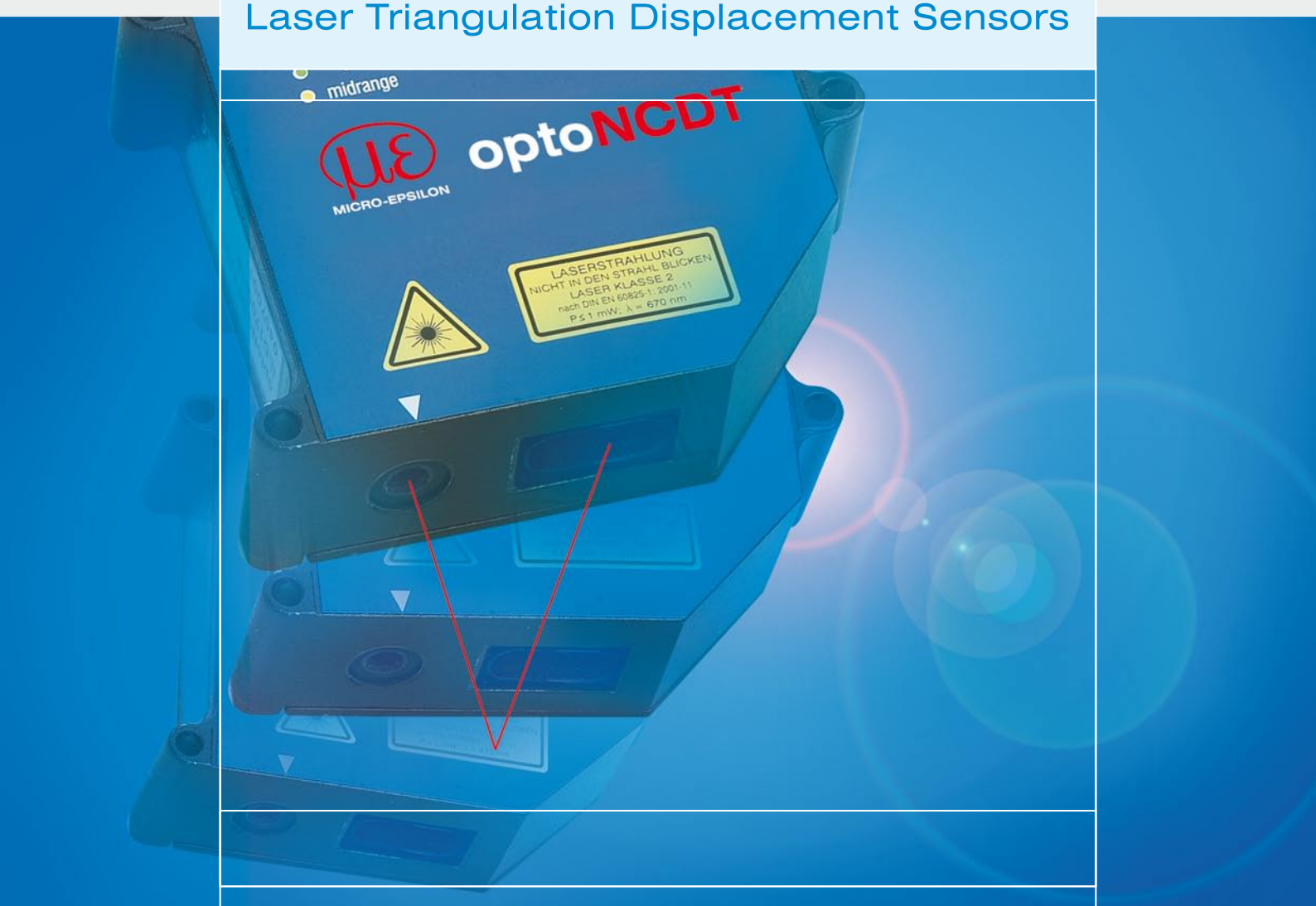
MICRO-EPSILON

Laser Triangulation Displacement Sensors



- **Non-contact and wear-free**
- **Large stand off**
- **Tiny measuring spot for small targets**
- **High speed measurement**
- **High precision**
- **Almost all targets can be measured**

The optoNCDT product group represents the highest precision in laser-based optical displacement and position measurement.

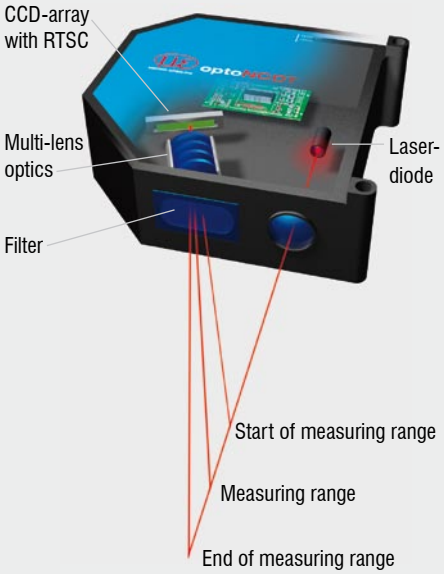
Laser-based optical displacement sensors measure from a large distance to the target using a very small spot which enables measurements on the very small parts. The large measurement distance in turn enables measurements to be taken against difficult target surfaces such as hot metals.

The non-contact principle enables wear-free measurements as the sensors are not subject to any physical contact with the target.

Furthermore, the laser triangulation principle is ideal for very fast measurements with high accuracy and resolution.

Leadership in laser displacement measurement

Micro-Epsilon has a long-standing success of developing laser displacement sensors. Already a pioneer in the field of CCD sensors, Micro-Epsilon has continually raised the bar in industrial laser displacement measurement. The current optoNCDT range now offers five series, each of which is amongst the best in its class.



Measurement principle: Laser triangulation

Laser triangulation sensors operate with a laser diode which projects a visible light spot onto the surface of the measurement target. The light reflected from the spot is imaged by an optical receiving system onto a position-sensitive element. If the light spot changes its position, this change is imaged on the receiving element and evaluated. With the 1607 Series an analogue PSD module is used as the position-sensitive measuring element, whereas with the remaining sensors CMOS elements and CCD elements are used.

IEC - Standard

optoNCDT sensors uses a semiconductor laser with a wavelength of 670nm (visible/red). The maximum optical output power is 1mW. The sensor is classified as laser class II. A warning sign is attached to the sensor housing.

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KOMPAKT & LOW COST Series 1302 / 1402 / 1402SC

Ranges 5 - 600mm
Resolution from 1µm
For tiny installation rooms

- CMOS sensor element
- Output analogue / digital
- Integrated controller
- Auto Target Compensation (ATC)
- Trigger input and teach in
- DAQ and configuration software (series 1402/SC)
- Performance certificate (series 1402/SC)
- High flex cables rated for drag chain use
- Robot rated cable (optional)
- Adjustable measuring rate (series 1402/SC)
- Version 1402SC with stainless steel housing

Ranges: 100µm 1mm 10mm 100mm 1m
Linearity: 100nm 1µm 10µm 100µm 1mm 10mm
Resolution: 10nm 100nm 1µm 10µm 100µm 1mm

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HIGH PERFORMANCE WITH INTEGRATED CONTROLLER Series 1700

Ranges 2 - 750mm
Resolution from 0.1µm
No external controller

- CCD sensor element
- Output analogue / digital
- Integrated controller
- Auto Target Compensation (ATC)
- Real-Time-Surface-Compensation (RTSC)
- Adjustable filter functions
- DAQ and configuration software
- Performance certificate
- High flex cables for drag chain use
- Robot rated cable
- Adjustable measuring rate

Ranges: 100µm 1mm 10mm 100mm 1m
Linearity: 100nm 1µm 10µm 100µm 1mm 10mm
Resolution: 10nm 100nm 1µm 10µm 100µm 1mm

page 16-19

HIGHEST PRECISION SENSOR Series 2200 / 2220

Ranges 2 - 200mm
Resolution from 0.03µm
Unmatched accuracy
Measuring rate up to 20kHz

- CCD sensor element
- Output analogue / digital
- Auto Target Compensation (ATC)
- Real-Time-Surface-Compensation (RTSC)
- Adjustable filter functions
- DAQ and configuration software
- Performance certificate
- High flex cables for drag chain use

Ranges: 100µm 1mm 10mm 100mm 1m
Linearity: 100nm 1µm 10µm 100µm 1mm 10mm
Resolution: 10nm 100nm 1µm 10µm 100µm 1mm

page 20-27

LASER SENSORS FOR SHINY METALLIC, ROUGH AND DIRECT REFLECTING SURFACES Series 1700DR / 1700LL / 2200LL / 2220LL

Ranges 2 - 50mm
LL option for metallic or rough surfaces
DR option for direct reflection

- Technical data see series 1700, 2200 and 2220
- LL models with small Laser Line averages across shiny metallic or structured surfaces
- DR models for precise measurement of direct reflecting surfaces (glass and mirror)

Ranges: 100µm 1mm 10mm 100mm 1m
Linearity: 100nm 1µm 10µm 100µm 1mm 10mm
Resolution: 10nm 100nm 1µm 10µm 100µm 1mm

page 28-31

LARGE STAND OFF Series 1810-50 / 2210 / 1710-1000

Ranges 10 - 1000mm
Resolution from 0.5µm
Large stand off

- CCD sensor element
- Output analogue / digital
- Auto Target Compensation (ATC)
- Real-Time-Surface-Compensation (RTSC)
- Adjustable filter functions
- DAQ and configuration software
- Performance certificate
- High flex cables for drag chain use
- 1710-1000 with measuring range up to 1000mm

Ranges: 100µm 1mm 10mm 100mm 1m
Linearity: 100nm 1µm 10µm 100µm 1mm 10mm
Resolution: 10nm 100nm 1µm 10µm 100µm 1mm

page 32-33

THE HIGH SPEED TRUE ANALOGUE SENSOR Series 1607

Ranges 0.5 - 200mm
Resolution from 0.1µm
Selectable frequencies up to 37kHz (-3dB)

- PSD sensor element
- Output analogue / digital
- Auto Target Compensation (ATC)
- Performance certificate
- Very small sensor head
- High flex cables for drag chain use

Ranges: 100µm 1mm 10mm 100mm 1m
Linearity: 100nm 1µm 10µm 100µm 1mm 10mm
Resolution: 10nm 100nm 1µm 10µm 100µm 1mm

Designed for industrial applications

The sensors in the optoNCDT product range are designed for industrial applications. Due to their robust construction and user friendly technical features, they achieve precise measurement results even in harsh ambient conditions. Each series is available in a number of measurement ranges, covering one of the widest laser measurement product ranges in the marketplace.

Analogue and digital output types
The optoNCDT sensors are equipped with a number of outputs to fulfil many industrial user requirements. Both analogue and digital interfaces are available, to maximise flexibility of sensor integration to your existing production environments. Sensors with USB interfaces can be configured using an external PC and software supplied as standard.

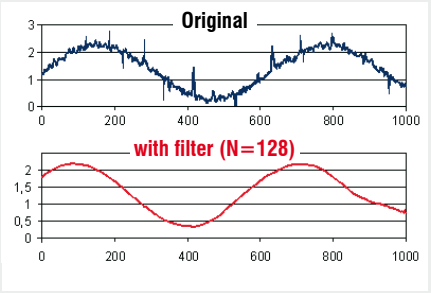
Compact with integrated controller
Despite their very compact dimensions, Series 1302, 1402, 1700, 1700LL and 1700DR have a fully integrated controller. As a result, simple, rapid installation and wiring is possible. The sensors can be integrated easily into the tightest installation space.

Cables suitable for drag chain systems
All sensor cables for optoNCDT sensors are rated for use in drag chains and are therefore suitable for various fields of applications. For integration with robot systems, robot-compatible cables for the 1302, 1402, 1700, 1700LL and 1700DR Series can be supplied as an option.

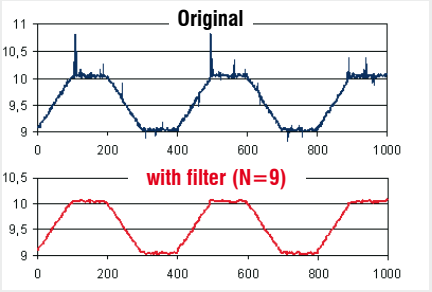
High measuring rate
High measuring rates are required for fast moving targets or measurements on difficult surfaces.
Sensors in the 2220 Series achieve a measuring rate of up to 20 kHz. The high-speed 1627 Series achieves measuring rates of up to 37kHz (-3dB).

Certified quality: Calibration certificate
To document the performance capability of the optoNCDT sensors, each sensor is calibrated before delivery and supplied with its own calibration certificate. This document is supplied with the sensor and is used as proof to the achieved measurement precision.
[available for all series except 1302]

Adjustable filter functions
A number of filters are available in order to obtain optimum results for each application: sliding mean, recursive mean and median. The filters are applied directly to the measurement results inside the controller before output.
[available for all series except 1302, 1607]

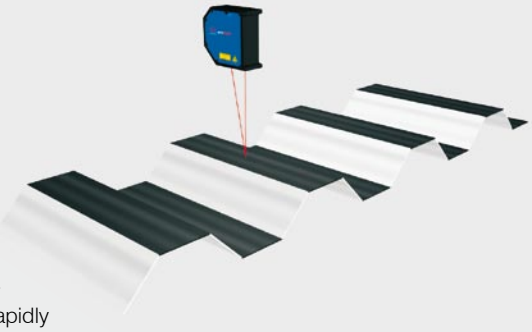


Vibration measurement with sliding mean



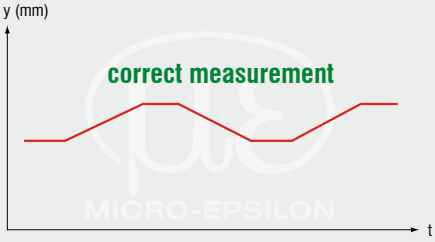
Profile measurement with median

A world first: Real Time Surface Compensation (RTSC)

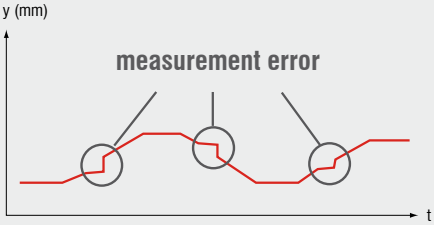


Through the unique RTSC function, the amount of reflection from the target surface is compensated during continuous exposure and in real-time. The exposure time or the amount of light produced by the laser is optimally matched to the reflection characteristics of the target surface. Unique to Micro-Epsilon sensors, this innovative real-time control always achieves optimum results, even with rapidly changing surface types.
Standard, commercially-available laser triangulation sensors normally operate with a time-shift control, which builds on previous measurement cycles. In this case, the amount of reflection from previous measurements is used to derive the degree of reflection for the next measurement. With changing or textured surfaces the measurement results therefore deviate noticeably from the actual measurement value, whereas optoNCDT is controlled in real time and as such, is adjusted to the optimum reflection conditions without needing to apply averaging filters.
[available for all series except 1302, 1402, 1607]

Comparison: optoNCDT with RTSC and conventional sensor



optoNCDT with RTSC real-time control



Conventional laser sensors with time-shift control - noticeable errors in measurement during change of surface conditions.

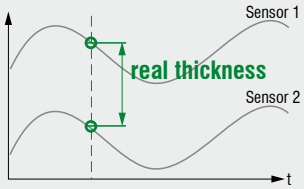
Measurement with multiple sensors

For many applications, it is necessary to measure or acquire data simultaneously using multiple sensors. The following range of functions are available to support synchronised measurements.

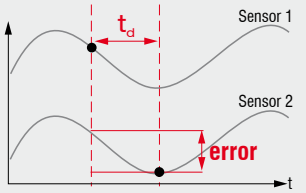
Genuine synchronisation of two sensors

A „true synchronous“ measurement is required to precisely acquire moving or oscillating objects during thickness or differential measurements. In this case, one optoNCDT acts as the master, which provides the corresponding cycle pulse for the second sensor (slave). This function facilitates the genuine synchronous pulsing of two sensors.
[available for all series except 1302, 1402, 1607]

Synchronisiation at thickness measurements of two sensors



Genuine synchronisation during thickness measurement using two optoNCDT sensors with simultaneous data acquisition



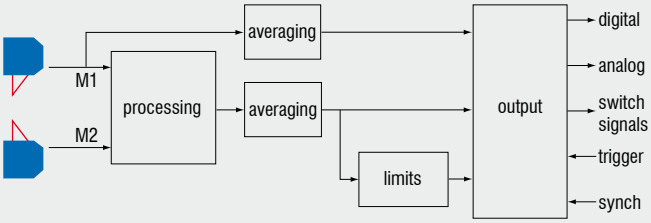
Conventional laser sensor with usual time offset erroneous measurement

IF2008 Interface Card for synchronous data acquisition

The IF2008 Interface Card is designed for the data acquisition of up to eight sensors (6x digital, 2x analogue) and two encoder. This enables the simultaneous evaluation of multiple signals. Here, the sensors can be located opposite one another, e.g. for thickness measurement, or mounted in one plane, e.g. for differential height measurement. The interface card reads out the data from all the connected devices simultaneously and passes them to an external PC for further processing.
Whereas the simultaneous measurement method is intended for opaque targets, alternating synchronisation, which prevents possible interference, can be set up for transparent objects.
[technical data on page 34]

CSP 2008: Controller for up to six sensors

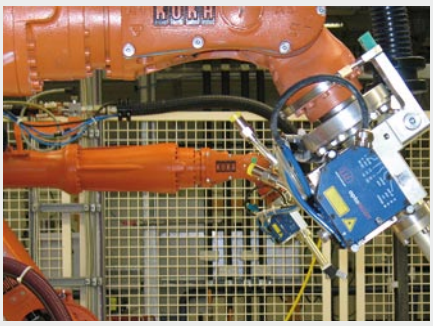
The CSP2008 controller can be used to process between two and six digital or analogue input signals (2 x internal plus 4 x external via Ethercat modules from Beckhoff (available september 2010)) of almost all Micro-Epsilon displacement sensors. Ethercat can also be used as an external interface for connecting further sensors and I/O modules. The controller has a high luminance display so that measured values can be easily read, even from a long distance.
[technical data on page 35]



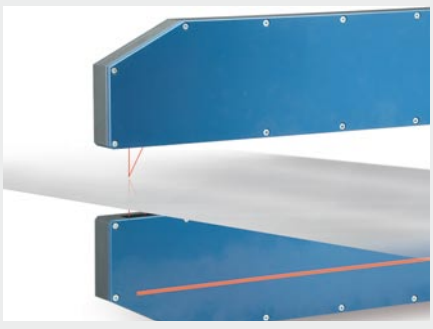
Thickness measurement with 2 optoNCDT laser sensors

optoNCDT on trimming systems of saw mills

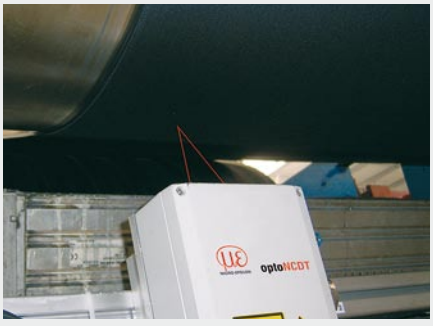
Profile measurement of marine propellers



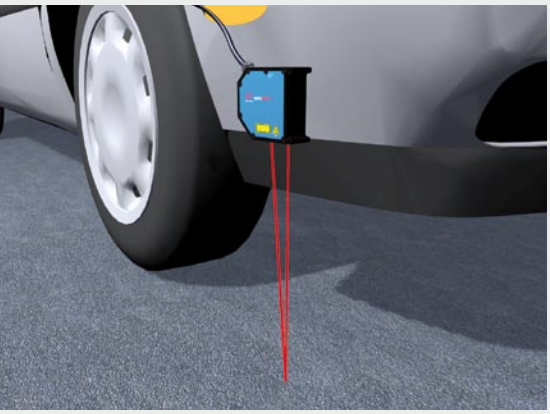
optoNCDT on robots in car production



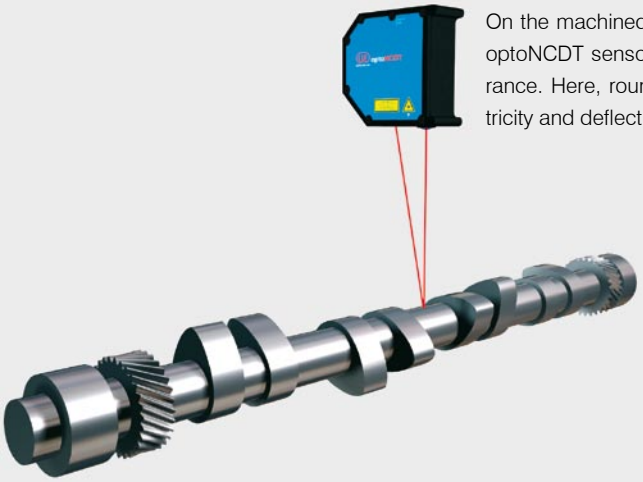
Strip thickness measurement with two sensors



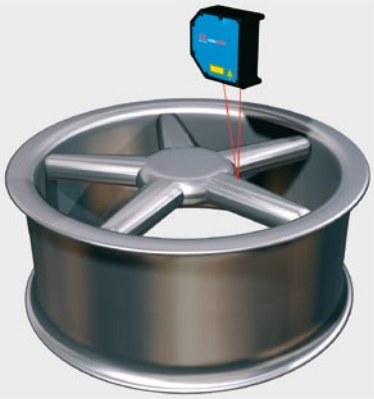
High speed measurement of black rubber



Distance of vehicle to road surface
In road tests, pitching and rolling movements, spring compression during braking and other quantities are measured with optoNCDT sensors. optoNCDT is particularly suitable here due to its compact construction and the possibility of powering the sensor from the vehicle power supply. For these applications, special models with increased resistance to extraneous light and vibration are available.

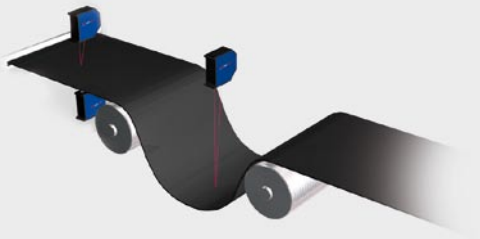


Measurement of automotive parts
On the machined surfaces of metal products, optoNCDT sensors are used for quality assurance. Here, roundness, concentricity, eccentricity and deflection can be acquired.

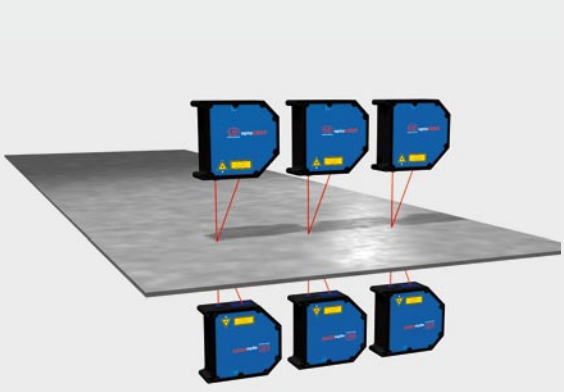


Shape conformance on aluminum wheels
After casting, aluminum wheels are measured for a range of properties, e.g. hub depth, roundness and bulging.

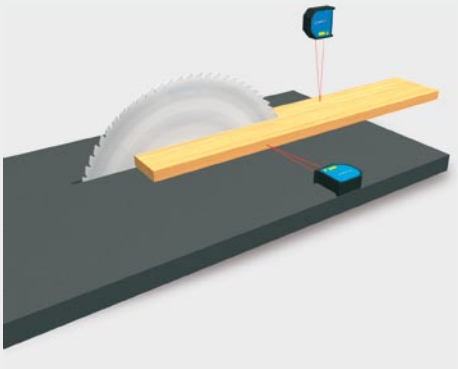
Car Body positioning in production lines
For automated processing of car bodies or vehicles, an exact determination of the position relative to the processing tool is necessary (drilling, punching, fitting, subassemblies). With its Real Time Surface Compensation, the optoNCDT sensor is ideally suited to the high-precision acquisition of sprayed surfaces.



Deflection
Black rubber, an extremely difficult material to measure, is already measured directly after the calender with optoNCDT sensors. The sensors provide an error-free production of the rubber web.

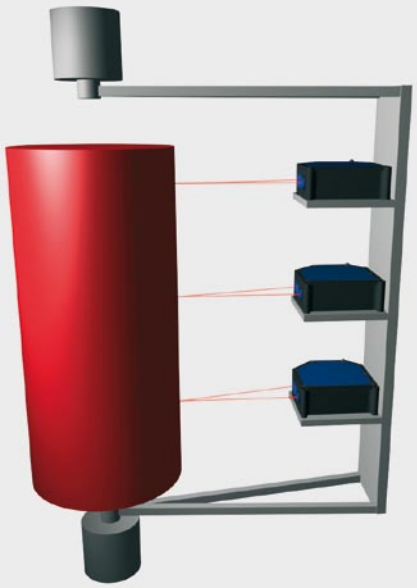


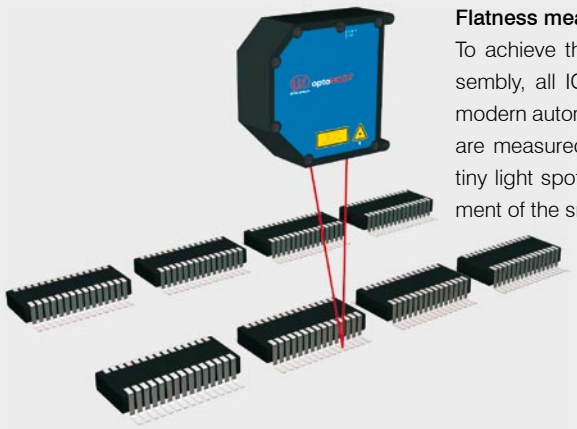
Synchronous thickness measurement
optoNCDT sensors are ideally suited to the thickness measurement of a variety of (web) materials. Due to the high measuring rate and the possibility of synchronising multiple sensors, even moving and oscillating targets can be reliably acquired.



Dimension measurement in wood production

optoNCDT sensors are used in woodworking plants to ensure the dimensional conformance of the work pieces. Here, both treated and untreated pieces are acquired.



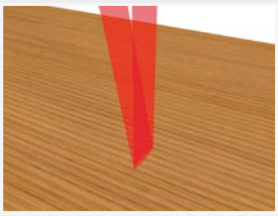


Flatness measurement of IC pins

To achieve the best quality during board assembly, all IC pins must lie in one plane. In modern automatic placement systems, the ICs are measured directly before placement. The tiny light spot diameters enable the measurement of the smallest pin geometries.

Contour measurement

During the production of ceramic catalytic converters for the automotive industry the billets are measured for roundness and diameter at multiple radial tracks for classification. Using the IF2004 interface card, the encoder and sensor signals are synchronised and mapped to obtain precise profile.



optoNCDT LL series - Anti speckle sensor

The distance information for the triangulation principle is obtained via the reflection of the laser beam. Thereby, surface roughness in the sub-micrometre range causes interference in the laser spot, whereby false measurement results can be obtained. This physical effect is particularly predominant in shiny, highly polished objects and cannot be avoided using currently available products on the market. Micro-Epsilon, as a specialist in measurement technology, announces its new optoNCDT LL, which also makes reliable measurements on shiny metallic objects thanks to an oval light spot. The point-shaped laser beam has now been widened using a special cylindrical lens and projected onto the target. The light spot is absorbed by a receiving array and evaluated. As the light spot is averaged using a special software algorithm, interference is completely filtered out.

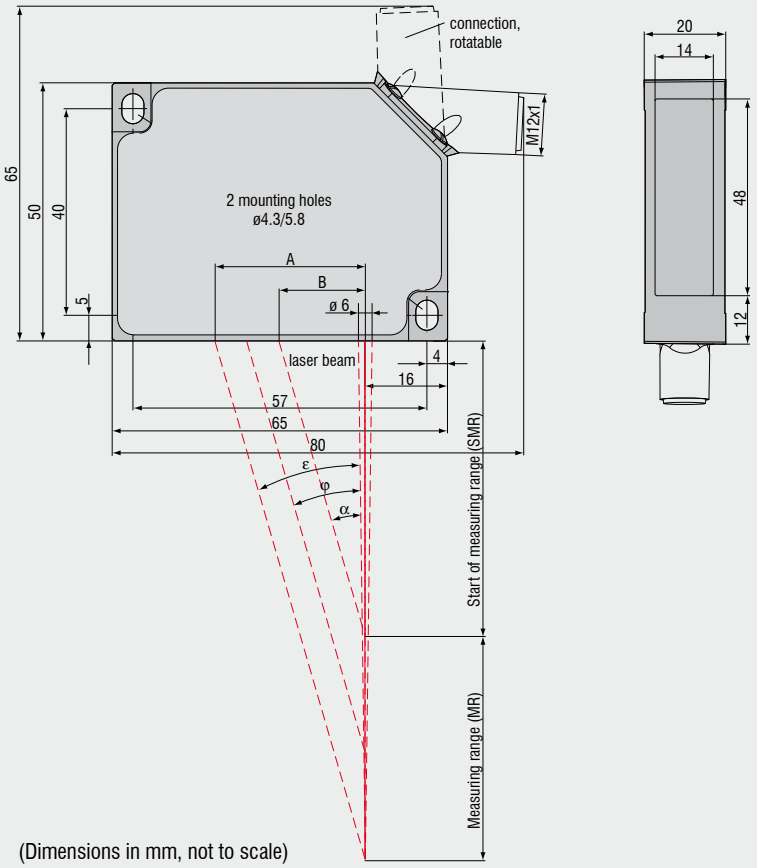
Another application area for the optoNCDT LL is structured surfaces, where the distance and not the structure itself needs to be measured. The distance information is not influenced by the structure of the surface but instead provides a constantly reliable value of the distance from the target. The optoNCDT 2200LL is based on the successful optoNCDT 2200 model and therefore has all the other advantages of the series, such as fast measured data evaluation or automatic exposure regulation in real-time. The optoNCDT 1700LL has the advantages of the integrated controller, thus making mounting of the sensor in confined spaces, or on robots much more practical.

- Four models with measuring ranges from 20mm to 200mm
- Ideal for OEM applications
- Compact design with integrated controller
- Measuring rate up to 750Hz
- Analogue (U/I) and digital output
- Trigger input and teach-in
- High flex cables for dragchain or robot use
- Configuration via software www.micro-epsilon.com/download

The miniaturised optoNCDT 1302 is a low-cost laser sensor for common measuring tasks. The extremely small design facilitates its integration even in areas with limited space. Despite the small dimensions, the 1302 series provides precise measurement results and is suitable for machine integration and automation technology.

MR	SMR	α	φ	ε	A	B
20	30.0	31.2	27.9	25.8	24.2	18.2
50	45.0	25.1	19.6	16.9	28.9	21.1
100	50.0	23.1	14.4	11.3	30.1	21.3
200	60.0	20.1	9.4	6.8	30.8	22.0

optoNCDT 1302

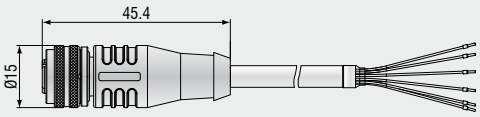


(Dimensions in mm, not to scale)

Model		ILD 1302-20	ILD 1302-50	ILD 1302-100	ILD 1302-200
Measuring range		20mm	50mm	100mm	200mm
Start of measuring range	SMR	30mm	45mm	50mm	60mm
Midrange	MR	40mm	70mm	100mm	160mm
End of measuring range	EMR	50mm	95mm	150mm	260mm
Linearity		40µm	100µm	200µm	400µm
		±0.2 % FSO			
Resolution	averaged with averaging factor 64	4µm	10µm	20µm	40µm
		0.02 % FSO			
	dynamic 750Hz	10µm	25µm	50µm	100µm
		0.05 % FSO			
Measuring rate		750Hz			
Light source		semiconductor laser <1mW, 670nm (red)			
Laser protection class		class 2 IEC 60825-1 : 2001-11			
Spot diameter	SMR	210µm	1100µm	1400µm	2300µm
	MR	530µm	110µm	130µm	2200µm
	EMR	830µm	1100µm	1400µm	2100µm
Protection class		IP 67			
Vibration		15g / 10Hz…1kHz			
Shock		15g / 6ms (IEC 68-2-29)			
Weight (without cable)		approx. 83g			
Temperature stability		0.03 % FSO/°C		0.08 % FSO/°C	
Operating temperature		0…+50°C			
Storage temperature		-20...+70°C			
Output	analogue	4...20mA (1...5V with cable PC 1402-3/U)			
	digital	RS422			
Control I/O		1x open collector output (switching output, switch, error); 1x input (teach in, trigger); 1x laser on/off			
Power supply		11...30VDC, 24VDC / 50mA			
Controller		integrated signal processor			
Electromagnetic compatibility (EMC)		EN 61326-1:2006 / EN 55011 Class B (Interface emission) EN 61326-1:2006 / EN 61000-4-2:1995 + A1:1998 + A2:2001 (Interference resistance)			

FSO = Full scale output All specifications apply for a diffusely reflecting matt white ceramic target
SMR = Start of measuring range; MR = Midrange; EMR = End of measuring range

Connector axial



12-pin-connector
(view on solder termination side of male inserts)

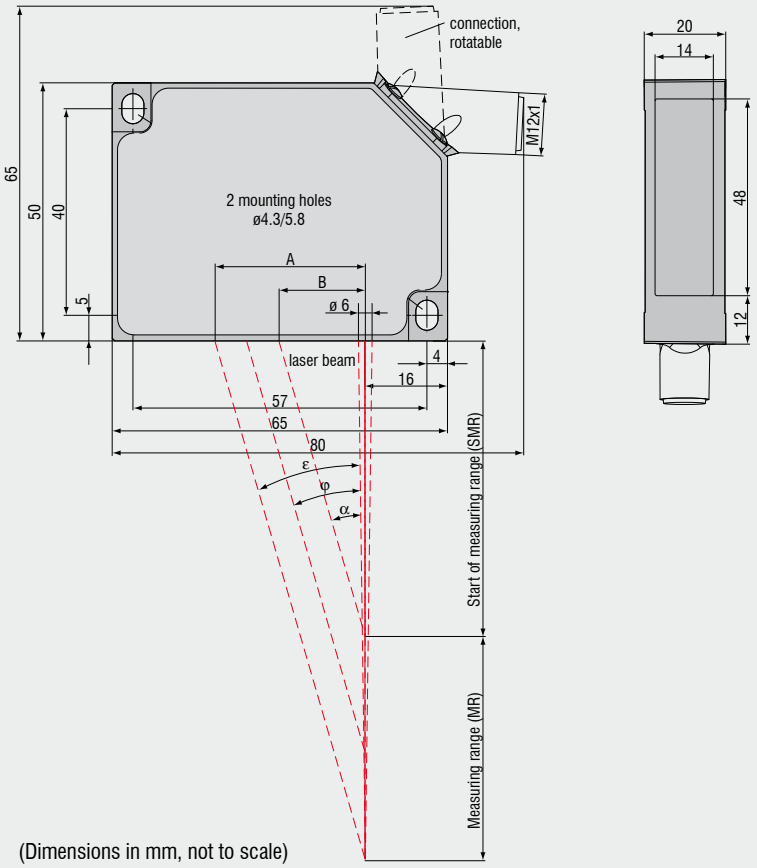
Pin	Description		colour PC1402-x/I
3	RS422 Rx+	serial input	green
4	RS422 Rx-	serial input	yellow
5	RS422 Tx+	serial output	grey
6	RS422 Tx-	serial output	pink
7	$+U_B$	11-30VDC type 24V	red
8	Laser off	switch input	black
9	Teach in	switch input	violet
10	Error	switch output	brown
11	I_{OUT}	4 ... 20mA	white
12	GND	supply and signal ground	blue
1/2	n.c.		

The cable screen is connected with the sensor housing. The interface and power supply cable are robot rated and UL certfied. At one end there is a 12pin M12 connector, the other end is open.

- Eight models with measuring ranges from 5mm to 600mm
- Ideal for OEM applications
- Compact design with integrated controller
- Adjustable measuring rate up to 1.5kHz
- Analogue (U/I) and digital output
- Trigger input and teach-in
- Adjustable filter functions Peak selection (firmware)
- High flex cables for dragchain or robot use
- Calibration certificate included
- Configuration via software www.micro-epsilon.com/download

The miniature optoNCDT 1402 series is the leading sensor in this price/ performance category. The compact construction enables integration inside small areas. The optoNCDT 1402 series is ideally suited for integration into machines and automation applications.

optoNCDT 1402



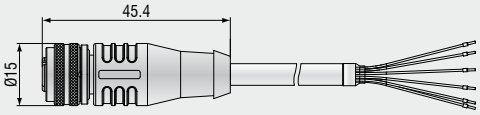
(Dimensions in mm, not to scale)

MR	SMR	α	φ	ε	A	B
5	20.0	33.5	35.5	37.1	18.9	13.2
10	20.0	33.5	32.9	32.4	19.1	13.2
20	30.0	31.2	27.9	25.8	24.2	18.2
50	45.0	25.1	19.6	16.9	28.9	21.1
100	50.0	23.1	14.4	11.3	30.1	21.3
200	60.0	20.1	9.4	6.8	30.8	22.0
250VT	100.0	14.7	7.6	5.5	33.9	26.2
600	200.0	9.7	4.3	3	41.6	33.7

Model		ILD 1402-5	ILD 1402-10	ILD 1402-20	ILD 1402-50	ILD 1402-100	ILD 1402-200	ILD 1402-250VT	ILD 1402-600
Measuring range		5mm	10mm	20mm	50mm	100mm	200mm	250mm	600mm
Start of measuring range	SMR	20mm	20mm	30mm	45mm	50mm	60mm	100mm	200mm
Midrange	MMR	22.5mm	25mm	40mm	70mm	100mm	160mm	225mm	500mm
End of measuring range	EMR	25mm	30mm	50mm	95mm	150mm	260mm	350mm	800mm
Linearity		5...9µm	5...18µm	7...36µm	12...90µm	20...180µm	40...360µm	50...1200µm	120...3000µm
		≤0.18% FSO						≤0.5% FSO	
Resolution [1]	averaged with averaging factor 64	0.6µm	1µm	2µm	5µm	10µm	13µm	32µm	80µm
		0.01% FSO							
	dynamic 1.5 kHz	1...3µm	2...5µm	5...10µm	6...25µm	12...50µm	13...100µm	32...300µm	80...600µm
		0.02...0.05% FSO						0.02...0.12% FSO	
Measuring rate, programmable		1.5kHz; 1kHz; 750Hz; 375Hz; 50Hz							
Exposure rate, programmable [2]		0.6ms; 1ms; 1.3ms; 2.6ms; 20ms							
Light source		semiconductor laser <1mW, 670nm (red)							
Laser safety class		class 2 IEC 60825-1 : 2001-11							
Spot diameter	SMR	110µm	110µm	210µm	1100µm	1400µm	2300µm	5000µm	2.6 x 5mm
	MMR	380µm	650µm	530µm	110µm	130µm	2200µm	5000µm	2.6 x 5mm
	EMR	650µm	1200µm	830µm	1100µm	1400µm	2100µm	5000µm	2.6 x 5mm
Protection class		IP 67							
Vibration		15g / 10Hz … 1kHz						20g / 10Hz…1kHz	
Shock		15g / 6ms (IEC 68-2-29)							
Weight (without cable)		appr. 83g						appr. 130g	
Temperature stability		0.03 % FSO/°C				0.08 % FSO/°C			
Operation temperature		0 …+50°C							
Storage temperature		-20 ... +70°C							
Output	analogue	4 ... 20mA (1 ... 5V with cable PC 1402-3/U); free scalable within the nominal range							
	digital	RS422 / 14bit							
Control I/O		1x open collector output (switching output, switch, error); 1x input (teach in, trigger); 1x laser on/off							
Supply		11 ... 30VDC, 24VDC / 50mA							
Controller		integrated signal processor							
Software		free setup and aquisition tool + SDK (software development kit)							
Electromagnetic compatibility (EMC)		EN 61326-1:2006 / EN 55011 Class B (Interface emission) EN 61326-1:2006 / EN 61000-4-2:1995 + A1:1998 + A2:2001 (Interference resistance)							

FSO = Full scale output All specifications apply for a diffusely reflecting matt white ceramic target
[1] resolution digital output 14bit [2] tide to measurement rate
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range

Connector axial



12-pin-connector
(view on solder termination side of male inserts)

Pin	Description		colour PC1402-x/I
3	RS422 Rx+	serial input	green
4	RS422 Rx-	serial input	yellow
5	RS422 Tx+	serial output	grey
6	RS422 Tx-	serial output	pink
7	$+U_B$	11-30DV 24V MP	red
8	Laser off	switch input	black
9	Teach in	switch input	violet
10	Error	switch output	brown
11	I_{OUT}	4 ... 20mA	white
12	GND	supply and signal ground	blue
1/2	n.c.		

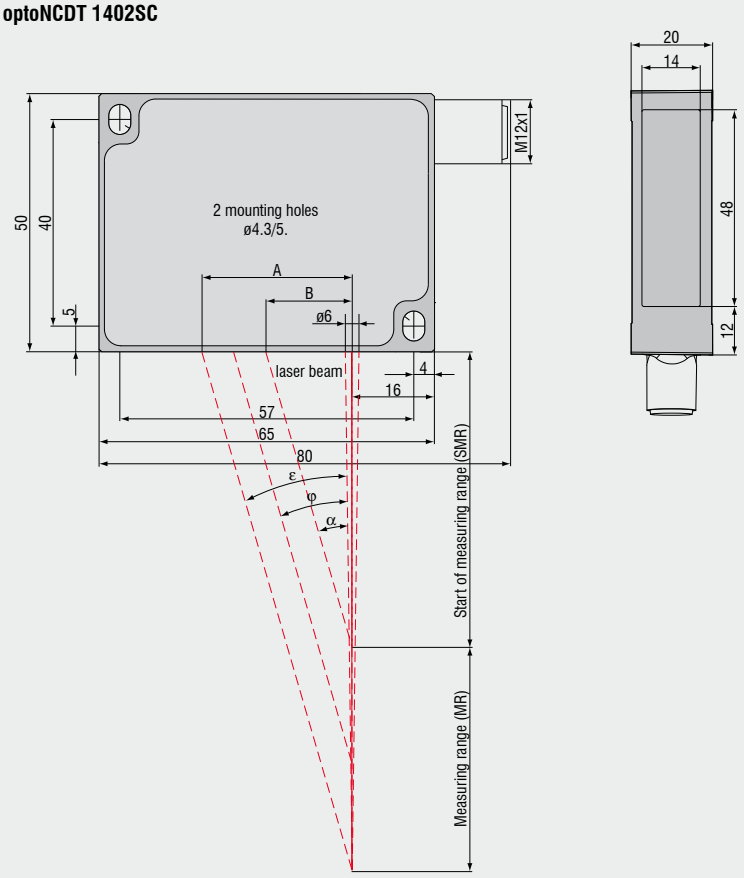
The cable screen is connected with the sensor housing. The interface and power supply cable are robot rated and UL certfied. At one end there is a 12pin M12 connector, the other end is open.

Compact sensor with stainless steel housing

- Eight models with measuring ranges from 5mm to 600mm
- Ideal for OEM applications
- Compact sensor with stainless steel housing
- Adjustable measuring rate up to 1.5kHz
- Analogue (U/I) and digital output
- Trigger input and teach-in
- Adjustable filter functions Peak selection (firmware)
- High flex cables for dragchain or robot use
- Calibration certificate included
- Configuration via software www.micro-epsilon.com/download

The optoNCDT 1402SC sensor is protected to IP69K and is available in all measuring ranges between 5mm and 600mm. Due to its very robust design, the sensor is suitable for the food industry, outdoor use or for demanding process manufacturing applications. The housing for this model comprises V4A steel and complies with all food industry requirements. In this version, the sensor is resistant to high pressure jet washing and to aggressive cleaning detergents and disinfection agents, including hydrogen peroxide and other alkaline-based cleaning materials and cleaning materials that contain chlorine. The sensor electronics are similar to those used by the optoNCDT 1402 standard model.

optoNCDT 1402SC



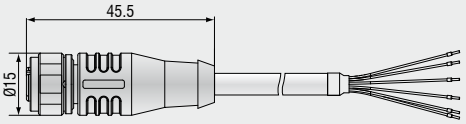
(Dimensions in mm, not to scale)

MR	SMR	α	φ	ε	A	B
5	20.0	33.5	35.5	37.1	18.9	13.2
10	20.0	33.5	32.9	32.4	19.1	13.2
20	30.0	31.2	27.9	25.8	24.2	18.2
50	45.0	25.1	19.6	16.9	28.9	21.1
100	50.0	23.1	14.4	11.3	30.1	21.3
200	60.0	20.1	9.4	6.8	30.8	22.0
250VT	100.0	14.7	7.6	5.5	33.9	26.2
600	200.0	9.7	4.3	3	41.6	33.7

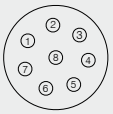
Model		ILD 1402-5SC	ILD 1402-10SC	ILD 1402-20SC	ILD 1402-50SC	ILD 1402-100SC	ILD 1402-200SC	ILD 1402-250SC	ILD 1402-600SC
Measuring range		5mm	10mm	20mm	50mm	100mm	200mm	250mm	600mm
Start of measuring range	SMR	20mm	20mm	30mm	45mm	50mm	60mm	100mm	200mm
Midrange	MMR	22.5mm	25mm	40mm	70mm	100mm	160mm	225mm	500mm
End of measuring range	EMR	25mm	30mm	50mm	95mm	150mm	260mm	350mm	800mm
Linearity		5...9µm	5...18µm	7...36µm	12...90µm	20...180µm	40...360µm	50...1200µm	120...3000µm
		≤0.18% FSO						≤0.5% FSO	
Resolution [1]	averaged with averaging factor 64	0.6µm	1µm	2µm	5µm	10µm	13µm	32µm	80µm
		0.01% FSO							
	dynamic 1.5 kHz	1...3µm	2...5µm	5...10µm	6...25µm	12...50µm	13...100µm	32...300µm	80...600µm
		0.02...0.05% FSO						0.02...0.12% FSO	
Measuring rate, programmable		1.5kHz; 1kHz; 750Hz; 375Hz; 50Hz							
Exposure rate, programmable [2]		0.6ms; 1ms; 1.3ms; 2.6ms; 20ms							
Light source		semiconductor laser <1mW, 670nm (red)							
Laser safety class		class 2 IEC 60825-1 : 2001-11							
Spot diameter	SMR	110µm	110µm	210µm	1100µm	1400µm	2300µm	5000µm	2.6 x 5mm
	MMR	380µm	650µm	530µm	110µm	130µm	2200µm	5000µm	2.6 x 5mm
	EMR	650µm	1200µm	830µm	1100µm	1400µm	2100µm	5000µm	2.6 x 5mm
Protection class		IP 69 K							
Vibration		15g / 10Hz … 1kHz						20g / 10Hz…1kHz	
Shock		15g / 6ms (IEC 68-2-29)							
Weight (without cable)		appr. 83g						appr. 130g	
Temperature stability		0.03 % FSO/°C				0.08 % FSO/°C			
Operation temperature		0 …+50°C							
Storage temperature		-20 ... +70°C							
Output	analogue	4 ... 20mA (1 ... 5V with cable PC 1402-3/U); free scalable within the nominal range							
	digital	RS422 / 14bit							
Control I/O		1x open collector output (switching output, switch, error); 1x input (teach in, trigger); 1x laser on/off							
Supply		11 ... 30VDC, 24VDC / 50mA							
Controller		integrated signal processor							
Software		free setup and aquisition tool + SDK (software development kit)							
Electromagnetic compatibility (EMC)		EN 61326-1:2006 / EN 55011 Class B (Interface emission) EN 61326-1:2006 / EN 61000-4-2:1995 + A1:1998 + A2:2001 (Interference resistance)							

FSO = Full scale output All specifications apply for a diffusely reflecting matt white ceramic target
[1] resolution digital output 14bit [2] tide to measurement rate
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range

Connector axial



8-pin-connector



Pin	Description	colour
1	I_{OUT}	white
2	Error	brown
3	RS422 Rx+	green
4	RS422 Rx–	yellow
5	RS422 Tx+	grey
6	RS422 Tx–	pink
7	GND	blue
8	$+U_B$	red
	Laser off	
	Teach in	

- Ten models with measuring ranges from 2mm to 750mm
- Compact design with integrated controller
- RTSC Real Time Surface Compensation
- Adjustable measuring rate up to 2.5kHz
- Analogue (U/I) and digital output
- Adjustable filter functions (firmware)
- High flex cables for dragchain or robot use
- Calibration certificate included
- Configuration via software www.micro-epsilon.com/download

The benchmark in laser triangulation sensors

The optoNCDT 1700 series is truly a world leading laser displacement sensor. Featuring Real Time Surface Compensation (RTSC), remote software programming and excellent linearity & resolution the optoNCDT 1700 is difficult to match at this price level. Integrated conditioning electronics allows the sensor to have a very unique and compact design.

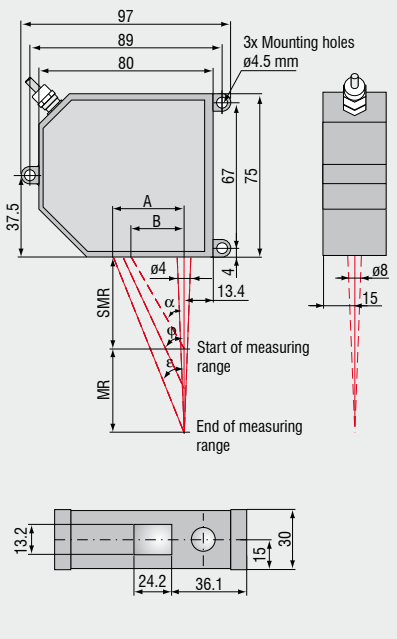
Adjustable limit switches

As well as for precise measurement, the optoNCDT 1700 sensors are also used for tolerance or limit monitoring. Two switching points are available which can be configured and adjusted via the remote software (USB connection). The switching hysteresis can also be individually adjusted for each limit point.

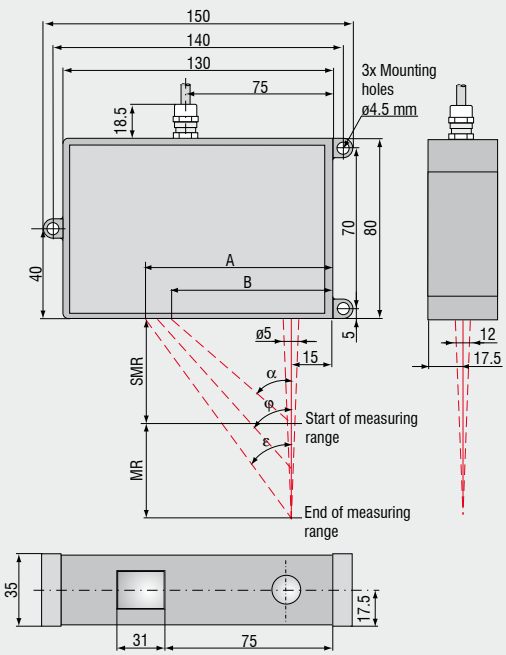
Adjustable exposure time/measuring rate

For poor reflecting targets, the measuring rate can be reduced to enable a longer exposure time. The set measurement rate always remains constant so that with closed-loop control the system response time is always the same.

optoNCDT 1700 (2/10/20/50/100/200/250VTmm)



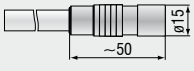
optoNCDT 1700 (40/500/750mm)



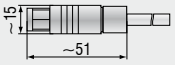
(Dimensions in mm, not to scale. All CAD files are available online.)

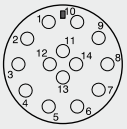
MR	SMR	α	φ	ε	A	B
2	24	35°	40°	44.8°	25.8	16.8
10	30	34.3°	35.2°	35.6°	28.7	20.5
20	40	28.8°	27.5°	26.7°	30.1	22.0
50	45	26.5°	23.0°	18.3°	31.5	22.5
100	70	19.0°	15.4°	10.9°	32.6	24.1
200	70	19.0°	9.78°	6.97°	33.1	24.1
250VT	70	19.0°	8.4°	6.0°	33.5	24.1
40	175	22.1°	21.9°	21.8°	101	86
500	200	19.3°	9.8°	7.0°	101	85
750	200	19.3°	7.7°	5.0°	101	85

Connector (sensor side)
Article Number: 0323243



Connector (sensor cable)
Article Number: 0323272





14-pin-connector
(Pin side female cable connector or solder-pin side male cable connector)

Model	ILD 1700-2	ILD 1700-10	ILD 1700-20	ILD 1700-40	ILD 1700-50	ILD 1700-100	ILD 1700-200	ILD 1700-250VT	ILD 1700-500	ILD 1700-750
Measuring range	2mm	10mm	20mm	40mm	50mm	100mm	200mm	250mm	500mm	750mm
Start of measuring range	24mm	30mm	40mm	175mm	45mm	70mm	70mm	70mm	200mm	200mm
Midrange	25mm	35mm	50mm	195mm	70mm	120mm	170mm	195mm	450mm	575mm
End of measuring range	26mm	40mm	60mm	215mm	95mm	170mm	270mm	320mm	700mm	950mm
Linearity	2µm	8µm	16µm	32µm	40µm	80µm	200µm	630µm	400µm	750µm
FSO	≤0.1%			≤0.08%			≤0.1%	≤0.25%	≤0.08%	≤0.1%
Resolution (at 2.5kHz without averaging)	0.1µm	0.5µm	1.5µm	4µm	3µm	6µm	12µm	50µm	30µm	50µm
Measuring rate	2.5kHz / 1.25kHz / 625Hz / 312.5Hz (adjustable)									
Light source	semiconductor laser <1mW, 670nm (red)									
Permissable ambient light (at 2.5kHz)	10,000lx							15,000lx	10,000lx	
Laser safety class	class 2 acc. DIN EN 60825-1 : 2001-11									
Spot diameter SMR	80µm	110µm	320µm	230µm	570µm	740µm	1300µm	1500µm	1500µm	1500µm
Spot diameter MMR	35µm	50µm	45µm	210µm	55µm	60µm	1300µm	1500µm	1500µm	1500µm
Spot diameter EMR	80µm	110µm	320µm	230µm	570µm	700µm	1300µm	1500µm	1500µm	1500µm
Temperature stability*	0.025% FSO/°C	0.01 % FSO/°C						0.025% FSO/°C	0.01 % FSO/°C	
Operation temperature	0 ...+50°C							0 ...+55°C	0 ...+50°C	
Storage temperature	-20 ... +70°C									
Output measurements	selectable: 4 ... 20mA / 0 ... 10V / RS 422 / USB (optional with cable PC1700-3/USB)									
Output switching outputs	1 x error or 2 x limit (each pogrammable)									
Switch Input	laser ON-OFF / zero									
Operation	via touch screen on sensor or via PC with ILD 1700 tool									
Power supply	24VDC (11 ... 30VDC), max. 150mA									
Electromagnetic compatibility (EMC)	EN 61000-6-3 EN 61000-6-2									
Sensor cable length (with connector)	0.25m (integrated cable with connector) option: 3m or 10m									
Synchronisation	possible for simultaneous or alternating measurements									
Protection class	IP 65									
Vibration	2g / 20 ... 500Hz									
Shock	15g / 6ms									
Weight (with 0.25m cable)	~ 550g			~ 600g	~ 550g				~ 600g	

FSO = Full Scale Output All specifications apply for a diffusely reflecting white ceramic target
* based on digital output
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range

Custom Sensor Modifications

For applications where the above standard sensors do not meet your requirements, it may be possible to supply a sensor with modified specification. Please contact us for further information.

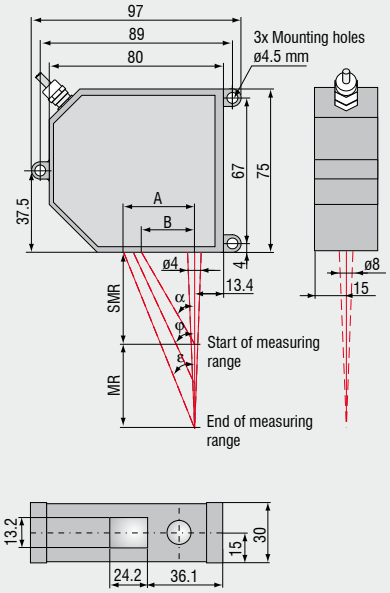
Options

- Non standard measuring range and stand off
- Custom housing or mounting geometry
- Non standard signal interfaces
- Special cable length of electrical connector
- 90° beam deflection
- Vacuum suitability
- Reduced mass
- Increased shock and vibration resistance

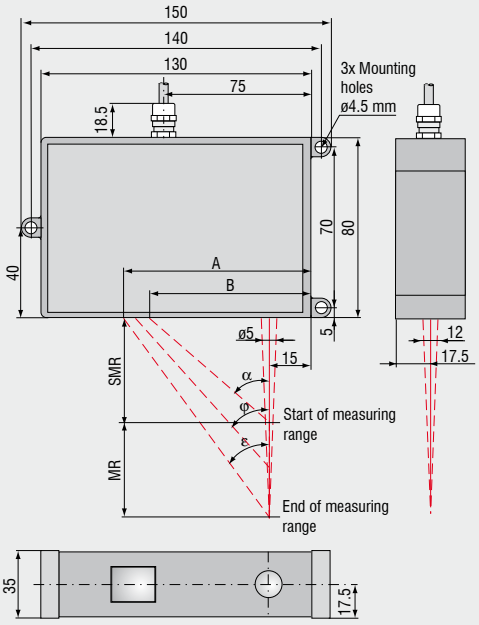
- Seven models with measuring ranges from 2mm to 200mm
- Sensor head and separate controller
- Measurement rate up to 10kHz
- Real Time Surface Compensation
- Analogue and digital output
- Adjustable filter functions (firmware)
- Calibration certificate included
- Configuration via software www.micro-epsilon.com/download

At the head of the Micro-Epsilon laser family stands the optoNCDT 2200 series. Extreme accuracy, high measuring rate and constant signal stability, can be achieved at maximum speed without any signal averaging. This is world's first in terms of capability, enabling the sensor to solve the most demanding measurement applications. The digital output signal can be combined with the IF2008 PCI card (also designed and supplied by Micro-Epsilon) to synchronise multiple sensors at full measurement rate for easy data acquisition direct to a PC.

optoNCDT 2200 (2/10/20/50/100mm)

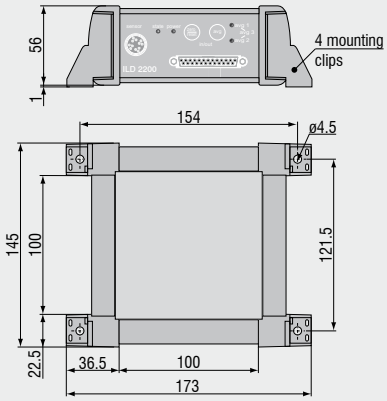


optoNCDT 2200 (40/200mm)



(Dimensions in mm, not to scale. All CAD files are available online.)

Controller



MR	SMR	α	φ	ε	A	B
2	24	35.0°	40.0°	44.8°	25.8	16.8
10	30	34.3°	35.2°	35.6°	28.7	20.5
20	40	28.8°	27.5°	26.7°	30.1	22
50	45	26.5°	23.0°	18.3°	31.5	22.5
100	70	19.0°	15.4°	10.9°	32.6	24.1
40	175	22.1°	21.9°	21.8°	101	86
200	130	25.1°	16.7°	13.1°	91.6	76

Model	ILD 2200-2	ILD 2200-10	ILD 2200-20	ILD 2200-40	ILD 2200-50	ILD 2200-100	ILD 2200-200
Measuring range	2mm	10mm	20mm	40mm	50mm	100mm	200mm
Start of measuring range	24mm	30mm	40mm	175mm	45mm	70mm	130mm
Midrange	25mm	35mm	50mm	195mm	70mm	120mm	230mm
End of measuring range	26mm	40mm	60mm	215mm	95mm	170mm	330mm
Linearity	1µm ≤0.05% FSO	3µm	6µm	12µm ≤0.03% FSO	15µm	30µm	60µm
Resolution [1] (at 10 kHz without averaging)	0.03µm	0.15µm	0.3µm	0.6µm 0.0015% FSO	0.8 µm	1.5µm	3µm
Measuring rate	10kHz						
Permissable ambient light	30,000lx						
Spot diameter SMR	80µm	110µm	160µm	230µm	215µm	350µm	1300µm
Spot diameter MMR	35µm	50µm	60µm	210µm	80µm	130µm	1300µm
Spot diameter EMR	80µm	110µm	160µm	230µm	215µm	350µm	1300µm
Light source	semiconductor laser <1mW, 670nm (red)						
Laser safety class	class 2 acc. DIN EN 60825-1/A1 12.99 / IEC 825-1/A1 12.99 / FDA						
Protection class	sensor: IP 65 / controller: IP 50						
Temperature stability	0.025% FSO/°C	0.01% FSO/°C					
Operation temperature	0 ... +50°C						
Storage temperature	-20 ... +70°C						
Output	analogue: ±5V digital: RS 422 / 691.2kBaud						
Power supply	24VDC (±15%), max. 500mA						
Sensor cable length	standard: 2m - integrated option: 5m/10m						
Controller	functions: auto zero / signal averaging dimensions: 143mm x 145mm x 52mm - without mounting clips						
Electromagnetic compatibility (EMC)	EN 55011/12.1998 and EN 50082-2/ 02.1996						
Vibration	2g / 20 ... 500Hz						
Shock	15g / 6ms / 3 axis						
Weight sensor	~550g			~600g	~550g		~600g
Weight controller	~1000g						

FSO = Full Scale Output All specifications apply for a diffusely reflecting matt white ceramic target
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range
[1] resolution digital output 16bit

Custom Sensor Modifications

For applications where the above standard sensors do not meet your requirements, it may be possible to supply a sensor with modified specification. Please contact us for further information.

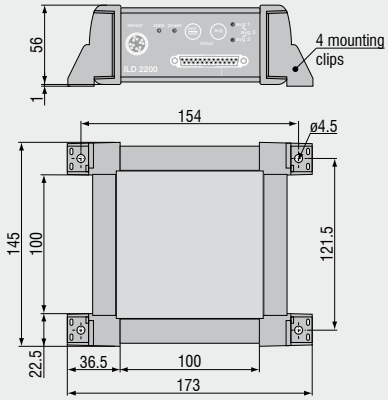
Options

- Non standard measuring range and stand off
- Custom housing or mounting geometry
- Measuring rate 2.5 / 5 / 10 / 20kHz
- Non standard signal interfaces
- Special cable length of electrical connector
- 90° beam deflection
- Vacuum suitability
- Reduced mass
- Increased shock and vibration resistance

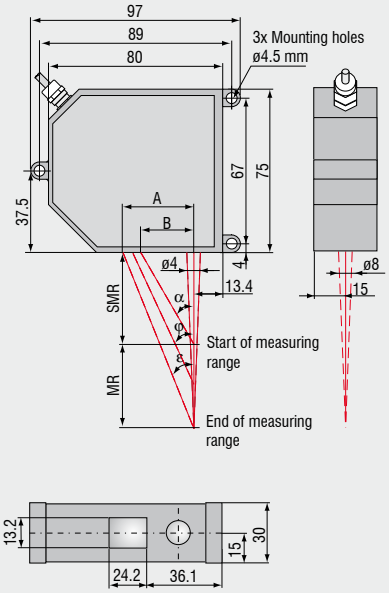
- **Six models with measuring ranges from 2mm to 200mm**
- **Sensor head and separate controller**
- **20kHz measurement rate over the full working range**
- **Real Time Surface Compensation**
- **Analogue and digital output**
- **Adjustable filter functions (firmware)**
- **Calibration certificate included**
- **Configuration via software www.micro-epsilon.com/download**

The optoNCDT 2220 provides a genuine 20kHz measurement rate for every measurement task. The series is ideally suited to superfast, complex applications and offers a high speed measurement with excellent resolution. In addition, the optoNCDT 2220 incorporates all the popular Micro-Epsilon benefits including the RTSC function for changing surfaces or the specific CCD-line for high resolution measurements.

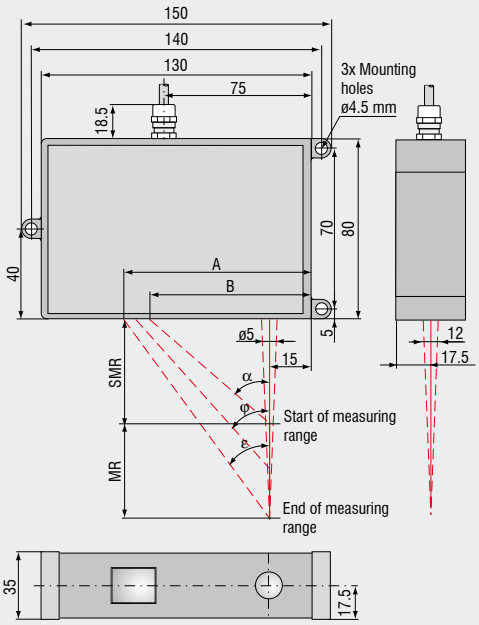
Controller



optoNCDT 2220 (2/10/20/50/100mm)



optoNCDT 2220 (200mm)



(Dimensions in mm, not to scale. All CAD files are available online.)

MR	SMR	α	φ	ε	A	B
2	24	35.0°	40.0°	44.8°	25.8	16.8
10	30	34.3°	35.2°	35.6°	28.7	20.5
20	40	28.8°	27.5°	26.7°	30.1	22
50	45	26.5°	23.0°	18.3°	31.5	22.5
100	70	19.0°	15.4°	10.9°	32.6	24.1
200	130	25.1°	16.7°	13.1°	91.6	76

Model	ILD 2220-2	ILD 2220-10	ILD 2220-20	ILD 2220-50	ILD 2220-100	ILD 2220-200
Measuring range	2mm	10mm	20mm	50mm	100mm	200mm
Start of measuring range	24mm	30mm	40mm	45mm	70mm	130mm
Midrange	25mm	35mm	50mm	70mm	120mm	230mm
End of measuring range	26mm	40mm	60mm	95mm	170mm	330mm
Linearity	1µm	3µm	6µm	15µm	30µm	60µm
	≤0.05% FSO	≤0.03% FSO				
Resolution [1] (at 20 kHz without averaging)	0.03µm	0.15µm	0.3µm	0.8µm	1.5µm	3µm
	0.0015% FSO					
Measuring rate	20kHz					
Permissable ambient light	30.000lx					
Spot diameter SMR	80µm	110µm	160µm	215µm	350µm	1300µm
Spot diameter MMR	35µm	50µm	60µm	80µm	130µm	1300µm
Spot diameter EMR	80µm	110µm	160µm	215µm	350µm	1300µm
Light source	semiconductor laser <1mW, 670nm (red)					
Laser safety class	class 2 acc. DIN EN 60825-1/A1 12.99 / IEC 825-1/A1 12.99 / FDA					
Protection class	sensor: IP 65 / controller: IP 50					
Temperature stability	0.025 % FSO/°C	0.01 % FSO/°C				
Operation temperature	0 ... +50°C					
Storage temperature	-20 ... +70°C					
Output	analogue: ±5V digital: RS 422 / 691.2kBaud					
Power supply	24VDC (±15%), max. 500mA					
Sensor cable length	standard: 2m - integrated option: 5m/10m					
Controller	functions: auto zero / signal averaging dimensions: 143mm x 145mm x 52mm - without mounting clips					
Electromagnetic compatibility (EMC)	EN 55011/12.1998 and EN 50082-2/ 02.1996					
Vibration	2g / 20 ... 500Hz					
Shock	15g / 6ms / 3 axis					
Weight sensor	~550g					~600g
Weight controller	~1000g					

FSO = Full Scale Output
All specifications apply for a diffusely reflecting matt white ceramic target
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range
[1] resolution digital output 16bit

Custom Sensor Modifications

For applications where the above standard sensors do not meet your requirements, it may be possible to supply a sensor with modified specification. Please contact us for further information.

Options

- Non standard measuring range and stand off
- Custom housing or mounting geometry
- Measuring rate 2.5 / 5 / 10 / 20kHz
- Non standard signal interfaces
- Special cable length of electrical connector
- 90° beam deflection
- Vacuum suitability
- Reduced mass
- Increased shock and vibration resistance

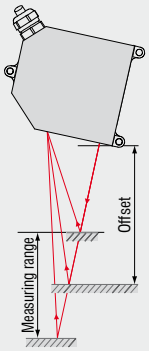
- Precise measurement of direct reflecting surfaces (glass and mirror)
- Three models with measuring ranges from 2mm to 20mm
- Compact design with integrated controller
- RTSC Real Time Surface Compensation
- 312Hz 375Hz 1000Hz Adjustable measuring rate up to 2.5kHz
- Analog Digital Analogue (U/I) and digital output
- Filter inside Adjustable filter functions (firmware)
- High flex cables for dragchain or robot use
- Certified Calibration certificate included
- //www. Configuration via software www.micro-epsilon.com/download

Specular Model for direct reflecting targets (glass and mirror)

optoNCDT 1700DR is designed for use with direct reflective materials, such as mirrored surfaces that are traditionally difficult to measure with laser technology. The sensor compensates for the high intensity of the reflected light by using patented, high speed software algorithms that dramatically reduce signal noise. The unit size is identical to the standard optoNCDT 1700 series and is therefore ideal for use in small areas (mounting device included).

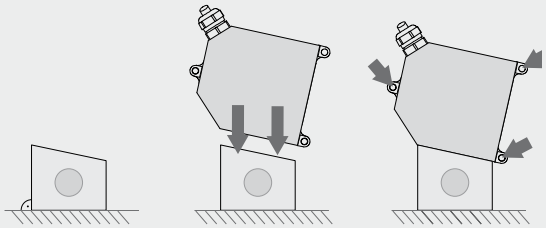
A different tilt angle is necessary for each sensor depending on the measuring range. Therefore, mounting stencils for easy alignment of the sensors to the target are included as standard.

Mounting direct reflection
(tilt tolerance <0.1°)



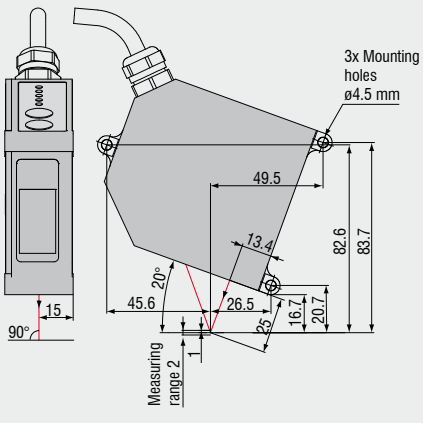
Mirror-like surface

Precision alignment accessory
(Mounting device included with delivery)

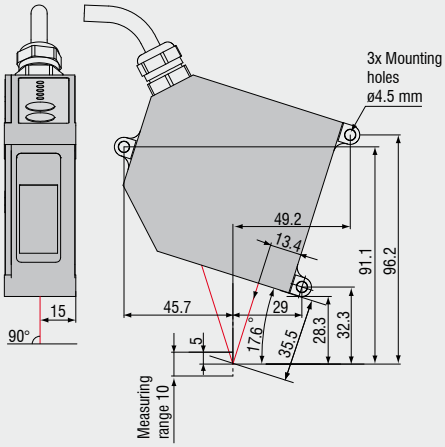


① Mounting the alignment ② Orientation of the sensor ③ Fixing the sensor

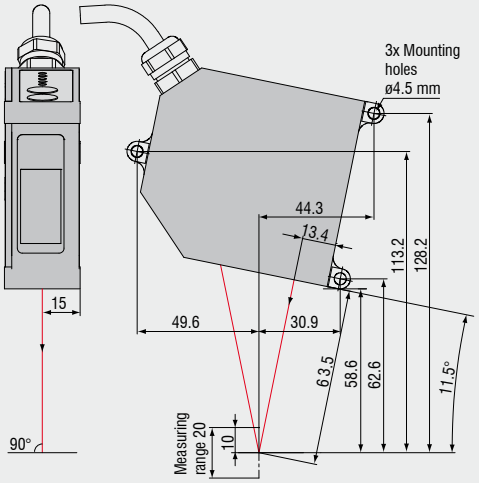
optoNCDT 1700DR (2mm)



optoNCDT 1700DR (10mm)



optoNCDT 1700DR (20mm)



(Dimensions in mm, not to scale. All CAD files are available online.)

Model		ILD1700-2DR	ILD1700-10DR	ILD1700-20DR
Measuring range		2mm	10mm	20mm
Start, mid, end of measuring range		see engineering drawing		
Linearity		2µm ≤0.1% FSO	10µm	40µm ≤0.2% FSO
Resolution (at 2.5kHz without averaging)		0.1µm	0.5µm	3µm
Measuring rate		2.5kHz / 1.25kHz / 625Hz / 312.5Hz (adjustable)		
Light source		semiconductor laser <1mW, 670nm (red)		
Permissable ambient light		10,000lx (at 2.5kHz)		
Laser safety class		class 2 acc. DIN EN 60825-1 : 2001-11		
Spot diameter	SMR	80µm	110µm	320µm
	MMR	35µm	50µm	45µm
	EMR	80µm	110µm	320µm
Temperature stability		0.025 % FSO/°C	0.01 % FSO/°C (based on digital output)	
Operation temperature		0 … +50°C		
Storage temperature		-20 … +70°C		
Output	measurements	selectable: 4 ... 20mA / 0 ... 10V / RS 422 / USB (option with cable PC1700-3/USB)		
	switching outputs	1 x error or 2 x limit (each pogrammable)		
Switch input		laser ON-OFF / zero		
Operation		via touch screen on sensor or via PC with ILD 1700 tool		
Power supply		24VDC (11 ... 30VDC), max. 150mA		
Electromagnetic compatibility (EMC)		EN 61000-6-3; EN 61000-6-2		
Sensor cable length (with connector)		0.25m (integrated cable with connector) option: 3m or 10m		
Synchronisation		possible for simultaneous or alternating measurements		
Protection class		IP 65		
Vibration		2g / 20 ... 500Hz		
Shock		15g / 6ms		
Weight (with 0.25m cable)		~ 550g		

FSO = Full Scale Output All specifications are valid for polished and planar surfaces.
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range

Custom Sensor Modifications

For applications where the above standard sensors do not meet your requirements, it may be possible to supply a sensor with modified specification. Please contact us for further information.

Options

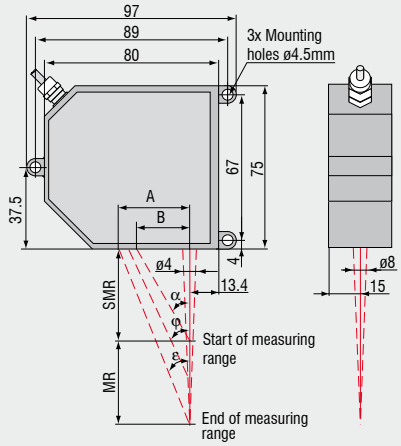
- Non standard measuring range and stand off
- Custom housing or mounting geometry
- Non standard signal interfaces
- Special cable length of electrical connector
- 90° beam deflection
- Vacuum suitability
- Reduced mass
- Increased shock and vibration resistance

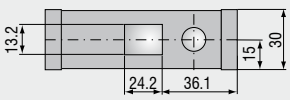
Sensor with laserline for shiny metallic and rough surfaces

- Laser Line averages across shiny metallic or structured surfaces
- Four models with measuring ranges from 2mm to 50mm
- Compact design with integrated controller
- RTSC Real Time Surface Compensation
- 312Hz 375Hz 1000Hz Adjustable measuring rate up to 2.5kHz
- Analog Digital Analogue (U/I) and digital output
- Filter inside Adjustable filter functions (firmware)
- High flex cables for dragchain or robot use
- Certified Calibration certificate included
- //www. Configuration via software www.micro-epsilon.com/download

Designed for shiny and rough surfaces where high accuracy measurements are required. The optoNCDT 1700LL provides precision accuracy with an integrated controller. The laser spot is optically enlarged to make an oval point thus reducing the physical interference making measurements on rough surfaces considerably easier to perform. The 1700LL combines the advantages of both the 1700 and the 2200LL series offering high precision and flexibility with a compact sensor size.

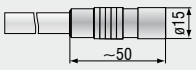
optoNCDT 1700LL (2/10/20/50mm)





MR	SMR	α	φ	ε	A	B
2	24	35°	40°	44.8°	25.8	16.8
10	30	34.3°	35.2°	35.6°	28.7	20.5
20	40	28.8°	27.5°	26.7°	30.1	22.0
50	45	26.5°	23.0°	18.3°	31.5	22.5

Connector (sensor side)
Article Number: 0323243



Connector (sensor cable)
Article Number: 0323272

(Dimensions in mm, not to scale. All CAD files are available online.)

Model		ILD1700-2LL	ILD 1700-10LL	ILD 1700-20LL	ILD 1700-50LL
Measuring range		2mm	10mm	20mm	50mm
Start of measuring range		24mm	30mm	40mm	45mm
Midrange		25mm	35mm	50mm	70mm
End of measuring range		26mm	40mm	60mm	95mm
Linearity		2µm	8µm	16µm	40µm
	FSO	≤0.1%	≤0.08%		
Resolution [1] (at 2.5kHz without averaging)		0.1µm	0.5µm	1.5µm	3µm
Measuring rate		2.5kHz / 1.25kHz / 625Hz / 312.5Hz (adjustable)			
Light source		semiconductor laser <1mW, 670nm (red)			
Permissable ambient light	at 2.5kHz	10,000lx			
Laser safety class		class 2 acc. DIN EN 60825-1 : 2001-11			
Spot diameter	SMR	85 x 240µm	120 x 405µm	185 x 485µm	350 x 320µm
	MMR	24 x 280µm	35 x 585µm	55 x 700µm	70 x 960µm
	EMR	64 x 400µm	125 x 835µm	195 x 1200µm	300 x 1940µm
Temperature stability [2]		0.025% FSO/°C	0.01 % FSO/°C		
Operation temperature		0 ...+50°C			
Storage temperature		-20 ... +70°C			
Output	measurements	selectable: 4 ... 20mA / 0 ... 10V / RS 422 / USB (optional with cable PC1700-3/USB)			
	switching outputs	1 x error or 2 x limit (each pogrammable)			
Switch Input		laser ON-OFF / zero			
Operation		via touch screen on sensor or via PC with ILD 1700 tool			
Power supply		24VDC (11 ... 30VDC), max. 150mA			
Electromagnetic compatibility (EMC)		EN 61000-6-3 EN 61000-6-2			
Sensor cable length (with connector)		0.25m (integrated cable with connector) option: 3m or 10m			
Synchronisation		possible for simultaneous or alternating measurements			
Protection class		IP 65			
Vibration		2g / 20 ... 500Hz			
Shock		15g / 6ms			
Weight (with 0.25m cable)		~ 550g			

FSO = Full Scale Output All specifications apply for a diffusely reflecting white ceramic target
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range
[1] for measurements against high glossy surfaces (targets), resolution depends on the material
[2] based on digital output

Custom Sensor Modifications

For applications where the above standard sensors do not meet your requirements, it may be possible to supply a sensor with modified specification. Please contact us for further information.

Options

- Non standard measuring range and stand off
- Custom housing or mounting geometry
- Non standard signal interfaces
- Special cable length of electrical connector
- 90° beam deflection
- Vacuum suitability
- Reduced mass
- Increased shock and vibration resistance

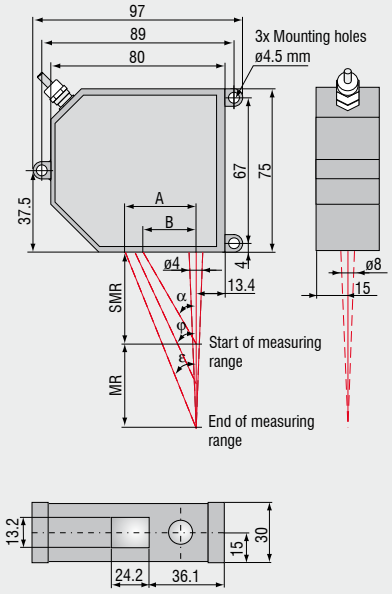
High performance laser sensor for shiny metallic and rough surfaces

- Laser line averages across shiny metallic or structured surfaces
- Four models with measuring ranges from 2mm to 50mm
- Sensor head and separate controller
- Measurement rate up to 10kHz
- Real Time Surface Compensation
- Analogue and digital output
- Adjustable filter functions (firmware)
- Calibration certificate included
- Configuration via software www.micro-epsilon.com/download

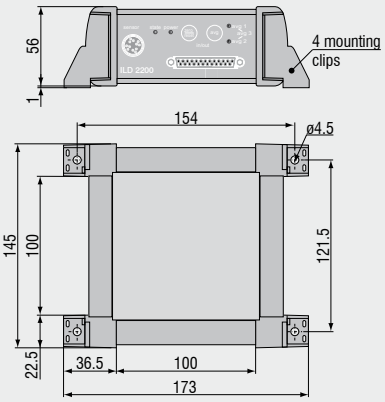
The optoNCDT 2200LL series uses a small laser line, instead of a spot, to provide accurate measurement against shiny metallic surfaces. The use of the laser line allows the sensor to perform an average across the line. This makes it possible to measure rough surfaces with greater accuracy than before. The sensor can also be used for measuring directly reflecting surfaces without the need to angle the sensor.

MR	SMR	α	φ	ε	A	B
2	24	35.0°	40.0°	44.8°	25.8	16.8
10	30	34.3°	35.2°	35.6°	28.7	20.5
20	40	28.8°	27.5°	26.7°	30.1	22
50	45	26.5°	23.0°	18.3°	31.5	22.5

optoNCDT 2200LL (2/10/20/50mm)



Controller



(Dimensions in mm, not to scale. All CAD files are available online.)

Model		ILD 2200-2LL	ILD 2200-10LL	ILD 2200-20LL	ILD 2200-50LL
Measuring range		2mm	10mm	20mm	50mm
Start of measuring range		24mm	30mm	40mm	45mm
Midrange		25mm	35mm	50mm	70mm
End of measuring range		26mm	40mm	60mm	95mm
Linearity		1µm ≤0.05% FSO	3µm	6µm ≤0.03% FSO	15µm
Resolution [1) 2)] (at 10kHz without averaging)		0.03µm	0.15µm	0.3µm	0.8µm
		0.0015% FSO			
Measuring rate		10kHz			
Permissable ambient light		30.000lx			
Spot diameter	SMR	85 x 240µm	120 x 405µm	185 x 485µm	350 x 320µm
	MMR	24 x 280µm	35 x 585µm	55 x 700µm	70 x 960µm
	EMR	64 x 400µm	125 x 835µm	195 x 1200µm	300 x 1940µm
Light source		semiconductor laser <1mW, 670nm (red)			
Laser safety class		class 2 acc. DIN EN 60825-1/A1 12.99 / IEC 825-1/A1 12.99 / FDA			
Protection class		sensor: IP 65 / controller: IP 50			
Temperature stability		0.025% FSO/°C	0.01 % FSO/°C		
Operation temperature		0 ... +50°C			
Storage temperature		-20 ... +70°C			
Output		analogue: ±5V digital: RS 422 / 691.2kBaud			
Power supply		24VDC (±15%), max. 500mA			
Sensor cable length		standard: 2m - integrated option: 5m/10m			
Controller		functions: auto zero / signal averaging dimensions: 143mm x 145mm x 52mm - without mounting clips			
Electromagnetic compatibility (EMC)		EN 55011/12.1998 and EN 50082-2/02.1996			
Vibration		2g / 20 ... 500Hz			
Shock		15g / 6ms / 3 axis			
Weight		sensor: ~550g controller: ~1000g			

FSO = Full Scale Output SMR = Start of measuring range MMR = Midrange EMR = End of measuring range
All specifications apply for a diffusely reflecting white ceramic target
[1)] for measurements against high glossy surfaces (targets), resolution depends on the material
[2)] resolution digital output 16bit

Custom Sensor Modifications

For applications where the above standard sensors do not meet your requirements, it may be possible to supply a sensor with modified specification. Please contact us for further information.

Options

- Non standard measuring range and stand off
- Custom housing or mounting geometry
- Measuring rate 2.5 / 5 / 10 / 20kHz
- Non standard signal interfaces
- Special cable length of electrical connector
- 90° beam deflection
- Vacuum suitability
- Reduced mass
- Increased shock and vibration resistance

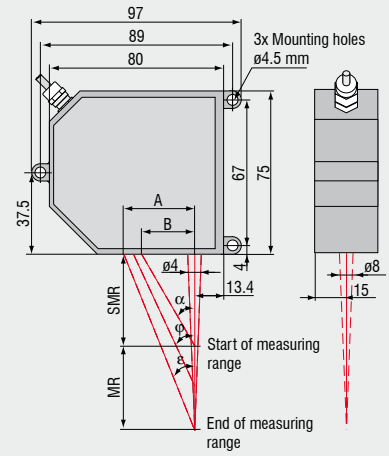
High speed laser sensor for shiny metallic or rough surfaces

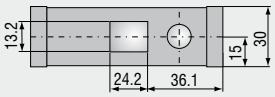
- Laser line averages across shiny metallic or structured surfaces
- Four models with measuring ranges from 2mm to 50mm
- Sensor head and separate controller
- 20kHz measurement rate over the full working range
- Real Time Surface Compensation
- Analogue and digital output
- Adjustable filter functions (firmware)
- Calibration certificate included
- Configuration via software www.micro-epsilon.com/download

The optoNCDT 2220LL series uses a small laser line, instead of a spot, to provide accurate measurement against shiny metallic surfaces all at high speed. The optoNCDT 2220LL provides a 20kHz measurement rate across its entire measurement range for any type of situation. The use of the laser line allows the sensor to perform an average across the line which makes it possible to measure rough surfaces with greater accuracy than before. The sensor can also be used for measuring directly reflecting surfaces without the need to angle the sensor. The high measurement rate and excellent resolution allow measurements to be taken on very fast applications with challenging or reflecting surfaces.

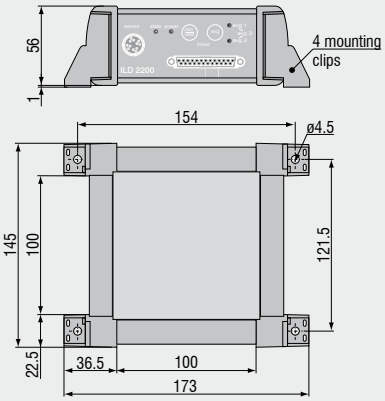
MR	SMR	α	φ	ε	A	B
2	24	35.0°	40.0°	44.8°	25.8	16.8
10	30	34.3°	35.2°	35.6°	28.7	20.5
20	40	28.8°	27.5°	26.7°	30.1	22
50	45	26.5°	23.0°	18.3°	31.5	22.5

optoNCDT 2220LL (2/10/20/50mm)





Controller



(Dimensions in mm, not to scale. All CAD files are available online.)

Model		ILD 2220-2LL	ILD 2220-10LL	ILD 2220-20LL	ILD 2220-50LL
Measuring range		2mm	10mm	20mm	50mm
Start of measuring range		24mm	30mm	40mm	45mm
Midrange		25mm	35mm	50mm	70mm
End of measuring range		26mm	40mm	60mm	95mm
Linearity		1µm ≤0.05% FSO	3µm	6µm ≤0.03% FSO	15µm
Resolution [1) 2)] (at 20 kHz without averaging)		0.03µm	0.15µm	0.3µm	0.8µm
		0.0015% FSO			
Measuring rate		20kHz			
Permissable ambient light		30.000lx			
Spot diameter	SMR	85 x 240µm	120 x 405µm	185 x 485µm	350 x 320µm
	MMR	24 x 280µm	35 x 585µm	55 x 700µm	70 x 960µm
	EMR	64 x 400µm	125 x 835µm	195 x 1200µm	300 x 1940µm
Light source		semiconductor laser <1mW, 670nm (red)			
Laser safety class		class 2 acc. DIN EN 60825-1/A1 12.99 / IEC 825-1/A1 12.99 / FDA			
Protection class		sensor: IP 65 / controller: IP 50			
Temperature stability		0.025 % FSO/°C	0.01 % FSO/°C		
Operation temperature		0 ... +50°C			
Storage temperature		-20 ... +70°C			
Output		analogue: ±5V digital: RS 422 / 691.2kBaud			
Power supply		24VDC (±15%), max. 500mA			
Sensor cable length		standard: 2m - integrated option: 5m/10m			
Controller		functions: auto zero / signal averaging dimensions: 143mm x 145mm x 52mm - without mounting clips			
Electromagnetic compatibility (EMC)		EN 55011/12.1998 and EN 50082-2/ 02.1996			
Vibration		2g / 20 ... 500Hz			
Shock		15g / 6ms / 3 axis			
Weight		sensor: ~550g controller: ~1000g			

FSO = Full Scale Output
All specifications apply for a diffusely reflecting matt white ceramic target
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range
[1)] for measurements against high glossy surfaces (targets), resolution depends on the material
[2)] resolution digital output 16bit

Custom Sensor Modifications

For applications where the above standard sensors do not meet your requirements, it may be possible to supply a sensor with modified specification. Please contact us for further information.

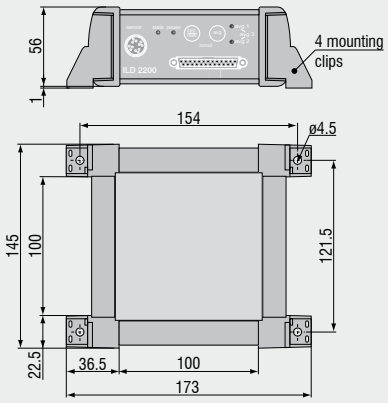
Options

- Non standard measuring range and stand off
- Custom housing or mounting geometry
- Measuring rate 2.5 / 5 / 10 / 20kHz
- Non standard signal interfaces
- Special cable length of electrical connector
- 90° beam deflection
- Vacuum suitability
- Reduced mass
- Increased shock and vibration resistance

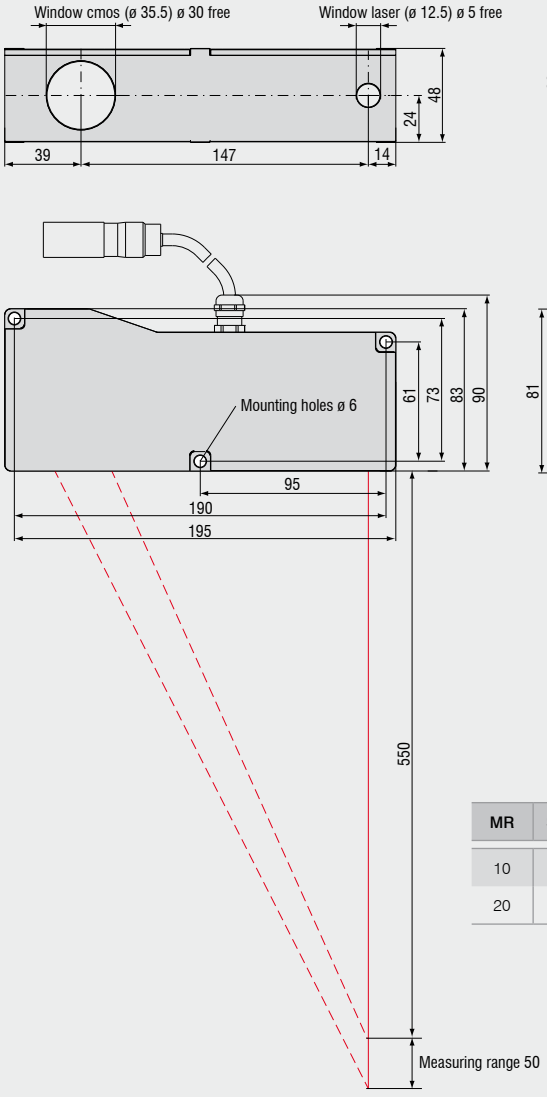
- High accuracy and long standoff distances
- Three models with measuring ranges from 10mm to 50mm
- Sensor head and separate controller
- 10 kHz Measurement rate up to 10kHz
- RTSC Real Time Surface Compensation
- Analog Digital Analogue and digital output
- Filter inside Adjustable filter functions (firmware)
- Certified Calibration certificate included
- //www. Configuration via software www.micro-epsilon.com/download

In contrast to conventional laser sensors, the Long-Range series allows accurate measurements to be taken at much longer stand off distances than normal. This is an important advantage, especially if the sensor cannot be mounted close to the target due to the environment the target is within. The long stand off is particularly useful if you need to look through a window at a target in a pressure chamber or similar vessel. A special CMOS line and the Real Time Surface Compensation enable the sensor to be used even on changing surfaces.

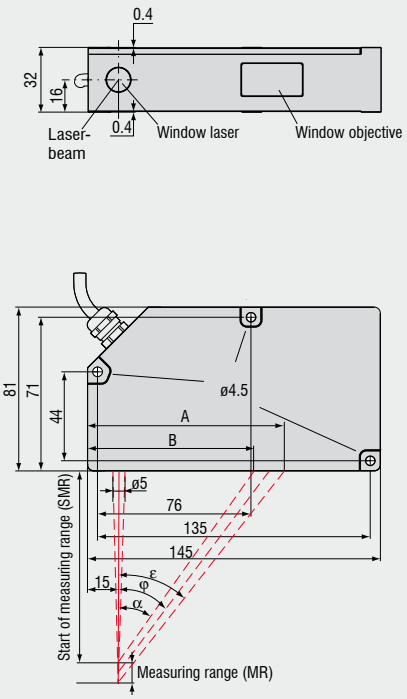
Controller



optoNCDT 1810-50 (50mm)



optoNCDT 2210 (10/20mm)



(Dimensions in mm, not to scale.)

MR	SMR	α	φ	ε	A	B
10	95	34.6°	36.9°	38.8°	99.4	80.6
20	90	36.1°	36.9°	37.5°	99.4	80.6

Model		ILD 1810-50	ILD 2210-10	ILD 2210-20
Measuring range		50mm	10mm	20mm
Start of measuring range		550mm	95mm	90mm
Midrange		575mm	100mm	
End of measuring range		600mm	105mm	110mm
Linearity		50µm ≤0.1% FSO	3µm ≤0.03% FSO	6µm
Resolution	dynamic [1]	5µm 0.01% FSO	0.5µm 0.005% FSO	1µm
Measuring rate		2.5kHz	10kHz	
Permissable ambient light		10.000lx	30.000lx	
Spot diameter	SMR	400 x 500µm	130µm	200µm
	MMR	400 x 500µm	60µm	60µm
	EMR	400 x 500µm	130µm	200µm
Light source		semiconductor laser <1mW, 670nm (red)		
Laser safety class		class 2 acc. DIN EN 60825-1 : 2001-11 / Class 2 (IEC 60825-1) Class II (FDA)		
Protection class		sensor: IP 65 controller: IP 50		
Temperature stability		0.01 % FSO/°C		
Operation temperature		0 ... 50°C		
Storage temperature		-20 ... 70°C		
Output	analogue	±5V (-10V ... +10V)		
	digital	option: RS232 or RS422	RS422 / 687.5kBaud	
Power supply		24VDC (±15%), max. 500mA		
Sensor cable length		standard: 2m - integrated option: 5m/10m on request		
Controller		functions: auto zero / signal averaging dimensions: 143mm x 145mm x 52mm - without mounting clips		
Electromagnetic compatibility (EMC)		EN 50081-1 and EN 50082-2		
Vibration		2g / 20 ... 500Hz		
Shock		15g / 6ms / 3 axis		
Weight	sensor	~800g	~500g	
	controller	~1000g		

FSO = Full Scale Output
All specifications apply for a diffusely reflecting matt white ceramic target
[1] series 1810: at 2.5 kHz without averaging, series 2210: at 10 kHz without averaging
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range

Custom Sensor Modifications

For applications where the above standard sensors do not meet your requirements, it may be possible to supply a sensor with modified specification. Please contact us for further information.

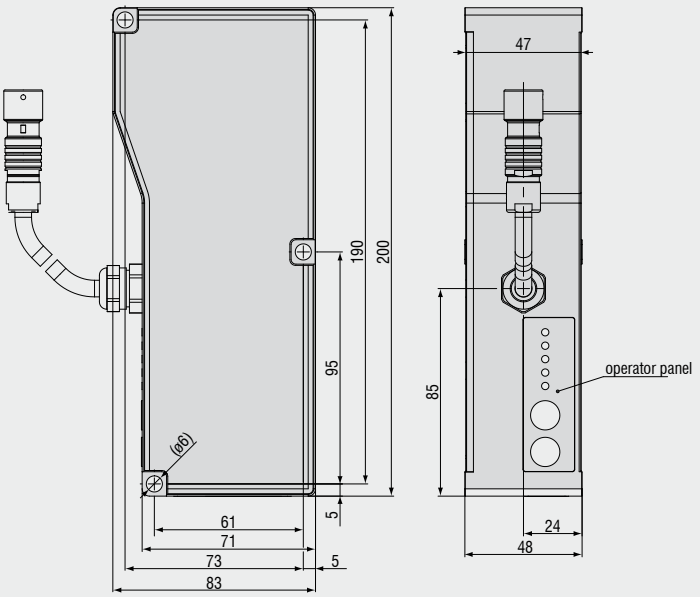
Options

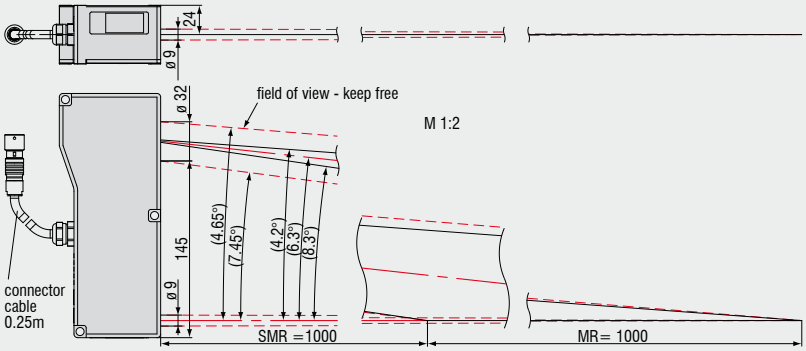
- Non standard measuring range and stand off
- Custom housing or mounting geometry
- Measuring rate 2.5 / 5 / 10 / 20kHz
- Non standard signal interfaces
- Special cable length of electrical connector
- Vacuum suitability
- Reduced mass
- Increased shock and vibration resistance

Intelligent laser sensor with 1,000mm measuring range

- High accuracy and long standoff distances
- Model with measuring range up to 1000mm
- Compact design with integrated controller
- Adjustable measuring rate up to 2.5kHz
- Real Time Surface Compensation
- Analogue (U/I) and digital output
- Adjustable filter functions (firmware)
- Calibration certificate included
- Configuration via software www.micro-epsilon.com/download

The optoNCDT 1710-1000 laser sensors are unrivalled in measurement performance worldwide. The sensor can measure over a working range of 1,000mm. The start of measurement is 1,000mm from the sensor body which means that objects upto 2m in distance can be measured. The controller is integrated into the housing of the sensor which means that external electronic processing is not required. The sensor operates with automatic, real time surface compensation, RTSC which auto adapts the laser intensity to the surface being measured. Additionally built in, programmable limit switch give the sensor further integration flexibility.





Model		ILD1710-1000
Measuring range		1000mm
Start of measuring range		1000mm
Midrange		1500mm
End of measuring range		2000mm
Linearity	≤ ±0.1% FSO	±1mm
Resolution (at 2.5kHz, without averaging)		100µm
Measuring rate		2.5 kHz / 1.25 kHz / 625 Hz / 312.5 Hz (adjustable)
Lichtquelle		semiconductor laser <1mW, 670nm (red)
Permissable ambient light	at 2.5kHz	10.000lx
Laser safety class		class 2 acc. DIN EN 60825-1 : 2001-11 / Class 2 (IEC 60825-1) Class II (FDA)
Spot diameter	SMR	2.5…5mm
	MMR	2.5…5mm
	EMR	2.5…5mm
Temperature stability		0.01 % FSO/°C
Operation temperature		0 … 50°C
Storage temperature		-20 ... +70°C
Output	measurements	switchable: 4 ... 20 mA / 0 ... 10 V / RS 422 / USB (optional via cable PC1700-3/USB)
	switching outputs	1 x error or 2x limit values (configurable)
Switching input		Laser ON-OFF / Zero
Operation		via keypad directly on the sensor and/or via PC with ILD1700 Tool
Power supply		24VDC (11 … 30 VDC), max. 150mA
Electromagnetic compatibility (EMC)		EN 61000-6-3 and EN 61000-6-2
Sensor cable		standard 0.25m integrated
Synchronisation		possible for simultaneous or alternating measurements
Protection class		IP 65
Vibration		2g / 20 … 500Hz
Shock		15g / 6ms
Weight		~ 0.8kg

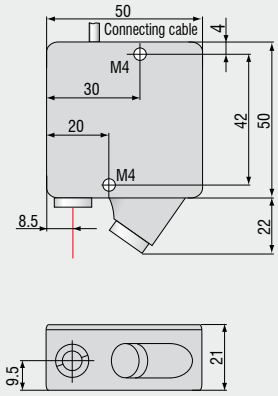
FSO = Full Scale Output All specifications apply for a diffusely reflecting matt white ceramic target
SMR = Start of measuring range; MMR = Midrange; EMR = End of measuring range;

- Eight models with measuring ranges from 0.5mm to 200mm
- Sensor head and separate controller
- Up to 37kHz true analogue frequency response
- Analogue (U/I) and digital outputs
- Adjustable filter functions (firmware)
- Calibration certificate included

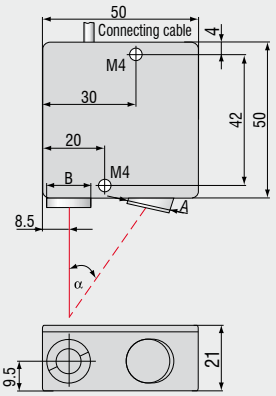
The true analogue optoNCDT 1607 is ideal for high speed measurements such as vibration amplitude, impact and drop tests. The 37kHz frequency response is available for all the measurement ranges from 0.5mm to 200mm and is most suited for tasks where targets move quickly and can be of fixed colour.

MR	Angle	A	B
0.5	SMR 1.75 mm, measures are not relevant		
2	45°	13	5
4	45°	13	5
10	29°	12	5
20	23°	12	5
50	28°	22	8
100	18°	22	8
200	12°	22	8

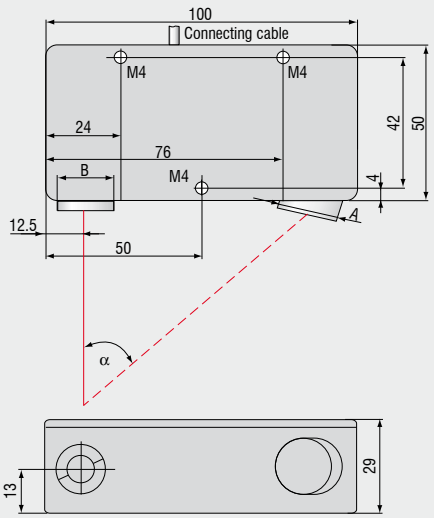
optoNCDT 1607 (0.5mm)



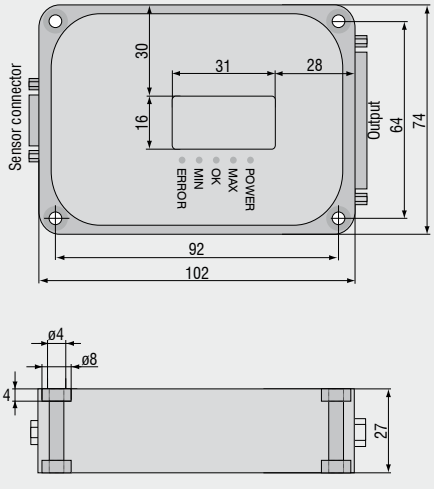
optoNCDT 1607 (2/4/10/20mm)



optoNCDT 1607 (50/100/200mm)



Controller



(Dimensions in mm, not to scale. CAD files are available online)

Model	LD 1607-0.5	LD 1607-2	LD 1607-4	LD 1607-10	LD 1607-20	LD 1607-50	LD 1607-100	LD 1607-200
Measuring range	0.5mm	2mm	4mm	10mm	20mm	50mm	100mm	200mm
Start of measuring range	23.75mm	23mm	22mm	40mm	55mm	95mm	170mm	240mm
Midrange	24mm	24mm	24mm	45mm	65mm	120mm	220mm	340mm
End of measuring range	24.25mm	25mm	26mm	50mm	75mm	145mm	270mm	440mm
Linearity	1µm	4µm	8µm	20µm	40µm	100µm	200µm	400µm
	≤0.2% FSO							
Resolution (Noise) [1] static	0.1µm	0.5µm	1µm	3µm	6µm	20µm	30µm	60µm
Frequency response	10kHz, 7kHz, 4kHz, 1kHz, 250Hz, 100Hz, 25Hz or 15Hz (-3dB), selectable with DIP switches optional: Model LD1627: 37kHz (-3dB)							
Temperature stability	±0.03 % FSO/°C							
Light source	laser <1mW, wavelength: 670nm (red)							
Life cycle typ.	100,000h (laserdiode)							
Laser safety class	class 2 (DIN EN 60825-1:2001-11)							
Spot diameter MMR	0.1mm	0.3mm	0.3mm	0.6mm	0.9mm	1.5mm	1.5mm	4mm
Permissible ambient light	20,000lx							
Output	displacement: ±10V / 4 - 20mA / RS232 intensity: 0 ... 10V							
Vibration	2g (IEC 68-2-6)							
Shock	15g (IEC 68-2-6)							
Operation temperature	0 ... +50°C							
Storage temperature / humidity	-20 ... +70°C / up to 90% RH							
Protection class	sensor: IP 64 / electronics: IP 40							
Supply	+ 24VDC / 200mA (10 ... 30VDC)							
Connector	25-pin Sub-D connector							
Weight Sensor	250g	240g				400g		
Weight Controller	275g							
Sensor cable length	2m							

FSO = Full Scale Output All specifications apply for a diffusely reflecting matt white ceramic target
[1] Frequency response 15 Hz
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range

switching outputs (connector) 24 V logic	
MIN	+24V / 10mA
OK	+24V / 10mA
MAX	+24V / 10mA
Hysteresis	appr. 0.4% FSO

Output of errors (connector)	
Too little light	+24V / 10mA
Too much light	+24V / 10mA

LED - indicators		
POWER	GREEN	power on
MAX	RED	adjustable MAX value is exceeded
OK	GREEN	LED level indicator OK shows the position of the target within the set limits
MIN	YELLOW	adjustable value drops below the set MIN
ERROR	RED	too little light is reflected

Pin assignment controller		
Pin	Function	Cable Colors
1	Displacement output, ±10V	green
2	Too little light, +24V	-
3	Laser OFF Input +15 - 30V	white
4	TXD (RS232)	-
5	OK in range, +24V	-
6	4 ... 20mA	-
7	RXD (RS232)	-
8	0 V supply	brown
9-13	n.c.	-
14	Analogue ground	blue screen
15	Too much light +24V	-
16	MAX, +24V	-
17	n.c.	-
18	RTS (RS232)	-
19	MIN, +24V	-
20	Light intensity 0 - 10V	red
21	+24V supply (10 - 36V)	green
22-25	n.c.	-

Accessories for all optoNCDT Series

Power supply

PS 2010 (for top-hat rail mounting; L/W/H 120x120x40mm; Input 115 / 230VAC selectable; output 24VDC / 2.5A)

Controller

CSP 2008 (controller for processing of multiple sensor signals; analogue and digital interfaces)

Interface card

IF2008 (Interface card for individual signal processing; analogue and digital interfaces)

Accessories optoNCDT 1302 / 1402

Supply and output cable, rated for moving cable tracks (also available in 90° version)

PC 1402-3/I (3m, output 4 ... 20mA)
PC 1402-6/I (6m, output 4 ... 20mA)
PC 1402-3/U (3m, with integral resistance, output 1 ... 5VDC)
PC 1402-6/U (6m, with integral resistance, output 1 ... 5VDC)
PC1402-3/IF2008 (3m, supply and output cable)
PC 1402-3/USB (3m, supply and output cable)
PC1401/1402-0.2 (0.2m, adapter cable 12-pin to 7-pin)
PC 1402-3/CSP (3m, required for CSP 2008, optoNCDT 1402 only)

Supply and output cable, robot rated (available in 90° version)

PCR 1402-3/I (3m)
PCR 1402-6/I (6m)
PCR 1402-8/I (8m)

Protective housing

SGH 1800
SGHF 1800

Accessories optoNCDT 1607 / 1627

Supply and output cable

PC 1605-3 (3m)
PC 1605-6 (6m)
PC 1607-3/RS232 (3m, with 9-pin Sub-D connector for RS232)

Protective housing

SGF 1605-20 (for LD1607-2/4/10/20)
SGF 1605-200 (for LD1607-50/100/200)
SGL with connection for compressed air

Accessories optoNCDT 1700/1700LL/1700DR

Supply and output cable (drag chain rated)

PC 1700-3 (3m)
PC 1700-10 (10m)
PC 1700-10/3/IF2008 (10m, for use with interface card IF2008)
PC 1700-3/T (3m, for use with trigger box)
PC 1700-10/T (10m, for use with trigger box)
PC 1700-3/USB (3m, with USB-RS422-converter, power supply 90 ... 230 VAC)

Supply and output cable (robot rated)

PCR 1700-5 (5m)
PCR 1700-10 (10m)

Protective housing

SGH 1800 (for ILD 1700-2/10/20/50/100/200/250VT and ILD 1700-2LL/10LL/20LL/50LL)
SGH 2200-200 (for ILD 1700-40/500/750)
SGxF 1800 (option with compressed air clean setup)
SGxF 2200-200 (option with compressed air clean setup)

External trigger

Triggerbox 1700 (Electronics for triggering optoNCDT 1700 sensors. Acceptable trigger levels from +2.4VDC to +24VDC, L/W/H 98x64x34mm)

Accessories optoNCDT 2200(LL) / 2220(LL) / 1810-50 / 2210

Supply and output cable (drag chain rated)

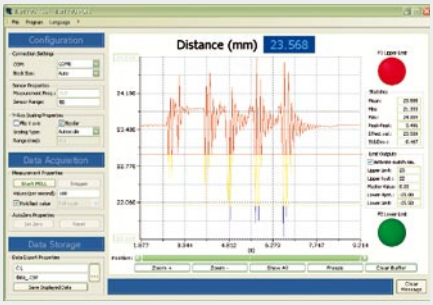
PC 1800-3 (3m)
PC 1800-8 (8m)
PC2200-3/10/RS485 (3m, RS 485 for use with interface card IF2008)
PC 2200-3/3/RS422 (3m, for IF2008/RS422/USB-converter)

Sensor cable extension (drag chain rated)

CE 1800-3 (3m)
CE 1800-8 (8m)

Protective housing (only for series 2200, 2200LL, 2220, 2220LL)

SGx 1800 (for ILD 2200-2/10/20/50/100, ILD 2200-2LL/10LL/20LL/50LL, ILD 2220-2/10/20/50/100, ILD 2220-2LL/10LL/20LL/50LL)
SGH 2200-200 (for ILD 2200-40/200, ILD 2220-200)
SGxF 1800 (option with compressed air clean setup)
SGxF 2200-200 (option with compressed air clean setup)



Setup and configuration software

ILD Tools is the software included for easy sensor configuration. All the settings can be implemented conveniently via a Windows user interface on the PC. The sensor parameters are sent to the sensor via the serial port and can also be saved if required. ILD Tools also includes a module which can display and save measurement results. The link to the PC is made via the sensor cable with a USB converter. [available for all series except 1302 and 1607]

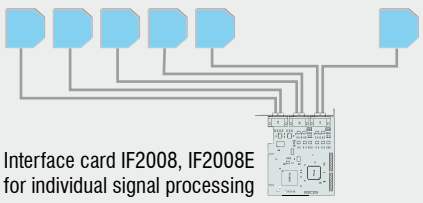
Driver support for customer software

For the optoNCDT sensors documented DLL drivers are available free of charge, which enables easy integration of the sensors into existing software.

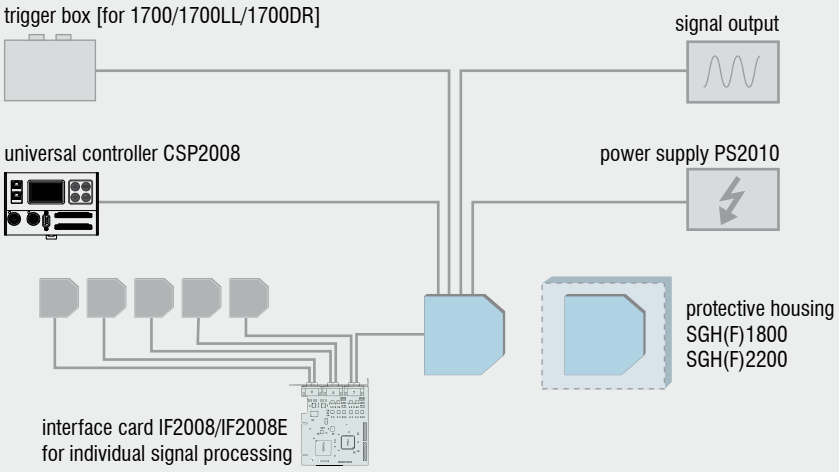
Software download free of charge from www.micro-epsilon.com/download

IF 2008 Interface card

The Interface card IF2008/IF2008E enables a synchronous data acquisition of up to six digital signals and two encoder. The data is stored in a FIFO memory to generate a ressource-conserving processing in blocks. The IF2008E board offers two sensor inputs, two AD-Converter inputs, four opto-coupler inputs and four opto-coupler outputs. The boards IF2008 and IF2008E can operate independently of each other or coupled. In sum, eight sensors and two encoders can be connected with the boards.



Interface card IF2008, IF2008E for individual signal processing



CSP 2008: Universal controller for multiple sensor signals

Inputs/Outputs sensors
- 2 sensor connectors (16 pin)

Digital
- 1x ethernet (PC 100 MBit)
- 1x ethercat
- 1x RS422 (PLC max. 1,5 Mbaud)
- 2 terminal strips (13 pins)

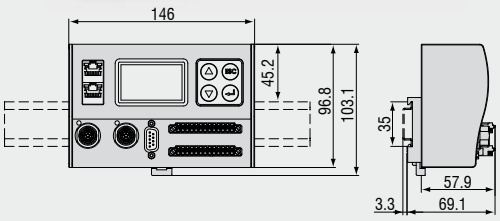
Analogue input
- voltage 0…5 V, scaleable via software
- 0…10 V, -5…5 V, -10…10 V,
- electrically isolated, 100 kHz, 16 Bit
- (available september 2010)

Analogue output
- voltage 0…5 V,
- 0…10 V, -5…5 V, -10…10 V

Functions
- filter: moving average 1…1024 /
- recursive 1...32768 / median 3/5/7/9
- zero, master
- trigger (measuring value, edge, gate, software)
- automatic sensor detection (digital interface)
- scaleable measuring ranges
- synchronisation

Limits
- OG, UG, OW, UW, OK

Calculation
- A,B; A+B; A-B; -A-B; K-A-B; K+A+B; K+A-B; K+A; K+B; K(A+B); K(A+k*B)



Universal controller with DIN rail TS 35
(dimensions not to scale)

Protective housing for harsh environment

To protect the laser sensors in extreme environments individual protective housings are available for all sensor models. Three options for the protective housing are offered.

Option SGH:

Completely enclosed housing with an integrated front window, where the sensor measures through the window. The water resistant housing (IP68) provides protection against aggressive solvents and detergents.

Option SGHF:

The SGHF version offers optimum protection for the sensor with integrated compressed air cooling and provides protection against fluids.

Option SGL:

Protective housing with open slot for air purging of the measurement gap and cooling purpose.

Dimensions

SGx 16x7/20: 74x80x58mm for
ILD 16x7-2/4/10/20

SGx 16x7/200: 125x80x58mm for
ILD16x7-50/100/200

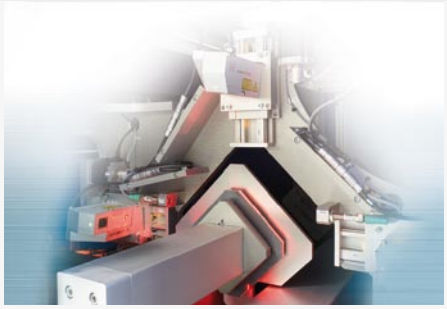
SGx 1800: 140x140x71 mm for
ILD 1302 and ILD 1402
ILD 1700-2/10/20/50/100/200/250VT,
ILD 1700-2LL/10LL/20LL/50LL,
ILD 2200-2/10/20/50/100,
ILD 2200-2LL/10LL/20LL/50LL,
ILD 2220-2/10/20/50/100,
ILD 2220-2LL/10LL/20LL/50LL

SGx 2200: 140x180x71 mm for
ILD 1700-40/500/750,
ILD 2200-40/200,
ILD 2220-200

High performance sensors made by Micro-Epsilon

Sensors and systems for displacement, position and dimension
Eddy current sensors
Optical and laser sensors
Capacitive sensors
Inductive sensors
Draw-wire sensors
Optical micrometers
2D/3D profile sensors
Image processing

Sensors and measurement devices for non-contact temperature sensors
Online instruments
Handheld devices



Measuring systems for quality control
for plastic and film
for tire and rubber
for web material
for automotive components
for glass

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