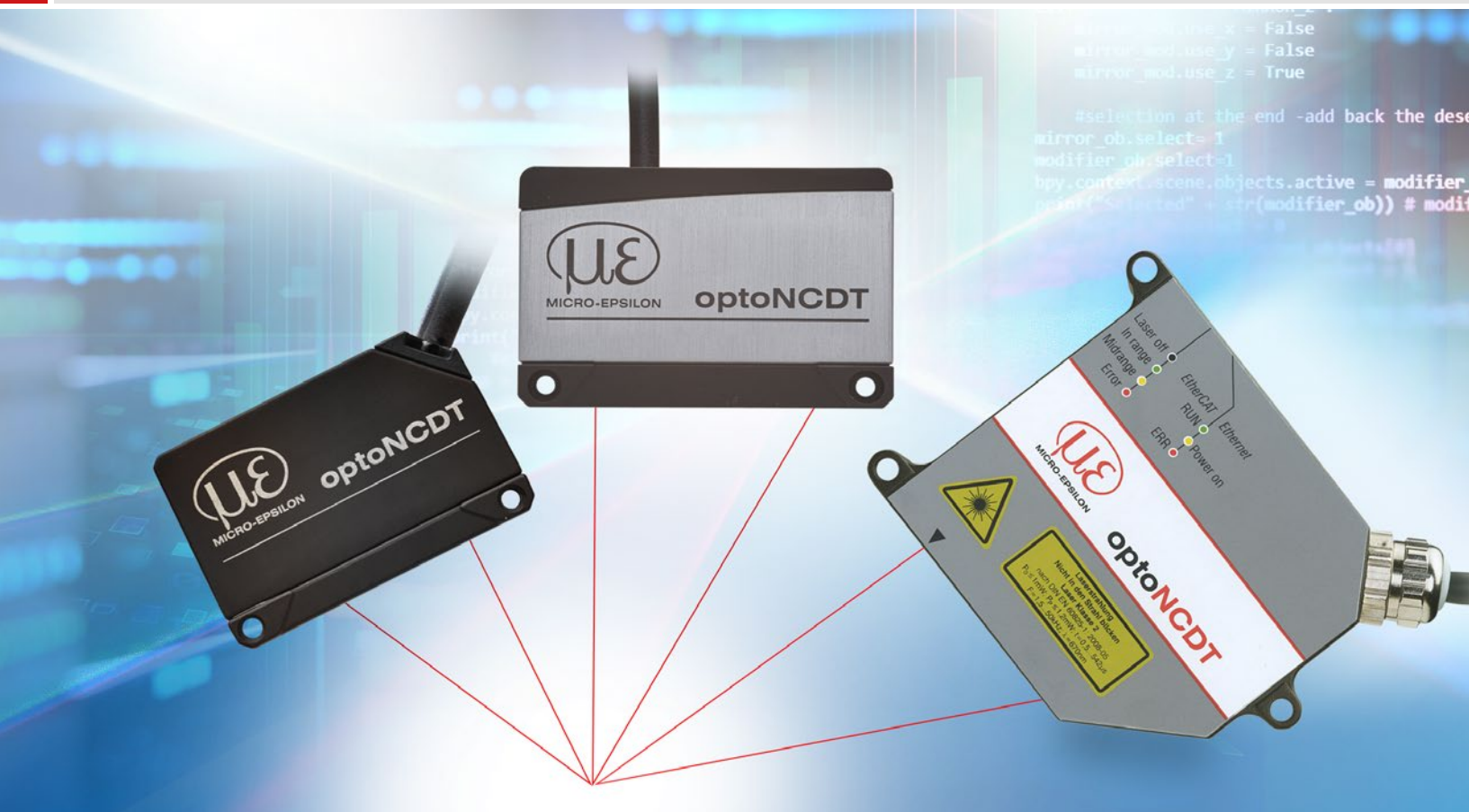












More Precision

optoNCDT // Laser displacement sensors (triangulation)



Smart laser sensors for precise measurements optoNCDT 1900

designed for advanced
AUTOMATION

-  For common surfaces
-  Measuring rate up to 10 kHz
-  **INTER FACE** Analog (U/I) / RS422 / PROFINET / EtherNet/IP / EtherCAT
-  **ASc** Advanced Surface Compensation
-  Repeatability $<0.1 \mu\text{m}$
-  Ideal for series and OEM applications
-  Highest immunity to ambient light
-  High resistance to shocks and vibrations

Next-generation laser sensors

The optoNCDT 1900 laser sensors are used for dynamic displacement, distance and position measurements and offer a unique combination of performance, design and integration capability. The integrated high-performance controller enables fast and highly precise processing and output of measurement values. These innovative sensors are used whenever maximum precision is combined with the latest technology, e.g., in sophisticated automation, automotive production, 3D printing and coordinate measuring machines.

Advanced Surface Compensation –

The intelligent exposure control for demanding surfaces

The optoNCDT 1900 laser sensors are equipped with an intelligent surface control feature. Innovative algorithms enable 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, these are the sensors with the highest resistance to ambient light in their class and can even be used in strongly illuminated environments.

Industrial Ethernet for easy integration

The latest optoNCDT 1900 laser triangulation sensors are also available with integrated Industrial Ethernet interface. Depending on the model, you can integrate the full sensor performance into your PLC directly via EtherCAT, EtherNet/IP or PROFINET without any additional interface module. You benefit from real-time data without time delay as well as reduced installation and wiring effort.





Advanced Surface Compensation

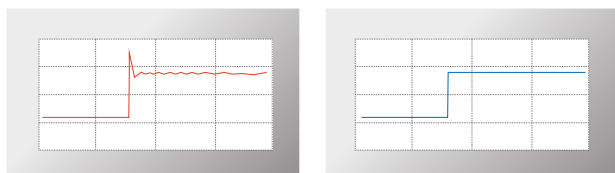
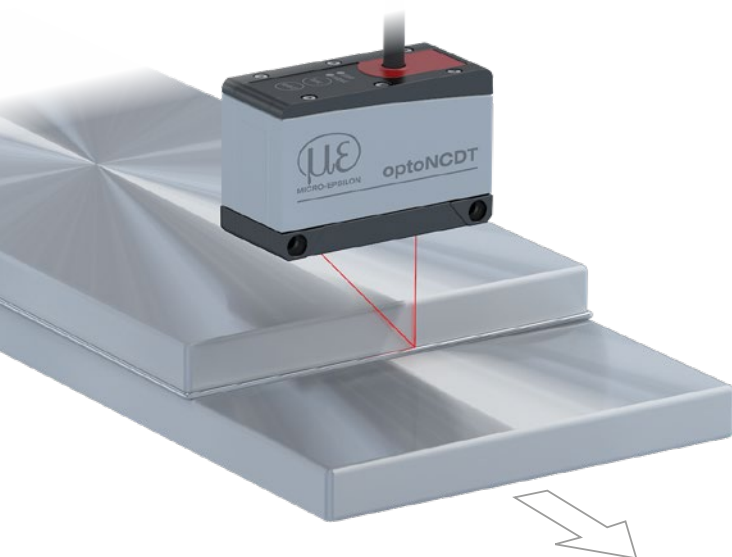
With rapidly changing surfaces, the exposure control enables reliable measurement results.

EtherCAT®

EtherNet/IP®

PROFI
NET®

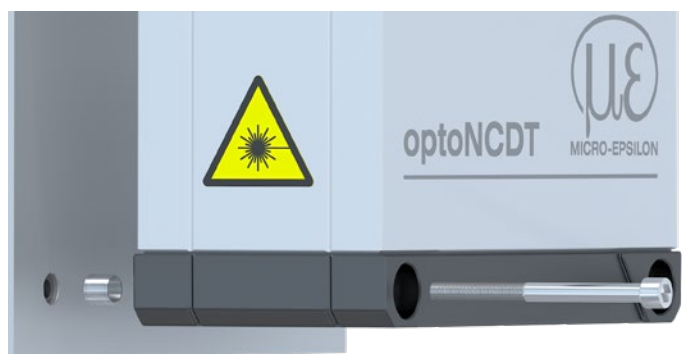
| Model | Technology | Measuring range | Repeatability | Linearity |
|-----------------|---|-----------------|-------------------|-------------|
| optoNCDT 1900 |  | 2 - 500 mm | 0.1 μm | from 0.02 % |
| optoNCDT 1900LL |  | 2 - 50 mm | 0.1 μm | from 0.02 % |



The two-step measurement value averaging enables smooth signal courses when measuring edges (right). Otherwise, interfering signals occur (left).

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.



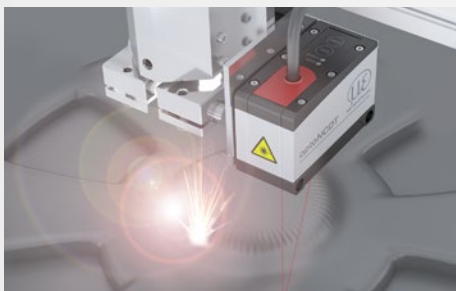
Patented installation

Easy mounting and high repeatability when replacing the sensor

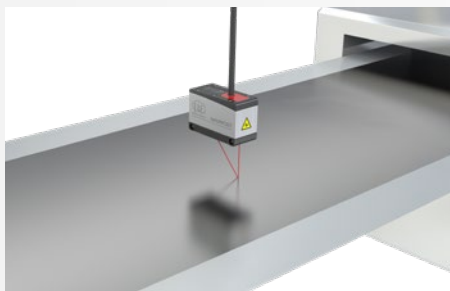
Simple mounting and initial operation

Mounting the sensor using fitting sleeves automatically aligns the sensor in the correct position. This enables both easy sensor replacement and even higher precision in solving measurement tasks. Thanks to its small dimensions, the laser sensor can also be integrated in confined spaces.

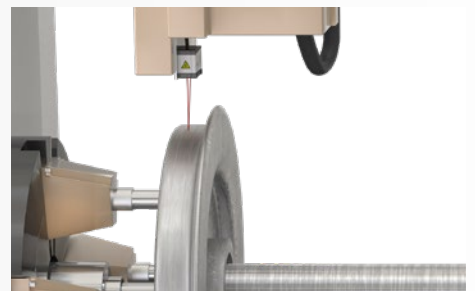
Application examples



Distance measurement of print heads



Thickness measurement of electrode film



Wear inspection of wheel tires

optoNCDT 1900 with integrated Industrial Ethernet interface (General technical data)



| Model | | ILD1900-xx with integrated Industrial Ethernet interface |
|---|-----------|--|
| Measuring rate ^[1] | | 7 adjustable stages: 10 kHz / 8 kHz / 4 kHz / 2 kHz / 1 kHz / 500 Hz / 250 Hz |
| Temperature stability ^[2] | | ±0.005 % FSO / K |
| Light source | | Semiconductor laser ≤ 1 mW, 670 nm (red) with laser class 2 |
| Laser class | | Class 2 in accordance with IEC 60825-1: 2014 (Class 3 available on request) |
| Supply voltage ^[3] | | 11 ... 30 VDC or PoE |
| Power consumption | | < 3 W (24 V) |
| Signal input | | 1 x HTL/TTL Laser on/off |
| Digital interface | | EtherCAT / EtherNet/IP / PROFINET |
| Connection | | integrated pigtail 0.3 m with 12-pin M12 plug; optional extension to 3 m / 6 m / 9 m (see accessories for suitable connection cables) |
| 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) |
| Control and indicator elements ^[4] | | Select key: factory settings, switching the operation mode; web interface for setup: application-specific presets, peak selection, video signal, freely selectable averaging possibilities, data reduction, setup management; 1 x color LED for power / status; 2 x color LEDs for fieldbus status |

^[1] Maximum measuring rate depending on fieldbus and bus cycle time; factory settings: measuring rate 4 kHz, median 9

^[2] In the mid of the measuring range; the specified value is only achieved by mounting on a metallic sensor holder.

Good heat dissipation from the sensor to the holder must be ensured; value is valid in a range from 20 °C to 50 °C

^[3] PoE not possible with PROFINET

^[4] Connection to PC via network cable (with EtherCAT: sensor in Ethernet setup mode)

Technical data

optoNCDT 1900



Laser point - optoNCDT 1900 / Measuring ranges 2 - 25

| Model | | ILD1900-2 | ILD1900-6 | ILD1900-10 | ILD1900-25 |
|------------------------------------|------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Measuring range | | 2 mm | 6 mm | 10 mm | 25 mm |
| Start of measuring range | | 15 mm | 17 mm | 20 mm | 25 mm |
| Mid of measuring range | | 16 mm | 20 mm | 25 mm | 37.5 mm |
| End of measuring range | | 17 mm | 23 mm | 30 mm | 50 mm |
| Linearity ^[1] | | < ±1 µm | < ±1.8 µm | < ±2 µm | < ±5 µm |
| | | < ±0.05 % FSO | < ±0.03 % FSO | < ±0.02 % FSO | < ±0.02 % FSO |
| Repeatability ^[2] | | < 0.1 µm | < 0.25 µm | < 0.4 µm | < 0.8 µm |
| Light spot diameter ^[3] | SMR | 60 x 75 µm | 85 x 105 µm | 115 x 150 µm | 200 x 265 µm |
| | MMR | 55 x 65 µm | 57 x 60 µm | 60 x 65 µm | 70 x 75 µm |
| | EMR | 65 x 75 µm | 105 x 120 µm | 120 x 140 µm | 220 x 260 µm |
| | smallest Ø | 55 x 65 µm with 16 mm | 57 x 60 µm with 20 mm | 60 x 65 µm with 25 mm | 65 x 70 µm with 35 mm |
| Permissible ambient light | | 50,000 lx | | | |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

^[2] Typical value with measurements at 4 kHz and median 9

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

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



Laser point - optoNCDT 1900 / Measuring ranges 50 - 500

| Model | | ILD1900-50 | ILD1900-100 | ILD1900-200 | ILD1900-500 |
|------------------------------------|------------|-----------------------|-------------------------|---------------|----------------|
| Measuring range | | 50 mm | 100 mm | 200 mm | 500 mm |
| Start of measuring range | | 40 mm | 50 mm | 60 mm | 100 mm |
| Mid of measuring range | | 65 mm | 100 mm | 160 mm | 350 mm |
| End of measuring range | | 90 mm | 150 mm | 260 mm | 600 mm |
| Linearity ^[1] | | < ±10 µm | < ±30 µm | < ±100 µm | < ±400 µm |
| | | < ±0.02 % FSO | < ±0.03 % FSO | < ±0.05 % FSO | < ±0.08 % FSO |
| Repeatability ^[2] | | < 1.6 µm | < 4 µm | < 8 µm | < 20 ... 40 µm |
| Light spot diameter ^[3] | SMR | 220 x 300 µm | 310 x 460 µm | 950 x 1200 µm | 950 x 1200 µm |
| | MMR | 95 x 110 µm | 140 x 170 µm | | |
| | EMR | 260 x 300 µm | 380 x 410 µm | | |
| | smallest Ø | 85 x 90 µm with 55 mm | 120 x 125 µm with 75 mm | - | - |
| Permissible ambient light | | 50,000 lx | 30,000 lx | 10,000 lx | 10,000 lx |

^[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

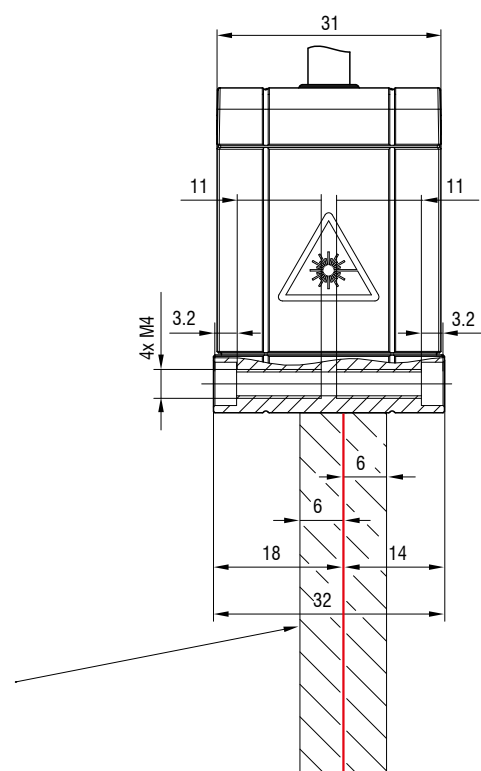
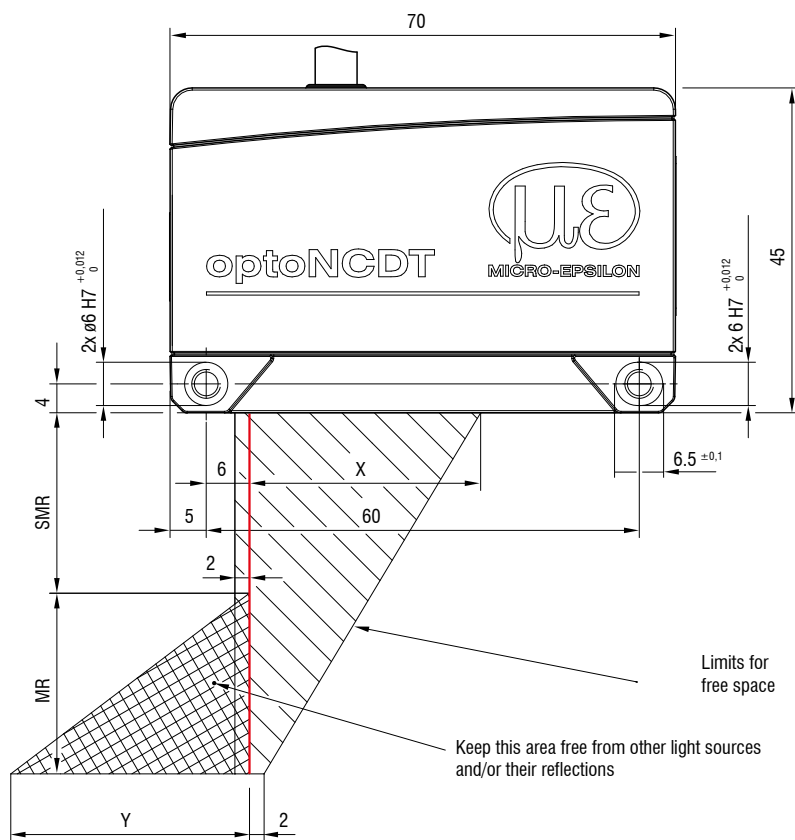
^[2] Typical value with measurements at 4 kHz and median 9

^[3] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

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

Dimensions

optoNCDT 1900



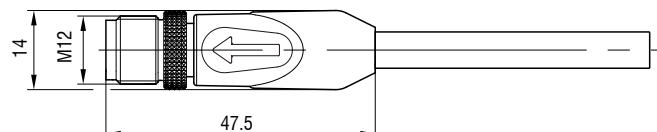
| MR | SMR | X | Y |
|-----|-----|----|-----|
| 2 | 15 | 23 | 3 |
| 6 | 17 | 27 | 9 |
| 10 | 20 | 33 | 14 |
| 25 | 25 | 33 | 33 |
| 50 | 40 | 36 | 45 |
| 100 | 50 | 37 | 75 |
| 200 | 60 | 39 | 130 |
| 500 | 100 | 43 | 215 |

(Dimensions in mm, not to scale)

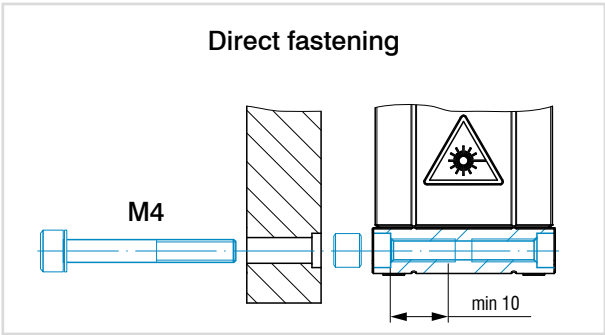
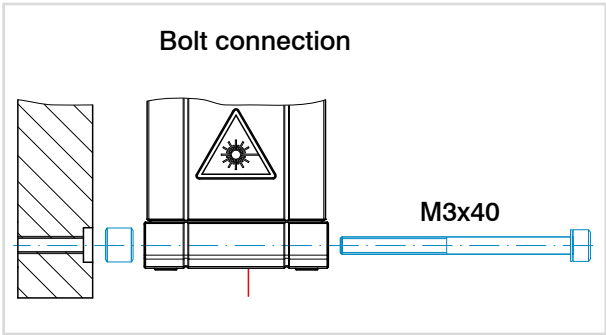
MR = measuring range; SMR = start of measuring range

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

Connector (sensor side)



Installation options



Accessories for optoNCDT 1900/1910

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)

Protective film

Transparent protective film 52 x 15 mm for ILD1900

Protective housings

with air purge and cooling, see page 62

Scope of supply

- 1 Sensor ILD1900/1910
- 1 Assembly instructions
- 1 Calibration protocol
- Accessories (2 pc. centering sleeves, 2 pc. M3 x 40)

Article designation




| | | | | |
|---|---|----|------|---|
| ILD1900- | 6 | LL | CL3B | EtherCAT |
| | | | | Interface No indication: RS422, current, voltage (standard) integrated fieldbus: EtherCAT, EtherNet/IP, PROFINET |
| | | | | Laser class No indication: class 2 (standard) 3B: on request 3R: on request |
| | | | | Laser type No indication: Red laser point (standard) LL: Laser Line |
| | | | | Measuring range in mm |
| Series ILD1900: Laser displacement sensor for Advanced Automation | | | | |

Connection possibilities

optoNCDT 1900







Connection possibilities for sensors with integrated cables

| | |
|--------------------|--|
| Cable diameter: | 5.80 ±0.2 mm |
| Drag chain: | yes |
| Robot: | no |
| Temperature range: | -25 ... 80 °C (moving) -40 ... 80 °C (not moving) |
| Bending radius: | > 30 mm (fixed installation) > 75 mm (dynamic) |

| Sensor | Cables | Type | Connection possibilities and accessories |
|---|--------------------------------|-----------|--|
| LD1900-xx ILD1900-xxLL ILD1910-xx | Integrated cable length 3 m | Open ends | <div> Supply voltage connection Power supply unit PS2020  </div> <div> Interface module of RS422 to USB IF2001/USB IC2001/USB  </div> <div> Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT  </div> |

Drag-chain suitable connection cables for sensors with pigtail

| | |
|--------------------|--|
| Cable diameter: | 6.7 ±0.2 mm |
| Drag chain: | yes |
| Robot: | no |
| Temperature range: | -25 ... 80 °C (moving) (up to +105 °C for max. 3000 hrs) -40 ... 80 °C (not moving) |
| Bending radius: | > 34 mm (fixed installation) > 67 mm (dynamic) > 81 mm (drag chain) |

| Sensor | Cables | Type | Connection possibilities and accessories | |
|--|--|-----------|---|---|
| ILD1900-xx ILD1900-xxLL ILD1910-xx | Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m <i>Art. no.</i> <i>Designation</i> 29011218 PC1900-3/OE 29011219 PC1900-6/OE 29011220 PC1900-9/OE 29011221 PC1900-15/OE | Open ends | Connection supply voltage PS2020 |  |
| | Interface module of RS422 to USB IF2001/USB IC2001/USB | |  | |
| | Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT | |  | |
| | Adapter cable for PC interface card Length 3 m / 6 m / 9 m / 15 m <i>Art. no.</i> <i>Designation</i> 29011316 PC1900-3/IF2008 PCIE 29011317 PC1900-6/IF2008 PCIE 29011318 PC1900-9/IF2008 PCIE 29011319 PC1900-15/IF2008 PCIE | Sub-D | Interface card for synchronous data acquisition IF2008PCle / IF2008E |  |
| | 4-fold interface module from RS422 to USB IF2004/USB | |  | |
| | Adapter cable for sensor calculation Length 3 m / 6 m / 9 m / 15 m <i>Art. no.</i> <i>Designation</i> 29011320 PC1900-3/C-Box 29011321 PC1900-6/C-Box 29011322 PC1900-9/C-Box 29011323 PC1900-15/C-Box | 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 <i>Art. no.</i> <i>Designation</i> 29011326 PCE1900-3/M12 | | M12 | Interface module for Ethernet connection of up to 8 sensors IF2008/ETH |

Robot-suitable connection cables

| | |
|--------------------|--|
| Cable diameter: | approx. 7.3 mm |
| Drag chain: | no |
| Robot: | yes |
| Temperature range: | -40 ... 90 °C (moving) -50 ... 90 °C (not moving) |
| Bending radius: | > 37 mm (fixed installation) > 73 mm (dynamic) |

| Sensor | Cables | Type | Connection possibilities and accessories |
|---|--|-----------|--|
| LD1900-xx ILD1900-xxLL ILD1910-xx | Extension cable pigtail Length 3 m / 6 m / 9 m / 15 m | Open ends | Connection supply voltage PS2020 |
| | <i>Art. no.</i> <i>Designation</i> 29011404 PC1900R-3/OE | | Interface module of RS422 to USB IF2001/USB IC2001/USB |
| | 29011405 PC1900R-6/OE | | |
| | 29011406 PC1900R-9/OE | | Interface module for Industrial Ethernet connection IF2035-PROFINET IF2035-EIP IF2035-EtherCAT |
| | 29011407 PC1900R-15/OE | | |

Connection cables for sensors with integrated Industrial Ethernet interface

| | |
|--------------------|--|
| Cable diameter: | 7.5 ±0.2 mm |
| Drag chain: | yes |
| Robot: | no |
| Temperature range: | -40 ... 90 °C (moving) -50 ... 90 °C (not moving) |
| Bending radius: | > 38 mm (fixed installation) > 75 mm (dynamic) |

| Sensor | Cables | Type | Connection possibilities and accessories |
|--|--|---------------------|--|
| ILD1900-xx-PROFINET* ILD1900-xxLL-PROFINET* | Connection cables PoE, laser On/Off hardware Length 3 m / 6 m / 9 m / 15 m | Open ends & RJ45 | Signal / Supply PoE optional: PoE Switch |
| ILD1900-xx-EtherCAT | <i>Art. no.</i> <i>Designation</i> 29011332 PC1900-IE-3/OE-RJ45 | | |
| ILD1900-xxLL-EtherCAT | 29011333 PC1900-IE-6/OE-RJ45 | | |
| ILD1900-xx-EtherNet/IP | 29011334 PC1900-IE-9/OE-RJ45 | | |
| ILD1900-xxLL-EtherNet/IP | 29011444 PC1900-IE-15/OE-RJ45 | RJ45 | |
| ILD1900-xx-EtherCAT | Connection cables PoE, laser On/Off Software Length 3 m / 6 m / 9 m / 15 m | | |
| ILD1900-xxLL-EtherCAT | <i>Art. no.</i> <i>Designation</i> 29011338 PC1900-IE-3/RJ45 | | |
| ILD1900-xx-EtherNet/IP | 29011355 PC1900-IE-6/RJ45 | | |
| ILD1900-xxLL-EtherNet/IP | 29011356 PC1900-IE-9/RJ45 | | |
| | 29011445 PC1900-IE-15/RJ45 | | |

*PoE not possible with PROFINET

Other cables

| | |
|--------------------|---|
| Cable diameter: | 6.7 mm |
| Drag chain: | yes |
| Robot: | no |
| Temperature range: | -40 ... 80 °C |
| Bending radius: | > 27 mm (fixed installation) > 51 mm (dynamic) |

| Input | Cables | Type | Connection possibilities and accessories |
|---|--|-------|--|
| 2 x Sub-D (PC1900-X/ IF2008 PCIE) | Adapter cable for the connection of two sensors per Sub-D connector Length 0.1 m | Sub-D | Interface card for synchronous data acquisition IF2008PCIE / IF2008E |
| | <i>Art. no.</i> <i>Designation</i> 2901528 IF2008-Y-adapter cable | | 4-fold USB converter & parameter setting IF2004/USB |

IF2035: Interface module for Industrial Ethernet connection

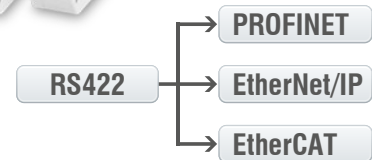
- Connection of RS422 or RS485 interfaces to PROFINET / Ethernet/IP / EtherCAT
- Synchronization output for RS422 sensors
- 2 network connections for different network topologies
- Data rate up to 4 MBaud
- 4-fold oversampling (with EtherCAT)
- Ideal for confined spaces due to a compact housing and DIN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



EtherCAT®

EtherNet/IP®

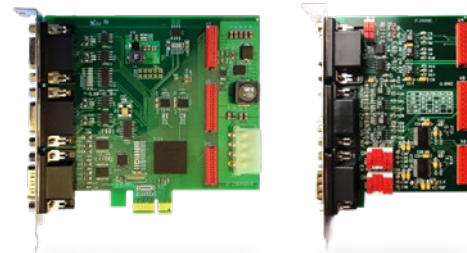
PROFI
NET®



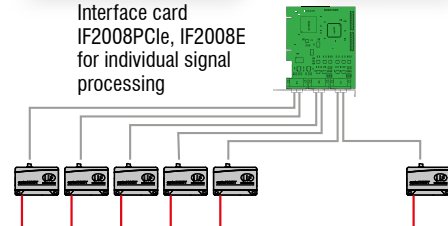
IF2008PCle/IF2008E:

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)

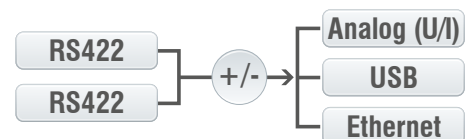


Interface card
IF2008PCle, IF2008E
for individual signal
processing



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 / ± 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-adapter cable

Protective housings for demanding environments

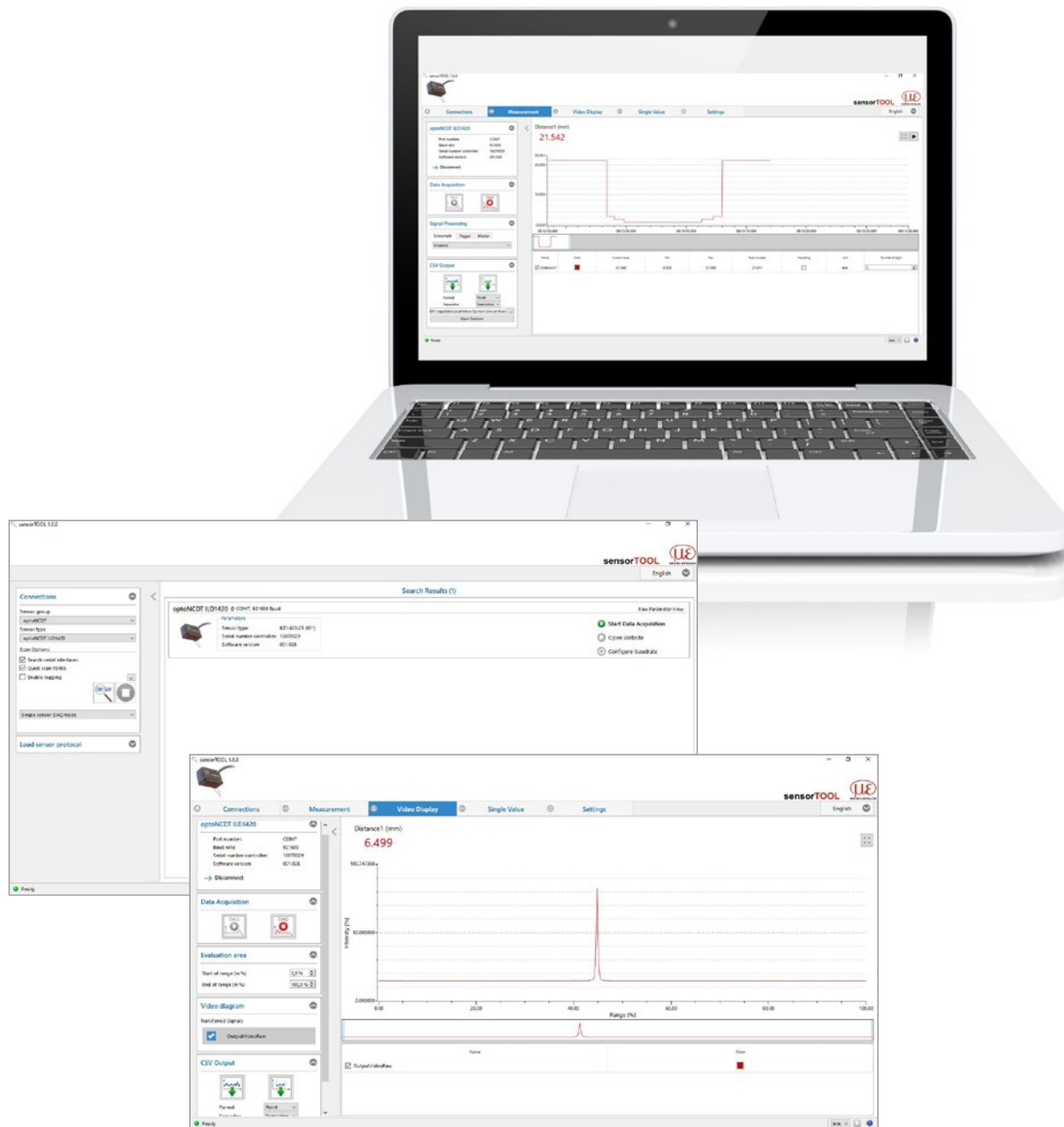
optoNCDT

| 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 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

Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



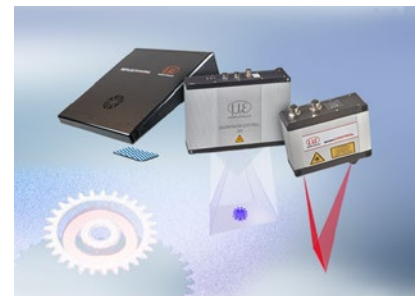
Measuring and inspection systems for metal strips, plastics and rubber



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