MICRO-EPSILON

More Precision

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

designed for advanced
AUTOMATION

Best-in-class: High precision laser sensors
optoNCDT 1220 / 1320 / 1420

- **Hz** Measuring rate up to 8 kHz
- **INTER FACE** Analog (U/I) / RS422 / PROFINET / EtherNet/IP
- **ASC** Active Surface Compensation
- Repeatability 0.5 μm
- 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. They are used for precise measurement of displacement, distance and position in all fields of automation technology, e.g., in machine building, 3D printers or robotics.

The optoNCDT 1x20 sensors use an intelligent surface control feature. The Auto Target Compensation (ATC) 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 selectable setting and evaluation possibilities, the optoNCDT 1x20 sensors meet the requirements for use in industrial serial and OEM applications.

Now even more powerful!

The optoNCDT 1x20 sensors are optimized for industrial series use. Their 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.
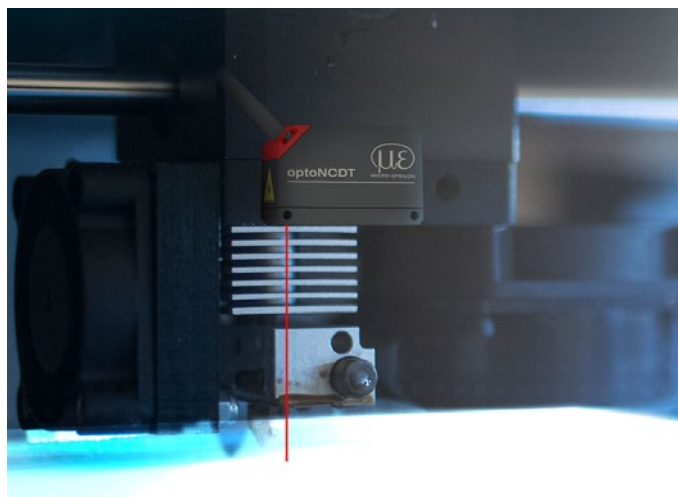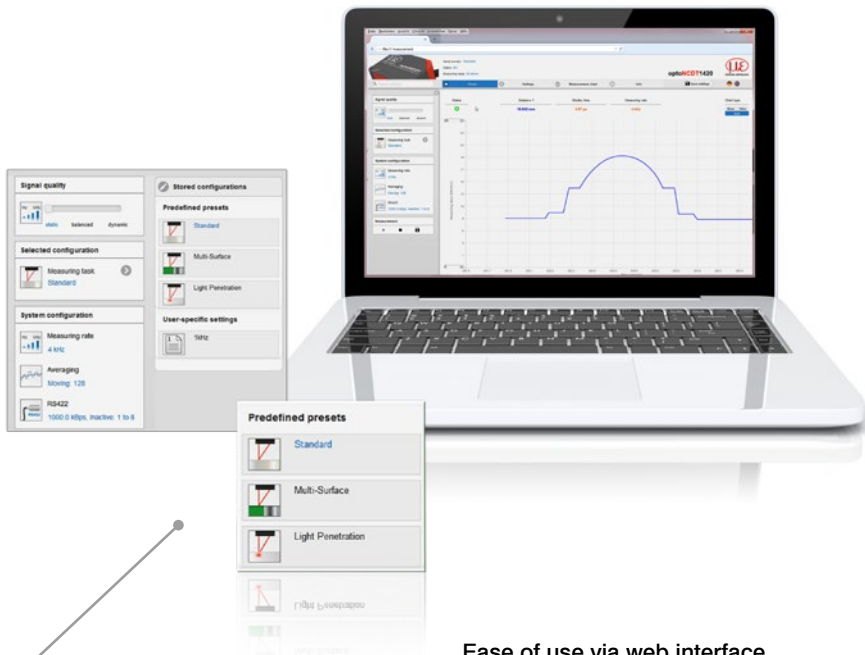
The presets enable faster selection of sensor settings for certain targets.

Ease of use via web interface

The optoNCDT 1x20 models are operated using an intuitive web interface. The settings for the measurement task can be quickly selected using predefined presets. The quality slider enables the sensor to be adapted to static and dynamic processes. Up to eight user-specific sensor settings can be stored and exported in the setup management. The video signal display, the signal peak selection and a freely adjustable signal averaging enable optimization of the measurement task. The ROI function (region of interest) allows, e.g., for interfering signals in the background to be filtered out. The remaining signal peak is optimally corrected.
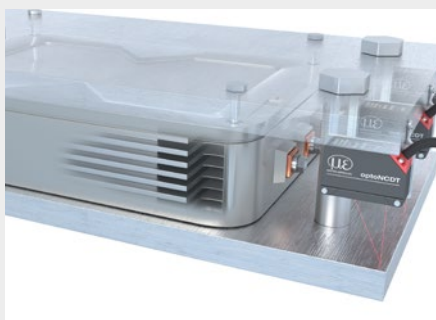
Highest precision in a minimum of space

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.
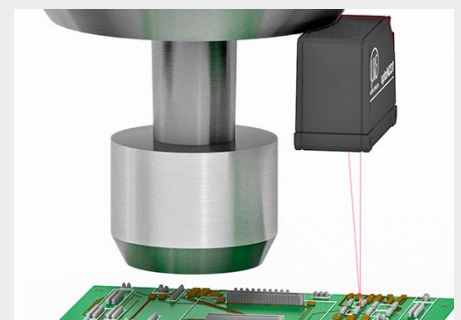

Applications

Dimension control of turned parts

Monitoring the expansion of battery cells

Distance control of print heads

Technical Data

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 [1]	4 adjustable stages: 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz					
Linearity [2]	$< \pm10\,\mu m$	$< \pm25\,\mu m$	$< \pm50\,\mu m$	$< \pm100\,\mu m$	$< \pm200\,\mu m$	$< \pm750\,\mu m \ldots 1500\,\mu m$
	$< \pm0.10\,\%$ FSO					$< \pm0.15\,\% \ldots 0.30\,\%$ FSO
Repeatability [3]	$1\,\mu m$	$2.5\,\mu m$	$5\,\mu m$	$10\,\mu m$	$20\,\mu m$	$50\,\mu m$
Temperature stability [4]	$\pm0.015\,\%$ FSO / K			$\pm0.01\,\%$ FSO / K		
Light spot diameter [5] — SMR	$90 \times 120\,\mu m$	$100 \times 140\,\mu m$	$90 \times 120\,\mu m$	$750 \times 1100\,\mu m$	$750 \times 1100\,\mu m$	$750 \times 1100\,\mu m$
Light spot diameter [5] — MMR	$45 \times 40\,\mu m$	$120 \times 130\,\mu m$	$230 \times 240\,\mu m$			
Light spot diameter [5] — EMR	$140 \times 160\,\mu m$	$390 \times 500\,\mu m$	$630 \times 820\,\mu m$			
Light spot diameter [5] — smallest Ø	$45 \times 40\,\mu m$ with 24 mm	$55 \times 50\,\mu m$ with 31 mm	$70 \times 65\,\mu m$ 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 [6]	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)					
Temperature range — 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 [7]	Select button: zero, teach, factory settings; web interface for setup; 2 x color LEDs for power / status					

[1] Factory setting 1 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)
[2] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)
[3] Measuring rate 1 kHz, median 9
[4] 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.
[5] ± 10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range
[6] Illuminant: light bulb
[7] Access to web interface requires connection to PC via IF2001/USB (see accessories)

Laser point - optoNCDT 1320

Model	ILD1320-10	ILD1320-25	ILD1320-50	ILD1320-100	ILD1320-200	ILD1320-500
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 [1]	5 adjustable stages: 4 kHz / 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz					
Linearity [2]	$< \pm 10\,\mu m$	$< \pm 25\,\mu m$	$< \pm 50\,\mu m$	$< \pm 100\,\mu m$	$< \pm 200\,\mu m$	$< \pm 600\,\mu m … \pm 1200\,\mu m$
	$< \pm 0.10\ \%\ FSO$					$< \pm 0.12 … \pm 0.24\ \%\ FSO$
Repeatability [3]	$1\,\mu m$	$2.5\,\mu m$	$5\,\mu m$	$10\,\mu m$	$20\,\mu m$	$50\,\mu m$
Temperature stability [4]	$\pm 0.015\ \%\ FSO / K$			$\pm 0.01\ \%\ FSO / K$		
Light spot diameter [5] — SMR	$90 \times 120\,\mu m$	$100 \times 140\,\mu m$	$90 \times 120\,\mu m$	$750 \times 1100\,\mu m$	$750 \times 1100\,\mu m$	$750 \times 1100\,\mu m$
Light spot diameter [5] — MMR	$45 \times 40\,\mu m$	$120 \times 130\,\mu m$	$230 \times 240\,\mu m$			
Light spot diameter [5] — EMR	$140 \times 160\,\mu m$	$390 \times 500\,\mu m$	$630 \times 820\,\mu m$			
Light spot diameter [5] — smallest Ø	$45 \times 40\,\mu m$ with 24 mm	$55 \times 50\,\mu m$ with 31 mm	$70 \times 65\,\mu m$ 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 [6]	30,000 lx			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 [7]	RS422 (16 bit) / EtherCAT / PROFINET / EtherNet/IP					
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 3 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)					
Temperature range — 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. 145 g (incl. cable)					
Control and indicator elements [8]	Select button: zero, teach, factory settings; web interface for setup with defined presets; 2 x color LEDs for power / status					

[1] Factory setting 2 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)
[2] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)
[3] Measuring rate 1 kHz, median 9
[4] 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.
[5] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range
[6] Illuminant: light bulb
[7] For EtherCAT, PROFINET and EtherNet/IP, connection via interface module is required (see accessories)
[8] Access to web interface requires connection to PC via IF2001/USB (see accessories)

Technical Data

General technical data	ILD1420-xx
Measuring rate [1]	6 adjustable stages: 8 kHz / 4 kHz / 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz
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 [2]	RS422 (16 bit) / EtherCAT / PROFINET / EtherNet/IP
Analog output [3]	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
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)
Temperature range — 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) [4]	IP67
Material	Aluminum housing
Weight	approx. 60 g (incl. pigtail), approx. 145 g (incl. cable)
Control and indicator elements[5]	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

[1] 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
[2] For EtherCAT, PROFINET and EtherNet/IP, connection via interface module is required (see accessories)
[3] For models with laser class 1 the D/A conversion is done with 12 bit
[4] Models with laser class 1 have the protection class IP65
[5] 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 [1]	$< \pm 8\,\mu m$	$< \pm 20\,\mu m$	$< \pm 40\,\mu m$	$< \pm 80\,\mu m$	$< \pm 160\,\mu m$	$< \pm 500 … \pm 1000\,\mu m$
Linearity [1]	$< \pm 0.08$ % FSO					$< \pm 0.1 … \pm 0.2$ % FSO
Repeatability [2]	$0.5\,\mu m$	$1\,\mu m$	$2\,\mu m$	$4\,\mu m$	$8\,\mu m$	$20 … 40\,\mu m$
Temperature stability [3]	± 0.015 % FSO / K			± 0.01 % FSO / K		
Light spot diameter [4] — 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
Light spot diameter [4] — MMR	45 x 40 μm	120 x 130 μm	230 x 240 μm			
Light spot diameter [4] — EMR	140 x 160 μm	390 x 500 μm	630 x 820 μm			
Light spot diameter [4] — 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[5]	50,000 lx			30,000 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] Measuring rate 2 kHz, median 9
[3] 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.
[4] ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range
[5] Illuminant: light bulb

Laser line - optoNCDT 1420LL

Model	ILD1420-10LL	ILD1420-25LL	ILD1420-50LL
Measuring range	10 mm	25 mm	50 mm
Start of measuring range	20 mm	25 mm	35 mm
Mid of measuring range	25 mm	37.5 mm	60 mm
End of measuring range	30 mm	50 mm	85 mm
Linearity [1]	$< \pm 8\,\mu m$	$< \pm 20\,\mu m$	$< \pm 40\,\mu m$
		$< \pm 0.08$ % FSO	
Repeatability [2]	$0.5\,\mu m$	$1\,\mu m$	$2\,\mu m$
Temperature stability [3]		± 0.015 % FSO / K	
Light spot diameter [4] — SMR	$140 \times 720\,\mu m$	$220 \times 960\,\mu m$	$240\,\mu m \times 1250\,\mu m$
Light spot diameter [4] — MMR	$65 \times 680\,\mu m$	$80 \times 970\,\mu m$	$130\,\mu m \times 1450\,\mu m$
Light spot diameter [4] — EMR	$140 \times 660\,\mu m$	$240 \times 1000\,\mu m$	$380\,\mu m \times 1650\,\mu m$
Light spot diameter [4] — smallest Ø	$65 \times 680\,\mu m$ with 25 mm	$80 \times 970\,\mu m$ with 37.5 mm	$110 \times 1400\,\mu m$ with 52.5 mm
Light source		Semiconductor laser < 1 mW, 670 nm (red)	
Laser class		Class 2 in accordance with IEC 60825-1: 2014	
Permissible ambient light[5]		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] Measuring rate 2 kHz, median 9
[3] 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.
[4] ±10 %; SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range
 Light spot diameter with line-shaped laser determined based on the emulated 90/10 knife-edge method
[5] Illuminant: light bulb

Laser class 1 - optoNCDT 1420 CL1

Model	ILD1420-10CL1	ILD1420-25CL1	ILD1420-50CL1
Measuring range	10 mm	25 mm	50 mm
Start of measuring range	20 mm	25 mm	35 mm
Mid of measuring range	25 mm	37.5 mm	60 mm
End of measuring range	30 mm	50 mm	85 mm
Linearity [1]	$< \pm 8\,\mu m$	$< \pm 20\,\mu m$	$< \pm 40\,\mu m$
		$< \pm 0.08$ % FSO	
Repeatability [2]	$0.5\,\mu m$	$1\,\mu m$	$2\,\mu m$
Temperature stability [3]		± 0.015 % FSO / K	
Light spot diameter [4] — SMR	$90 \times 120\,\mu m$	$100 \times 140\,\mu m$	$90 \times 120\,\mu m$
Light spot diameter [4] — MMR	$45 \times 40\,\mu m$	$120 \times 130\,\mu m$	$230 \times 240\,\mu m$
Light spot diameter [4] — EMR	$140 \times 160\,\mu m$	$390 \times 500\,\mu m$	$630 \times 820\,\mu m$
Light spot diameter [4] — smallest Ø	$45 \times 40\,\mu m$ with 24 mm	$55 \times 50\,\mu m$ with 31 mm	$70 \times 65\,\mu m$ with 42 mm
Light source		Semiconductor laser < 0.39 mW, 670 nm (red)	
Laser class		Class 1 in accordance with DIN EN 60825-1: 2015-07	
Permissible ambient light[5]		15,000 lx	

[1] FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)
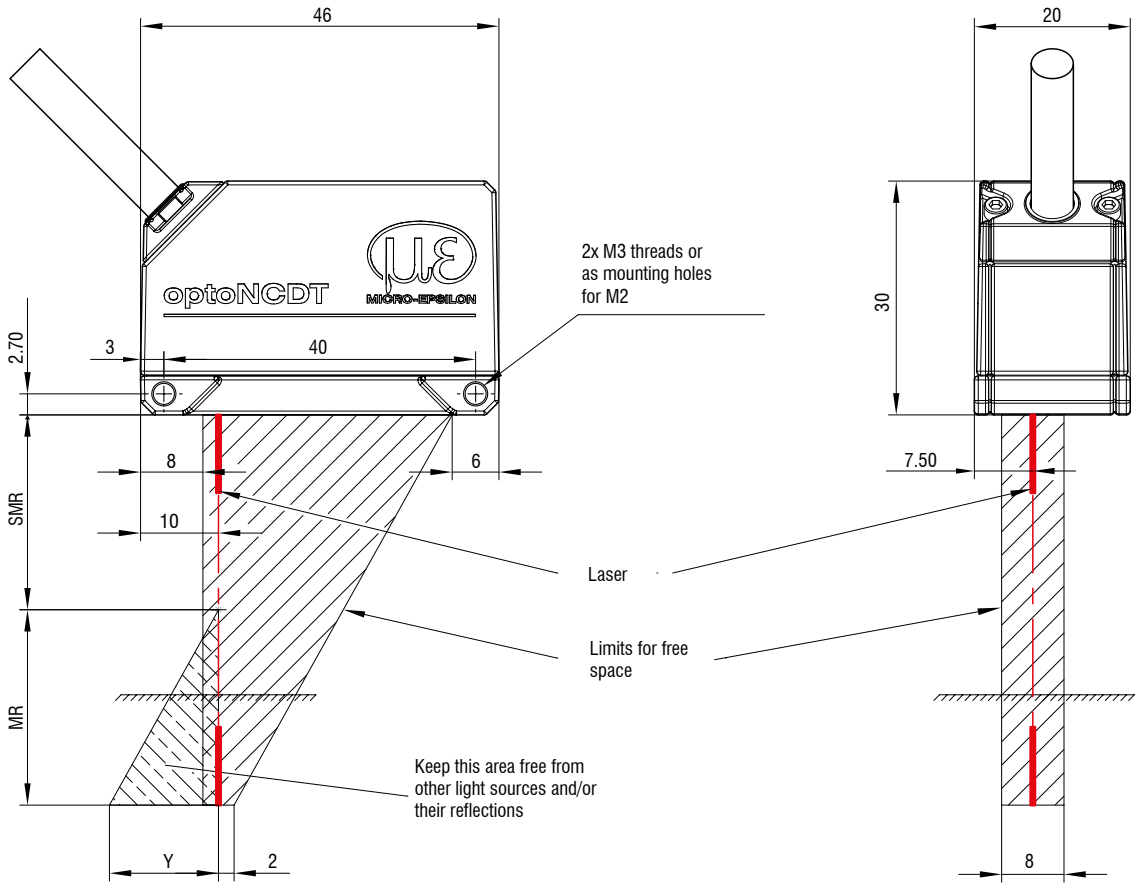[2] Measuring rate 2 kHz, median 9
[3] The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.
[4] ±10 %; SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range
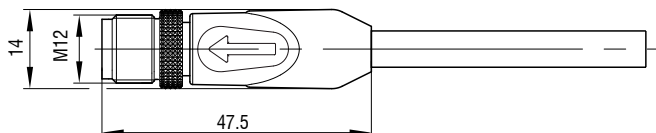[5] Illuminant: light bulb

Dimensions

2x M3 threads or
as mounting holes
for M2

Laser

Limits for free
space

Keep this area free from
other light sources and/or
their reflections

(dimensions in mm, not to scale)

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

optoNCDT 1420LL / 1420CL1

MR	SMR	Y
10	20	10
25	25	21
50	35	28

Connector (sensor side)