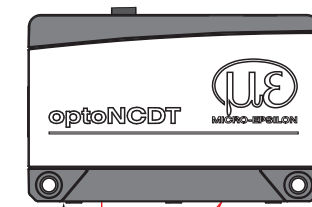## Sensor Mounting

The optoNCDT 1900 sensor is an optical system for measurements with micrometer accuracy. Pay attention to careful handling during mounting and operation.

- Mount the sensor only to the existing through-holes (mounting holes) on a flat surface. Clamps of any kind are not permitted.
- Mount the sensor by means of 2 screws type M4 or by means of through bores for M3 with the screws from the accessories.
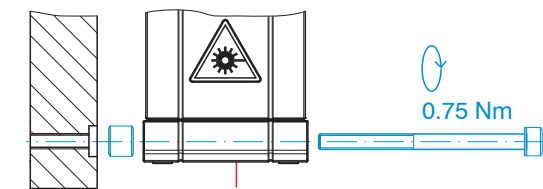
Measuring Range, Start of Measuring Range

Sensor mounting with diffuse reflection. The laser beam must be directed perpendicularly onto the surface of the target, otherwise measurement uncertainties cannot be excluded.

Current	Voltage	Digital value [1]	
3 mA	5.2 V / 10.2 V	262077	MR = Measuring range
4 mA (SMR)	0 V	98232	SMR = Start of measuring range
			MMR = Mid of measuring range
12 mA (MMR)	2.5 V / 5 V	131000	EMR = End of measuring range
20 mA (EMR)	5 V / 10 V	163768	
3 mA	5.2 V / 10.2 V	262078	

1) For displacement values without zero setting or mastering.

Mounting

Bolt connection

0.75 Nm

M3 x 40; ISO 4762, A2-70

Direct fastening

2.0 Nm

min 10 (.04)
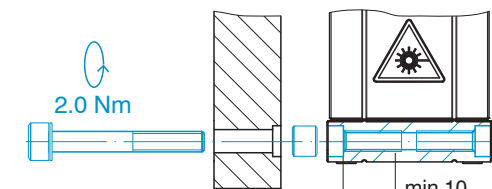
M4; ISO 4762, A2-70
screw depth min. 10 mm

Drawings, Free Space

Limits for free space

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

Dimensions in mm (inches)
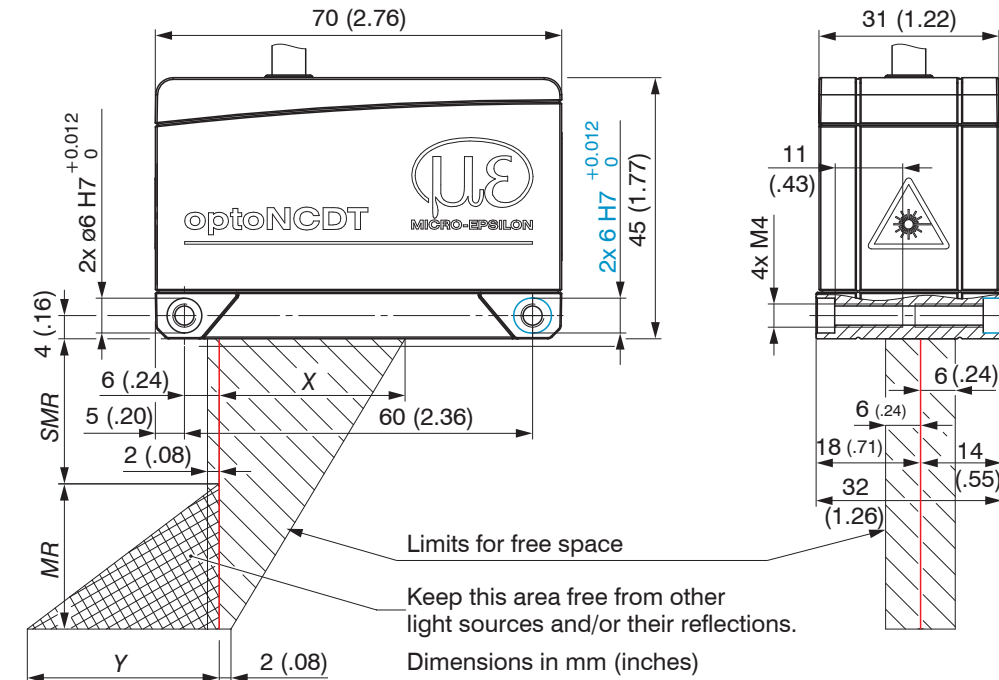
MR	2/2LL	6/6LL	10/10LL	25/25LL	50/50LL	100	200	500
SMR	15	17	20	25	40	50	60	100
X	23	27	33	33	36	37	39	43
Y	3	9	14	33	45	75	130	215

Dimensions in mm

Dimensional drawing, drilling pattern, mounting plate
Alignment via centering elements (optional)

0,3 m

ILD1900 / ILD1900LL with pigtail

3 m

ILD1900 / ILD1900LL with open ends

Pin Assignment

Signal	Pin	Cable color PC1900-x	Description
V_+	5	Red	Supply voltage (11 ... 30 VDC)
GND	14	Blue	System ground supply, switch signals (Laser on/off, Zero, Limits)
Analog output	1	Coaxial inner conductor, white	Current 4 ... 20 mA ($R_B < (V_+ - 6 \text{ V}) / 20 \text{ mA}$)) Voltage 0 ... 5 VDC Voltage 0 ... 10 VDC ($R_L = 50 \text{ Ohm}, I_{max} = 5 \text{ mA}$)
AGND	2	Screening, black	Reference potential for analog output
Laser on/off	3	Black	Switching input, Laser operates when pin 3 is connected to GND
Multifunction input	13	Violet	Switching input, TrigIn, Zero/Master, TeachIn, SlaveIn
Error/Limit 1	10	Brown	Switching output 1
Limit 2	11	White	Switching output 2 Programmable switching behavior: (NPN, PNP, push-pull)
Sync +	17	Gray-pink	Symmetrical synchronous output (Master) or input (Slave). RS422 Level, 120 Ohm switchable for terminating, selectable input or output depending on synchronization mode
Sync -	12	Red-blue	
Tx +	8	Gray	RS422 - Output (symmetric) terminate receiver with 120 Ohm
Tx -	15	Pink	
Rx +	9	Green	RS422 - Input (symmetric) internally terminated with 120 Ohm
Rx -	16	Yellow	

The PC1900 sensor cable is qualified for drag chain use. One end of the cable has a molded cable connector, the other end has braids with ferrules.
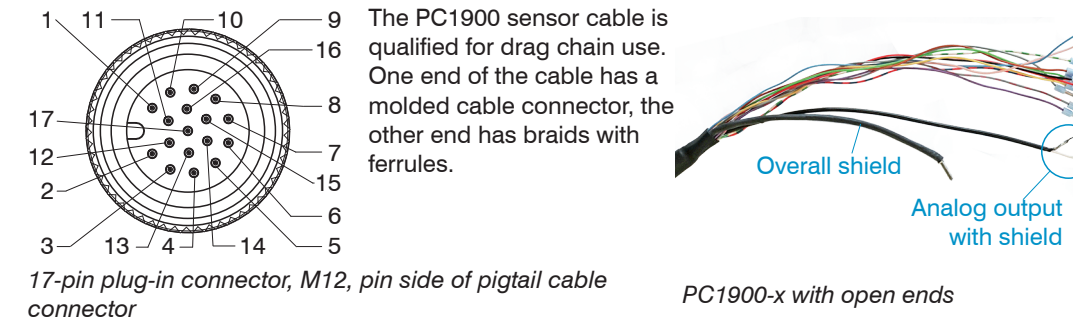
17-pin plug-in connector, M12, pin side of pigtail cable connector

Overall shield

Analog output with shield

PC1900-x with open ends

Supply voltage, Nominal value: 24 V DC (11 ... 30 V, P < 3 W)

Sensor Pin	PC1900-x/Y Color	Supply
5	Red	V_+
14	Blue	GND

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

Laser Safety

The optoNCDT 1900 operates with a semiconductor laser with a wavelength of 670 nm (visible/red) or 658 nm (visible/red). Operation of the laser is indicated visually by the LED `state` on the sensor. 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. The sensor complies with all applicable laws for the manufacturer of laser devices. Please observe national regulations, e. g., Laser Notice No. 50 for the USA.

i 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.

Laser Class 2

The sensors fall within laser class 2. The laser is operated on a pulsed mode, the maximum optical power is ≤ 1 mW. The pulse frequency depends on the adjusted measuring rate (0.25 ... 10 kHz). The pulse duration of the peaks is regulated depending on the measuring rate and reflectivity of the target and can be 4 up to 3995 µs.

Laser warning sign on the sensor housing
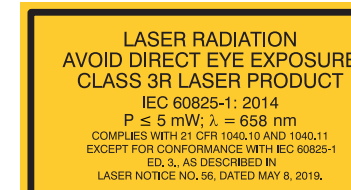
Laser label on the sensor cable

⚠ CAUTION

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

Laser Class 3R

The sensors fall within laser class 3R. The laser is operated on a pulsed mode, the maximum optical power is ≤ 5 mW. The pulse frequency depends on the adjusted measuring rate (0.25 ... 10 kHz). The pulse duration of the peaks is regulated depending on the measuring rate and reflectivity of the target and can be 4 up to 3995 µs.

Laser warning sign on the sensor housing

Laser labels on the sensor cable

⚠ 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.

Accordingly, the following applies: 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 ever-lasting. During operation the laser area has to be restricted and marked.

Intended Use

The optoNCDT 1900 system is designed for use in industrial and laboratory areas. It is used for measuring displacement, distance and position as well as in in-process quality control and dimensional testing.

The sensor must only be operated within the limits specified in the technical data, see operating instructions, Chap. 3.3. The sensor must be used in such a way that no persons are endangered or machines and other material goods are damaged in the event of malfunction or total failure of the sensor. Take additional precautions for safety and damage prevention for safety-related applications.

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.

Proper Environment

- Protection class: IP67 (applies only when the sensor cable is plugged in)
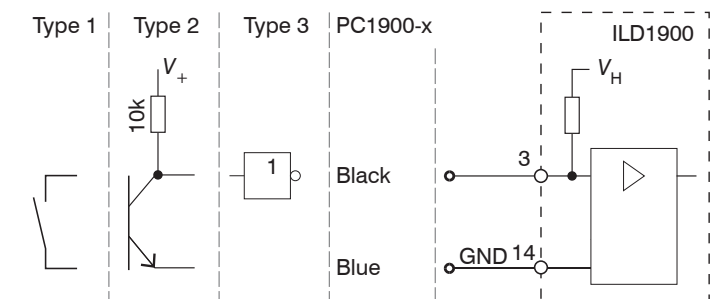
Optical inputs are excluded from protection class. Contamination leads to impairment or failure of the function.

- Temperature range
  - Operation: 0 ... +50 °C (+32 ... +122 °F)
  - Storage: -20 ... +70 °C (-4 ... +158 °F)
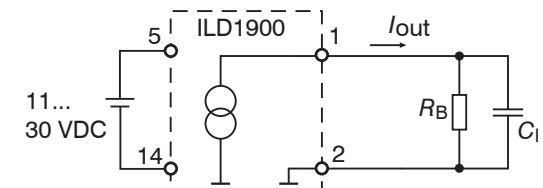- Humidity: 5 ... 95 % (non-condensing)

Switch on the Laser

The laser remains off as long as pin 3 is not electrically connected with pin 14.

Analog Output

Current output 4 ... 20 mA or
Voltage output 0 ... 5 V or 0 ... 10 V

ⓘ The current output may not be continuously operated in short-circuit operation without load resistor. This would lead to thermal overload and thus to the automatic overload cut-off of the output.
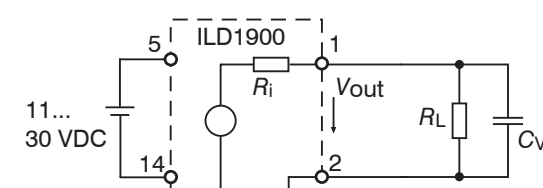
Current output

$R_B < (V_+ \text{-6 V}) / 20 \text{ mA}$;
R_B max. = 250 Ohm
at $V_+ = 11$ V
$C_I \leq 33$ nF

Voltage output

$R_i = 50$ Ohm, $I_{max} = 5$ mA,
Short circuit protection 7 mA
$R_L > 20$ MOhm
$C_V \leq 100$ nF

Analog output

Pin 1,
coaxial inner conductor, white

AGND Pin 2,
screening

Multi-Function Input

The multi-function input enables triggering, zero setting/mastering and teaching. The function depends on the programming of the input and on the timing of the input signal.

The inputs are not electrically isolated. The maximum switching frequency is 10 kHz.
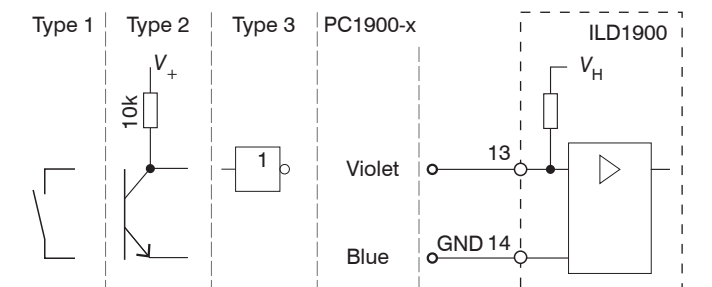
24 V logic (HTL):
Low ≤ 3 V; High ≥ 8 V
(max 30 V)

5 V logic (TTL):
Low ≤ 0.8 V; High ≥ 2 V

internal pull-up resistor, an open input is detected as High.

⇨ Connect the input to GND to trigger the function.

RS422 Connection with USB Converter IF2001/USB

Cross the lines for connections between sensor and PC.

ⓘ Disconnect or connect the D-sub connection between RS422 and USB converter when the sensor is disconnected from power supply only.

| Sensor		End device (converter)
17-pin cable connector	Sensor cable	Type IF2001/USB from MICRO-EPSILON
Tx + (Pin 8)	Gray	Rx +
Tx - (Pin 15)	Pink	Rx -
Rx + (Pin 9)	Green	Tx +
Rx - (Pin 16)	Yellow	Tx -
GND (Pin 14)	Blue	GND
Laser On (Pin 3)	Black	Laser ON

Symmetric differential signals acc. to EIA-422, not electrically isolated from supply voltage. Use a shielded cable with twisted cores e.g. PC1900-x.

Quick Guide

Components

⇨ Mount the sensor and connect the components.
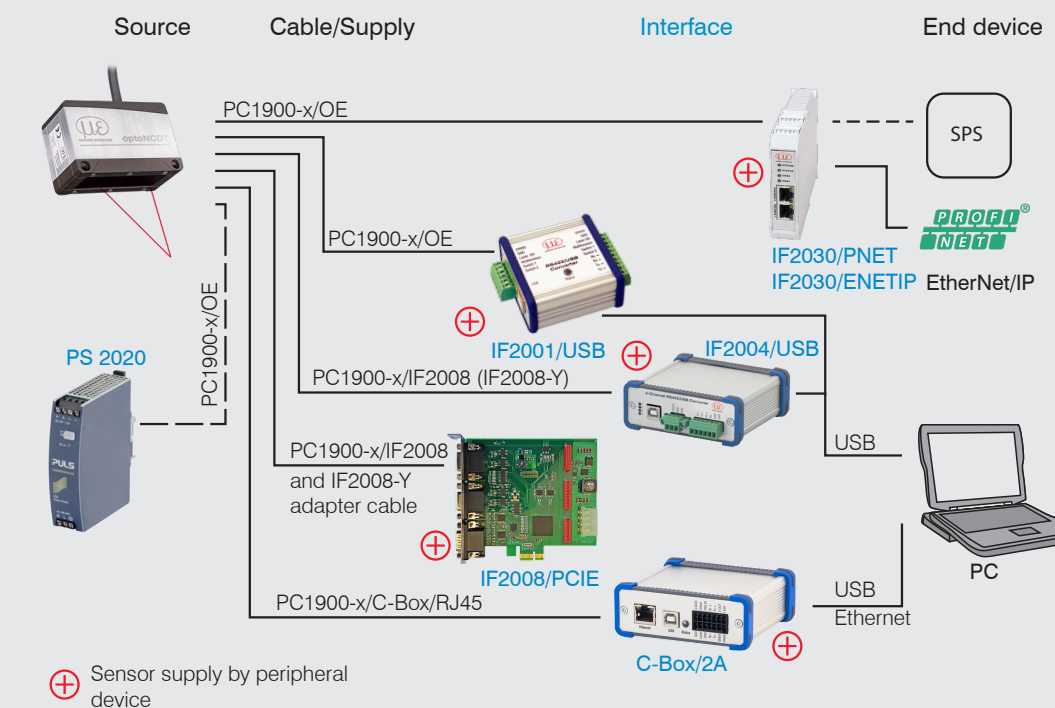
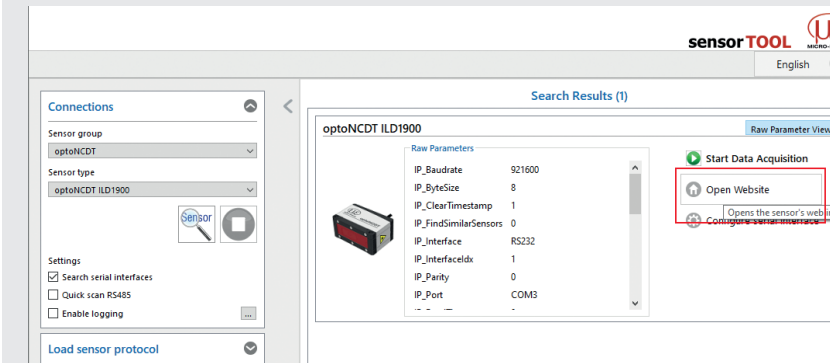⊕ Sensor supply by peripheral device

Initial Operation

⇨ Connect the sensor to a PC/notebook via a RS422 connector. Connect the supply voltage.

⇨ Start the program `sensorTOOL`.

⇨ Click the `Sensor` button.

The program searches for connected ILD1900 sensors on available interfaces

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

You need a web browser compatible with HTML5 on a PC/notebook.

⇨ Select the desired sensor. Click on the button `Open Website`.

Access via Web Interface

Interactive web pages for programming the sensor now appear in the web browser. The sensor is active and supplies measurement values. The ongoing measurement can be operated by means of function buttons in the area `Measurement chart`.
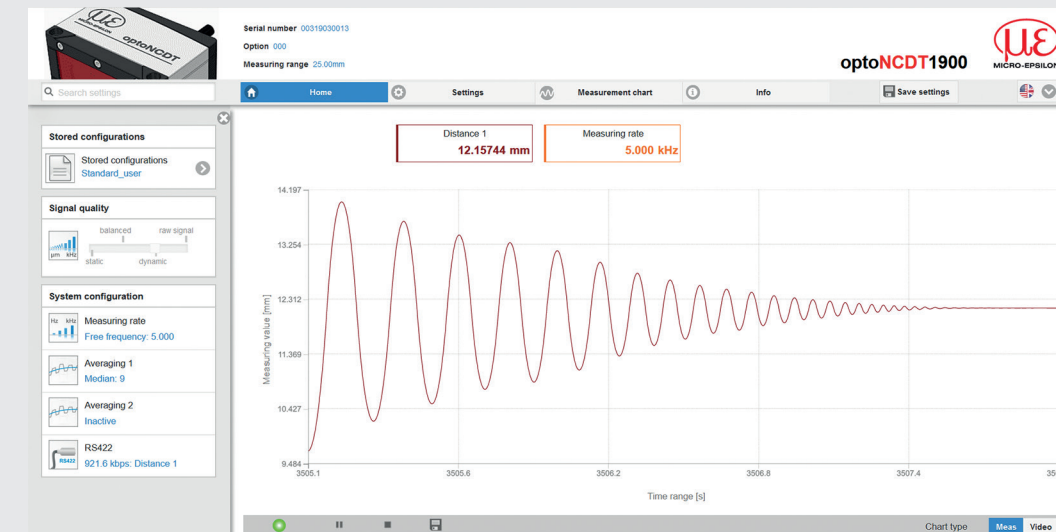
In the top navigation bar other functions (settings, measurement chart etc.) are available.

The appearance of the websites can change dependent on the functions. Each page contains descriptions of parameters and tips for filling the website.

Select a Measuring Rate

⇨ Go to the menu `Settings > Data recording > Measuring rate`.

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

Select an Interface

⇨ Go to the menu `Settings > Outputs > Output interface`.

Defines which interface is used for output of measured values. Parallel output of measured values via multiple channels is not possible. RS422 and analog output cannot be operated simultaneously. While using the web interface, the output is switched off via RS422.

Place Target

⇨ Position the target (measuring object) as much as possible in the midrange.
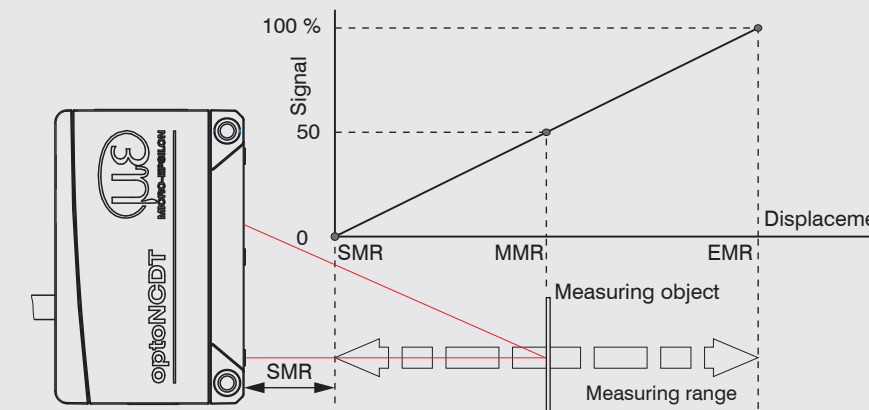
The State LED on the sensor indicates the position of the target to the sensor.

LED	Color		Labeling	Meaning
State	○	off	Laser off	Laser beam is switched off
	✳	green	In range	Target within measuring range
	✳	yellow	Midrange	Target within the midrange
	✳	red	Error	Target outside the measuring range, too low reflection

Store the Settings

⇨ Go to the menu `Settings > System settings > Load & Stores` or click the `Save settings` button.

Read the detailed operating instructions before using the sensor. The manual is available online on www.micro-epsilon.com/download/manuals/man--optoNCDT-1900--en.pdf

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