MICRO-EPSILON

# More Precision

## optoNCDT // Laser Triangulation Displacement Sensors


- Eleven models with measuring ranges from 2mm to 1000mm
- 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

### 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.

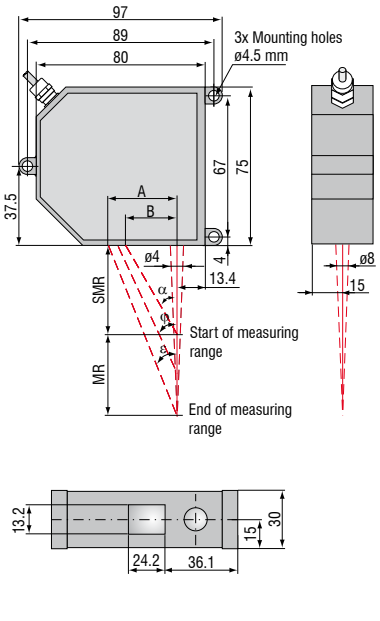
### Adjustable limit switches

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.

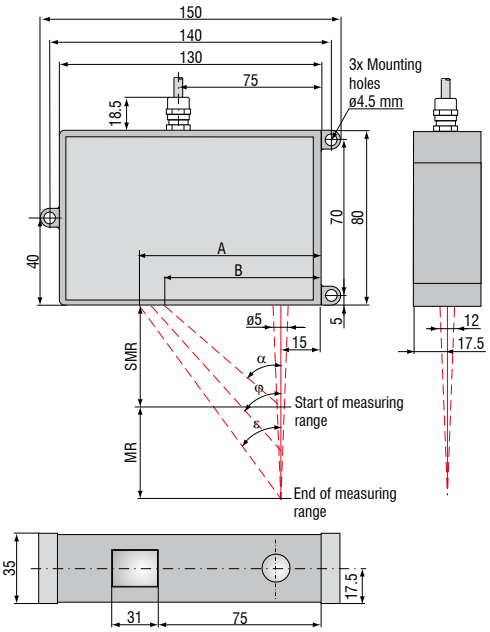
### Adjustable exposure time/measuring rate

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)**

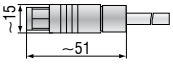


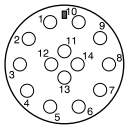

(Dimensions in mm, not to scale. All CAD files are available online.)

| 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: 0323272


**Connector (sensor cable)**
Article Number: 0323243




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 : 2008-05 | | | | | | | | | |
| Spot diameter | SMR | 80µm | 110µm | 320µm | 230µm | 570µm | 740µm | 1300µm | 1500µm | 1500µm | 1500µm |
| | MMR | 35µm | 50µm | 45µm | 210µm | 55µm | 60µm | 1300µm | 1500µm | 1500µm | 1500µm |
| | EMR | 80µm | 110µm | 320µm | 230µm | 570µm | 700µm | 1300µm | 1500µm | 1500µm | 1500µm |
| Temperature stability[1)] | | 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) | | | | | | | | | |
| | 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
1) 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 asensor 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

## Accessories for all optoNCDT Series

**Power supply**
- PS 2020 (Power Supply 24 V / 2,5 A, Input 100 - 240 VAC, output 24 VDC / 2.5 A, for snap in mounting on DIN 50022 rail)

**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)

**Converter**
- IF2004/USB 4 Channel RS422/USB Converter

## Accessories optoNCDT 1302/1402/1402SC

**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)

**Supply and output cable 1402SC**
- PC1402SC-3/I (3m, output 4...20 mA)
- PC1402SC-8/I (8m, output 4...20 mA)
- PC1402SC-10/I (10m, output 4...20 mA)
- PC1402SC-3/U (3m, output 1...5 V)
- PC1402SC-6/U (6m, output 1...5 V)
- PC1402SCT-3/I (3m, output 4...20 mA)
- PC1402SC-12/IF2008 (12m, supply and output cable)

**Protective housing**
- SGH ILD 1402(01)
- SGHF ILD 1402(01)

## Accessories optoNCDT 1610 / 1630

**Supply and output cable**
- PC 1605-3 (3m)
- PC 1605-6 (6m)
- PC 1607-5/BNC (5m, BNC connector)

## Accessories optoNCDT1700/1700LL/1700BL

**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)

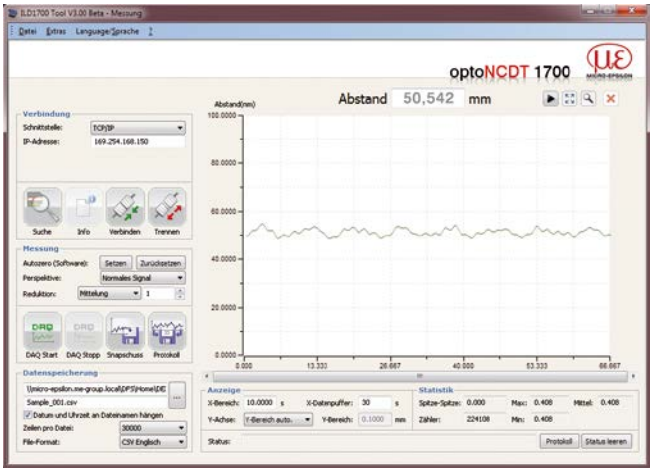
**Supply and output cable (robot rated)**
- PCR 1700-5 (5m)
- PCR 1700-10 (10m)

**Protective housing**
- SGH (size S and M)
- SGHF (size S and M)

## Accessories optoNCDT 2300

**Supply and output cable**
- PC2300-0,5Y (Connecting cable to PC or SPS; for operation a PC2300-3/SUB-D will be required)
- PC2300-3/SUB-D (3m; for operation a PC2300-0,5Y will be required)
- PC2300-3/CSP (3m, connecting cable ILD2300 and CSP2008)
- PC2300-10/CSP (10m, connecting cable ILD2300 and CSP2008)
- PC2300-15/CSP (15m, connecting cable ILD2300 and CSP2008)
- PC2300-3/IF2008 (3m, interface and supply cable)
- PC2300-3/OE (3m)
- PC2300-6/OE (6m)
- PC2300-9/OE (9m)
- PC2300-15/OE (15m)

**Protective housing**
- SGH (size S and M)
- SGHF (size S and M)




## 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 16x0]

## 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

## 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 provides protection against solvents and detergents.

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

**SGH ILD 1402(01) & SGHF ILD 1402(01)**
for optoNCDT 1402(025)

**SGx ILD size S (140x140x71mm)**
for optoNCDT 1700 / 2300
dimensions 97x75mm

**SGx ILD size M (140x180x71mm)**
for optoNCDT 1700 / 2300
dimensions 150x80mm

### IF2008 - PCI interface card

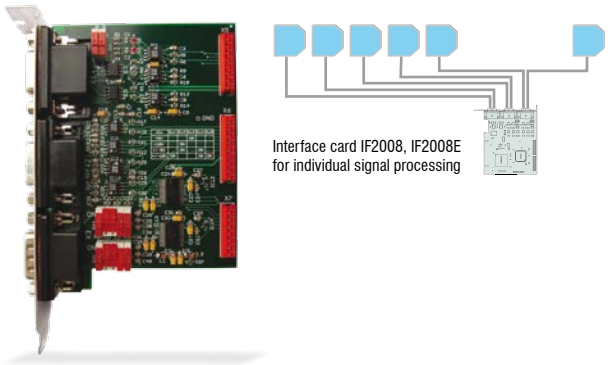
The IF 2008 interface card is designed for installation in PCs and enables the synchronous capture of 4 digital sensor signals and 2 encoders. The absolutely synchronous data acquisition plays an important role particularly for planarity or thickness measurement tasks. The data are stored in a FIFO memory in order to enable resource-saving processing in the PC in blocks.

**Particular Benefits**

- 4x digital signals and two encoders with basic printed circuit board
- Additional expansion board for a total of 6x digital signals, 2x encoder and 2x analogue signals and 8x I/O Signals
- FIFO data memory
- Synchronous data acquisition

### IF2008E - Expansion board

The IF 2008E expansion board is designed for installation in PCs and enables the synchronous capture of 2 digital sensor signals and 2 encoders as well as 8 I/O-Signals. The expansion board is connected to the basis board IF2008. The absolutely synchronous data acquisition plays an important role particularly for planarity or thickness measurement tasks.




**Particular Benefits**

- Two digital signals, two analogue signals and 8 I/O signals
- Overall with IF2008: 6 digital signals, 2 encoders and 2 analogue signals and 8 I/O Signals
- FIFO data memory
- Synchronous data acquisition

### IF2004/USB 4 Channel RS422/USB Converter

The RS422/USB converter is used for transforming digital signals from up to 4 ILD sensors into USB data signals. Equipped with 4 trigger inputs and 1 trigger output additional USB converters can be adapted.


**Particular Benefits**

- 4x digital signals via RS422
- 4 trigger inputs, 1 trigger output
- Synchronous data aquisition
- USB interface

### C-Box controller for up to 2 displacement signals

The C-Box is a compact controller for the digital-to-analogue conversion of a digital sensor signal and for the evaluation of two digital sensor signals. The output occurs via parameterisable analogue output, Ethernet, RS422 or USB. Besides the averaging and statistics function the measurement of thickness, average, step or tilting is possible. The C-Box may be used with ILD2300 and IFC2451/2471. The digital-to-analogue conversion happens with 16 Bit and 70 kHz maximum.

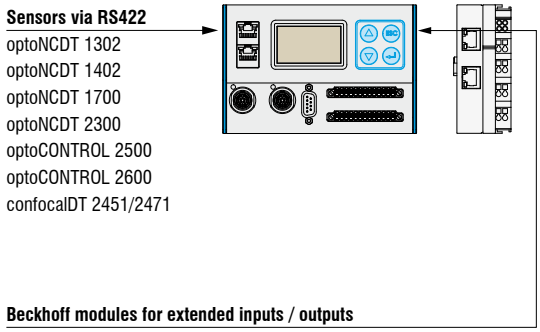
## CSP2008 - Universal controller for up to six sensor signals

The controller CSP2008 has been designed to process 2 to 6 both optical and other sensors from Micro-Epsilon (6 digital or 4 analogue input signals max., 2x internal + 4x external via EtherCAT modules from the company Beckhoff. EtherCAT is intended as external bus for connecting further sensors and I/O modules. The controller is equipped with a display offering multicolour backlighting which changes its color in the case of exceeding the limit value while a signal is displayed.


### Features

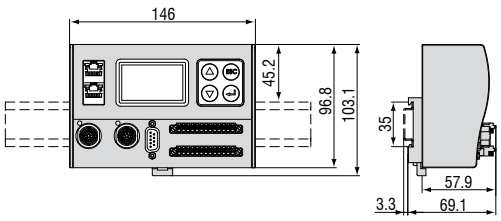
- Real-time processing of input and output signals at up to 100kHz (user selectable)
- Unique user interface for the configuration of the controller via Ethernet on a PC or laptop. All user selectable functions of the controller and the measured values can be viewed, displayed and stored in real time via your own web browser without installing any 3rd part software
- Simple sensor connection with automatic sensor recognition, configuration of the sensor using buttons and display on controller or via web browser
- Modular system upgradable with additional I/O modules for customer-specific requirements. The internal communication between I/O components using EtherCAT connection
  (CSP 2008 acts as master)
- Extremely flexible and powerful functionality; function modules can be combined in many ways.
- Simple mounting using DIN rail TS 35

### System setup




**Beckhoff modules for extended inputs / outputs**

EK1100, EtherCat bus coupler
EL4102, Analogue output terminal 0 V bis +10 V, 2 channels (16 Bit), EtherCAT
EL4132, Analogue output terminal -10 V bis +10 V, 2 channels (16 Bit), EtherCAT
EL4024, Analogue output terminal 4 ... 20 mA, 4 channels (12 Bit), EtherCAT
EL2002, Digital output terminal, 24 VDC/ 0,5 A, 2 channels, EtherCAT
EL2002, Digital output terminal, 24 VDC/ 0,5 A, 2 channels, EtherCAT
EL2004, Digital output terminal, 24 VDC/ 0,5 A, 4 channels, EtherCAT
EL3142, Analogue input terminal 0 ... 20 mA, 2 channels (16 Bit), EtherCAT
EL3162, Analogue input terminal 0 ... 10 V, 2 channels (16 Bit), EtherCAT
EL1002, Digital input terminal 24 VDC/3 ms, 2 channels, EtherCAT
EL1012, Digital input terminal 24 VDC/10 µs, 2 channels, EtherCAT
EL1014, Digital input terminal 24 VDC/10 µs, 4 channels, EtherCAT
EL1104, Digital input terminal 24 VDC/3 ms, 4 channels, EtherCAT
EL5101, Incremental encoder interface, RS485 differential inputs, EtherCAT
EK1122, 2-Port EtherCAT junction
RS422 extension terminal




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

## High performance sensors made by Micro-Epsilon

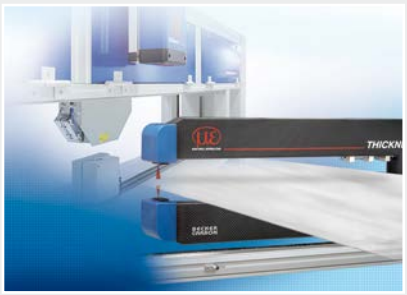
Sensors and systems for displacement and position

Sensors and measurement devices for non-contact temperature measurement

2D/3D profile sensors (laser scanner)

Optical micrometers, fibre optic sensors and fibre optics

Colour recognition sensors, LED analyzers and colour online spectrometer



Measurement and inspection systems

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