EN 60825-1: 2015-07						
Permissible ambient light	50,000 lx				30,000 lx	10,000 lx	
Supply voltage	11 … 30 VDC						
Power consumption	< 3 W (24 V)						
Signal input	1 x HTL/TTL laser on/off; 1 x HTL/TTL multi-function input: trigger in, slave in, zero setting, mastering, teach-in; 1 x RS422 synchronization input: trigger in, sync in, master/slave, master/slave alternating						
Digital interface	RS422 (18 bit) / PROFINET [6] / EtherNet/IP [6]						
Analog output	4 ... 20 mA / 0 … 5 V / 0 … 10 V (16 bit, freely scalable within the measuring range)						
Switching output	2x switching outputs (error & limit value): npn, pnp, push pull						
Synchronization	possible for simultaneous or alternating measurements						
Connection	integrated cable 3 m, open ends, min. bending radius 30 mm (fixed installation); or integrated pigtail 0.3 m with 17-pin M12 plug; optional extension to 3 m / 6 m / 9 m / 15 m possible (suitable connection cable see Accessories)						
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)	30 g / 20 … 500 Hz						
Protection class (DIN EN 60529)	IP67						
Material	Aluminum housing						
Weight	approx. 185 g (incl. pigtail), approx. 300 g (incl. cable)						
Control and display elements	Select & function keys: interface selections, mastering (zero), teach, presets, quality slider, frequency selection, factory settings; web interface for setup [7]: application-specific presets, peak selection, video signal, freely selectable averaging possibilities, data reduction, setup management; 2 x color LEDs for power / status						

FSO = Full Scale Output
SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range
The specified data apply to a white, diffuse reflecting surface (Micro-Epsilon reference ceramic for ILD sensors)
[1] Factory setting: measuring rate 4 kHz, median 9; modifying the factory setting requires the IF2001/USB converter (see accessories)
[2] Relates to digital output
[3] Typical value with measurements at 4 kHz and median 9
[4] Relates to digital output in mid of measuring range
[5] Light spot diameter determined using a point-shaped laser with Gaussian fit (full 1/e² width); for ILD1900-2: determined with emulated 90/10 knife-edge method
[6] Connection via interface module (see accessories)
[7] Connection to PC via IF2001/USB (see accessories)

Accessories for all optoNCDT series

Power supply
- 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)

Accessories for 1220/1320 series

Protective film
- Transparent protective film 32 x 11 mm for ILD1x20

Accessories for 1420 series

Supply and output cable (drag-chain suitable)
- PCF1420-1/I (1 m, output 4 ... 20 mA)
- PCF1420-1/I(01) (1 m, output 4...20 mA)
- PCF1420-3/I (3 m, output 4 ... 20 mA)
- PCF1420-6/I (6 m, output 4 ... 20 mA)
- PCF1420-10/I (10 m, output 4 ... 20 mA)
- PCF1420-15/I (15 m, output 4 ... 20 mA)
- PCF1420-3/U (3 m, with integrated resistor, output 1 ... 5 VDC)*
- PCF1420-6/U (6 m, with integrated resistor, output 1 ... 5 VDC)*
- PCF1420-10/U (10 m, with integrated resistor, output 1 ... 5 VDC)*
- PCF1420-15/U (15 m, with integrated resistor, output 1 ... 5 VDC)*
- PCF1420-3/IF2008 (3 m, interface and supply cable)
- PCF1420-6/IF2008 (6 m, interface and supply cable)
- PCF1420-10/IF2008 (10 m, interface and supply cable)
- PCF1420-3/C-Box (3 m)
* on request with output 2 ...10 VDC

Supply and output cable, suitable for use with robots
(available in 90° version)
- PCR1402-3/I (3 m)
- PCR1402-6/I (6 m)
- PCR1402-8/I (8 m)

Protective film
Transparent protective film 32 x 11mm for ILD1x20

Accessories for 1710/1750 series

Supply and output cable (drag-chain suitable)
- PC1700-3 (3 m)
- PC1700-10 (10 m)
- PC1700-10/IF2008 (10 m, for use with interface card IF2008)
- PC1750-3/C-Box (3 m)
- PC1750-6/C-Box (6 m)
- PC1750-9/C-Box (9 m)

Supply and output cable (suitable for use with robots)
- PCR1700-5 (5 m)
- PCR1700-10 (10 m)

Supply and output cables for temperatures up to 200 °C
- PC1700-3/OE/HT (3 m)
- PC1700-6/OE/HT (6 m)
- PC1700-15/OE/HT (15 m)

Protective housings
- SGH model (sizes S and M)
- SGHF model (sizes S and M)
- SGHF-HT model

Accessories for 1900 series

Supply and output cable (drag-chain suitable)
- PC1900-3/IF2008 Supply/output cable 3 m
- PC1900-6/IF2008 Supply/output cable 6 m
- PC1900-9/IF2008 Supply/output cable 9 m
- PC1900-15/IF2008 Supply/output cable 15 m
- PC1900-3/C-Box Power/output cable 3 m
- PC1900-6/C-Box Power/output cable 6 m
- PC1900-9/C-Box Power/output cable 9 m
- PC1900-15/C-Box Power/output cable 15 m
- PC1900-3/OE Supply/output cable 3 m
- PC1900-6/OE Supply/output cable 6 m
- PC1900-9/OE Supply/output cable 9 m
- PC1900-15/OE Supply/output cable 15 m

Accessories for 2300/2310 series

Supply and output cable
- PC2300-0,5Y (connection cable to PC or PLC; for operation a PC2300-3/SUB-D will be required in addition)
- PC2300-3/SUB-D (3 m; for operation a PC2300-0,5Y will be required in addition)
- PC2300-3/IF2008 (interface and supply cable)
- PC2300-3/OE (3 m)
- PC2300-6/OE (6 m)
- PC2300-9/OE (9 m)
- PC2300-15/OE (15 m)
- PC2300-3/C-Box/RJ45 (3 m)
* other cable lengths on request

Supply and output cables for temperatures up to 200 °C
- PC2300-3/OE/HT (3 m)
- PC2300-6/OE/HT (6 m)
- PC2300-9/OE/HT (9 m)
- PC2300-15/OE/HT (15 m)

Protective housings
- SGH model (sizes S and M)
- SGHF model (sizes S and M)
- SGHF-HT model

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.
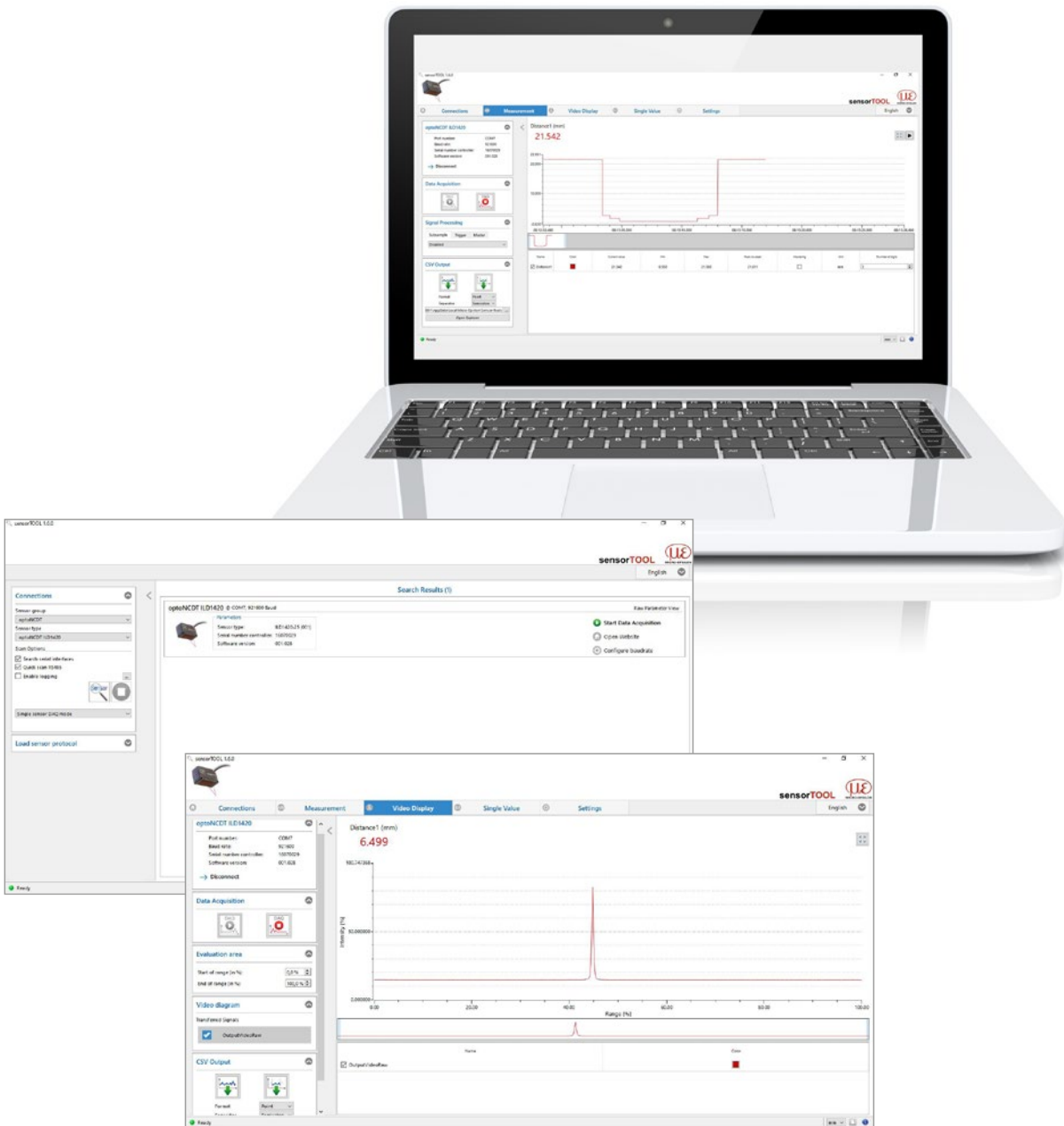
Free download

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.com/download

Accessories
optoNCDT

Protective housings for demanding environments
To protect the optoNCDT laser sensors in harsh environments, protective housings are available in different designs.

SGH model:
The SGH protective housing encloses the sensor and is equipped with a replaceable protective window. The water-resistant housing protects the sensor from solvents and detergents.

Size S for the following models:
- 1750-20BL and 1750-200BL
- 2300-2, 2300-5, 2300-10, 2300-20, 2300-50 and 2300-100
- 2300-2LL, 2300-10LL, 2300-20L and 2300-50LL
- 2300-2BL, 2300-5BL and 2300-10BL

Size M for the following models:
- 1750-500BL and 1750-750BL
- 1750 500 and 1750-750
- 2300-200 and 2300-300
- 2310-10, 2310-20 and 2310-40

SGHF model:
With window and compressed-air connection ideal for high ambient temperatures. The integrated air cooling of the housing offers optimum protection for the sensor.

Size S for the following models:
- 1750-20BL and 1750-200BL
- 2300-2, 2300-5, 2300-10, 2300-20, 2300-50 and 2300-100
- 2300-2LL, 2300-10LL, 2300-20L and 2300-50LL
- 2300-2BL, 2300-5BL and 2300-10BL

Size M for the following models:
- 1750-500BL and 1750-750BL
- 1750 500 and 1750-750
- 2300-200 and 2300-300
- 2310-10, 2310-20 and 2310-40

SGHF-HT model:
This water-cooled protective housing with window and compressed-air connection is designed for measurement tasks in ambient temperatures up to 200 °C.

For the following models:
- 1710-50 and 1710-1000
- 1710-50BL and 1710-1000BL
- 1750-500 and 1750-750
- 1750-500BL and 1750-750BL
- 2300-200 and 2300-300
- 2310-50BL
- 2310-10, 2310-20, 2310-40 and 2310-50

Maximum temperature of cooling water T(max) = 10 °C
Minimum water flow rate Q(min) = 3 liters/min

SGH size S (140 x 140 x 71 mm)

SGH size M (180 x 140 x 71 mm)

SGHF size S (140 x 140 x 71 mm)

SGHF size M (180 x 140 x 71 mm)

SGHF-HT (260 x 180 x 154 mm)

Interface modules

| Module	optoNCDT 1220	optoNCDT 1320	optoNCDT 1420	optoNCDT 1710	optoNCDT 1750	optoNCDT 1900	optoNCDT 2300	optoNCDT 2310
C-Box/2A Controller unit for evaluation and signal conversion of up to 2 sensor signals	⊘	⊘	✔	⊘	✔	✔	✔	✔
IF2001/USB RS422/USB converter to transform a digital signal to USB	✔	✔	✔	✔	✔	✔	✔	✔
IC2001/USB Single-channel RS422/USB converter cable	✔	✔	✔	✔	✔	✔	✔	✔
IF2004/USB RS422/USB converter to convert up to 4 digital signals to USB	⊘	⊘	✔	✔	✔	✔	✔	✔
IF2008/ETH Interface module for Ethernet connection for up to 8 sensors	⊘	⊘	✔	⊘	✔	✔	✔	✔
IF2008PCIE Interface card for multiple sensor signals; analog and digital interfaces	⊘	⊘	✔	✔	✔	✔	✔	✔
IF2030/PNET Interface module for Industrial Ethernet connection (PROFINET)	✔	✔	✔	⊘	✔	✔	✔	✔
IF2030/ENETIP Interface module for Industrial Ethernet connection (EtherNet/IP)	✔	✔	✔	⊘	✔	✔	✔	✔

C-Box/2A Controller for D/A conversion and evaluation of up to 2 sensor signals

C-Box/2A is used for fast D/A conversion of two digital input signals or for evaluating two digital sensor signals. The controller is compatible with the optoNCDT 1420, 1750, 1900 and 2300 models. Handling of the C-Box/2A and of the connected sensors are performed via web interface. Averaging functions, thickness, diameter, step and inclinations can be calculated. The D/A conversion is executed at 16 bit and max. 70 kHz.

Special features
- 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 sensors or C-Box/2A status
- Parallel data output via three output interfaces
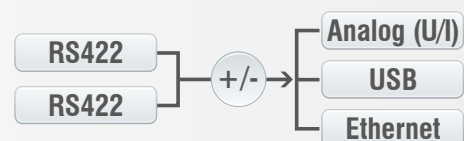
### IF2030
Interface module for Industrial Ethernet connection

The IF2030 interface modules are designed for easy connection of Micro-Epsilon sensors to Ethernet-based fieldbuses, e.g., plant control systems. The PROFINET and Ethernet/IP modules are compatible with sensors that output data via an RS422 or RS485 interface. These modules operate on the sensor side with up to 4 MBd and have two network connections for different network topologies. Installation in control cabinets is via a DIN rail.
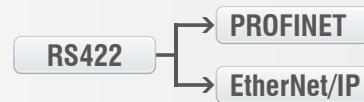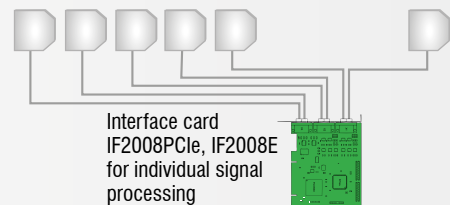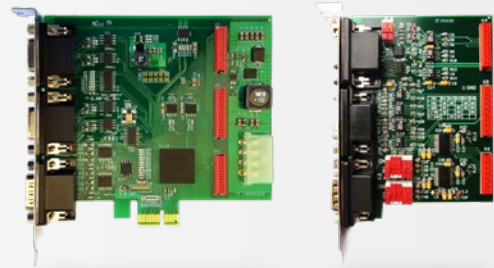

IF2008PCIe / IF2008E
Interface card for synchronous data acquisition

Absolute synchronous data acquisition is a decisive factor for the planarity or thickness measurement using several laser sensors. The IF2008PCIe interface card is designed for installation in PCs and enables the synchronous capture of four digital sensor signals and two encoders. The data is stored in a FIFO memory in order to enable resource-saving processing in blocks in the PC. The IF2008E expansion board enables to detect in addition two digital sensor signals, two analog sensor signals and eight I/O signals.

Special features
- IF2008PCIe - Basic printed circuit board:
  4 digital signals and 2 encoders
- IF2008E - Expansion board:
  2x digital signals, 2x analog signals and 8x I/O signals

Interface card IF2008PCIe, IF2008E for individual signal processing

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

The IF2008/ETH integrates up to eight sensors and/or encoders with an RS422 interface into an Ethernet network. Four programmable switching in-/outputs (TTL and HTL logic) are available. Ten indicator LEDs directly on the module show both the channel and the device status. In addition, acquisition and output of data via Ethernet is in addition performed at high speeds up to 200 kHz. Parameter setting of the interface module can be easily done via the web interface.
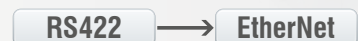
IC2001/USB Single-channel converter cable RS422/USB

The IC2001/USB single-channel converter cable is used for the USB connection of optoNCDT sensors equipped with an RS422 interface. The cable is easy to assemble and can therefore also be used for installation in machines and systems.

Special features

- 5-core interface cable without outer shield
- Conversion from RS422 to USB
- Easy sensor connection via USB
- Supports baud rates from 9.6 kBaud to 1 MBaud

RS422 → USB

IF2001/USB converter RS422 to USB

The RS422/USB converter transforms digital signals from a laser-optical sensor into a USB data packet. The sensor and the converter are connected via the RS422 interface of the converter.

Data output is done via USB interface. The converter loops through further signals and functions such as laser on/off, switch signals and function output. The connected sensors and the converter can be programmed through software.

Special features

- Robust aluminum housing
- Easy sensor connection via screw terminals (plug & play)
- Conversion from RS422 to USB
- Supports baud rates from 9.6 kBaud to 12 MBaud
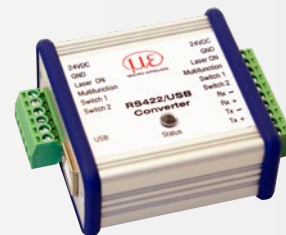
RS422 → USB

IF2004/USB: 4-channel converter from RS422 to USB

The RS422/USB converter is used for transforming digital signals from up to four optical sensors into USB data signals. The converter has four trigger inputs and a trigger output for connecting additional converters. Data is output via an USB interface. The connected sensors and the converter can be programmed through software.

Special features

- 4x digital signals via RS422
- 4x trigger inputs, 1x trigger output
- Synchronous data acquisition
- Data output via USB

RS422
RS422
RS422 → USB
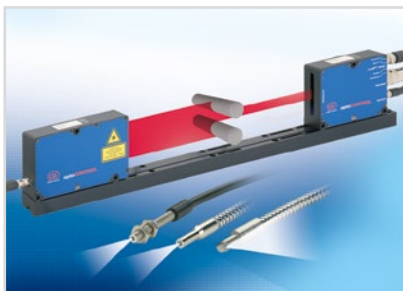RS422
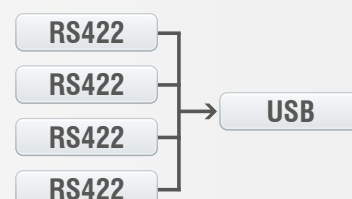
Sensors and Systems from Micro-Epsilon

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

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