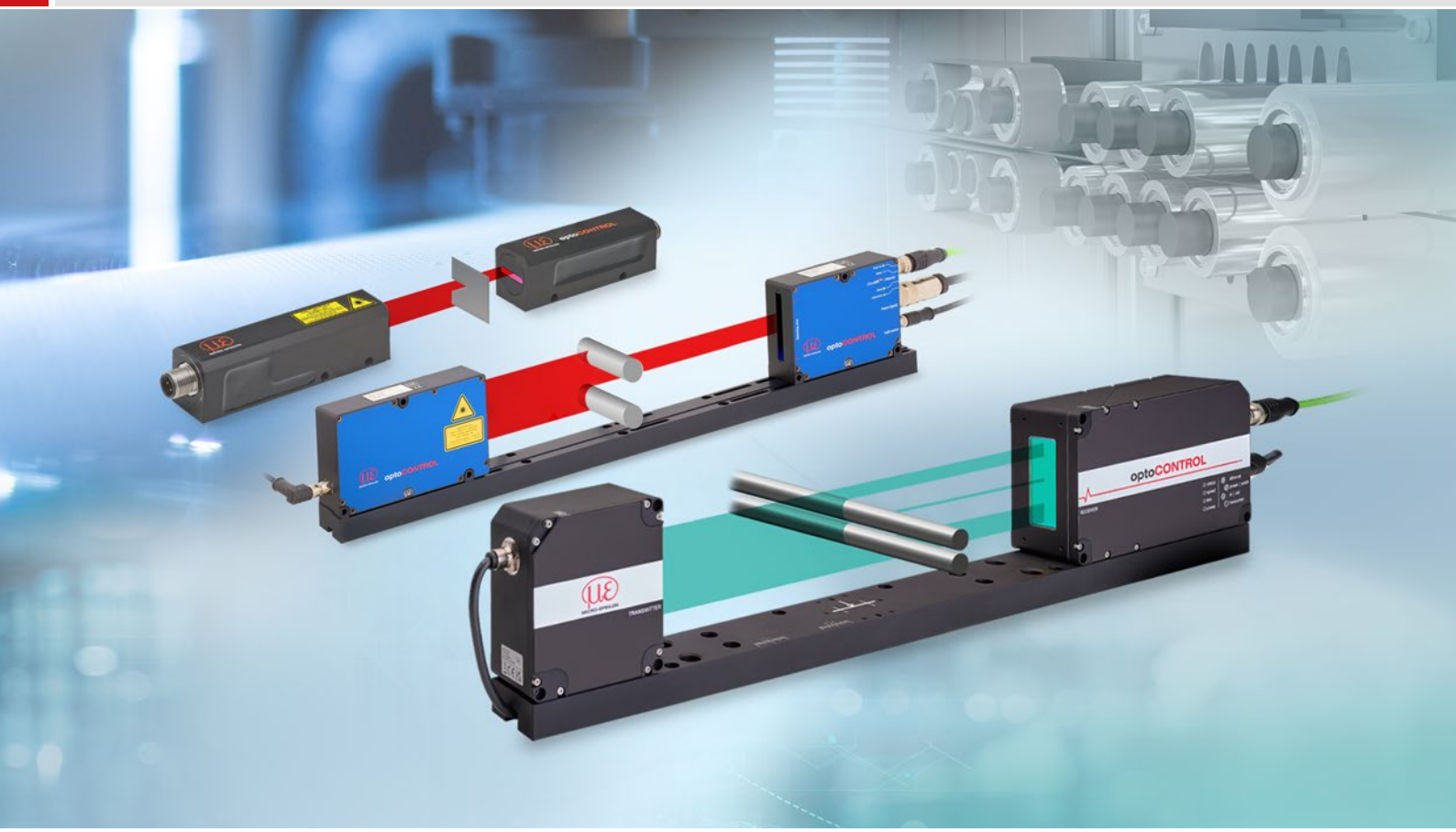
MICRO-EPSILON

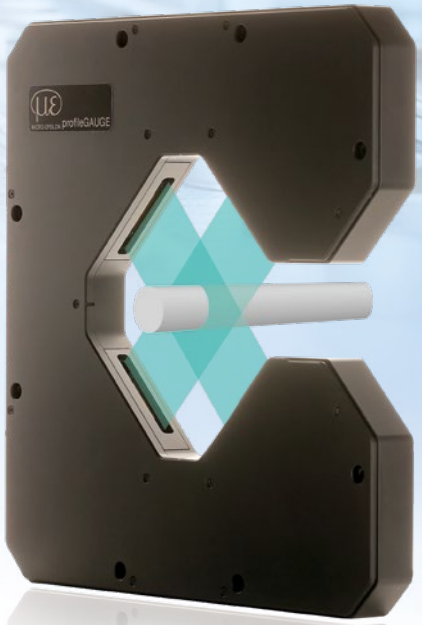
More Precision.

optoCONTROL // Optical precision micrometers



Measuring and inspection system for (inline) profile measurement
profileGAUGE

- Precision frame for two ODC2700 optical micrometers
- Synchronous and asynchronous operation possible
- Parallel output via sensorTOOL
- Angle measurement and active inclination correction of the measuring object
- Ethernet / EtherCAT / RS422 / Analog / EtherNet/IP / PROFINET



profileGAUGE – Precise measurement of diameter, profile and position

The profileGAUGE is a high-precision inline measurement system for non-contact diameter measurement of tubes, wires, round stock and other cylindrical measuring objects. Two preassembled optoCONTROL 2700 precision micrometers in an X-arrangement measure the measuring object simultaneously on two axes and enable diameter measurements starting at 30 µm. Active inclination correction automatically compensates for tilted measuring objects and thereby prevents measurement errors. The correction is performed for each individual measurement value and operates in the measurement programs for outer diameter, wire and contour measurement at up to 15,000 measurements per second. The fully aligned and wired system is ready for immediate use and can be easily integrated into existing systems via the standard Ethernet and RS422 interfaces. In addition, EtherCAT, EtherNet/IP or PROFINET fieldbus interfaces are available on board upon request. The optical measuring principle enables reliable measurement of not only metallic materials but also transparent materials such as glass or plastic.

Highest precision for dynamic measurement tasks

The short exposure time of 8.5 µs enables precise measurement results even for fast-moving or vibrating measuring objects. Synchronous acquisition of measurement values on both axes ensures precise time synchronization, thereby enabling highly accurate determination of diameters and center-axis positions. A shared encoder input for both axes is available for system-related information or triggering. Each measurement value is assigned to an encoder value.

Integrated contamination detection

Intelligent contamination detection continuously monitors the state of the optics and detects even the smallest dust particles or oil splashes on the optics. Potential degradation of measurement accuracy is detected early, so that unplanned downtime can be avoided and maintenance intervals can be optimally planned. The contamination level can be output at any time on request via the integrated interfaces.

Optional accessories

For use in harsh environments, the profileGAUGE is optionally available with protective glass or an air purge collar. The protective glass reliably protects the optics from damage, while the air purge collar keeps the beam path free of dust and other foreign particles, ensuring consistently high measurement quality.

Precise inline inspection of tubes, wires and round stock

Model		C.ODC-10/2	C.ODC-10/2.PG	C.ODC-10/2.PGA	C.ODC-40/2	C.ODC-40/2.PG	C.ODC-40/2.PGA
Sensor used		ODC2700-10			ODC2700-40		
Measuring range		10 mm			40 mm		
Min. target size [1]		0,05 mm (0,03 mm)			0,3 mm (0,1 mm)		
Distance light source - receiver		300 mm			300 mm		
Measuring distance target - receiver		150 (±2,5) mm			150 (±10) mm		
Version		without protective glass attachment and air purge	with protective glass attachment	with protective glass attachment and air purge	without protective glass attachment and air purge	with protective glass attachment	with protective glass attachment and air purge
Sampling rate [2]		15 kHz					
Measuring rate [3]		15 kHz					
Exposure time [4]		8.5 µs					
Resolution [5]		10 nm					
Linearity [6]		≤ 0.5 µm [7]			≤ 1 µm [8]		
Repeatability [6]		≤ 0.03 µm			≤ 0,1 µm		
Light source		LED turquoise 508 nm (blue-green)					
Laser class		no laser, LED according to DIN EN 62471 risk group 1			no laser, LED according to DIN EN 62471 risk group 1		
Permissible extraneous light		30,000 lx indirect; 5,000 lx direct irradiation					
Supply voltage		11 ... 30 VDC					
Max. current consumption		≤ 1 A					
Signal input		3x inputs (for both axes) optionally for encoder, zero point, reset, trigger; light on/off (can be switched off via menu)					
Digital interface [9]		Ethernet, RS422 (up to 8 MBaud) EtherCAT, EtherNet/IP, PROFINET					
Switching output		3 outputs (per axis), optionally for error and 2x limit values, not galvanically isolated 24V logic (HTL), High level depends on operating voltage Switchable TTL level					
Digital output		Synchronization					
Connection	Receiver	2x 12-pin M12 sockets for power supply, sync, and RS422, 2x 4-pin M12x1 sockets for Ethernet or fieldbus, 1x 12-pin M12 plug for outputs (errors, limit values) - inputs (trigger/encoder)					
Mounting		Both a feed-through connection with 8 × M10 and a screw connection with 8 × M12 screws are possible.					
Temperature range [10]	Storage	-20 ... +70 °C					
	Operation	0 ... +50 °C					
Shock (DIN EN 60068-2-27)		15 g / 6 ms in XY axis, 100 shocks each					
Vibration (DIN EN 60068-2-6)		2 g / 20 … 500 Hz in XY axis, 10 cycles each					
Protection class (DIN EN 60529)		IP67 (with protective glass and connected cables)					
Material		Aluminum housing					
Weight		26 kg					
Measuring programs		Diameter / gap / segment measurement / edge measurement with rising or falling edge / search and measurement direction / additional detection of edge positions and center axes					
Presets		Strip edge / wire measurement / (outer) diameter incl. inclination correction / contour measurement incl. encoder value / Multi-segment as well as roller, gap and angle measurement					
Control and indicator elements		4x LEDs (Power, Status, Link, Speed) Website: Inclination correction, soiling indicator, 6 application-specific presets, freely selectable averaging, data reduction, 8 editable user programs, value-time charts, measurement chart in mm/inch, video signal, setup mode with measuring line and measuring object; menu languages: German, English, and others					
Special features		Includes "sensorTOOL" software for data acquisition and processing, "MedaQLib" programming library					

[1] Value in brackets related to the mid of the measuring range

[2] Number of measurements taken per second

[3] Number of measured values that are output at the sensor interface

[4] With video averaging switched on = 3 x 8.5 µs exposures per measurement

[5] At the digital interface

[6] The data applies to a 95% confidence interval for diameter measurements with an average of 1024 values over a period of 5 minutes in a temperature-stabilized environment after a warm-up time of 45 minutes.

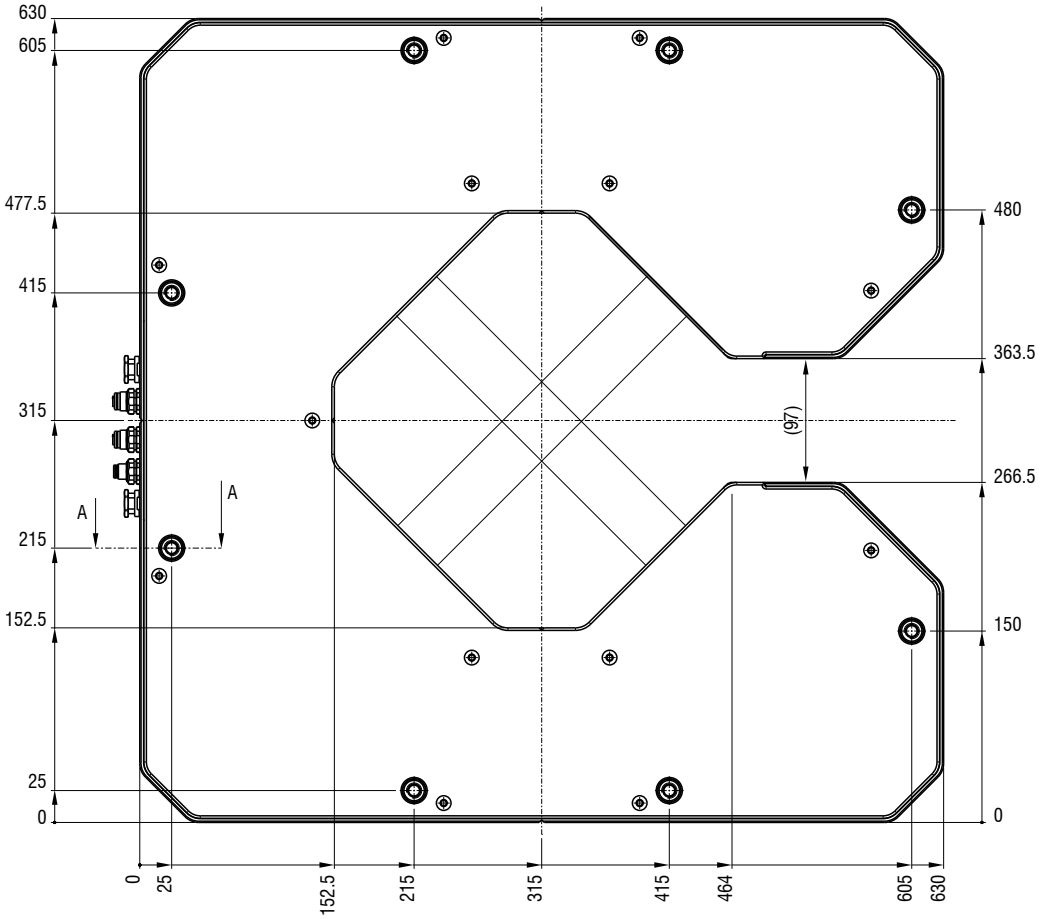
[7] Measured with 2 mm testing pin at a measurement distance of 150 mm in measuring field 1 (Z=±0.5 mm) linearity ≤ 0,5, in measuring field 2 (Z=±1.5 mm) linearity ≤ 1 µm, in measuring field 3 (Z=±2.5 mm) linearity ≤ 2,5 µm

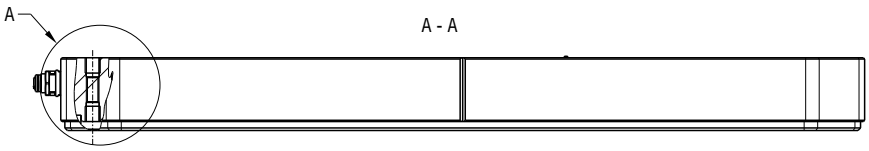
[8] Measured with 2 mm testing pin at a measurement distance of 150 mm in measuring field 1 (Z=±2.5 mm). In measuring field 2 (Z=±10 mm) linearity ≤ 3 µm - 95% confidence interval

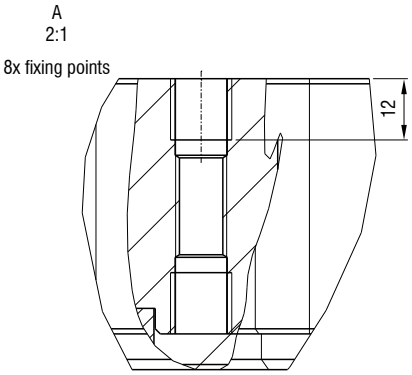
[9] EtherCAT, PROFINET, and EtherNet/IP: Connection via interface module (see accessories) or directly in the sensor "on board" as an alternative to Ethernet on request

[10] Relative humidity % 5 ... 95 (non-condensing)

Measuring and inspection system for (inline) profile measurement **profileGAUGE**







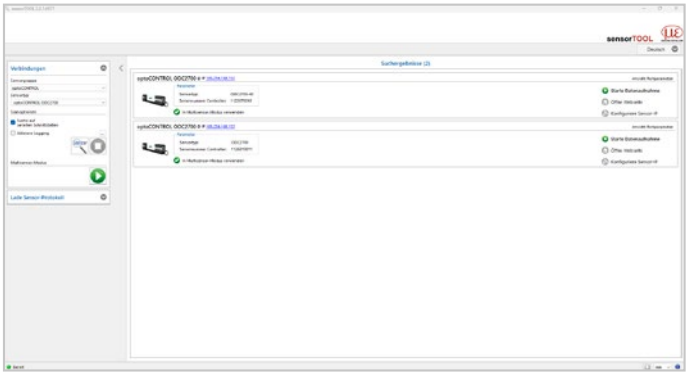
(dimensions in mm, not to scale)

Interface modules and accessories
optoCONTROL

XFrame2520-46 set for 2-axis measurements
ODC2520-46 micrometers for diameter measurement and XY position determination of round stock

- 2-axis frame for X-arrangement of 2 sensors
- Compressed-air cleaning of the optics via an air purge system
- e.g., for wires, cables, tubes, rods or flat steel
- Objects up to 46 mm in diameter can be measured
- Measuring range 46 × 46 mm

The multi-sensor function in sensorTOOL enables multiple optoCONTROL ODC sensors to be connected simultaneously and their measurement values to be viewed together. This enables measurement data from different sensors to be displayed, compared, recorded, and exported within a single interface. This is especially useful for multi-channel or combined measurement tasks, because all relevant values can be clearly displayed in a single chart.



Interface modules

Module	ODC1200	ODC2520	ODC2700
IF2001/USB RS422/USB converter to transform a digital signal to USB	⊘	✔	✔
IC2001/USB Single-channel RS422/USB converter cable	⊘	✔	✔
IF2004/USB RS422/USB converter for converting up to 4 digital signals to USB	⊘	✔	✔
IF2008/ETH Interface module for Ethernet connection for up to 8 sensors	⊘	✔	✔
IF2008PCIE Interface card for processing multiple sensor signals; analog and digital interfaces	✔	✔	✔
IF2035-EtherCAT Interface module for Industrial Ethernet connection (EtherCAT)	⊘	✔	✔
IF2035/PROFINET Interface module for Industrial Ethernet connection (PROFINET)	⊘	✔	✔
IF2035/EtherNetIP Interface module for Industrial Ethernet connection (EtherNet/IP)	⊘	✔	✔
IF1032/ETH Interface module for connecting the analog interface to Ethernet or Industrial Ethernet (EtherCAT)	✔	⊘	⊘
Dual Processing Unit Controller for D/A conversion and processing of up to 2 sensor signals	⊘	✔	✔

Interface modules and accessories
optoCONTROL

IF2001/USB: RS422-to-USB converter

The RS422/USB converter converts the digital signals from an optical micrometer into a USB data packet. To do this, the sensor is connected to the converter's RS422 interface. The data are output via the USB interface; additional signals and functions such as Laser On/Off, switching signals, and the function output are passed through by the converter. The converter and the connected sensors can be parameterized via software.

Special features

- Robust aluminum housing
- Easy sensor connection via screw terminals (Plug & Play)
- RS422-to-USB conversion
- Supports baud rates from 9.6 kBaud to 12 MBaud

IC2001/USB: Single-channel converter cable RS422/USB

The IC2001/USB single-channel converter cable is used to connect optoCONTROL sensors with an RS422 interface to USB. The cable is easy to install and therefore also suitable for integration into machines and systems.

Special features

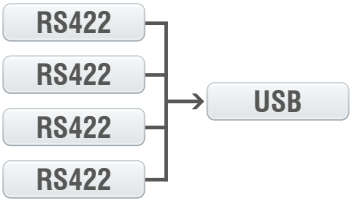
- 5-core interface cable without outer shield
- RS422-to-USB conversion
- Easy sensor connection via USB
- Supports baud rates from 9.6 kBaud to 1 MBaud

IF2004/USB: 4-channel RS422/USB converter

The RS422/USB converter converts the digital signals from up to 4 optical precision micrometers into a USB data packet. The converter features 4 trigger inputs and a trigger output for connecting additional converters. The data are output via a USB interface. The converter and the connected sensors can be parameterized via software. The COM interfaces can be used individually and switched as required.

Special features

- 4 digital signals via RS422
- 4 trigger inputs, 1 trigger output
- Synchronous data acquisition
- Data output via USB



IF2008/ETH

IF2008/ETH interface module for Ethernet connection for up to 8 sensors

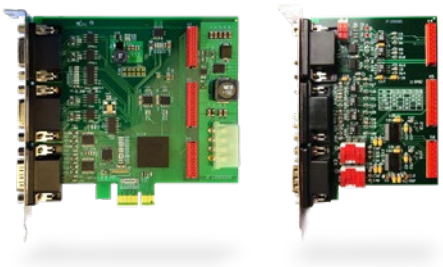
The IF2008/ETH integrates up to eight sensors and/or encoders with an RS422 interface into an Ethernet network. Four programmable switching inputs/outputs (TTL and HTL logic) are available.

Both the channel and the device status can be read directly on the module via the ten indicator LEDs. Data acquisition and output via Ethernet are also performed at a high speed of up to 200 kHz. Parameter setting of the interface module can be easily done via the web interface.

IF2008PCIe/IF2008E

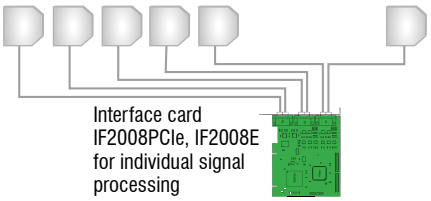
Interface card for synchronous data acquisition

Fully synchronous data acquisition is critical when measuring deflection or straightness with multiple optical micrometers. The IF2008PCIe interface card is designed for installation in PCs and enables the synchronous capture of 4 digital sensor signals and 2 encoders. The data are stored in a FIFO memory to enable resource-efficient block processing on the PC. With the IF2008E expansion card, an additional 2 digital sensor signals, 2 analog sensor signals and 8 I/O signals can be captured.



Special features

- IF2008PCIe – Basic board: 4 digital signals and 2 encoders
- IF2008E – Expansion board: 2 digital signals, 2 analog signals and 8 I/O signals



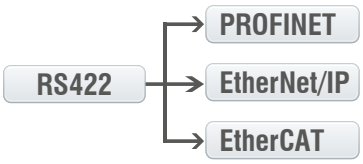
IF2035

Interface module for Industrial Ethernet connection

The IF2035 series interface modules were developed for easy connection of Micro-Epsilon sensors to Ethernet-based fieldbuses. The IF2035 is compatible with sensors that output data via an RS422 or RS485 interface and supports the common Industrial Ethernet protocols EtherCAT, PROFINET and EtherNet/IP.

The modules operate on the sensor side with up to 4 MBaud and have two network connections for different network topologies. In addition, the IF2035-EtherCAT offers a 4-fold oversampling function, which enables faster measurements than permitted by the bus cycle when required. Installation in control cabinets is via a DIN rail.

EtherNet/IP
PROFINET
EtherCAT



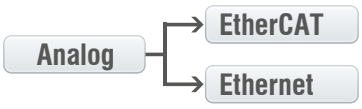
IF1032/ETH

With the IF1032/ETH interface module, the proven operating concept with web interface is now also available for optical micrometers with analog interfaces. Measurement data can be conveniently displayed on a PC via the Ethernet interface. In addition, optical micrometers can be connected to an EtherCAT bus. The existing RS485 interface allows connection of new optical precision micrometers that use the Micro-Epsilon-specific RS485 protocol.

EtherCAT

Interfaces

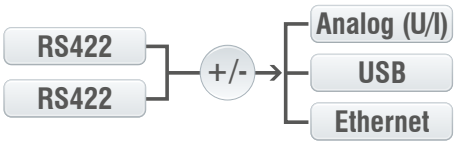
- Ethernet/EtherCAT
- 1x RS485 (ME proprietary protocol)
- 2x analog-in (14 bit, max. 4 ksps), voltage
- 1x analog-in, (14 bit, max. 4 ksps), current
- Inputs for supply voltage
- Trigger input
- EtherCAT synchronization output
- Output for sensor power supply



Interface modules and accessories
optoCONTROL

Dual Processing Unit: Controller for D/A conversion and processing of up to 2 sensor signals

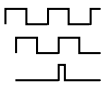
- Fast D/A conversion (16-bit, up to 100 kHz) of 2 digital input signals or processing of 2 digital sensor signals
- Averaging functions and calculation of thickness, step, diameter, ovality and runout
- Trigger input
- Multi-function output
- Output of measurement values via Ethernet, USB, analog output 4 ... 20 mA/ 0 ... 5 V / 0 ... 10 V / ±5 V / ±10 V (scalable via the web interface)
- 2 x switching outputs for sensor or Dual Processing Unit status
- Parallel data output via three output interfaces
- Two filter options
- Post-linearization of measurement values or calculated values
- Simple parameterization via web interface (controller and sensors)



optoCONTROL 1200/1201

Connection	Interface modules	Connection cables	Mounting	Accessories
Power supply Power supply PS2031 2420096 Power supply unit PS2020 2420062 		**Power supply and signal cables** PC1200/90-5 (5 m) (90°) 2901261 PC1200-5 (5 m) 2901260 PC1200-10 (10 m) 2901483		**Adjustment plate** <u>Receiver</u> JU1200-HR (horizontal) 2966018 JU1200-VR (vertical) 2966019 <u>Transmitter</u> JU1200-VT (vertical) 2966020 JU1200-HT (horizontal) 2966021 (for 1200 and 1200/90)
Digital output / Ethernet / EtherCAT 	IF1032/ETH 2420066 max. 4 kSps 			
PLC analog Connection via 0 … 10 V 	Direct 0–10 VDC		**C-frame mounting rail** ODC1202-L100 (L = 0.4 m) 2966006 ODC1202-L200 (L = 0.5 m) 2966007 ODC1202-L500 (L = 0.8 m) 2966008 (for 1200 and 1200/90)	**Bracket for C-frame mounting** BR1200L220 (L=220 mm) 2966024 BR1200L320 (L=320 mm) 2966025

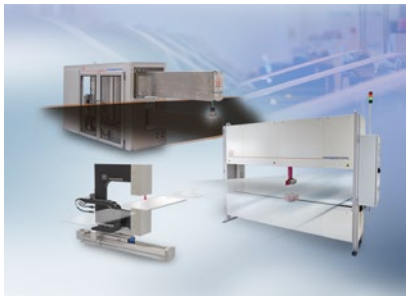
Interface modules and accessories
profileGAUGE

Connection	Interface modules	Connection cables	Mounting
Power supply 2420096 (24 V; 1 A) 2420062 (24 VDC / 2.5 A) **Power supply** Power supply PS2031 2420096 Power supply PS2020 2420062 		**Power supply, interface and signal cables with open ends** PC/SC2700-3 (3 m) 29011452 PC/SC2700-5 (5 m) 29011453 PC/SC2700-10 (10 m) 29011454 PC/SC2700-20 (20 m) 29011455 	
PLC PROFINET / EtherNet/IP 	IF2035-EtherCAT 2211036 IF2035-PROFINET 2211039 IF2035-EtherNetIP 2211038 		
Serial RS422	Direct RS422 OE to PC		
Digital output / USB / Ethernet 	IC2001/USB 2213041 Converter cable IF2001/USB 2213025 Converter 		
Serial RS422	Direct RS422 to PC		
Analog 0 … 10 V	IF2004/USB 2213024 IF2008PCIE 2213032 IF2008E 2213018 	**Interface and power supply cables** for IF2008; PC/SC2700-3/IF2008 (3 m) 29011508 IF2008-Y adapter cable, additionally required for connecting a 3rd or 4th sensor (0.1 m) 	
	Encoder and I/Os Encoder 	**Output cables** SC2700-5/pG (5 m) 29011804 	
Ethernet	Direct to PC via Ethernet via RJ45	**Digital output cables** SCD2700-3 (3 m) 29011456 SCD2700-5 (5 m) 29011457 SCD2700-10 (10 m) 29011458 SCD2700-20 (20 m) 29011459 	
EtherCAT, EtherNet/IP, PROFINET 	Direct via RJ45		
	via EtherCAT switch using M12	SCD2700-5 M12 (5 m) 29011460	
Digital output Ethernet 	IF2008ETH 2213018 	**Power supply and output cable** PCE2700-3/M12 (3 m) 29011541 	**For extension:** Transmitter-receiver connection cable extension CE2700-1/E (1 m) 29011483 CE2700-2/E (2 m) 29011484 CE2700-5/E (5 m) 29011485

Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

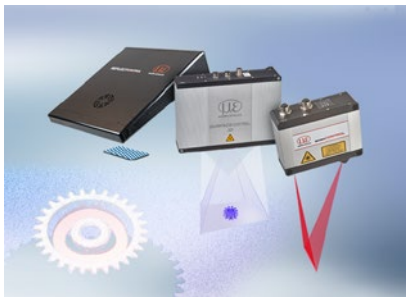
Sensors and measurement devices for non-contact temperature measurement



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

Modifications reserved / Y9766284-H012096GKE

MICRO-EPSILON

MICRO-EPSILON USA
8120 Brownleigh Dr. · Raleigh, NC 27617 / USA
Phone +1/919/787-9707 · Fax +1/919/787-9706
me-usa@micro-epsilon.com · **www.micro-epsilon.com**