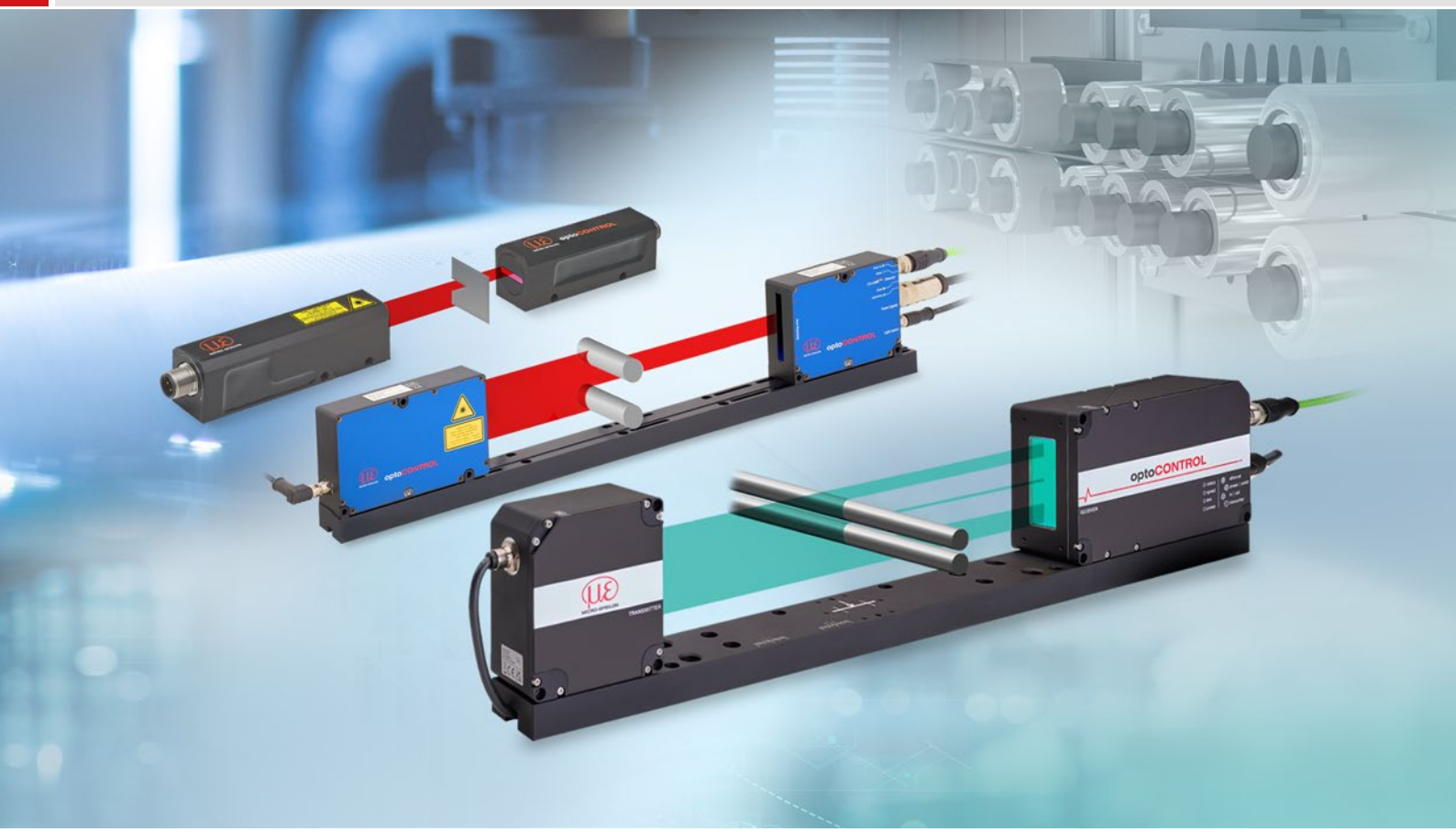
MICRO-EPSILON

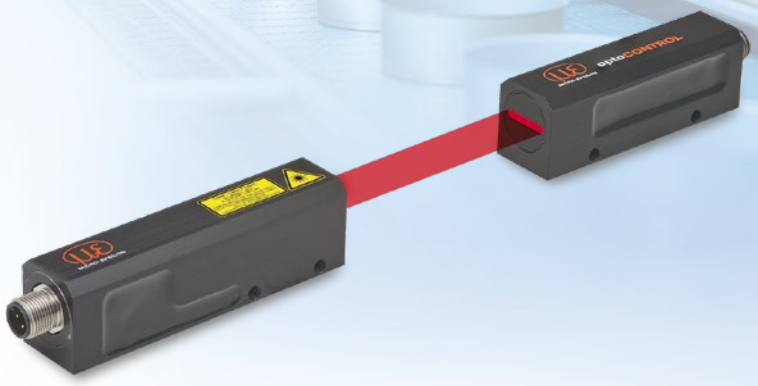
More Precision.

optoCONTROL // Optical precision micrometers



Compact high-speed micrometers
optoCONTROL 1200 / 1201

- Measuring ranges 2–30 mm
- Resolution ≥ 8 µm
- Measuring rate up to 100 kHz (-3 dB)
- INTER FACE Analog output 0 ... 10 VDC
- Laser class 1
- Detection of the smallest objects from 0.03 mm

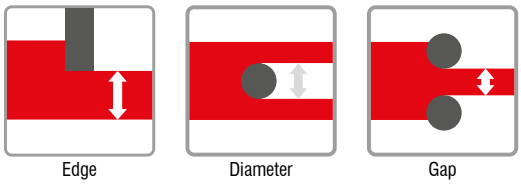


Light source and receiver can be mounted at any distance up to 2.5 m apart. All models can be mounted vertically or horizontally without additional brackets.

The compact housing design and the 90° version enable the miniature micrometers to be mounted even in confined installation spaces. In addition to the analog output, an adjustable limit switch is available. It can be operated in both NPN (light switching) and PNP logic (dark switching).

The optoCONTROL 1200 reliably measures diameters as small as 0.3 mm. For gap measurement from 50 µm, an option with intensity-based light quantity measurement is available.

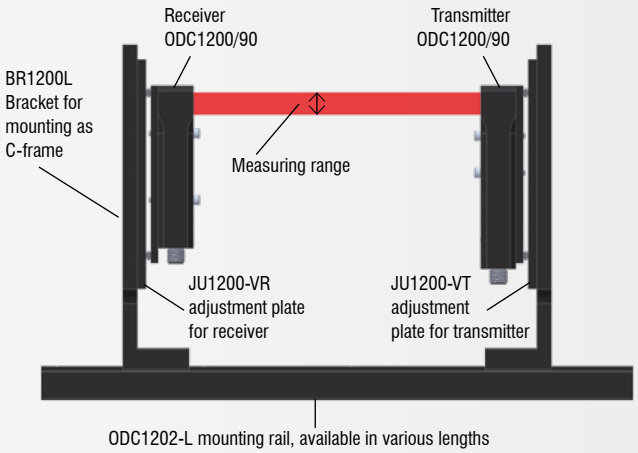
Measurement programs



90°



optoCONTROL 1200/90:
90° beam path version for mounting in confined installation spaces.
Optional mounting using the ODC1202-L mounting rail as a C-frame.

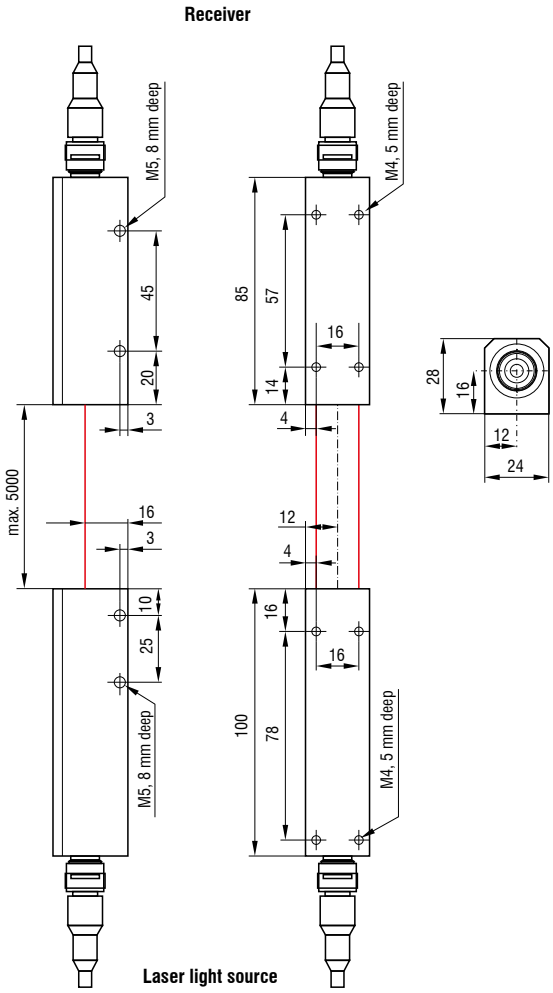


Model		ODC 1200 (axial model)				ODC 1200/90 (90 model)				ODC1201	
Measuring range		2 mm	5 mm	10 mm	16 mm	2 mm [3]	5 mm	10 mm	16 mm	20 mm	30 mm
Min. target size [2]		≥ 0.03 mm	≥ 0.05 mm	≥ 0.1 mm	≥ 0.15 mm	≥ 0.03 mm	≥ 0.05 mm	≥ 0.1 mm	≥ 0.15 mm	≥ 0.15 mm	≥ 0.2 mm
Distance light source - receiver (free space) [1]		min. 30 mm to 150 mm [1] max. 2500 mm									
Measuring distance (measured object - receiver)		20 mm … 2000 mm; Optimum distances: 20, 50 mm [1]									
Measuring rate		100 kHz (-3 db)									
Resolution		8 µm	10 µm	20 µm	30 µm	8 µm	10 µm	20 µm	30 µm	50 µm	70 µm
Linearity [2]		±2 % FSO		±3.5 % FSO		±2 % FSO		±3.5 % FSO			
Repeatability [4] [5]		≤16 µm	≤20 µm	≤40 µm	≤60 µm	≤16 µm	≤20 µm	≤40 µm	≤60 µm	≤100 µm	≤140 µm
Light source		Semiconductor laser 670 nm (red)									
Laser class		Laser class 1 (Pmax ≤ 0.39 mW) according to IEC 60825-1:2014									
Permissible ambient light		≤ 5000 lx [6]									
Analog output		0 ... 10 VDC (adjustable amplification, depending on direction)									
Digital interface		Ethernet [7] , EtherCAT [7] (max. 14 Bit/4 kSa/s)									
Switching output		PNP dark switching and NPN light switching (max. switching frequency 60 kHz) adjustable switching threshold									
Signal input		Laser control (light source) 0 ... 5 VDC									
Connection	Receiver	4-pin M12 socket for power supply, analog and digital output									
	Light source	4-pin socket M12 for supply and laser control									
Mounting		Mounting rail, adjustment plates (see accessories), mounting holes									
Temperature range	Storage	-20 … + 70 °C									
	Operation	0 ... + 50 °C									
Supply voltage		12 … 32 VDC									
Maximum power consumption		< 0.3 A									
Shock (DIN EN 60068-2-27)		15 g / 6 ms									
Vibration (DIN EN 60068-2-6)		15 g / 0.01 … 1 kHz									
Protection class (DIN EN 60529)	Receiver / light source	IP67									
Material	Receiver / light source	Aluminum housing									
Weight	Light source	approx. 150 g				approx. 170 g				approx. 260 g	
	Receiver	approx. 120 g				approx. 160 g				approx. 220 g	
Measuring programs		Edge (outer-) diameter / width gap									
Control and indicator elements		Receiver (LED) indication: switching state indicator and dirt with free beam path Light source (LED) indication: power ON/OFF									
Special features		Measurements server for transmission of several measurements to the PC (optional IF1032/ETH)									

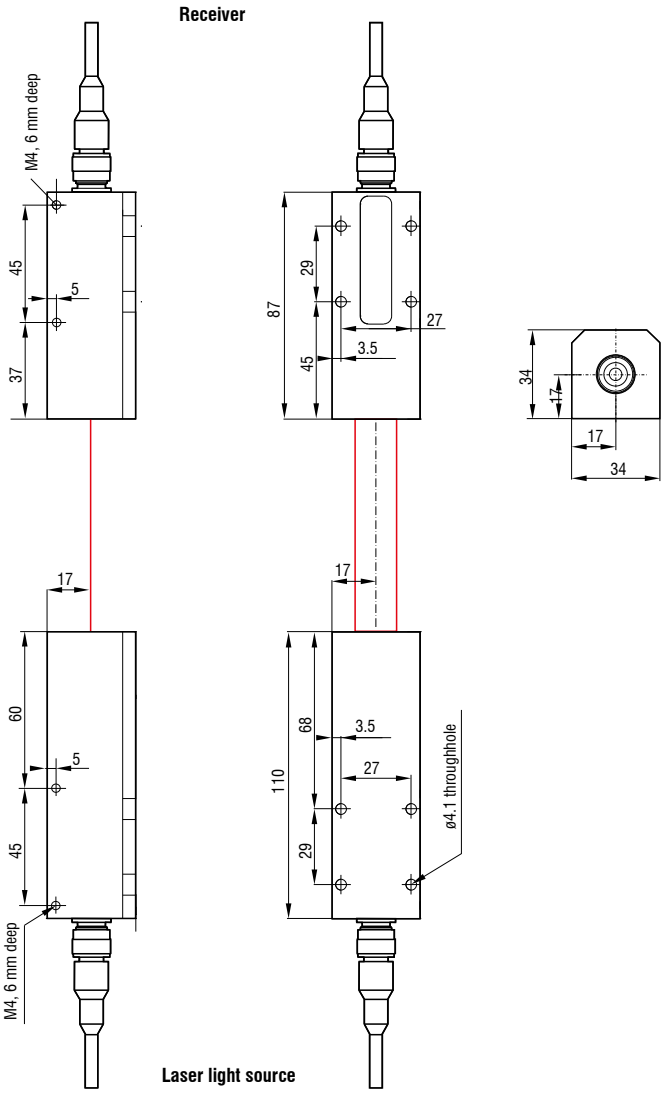
FSO = Full Scale Output
The specified data apply for a constant room temperature of 20 °C after a warm-up period of 180 min, in the range 10 ... 90 %
of the analog output at a distance of 150 mm between light source and receiver without ambient light effect.
Analog offset if laser beam is covered without ambient light < 0.05 V
[1] Linearity and resolution decrease with larger distances.
[2] Applies in the mid of the measuring range for distance: target - receiver 20 mm; distance: light source - receiver 150 mm.
[3] For gap measurement 50 ... 400 µm, an option is available with a regulated controller for transmitted light operation and measurement distance up to 700 mm.
[4] The specified values apply at ±2 sigma
[5] Measured in the mid of the measuring range with static noise over 3 min.
[6] With direct or indirect irradiation, shadowing from daylight increases the stability of the measurement
[7] Connection via interface module (see accessories)

Compact high-speed micrometers
optoCONTROL 1200/1201

optoCONTROL 1200

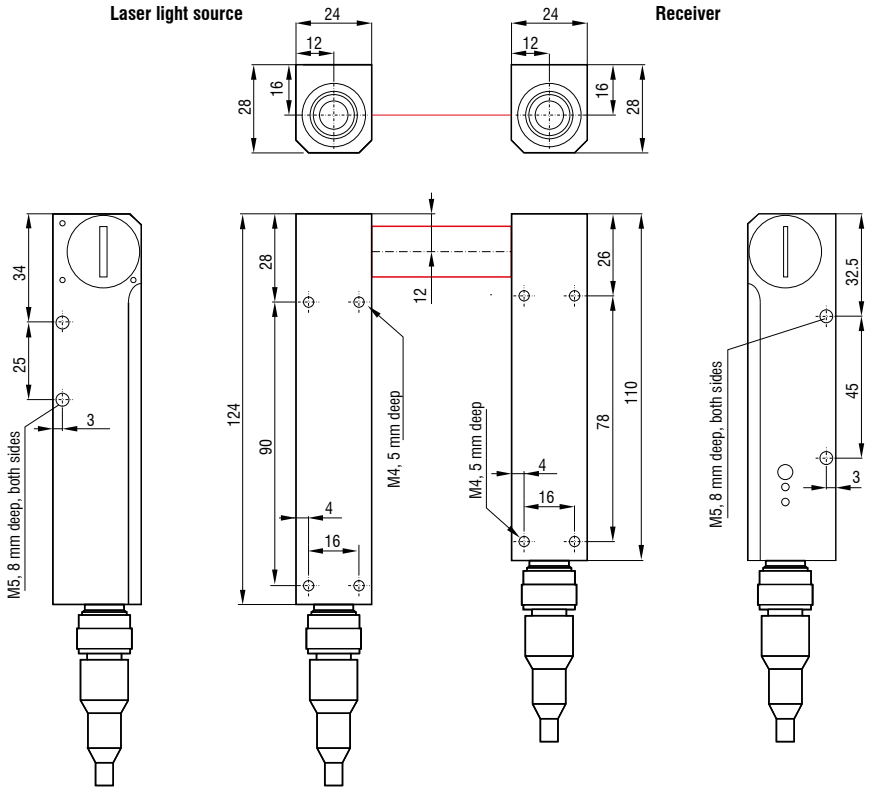


optoCONTROL 1201



(dimensions in mm, not to scale)

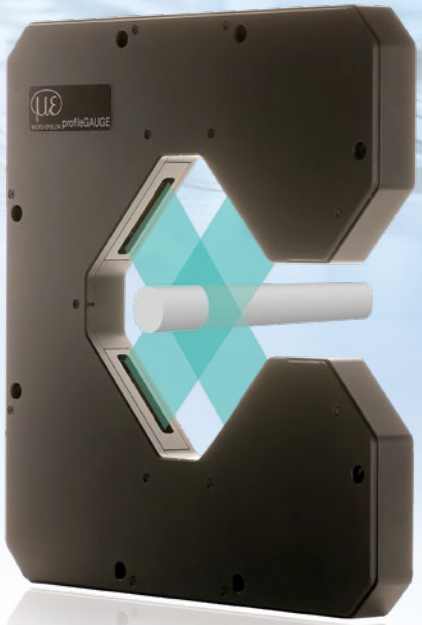
optoCONTROL 1200/90



(dimensions in mm, not to scale)

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.

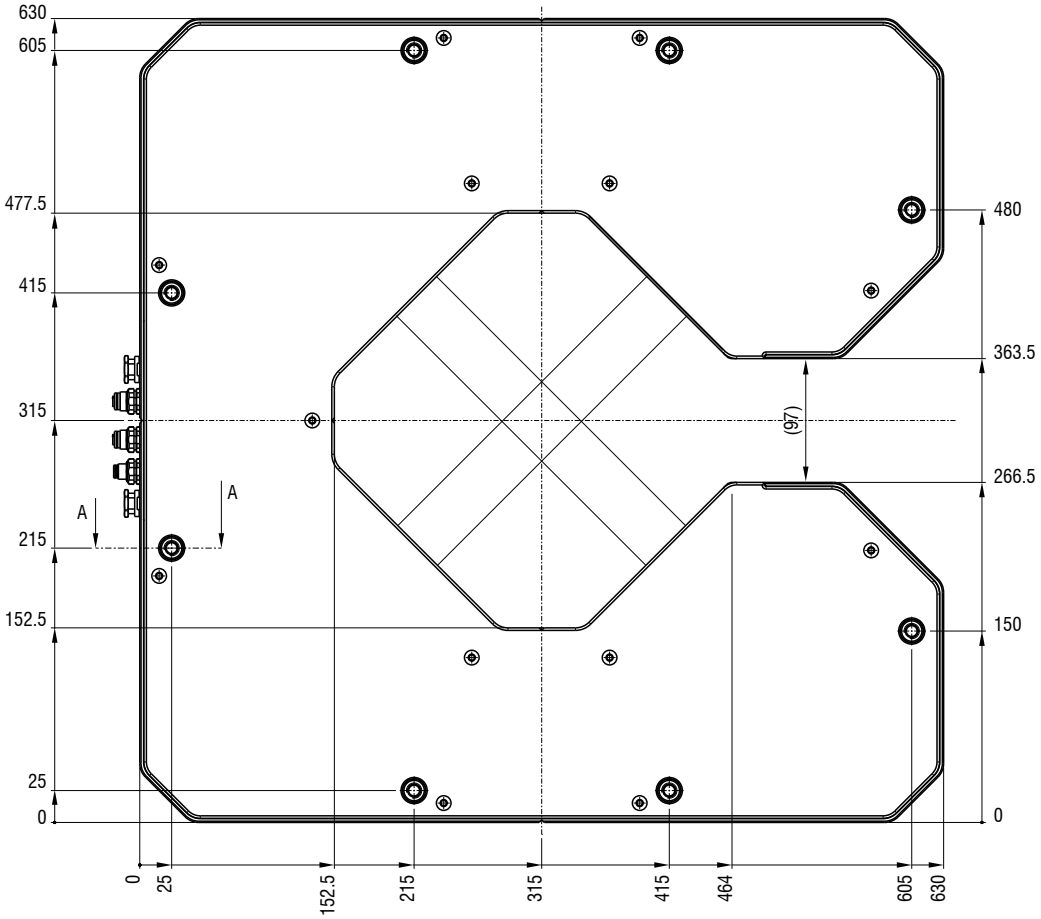
[7] Measured with 2 mm testing pin at a measurement distance of 150 mm in measuring field 1 (Z=±0.5 mm) linearity ≤ 0,5, in measuring field 2 (Z=±1.5 mm) linearity ≤ 1 µm, in measuring field 3 (Z=±2.5 mm) linearity ≤ 2,5 µm

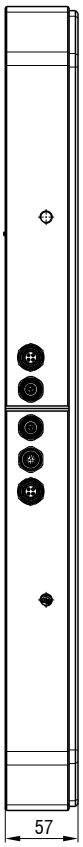
[8] Measured with 2 mm testing pin at a measurement distance of 150 mm in measuring field 1 (Z=±2.5 mm). In measuring field 2 (Z=±10 mm) linearity ≤ 3 µm - 95% confidence interval

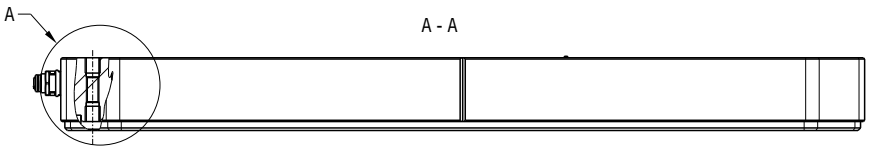
[9] EtherCAT, PROFINET, and EtherNet/IP: Connection via interface module (see accessories) or directly in the sensor "on board" as an alternative to Ethernet on request

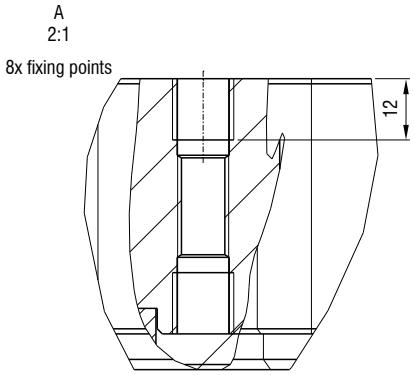
[10] Relative humidity % 5 ... 95 (non-condensing)

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









(dimensions in mm, not to scale)

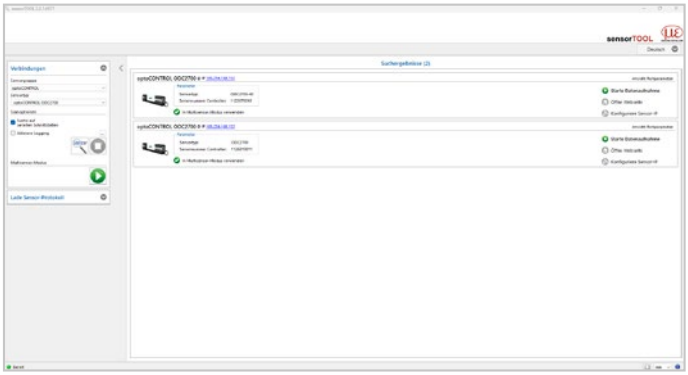
Interface modules and accessories
optoCONTROL

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.



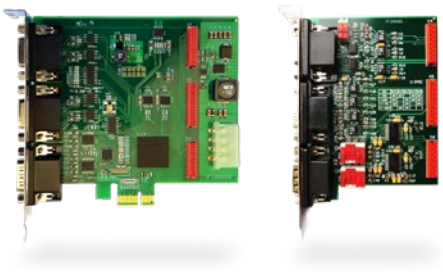
Interface modules

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	⊘	✔	✔

IF2008PCIe/IF2008E

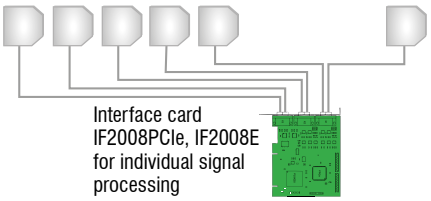
Interface card for synchronous data acquisition

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

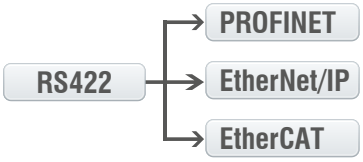
Interface module for Industrial Ethernet connection

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

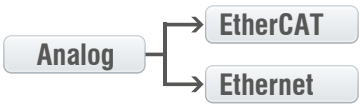
With the IF1032/ETH interface module, the proven operating concept with web interface is now also available for optical micrometers with analog interfaces. Measurement data can be conveniently displayed on a PC via the Ethernet interface. In addition, optical micrometers can be connected to an EtherCAT 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

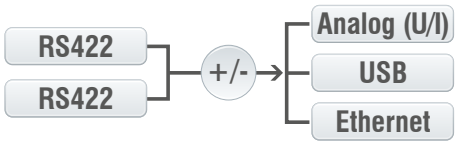


Interface modules and accessories
optoCONTROL

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