









# More Precision

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



# High precision laser sensors in miniature design optoNCDT 1220 / 1320 / 1420

designed for advanced  
**AUTOMATION**

-  Measuring rate up to 8 kHz
-  **INTER FACE** Analog (U/I) / RS422 / PROFINET / EtherNet/IP / EtherCAT
-  **ASC** Active Surface Compensation
-  Repeatability 0.5  $\mu\text{m}$
-  Ideal for series and OEM applications
-  Low weight, ideal for high accelerations



## Best in Class:

### Compact, precise and faster






The optoNCDT 1x20 laser sensors are among the best in their class. The sensors offer a unique combination of speed, size and performance. The laser sensors are used for the precise measurement of displacement, distance and position in all fields of automation technology, such as machine building, 3D printers and robotics.

The optoNCDT 1x20 sensors use an intelligent surface control feature. The Active Surface Compensation (ASC) ensures stable measurement results regardless of changing colors or brightness of the target surface.

### Ideal for industrial series applications

Different output signals enable the sensor to be integrated into plant and machine control systems. As well as analog voltage and current outputs, a digital RS422 interface provides distance information from the sensor.

Due to the universal setting and evaluation possibilities, the optoNCDT 1x20 sensors meet all the requirements for use in industrial series and OEM applications.

| Model            | Technology  | Measuring range | Repeatability     | Linearity   |
|------------------|---|-----------------|-------------------|-------------|
| optoNCDT 1220    |  | 10 - 500 mm     | 1 $\mu\text{m}$   | 0.10 %      |
| optoNCDT 1320    |  | 10 - 500 mm     | 1 $\mu\text{m}$   | 0.10 %      |
| optoNCDT 1420    |  | 10 - 500 mm     | 0.5 $\mu\text{m}$ | from 0.08 % |
| optoNCDT 1420LL  |  | 10 - 50 mm      | 0.5 $\mu\text{m}$ | from 0.08 % |
| optoNCDT 1420CL1 |  | 10 - 50 mm      | 0.5 $\mu\text{m}$ | from 0.08 % |

#### Highest precision in a minimum of space

Compact size combined with low weight opens up new fields of application. The selectable connector type, i.e. cable or pigtail, together with compact size reduce the sensor installation effort to a minimum.

#### Now even more powerful!

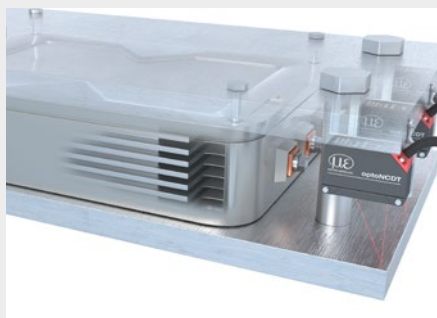
The optoNCDT 1x20 sensors have been optimized for industrial series use. Furthermore, the robust IP67 sensor housing allows use in industrial environments, even with high accelerations. A high-performance D/A converter enables 16 bit resolution at the analog output. Therefore, the sensor achieves even more precise measurement results. With the doubled measuring rate, even faster measurements can now be performed.



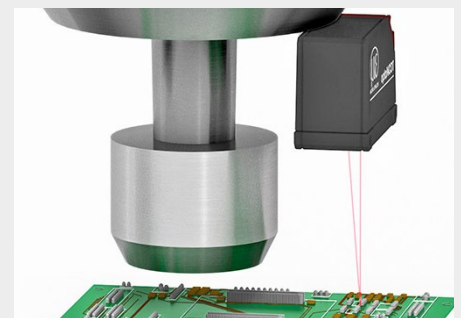
### Application examples



Dimension control of turned parts



Monitoring the expansion of battery cells



Distance control of print heads

# Technical data

## optoNCDT 1220 / 1320



### Laser point - optoNCDT 1220

| Model   | ILD1220-10   | ILD1220-25                      | ILD1220-50            | ILD1220-100           | ILD1220-200   | ILD1220-500              |               |
|---|--|---------------------------------|-----------------------|-----------------------|---------------|--------------------------|---------------|
| Measuring range                               | 10 mm  | 25 mm                           | 50 mm                 | 100 mm                | 200 mm        | 500 mm                   |               |
| Start of measuring range                      | 20 mm  | 25 mm                           | 35 mm                 | 50 mm                 | 60 mm         | 100 mm                   |               |
| Mid of measuring range                        | 25 mm  | 37.5 mm                         | 60 mm                 | 100 mm                | 160 mm        | 350 mm                   |               |
| End of measuring range                        | 30 mm  | 50 mm                           | 85 mm                 | 150 mm                | 260 mm        | 600 mm                   |               |
| Measuring rate <sup>[1]</sup>                 | 4 adjustable stages: 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz  |                                 |                       |                       |               |                          |               |
| Linearity <sup>[2]</sup>                      | < ±10 μm   | < ±25 μm                        | < ±50 μm              | < ±100 μm             | < ±200 μm     | < ±750 μm ... 1500 μm    |               |
|   | < ±0.10 % FSO  |                                 |                       |                       |               | < ±0.15 % ... 0.30 % FSO |               |
| Repeatability <sup>[3]</sup>                  | 1 μm   | 2.5 μm                          | 5 μm                  | 10 μm                 | 20 μm         | 50 μm                    |               |
| Temperature stability <sup>[4]</sup>          | ±0.015 % FSO / K   |                                 |                       | ±0.01 % FSO / K       |               |                          |               |
| Light spot diameter <sup>[5]</sup>            | SMR  | 90 x 120 μm                     | 100 x 140 μm          | 90 x 120 μm           | 750 x 1100 μm | 750 x 1100 μm            | 750 x 1100 μm |
|   | MMR  | 45 x 40 μm                      | 120 x 130 μm          | 230 x 240 μm          |               |                          |               |
|   | EMR  | 140 x 160 μm                    | 390 x 500 μm          | 630 x 820 μm          |               |                          |               |
|   | smallest Ø   | 45 x 40 μm with 24 mm           | 55 x 50 μm with 31 mm | 70 x 65 μm with 42 mm | -             | -                        |               |
| Light source                                  | Semiconductor laser < 1 mW, 670 nm (red)   |                                 |                       |                       |               |                          |               |
| Laser class                                   | Class 2 in accordance with IEC 60825-1: 2014   |                                 |                       |                       |               |                          |               |
| Permissible ambient light <sup>[6]</sup>      | 20,000 lx  |                                 |                       |                       | 7,500 lx      |                          |               |
| Supply voltage                                | 11 ... 30 VDC  |                                 |                       |                       |               |                          |               |
| Power consumption                             | < 2 W (24 V)   |                                 |                       |                       |               |                          |               |
| Signal input                                  | 1 x HTL laser on/off; 1 x HTL multifunction input: trigger in, zero setting, teach                       |                                 |                       |                       |               |                          |               |
| Digital interface                             | RS422 (16 bit)   |                                 |                       |                       |               |                          |               |
| Analog output                                 | 4 ... 20 mA (16 bit, freely scalable within the measuring range)   |                                 |                       |                       |               |                          |               |
| Switching output                              | 1 x error output: npn, pnp, push pull  |                                 |                       |                       |               |                          |               |
| Connection                                    | integrated cable 2 m, open ends, minimum bending radius 30 mm (fixed installation)                       |                                 |                       |                       |               |                          |               |
| Installation                                  | Screw connection via two 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, 1000 shocks each  |                                 |                       |                       |               |                          |               |
| Vibration (DIN EN 60068-2-6)                  | 20 g / 20 ... 500 Hz in 3 axes, 2 directions and 10 cycles each  |                                 |                       |                       |               |                          |               |
| Protection class (DIN EN 60529)               | IP67   |                                 |                       |                       |               |                          |               |
| Material                                      | Aluminum housing   |                                 |                       |                       |               |                          |               |
| Weight  | approx. 30 g (without cable), approx. 110 g (incl. cable)  |                                 |                       |                       |               |                          |               |
| Control and indicator elements <sup>[7]</sup> | Select button: zero, teach, factory settings; web interface for setup; 2 x color LEDs for power / status |                                 |                       |                       |               |                          |               |

<sup>[1]</sup> Factory setting 1 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)

<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 1 kHz, median 9

<sup>[4]</sup> 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.

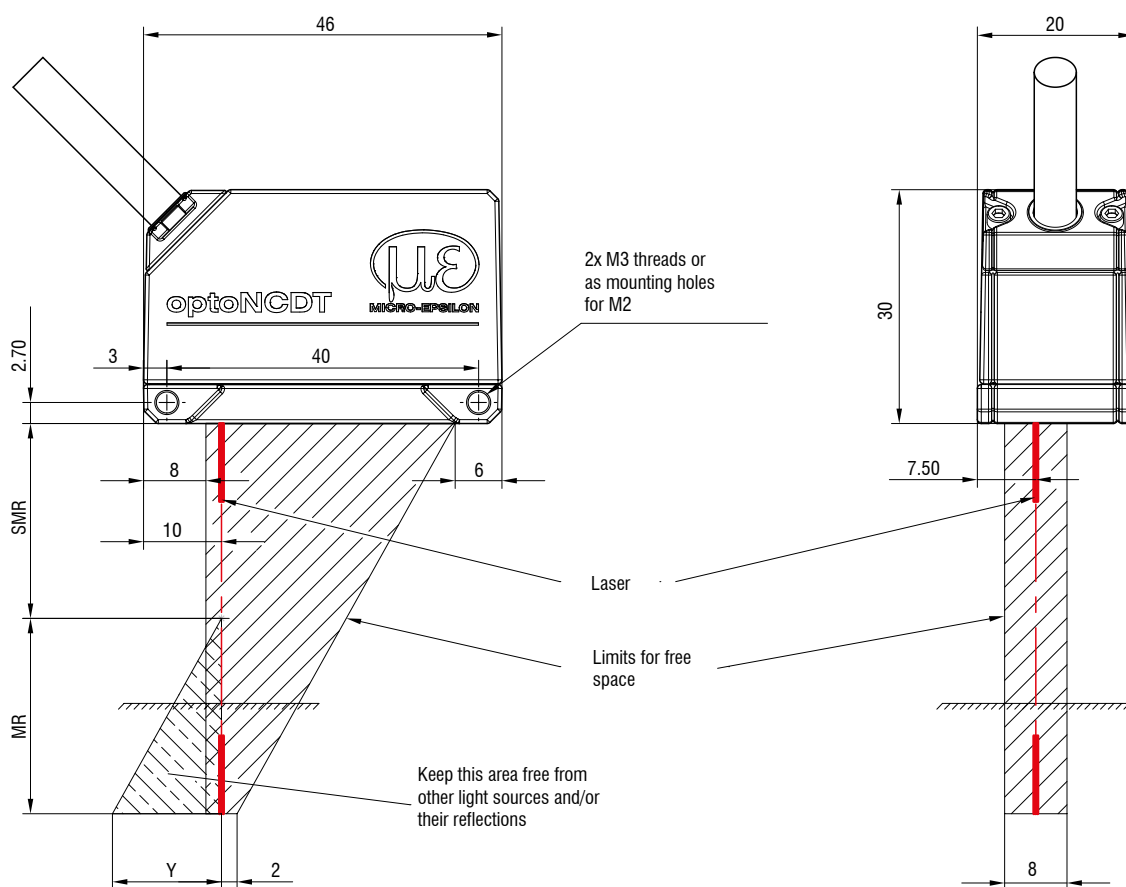
<sup>[5]</sup> ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

<sup>[6]</sup> Illuminant: light bulb

<sup>[7]</sup> Access to web interface requires connection to PC via IF2001/USB (see accessories)

# Dimensions

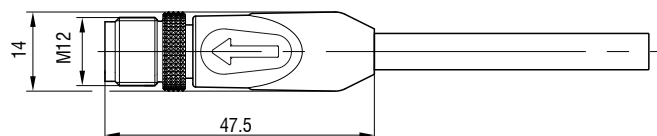
## optoNCDT 1220 / 1320 / 1420



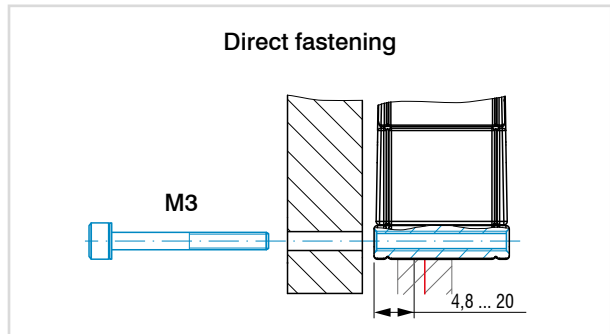
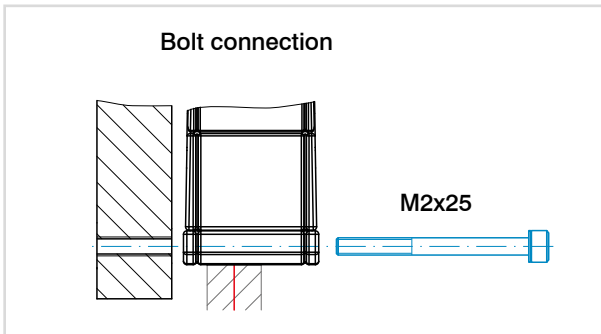
| MR  | SMR | Y   |
|-----|-----|-----|
| 10  | 20  | 10  |
| 25  | 25  | 21  |
| 50  | 35  | 28  |
| 100 | 50  | 46  |
| 200 | 60  | 70  |
| 500 | 100 | 190 |

(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 1220/1320/1420

### 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 32 x 11 mm for ILD1x20

## Scope of supply

- 1 ILD1x20 sensor
- 1 Assembly instructions
- 1 digital calibration protocol accessible via web interface
- Accessories (2x M2 screws and 2 washers)

## Article designation

|   |    |    |  |
|---|----|----|--|
| ILD1420-  | 10 | LL | CL1  |
|   |    |    | <b>Laser class</b><br>No indication: class 2 (standard)<br>CL1: Class 1 (only with ILD1420)          |
|   |    |    | <b>Laser type</b><br>No indication: Red laser point (standard)<br>LL: Laser Line (only with ILD1420) |
| <b>Measuring range</b> in mm  |    |    |  |
| <b>Series</b><br>ILD1220: Compact laser displacement sensor for OEM and serial applications<br>ILD1320: Compact laser triangulation displacement sensor<br>ILD1420: Smart laser triangulation displacement sensor |    |    |  |

# Connection possibilities

## optoNCDT 1220 / 1320 / 1420

### Sensors with integrated cable

|                    |  |
|--------------------|--|
| Cable diameter:    | 5.40 ±0.2 mm   |
| Drag chain:        | no   |
| Robot:             | no   |
| Temperature range: | -25 ... 105 °C (moving)<br>-40 ... 105 °C (not moving) |
| Bending radius:    | > 27 mm (fixed installation)<br>> 54 mm (dynamic)      |

| Sensor                                   | Cables                                | Type      | Connection possibilities and accessories  |
|--|---------------------------------------|-----------|---|
| ILD1220-xx                               | <b>Integrated cable</b><br>Length 2 m | Open ends | <b>Supply voltage connection</b><br>Power supply unit PS2020  |
| ILD1320-xx<br>ILD1420-xx<br>ILD1420-xxLL | <b>Integrated cable</b><br>Length 3 m |           | <b>Interface module of RS422 to USB</b><br>IF2001/USB<br>IC2001/USB<br><br><b>Interface module for Industrial Ethernet connection</b><br>IF2035-PROFINET<br>IF2035-EIP<br>IF2035-EtherCAT |




### Drag-chain suitable extension and adapter cables

|                    |   |
|--------------------|---|
| Cable diameter:    | 6.0 ±0.2 mm                                       |
| Drag chain:        | yes   |
| Robot:             | no (optional on request)                          |
| Temperature range: | -40 ... 90 °C                                     |
| Bending radius:    | > 30 mm (fixed installation)<br>> 60 mm (dynamic) |

| Sensor                     | Cables   | Type      | Connection possibilities and accessories  |
|----------------------------|--|-----------|---|
| ILD1420-xx<br>ILD1420-xxLL | <b>Extension cable pigtail</b><br>Length 3 m / 6 m / 10 m / 15 m<br><br><i>Art. no.      Designation</i><br>29011067      PCF1420-3/I<br>29011068      PCF1420-6/I<br>29011069      PCF1420-10/I<br>29011070      PCF1420-15/I<br>29011071      PCF1420-3/U<br>29011072      PCF1420-6/U<br>29011073      PCF1420-10/U<br>29011074      PCF1420-15/U | Open ends | <b>Supply voltage connection</b><br>Power supply unit PS2020<br><br><b>Interface module of RS422 to USB</b><br>IF2001/USB<br>IC2001/USB<br><br><b>Interface module for Industrial Ethernet connection</b><br>IF2035-PROFINET<br>IF2035-EIP<br>IF2035-EtherCAT |
|                            | <b>Adapter cable for PC interface card</b><br>Length 3 m / 6 m / 10 m<br><br><i>Art. no.      Designation</i><br>29011079      PCF1420-3/IF2008<br>29011088      PCF1420-6/IF2008<br>29011089      PCF1420-10/IF2008   | Sub-D     | <b>Interface card for synchronous data acquisition</b><br>IF2008PCIe / IF2008E<br><br><b>4-fold interface module from RS422 to USB</b><br>IF2004/USB  |
|                            | <b>Adapter cable for sensor calculation</b><br>Length 3 m / 6 m / 9 m<br><br><i>Art. no.      Designation</i><br>29011171      PCF1420-3/C-Box<br>29011172      PCF1420-6/C-Box<br>29011170      PCF1420-9/C-Box   | Sub-D     | <b>Controller for D/A conversion and evaluation of up to 2 sensor signals</b><br>Dual Processing Unit   |
|                            | <b>Adapter cable for sensor calculation</b><br>Length 2 m<br><br><i>Art. no.      Designation</i><br>29011149      PCE1420-2/M12   | M12       | <b>Interface module for Ethernet connection of up to 8 sensors</b><br>IF2008/ETH  |

## Other cables

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

| Input                               | Cables  | Type            | Connection possibilities and accessories |         |                        |       |  |  |
|-------------------------------------|---|-----------------|--|---------|------------------------|-------|--|--|
| 2 x Sub-D<br>(PCF1420-x/<br>IF2008) | <p><b>Adapter cable for the connection of two sensors per Sub-D connector</b><br/>Length 0.1 m</p> <table> <tr> <td><i>Art. no.</i></td> <td><i>Designation</i></td> </tr> <tr> <td>2901528</td> <td>IF2008-Y-adapter cable</td> </tr> </table>  | <i>Art. no.</i> | <i>Designation</i>                       | 2901528 | IF2008-Y-adapter cable | Sub-D | <p><b>Interface card for synchronous data acquisition</b><br/>IF2008PCle / IF2008E</p>  | <p><b>4-fold interface module from RS422 to USB</b><br/>IF2004/USB</p>  |
| <i>Art. no.</i>                     | <i>Designation</i>  |                 |  |         |                        |       |  |  |
| 2901528                             | IF2008-Y-adapter cable  |                 |  |         |                        |       |  |  |



## 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