













## Laser Triangulation Displacement Sensors

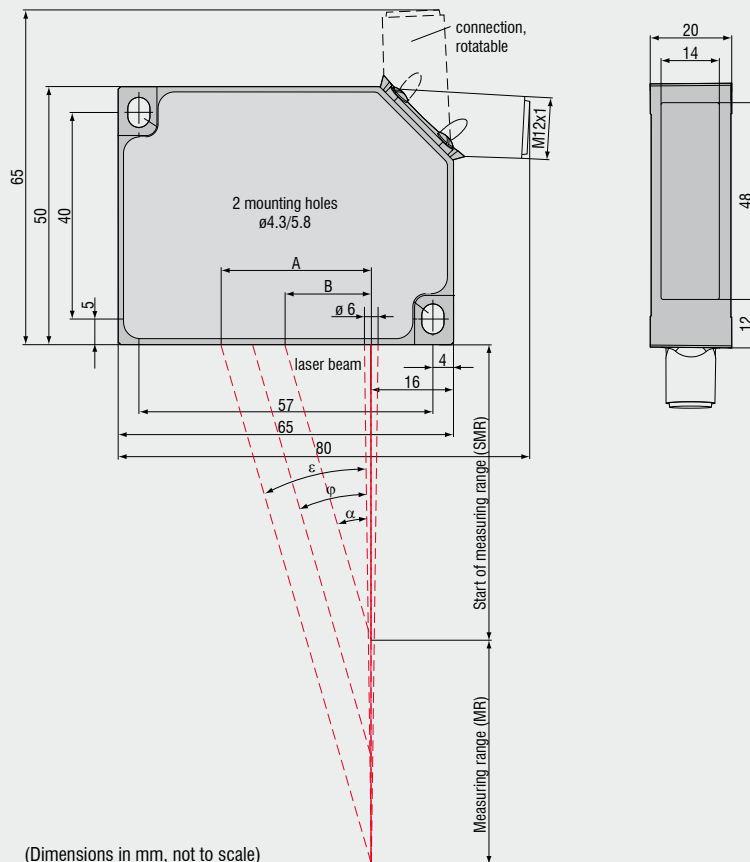




-  **Eight models with measuring ranges from 5mm to 600mm**
-  **Ideal for OEM applications**
-  **Compact design with integrated controller**
-  **Adjustable measuring rate up to 1.5kHz**
-  **Analogue (U/I) and digital output**
-  **Trigger input and teach-in**
-  **Adjustable filter functions Peak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

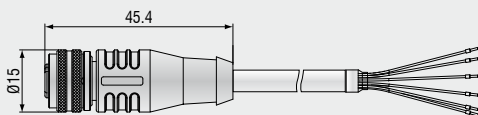
Model		ILD 1402-5	ILD 1402-10	ILD 1402-20	ILD 1402-50	ILD 1402-100	ILD 1402-200	ILD 1402-250VT	ILD 1402-600
Measuring range		5mm	10mm	20mm	50mm	100mm	200mm	250mm	600mm
Start of measuring range	SMR	20mm	20mm	30mm	45mm	50mm	60mm	100mm	200mm
Midrange	MMR	22.5mm	25mm	40mm	70mm	100mm	160mm	225mm	500mm
End of measuring range	EMR	25mm	30mm	50mm	95mm	150mm	260mm	350mm	800mm
Linearity		5...9 $\mu$ m	5...18 $\mu$ m	7...36 $\mu$ m	12...90 $\mu$ m	20...180 $\mu$ m	40...360 $\mu$ m	50...1200 $\mu$ m	120...3000 $\mu$ m
		$\leq 0.18\%$ FSO						$\leq 0.5\%$ FSO	
Resolution <sup>1)</sup>	averaged with averaging factor 64	0.6 $\mu$ m	1 $\mu$ m	2 $\mu$ m	5 $\mu$ m	10 $\mu$ m	13 $\mu$ m	32 $\mu$ m	80 $\mu$ m
	dynamic 1.5 kHz	1...3 $\mu$ m	2...5 $\mu$ m	5...10 $\mu$ m	6...25 $\mu$ m	12...50 $\mu$ m	13...100 $\mu$ m	32...300 $\mu$ m	80...600 $\mu$ m
		$0.02...0.05\%$ FSO						$0.02...0.12\%$ FSO	
Measuring rate, programmable		1.5kHz; 1kHz; 750Hz; 375Hz; 50Hz							
Light source		semiconductor laser <1mW, 670nm (red)							
Laser safety class		class 2 IEC 60825-1 : 2008-05							
Spot diameter	SMR	110 $\mu$ m	110 $\mu$ m	210 $\mu$ m	1100 $\mu$ m	1400 $\mu$ m	2300 $\mu$ m	5000 $\mu$ m	2.6 x 5mm
	MMR	380 $\mu$ m	650 $\mu$ m	530 $\mu$ m	110 $\mu$ m	130 $\mu$ m	2200 $\mu$ m	5000 $\mu$ m	2.6 x 5mm
	EMR	650 $\mu$ m	1200 $\mu$ m	830 $\mu$ m	1100 $\mu$ m	1400 $\mu$ m	2100 $\mu$ m	5000 $\mu$ m	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

<sup>1)</sup> resolution digital output 14bit <sup>2)</sup> tide to measurement rate

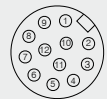
SMR = Start of measuring range MMR = Midrange EMR = End of measuring range

#### 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 <sub>b</sub>	11-30DV 24V MP	red
8	Laser off	switch input	black
9	Teach in	switch input	violet
10	Error	switch output	brown
11	I <sub>OUT</sub>	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 certified. At one end there is a 12pin M12 connector, the other end is open.

**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)

**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**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) /****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 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)

**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)

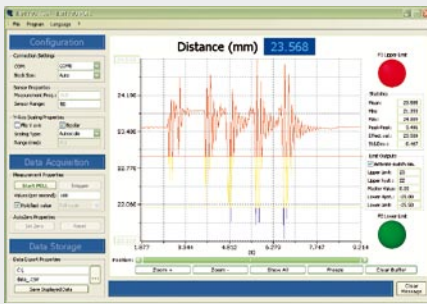
PC2300-3/IF2008 (3m, interface and supply cable)

PC2300-3/OE (3m)

PC2300-6/OE (6m)

PC2300-9/OE (9m)

PC2300-15/OE (15m)



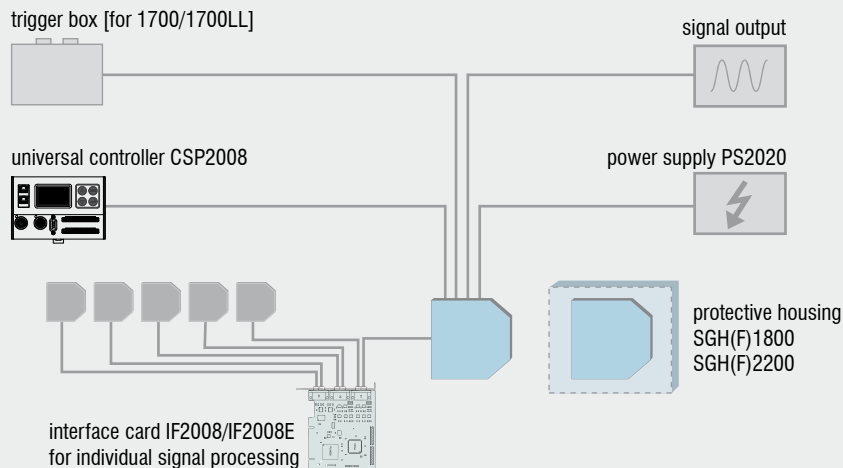
### Setup and configuration software

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 optNCDT 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](http://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 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

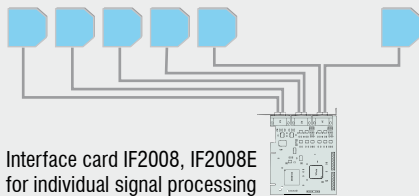
**SGx 2200:** 140x180x71 mm for  
ILD 1700-40/500/750,  
ILD 2200-40/200,  
ILD 2220-200

### 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

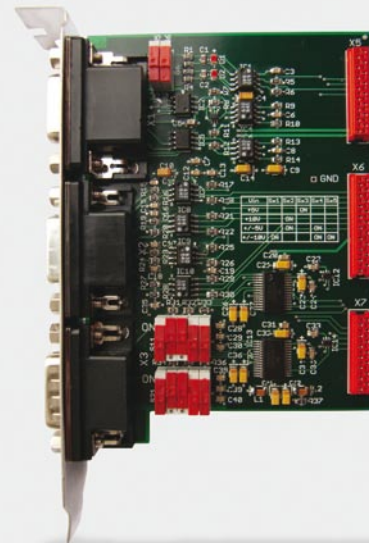


### IF2008E - Expansion board

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



### CSP2008 - Universal controller

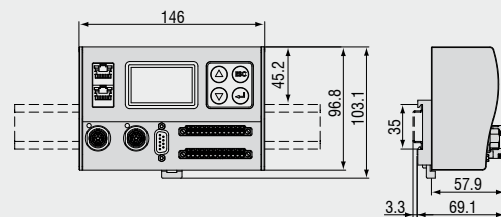
The CSP2008 controller can be used to process two digital or analogue input signals of almost all Micro-Epsilon displacement sensors (2x internal plus 4x external via Ethercat modules from Beckhoff). Ethercat can also be used as an external interface (master) for connecting further sensors and I/O modules.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

#### Features

- Real-time processing of input and output signals at upto 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 laptop
- 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)
- Simple mounting using DIN rail TS 35
- Extremely flexible and powerful functionality; function modules can be combined in many ways. Application example:



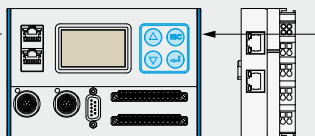
Universal controller with DIN rail TS 35  
(dimensions not to scale)



#### System setup

##### Sensors via RS422

optoNCDT 1402  
optoNCDT 1700  
optoNCDT 2200/2220  
optoNCDT 2300  
optoCONTROL 2500  
optoCONTROL 2600  
confocalDT



##### Beckhoff modules for extended inputs / outputs

EK1100 (EtherCat bus coupler)  
EL2004 (4 channel digital output terminal 24VDC)  
EL4132 (2 channel analogue output terminal for -10...10V, 16Bit)  
EL1012/EL1014/EL1018 (2 / 4 / 8 channel digital output terminal for 24V DC)  
EL3161/EL3162 (1 / 2 channel analogue output terminal for 0...10V, 16Bit)  
EL3141/EL3142 (1 / 2 channel analogue output terminal for 0...20mA, 16Bit)  
EL4112 (2 channel analogue output terminal for 0...20mA, 16Bit)  
RS422 Extension terminal for CSP2008

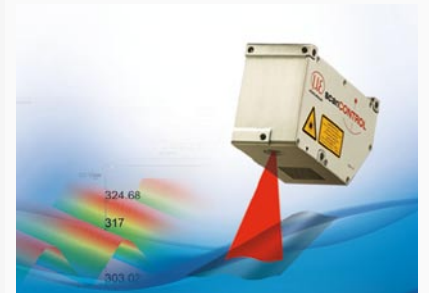
## High performance sensors made by Micro-Epsilon



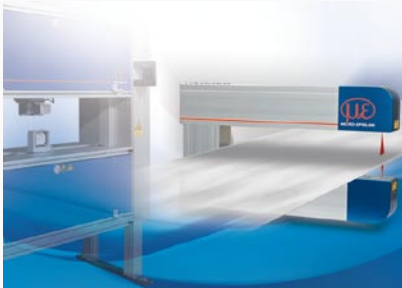
Sensors and systems for displacement and position



Sensors and measurement devices for non-contact temperature measurement



2D/3D profile sensors (laser scanner)



Measurement and inspection systems for quality assurance



Optical micrometers, fiber optic sensors and optical fibers



Color recognition sensors, LED analyzers and color online spectrometer