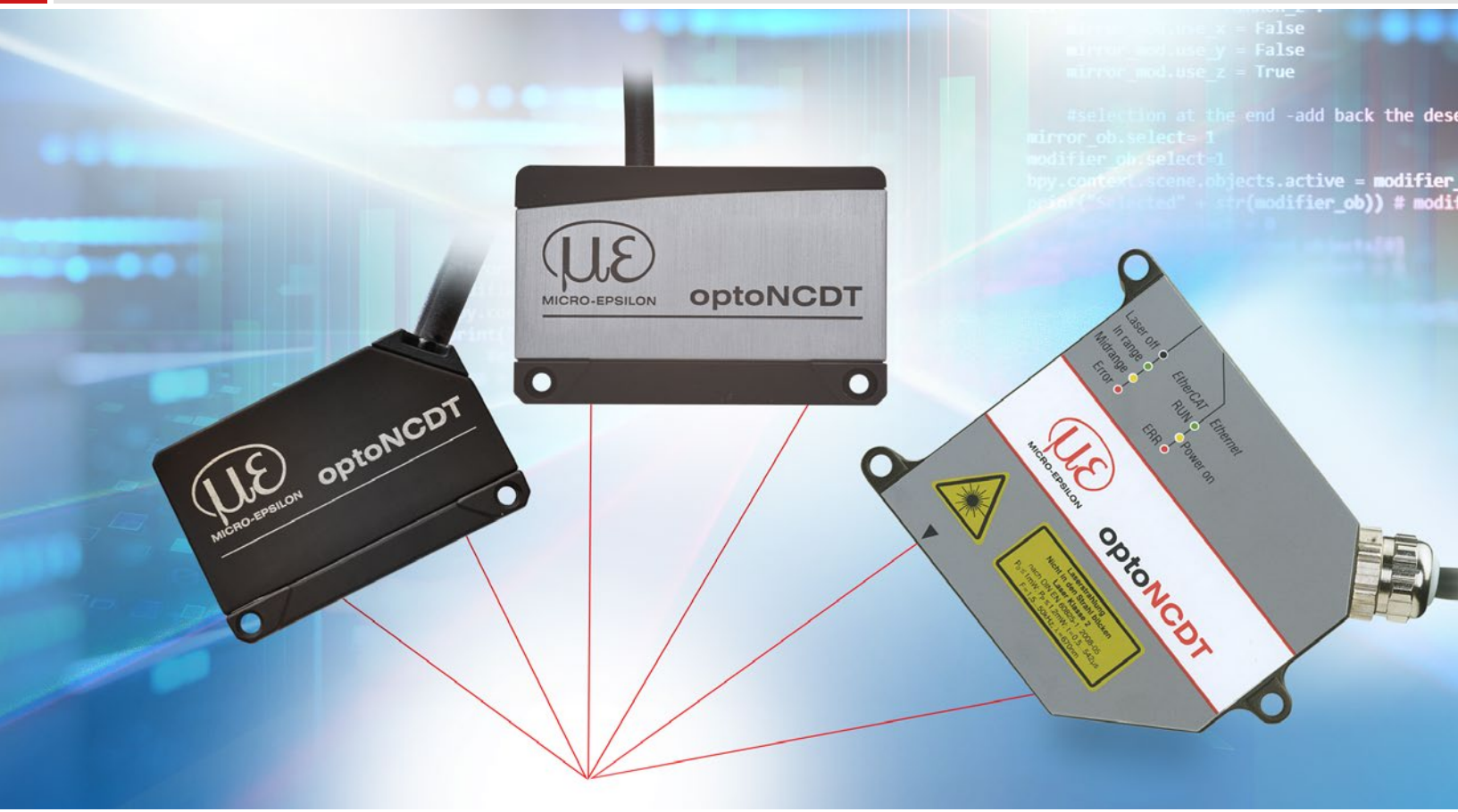










# More Precision

**optoNCDT** // Laser displacement sensors (triangulation)



# High precision laser sensors in miniature design optoNCDT 1220 / 1320 / 1420

designed for advanced  
**AUTOMATION**

-  Measuring rate up to 8 kHz
-  **INTERFACE** Analog (U/I) / RS422 / PROFINET / EtherNet/IP / EtherCAT
-  **ASC** Active Surface Compensation
-  Repeatability 0.5  $\mu\text{m}$
-  Ideal for series and OEM applications
-  Low weight, ideal for high accelerations



## Best in Class:

### Compact, precise and faster






The optoNCDT 1x20 laser sensors are among the best in their class. The sensors offer a unique combination of speed, size and performance. The laser sensors are used for the precise measurement of displacement, distance and position in all fields of automation technology, such as machine building, 3D printers and robotics.

The optoNCDT 1x20 sensors use an intelligent surface control feature. The Active Surface Compensation (ASC) ensures stable measurement results regardless of changing colors or brightness of the target surface.

### Ideal for industrial series applications

Different output signals enable the sensor to be integrated into plant and machine control systems. As well as analog voltage and current outputs, a digital RS422 interface provides distance information from the sensor.

Due to the universal setting and evaluation possibilities, the optoNCDT 1x20 sensors meet all the requirements for use in industrial series and OEM applications.

Model	Technology	Measuring range	Repeatability	Linearity
optoNCDT 1220		10 - 500 mm	1 $\mu\text{m}$	0.10 %
optoNCDT 1320		10 - 500 mm	1 $\mu\text{m}$	0.10 %
optoNCDT 1420		10 - 500 mm	0.5 $\mu\text{m}$	from 0.08 %
optoNCDT 1420LL		10 - 50 mm	0.5 $\mu\text{m}$	from 0.08 %
optoNCDT 1420CL1		10 - 50 mm	0.5 $\mu\text{m}$	from 0.08 %

#### Highest precision in a minimum of space

Compact size combined with low weight opens up new fields of application. The selectable connector type, i.e. cable or pigtail, together with compact size reduce the sensor installation effort to a minimum.

#### Now even more powerful!

The optoNCDT 1x20 sensors have been optimized for industrial series use. Furthermore, the robust IP67 sensor housing allows use in industrial environments, even with high accelerations. A high-performance D/A converter enables 16 bit resolution at the analog output. Therefore, the sensor achieves even more precise measurement results. With the doubled measuring rate, even faster measurements can now be performed.



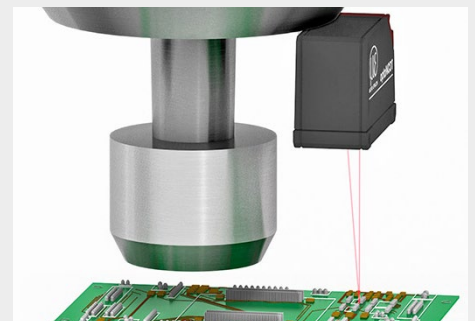
## Application examples



Dimension control of turned parts



Monitoring the expansion of battery cells



Distance control of print heads

# Technical data

## optoNCDT 1420

### optoNCDT 1420 (General technical data)

Model	ILD1420-xx	
Measuring rate <sup>[1]</sup>	6 adjustable stages: 8 kHz / 4 kHz / 2 kHz / 1 kHz / 0.5 kHz / 0.25 kHz	
Supply voltage	11 ... 30 VDC	
Power consumption	< 2 W (24 V)	
Signal input	1 x HTL laser on/off; 1 x HTL multifunction input: trigger in, zero setting, teach	
Digital interface <sup>[2]</sup>	RS422 (16 bit) / EtherCAT / PROFINET / EtherNet/IP	
Analog output <sup>[3]</sup>	4 ... 20 mA / 1 ... 5 V with PCF1420-3/U cable (16 bit, freely scalable within the measuring range)	
Switching output	1 x error output: npn, pnp, push pull	
Connection	integrated cable 3 m, open ends, min. bending radius 30 mm (fixed installation) or integrated pigtail 0.3 m with 12-pin M12 plug (see accessories for suitable connection cable)	
Installation	Screw connection via two mounting holes	
Temperature range	Storage	-20 ... +70 °C (non-condensing)
	Operation	0 ... +50 °C (non-condensing)
Shock (DIN EN 60068-2-27)	15 g / 6 ms in 3 axes, 1000 shocks each	
Vibration (DIN EN 60068-2-6)	20 g / 20 ... 500 Hz in 3 axes, 2 directions and 10 cycles each	
Protection class (DIN EN 60529) <sup>[4]</sup>	IP67	
Material	Aluminum housing	
Weight	approx. 60 g (incl. pigtail), approx. 145 g (incl. cable)	
Control and indicator elements <sup>[5]</sup>	Select button: zero, teach, factory setting; web interface for setup: selectable presets, peak selection, video signal, freely selectable averaging, data reduction, setup management; 2 x color LEDs for power / status	

<sup>[1]</sup> Factory setting 4 kHz, modifying the factory setting requires the IF2001/USB converter (see accessories)

For models with laser class 1 the maximum measuring rate is 4 kHz

<sup>[2]</sup> For EtherCAT, PROFINET and EtherNet/IP, connection via interface module is required (see accessories)

<sup>[3]</sup> For models with laser class 1 the D/A conversion is done with 12 bit

<sup>[4]</sup> Models with laser class 1 have the protection class IP65

<sup>[5]</sup> Access to web interface requires connection to PC via IF2001/USB (see accessories)



### Laser point - optoNCDT 1420

Model	ILD1420-10	ILD1420-25	ILD1420-50	ILD1420-100	ILD1420-200	ILD1420-500	
Measuring range	10 mm	25 mm	50 mm	100 mm	200 mm	500 mm	
Start of measuring range	20 mm	25 mm	35 mm	50 mm	60 mm	100 mm	
Mid of measuring range	25 mm	37.5 mm	60 mm	100 mm	160 mm	350 mm	
End of measuring range	30 mm	50 mm	85 mm	150 mm	260 mm	600 mm	
Linearity <sup>[1]</sup>	< ±8 μm	< ±20 μm	< ±40 μm	< ±80 μm	< ±160 μm	< ±500 ... ±1000 μm	
	< ±0.08 % FSO					< ±0.1 ... ±0.2 % FSO	
Repeatability <sup>[2]</sup>	0.5 μm	1 μm	2 μm	4 μm	8 μm	20 ... 40 μm	
Temperature stability <sup>[3]</sup>	±0.015 % FSO / K			±0.01 % FSO / K			
Light spot diameter <sup>[4]</sup>	SMR	90 x 120 μm	100 x 140 μm	90 x 120 μm	750 x 1100 μm	750 x 1100 μm	750 x 1100 μm
	MMR	45 x 40 μm	120 x 130 μm	230 x 240 μm			
	EMR	140 x 160 μm	390 x 500 μm	630 x 820 μm	-	-	-
	smallest Ø	45 x 40 μm with 24 mm	55 x 50 μm with 31 mm	70 x 65 μm with 42 mm	-	-	-
Light source	Semiconductor laser < 1 mW, 670 nm (red)						
Laser class	Class 2 in accordance with IEC 60825-1: 2014						
Permissible ambient light <sup>[5]</sup>	50,000 lx			30,000 lx	10,000 lx		

<sup>[1]</sup> FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

<sup>[2]</sup> Measuring rate 2 kHz, median 9

<sup>[3]</sup> The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.

<sup>[4]</sup> ±10 %; SMR = Start of measuring range; MMR = Mid of measuring range; EMR = End of measuring range

<sup>[5]</sup> Illuminant: light bulb



## Laser line - optoNCDT 1420LL

Model	ILD1420-10LL	ILD1420-25LL	ILD1420-50LL	
Measuring range	10 mm	25 mm	50 mm	
Start of measuring range	20 mm	25 mm	35 mm	
Mid of measuring range	25 mm	37.5 mm	60 mm	
End of measuring range	30 mm	50 mm	85 mm	
Linearity <sup>[1]</sup>	< ±8 μm	< ±20 μm	< ±40 μm	
	< ±0.08 % FSO			
Repeatability <sup>[2]</sup>	0.5 μm	1 μm	2 μm	
Temperature stability <sup>[3]</sup>	±0.015 % FSO / K			
Light spot diameter <sup>[4]</sup>	SMR	140 x 720 μm	220 x 960 μm	240 μm x 1250 μm
	MMR	65 x 680 μm	80 x 970 μm	130 μm x 1450 μm
	EMR	140 x 660 μm	240 x 1000 μm	380 μm x 1650 μm
	smallest Ø	65 x 680 μm with 25 mm	80 x 970 μm with 37.5 mm	110 x 1400 μm with 52.5 mm
Light source	Semiconductor laser < 1 mW, 670 nm (red)			
Laser class	Class 2 in accordance with IEC 60825-1: 2014			
Permissible ambient light <sup>[5]</sup>	50,000 lx			

<sup>[1]</sup> FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

<sup>[2]</sup> Measuring rate 2 kHz, median 9

<sup>[3]</sup> The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.

<sup>[4]</sup> ±10 %; SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range

Light spot diameter with line-shaped laser determined based on the emulated 90/10 knife-edge method

<sup>[5]</sup> Illuminant: light bulb



## Laser class 1 - optoNCDT 1420 CL1

Model	ILD1420-10CL1	ILD1420-25CL1	ILD1420-50CL1	
Measuring range	10 mm	25 mm	50 mm	
Start of measuring range	20 mm	25 mm	35 mm	
Mid of measuring range	25 mm	37.5 mm	60 mm	
End of measuring range	30 mm	50 mm	85 mm	
Linearity <sup>[1]</sup>	< ±8 μm	< ±20 μm	< ±40 μm	
	< ±0.08 % FSO			
Repeatability <sup>[2]</sup>	0.5 μm	1 μm	2 μm	
Temperature stability <sup>[3]</sup>	±0.015 % FSO / K			
Light spot diameter <sup>[4]</sup>	SMR	90 x 120 μm	100 x 140 μm	90 x 120 μm
	MMR	45 x 40 μm	120 x 130 μm	230 x 240 μm
	EMR	140 x 160 μm	390 x 500 μm	630 x 820 μm
	smallest Ø	45 x 40 μm with 24mm	55 x 50 μm with 31 mm	70 x 65 μm with 42 mm
Light source	Semiconductor laser < 0.39 mW, 670 nm (red)			
Laser class	Class 1 in accordance with DIN EN 60825-1: 2015-07			
Permissible ambient light <sup>[5]</sup>	15,000 lx			

<sup>[1]</sup> FSO = Full Scale Output; the specified data apply to white, diffuse reflecting surfaces (Micro-Epsilon reference ceramic for ILD sensors)

<sup>[2]</sup> Measuring rate 2 kHz, median 9

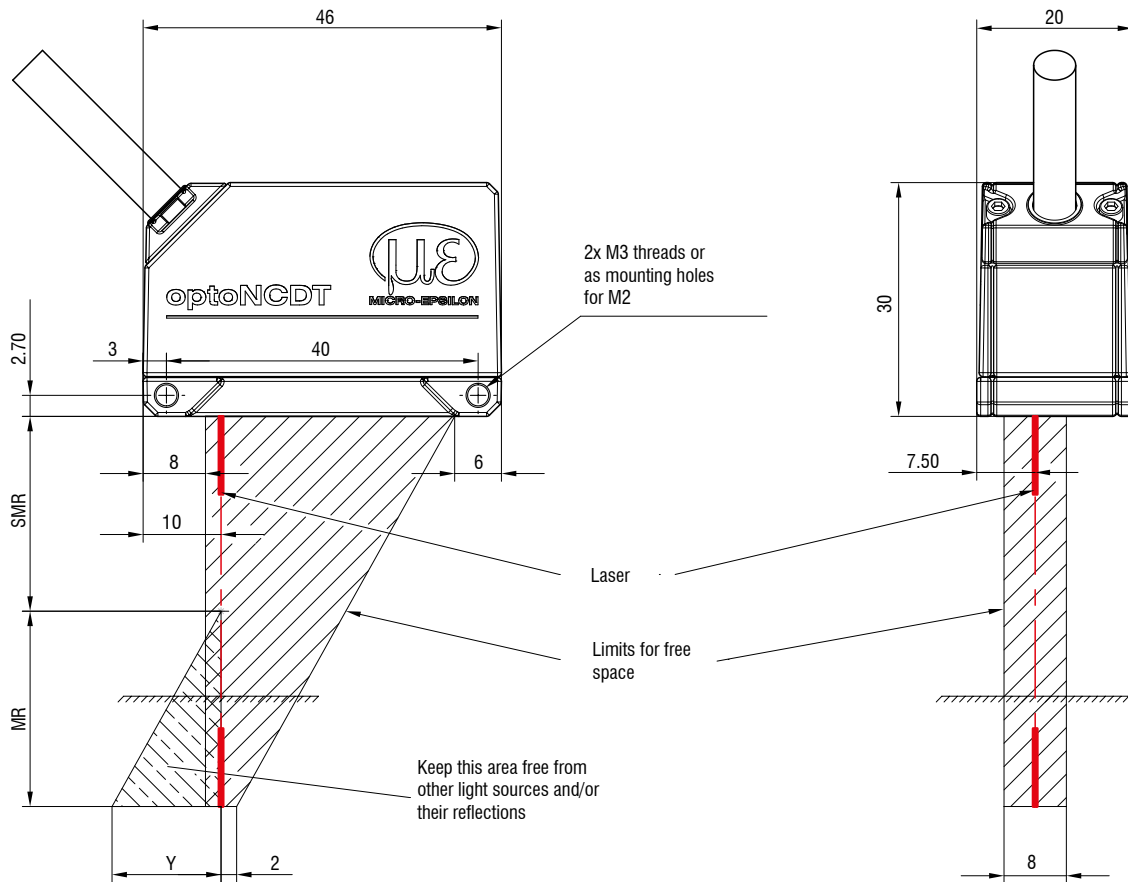
<sup>[3]</sup> The specified value is only achieved by mounting on a metallic sensor holder. Good heat dissipation from the sensor to the holder must be ensured.

<sup>[4]</sup> ±10 %; SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range

<sup>[5]</sup> Illuminant: light bulb

# Dimensions

## optoNCDT 1220 / 1320 / 1420



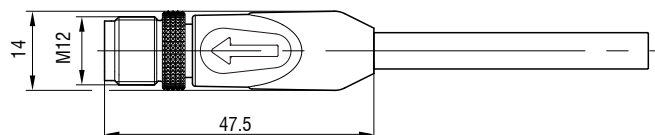
MR	SMR	Y
10	20	10
25	25	21
50	35	28
100	50	46
200	60	70
500	100	190

(Dimensions in mm, not to scale)

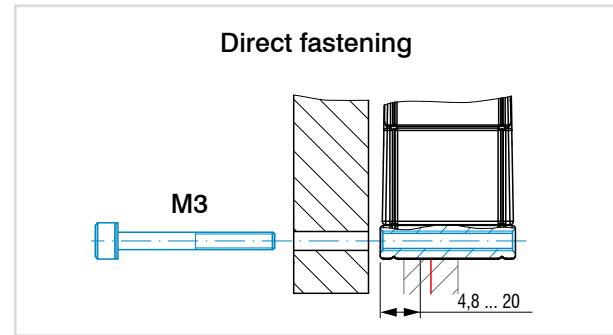
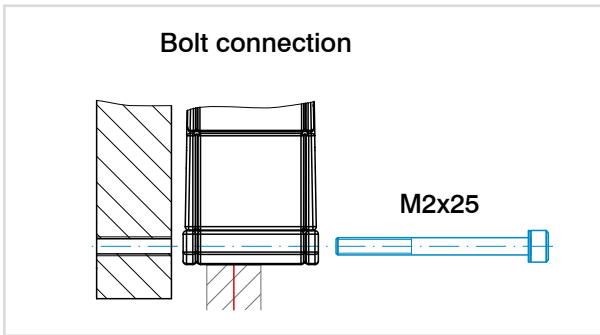
MR = measuring range; SMR = start of measuring range;

MMR = mid of measuring range; EMR = end of measuring range

### Connector (sensor side)



## Installation options



## Accessories for optoNCDT 1220/1320/1420

### Power supply unit

PS2020 (power supply 24 V / 2.5 A, input 100 - 240 VAC, output 24 VDC / 2.5 A, mounting onto symmetrical standard rail 35 mm x 7.5 mm, DIN 50022)

### Protective film

Transparent protective film 32 x 11 mm for ILD1x20

## Scope of supply

- 1 ILD1x20 sensor
- 1 Assembly instructions
- 1 digital calibration protocol accessible via web interface
- Accessories (2x M2 screws and 2 washers)

## Article designation

ILD1420-	10	LL	CL1
			<b>Laser class</b> No indication: class 2 (standard) CL1: Class 1 (only with ILD1420)
			<b>Laser type</b> No indication: Red laser point (standard) LL: Laser Line (only with ILD1420)
<b>Measuring range</b> in mm			
<b>Series</b> ILD1220: Compact laser displacement sensor for OEM and serial applications ILD1320: Compact laser triangulation displacement sensor ILD1420: Smart laser triangulation displacement sensor			






# Connection possibilities

## optoNCDT 1220 / 1320 / 1420








### Sensors with integrated cable

Cable diameter:	5.40 ±0.2 mm
Drag chain:	no
Robot:	no
Temperature range:	-25 ... 105 °C (moving) -40 ... 105 °C (not moving)
Bending radius:	> 27 mm (fixed installation) > 54 mm (dynamic)

Sensor	Cables	Type	Connection possibilities and accessories	
ILD1220-xx	<b>Integrated cable</b> Length 2 m	Open ends	<b>Supply voltage connection</b> Power supply unit PS2020	
ILD1320-xx ILD1420-xx ILD1420-xxLL	<b>Integrated cable</b> Length 3 m		<b>Interface module of RS422 to USB</b> IF2001/USB IC2001/USB	
			<b>Interface module for Industrial Ethernet connection</b> IF2035-PROFINET IF2035-EIP IF2035-EtherCAT	

### Drag-chain suitable extension and adapter cables




Cable diameter:	6.0 ±0.2 mm
Drag chain:	yes
Robot:	no (optional on request)
Temperature range:	-40 ... 90 °C
Bending radius:	> 30 mm (fixed installation) > 60 mm (dynamic)

Sensor	Cables	Type	Connection possibilities and accessories	
ILD1420-xx ILD1420-xxLL	<b>Extension cable pigtail</b> Length 3 m / 6 m / 10 m / 15 m  <i>Art. no.</i> <i>Designation</i> 29011067      PCF1420-3/I 29011068      PCF1420-6/I 29011069      PCF1420-10/I 29011070      PCF1420-15/I 29011071      PCF1420-3/U 29011072      PCF1420-6/U 29011073      PCF1420-10/U 29011074      PCF1420-15/U	Open ends	<b>Supply voltage connection</b> Power supply unit PS2020	
			<b>Interface module of RS422 to USB</b> IF2001/USB IC2001/USB	
			<b>Interface module for Industrial Ethernet connection</b> IF2035-PROFINET IF2035-EIP IF2035-EtherCAT	
			<b>Interface card for synchronous data acquisition</b> IF2008PCIe / IF2008E	
	<b>Adapter cable for PC interface card</b> Length 3 m / 6 m / 10 m  <i>Art. no.</i> <i>Designation</i> 29011079      PCF1420-3/IF2008 29011088      PCF1420-6/IF2008 29011089      PCF1420-10/IF2008	Sub-D	<b>4-fold interface module from RS422 to USB</b> IF2004/USB	
	<b>Adapter cable for sensor calculation</b> Length 3 m / 6 m / 9 m  <i>Art. no.</i> <i>Designation</i> 29011171      PCF1420-3/C-Box 29011172      PCF1420-6/C-Box 29011170      PCF1420-9/C-Box	Sub-D	<b>Controller for D/A conversion and evaluation of up to 2 sensor signals</b> Dual Processing Unit	
	<b>Adapter cable for sensor calculation</b> Length 2 m  <i>Art. no.</i> <i>Designation</i> 29011149      PCE1420-2/M12	M12	<b>Interface module for Ethernet connection of up to 8 sensors</b> IF2008/ETH	



## Other cables

Cable diameter: 6.7 mm  
 Drag chain: yes  
 Robot: no  
 Temperature range: -40 ... 80 °C  
 Bending radius: > 27 mm (fixed installation)  
 > 51 mm (dynamic)

Input	Cables	Type	Connection possibilities and accessories	
2 x Sub-D  (PCF1420-x/ IF2008)	<b>Adapter cable for the connection of two sensors per Sub-D connector</b> Length 0.1 m  <i>Art. no.</i> <i>Designation</i> 2901528     IF2008-Y-adapter cable  	Sub-D	<b>Interface card for synchronous data acquisition</b> IF2008PCIe / IF2008E  	
			<b>4-fold interface module from RS422 to USB</b> IF2004/USB  	

## Sensors and Systems from Micro-Epsilon



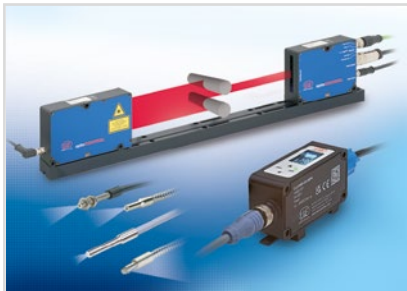
Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for metal strips, plastics and rubber



Optical micrometers and fiber optics, measuring and test amplifiers



Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection