Laser Safety

The ILD23x0-x operates with a semiconductor laser with a wavelength of 670 nm (visible/red).

ℹ️ If both warning labels are covered over when the unit is installed, the user must ensure that supplementary labels are applied..
Observe the national laser protection regulations.

Operation of the laser is indicated visually by the LED on the sensor. The housing of the optical sensors may only be opened by the manufacturer. For repair and service purposes, the sensors must always be sent to the manufacturer.

Please observe national regulations, e. g., Laser Notice No. 50 for the USA.
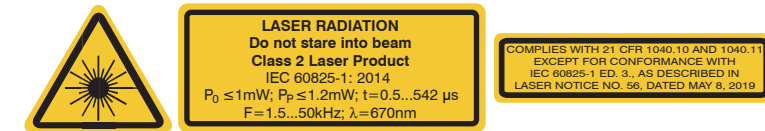
During operation of the sensor, the pertinent regulations according to IEC 60825-1 on „Safety of laser products" must be fully observed at all times.
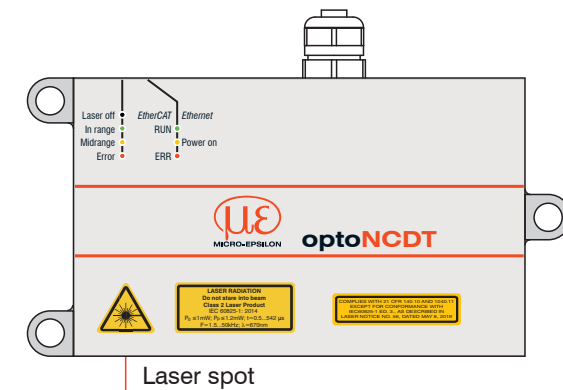
Laser Class 2

The sensors fall within laser class 2. The laser is operated on a pulsed mode, the maximum optical power is ≤ 1.2 mW. The pulse frequency depends on the adjusted measuring rate (1.5 ... 49.14 kHz). The pulse duration of the peaks is regulated depending on the measuring rate and reflectivity of the target and can be 0.5 up to 542 μs.

⚠️ **CAUTION** — Laser radiation. Irritation or injury of the eyes possible. Close your eyes or immediately turn away if the laser beam hits the eye.

The following warning labels are attached to the cover (front and rear side) of the sensor housing:

LASER RADIATION
Do not stare into beam
Class 2 Laser Product
IEC 60825-1: 2014
$P_0 \leq 1mW$; $P_P \leq 1.2mW$; $t=0.5...542 \mu s$
F=1.5...50kHz; λ=670nm

COMPLIES WITH 21 CFR 1040.10 AND 1040.11 EXCEPT FOR CONFORMANCE WITH IEC 60825-1 ED. 3., AS DESCRIBED IN LASER NOTICE NO. 50, DATED MAY 8, 2019

Laser warning sign and laser label, ILD23x0   Only for USA
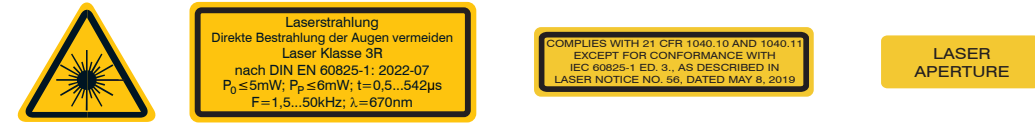

Laser spot

Sensor with laser labels laser class 2

Laser Class 3R

The sensors fall within Laser Class 3R. The laser is operated on a pulsed mode, the average power is ≤ 5 mW in each case, the peak power can be up to 6 mW. The pulse frequency depends on the adjusted measuring rate /1.5 ... 49.140 kHz). The pulse duration of the peaks is regulated depending on the measuring rate and reflectivity of the target and can be 0.5 up to 542 μs.

⚠️ **CAUTION** — Laser radiation. Irritation or injury of the eyes possible. Use suitable protective equipment and close your eyes or immediately turn away if the laser beam hits the eye.

The following warning labels are attached to the cover (front and rear side) of the sensor housing:

Laserstrahlung
Direkte Bestrahlung der Augen vermeiden
Laser Klasse 3R
nach DIN EN 60825-1: 2022-07
$P_0 \leq 5mW$; $P_P \leq 6mW$; $t=0.5...542 \mu s$
F=1.5...50kHz; λ=670nm

COMPLIES WITH 21 CFR 1040.10 AND 1040.11 EXCEPT FOR CONFORMANCE WITH IEC 60825-1 ED. 3., AS DESCRIBED IN LASER NOTICE NO. 50, DATED MAY 8, 2019

LASER APERTURE

Laser warning sign and laser label, ILD23x0-x   Only for USA   Near laser output

The accessible laser radiation is harmful to the eyes. Looking directly into the laser beam is harmful to the eyes with laser class 3R devices. Reflections of shiny or mirroring surfaces are also harmful to the eyes.

Class 3R laser sensors require a laser protection officer. Mark the laser area recognizable and everlasting. During operation the laser area has to be restricted and marked.

LASER APERTURE

Laser spot
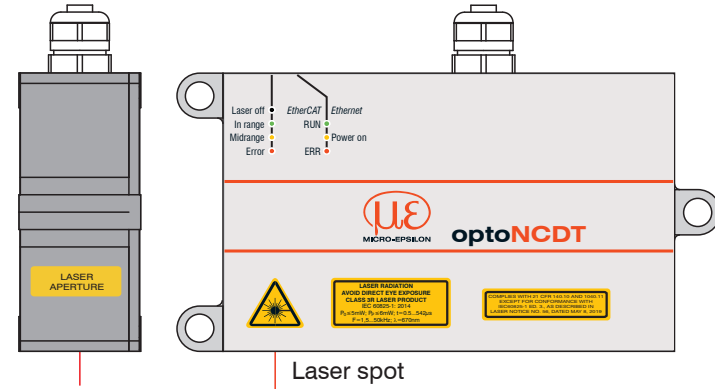
Sensor with laser labels laser class 3R

Optimizing the Measurement Accuracy

Alignment to a wall
In order to suppress stray reflections, a corresponding clearance around the reception area of the sensor must be kept free.

Turning object
The sensor should ideally be aligned along the axis of rotation.

Color change
The sensor should ideally be aligned at 90° to the direction of movement/ color change.

correct — incorrect (shadow)

Indentation

In case of bore holes, blind holes and edges in the surface of moving parts, the sensor must be arranged in such a way that the edge does not obscure the laser spot.

Sensor Mounting

The optoNCDT 23x0 sensor is an optical system for measurements with micrometer accuracy.

ℹ️ Ensure careful handling during installation and operation!

➡️ Mount the sensor only to the existing through-bores on a flat surface. Any type of clamping is not permitted.

➡️ Use three M4 or M5 screws to mount the sensors. The bearing surfaces surrounding the through-holes (fastening holes) are slightly raised.

Bolt connection		Housing M
Bolt length		35 mm
Screw	ISO 4762-A2	M4
Washer	ISO 7089-A2	A4.3
Tightening torque	$\mu = 0.12$	2 Nm

Direct fastening		Housing M
Screwing depth	Minimum	8 mm
	Maximum	10 mm
Screw	ISO 4762-A2	M5
Tightening torque	$\mu = 0.12$	3.5 Nm

Tightening torque
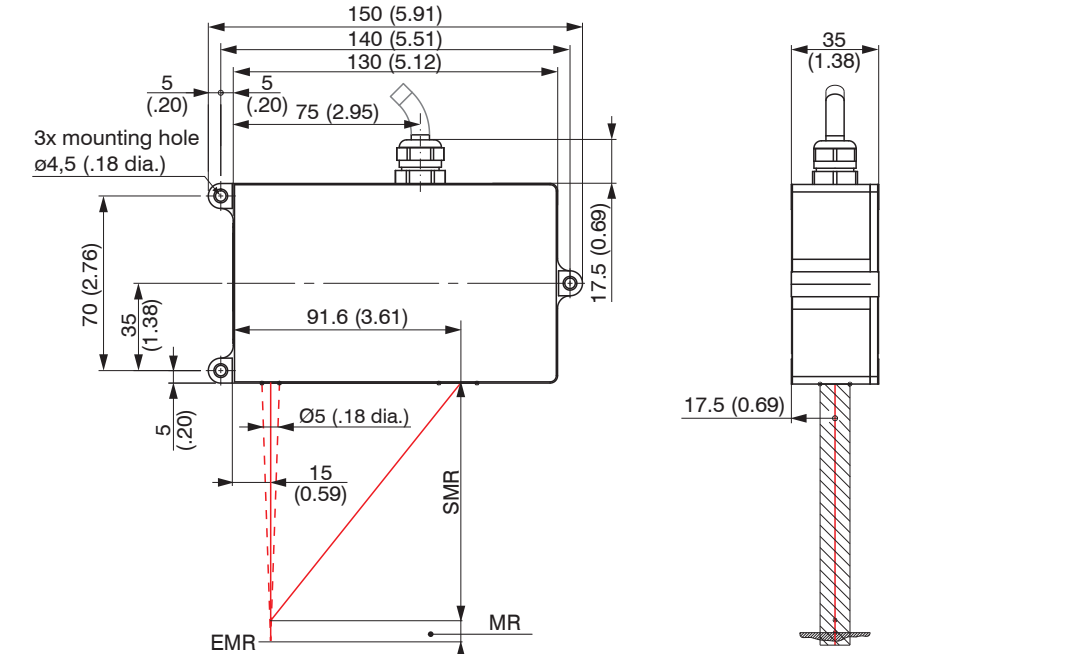
Drawings and free space for the ILD2310, 10/20/40 mm measuring ranges

ILD2310-	MR	SMR	MMR	EMR
10	10 (.39)	95 (3.74)	100 (3.94)	105 (4.13)
20	20 (.79)	90 (3.54)	100 (3.94)	110 (4.33)
40	40 (1.57)	175 (6.89)	195 (7.67)	215 (8.46)

MR = Measuring range
SMR = Start of measuring range
MMR = Midrange
EMR = End of measuring range
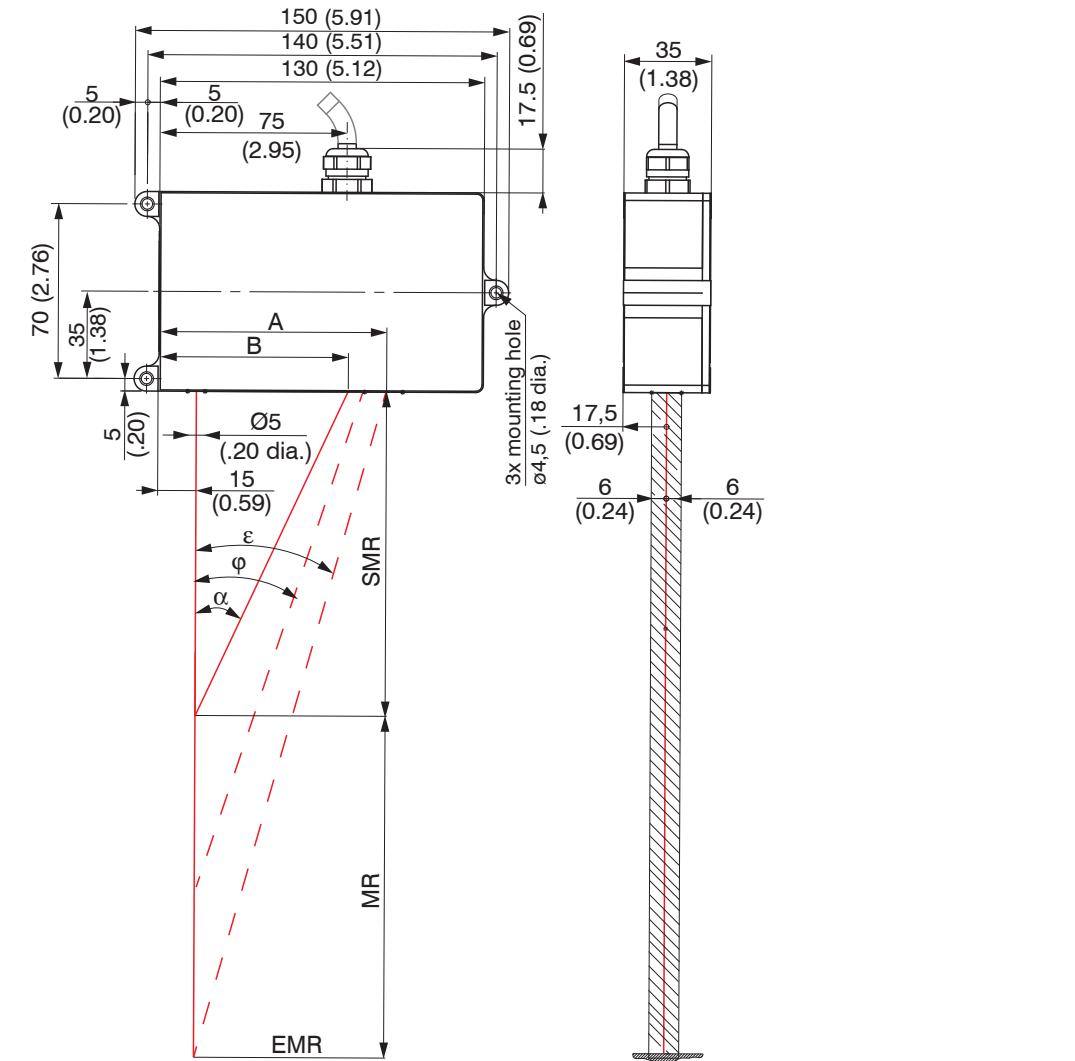
Drawings and free space for the ILD2300, 200/300 mm measuring ranges

ILD2300-	MR	SMR	MMR	EMR	a	j	e	A	B
200	200 (7.87)	130 (5.12)	230 (9.06)	330 (12.99)	25.1 °	16.7 °	13.1 °	91.6 (3.61)	76.0 (2.99)
300	300 (11.81)	200 (7.87)	350 (13.78)	500 (19.69)	18.3 °	12.2 °	9.6 °	99.4 (3.91)	81 (3.19)

Dimensions in mm (inches, rounded off)

MICRO-EPSILON

Assembly Instructions
optoNCDT 2300
optoNCDT 2310

Proper Environment

- Protection class: IP65 (applies only when sensor cable is plugged in)
Lenses are excluded from the protection class. Contamination of the lenses causes impairment or failure of the function.
- Operating temperature: 0 ... +50 °C (+32 ... +122 °F)
- Storage temperature: -20 ... +70 °C (-4 ... +158 °F)
- Humidity: 5 - 95% (non-condensing)
- Ambient pressure: Atmospheric pressure

Warnings

Avoid unnecessary laser radiation to be exposed to the human body. Switch off the sensor for cleaning and maintenance. Switch off the sensor for system maintenance and repair if the sensor is integrated into a system. Caution - use of controls or adjustments or performance of procedures other than those specified may cause harm.

Connect the power supply according to the safety regulations for electrical equipment. The supply voltage must not exceed the specified limits.
> Risk of injury, damage to or destruction of the sensor.

Avoid constant exposure of the sensor to splashes of water. Avoid exposure of sensor to aggressive media (detergents, cooling emulsions).
> Damage to or destruction of the sensor

Avoid shock and vibration to the sensor. Protect the sensor cable against damage.
> Damage to or destruction of the sensor , failure of the measuring device.

Inputs and Outputs

Signal Designation	Sensor Pin	Comments	PC2300-x/SUB-D cable [1]
			15-pin sub-D
V_+	1	Supply voltage (11...30 VDC)	1
GND	2	System ground for supply and reference ground for RS422 level	9
+Laser on/off	3	Optocoupler input, electrically isolated Laser off: $V_{IN} \leq 0.8$ V (Low)	2
- Laser on/off	4	Laser on: 2.8 V $\leq V_{IN} \leq 30$ V (High)	10
Sync-in/out [2]	5	Synchronous or trigger signals, symmetrical, RS422 level, terminating resistor 120 ohm switchable, input or output can be selected depending on synchronization mode	3
/Sync-in/out [2]	6		11
RxD-RS422	7	Serial RS422 input, symmetrical, internally terminated with 120 ohm	4
/RxD-RS422	8		12
TxD-RS422	9	Serial RS422 output, symmetrical	5
/TxD-RS422	10		13
Tx - Ethernet	11	Ethernet output, electrically isolated	6
/Tx - Ethernet	12		14
Rx - Ethernet	13	Ethernet input, electrically isolated	7
/Rx - Ethernet	14		15
Shield	Housing	no galvanic connection to GND	Housing

1) Other cables are optionally available.

2) In trigger mode, the input is used for triggering.

Connector: ODU MINI-SNAP, 14 poles, B series, size 2, coding F, IP68.

Round sensor connector, view on solder pin side cable connector
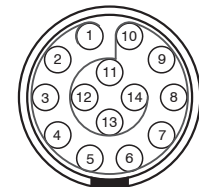
Supply Voltage, Nominal value: 24 V DC (11 ... 30 V max, 150 mA)

Sensor Pin	PC2300-x/Y Color	Power supply
1	White	V_+
2	Brown	GND

Use the supply voltage only for measuring devices. MICRO-EPSILON recommends using an optional available power supply unit PS2020 for the sensor.

Turning on Laser

Laser off: $V_{IN} \leq 0.8$ V

Laser on: 2.8 V $\leq V_{IN} \leq 30$ V
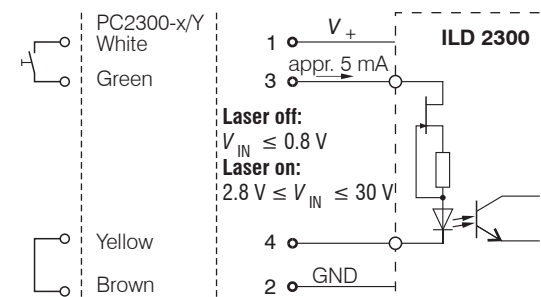
i The laser remains off as long as pin 3 is not electrically connected to V_+ and pin 4 to GND.
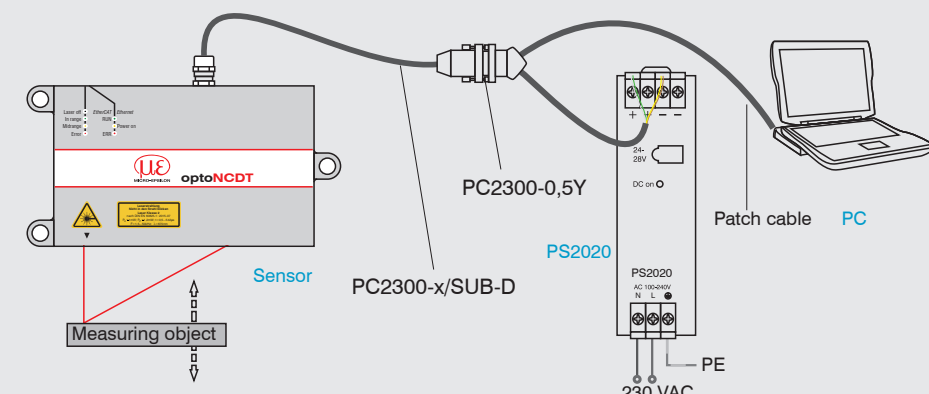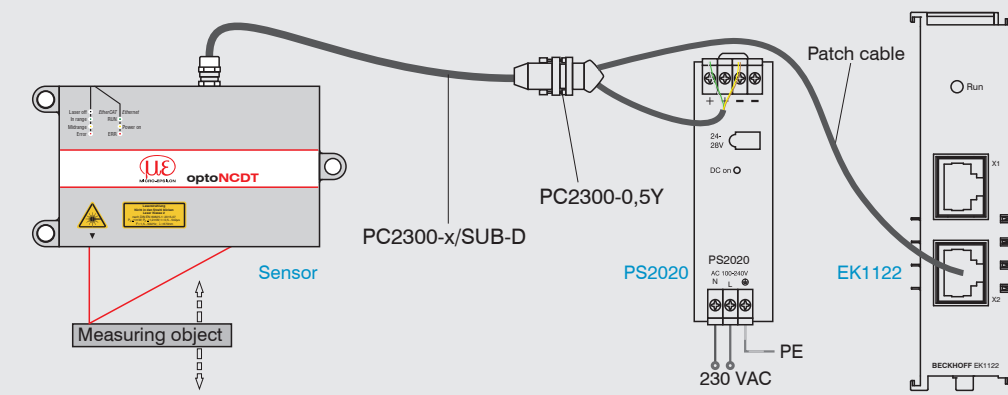

Quick Guide

Structure of the Components

- Sensor
- Power supply
- Laptop / PC + USB/Ethernet adapter + Ethernet cable

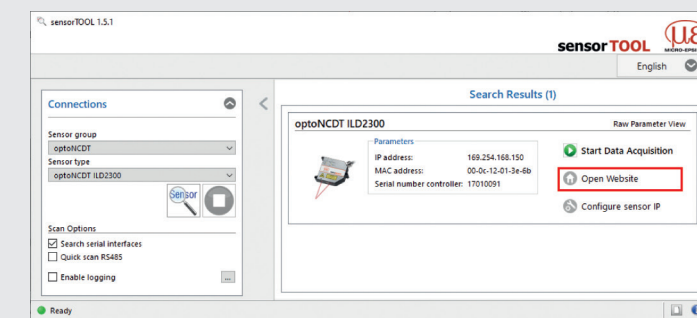➡ Mount the sensor and connect the components to one another.

Ethernet Connection

EtherCAT Connection

Initial Operation

The sensorTOOL program is available online at www.micro-epsilon.com/service/download/software/.

The sensor is shipped with the factory-set IP address 169.254.168.150. You can query the IP addresses of the sensors that are connected to a PC or network by using the `sensorTOOL` program.

➡ Connect the sensor to a PC notebook via a PC2300-x/SUB-D and a PC2300-0,5Y. Connect the power supply.

➡ Launch the `sensorTOOL` program and click on the `Sensor` button.

The program will now search for connected sensors on the available interfaces.

➡ Select the desired sensor and click the `Open Website` button.
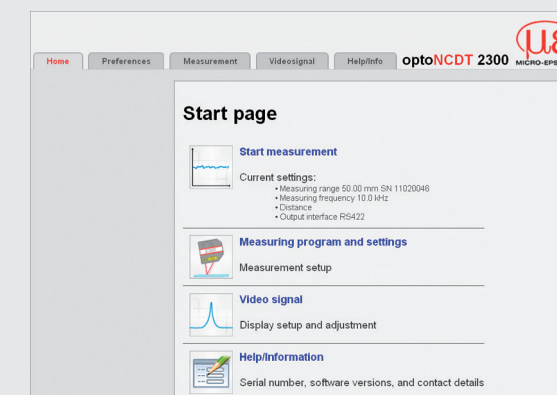
The start screen of the sensor software should now be displayed in the web browser.

➡ Save the changes by clicking the `Save setup` button in the `Preferences` menu.

You can select other interactive web pages for programming the sensor.

Selecting Measuring Program

➡ Go to the `Preferences > Measuring program` menu.

➡ Select `Diffuse reflection` as measurement arrangement and confirm with `Submit`.

Select a Measuring Rate

➡ Go to the `Preferences > Measuring rate` menu.

Start with a medium measuring rate. Select a measuring rate from the list. Confirm with `Submit`.

## Selecting Digital Interface

➡ Go to the `Preferences > Digital interfaces > Digital interface selection` menu.

➡ Select `Web diagram` and confirm with `Submit`.

Saving the Settings

➡ Go to the `Preferences > Load/save settings` menu.

➡ Choose a `Setup No` and click the `Save setup` button.

Positioning the Target

➡ Position the target as centrally as possible within the measuring range.
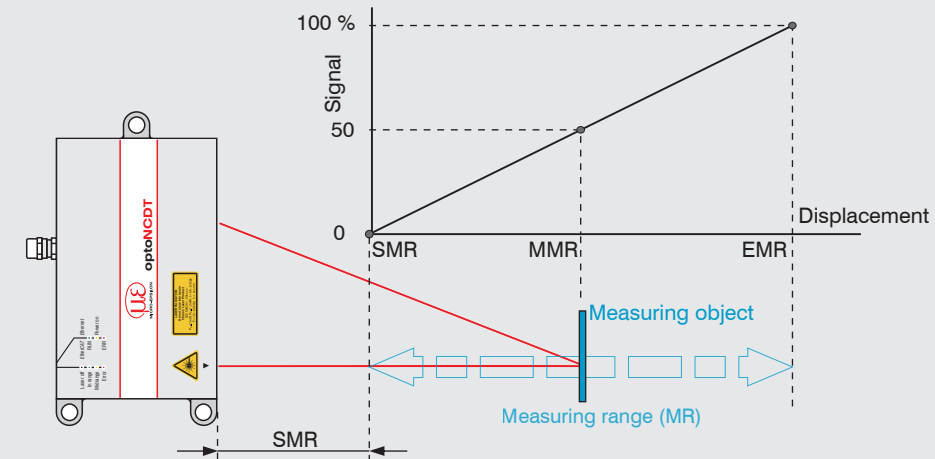
The Status LED on the sensor indicates the position of the target to the sensor.

LED	Color		Label	Meaning
Status	○	Off	Laser off	Laser beam is switched off
	●	Green	In range	Sensor in operation, target in the measuring range
	●	Yellow	Midrange	Target is in the mid of measuring range
	●	Red	Error	Target outside the measuring range, too low reflection

---

Distance Measurement

➡ Go to the `Preferences > Measuring program` menu and select `Direct reflection – distance measurement` as measurement arrangement.

➡ Switch to the `Measurement` menu.
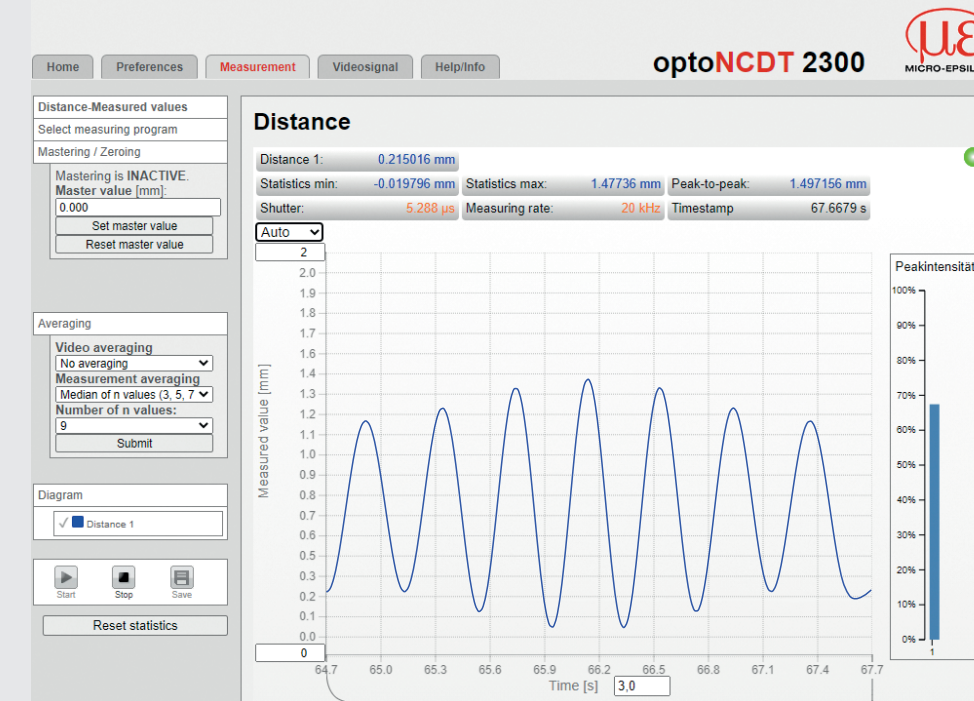
Thickness Measurement

➡ Go to the `Preferences > Measuring program` menu and select `Direct reflection – thickness measurement` as measurement arrangement.

➡ Select the target material from the list and confirm with `Submit`.

Saving the Settings

➡ Go to the `Preferences > Load/save settings` menu.

➡ Select a `Setup No` and click the `Save Setup` button.

You can find more information about the sensor in the operating instructions. They are available online at: www.micro-epsilon.com/download/manuals/man--optoNCDT-2300--en.pdf

X9771234.03-A022123MSC