









# 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!

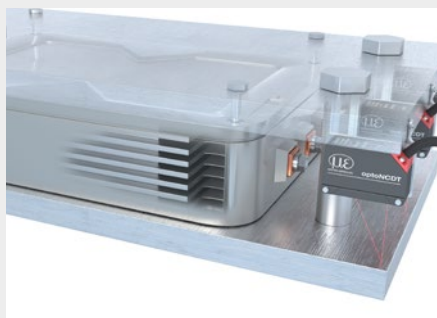
The optoNCDT 1x20 sensors have been optimized for industrial series use. Furthermore, the robust IP67 sensor housing allows use in industrial environments, even with high accelerations. A high-performance D/A converter enables 16 bit resolution at the analog output. Therefore, the sensor achieves even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



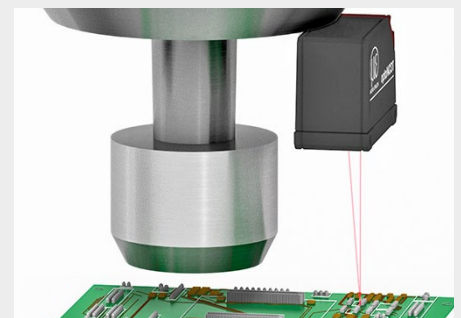
### Application examples



Dimension control of turned parts



Monitoring the expansion of battery cells



Distance control of print heads

# Technical data

## optoNCDT 1420

### optoNCDT 1420 (General technical data)

Model	ILD1420-xx	
Measuring rate <sup>[1]</sup>	6 adjustable stages: 8 kHz / 4 kHz / 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz	
Supply voltage	24V (11,2 ... 30V) DC, P < 2W	
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 <sup>[2]</sup>	RS422 (16 bit) / EtherCAT / PROFINET / EtherNet/IP	
Analog output <sup>[3]</sup>	4 ... 20 mA / 1 ... 5 V with PCF1420-3/U cable (16 bit, freely scalable within the measuring range)	
Switching output	1 x error output: npn, pnp, push pull, push-pull negative	
Connection	integrated cable 3 m, open ends, min. bending radius 30 mm (fixed installation) or integrated pigtail 0.3 m with 12-pin M12 plug (see accessories for suitable connection cable)	
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) <sup>[4]</sup>	IP67	
Material	Aluminum housing	
Weight	approx. 70 g (incl. pigtail), approx. 150 g (incl. cable)	
Control and indicator elements <sup>[5]</sup>	Select button: zero, teach, factory setting; web interface for setup: selectable presets, peak selection, video signal, freely selectable averaging, data reduction, setup management; 2 x color LEDs for power / status	

<sup>[1]</sup> Factory setting 4 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)  
For models with laser class 1 the maximum measuring rate is 4 kHz

<sup>[2]</sup> For EtherCAT, PROFINET and EtherNet/IP connection via interface module is required (see accessories)

<sup>[3]</sup> For models with laser class 1 the D/A conversion is done with 12 bit

<sup>[4]</sup> Models with laser class 1 have the protection class IP65

<sup>[5]</sup> Access to web interface requires connection to PC via IF2001/USB (see accessories)



### Laser point - optoNCDT 1420

Model		ILD1420-10	ILD1420-25	ILD1420-50	ILD1420-100	ILD1420-200	ILD1420-500
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
Linearity <sup>[1]</sup>		< ±8 μm	< ±20 μm	< ±40 μm	< ±80 μm	< ±160 μm	< ±500 ... ±1000 μm
		< ±0.08 % FSO					< ±0.1 ... ±0.2 % FSO
Repeatability <sup>[2]</sup>		0.5 μm	1 μm	2 μm	4 μm	8 ... 16 μm	20 ... 40 μm
Temperature stability <sup>[3]</sup>		±0.015 % FSO / K			±0.01 % FSO / K		
Light spot diameter <sup>[4]</sup>	SMR	100 x 130 μm	200 x 260 μm	250 x 340 μm	710 x 910 μm	710 x 910 μm	710 x 910 μm
	MMR	45 x 50 μm	55 x 60 μm	80 x 95 μm			
	EMR	158 x 200 μm	255 x 330 μm	380 x 380 μm	710 x 910 μm	710 x 910 μm	710 x 910 μm
	smallest Ø	45 x 40 μm with 24 mm	53 x 60 μm with 31 mm	75 x 85 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>[5]</sup>		50,000 lx			30,000 lx	10,000 lx	

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

<sup>[2]</sup> Measuring rate 2 kHz, median 9

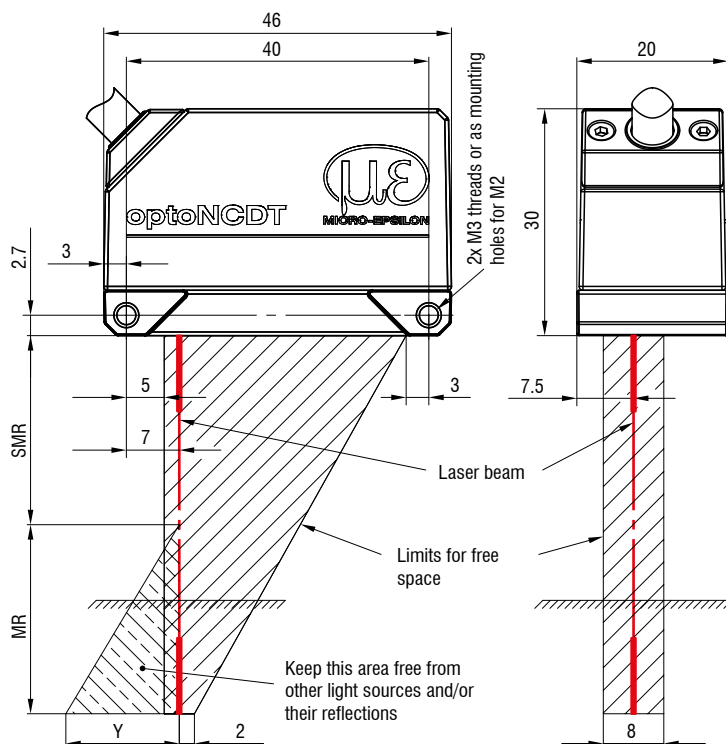
<sup>[3]</sup> The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.

<sup>[4]</sup> ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

<sup>[5]</sup> Illuminant: light bulb

# Dimensions

## optoNCDT 1220 / 1320 / 1420



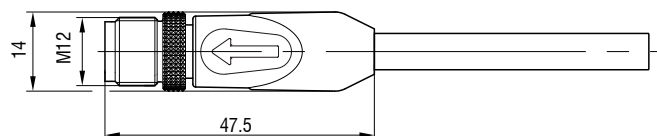
MR	SMR	Y
10	20	10
25	25	21
50	35	28
100	50	46
200	60	70
500	100	190

(Dimensions in mm, not to scale)

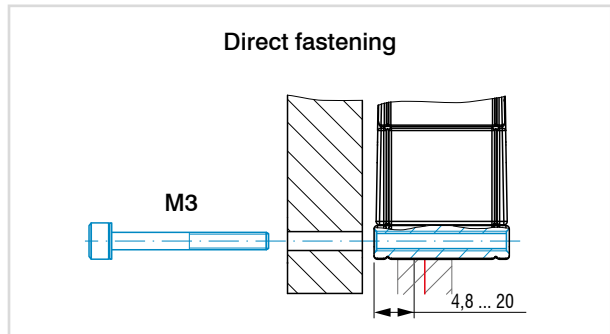
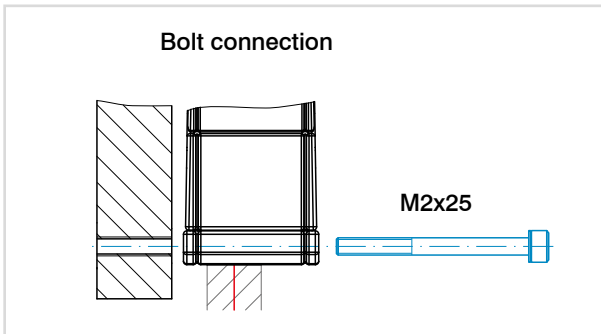
MR = measuring range; SMR = start of measuring range;

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> No indication: class 2 (standard) CL1: Class 1 (only with ILD1420)
			<b>Laser type</b> No indication: Red laser point (standard) LL: Laser Line (only with ILD1420)
<b>Measuring range</b> in mm			
<b>Series</b>			
ILD1220: Compact laser displacement sensor for OEM and serial applications			
ILD1320: Compact laser triangulation displacement sensor			
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)  
 -40 ... 105 °C (not moving)  
 Bending radius: > 27 mm (fixed installation)  
 > 54 mm (dynamic)

Sensor	Cables	Type	Connection possibilities and accessories	
ILD1220-xx	<b>Integrated cable</b> Length 2 m	Open ends	<b>Supply voltage connection</b> Power supply unit PS2020	
ILD1320-xx ILD1420-xx ILD1420-xxLL	<b>Integrated cable</b> Length 3 m		<b>Interface module of RS422 to USB</b> IF2001/USB IC2001/USB	
			<b>Interface module for Industrial Ethernet connection</b> IF2035-PROFINET IF2035-EIP 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)  
 > 60 mm (dynamic)

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

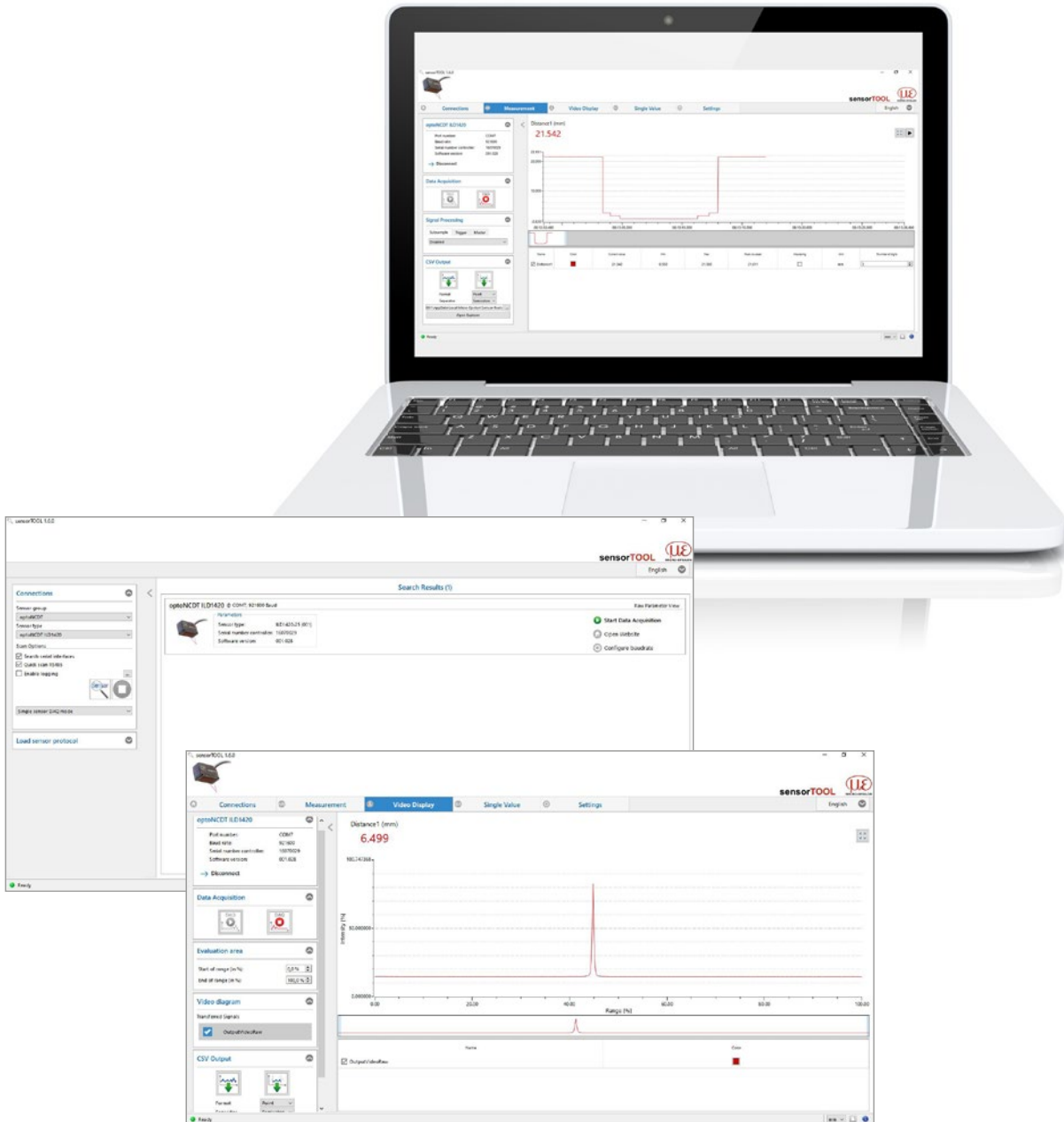
## Other cables

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

Input	Cables	Type	Connection possibilities and accessories					
2 x Sub-D (PCF1420-x/ IF2008)	<p><b>Adapter cable for the connection of two sensors per Sub-D connector</b> 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> IF2008PCle / IF2008E</p> 	<p><b>4-fold interface module from RS422 to USB</b> IF2004/USB</p> 
<i>Art. no.</i>	<i>Designation</i>							
2901528	IF2008-Y-adapter cable							

## 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](http://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