Laser Triangulation Displacement Sensors

![Image of Laser Triangulation Displacement Sensors](image_url)
In numerous applications, blue Laser sensors are clearly superior to the standard sensors with a red laser diode. During measurements on metals, particularly on red glowing metals and organic matters such as wood, skin, food-stuffs, veneers etc., the wavelength of the blue laser offers significant benefits. In contrast to the red laser, the blue laser light does not penetrate the measuring object due to the reduced wavelength. The blue laser generates a minimal laser point on the surface and therefore offers stable and precise results on measuring objects which are usually considered to be critical. The sensors are equipped with re-designed high-end lenses, a new intelligent laser control and evaluation algorithms.
<table>
<thead>
<tr>
<th>Model</th>
<th>ILD 1700-20BL</th>
<th>ILD 1700-200BL</th>
<th>ILD 1700-500BL</th>
<th>ILD 1700-750BL</th>
<th>ILD 1710-50BL</th>
<th>ILD 1710-1000BL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>20mm</td>
<td>200mm</td>
<td>500mm</td>
<td>750mm</td>
<td>50mm</td>
<td>1000mm</td>
</tr>
<tr>
<td>Start of measuring range</td>
<td>40mm</td>
<td>100mm</td>
<td>200mm</td>
<td>200mm</td>
<td>550mm</td>
<td>1000mm</td>
</tr>
<tr>
<td>Midrange</td>
<td>50mm</td>
<td>200mm</td>
<td>450mm</td>
<td>575mm</td>
<td>575mm</td>
<td>1500mm</td>
</tr>
<tr>
<td>End of measuring range</td>
<td>60mm</td>
<td>300mm</td>
<td>700mm</td>
<td>950mm</td>
<td>600mm</td>
<td>2000mm</td>
</tr>
<tr>
<td>Linearity</td>
<td>16µm</td>
<td>200µm</td>
<td>400µm</td>
<td>750µm</td>
<td>50µm</td>
<td>±1mm</td>
</tr>
<tr>
<td>Resolution (at 2.9kHz without averaging)</td>
<td>1.5µm</td>
<td>12µm</td>
<td>30µm</td>
<td>50µm</td>
<td>5µm</td>
<td>100µm</td>
</tr>
<tr>
<td>Measuring rate</td>
<td>2.5kHz</td>
<td>1.25kHz</td>
<td>625kHz</td>
<td>312.5kHz</td>
<td>(adjustable)</td>
<td></td>
</tr>
<tr>
<td>Light source</td>
<td>semiconductor laser &lt;1 mW, 405nm (blue violet)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permissible ambient light (at 2.5 kHz)</td>
<td>10,000lx</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser safety class</td>
<td>class 2 IEC 60825-1 : 2008-05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spot diameter</td>
<td>SMR 320µm</td>
<td>1300µm</td>
<td>1500µm</td>
<td>1500µm</td>
<td>400x500µm</td>
<td>2.5...5mm</td>
</tr>
<tr>
<td></td>
<td>MMR 45µm</td>
<td>1300µm</td>
<td>1500µm</td>
<td>1500µm</td>
<td>400x500µm</td>
<td>2.5...5mm</td>
</tr>
<tr>
<td></td>
<td>EMR 320µm</td>
<td>1300µm</td>
<td>1500µm</td>
<td>1500µm</td>
<td>400x500µm</td>
<td>2.5...5mm</td>
</tr>
<tr>
<td>Temperature stability*</td>
<td>0.01% FSO/°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation temperature</td>
<td>0 ... +50 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 ... +70 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output measurements</td>
<td>selectable: 4 ... 20mA / 0 ... 10V / RS 422 / USB (option with cable PC1700-3/USB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch input</td>
<td>Laser ON-OFF / Zero</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>via touch screen on sensor or via PC with ILD 1700 tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>24VDC (11 ... 30VDC), max. 150mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor cable length (with connector)</td>
<td>standard 0.25m integrated / optional: extension 3m or 10m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synchronisation</td>
<td>possible for simultaneous or alternating measurements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>2g / 20 ... 500Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>15g / 6ms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (with 25cm cable)</td>
<td>− 550g</td>
<td>− 550g</td>
<td>− 600g</td>
<td>− 600g</td>
<td>− 800g</td>
<td>− 800g</td>
</tr>
</tbody>
</table>

FSO = Full scale output  All specifications apply for a diffusely reflecting matt white ceramic target
*based to digital output ; SMR = Start of measuring range  MMR = Midrange  EMR = End of measuring range
### Accessories

#### 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 1610 / 1630

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

#### Accessories optoNCDT 1700/1700LL/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)
- PCR 1700-3/USB (3m, with USB-RS422-converter, power supply 90 ... 230 VAC)

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

#### Accessories optoNCDT 1302/1402/1402SC

**Supply and output cable, rated for moving cable tracks (also available in 90° version)**
- PC 1402-3/3 (3m, output 4 ... 20mA)
- PC 1402-6/6 (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)
- PC 1402-3/ILD2300 (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 1402-3/3 (3m)
- PCR 1402-6/6 (6m)
- PCR 1402-8/8 (8m)

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

#### Accessories optoNCDT 1710-50 / 2210

**Supply and output cable (drag chain rated)**
- PC 1800-3 (3m)
- PC 1800-8 (8m)
- PC2200-3/10/RS485 (3m, RS 485 with interface card IF2008)
- PC 2200-3/3/RS422 (3m, for IF2008/RS422/USB-converter)

**Sensor cable extension (drag chain rated)**
- CE 1800-2 (3m)
- CE 1800-8 (8m)
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 (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 sensor cooling.

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

[available from 07-2013]

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 acquisition
- USB interface
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

Sensors via RS422
- optoNCDT 1302
- optoNCDT 1402
- optoNCDT 1700
- optoNCDT 2300
- optoCONTROL 2500
- optoCONTROL 2600
- confocalDT 2451
- confocalDT 2471

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
- ELS5101, Incremental encoder interface, RS485 differential inputs, EtherCAT
- EK1122, 2-Port EtherCAT junction
- RS422 extension terminal
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)

Measurement and inspection systems for quality assurance

Optical micrometers, fibre optic sensors and fibre optics

Colour recognition sensors, LED analyzers and colour online spectrometer

MICRO-EPSILON Headquarters
Koenigbacher Str. 15 · 94496 Ortenburg / Germany
Tel. +49 (0) 8542 / 168-0 · Fax +49 (0) 8542 / 168-90
info@micro-epsilon.com · www.micro-epsilon.com